ARM Group LLC
Engineers and Scientists

February 14, 2022

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
Third 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 Third Quarter 2021 water quality monitoring results for Creswell Landfill (CWLF). As part of this evaluation, ARM reviewed the historic and Third 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 Third Quarter 2021 were analyzed for quarterly Form 19 parameters. The following narrative provides a summary of noteworthy observations of the results for the Third 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 (Third 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. In the Third Quarter 2021 sampling results, field specific conductance was identified as an outlier and was subsequently removed from the UPL process.

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 Third 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 Third 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 – MP-1 is the upgradient well from which the statistical background standards are calculated. Field specific conductance (SpC [f]) was observed above statistical background levels in the Third Quarter 2021 results. SpC appears to be stable over time apart from short-term fluctuations. pH appears to have a slightly increasing long-term trend.

- MP-2 – Parameters noted above background in this well include alkalinity (bicarbonate and total), calcium, chloride, magnesium, manganese, sodium, SpC (field and lab [f/l]), sulfate, total dissolved solids (TDS), total organic carbon (TOC). Many of these parameters appear to be slowly increasing over time, with the exception of calcium which appears to be decreasing.

  Additionally, 1,1-dichloroethane was detected but does not meet the criteria for calculating a statistical background standard due to a lack of historical upgradient detections. Concentrations appear to be stable over time. VOC trend plots are included in **Attachment 3.** pH appears to mimic the trend observed in the upgradient well at levels approximately 0.45 unit higher, on average, while fluctuating over a slightly wider range.

- MP-3 – Parameters noted above background in this well include alkalinity (bicarbonate and total), calcium, chloride, sodium, sulfate, and SpC (f). Concentrations of all noted parameters appear to be either stable or decreasing since 2018 except for sodium, which appears to be decreasing over time with short-term fluctuations.

  Additionally, 1,1-dichloroethane was detected but does not meet the criteria for calculating a statistical background standard due to a lack of historical upgradient detections. Concentrations appear to be decreasing over time. VOC trend plots are included in **Attachment 3.** pH appears to mimic the trend observed in the upgradient well at levels approximately 0.30 unit higher, on average.

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

- MP-5 – Parameters noted above background in this well include alkalinity (bicarbonate and total), chloride, sodium, and SpC (f/l), and sulfate. Alkalinity and sulfate concentrations appear to be slowly increasing over time. Concentrations of the other noted parameters appear to be either stable or decreasing, apart from short-term fluctuations, since approximately 2010. pH appears to be stable over time with a long-term average value approximately 0.22 unit higher than background.

- MP-7 – Parameters noted above background in this well include ammonia-N, alkalinity (bicarbonate and total), chloride, sodium, SpC (f/l), sulfate, and TDS. Alkalinity and sulfate concentrations appear to be increasing over time with short-term fluctuations. Ammonia-N, chloride, sodium, SpC, and TDS concentrations appear to be either stable or decreasing since

approximately 2009. pH appears to be stable over time with a long-term average value approximately 0.19 unit higher than background.

- MP-8 –Parameters noted above background in this well include ammonia-N, alkalinity (bicarbonate and total), calcium, chemical oxygen demand (COD), iron, magnesium, manganese, potassium, sodium, SpC (f/l), sulfate, TDS, and TOC. Ammonia-N concentrations appear to be slowly increasing since approximately 2010. Concentrations of the other noted parameters appear to be stable or decreasing over time, apart from short-term fluctuations.

  Additionally, benzene and 1,1-dichloroethane were detected but do not meet the criteria for calculating a statistical background standard due to a lack of historical upgradient detections. Concentrations of these VOCs appear to be stable over time. VOC trend plots are included in **Attachment 3.** pH appears to mimic the trend observed in the upgradient well at levels approximately 0.78 unit higher, on average, while fluctuating over a slightly narrower range.

- MP-9 – Parameters noted above background in this well include ammonia-N, alkalinity (bicarbonate and total), calcium, COD, iron, magnesium, manganese, potassium, sodium, SpC (f/l), sulfate, TDS, and TOC. All parameters noted above background appear to be increasing over time except alkalinity, which appears to be stable over time, apart from short-term fluctuations.

  Additionally, benzene and 1,1-dichloroethane were detected but do not meet the criteria for calculating a statistical background standard due to a lack of historical upgradient detections. Concentrations of these VOCs appear to be stable over time. VOC trend plots are included in **Attachment 3.** pH appears to be slightly decreasing over time with a long-term average value approximately 0.92 unit higher than background.

- MP-10 – Parameters noted above background in this well include ammonia-N, alkalinity (bicarbonate and total), calcium, chloride, magnesium, manganese, potassium, sodium, SpC (f/l), sulfate, TDS, and TOC. Ammonia-N and TOC concentrations appear to be decreasing over time. Concentrations of all other noted parameters appear to have a stable long-term trend while fluctuating across relatively wide ranges. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.28 units higher, on average.

- MP-12 – Parameters noted above background in this well include ammonia-N, alkalinity (bicarbonate and total), calcium, chloride, iron, manganese, SpC (f), sulfate, and turbidity. Turbidity levels appear to be fluctuating rapidly between approximately 1-1,300 NTU since 2013. Iron and TOC concentrations appear to have stable long-term trends but fluctuate across relatively wide ranges. Manganese concentrations appear to be decreasing over time. Concentrations of all other noted parameters appear to be stable over time apart from short-term fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.69 units higher, on average.

- MP-16 – Parameters noted above background in this well include alkalinity (bicarbonate and total), and sulfate. Alkalinity concentrations appear to be stable over time, and sulfate

concentrations appear to be decreasing since approximately 2012. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.67 units higher, on average.

- 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 also be interpreted, to some extent, as a background evaluation point for evaluating downstream conditions in Mann's Run (i.e., at MP-18S).

  Parameters noted above background at MP-17S include ammonia-N, alkalinity (bicarbonate and total), calcium, chloride, iron, magnesium, manganese, nitrate-N, potassium, sodium, SpC (f/l), sulfate, TDS, and TOC. TOC concentrations appear to be decreasing over time, while concentrations of the other noted parameters appear to be increasing over time and fluctuating across a relatively wide range of values. The apparently anomalous sodium concentration observed in the previous quarter (4,160 mg/L) appears to be confirmed as an anomaly based on the Third Quarter 2021 result (407 mg/L), which appears to be within the historical concentration range. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.01 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 noted above background at MP-18S include alkalinity (bicarbonate and total), calcium, COD, chloride, magnesium, potassium, sodium, SpC (f/l), sulfate, TDS, and TOC. TOC concentrations appear to be stable over time. Concentrations of the other noted parameters appear to be increasing over time and fluctuating across a relatively wide range of values. The apparently anomalous sodium concentration observed in the previous quarter (2,680 mg/L) appears to be confirmed as an anomaly based on the Third Quarter 2021 result (320 mg/L), which appears to be within the historical concentration range. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.47 units higher, on average. In general, the water quality observed at MP-18S appears similar to the historical observations from MP-17S.

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 statistical background levels.

Overall, the groundwater quality at CWLF appears to be improving, especially with respect to VOC concentrations. Some metal and ion concentrations (e.g., calcium, sodium, and chloride) appear to be increasing slowly in some wells over time, but these water quality changes are generally gradual with the exception of a few noted abrupt increases. 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 July 19, 2021. Both blank samples were analyzed for VOCs only. Laboratory analyses were completed on July 21, 2021. No VOCs were detected in either blank sample, and all surrogate recoveries were within acceptable ranges.

Additionally, one (1) trip blank sample and one (1) field blank sample were received by the laboratory on July 22, 2021. Both blank samples were analyzed for VOCs. The field blank was also analyzed for wet chemistry and metal parameters. Laboratory analyses were completed between July 23, 2021 and August 4, 2021. In the field blank sample, SpC was detected at 1 µmho/cm, turbidity at 0.13 NTU, and pH at 5.45 units. No metals were detected in the field blank sample. Methylene chloride was detected at 3.0 µg/L in the field blank sample. No VOCs were detected in the trip blank sample, and all surrogate recoveries were within acceptable ranges.

Closing

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

Sincerely,
ARM Group LLC

Gillian Green

Gillian Green
Staff Geologist

Ryan A. Brandon

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 - 3rd 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	µg/L	0.116	< 0.100	< 0.100	< 0.100	< 0.100	0.188	7.16	28.0	< 0.100	< 0.100	< 0.100	0.408	< 0.100
BICARBONATE	8	µg/L	7	125	22	31	19	239	436	472	367	86	11	456	336
CALCIUM, TOTAL	19.9	µg/L	14.8	51.8	22.2	18.7	13.6	19.4	74.6	163	74.9	32.0	5.7	84.3	84.8
COD (CHEMICAL OXYGEN DEMAND)	12**	µg/L	< 15	< 15	< 15	< 15	< 15	< 15	32	105	< 15	< 15	< 15	< 15	< 15
CHLORIDE	32.6	µg/L	27.3	102	62.5	46.1	56.3	67.3	62.7	645	598	34.7	3.1	794	644
FLUORIDE	0.20*	mg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.50	< 0.50
IRON, TOTAL	3.3	mg/L	0.56	< 0.067	< 0.067	< 0.067	< 0.067	< 0.067	28.7	37.1	0.30	16.2	2.0	0.27	0.11
MAGNESIUM, TOTAL	12.5	µg/L	10.7	16.8	8.5	6.8	7.4	10.1	36.7	77.9	68.6	9.4	1.5	87.8	74.9
MANGANESE, TOTAL	0.12	mg/L	0.055	1.1	0.0061	0.0083	0.050	0.0077	17.4	12.9	0.38	0.32	0.015	0.14	< 0.0056
NITRATE-NITROGEN	23.5	mg/L	18.7	4.3	7.0	5.7	8.3	10.0	< 0.20	< 0.20	16.3	7.9	2.1	25.4	17.4
pH-FIELD	None***	mg/L	5.15	5.60	5.24	5.32	5.08	5.02	5.91	6.06	6.67	5.91	5.31	7.93	8.47
pH-LAB	None***	µg/L	5.50	6.18	5.91	6.09	5.64	5.64	6.68	6.68	7.18	6.57	6.20	8.05	8.47
POTASSIUM, TOTAL	2.9	mg/L	2.4	2.9	1.7	1.4	2.1	2.4	10.1	36.0	17.3	1.4	< 0.56	19.2	22.1
SODIUM, TOTAL	15.6	µg/L	13.0	29.7	20.2	15.8	29.9	33.8	53.3	180	295	13.8	3.4	407	320
SPEC. COND., FIELD	327	mg/L	369	760	434	354	426	533	1,467	4,020	3,409	467	91	5,119	3,768
SPEC. COND., LAB	298	mg/L	224	530	279	228	254	324	887	2,210	2,190	283	57	3,120	2,550
SULFATE	3.0	mg/L	2.3	21.7	5.2	5.9	4.9	20.5	5.6	6.2	44.8	5.4	9.9	93.1	57.6
ALKALINITY	7	mg/L	7	125	22	31	19	14	436	472	367	86	11	456	358
TDS (TOTAL DISSOLVED SOLIDS)	260	µg/L	208	432	258	218	212	266	520	1,230	1,310	224	57	1,710	1,480
TOC (TOTAL ORGANIC CARBON)	1.1	mg/L	< 0.50	4.2	< 0.50	0.61	< 0.50	< 0.50	12.2	34.9	6.0	0.94	< 0.50	5.4	7.0
TOTAL PHENOLICS	0.005*	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TURBIDITY	166	mg/L	6.09	5.51	2.79	1.21	0.86	0.33	20.8	37.6	0.63	183	4.54	1.32	0.58
BENZENE	1.0*	µmho/cm	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.6	2.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-DIBROMOETHANE	1.0*	µmho/cm	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHANE	1.0*	mg/L	< 1.0	12.9	1.8	< 1.0	< 1.0	< 1.0	2.6	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHENE	1.0*	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-DICHLOROETHANE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-DICHLOROETHENE	1.0*	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans 1,2-DICHLOROETHENE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
ETHYLBENZENE	1.0*	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
METHYLENE CHLORIDE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TETRACHLOROETHENE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TOLUENE	1.0*	NTU	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-TRICHLOROETHANE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TRICHLOROETHENE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
VINYL CHLORIDE	1.0*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
XYLENES (TOTAL)	3.0*	µg/L	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

Notes:

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 in the upgradient well.

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS

LCSWMA Creswell Landfill
3rd 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	19.9	mg/L
cod (chemical oxygen demand)	Normal	12**	mg/L
chloride	No Distribution	32.6	mg/L
fluoride	NA	0.20*	mg/L
iron, total	Lognormal	3.3	mg/L
magnesium, total	No Distribution	12.5	mg/L
manganese, total	No Distribution	0.12	mg/L
nitrate-nitrogen	No Distribution	23.5	mg/L
ph-field	No Distribution	None***	S.U.
ph-lab	Normal	None***	S.U.
potassium, total	Normal	2.9	mg/L
sodium, total	Normal	15.6	mg/L
spec. cond., field	Normal	327	µmhos/cm
spec. cond., lab	No Distribution	298	µmhos/cm
sulfate	Lognormal	3.0	mg/L
total alkalinity	No Distribution	7	mg/L
tds (total dissolved solids)	Normal	260	mg/L
toc (total organic carbon)	Normal	1.1	mg/L
total phenolics	NA	0.005*	mg/L
turbidity	Lognormal	166	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 5.12/12/2022 5:49:19 PM								
4		From File		2Q21 ProUCL Input rb.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	124			Number of Missing Observations	12			
15				Number of Distinct Observations	7							
16				Number of Detects	11			Number of Non-Detects	113			
17				Number of Distinct Detects	6			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	0.00124			Percent Non-Detects	91.13%			
21				Mean Detected	0.134			SD Detected	0.0352			
22				Mean of Detected Logged Data	-2.033			SD of Detected Logged Data	0.221			
23												
24					Critical Values for Background Threshold Values (BTVs)							
25				Tolerance Factor K (For UTL)	1.892			d2max (for USL)	3.281			
26												
27					Normal GOF Test on Detects Only							
28				Shapiro Wilk Test Statistic	0.696			Shapiro Wilk GOF Test				
29				5% Shapiro Wilk Critical Value	0.85			Data Not Normal at 5% Significance Level				
30				Lilliefors Test Statistic	0.293			Lilliefors GOF Test				
31				5% Lilliefors Critical Value	0.251			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	0.0139			
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)	0.135			95% KM USL	0.149			
39												
40					DL/2 Substitution Background Statistics Assuming Normal Distribution							
41				Mean	0.0575			SD	0.026			
42				95% UTL95% Coverage	0.107			95% UPL (t)	0.101			
43				90% Percentile (z)	0.0908			95% Percentile (z)	0.1			
44				99% Percentile (z)	0.118			95% USL	0.143			
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	1.068			Anderson-Darling GOF Test				
49				5% A-D Critical Value	0.729			Data Not Gamma Distributed at 5% Significance Level				
50				K-S Test Statistic	0.299			Kolmogorov-Smirnov GOF				
51				5% K-S Critical Value	0.255			Data Not Gamma Distributed at 5% Significance Level				

	A	B	C	D	E	F	G	H	I	J	K	L
52	Data Not Gamma Distributed at 5% Significance Level											
53												
54	Gamma Statistics on Detected Data Only											
55					k hat (MLE)	20.34			k star (bias corrected MLE)			14.85
56					Theta hat (MLE)	0.0066			Theta star (bias corrected MLE)			0.00903
57					nu hat (MLE)	447.4			nu star (bias corrected)			326.7
58					MLE Mean (bias corrected)	0.134						
59					MLE Sd (bias corrected)	0.0348			95% Percentile of Chisquare (2kstar)			43.41
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			0.0299
68					Maximum	0.23			Median			0.01
69					SD	0.039			CV			1.305
70					k hat (MLE)	1.095			k star (bias corrected MLE)			1.074
71					Theta hat (MLE)	0.0273			Theta star (bias corrected MLE)			0.0278
72					nu hat (MLE)	271.7			nu star (bias corrected)			266.4
73					MLE Mean (bias corrected)	0.0299			MLE Sd (bias corrected)			0.0288
74					95% Percentile of Chisquare (2kstar)	6.276			90% Percentile			0.0676
75					95% Percentile	0.0873			99% Percentile			0.133
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	0.0972	0.0971		95% Approx. Gamma UPL		0.0837	0.0826
80					95% Gamma USL	0.212	0.23					
81												
82	Estimates of Gamma Parameters using KM Estimates											
83					Mean (KM)	0.103			SD (KM)			0.0139
84					Variance (KM)	1.9448E-4			SE of Mean (KM)			0.00131
85					k hat (KM)	54.58			k star (KM)			53.27
86					nu hat (KM)	13537			nu star (KM)			13211
87					theta hat (KM)	0.00189			theta star (KM)			0.00193
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	0.771			Shapiro Wilk GOF Test			
99					5% Shapiro Wilk Critical Value	0.85			Data Not Lognormal at 5% Significance Level			
100					Lilliefors Test Statistic	0.289			Lilliefors GOF Test			
101					5% Lilliefors Critical Value	0.251			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	0.051				Mean in Log Scale	-3.168	
106					SD in Original Scale	0.0345				SD in Log Scale	0.625	
107					95% UTL95% Coverage	0.137				95% BCA UTL95% Coverage	0.14	
108					95% Bootstrap (%) UTL95% Coverage	0.14				95% UPL (t)	0.119	
109					90% Percentile (z)	0.0937				95% Percentile (z)	0.118	
110					99% Percentile (z)	0.18				95% USL	0.327	
111												
112	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
113					KM Mean of Logged Data	-2.279				95% KM UTL (Lognormal)95% Coverage	0.124	
114					KM SD of Logged Data	0.0989				95% KM UPL (Lognormal)	0.121	
115					95% KM Percentile Lognormal (z)	0.121				95% KM USL (Lognormal)	0.142	
116												
117	**Background DL/2 Statistics Assuming Lognormal Distribution**											
118					Mean in Original Scale	0.0575				Mean in Log Scale	-2.91	
119					SD in Original Scale	0.026				SD in Log Scale	0.282	
120					95% UTL95% Coverage	0.0928				95% UPL (t)	0.087	
121					90% Percentile (z)	0.0781				95% Percentile (z)	0.0866	
122					99% Percentile (z)	0.105				95% USL	0.137	
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	121				95% UTL with95% Coverage	0.14	
130					Approx, f used to compute achieved CC	1.592				Approximate Actual Confidence Coefficient achieved by UTL	0.872	
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	121				Number of Missing Observations	15	
144					Number of Distinct Observations	21						
145					Number of Detects	79				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	1.263				Percent Non-Detects	34.71%	
150					Mean Detected	6.313				SD Detected	1.124	
151					Mean of Detected Logged Data	1.828				SD of Detected Logged Data	0.173	
152												
153	**Critical Values for Background Threshold Values (BTVs)**											

154					Tolerance Factor K (For UTL)	1.896				d2max (for USL)		3.273
155												
156					**Normal GOF Test on Detects Only**							
157					Shapiro Wilk Test Statistic	0.892	**Normal GOF Test on Detected Observations Only**					
158					5% Shapiro Wilk P Value	1.8135E-7	Data Not Normal at 5% Significance Level					
159					Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**					
160					5% Lilliefors Critical Value	0.0998	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	5.758				KM SD		1.183
165					95% UTL95% Coverage	7.999				95% KM UPL (t)		7.726
166					90% KM Percentile (z)	7.273				95% KM Percentile (z)		7.703
167					99% KM Percentile (z)	8.509				95% KM USL		9.629
168												
169					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
170					Mean	4.995				SD		2.029
171					95% UTL95% Coverage	8.841				95% UPL (t)		8.372
172					90% Percentile (z)	7.595				95% Percentile (z)		8.332
173					99% Percentile (z)	9.714				95% USL		11.64
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	2.832	**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	0.225	**Kolmogorov-Smirnov GOF**					
180					5% K-S Critical Value	0.1	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)	33.45				k star (bias corrected MLE)		32.19
185					Theta hat (MLE)	0.189				Theta star (bias corrected MLE)		0.196
186					nu hat (MLE)	5285				nu star (bias corrected)		5085
187					MLE Mean (bias corrected)	6.313						
188					MLE Sd (bias corrected)	1.113				95% Percentile of Chisquare (2kstar)		84.1
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	2.344				Mean		5.516
197					Maximum	9.5				Median		5.1
198					SD	1.472				CV		0.267
199					k hat (MLE)	13.81				k star (bias corrected MLE)		13.47
200					Theta hat (MLE)	0.399				Theta star (bias corrected MLE)		0.409
201					nu hat (MLE)	3342				nu star (bias corrected)		3261
202					MLE Mean (bias corrected)	5.516				MLE Sd (bias corrected)		1.503
203					95% Percentile of Chisquare (2kstar)	40.05				90% Percentile		7.509
204					95% Percentile	8.198				99% Percentile		9.6

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				8.671	8.738	95% Approx. Gamma UPL				8.214	8.259
209	95% Gamma USL				11.75	12.04						
210												
211	**Estimates of Gamma Parameters using KM Estimates**											
212	Mean (KM)				5.758		SD (KM)				1.183	
213	Variance (KM)				1.398		SE of Mean (KM)				0.108	
214	k hat (KM)				23.71		k star (KM)				23.13	
215	nu hat (KM)				5737		nu star (KM)				5596	
216	theta hat (KM)				0.243		theta star (KM)				0.249	
217	80% gamma percentile (KM)				6.734		90% gamma percentile (KM)				7.336	
218	95% gamma percentile (KM)				7.858		99% gamma percentile (KM)				8.903	
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				8.074	8.086	95% Approx. Gamma UPL				7.752	7.757
224	95% KM Gamma Percentile				7.725	7.73	95% Gamma USL				10.18	10.27
225												
226	**Lognormal GOF Test on Detected Observations Only**											
227	Shapiro Wilk Approximate Test Statistic				0.902		**Shapiro Wilk GOF Test**					
228	5% Shapiro Wilk P Value				1.3673E-6		Data Not Lognormal at 5% Significance Level					
229	Lilliefors Test Statistic				0.215		**Lilliefors GOF Test**					
230	5% Lilliefors Critical Value				0.0998		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				5.595		Mean in Log Scale				1.692	
235	SD in Original Scale				1.373		SD in Log Scale				0.244	
236	95% UTL95% Coverage				8.622		95% BCA UTL95% Coverage				8	
237	95% Bootstrap (%) UTL95% Coverage				8.1		95% UPL (t)				8.15	
238	90% Percentile (z)				7.424		95% Percentile (z)				8.111	
239	99% Percentile (z)				9.576		95% USL				12.06	
240												
241	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
242	KM Mean of Logged Data				1.731		95% KM UTL (Lognormal)95% Coverage				8.128	
243	KM SD of Logged Data				0.192		95% KM UPL (Lognormal)				7.775	
244	95% KM Percentile Lognormal (z)				7.746		95% KM USL (Lognormal)				10.59	
245												
246	**Background DL/2 Statistics Assuming Lognormal Distribution**											
247	Mean in Original Scale				4.995		Mean in Log Scale				1.513	
248	SD in Original Scale				2.029		SD in Log Scale				0.455	
249	95% UTL95% Coverage				10.76		95% UPL (t)				9.685	
250	90% Percentile (z)				8.137		95% Percentile (z)				9.599	
251	99% Percentile (z)				13.09		95% USL				20.13	
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	118				95% UTL with95% Coverage	8.1	
259					Approx, f used to compute achieved CC	1.553				Approximate Actual Confidence Coefficient achieved by UTL	0.86	
260					Approximate Sample Size needed to achieve specified CC	153				95% UPL	8	
261					95% USL	9.5				95% KM Chebyshev UPL	10.93	
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	62				Number of Distinct Observations	32	
273										Number of Missing Observations	74	
274					Minimum	12				First Quartile	14.08	
275					Second Largest	20.1				Median	15.3	
276					Maximum	21				Third Quartile	17.38	
277					Mean	16.02				SD	2.171	
278					Coefficient of Variation	0.135				Skewness	0.362	
279					Mean of logged Data	2.765				SD of logged Data	0.134	
280												
281	**Critical Values for Background Threshold Values (BTVs)**											
282					Tolerance Factor K (For UTL)	2.01				d2max (for USL)	3.039	
283												
284	**Normal GOF Test**											
285					Shapiro Wilk Test Statistic	0.946				**Normal GOF Test**		
286					5% Shapiro Wilk P Value	0.0168				Data Not Normal at 5% Significance Level		
287					Lilliefors Test Statistic	0.149				**Lilliefors GOF Test**		
288					5% Lilliefors Critical Value	0.112				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	20.38				90% Percentile (z)	18.8	
293					95% UPL (t)	19.68				95% Percentile (z)	19.59	
294					95% USL	22.62				99% Percentile (z)	21.07	
295												
296	**Gamma GOF Test**											
297					A-D Test Statistic	0.971				**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	0.139				**Kolmogorov-Smirnov Gamma GOF Test**		
300					5% K-S Critical Value	0.113				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)	56.25				k star (bias corrected MLE)	53.54	
305					Theta hat (MLE)	0.285				Theta star (bias corrected MLE)	0.299	
306					nu hat (MLE)	6975				nu star (bias corrected)	6638	

307	MLE Mean (bias corrected)					16.02	MLE Sd (bias corrected)					2.19
308												
309	**Background Statistics Assuming Gamma Distribution**											
310	95% Wilson Hilferty (WH) Approx. Gamma UPL					19.82	90% Percentile					18.88
311	95% Hawkins Wixley (HW) Approx. Gamma UPL					19.84	95% Percentile					19.78
312	95% WH Approx. Gamma UTL with 95% Coverage					20.64	99% Percentile					21.55
313	95% HW Approx. Gamma UTL with 95% Coverage					20.68						
314	95% WH USL					23.38	95% HW USL					23.49
315												
316	**Lognormal GOF Test**											
317	Shapiro Wilk Test Statistic					0.955	**Shapiro Wilk Lognormal GOF Test**					
318	5% Shapiro Wilk P Value					0.0502	Data appear Lognormal at 5% Significance Level					
319	Lilliefors Test Statistic					0.132	**Lilliefors Lognormal GOF Test**					
320	5% Lilliefors Critical Value					0.112	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					20.8	90% Percentile (z)					18.86
325	95% UPL (t)					19.91	95% Percentile (z)					19.8
326	95% USL					23.88	99% Percentile (z)					21.7
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					61	95% UTL with 95% Coverage					20.1
333	Approx, f used to compute achieved CC					1.605	Approximate Actual Confidence Coefficient achieved by UTL					0.823
334							Approximate Sample Size needed to achieve specified CC					93
335	95% Percentile Bootstrap UTL with 95% Coverage					20.1	95% BCA Bootstrap UTL with 95% Coverage					20.1
336	95% UPL					20.04	90% Percentile					19.17
337	90% Chebyshev UPL					22.59	95% Percentile					19.7
338	95% Chebyshev UPL					25.56	99% Percentile					20.45
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					95	Number of Distinct Observations					43
351							Number of Missing Observations					40
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					15.89	SD					2.21
356	Coefficient of Variation					0.139	Skewness					-0.321
357	Mean of logged Data					2.756	SD of logged Data					0.145

	A	B	C	D	E	F	G	H	I	J	K	L
358												
359	**Critical Values for Background Threshold Values (BTVs)**											
360					Tolerance Factor K (For UTL)	1.932				d2max (for USL)		3.192
361												
362	**Normal GOF Test**											
363					Shapiro Wilk Test Statistic	0.95	**Normal GOF Test**					
364					5% Shapiro Wilk P Value	0.00384	Data Not Normal at 5% Significance Level					
365					Lilliefors Test Statistic	0.117	**Lilliefors GOF Test**					
366					5% Lilliefors Critical Value	0.0911	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	20.16				90% Percentile (z)		18.72
371					95% UPL (t)	19.58				95% Percentile (z)		19.53
372					95% USL	22.95				99% Percentile (z)		21.03
373												
374	**Gamma GOF Test**											
375					A-D Test Statistic	1.784	**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	0.133	**Kolmogorov-Smirnov Gamma GOF Test**					
378					5% K-S Critical Value	0.0916	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)	49.78				k star (bias corrected MLE)		48.22
383					Theta hat (MLE)	0.319				Theta star (bias corrected MLE)		0.33
384					nu hat (MLE)	9459				nu star (bias corrected)		9162
385					MLE Mean (bias corrected)	15.89				MLE Sd (bias corrected)		2.289
386												
387	**Background Statistics Assuming Gamma Distribution**											
388					95% Wilson Hilferty (WH) Approx. Gamma UPL	19.86				90% Percentile		18.89
389					95% Hawkins Wixley (HW) Approx. Gamma UPL	19.9				95% Percentile		19.83
390				95% WH Approx. Gamma UTL with	95% Coverage	20.55				99% Percentile		21.69
391				95% HW Approx. Gamma UTL with	95% Coverage	20.61						
392					95% WH USL	24.13				95% HW USL		24.32
393												
394	**Lognormal GOF Test**											
395					Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**					
396					5% Shapiro Wilk P Value	1.6460E-4	Data Not Lognormal at 5% Significance Level					
397					Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**					
398					5% Lilliefors Critical Value	0.0911	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	20.81				90% Percentile (z)		18.94
403					95% UPL (t)	20.03				95% Percentile (z)		19.96
404					95% USL	24.97				99% Percentile (z)		22.03
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	93				95% UTL with 95% Coverage		19.4
411					Approx, f used to compute achieved CC	1.632				Approximate Actual Confidence Coefficient achieved by UTL		0.859
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		19.47
414					95% UPL	19.2				90% Percentile		18.5
415					90% Chebyshev UPL	22.56				95% Percentile		19.13
416					95% Chebyshev UPL	25.57				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	132				Number of Missing Observations		4
429					Number of Distinct Observations	9						
430					Number of Detects	6				Number of Non-Detects		126
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		95.45%
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)	1.884				d2max (for USL)		3.302
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	5.74				KM SD		3.596
450					95% UTL95% Coverage	12.51				95% KM UPL (t)		11.72
451					90% KM Percentile (z)	10.35				95% KM Percentile (z)		11.66
452					99% KM Percentile (z)	14.11				95% KM USL		17.61
453												
454	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
455					Mean	8.489				SD		4.093
456					95% UTL95% Coverage	16.2				95% UPL (t)		15.29
457					90% Percentile (z)	13.73				95% Percentile (z)		15.22
458					99% Percentile (z)	18.01				95% USL		22
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**											
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					1.537
482				Maximum		31	Median					0.01
483				SD		4.96	CV					3.228
484				k hat (MLE)		0.186	k star (bias corrected MLE)					0.187
485				Theta hat (MLE)		8.261	Theta star (bias corrected MLE)					8.225
486				nu hat (MLE)		49.11	nu star (bias corrected)					49.33
487				MLE Mean (bias corrected)		1.537	MLE Sd (bias corrected)					3.555
488				95% Percentile of Chisquare (2kstar)		1.959	90% Percentile					4.642
489				95% Percentile		8.057	99% Percentile					17.56
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	5.549	4.786	95% Approx. Gamma UPL				4.253	3.494
494				95% Gamma USL	20.43	23.28						
495												
496	**Estimates of Gamma Parameters using KM Estimates**											
497				Mean (KM)		5.74	SD (KM)					3.596
498				Variance (KM)		12.93	SE of Mean (KM)					0.375
499				k hat (KM)		2.548	k star (KM)					2.495
500				nu hat (KM)		672.8	nu star (KM)					658.8
501				theta hat (KM)		2.253	theta star (KM)					2.3
502				80% gamma percentile (KM)		8.371	90% gamma percentile (KM)					10.61
503				95% gamma percentile (KM)		12.72	99% gamma percentile (KM)					17.33
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	10.06	9.8	95% Approx. Gamma UPL				9.417	9.184
509				95% KM Gamma Percentile	9.366	9.135	95% Gamma USL				14.85	14.52
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	2.375	Mean in Log Scale	-0.0948				
520					SD in Original Scale	4.634	SD in Log Scale	1.384				
521					95% UTL95% Coverage	12.34	95% BCA UTL95% Coverage	12.55				
522					95% Bootstrap (%) UTL95% Coverage	12.55	95% UPL (t)	9.085				
523					90% Percentile (z)	5.36	95% Percentile (z)	8.862				
524					99% Percentile (z)	22.76	95% USL	87.8				
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	9.113				
528					KM SD of Logged Data	0.281	95% KM UPL (Lognormal)	8.565				
529					95% KM Percentile Lognormal (z)	8.522	95% KM USL (Lognormal)	13.57				
530												
531	**Background DL/2 Statistics Assuming Lognormal Distribution**											
532					Mean in Original Scale	8.489	Mean in Log Scale	2.023				
533					SD in Original Scale	4.093	SD in Log Scale	0.516				
534					95% UTL95% Coverage	19.99	95% UPL (t)	17.83				
535					90% Percentile (z)	14.65	95% Percentile (z)	17.67				
536					99% Percentile (z)	25.12	95% USL	41.55				
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	129	95% UTL with95% Coverage	20				
544					Approx, f used to compute achieved CC	1.697	Approximate Actual Confidence Coefficient achieved by UTL	0.901				
545					Approximate Sample Size needed to achieve specified CC	153	95% UPL	20				
546					95% USL	31	95% KM Chebyshev UPL	21.47				
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	134	Number of Missing Observations	2				
558					Number of Distinct Observations	66						
559					Number of Detects	131	Number of Non-Detects	3				
560					Number of Distinct Detects	65	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	19.5				Percent Non-Detects		2.239%
564					Mean Detected	25.12				SD Detected		4.416
565					Mean of Detected Logged Data	3.207				SD of Detected Logged Data		0.187
566												
567					**Critical Values for Background Threshold Values (BTVs)**							
568					Tolerance Factor K (For UTL)	1.882				d2max (for USL)		3.307
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	0.00111	Data Not Normal at 5% Significance Level					
573					Lilliefors Test Statistic	0.0948	**Lilliefors GOF Test**					
574					5% Lilliefors Critical Value	0.0778	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	25				KM SD		4.471
579					95% UTL95% Coverage	33.41				95% KM UPL (t)		32.43
580					90% KM Percentile (z)	30.73				95% KM Percentile (z)		32.35
581					99% KM Percentile (z)	35.4				95% KM USL		39.78
582												
583					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
584					Mean	24.85				SD		4.766
585					95% UTL95% Coverage	33.82				95% UPL (t)		32.78
586					90% Percentile (z)	30.96				95% Percentile (z)		32.69
587					99% Percentile (z)	35.94				95% USL		40.61
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	1.724	**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	0.12	**Kolmogorov-Smirnov GOF**					
594					5% K-S Critical Value	0.0812	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)	30.34				k star (bias corrected MLE)		29.65
599					Theta hat (MLE)	0.828				Theta star (bias corrected MLE)		0.847
600					nu hat (MLE)	7950				nu star (bias corrected)		7769
601					MLE Mean (bias corrected)	25.12						
602					MLE Sd (bias corrected)	4.612				95% Percentile of Chisquare (2kstar)		78.29
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		25.02
611					Maximum	33.2				Median		25.5
612					SD	4.438				CV		0.177

613					k hat (MLE)	29.91				k star (bias corrected MLE)		29.25
614					Theta hat (MLE)	0.836				Theta star (bias corrected MLE)		0.855
615					nu hat (MLE)	8017				nu star (bias corrected)		7839
616					MLE Mean (bias corrected)	25.02				MLE Sd (bias corrected)		4.626
617					95% Percentile of Chisquare (2kstar)	77.35				90% Percentile		31.1
618					95% Percentile	33.08				99% Percentile		37.02
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		34.35	34.51			95% Approx. Gamma UPL		33.12	33.23
623			95% Gamma USL		43.08	43.67						
624												
625	**Estimates of Gamma Parameters using KM Estimates**											
626					Mean (KM)	25				SD (KM)		4.471
627					Variance (KM)	19.99				SE of Mean (KM)		0.389
628					k hat (KM)	31.26				k star (KM)		30.57
629					nu hat (KM)	8379				nu star (KM)		8193
630					theta hat (KM)	0.8				theta star (KM)		0.818
631					80% gamma percentile (KM)	28.7				90% gamma percentile (KM)		30.94
632					95% gamma percentile (KM)	32.87				99% gamma percentile (KM)		36.7
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		34.42	34.58			95% Approx. Gamma UPL		33.18	33.3
638			95% KM Gamma Percentile		33.08	33.2			95% Gamma USL		43.26	43.86
639												
640	**Lognormal GOF Test on Detected Observations Only**											
641					Shapiro Wilk Approximate Test Statistic	0.931	**Shapiro Wilk GOF Test**					
642					5% Shapiro Wilk P Value	3.9654E-7	Data Not Lognormal at 5% Significance Level					
643					Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**					
644					5% Lilliefors Critical Value	0.0778	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	25.01				Mean in Log Scale		3.203
649					SD in Original Scale	4.441				SD in Log Scale		0.188
650					95% UTL95% Coverage	35.04				95% BCA UTL95% Coverage		32.67
651					95% Bootstrap (%) UTL95% Coverage	32.67				95% UPL (t)		33.62
652					90% Percentile (z)	31.3				95% Percentile (z)		33.51
653					99% Percentile (z)	38.09				95% USL		45.8
654												
655	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
656					KM Mean of Logged Data	3.202				95% KM UTL (Lognormal)95% Coverage		35.13
657					KM SD of Logged Data	0.19				95% KM UPL (Lognormal)		33.69
658					95% KM Percentile Lognormal (z)	33.58				95% KM USL (Lognormal)		46.04
659												
660	**Background DL/2 Statistics Assuming Lognormal Distribution**											
661					Mean in Original Scale	24.85				Mean in Log Scale		3.192
662					SD in Original Scale	4.766				SD in Log Scale		0.217
663					95% UTL95% Coverage	36.63				95% UPL (t)		34.92

664					90% Percentile (z)	32.15				95% Percentile (z)		34.79
665					99% Percentile (z)	40.34				95% USL		49.93
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	131				95% UTL with95% Coverage		33
673					Approx, f used to compute achieved CC	1.724				Approximate Actual Confidence Coefficient achieved by UTL		0.907
674					Approximate Sample Size needed to achieve specified CC	153				95% UPL		32.6
675					95% USL	41				95% KM Chebyshev UPL		44.56
676												
677	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
678	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
679	and consists of observations collected from clean unimpacted locations.											
680	The use of USL tends to provide a balance between false positives and false negatives provided the data											
681	represents a background data set and when many onsite observations need to be compared with the BTV.											
682												
683	FLUORIDE											
684												
685	General Statistics											
686					Total Number of Observations	96				Number of Missing Observations		40
687					Number of Distinct Observations	4						
688					Number of Detects	0				Number of Non-Detects		96
689					Number of Distinct Detects	0				Number of Distinct Non-Detects		4
690					Minimum Detect	N/A				Minimum Non-Detect		0.1
691					Maximum Detect	N/A				Maximum Non-Detect		0.5
692					Variance Detected	N/A				Percent Non-Detects		100%
693					Mean Detected	N/A				SD Detected		N/A
694					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
695												
696	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
697	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
698	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
699												
700	The data set for variable FLUORIDE was not processed!											
701												
702												
703	IRON, TOTAL											
704												
705	General Statistics											
706					Total Number of Observations	70				Number of Missing Observations		66
707					Number of Distinct Observations	48						
708					Number of Detects	67				Number of Non-Detects		3
709					Number of Distinct Detects	45				Number of Distinct Non-Detects		3
710					Minimum Detect	0.06				Minimum Non-Detect		0.12
711					Maximum Detect	3.5				Maximum Non-Detect		0.34
712					Variance Detected	0.707				Percent Non-Detects		4.286%
713					Mean Detected	1.112				SD Detected		0.841
714					Mean of Detected Logged Data	-0.19				SD of Detected Logged Data		0.822

715												
716	**Critical Values for Background Threshold Values (BTVs)**											
717					Tolerance Factor K (For UTL)	1.985			d2max (for USL)	3.084		
718												
719	**Normal GOF Test on Detects Only**											
720					Shapiro Wilk Test Statistic	0.865	**Normal GOF Test on Detected Observations Only**					
721					5% Shapiro Wilk P Value	4.3570E-8	Data Not Normal at 5% Significance Level					
722					Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**					
723					5% Lilliefors Critical Value	0.108	Data Not Normal at 5% Significance Level					
724	Data Not Normal at 5% Significance Level											
725												
726	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
727					KM Mean	1.07			KM SD	0.84		
728					95% UTL95% Coverage	2.738			95% KM UPL (t)	2.481		
729					90% KM Percentile (z)	2.147			95% KM Percentile (z)	2.452		
730					99% KM Percentile (z)	3.025			95% KM USL	3.661		
731												
732	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
733					Mean	1.069			SD	0.847		
734					95% UTL95% Coverage	2.751			95% UPL (t)	2.492		
735					90% Percentile (z)	2.155			95% Percentile (z)	2.463		
736					99% Percentile (z)	3.04			95% USL	3.682		
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	0.707	**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	0.0837	**Kolmogorov-Smirnov GOF**					
743					5% K-S Critical Value	0.11	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)	1.839			k star (bias corrected MLE)	1.767		
748					Theta hat (MLE)	0.604			Theta star (bias corrected MLE)	0.629		
749					nu hat (MLE)	246.5			nu star (bias corrected)	236.8		
750					MLE Mean (bias corrected)	1.112						
751					MLE Sd (bias corrected)	0.836			95% Percentile of Chisquare (2kstar)	8.722		
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	0.01			Mean	1.066		
760					Maximum	3.5			Median	0.76		
761					SD	0.85			CV	0.797		
762					k hat (MLE)	1.373			k star (bias corrected MLE)	1.324		
763					Theta hat (MLE)	0.776			Theta star (bias corrected MLE)	0.805		
764					nu hat (MLE)	192.3			nu star (bias corrected)	185.4		
765					MLE Mean (bias corrected)	1.066			MLE Sd (bias corrected)	0.927		

766				95% Percentile of Chisquare (2kstar)		7.195				90% Percentile		2.291
767				95% Percentile		2.897				99% Percentile		4.278
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				3.446	3.746	95% Approx. Gamma UPL				2.883	3.063
772				95% Gamma USL	6.066	7.16						
773												
774	**Estimates of Gamma Parameters using KM Estimates**											
775				Mean (KM)		1.07				SD (KM)		0.84
776				Variance (KM)		0.706				SE of Mean (KM)		0.101
777				k hat (KM)		1.621				k star (KM)		1.561
778				nu hat (KM)		226.9				nu star (KM)		218.5
779				theta hat (KM)		0.66				theta star (KM)		0.685
780				80% gamma percentile (KM)		1.648				90% gamma percentile (KM)		2.208
781				95% gamma percentile (KM)		2.75				99% gamma percentile (KM)		3.971
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				3.264	3.448	95% Approx. Gamma UPL				2.752	2.856
787				95% KM Gamma Percentile	2.699	2.795				95% Gamma USL	5.617	6.353
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		0.123	Detected Data appear Lognormal at 5% Significance Level					
792				Lilliefors Test Statistic		0.0783	**Lilliefors GOF Test**					
793				5% Lilliefors Critical Value		0.108	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		1.072				Mean in Log Scale		-0.257
798				SD in Original Scale		0.844				SD in Log Scale		0.867
799				95% UTL95% Coverage		4.324				95% BCA UTL95% Coverage		3.11
800				95% Bootstrap (%) UTL95% Coverage		3.2				95% UPL (t)		3.315
801				90% Percentile (z)		2.349				95% Percentile (z)		3.218
802				99% Percentile (z)		5.811				95% USL		11.21
803												
804	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
805				KM Mean of Logged Data		-0.277				95% KM UTL (Lognormal)95% Coverage		4.594
806				KM SD of Logged Data		0.908				95% KM UPL (Lognormal)		3.479
807				95% KM Percentile Lognormal (z)		3.372				95% KM USL (Lognormal)		12.45
808												
809	**Background DL/2 Statistics Assuming Lognormal Distribution**											
810				Mean in Original Scale		1.069				Mean in Log Scale		-0.282
811				SD in Original Scale		0.847				SD in Log Scale		0.919
812				95% UTL95% Coverage		4.681				95% UPL (t)		3.533
813				90% Percentile (z)		2.451				95% Percentile (z)		3.423
814				99% Percentile (z)		6.405				95% USL		12.85
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	69			95% UTL with95% Coverage	3.2		
822					Approx, f used to compute achieved CC	1.816			Approximate Actual Confidence Coefficient achieved by UTL	0.871		
823					Approximate Sample Size needed to achieve specified CC	93			95% UPL	3		
824					95% USL	3.5			95% KM Chebyshev UPL	4.759		
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	106			Number of Missing Observations	29		
836					Number of Distinct Observations	15						
837					Number of Detects	17			Number of Non-Detects	89		
838					Number of Distinct Detects	14			Number of Distinct Non-Detects	3		
839					Minimum Detect	0.05			Minimum Non-Detect	0.02		
840					Maximum Detect	1.2			Maximum Non-Detect	0.06		
841					Variance Detected	0.136			Percent Non-Detects	83.96%		
842					Mean Detected	0.327			SD Detected	0.369		
843					Mean of Detected Logged Data	-1.681			SD of Detected Logged Data	1.079		
844												
845	**Critical Values for Background Threshold Values (BTVs)**											
846					Tolerance Factor K (For UTL)	1.915			d2max (for USL)	3.229		
847												
848	**Normal GOF Test on Detects Only**											
849					Shapiro Wilk Test Statistic	0.753			**Shapiro Wilk GOF Test**			
850					5% Shapiro Wilk Critical Value	0.892			Data Not Normal at 5% Significance Level			
851					Lilliefors Test Statistic	0.282			**Lilliefors GOF Test**			
852					5% Lilliefors Critical Value	0.207			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	0.0726			KM SD	0.182		
857					95% UTL95% Coverage	0.42			95% KM UPL (t)	0.375		
858					90% KM Percentile (z)	0.305			95% KM Percentile (z)	0.371		
859					99% KM Percentile (z)	0.495			95% KM USL	0.659		
860												
861	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
862					Mean	0.0772			SD	0.181		
863					95% UTL95% Coverage	0.424			95% UPL (t)	0.379		
864					90% Percentile (z)	0.309			95% Percentile (z)	0.375		
865					99% Percentile (z)	0.498			95% USL	0.662		
866	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
867												

	A	B	C	D	E	F	G	H	I	J	K	L
868	**Gamma GOF Tests on Detected Observations Only**											
869					A-D Test Statistic	0.965	**Anderson-Darling GOF Test**					
870					5% A-D Critical Value	0.766	Data Not Gamma Distributed at 5% Significance Level					
871					K-S Test Statistic	0.245	**Kolmogorov-Smirnov GOF**					
872					5% K-S Critical Value	0.215	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)	1.023			k star (bias corrected MLE)			0.881
877					Theta hat (MLE)	0.32			Theta star (bias corrected MLE)			0.371
878					nu hat (MLE)	34.77			nu star (bias corrected)			29.96
879					MLE Mean (bias corrected)	0.327						
880					MLE Sd (bias corrected)	0.348			95% Percentile of Chisquare (2kstar)			5.523
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			0.0608
889					Maximum	1.2			Median			0.01
890					SD	0.185			CV			3.047
891					k hat (MLE)	0.478			k star (bias corrected MLE)			0.471
892					Theta hat (MLE)	0.127			Theta star (bias corrected MLE)			0.129
893					nu hat (MLE)	101.4			nu star (bias corrected)			99.89
894					MLE Mean (bias corrected)	0.0608			MLE Sd (bias corrected)			0.0886
895					95% Percentile of Chisquare (2kstar)	3.697			90% Percentile			0.167
896					95% Percentile	0.239			99% Percentile			0.417
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	0.222	0.201			95% Approx. Gamma UPL	0.179	0.159	
901				95% Gamma USL	0.573	0.578						
902												
903	**Estimates of Gamma Parameters using KM Estimates**											
904					Mean (KM)	0.0726			SD (KM)			0.182
905					Variance (KM)	0.033			SE of Mean (KM)			0.0185
906					k hat (KM)	0.16			k star (KM)			0.162
907					nu hat (KM)	33.9			nu star (KM)			34.27
908					theta hat (KM)	0.454			theta star (KM)			0.449
909					80% gamma percentile (KM)	0.0838			90% gamma percentile (KM)			0.217
910					95% gamma percentile (KM)	0.394			99% gamma percentile (KM)			0.898
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	0.248	0.23			95% Approx. Gamma UPL	0.206	0.189	
916				95% KM Gamma Percentile	0.202	0.186			95% Gamma USL	0.569	0.57	
917												
918	**Lognormal GOF Test on Detected Observations Only**											

919	Shapiro Wilk Test Statistic					0.897	**Shapiro Wilk GOF Test**					
920	5% Shapiro Wilk Critical Value					0.892	Detected Data appear Lognormal at 5% Significance Level					
921	Lilliefors Test Statistic					0.193	**Lilliefors GOF Test**					
922	5% Lilliefors Critical Value					0.207	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					0.0588	Mean in Log Scale					-5.492
927	SD in Original Scale					0.186	SD in Log Scale					2.49
928	95% UTL95% Coverage					0.485	95% BCA UTL95% Coverage					0.638
929	95% Bootstrap (%) UTL95% Coverage					0.665	95% UPL (t)					0.262
930	90% Percentile (z)					0.1	95% Percentile (z)					0.248
931	99% Percentile (z)					1.351	95% USL					12.8
932												
933	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
934	KM Mean of Logged Data					-3.452	95% KM UTL (Lognormal)95% Coverage					0.186
935	KM SD of Logged Data					0.925	95% KM UPL (Lognormal)					0.148
936	95% KM Percentile Lognormal (z)					0.145	95% KM USL (Lognormal)					0.629
937												
938	**Background DL/2 Statistics Assuming Lognormal Distribution**											
939	Mean in Original Scale					0.0772	Mean in Log Scale					-3.233
940	SD in Original Scale					0.181	SD in Log Scale					0.809
941	95% UTL95% Coverage					0.186	95% UPL (t)					0.152
942	90% Percentile (z)					0.111	95% Percentile (z)					0.149
943	99% Percentile (z)					0.259	95% USL					0.538
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					104	95% UTL with95% Coverage					0.69
951	Approx, f used to compute achieved CC					1.825	Approximate Actual Confidence Coefficient achieved by UTL					0.904
952	Approximate Sample Size needed to achieve specified CC					124	95% UPL					0.448
953	95% USL					1.2	95% KM Chebyshev UPL					0.868
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					46	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					10.97	SD					0.976

970					Coefficient of Variation	0.089					Skewness	-0.229
971					Mean of logged Data	2.391					SD of logged Data	0.0905
972												
973					**Critical Values for Background Threshold Values (BTVs)**							
974					Tolerance Factor K (For UTL)	2.079					d2max (for USL)	2.924
975												
976					**Normal GOF Test**							
977					Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**					
978					5% Shapiro Wilk Critical Value	0.945	Data Not Normal at 5% Significance Level					
979					Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**					
980					5% Lilliefors Critical Value	0.129	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					90% Percentile (z)	12.22
985					95% UPL (t)	12.62					95% Percentile (z)	12.57
986					95% USL	13.82					99% Percentile (z)	13.24
987												
988					**Gamma GOF Test**							
989					A-D Test Statistic	0.765	**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	0.139	**Kolmogorov-Smirnov Gamma GOF Test**					
992					5% K-S Critical Value	0.13	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)	126.5					k star (bias corrected MLE)	118.2
997					Theta hat (MLE)	0.0867					Theta star (bias corrected MLE)	0.0927
998					nu hat (MLE)	11634					nu star (bias corrected)	10877
999					MLE Mean (bias corrected)	10.97					MLE Sd (bias corrected)	1.008
1000												
1001					**Background Statistics Assuming Gamma Distribution**							
1002				95% Wilson Hilferty (WH) Approx. Gamma UPL		12.69					90% Percentile	12.28
1003				95% Hawkins Wixley (HW) Approx. Gamma UPL		12.7					95% Percentile	12.68
1004				95% WH Approx. Gamma UTL with	95% Coverage	13.11					99% Percentile	13.45
1005				95% HW Approx. Gamma UTL with	95% Coverage	13.13						
1006					95% WH USL	14.07					95% HW USL	14.11
1007												
1008					**Lognormal GOF Test**							
1009					Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**					
1010					5% Shapiro Wilk Critical Value	0.945	Data Not Lognormal at 5% Significance Level					
1011					Lilliefors Test Statistic	0.139	**Lilliefors Lognormal GOF Test**					
1012					5% Lilliefors Critical Value	0.129	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	13.18					90% Percentile (z)	12.26
1017					95% UPL (t)	12.73					95% Percentile (z)	12.67
1018					95% USL	14.23					99% Percentile (z)	13.48
1019												
1020					**Nonparametric Distribution Free Background Statistics**							

	A	B	C	D	E	F	G	H	I	J	K	L
1021	Data do not follow a Discernible Distribution (0.05)											
1022												
1023	Nonparametric Upper Limits for Background Threshold Values											
1024				Order of Statistic, r		45			95% UTL with 95% Coverage			12.5
1025				Approx, f used to compute achieved CC		1.184			Approximate Actual Confidence Coefficient achieved by UTL			0.677
1026									Approximate Sample Size needed to achieve specified CC			93
1027				95% Percentile Bootstrap UTL with 95% Coverage		12.5			95% BCA Bootstrap UTL with 95% Coverage			12.5
1028				95% UPL		12.47			90% Percentile			12.1
1029				90% Chebyshev UPL		13.93			95% Percentile			12.38
1030				95% Chebyshev UPL		15.27			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		78			Number of Distinct Observations			35
1043									Number of Missing Observations			57
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		10.93			SD			0.97
1048				Coefficient of Variation		0.0888			Skewness			-0.805
1049				Mean of logged Data		2.387			SD of logged Data			0.0932
1050												
1051	Critical Values for Background Threshold Values (BTVs)											
1052				Tolerance Factor K (For UTL)		1.965			d2max (for USL)			3.123
1053												
1054	Normal GOF Test											
1055				Shapiro Wilk Test Statistic		0.945			Normal GOF Test			
1056				5% Shapiro Wilk P Value		0.00461			Data Not Normal at 5% Significance Level			
1057				Lilliefors Test Statistic		0.14			Lilliefors GOF Test			
1058				5% Lilliefors Critical Value		0.1			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		12.83			90% Percentile (z)			12.17
1063				95% UPL (t)		12.55			95% Percentile (z)			12.52
1064				95% USL		13.96			99% Percentile (z)			13.19
1065												
1066	Gamma GOF Test											
1067				A-D Test Statistic		1.782			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		0.153			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)	120.8			k star (bias corrected MLE)	116.2		
1075					Theta hat (MLE)	0.0904			Theta star (bias corrected MLE)	0.094		
1076					nu hat (MLE)	18852			nu star (bias corrected)	18128		
1077					MLE Mean (bias corrected)	10.93			MLE Sd (bias corrected)	1.014		
1078												
1079	**Background Statistics Assuming Gamma Distribution**											
1080					95% Wilson Hilferty (WH) Approx. Gamma UPL	12.66			90% Percentile	12.25		
1081					95% Hawkins Wixley (HW) Approx. Gamma UPL	12.67			95% Percentile	12.65		
1082					95% WH Approx. Gamma UTL with 95% Coverage	12.98			99% Percentile	13.42		
1083					95% HW Approx. Gamma UTL with 95% Coverage	13						
1084					95% WH USL	14.32			95% HW USL	14.38		
1085												
1086	**Lognormal GOF Test**											
1087					Shapiro Wilk Test Statistic	0.916			**Shapiro Wilk Lognormal GOF Test**			
1088					5% Shapiro Wilk P Value	2.3552E-5			Data Not Lognormal at 5% Significance Level			
1089					Lilliefors Test Statistic	0.159			**Lilliefors Lognormal GOF Test**			
1090					5% Lilliefors Critical Value	0.1			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	13.07			90% Percentile (z)	12.26		
1095					95% UPL (t)	12.72			95% Percentile (z)	12.69		
1096					95% USL	14.56			99% Percentile (z)	13.52		
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	77			95% UTL with 95% Coverage	12.9		
1103					Approx, f used to compute achieved CC	2.026			Approximate Actual Confidence Coefficient achieved by UTL	0.907		
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	12.9		
1106					95% UPL	12.41			90% Percentile	12		
1107					90% Chebyshev UPL	13.86			95% Percentile	12.32		
1108					95% Chebyshev UPL	15.18			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	73			Number of Missing Observations	63		
1121					Number of Distinct Observations	13						
1122					Number of Detects	70			Number of Non-Detects	3		

1123					Number of Distinct Detects	13				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	7.9307E-4				Percent Non-Detects		4.11%
1127					Mean Detected	0.0662				SD Detected		0.0282
1128					Mean of Detected Logged Data	-2.792				SD of Detected Logged Data		0.386
1129												
1130					**Critical Values for Background Threshold Values (BTVs)**							
1131					Tolerance Factor K (For UTL)	1.977				d2max (for USL)		3.099
1132												
1133					**Normal GOF Test on Detects Only**							
1134					Shapiro Wilk Test Statistic	0.853				**Normal GOF Test on Detected Observations Only**		
1135					5% Shapiro Wilk P Value	2.6975E-9				Data Not Normal at 5% Significance Level		
1136					Lilliefors Test Statistic	0.203				**Lilliefors GOF Test**		
1137					5% Lilliefors Critical Value	0.106				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	0.065				KM SD		0.028
1142					95% UTL95% Coverage	0.12				95% KM UPL (t)		0.112
1143					90% KM Percentile (z)	0.101				95% KM Percentile (z)		0.111
1144					99% KM Percentile (z)	0.13				95% KM USL		0.152
1145												
1146					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
1147					Mean	0.0645				SD		0.0288
1148					95% UTL95% Coverage	0.121				95% UPL (t)		0.113
1149					90% Percentile (z)	0.101				95% Percentile (z)		0.112
1150					99% Percentile (z)	0.131				95% USL		0.154
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	2.273				**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	0.197				**Kolmogorov-Smirnov GOF**		
1157					5% K-S Critical Value	0.107				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)	6.608				k star (bias corrected MLE)		6.334
1162					Theta hat (MLE)	0.01				Theta star (bias corrected MLE)		0.0105
1163					nu hat (MLE)	925.1				nu star (bias corrected)		886.8
1164					MLE Mean (bias corrected)	0.0662						
1165					MLE Sd (bias corrected)	0.0263				95% Percentile of Chisquare (2kstar)		21.92
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	0.019				Mean		0.0648

1174					Maximum	0.15					Median	0.05
1175					SD	0.0285					CV	0.439
1176					k hat (MLE)	6.045					k star (bias corrected MLE)	5.806
1177					Theta hat (MLE)	0.0107					Theta star (bias corrected MLE)	0.0112
1178					nu hat (MLE)	882.6					nu star (bias corrected)	847.6
1179					MLE Mean (bias corrected)	0.0648					MLE Sd (bias corrected)	0.0269
1180					95% Percentile of Chisquare (2kstar)	20.5					90% Percentile	0.101
1181					95% Percentile	0.114					99% Percentile	0.143
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				0.127	0.128	95% Approx. Gamma UPL				0.115	0.116
1186	95% Gamma USL				0.179	0.185						
1187												
1188	**Estimates of Gamma Parameters using KM Estimates**											
1189					Mean (KM)	0.065					SD (KM)	0.028
1190					Variance (KM)	7.8417E-4					SE of Mean (KM)	0.0033
1191					k hat (KM)	5.394					k star (KM)	5.182
1192					nu hat (KM)	787.6					nu star (KM)	756.5
1193					theta hat (KM)	0.0121					theta star (KM)	0.0126
1194					80% gamma percentile (KM)	0.0871					90% gamma percentile (KM)	0.103
1195					95% gamma percentile (KM)	0.118					99% gamma percentile (KM)	0.149
1196												
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				0.125	0.126	95% Approx. Gamma UPL				0.113	0.114
1201	95% KM Gamma Percentile				0.112	0.113	95% Gamma USL				0.175	0.18
1202												
1203	**Lognormal GOF Test on Detected Observations Only**											
1204					Shapiro Wilk Approximate Test Statistic	0.926	**Shapiro Wilk GOF Test**					
1205					5% Shapiro Wilk P Value	3.8067E-4	Data Not Lognormal at 5% Significance Level					
1206					Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**					
1207					5% Lilliefors Critical Value	0.106	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	0.065	Mean in Log Scale					-2.814
1212					SD in Original Scale	0.0282	SD in Log Scale					0.395
1213					95% UTL95% Coverage	0.131	95% BCA UTL95% Coverage					0.132
1214					95% Bootstrap (%) UTL95% Coverage	0.138	95% UPL (t)					0.116
1215					90% Percentile (z)	0.0995	95% Percentile (z)					0.115
1216					99% Percentile (z)	0.15	95% USL					0.204
1217												
1218	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1219					KM Mean of Logged Data	-2.813	95% KM UTL (Lognormal)95% Coverage					0.13
1220					KM SD of Logged Data	0.391	95% KM UPL (Lognormal)					0.116
1221					95% KM Percentile Lognormal (z)	0.114	95% KM USL (Lognormal)					0.201
1222												
1223	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1224					Mean in Original Scale	0.0645	Mean in Log Scale					-2.83

1225				SD in Original Scale		0.0288				SD in Log Scale		0.421
1226				95% UTL95% Coverage		0.136				95% UPL (t)		0.12
1227				90% Percentile (z)		0.101				95% Percentile (z)		0.118
1228				99% Percentile (z)		0.157				95% USL		0.217
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		72				95% UTL with95% Coverage		0.15
1236				Approx, f used to compute achieved CC		1.895				Approximate Actual Confidence Coefficient achieved by UTL		0.885
1237				Approximate Sample Size needed to achieve specified CC		93				95% UPL		0.123
1238				95% USL		0.15				95% KM Chebyshev UPL		0.188
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		106				Number of Distinct Observations		15
1250										Number of Missing Observations		29
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		0.0652				SD		0.0266
1255				Coefficient of Variation		0.408				Skewness		1.819
1256				Mean of logged Data		-2.796				SD of logged Data		0.348
1257												
1258	Critical Values for Background Threshold Values (BTVs)											
1259				Tolerance Factor K (For UTL)		1.915				d2max (for USL)		3.229
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		0.0863				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)		0.0993
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		4.067				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	0.232	**Kolmogorov-Smirnov Gamma GOF Test**					
1277					5% K-S Critical Value	0.0879	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)	7.78			k star (bias corrected MLE)	7.566		
1282					Theta hat (MLE)	0.00838			Theta star (bias corrected MLE)	0.00862		
1283					nu hat (MLE)	1649			nu star (bias corrected)	1604		
1284					MLE Mean (bias corrected)	0.0652			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	0.0968		
1288				95% Hawkins Wixley (HW) Approx. Gamma UPL		0.109			95% Percentile	0.108		
1289				95% WH Approx. Gamma UTL with	95% Coverage	0.117			99% Percentile	0.133		
1290				95% HW Approx. Gamma UTL with	95% Coverage	0.117						
1291					95% WH USL	0.169			95% HW USL	0.172		
1292												
1293	**Lognormal GOF Test**											
1294					Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**					
1295					5% Shapiro Wilk P Value	3.6079E-7	Data Not Lognormal at 5% Significance Level					
1296					Lilliefors Test Statistic	0.208	**Lilliefors Lognormal GOF Test**					
1297					5% Lilliefors Critical Value	0.0863	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)	0.0954		
1302					95% UPL (t)	0.109			95% Percentile (z)	0.108		
1303					95% USL	0.188			99% Percentile (z)	0.137		
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	104			95% UTL with	95% Coverage	0.15	
1310					Approx, f used to compute achieved CC	1.825			Approximate Actual Confidence Coefficient achieved by UTL		0.904	
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	0.143	
1313					95% UPL	0.127			90% Percentile		0.1	
1314					90% Chebyshev UPL	0.145			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					132	Number of Missing Observations					4
1328	Number of Distinct Observations					50						
1329	Number of Detects					129	Number of Non-Detects					3
1330	Number of Distinct Detects					50	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					4.495	Percent Non-Detects					2.273%
1334	Mean Detected					20.55	SD Detected					2.12
1335	Mean of Detected Logged Data					3.017	SD of Detected Logged Data					0.108
1336												
1337	**Critical Values for Background Threshold Values (BTVs)**											
1338	Tolerance Factor K (For UTL)					1.884	d2max (for USL)					3.302
1339												
1340	**Normal GOF Test on Detects Only**											
1341	Shapiro Wilk Test Statistic					0.966	**Normal GOF Test on Detected Observations Only**					
1342	5% Shapiro Wilk P Value					0.0311	Data Not Normal at 5% Significance Level					
1343	Lilliefors Test Statistic					0.0957	**Lilliefors GOF Test**					
1344	5% Lilliefors Critical Value					0.0784	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					20.53	KM SD					2.111
1349	95% UTL95% Coverage					24.5	95% KM UPL (t)					24.04
1350	90% KM Percentile (z)					23.23	95% KM Percentile (z)					24
1351	99% KM Percentile (z)					25.44	95% KM USL					27.5
1352												
1353	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1354	Mean					20.33	SD					2.537
1355	95% UTL95% Coverage					25.11	95% UPL (t)					24.55
1356	90% Percentile (z)					23.58	95% Percentile (z)					24.51
1357	99% Percentile (z)					26.23	95% USL					28.71
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					1.365	**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					0.107	**Kolmogorov-Smirnov GOF**					
1364	5% K-S Critical Value					0.0817	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)					89.7	k star (bias corrected MLE)					87.62
1369	Theta hat (MLE)					0.229	Theta star (bias corrected MLE)					0.235
1370	nu hat (MLE)					23143	nu star (bias corrected)					22606
1371	MLE Mean (bias corrected)					20.55						
1372	MLE Sd (bias corrected)					2.195	95% Percentile of Chisquare (2kstar)					207.1
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											

	A	B	C	D	E	F	G	H	I	J	K	L
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		20.53
1381					Maximum	24.9				Median		20.95
1382					SD	2.101				CV		0.102
1383					k hat (MLE)	91.29				k star (bias corrected MLE)		89.22
1384					Theta hat (MLE)	0.225				Theta star (bias corrected MLE)		0.23
1385					nu hat (MLE)	24101				nu star (bias corrected)		23554
1386					MLE Mean (bias corrected)	20.53				MLE Sd (bias corrected)		2.173
1387					95% Percentile of Chisquare (2kstar)	210.6				90% Percentile		23.36
1388					95% Percentile	24.23				99% Percentile		25.92
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	24.78	24.82			95% Approx. Gamma UPL		24.24	24.28
1393				95% Gamma USL	28.41	28.56						
1394												
1395	**Estimates of Gamma Parameters using KM Estimates**											
1396					Mean (KM)	20.53				SD (KM)		2.111
1397					Variance (KM)	4.457				SE of Mean (KM)		0.186
1398					k hat (KM)	94.53				k star (KM)		92.39
1399					nu hat (KM)	24956				nu star (KM)		24390
1400					theta hat (KM)	0.217				theta star (KM)		0.222
1401					80% gamma percentile (KM)	22.3				90% gamma percentile (KM)		23.31
1402					95% gamma percentile (KM)	24.16				99% gamma percentile (KM)		25.82
1403												
1404	**The following statistics are computed using gamma distribution and KM estimates**											
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	24.8	24.85			95% Approx. Gamma UPL		24.26	24.29
1408				95% KM Gamma Percentile	24.22	24.25			95% Gamma USL		28.45	28.6
1409												
1410	**Lognormal GOF Test on Detected Observations Only**											
1411					Shapiro Wilk Approximate Test Statistic	0.946			**Shapiro Wilk GOF Test**			
1412					5% Shapiro Wilk P Value	1.0904E-4			Data Not Lognormal at 5% Significance Level			
1413					Lilliefors Test Statistic	0.112			**Lilliefors GOF Test**			
1414					5% Lilliefors Critical Value	0.0784			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	20.53				Mean in Log Scale		3.016
1419					SD in Original Scale	2.102				SD in Log Scale		0.107
1420					95% UTL95% Coverage	24.96				95% BCA UTL95% Coverage		23.6
1421					95% Bootstrap (%) UTL95% Coverage	24				95% UPL (t)		24.38
1422					90% Percentile (z)	23.41				95% Percentile (z)		24.33
1423					99% Percentile (z)	26.17				95% USL		29.04
1424												
1425	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1426					KM Mean of Logged Data	3.016				95% KM UTL (Lognormal)95% Coverage		24.99
1427					KM SD of Logged Data	0.107				95% KM UPL (Lognormal)		24.4
1428					95% KM Percentile Lognormal (z)	24.35				95% KM USL (Lognormal)		29.1

1429												
1430	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1431					Mean in Original Scale	20.33				Mean in Log Scale	3.003	
1432					SD in Original Scale	2.537				SD in Log Scale	0.141	
1433					95% UTL95% Coverage	26.3				95% UPL (t)	25.49	
1434					90% Percentile (z)	24.15				95% Percentile (z)	25.42	
1435					99% Percentile (z)	27.99				95% USL	32.13	
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	129				95% UTL with95% Coverage	24	
1443					Approx, f used to compute achieved CC	1.697				Approximate Actual Confidence Coefficient achieved by UTL	0.901	
1444					Approximate Sample Size needed to achieve specified CC	153				95% UPL	23.54	
1445					95% USL	24.9				95% KM Chebyshev UPL	29.76	
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	121				Number of Missing Observations	15	
1457					Number of Distinct Observations	73						
1458					Number of Detects	117				Number of Non-Detects	4	
1459					Number of Distinct Detects	69				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	0.109				Percent Non-Detects	3.306%	
1463					Mean Detected	5.053				SD Detected	0.33	
1464					Mean of Detected Logged Data	1.618				SD of Detected Logged Data	0.0642	
1465												
1466	**Critical Values for Background Threshold Values (BTVs)**											
1467					Tolerance Factor K (For UTL)	1.896				d2max (for USL)	3.273	
1468												
1469	**Normal GOF Test on Detects Only**											
1470					Shapiro Wilk Test Statistic	0.921				**Normal GOF Test on Detected Observations Only**		
1471					5% Shapiro Wilk P Value	9.7602E-8				Data Not Normal at 5% Significance Level		
1472					Lilliefors Test Statistic	0.126				**Lilliefors GOF Test**		
1473					5% Lilliefors Critical Value	0.0822				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	5.047				KM SD	0.329	
1478					95% UTL95% Coverage	5.672				95% KM UPL (t)	5.595	
1479					90% KM Percentile (z)	5.469				95% KM Percentile (z)	5.589	

1480				99% KM Percentile (z)		5.813				95% KM USL		6.125
1481												
1482						**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
1483				Mean		4.973				SD		0.543
1484				95% UTL95% Coverage		6.003				95% UPL (t)		5.877
1485				90% Percentile (z)		5.669				95% Percentile (z)		5.867
1486				99% Percentile (z)		6.237				95% USL		6.751
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		2.807				**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		0.117				**Kolmogorov-Smirnov GOF**		
1493				5% K-S Critical Value		0.0848				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)		242.4				k star (bias corrected MLE)		236.2
1498				Theta hat (MLE)		0.0208				Theta star (bias corrected MLE)		0.0214
1499				nu hat (MLE)		56716				nu star (bias corrected)		55263
1500				MLE Mean (bias corrected)		5.053						
1501				MLE Sd (bias corrected)		0.329				95% Percentile of Chisquare (2kstar)		524
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		5.048
1510				Maximum		6.27				Median		5.014
1511				SD		0.328				CV		0.065
1512				k hat (MLE)		245.2				k star (bias corrected MLE)		239.1
1513				Theta hat (MLE)		0.0206				Theta star (bias corrected MLE)		0.0211
1514				nu hat (MLE)		59340				nu star (bias corrected)		57870
1515				MLE Mean (bias corrected)		5.048				MLE Sd (bias corrected)		0.326
1516				95% Percentile of Chisquare (2kstar)		530.3				90% Percentile		5.47
1517				95% Percentile		5.597				99% Percentile		5.838
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	5.679	5.681				95% Approx. Gamma UPL	5.599	5.599
1522				95% Gamma USL	6.175	6.183						
1523												
1524						**Estimates of Gamma Parameters using KM Estimates**							
1525				Mean (KM)		5.047				SD (KM)		0.329
1526				Variance (KM)		0.109				SE of Mean (KM)		0.0303
1527				k hat (KM)		234.7				k star (KM)		228.9
1528				nu hat (KM)		56789				nu star (KM)		55383
1529				theta hat (KM)		0.0215				theta star (KM)		0.0221
1530				80% gamma percentile (KM)		5.325				90% gamma percentile (KM)		5.479

1531	95% gamma percentile (KM)					5.608	99% gamma percentile (KM)					5.855
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				5.682	5.684	95% Approx. Gamma UPL				5.601	5.602
1537	95% KM Gamma Percentile				5.594	5.595	95% Gamma USL				6.181	6.19
1538												
1539	**Lognormal GOF Test on Detected Observations Only**											
1540	Shapiro Wilk Approximate Test Statistic					0.936	**Shapiro Wilk GOF Test**					
1541	5% Shapiro Wilk P Value					1.2525E-5	Data Not Lognormal at 5% Significance Level					
1542	Lilliefors Test Statistic					0.114	**Lilliefors GOF Test**					
1543	5% Lilliefors Critical Value					0.0822	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					5.048	Mean in Log Scale					1.617
1548	SD in Original Scale					0.328	SD in Log Scale					0.0638
1549	95% UTL95% Coverage					5.685	95% BCA UTL95% Coverage					5.94
1550	95% Bootstrap (%) UTL95% Coverage					5.94	95% UPL (t)					5.602
1551	90% Percentile (z)					5.467	95% Percentile (z)					5.595
1552	99% Percentile (z)					5.844	95% USL					6.208
1553												
1554	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1555	KM Mean of Logged Data					1.617	95% KM UTL (Lognormal)95% Coverage					5.689
1556	KM SD of Logged Data					0.0643	95% KM UPL (Lognormal)					5.605
1557	95% KM Percentile Lognormal (z)					5.598	95% KM USL (Lognormal)					6.215
1558												
1559	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1560	Mean in Original Scale					4.973	Mean in Log Scale					1.596
1561	SD in Original Scale					0.543	SD in Log Scale					0.133
1562	95% UTL95% Coverage					6.356	95% UPL (t)					6.163
1563	90% Percentile (z)					5.856	95% Percentile (z)					6.147
1564	99% Percentile (z)					6.732	95% USL					7.639
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					118	95% UTL with95% Coverage					5.94
1572	Approx, f used to compute achieved CC					1.553	Approximate Actual Confidence Coefficient achieved by UTL					0.86
1573	Approximate Sample Size needed to achieve specified CC					153	95% UPL					5.62
1574	95% USL					6.27	95% KM Chebyshev UPL					6.489
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												

	A	B	C	D	E	F	G	H	I	J	K	L
1582	**pH-LAB**											
1583												
1584	**General Statistics**											
1585	Total Number of Observations					130	Number of Missing Observations					6
1586	Number of Distinct Observations					79						
1587	Number of Detects					126	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					0.117	Percent Non-Detects					3.077%
1592	Mean Detected					5.647	SD Detected					0.342
1593	Mean of Detected Logged Data					1.729	SD of Detected Logged Data					0.0598
1594												
1595	**Critical Values for Background Threshold Values (BTVs)**											
1596	Tolerance Factor K (For UTL)					1.886	d2max (for USL)					3.297
1597												
1598	**Normal GOF Test on Detects Only**											
1599	Shapiro Wilk Test Statistic					0.959	**Normal GOF Test on Detected Observations Only**					
1600	5% Shapiro Wilk P Value					0.00521	Data Not Normal at 5% Significance Level					
1601	Lilliefors Test Statistic					0.0756	**Lilliefors GOF Test**					
1602	5% Lilliefors Critical Value					0.0793	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					5.633	KM SD					0.347
1607	95% UTL95% Coverage					6.288	95% KM UPL (t)					6.211
1608	90% KM Percentile (z)					6.078	95% KM Percentile (z)					6.204
1609	99% KM Percentile (z)					6.441	95% KM USL					6.778
1610												
1611	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1612	Mean					5.556	SD					0.613
1613	95% UTL95% Coverage					6.712	95% UPL (t)					6.575
1614	90% Percentile (z)					6.341	95% Percentile (z)					6.564
1615	99% Percentile (z)					6.981	95% USL					7.576
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					1.186	**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					0.0707	**Kolmogorov-Smirnov GOF**					
1622	5% K-S Critical Value					0.0825	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)					279.8	k star (bias corrected MLE)					273.1
1627	Theta hat (MLE)					0.0202	Theta star (bias corrected MLE)					0.0207
1628	nu hat (MLE)					70498	nu star (bias corrected)					68821
1629	MLE Mean (bias corrected)					5.647						
1630	MLE Sd (bias corrected)					0.342	95% Percentile of Chisquare (2kstar)					601.7
1631												
1632	**Gamma ROS Statistics using Imputed Non-Detects**											

	A	B	C	D	E	F	G	H	I	J	K	L
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	5.632	
1639					Maximum	7.08				Median	5.575	
1640					SD	0.347				CV	0.0617	
1641					k hat (MLE)	269.8				k star (bias corrected MLE)	263.6	
1642					Theta hat (MLE)	0.0209				Theta star (bias corrected MLE)	0.0214	
1643					nu hat (MLE)	70157				nu star (bias corrected)	68539	
1644					MLE Mean (bias corrected)	5.632				MLE Sd (bias corrected)	0.347	
1645					95% Percentile of Chisquare (2kstar)	581.7				90% Percentile	6.081	
1646					95% Percentile	6.215				99% Percentile	6.471	
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	6.299	6.301			95% Approx. Gamma UPL	6.217	6.218	
1651				95% Gamma USL	6.837	6.846						
1652												
1653	**Estimates of Gamma Parameters using KM Estimates**											
1654					Mean (KM)	5.633				SD (KM)	0.347	
1655					Variance (KM)	0.121				SE of Mean (KM)	0.0308	
1656					k hat (KM)	263.1				k star (KM)	257	
1657					nu hat (KM)	68398				nu star (KM)	66821	
1658					theta hat (KM)	0.0214				theta star (KM)	0.0219	
1659					80% gamma percentile (KM)	5.926				90% gamma percentile (KM)	6.088	
1660					95% gamma percentile (KM)	6.223				99% gamma percentile (KM)	6.483	
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	6.301	6.303			95% Approx. Gamma UPL	6.218	6.22	
1666				95% KM Gamma Percentile	6.212	6.213			95% Gamma USL	6.839	6.848	
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	0.0586			Detected Data appear Lognormal at 5% Significance Level			
1671					Lilliefors Test Statistic	0.0699			**Lilliefors GOF Test**			
1672					5% Lilliefors Critical Value	0.0793			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	5.633				Mean in Log Scale	1.727	
1677					SD in Original Scale	0.347				SD in Log Scale	0.0608	
1678					95% UTL95% Coverage	6.306				95% BCA UTL95% Coverage	6.471	
1679					95% Bootstrap (%) UTL95% Coverage	6.476				95% UPL (t)	6.221	
1680					90% Percentile (z)	6.078				95% Percentile (z)	6.214	
1681					99% Percentile (z)	6.477				95% USL	6.871	
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			6.309
1685				KM SD of Logged Data		0.0611			95% KM UPL (Lognormal)			6.224
1686				95% KM Percentile Lognormal (z)		6.217			95% KM USL (Lognormal)			6.876
1687												
1688						**Background DL/2 Statistics Assuming Lognormal Distribution**							
1689				Mean in Original Scale		5.556			Mean in Log Scale			1.707
1690				SD in Original Scale		0.613			SD in Log Scale			0.141
1691				95% UTL95% Coverage		7.189			95% UPL (t)			6.966
1692				90% Percentile (z)		6.601			95% Percentile (z)			6.948
1693				99% Percentile (z)		7.649			95% USL			8.771
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		127			95% UTL with95% Coverage			6.52
1701				Approx, f used to compute achieved CC		1.671			Approximate Actual Confidence Coefficient achieved by UTL			0.894
1702				Approximate Sample Size needed to achieve specified CC		153			95% UPL			6.169
1703				95% USL		7.08			95% KM Chebyshev UPL			7.153
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		49			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		2.392			SD			0.293
1720				Coefficient of Variation		0.122			Skewness			0.148
1721				Mean of logged Data		0.865			SD of logged Data			0.124
1722												
1723						**Critical Values for Background Threshold Values (BTVs)**							
1724				Tolerance Factor K (For UTL)		2.063			d2max (for USL)			2.949
1725												
1726						**Normal GOF Test**						
1727				Shapiro Wilk Test Statistic		0.984			**Shapiro Wilk GOF Test**			
1728				5% Shapiro Wilk Critical Value		0.947			Data appear Normal at 5% Significance Level			
1729				Lilliefors Test Statistic		0.101			**Lilliefors GOF Test**			
1730				5% Lilliefors Critical Value		0.126			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		2.996			90% Percentile (z)			2.767

1735					95% UPL (t)	2.888				95% Percentile (z)		2.874
1736					95% USL	3.256				99% Percentile (z)		3.073
1737												
1738	**Gamma GOF Test**											
1739					A-D Test Statistic	0.318	**Anderson-Darling Gamma GOF Test**					
1740					5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level					
1741					K-S Test Statistic	0.0988	**Kolmogorov-Smirnov Gamma GOF Test**					
1742					5% K-S Critical Value	0.126	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)	67.57	k star (bias corrected MLE)					63.45
1747					Theta hat (MLE)	0.0354	Theta star (bias corrected MLE)					0.0377
1748					nu hat (MLE)	6622	nu star (bias corrected)					6218
1749					MLE Mean (bias corrected)	2.392	MLE Sd (bias corrected)					0.3
1750												
1751	**Background Statistics Assuming Gamma Distribution**											
1752					95% Wilson Hilferty (WH) Approx. Gamma UPL	2.912	90% Percentile					2.784
1753					95% Hawkins Wixley (HW) Approx. Gamma UPL	2.915	95% Percentile					2.906
1754					95% WH Approx. Gamma UTL with 95% Coverage	3.037	99% Percentile					3.145
1755					95% HW Approx. Gamma UTL with 95% Coverage	3.044						
1756					95% WH USL	3.353	95% HW USL					3.368
1757												
1758	**Lognormal GOF Test**											
1759					Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk Lognormal GOF Test**					
1760					5% Shapiro Wilk Critical Value	0.947	Data appear Lognormal at 5% Significance Level					
1761					Lilliefors Test Statistic	0.106	**Lilliefors Lognormal GOF Test**					
1762					5% Lilliefors Critical Value	0.126	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	3.064	90% Percentile (z)					2.782
1767					95% UPL (t)	2.927	95% Percentile (z)					2.909
1768					95% USL	3.418	99% Percentile (z)					3.165
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	48	95% UTL with 95% Coverage					3
1775					Approx, f used to compute achieved CC	1.263	Approximate Actual Confidence Coefficient achieved by UTL					0.71
1776							Approximate Sample Size needed to achieve specified CC					93
1777					95% Percentile Bootstrap UTL with 95% Coverage	3.02	95% BCA Bootstrap UTL with 95% Coverage					3
1778					95% UPL	2.95	90% Percentile					2.744
1779					90% Chebyshev UPL	3.28	95% Percentile					2.86
1780					95% Chebyshev UPL	3.682	99% Percentile					3.052
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	73			Number of Distinct Observations	35		
1793									Number of Missing Observations	62		
1794					Minimum	1.7			First Quartile	2.23		
1795					Second Largest	3.1			Median	2.3		
1796					Maximum	3.14			Third Quartile	2.5		
1797					Mean	2.378			SD	0.273		
1798					Coefficient of Variation	0.115			Skewness	0.695		
1799					Mean of logged Data	0.86			SD of logged Data	0.113		
1800												
1801	**Critical Values for Background Threshold Values (BTVs)**											
1802					Tolerance Factor K (For UTL)	1.977			d2max (for USL)	3.099		
1803												
1804	**Normal GOF Test**											
1805					Shapiro Wilk Test Statistic	0.93			**Normal GOF Test**			
1806					5% Shapiro Wilk P Value	5.5474E-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	2.917			90% Percentile (z)	2.728		
1813					95% UPL (t)	2.836			95% Percentile (z)	2.827		
1814					95% USL	3.223			99% Percentile (z)	3.013		
1815												
1816	**Gamma GOF Test**											
1817					A-D Test Statistic	1.703			**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	0.104			Data Not Gamma Distributed at 5% Significance Level			
1821	Data Not Gamma Distributed at 5% Significance Level											
1822												
1823	**Gamma Statistics**											
1824					k hat (MLE)	79.3			k star (bias corrected MLE)	76.05		
1825					Theta hat (MLE)	0.03			Theta star (bias corrected MLE)	0.0313		
1826					nu hat (MLE)	11578			nu star (bias corrected)	11103		
1827					MLE Mean (bias corrected)	2.378			MLE Sd (bias corrected)	0.273		
1828												
1829	**Background Statistics Assuming Gamma Distribution**											
1830					95% Wilson Hilferty (WH) Approx. Gamma UPL	2.847			90% Percentile	2.734		
1831					95% Hawkins Wixley (HW) Approx. Gamma UPL	2.849			95% Percentile	2.844		
1832					95% WH Approx. Gamma UTL with 95% Coverage	2.939			99% Percentile	3.058		
1833					95% HW Approx. Gamma UTL with 95% Coverage	2.942						
1834					95% WH USL	3.3			95% HW USL	3.312		
1835												
1836	**Lognormal GOF Test**											

1837				Shapiro Wilk Test Statistic		0.948	**Shapiro Wilk Lognormal GOF Test**					
1838				5% Shapiro Wilk P Value		0.0112	Data Not Lognormal at 5% Significance Level					
1839				Lilliefors Test Statistic		0.158	**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		2.953	90% Percentile (z)					2.73
1845				95% UPL (t)		2.855	95% Percentile (z)					2.845
1846				95% USL		3.351	99% Percentile (z)					3.072
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		72	95% UTL with 95% Coverage					3.1
1853				Approx, f used to compute achieved CC		1.895	Approximate Actual Confidence Coefficient achieved by UTL					0.885
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		3.063	90% Percentile					2.7
1857				90% Chebyshev UPL		3.202	95% Percentile					2.964
1858				95% Chebyshev UPL		3.575	99% Percentile					3.111
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		78	Number of Missing Observations					58
1871				Number of Distinct Observations		31						
1872				Number of Detects		75	Number of Non-Detects					3
1873				Number of Distinct Detects		31	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		2.622	Percent Non-Detects					3.846%
1877				Mean Detected		12.77	SD Detected					1.619
1878				Mean of Detected Logged Data		2.539	SD of Detected Logged Data					0.132
1879												
1880				**Critical Values for Background Threshold Values (BTVs)**								
1881				Tolerance Factor K (For UTL)		1.965	d2max (for USL)					3.123
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		0.186	Detected Data appear Normal at 5% Significance Level					
1886				Lilliefors Test Statistic		0.143	**Lilliefors GOF Test**					
1887				5% Lilliefors Critical Value		0.102	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
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	1.741	
1892					95% UTL95% Coverage	16.05				95% KM UPL (t)	15.55	
1893					90% KM Percentile (z)	14.86				95% KM Percentile (z)	15.5	
1894					99% KM Percentile (z)	16.68				95% KM USL	18.07	
1895												
1896	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1897					Mean	12.49				SD	2.122	
1898					95% UTL95% Coverage	16.66				95% UPL (t)	16.05	
1899					90% Percentile (z)	15.21				95% Percentile (z)	15.98	
1900					99% Percentile (z)	17.43				95% USL	19.12	
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	0.892				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	0.158				Kolmogorov-Smirnov GOF		
1907					5% K-S Critical Value	0.103				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)	60.02				k star (bias corrected MLE)	57.63	
1912					Theta hat (MLE)	0.213				Theta star (bias corrected MLE)	0.222	
1913					nu hat (MLE)	9003				nu star (bias corrected)	8644	
1914					MLE Mean (bias corrected)	12.77						
1915					MLE Sd (bias corrected)	1.683				95% Percentile of Chisquare (2kstar)	141.3	
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	
1925					SD	1.687				CV	0.133	
1926					k hat (MLE)	54.41				k star (bias corrected MLE)	52.33	
1927					Theta hat (MLE)	0.233				Theta star (bias corrected MLE)	0.242	
1928					nu hat (MLE)	8488				nu star (bias corrected)	8163	
1929					MLE Mean (bias corrected)	12.66				MLE Sd (bias corrected)	1.75	
1930					95% Percentile of Chisquare (2kstar)	129.5				90% Percentile	14.95	
1931					95% Percentile	15.67				99% Percentile	17.08	
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		16.28	16.32			95% Approx. Gamma UPL	15.69	15.72	
1936			95% Gamma USL		18.76	18.89						
1937												
1938	Estimates of Gamma Parameters using KM Estimates											

1939					Mean (KM)	12.63					SD (KM)	1.741
1940					Variance (KM)	3.03					SE of Mean (KM)	0.201
1941					k hat (KM)	52.66					k star (KM)	50.64
1942					nu hat (KM)	8215					nu star (KM)	7900
1943					theta hat (KM)	0.24					theta star (KM)	0.249
1944					80% gamma percentile (KM)	14.1					90% gamma percentile (KM)	14.95
1945					95% gamma percentile (KM)	15.69					99% gamma percentile (KM)	17.12
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				16.41	16.47	95% Approx. Gamma UPL				15.8	15.84
1951	95% KM Gamma Percentile				15.74	15.77	95% Gamma USL				19.02	19.18
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				0.00511		Data Not Lognormal at 5% Significance Level					
1956	Lilliefors Test Statistic				0.168		**Lilliefors GOF Test**					
1957	5% Lilliefors Critical Value				0.102		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				1.686		SD in Log Scale				0.139	
1963	95% UTL95% Coverage				16.48		95% BCA UTL95% Coverage				15.89	
1964	95% Bootstrap (%) UTL95% Coverage				15.9		95% UPL (t)				15.83	
1965	90% Percentile (z)				14.99		95% Percentile (z)				15.76	
1966	99% Percentile (z)				17.32		95% USL				19.35	
1967												
1968	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1969	KM Mean of Logged Data				2.526		95% KM UTL (Lognormal)95% Coverage				16.66	
1970	KM SD of Logged Data				0.146		95% KM UPL (Lognormal)				15.97	
1971	95% KM Percentile Lognormal (z)				15.9		95% KM USL (Lognormal)				19.74	
1972												
1973	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1974	Mean in Original Scale				12.49		Mean in Log Scale				2.507	
1975	SD in Original Scale				2.122		SD in Log Scale				0.207	
1976	95% UTL95% Coverage				18.43		95% UPL (t)				17.36	
1977	90% Percentile (z)				16		95% Percentile (z)				17.25	
1978	99% Percentile (z)				19.86		95% USL				23.43	
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				77		95% UTL with95% Coverage				15.9	
1986	Approx, f used to compute achieved CC				2.026		Approximate Actual Confidence Coefficient achieved by UTL				0.907	
1987	Approximate Sample Size needed to achieve specified CC				93		95% UPL				15.8	
1988	95% USL				16.4		95% KM Chebyshev UPL				20.27	
1989												

	A	B	C	D	E	F	G	H	I	J	K	L
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	99				Number of Distinct Observations	36	
2000										Number of Missing Observations	36	
2001					Minimum	10.7				First Quartile	12.35	
2002					Second Largest	16				Median	13	
2003					Maximum	16.4				Third Quartile	13.9	
2004					Mean	13.11				SD	1.197	
2005					Coefficient of Variation	0.0914				Skewness	0.124	
2006					Mean of logged Data	2.569				SD of logged Data	0.0918	
2007												
2008	**Critical Values for Background Threshold Values (BTVs)**											
2009					Tolerance Factor K (For UTL)	1.925				d2max (for USL)	3.206	
2010												
2011	**Normal GOF Test**											
2012					Shapiro Wilk Test Statistic	0.967				**Normal GOF Test**		
2013					5% Shapiro Wilk P Value	0.0898				Data appear Normal at 5% Significance Level		
2014					Lilliefors Test Statistic	0.0882				**Lilliefors GOF Test**		
2015					5% Lilliefors Critical Value	0.0893				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	15.41				90% Percentile (z)	14.64	
2020					95% UPL (t)	15.1				95% Percentile (z)	15.08	
2021					95% USL	16.94				99% Percentile (z)	15.89	
2022												
2023	**Gamma GOF Test**											
2024					A-D Test Statistic	0.741				**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	0.0996				**Kolmogorov-Smirnov Gamma GOF Test**		
2027					5% K-S Critical Value	0.0897				Data Not Gamma Distributed at 5% Significance Level		
2028	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
2029												
2030	**Gamma Statistics**											
2031					k hat (MLE)	120.6				k star (bias corrected MLE)	117	
2032					Theta hat (MLE)	0.109				Theta star (bias corrected MLE)	0.112	
2033					nu hat (MLE)	23887				nu star (bias corrected)	23165	
2034					MLE Mean (bias corrected)	13.11				MLE Sd (bias corrected)	1.212	
2035												
2036	**Background Statistics Assuming Gamma Distribution**											
2037					95% Wilson Hilferty (WH) Approx. Gamma UPL	15.17				90% Percentile	14.68	
2038					95% Hawkins Wixley (HW) Approx. Gamma UPL	15.18				95% Percentile	15.16	
2039					95% WH Approx. Gamma UTL with 95% Coverage	15.51				99% Percentile	16.09	
2040					95% HW Approx. Gamma UTL with 95% Coverage	15.53						

2041					95% WH USL	17.3					95% HW USL	17.35
2042												
2043						Lognormal GOF Test						
2044					Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Lognormal GOF Test					
2045					5% Shapiro Wilk P Value	0.0481	Data Not Lognormal at 5% Significance Level					
2046					Lilliefors Test Statistic	0.106	Lilliefors Lognormal GOF Test					
2047					5% Lilliefors Critical Value	0.0893	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	15.57	90% Percentile (z)	14.68				
2052					95% UPL (t)	15.21	95% Percentile (z)	15.18				
2053					95% USL	17.52	99% Percentile (z)	16.16				
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	97	95% UTL with 95% Coverage	15.8				
2060					Approx, f used to compute achieved CC	1.702	Approximate Actual Confidence Coefficient achieved by UTL	0.878				
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	15.82				
2063					95% UPL	15.2	90% Percentile	14.52				
2064					90% Chebyshev UPL	16.72	95% Percentile	15.02				
2065					95% Chebyshev UPL	18.35	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	120	Number of Missing Observations	15				
2078					Number of Distinct Observations	71						
2079					Number of Detects	116	Number of Non-Detects	4				
2080					Number of Distinct Detects	71	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	999.8	Percent Non-Detects	3.333%				
2084					Mean Detected	275.4	SD Detected	31.62				
2085					Mean of Detected Logged Data	5.611	SD of Detected Logged Data	0.121				
2086												
2087						Critical Values for Background Threshold Values (BTVs)						
2088					Tolerance Factor K (For UTL)	1.897	d2max (for USL)	3.271				
2089												
2090						Normal GOF Test on Detects Only						
2091					Shapiro Wilk Test Statistic	0.971	Normal GOF Test on Detected Observations Only					

	A	B	C	D	E	F	G	H	I	J	K	L
2092	5% Shapiro Wilk P Value					0.128	Detected Data appear Normal at 5% Significance Level					
2093	Lilliefors Test Statistic					0.0641	**Lilliefors GOF Test**					
2094	5% Lilliefors Critical Value					0.0826	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					31.94
2099	95% UTL95% Coverage					334.8	95% KM UPL (t)					327.4
2100	90% KM Percentile (z)					315.1	95% KM Percentile (z)					326.7
2101	99% KM Percentile (z)					348.5	95% KM USL					378.7
2102												
2103	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2104	Mean					270.6	SD					40.62
2105	95% UTL95% Coverage					347.6	95% UPL (t)					338.2
2106	90% Percentile (z)					322.7	95% Percentile (z)					337.4
2107	99% Percentile (z)					365.1	95% USL					403.5
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					1.168	**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					0.0751	**Kolmogorov-Smirnov GOF**					
2114	5% K-S Critical Value					0.0851	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)					71.54	k star (bias corrected MLE)					69.69
2119	Theta hat (MLE)					3.85	Theta star (bias corrected MLE)					3.952
2120	nu hat (MLE)					16597	nu star (bias corrected)					16169
2121	MLE Mean (bias corrected)					275.4						
2122	MLE Sd (bias corrected)					32.99	95% Percentile of Chisquare (2kstar)					167.9
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					275.5
2132	SD					31.67	CV					0.115
2133	k hat (MLE)					71.24	k star (bias corrected MLE)					69.47
2134	Theta hat (MLE)					3.851	Theta star (bias corrected MLE)					3.949
2135	nu hat (MLE)					17098	nu star (bias corrected)					16672
2136	MLE Mean (bias corrected)					274.3	MLE Sd (bias corrected)					32.91
2137	95% Percentile of Chisquare (2kstar)					167.4	90% Percentile					317.3
2138	95% Percentile					330.6	99% Percentile					356.6
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				339.5	340.3	95% Approx. Gamma UPL				330.9	331.4

	A	B	C	D	E	F	G	H	I	J	K	L
2143				95% Gamma USL	393.9	396.4						
2144												
2145	**Estimates of Gamma Parameters using KM Estimates**											
2146					Mean (KM)	274.2				SD (KM)		31.94
2147					Variance (KM)	1020				SE of Mean (KM)		2.956
2148					k hat (KM)	73.71				k star (KM)		71.87
2149					nu hat (KM)	17690				nu star (KM)		17249
2150					theta hat (KM)	3.72				theta star (KM)		3.815
2151					80% gamma percentile (KM)	301				90% gamma percentile (KM)		316.4
2152					95% gamma percentile (KM)	329.5				99% gamma percentile (KM)		355
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	340.2	341				95% Approx. Gamma UPL	331.4	332.1
2158				95% KM Gamma Percentile	330.7	331.3				95% Gamma USL	395.3	398
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	1.4338E-5	Data Not Lognormal at 5% Significance Level					
2163					Lilliefors Test Statistic	0.083	**Lilliefors GOF Test**					
2164					5% Lilliefors Critical Value	0.0826	Data Not Lognormal at 5% Significance Level					
2165	Data Not 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	31.71				SD in Log Scale		0.122
2170					95% UTL95% Coverage	343				95% BCA UTL95% Coverage		326.1
2171					95% Bootstrap (%) UTL95% Coverage	329.2				95% UPL (t)		333.4
2172					90% Percentile (z)	318.3				95% Percentile (z)		332.6
2173					99% Percentile (z)	361.3				95% USL		405.3
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		343.8
2177					KM SD of Logged Data	0.123				95% KM UPL (Lognormal)		334.1
2178					95% KM Percentile Lognormal (z)	333.3				95% KM USL (Lognormal)		407.1
2179												
2180	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2181					Mean in Original Scale	270.6				Mean in Log Scale		5.587
2182					SD in Original Scale	40.62				SD in Log Scale		0.179
2183					95% UTL95% Coverage	374.8				95% UPL (t)		359.5
2184					90% Percentile (z)	335.7				95% Percentile (z)		358.3
2185					99% Percentile (z)	404.8				95% USL		479.4
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	117				95% UTL with95% Coverage		329
2193					Approx, f used to compute achieved CC	1.539				Approximate Actual Confidence Coefficient achieved by UTL		0.856

2194	Approximate Sample Size needed to achieve specified CC					153					95% UPL	326
2195					95% USL	358					95% KM Chebyshev UPL	414
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	130					Number of Missing Observations	6
2207					Number of Distinct Observations	49						
2208					Number of Detects	127					Number of Non-Detects	3
2209					Number of Distinct Detects	49					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	314.1					Percent Non-Detects	2.308%
2213					Mean Detected	271.1					SD Detected	17.72
2214					Mean of Detected Logged Data	5.6					SD of Detected Logged Data	0.0668
2215												
2216	**Critical Values for Background Threshold Values (BTVs)**											
2217					Tolerance Factor K (For UTL)	1.886					d2max (for USL)	3.297
2218												
2219	**Normal GOF Test on Detects Only**											
2220					Shapiro Wilk Test Statistic	0.963	**Normal GOF Test on Detected Observations Only**					
2221					5% Shapiro Wilk P Value	0.0145	Data Not Normal at 5% Significance Level					
2222					Lilliefors Test Statistic	0.0923	**Lilliefors GOF Test**					
2223					5% Lilliefors Critical Value	0.079	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	270.6					KM SD	17.83
2228					95% UTL95% Coverage	304.3					95% KM UPL (t)	300.3
2229					90% KM Percentile (z)	293.5					95% KM Percentile (z)	300
2230					99% KM Percentile (z)	312.1					95% KM USL	329.4
2231												
2232	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2233					Mean	267.9					SD	27.17
2234					95% UTL95% Coverage	319.2					95% UPL (t)	313.1
2235					90% Percentile (z)	302.7					95% Percentile (z)	312.6
2236					99% Percentile (z)	331.1					95% USL	357.5
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	1.417	**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	0.0988	**Kolmogorov-Smirnov GOF**					
2243					5% K-S Critical Value	0.0822	Data Not Gamma Distributed at 5% Significance Level					
2244	Data Not Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
2245												
2246	**Gamma Statistics on Detected Data Only**											
2247					k hat (MLE)	229.4			k star (bias corrected MLE)			223.9
2248					Theta hat (MLE)	1.182			Theta star (bias corrected MLE)			1.211
2249					nu hat (MLE)	58257			nu star (bias corrected)			56882
2250					MLE Mean (bias corrected)	271.1						
2251					MLE Sd (bias corrected)	18.12			95% Percentile of Chisquare (2kstar)			498.2
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			270.7
2260					Maximum	310			Median			270
2261					SD	17.75			CV			0.0656
2262					k hat (MLE)	228.5			k star (bias corrected MLE)			223.2
2263					Theta hat (MLE)	1.185			Theta star (bias corrected MLE)			1.212
2264					nu hat (MLE)	59414			nu star (bias corrected)			58044
2265					MLE Mean (bias corrected)	270.7			MLE Sd (bias corrected)			18.12
2266					95% Percentile of Chisquare (2kstar)	496.8			90% Percentile			294.1
2267					95% Percentile	301.2			99% Percentile			314.6
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	305.6	305.8			95% Approx. Gamma UPL	301.3		301.4
2272				95% Gamma USL	333.9	334.6						
2273												
2274	**Estimates of Gamma Parameters using KM Estimates**											
2275					Mean (KM)	270.6			SD (KM)			17.83
2276					Variance (KM)	318			SE of Mean (KM)			1.58
2277					k hat (KM)	230.3			k star (KM)			225
2278					nu hat (KM)	59890			nu star (KM)			58509
2279					theta hat (KM)	1.175			theta star (KM)			1.203
2280					80% gamma percentile (KM)	285.7			90% gamma percentile (KM)			294
2281					95% gamma percentile (KM)	301			99% gamma percentile (KM)			314.4
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	305.8	306			95% Approx. Gamma UPL	301.4		301.6
2287				95% KM Gamma Percentile	301.1	301.2			95% Gamma USL	334.3		335
2288												
2289	**Lognormal GOF Test on Detected Observations Only**											
2290					Shapiro Wilk Approximate Test Statistic	0.949			**Shapiro Wilk GOF Test**			
2291					5% Shapiro Wilk P Value	3.2776E-4			Data Not Lognormal at 5% Significance Level			
2292					Lilliefors Test Statistic	0.103			**Lilliefors GOF Test**			
2293					5% Lilliefors Critical Value	0.079			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	270.7				Mean in Log Scale	5.599	
2298					SD in Original Scale	17.75				SD in Log Scale	0.0669	
2299					95% UTL95% Coverage	306.4				95% BCA UTL95% Coverage	305.2	
2300					95% Bootstrap (%) UTL95% Coverage	305.8				95% UPL (t)	301.9	
2301					90% Percentile (z)	294.3				95% Percentile (z)	301.5	
2302					99% Percentile (z)	315.6				95% USL	336.8	
2303												
2304	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2305					KM Mean of Logged Data	5.599				95% KM UTL (Lognormal)95% Coverage	306.6	
2306					KM SD of Logged Data	0.0674				95% KM UPL (Lognormal)	302	
2307					95% KM Percentile Lognormal (z)	301.7				95% KM USL (Lognormal)	337.2	
2308												
2309	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2310					Mean in Original Scale	267.9				Mean in Log Scale	5.584	
2311					SD in Original Scale	27.17				SD in Log Scale	0.125	
2312					95% UTL95% Coverage	337.2				95% UPL (t)	327.9	
2313					90% Percentile (z)	312.6				95% Percentile (z)	327.1	
2314					99% Percentile (z)	356.4				95% USL	402.5	
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	127				95% UTL with95% Coverage	307	
2322					Approx, f used to compute achieved CC	1.671				Approximate Actual Confidence Coefficient achieved by UTL	0.894	
2323					Approximate Sample Size needed to achieve specified CC	153				95% UPL	298.4	
2324					95% USL	310				95% KM Chebyshev UPL	348.7	
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	95				Number of Missing Observations	41	
2336					Number of Distinct Observations	18						
2337					Number of Detects	35				Number of Non-Detects	60	
2338					Number of Distinct Detects	17				Number of Distinct Non-Detects	2	
2339					Minimum Detect	1.1				Minimum Non-Detect	2	
2340					Maximum Detect	4.4				Maximum Non-Detect	5	
2341					Variance Detected	0.487				Percent Non-Detects	63.16%	
2342					Mean Detected	1.98				SD Detected	0.698	
2343					Mean of Detected Logged Data	0.632				SD of Detected Logged Data	0.315	
2344												
2345	**Critical Values for Background Threshold Values (BTVs)**											
2346					Tolerance Factor K (For UTL)	1.932				d2max (for USL)	3.192	

	A	B	C	D	E	F	G	H	I	J	K	L
2347												
2348	**Normal GOF Test on Detects Only**											
2349					Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**					
2350					5% Shapiro Wilk Critical Value	0.934	Data Not Normal at 5% Significance Level					
2351					Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**					
2352					5% Lilliefors Critical Value	0.148	Data Not Normal at 5% Significance Level					
2353	Data Not Normal at 5% Significance Level											
2354												
2355	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2356					KM Mean	1.869			KM SD	0.658		
2357					95% UTL95% Coverage	3.139			95% KM UPL (t)	2.967		
2358					90% KM Percentile (z)	2.712			95% KM Percentile (z)	2.951		
2359					99% KM Percentile (z)	3.399			95% KM USL	3.968		
2360												
2361	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2362					Mean	2.166			SD	0.616		
2363					95% UTL95% Coverage	3.357			95% UPL (t)	3.195		
2364					90% Percentile (z)	2.956			95% Percentile (z)	3.18		
2365					99% Percentile (z)	3.6			95% USL	4.133		
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	0.973	**Anderson-Darling GOF Test**					
2370					5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level					
2371					K-S Test Statistic	0.137	**Kolmogorov-Smirnov GOF**					
2372					5% K-S Critical Value	0.149	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)	9.957			k star (bias corrected MLE)	9.123		
2377					Theta hat (MLE)	0.199			Theta star (bias corrected MLE)	0.217		
2378					nu hat (MLE)	697			nu star (bias corrected)	638.6		
2379					MLE Mean (bias corrected)	1.98						
2380					MLE Sd (bias corrected)	0.656			95% Percentile of Chisquare (2kstar)	29.18		
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	0.711			Mean	1.862		
2389					Maximum	4.4			Median	1.798		
2390					SD	0.65			CV	0.349		
2391					k hat (MLE)	8.951			k star (bias corrected MLE)	8.675		
2392					Theta hat (MLE)	0.208			Theta star (bias corrected MLE)	0.215		
2393					nu hat (MLE)	1701			nu star (bias corrected)	1648		
2394					MLE Mean (bias corrected)	1.862			MLE Sd (bias corrected)	0.632		
2395					95% Percentile of Chisquare (2kstar)	28.04			90% Percentile	2.705		
2396					95% Percentile	3.009			99% Percentile	3.639		
2397	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											

	A	B	C	D	E	F	G	H	I	J	K	L
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				3.248	3.277	95% Approx. Gamma UPL				3.017	3.033
2401	95% Gamma USL				4.53	4.659						
2402												
2403	**Estimates of Gamma Parameters using KM Estimates**											
2404	Mean (KM)				1.869		SD (KM)				0.658	
2405	Variance (KM)				0.432		SE of Mean (KM)				0.102	
2406	k hat (KM)				8.081		k star (KM)				7.832	
2407	nu hat (KM)				1535		nu star (KM)				1488	
2408	theta hat (KM)				0.231		theta star (KM)				0.239	
2409	80% gamma percentile (KM)				2.396		90% gamma percentile (KM)				2.76	
2410	95% gamma percentile (KM)				3.086		99% gamma percentile (KM)				3.761	
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				3.158	3.166	95% Approx. Gamma UPL				2.945	2.946
2416	95% KM Gamma Percentile				2.925	2.926	95% Gamma USL				4.329	4.405
2417												
2418	**Lognormal GOF Test on Detected Observations Only**											
2419	Shapiro Wilk Test Statistic				0.93		**Shapiro Wilk GOF Test**					
2420	5% Shapiro Wilk Critical Value				0.934		Data Not Lognormal at 5% Significance Level					
2421	Lilliefors Test Statistic				0.14		**Lilliefors GOF Test**					
2422	5% Lilliefors Critical Value				0.148		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				1.866		Mean in Log Scale				0.576	
2427	SD in Original Scale				0.612		SD in Log Scale				0.305	
2428	95% UTL95% Coverage				3.206		95% BCA UTL95% Coverage				3.463	
2429	95% Bootstrap (%) UTL95% Coverage				3.463		95% UPL (t)				2.96	
2430	90% Percentile (z)				2.63		95% Percentile (z)				2.938	
2431	99% Percentile (z)				3.616		95% USL				4.708	
2432												
2433	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2434	KM Mean of Logged Data				0.575		95% KM UTL (Lognormal)95% Coverage				3.204	
2435	KM SD of Logged Data				0.305		95% KM UPL (Lognormal)				2.958	
2436	95% KM Percentile Lognormal (z)				2.936		95% KM USL (Lognormal)				4.706	
2437												
2438	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2439	Mean in Original Scale				2.166		Mean in Log Scale				0.725	
2440	SD in Original Scale				0.616		SD in Log Scale				0.331	
2441	95% UTL95% Coverage				3.909		95% UPL (t)				3.586	
2442	90% Percentile (z)				3.153		95% Percentile (z)				3.556	
2443	99% Percentile (z)				4.455		95% USL				5.931	
2444	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2445												
2446	**Nonparametric Distribution Free Background Statistics**											
2447	Data appear to follow a Discernible Distribution at 5% Significance Level											
2448												

	A	B	C	D	E	F	G	H	I	J	K	L
2449	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2450					Order of Statistic, r	93				95% UTL with95% Coverage		5
2451					Approx, f used to compute achieved CC	1.632				Approximate Actual Confidence Coefficient achieved by UTL		0.859
2452					Approximate Sample Size needed to achieve specified CC	124				95% UPL		5
2453					95% USL	5				95% KM Chebyshev UPL		4.75
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	74				Number of Missing Observations		62
2465					Number of Distinct Observations	5						
2466					Number of Detects	50				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	0.644				Percent Non-Detects		32.43%
2471					Mean Detected	5.946				SD Detected		0.802
2472					Mean of Detected Logged Data	1.774				SD of Detected Logged Data		0.134
2473												
2474	**Critical Values for Background Threshold Values (BTVs)**											
2475					Tolerance Factor K (For UTL)	1.975				d2max (for USL)		3.104
2476												
2477	**Normal GOF Test on Detects Only**											
2478					Shapiro Wilk Test Statistic	0.836				**Shapiro Wilk GOF Test**		
2479					5% Shapiro Wilk Critical Value	0.947				Data Not Normal at 5% Significance Level		
2480					Lilliefors Test Statistic	0.233				**Lilliefors GOF Test**		
2481					5% Lilliefors Critical Value	0.125				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	5.639				KM SD		0.789
2486					95% UTL95% Coverage	7.197				95% KM UPL (t)		6.962
2487					90% KM Percentile (z)	6.65				95% KM Percentile (z)		6.937
2488					99% KM Percentile (z)	7.474				95% KM USL		8.088
2489												
2490	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2491					Mean	4.828				SD		1.752
2492					95% UTL95% Coverage	8.288				95% UPL (t)		7.767
2493					90% Percentile (z)	7.074				95% Percentile (z)		7.71
2494					99% Percentile (z)	8.904				95% USL		10.27
2495	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2496												
2497	**Gamma GOF Tests on Detected Observations Only**											
2498					A-D Test Statistic	3.493				**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	0.225	**Kolmogorov-Smirnov GOF**					
2501					5% K-S Critical Value	0.125	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)	57.01	k star (bias corrected MLE)	53.6				
2506					Theta hat (MLE)	0.104	Theta star (bias corrected MLE)	0.111				
2507					nu hat (MLE)	5701	nu star (bias corrected)	5360				
2508					MLE Mean (bias corrected)	5.946						
2509					MLE Sd (bias corrected)	0.812	95% Percentile of Chisquare (2kstar)	132.4				
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	3.186	Mean	5.396				
2518					Maximum	8	Median	5				
2519					SD	1.066	CV	0.197				
2520					k hat (MLE)	25.6	k star (bias corrected MLE)	24.57				
2521					Theta hat (MLE)	0.211	Theta star (bias corrected MLE)	0.22				
2522					nu hat (MLE)	3789	nu star (bias corrected)	3636				
2523					MLE Mean (bias corrected)	5.396	MLE Sd (bias corrected)	1.089				
2524					95% Percentile of Chisquare (2kstar)	66.5	90% Percentile	6.83				
2525					95% Percentile	7.302	99% Percentile	8.246				
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	7.717	7.753	95% Approx. Gamma UPL		7.319	7.341	
2530					95% Gamma USL	9.361	9.475					
2531												
2532					**Estimates of Gamma Parameters using KM Estimates**							
2533					Mean (KM)	5.639	SD (KM)	0.789				
2534					Variance (KM)	0.622	SE of Mean (KM)	0.0926				
2535					k hat (KM)	51.09	k star (KM)	49.03				
2536					nu hat (KM)	7562	nu star (KM)	7257				
2537					theta hat (KM)	0.11	theta star (KM)	0.115				
2538					80% gamma percentile (KM)	6.303	90% gamma percentile (KM)	6.693				
2539					95% gamma percentile (KM)	7.026	99% gamma percentile (KM)	7.68				
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	7.241	7.248	95% Approx. Gamma UPL		6.977	6.979	
2545					95% KM Gamma Percentile	6.948	6.95	95% Gamma USL		8.307	8.34	
2546												
2547					**Lognormal GOF Test on Detected Observations Only**							
2548					Shapiro Wilk Test Statistic	0.832	**Shapiro Wilk GOF Test**					
2549					5% Shapiro Wilk Critical Value	0.947	Data Not Lognormal at 5% Significance Level					
2550					Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**					

2551	5% Lilliefors Critical Value					0.125	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					5.432	Mean in Log Scale					1.675
2556	SD in Original Scale					1.017	SD in Log Scale					0.187
2557	95% UTL95% Coverage					7.731	95% BCA UTL95% Coverage					6.35
2558	95% Bootstrap (%) UTL95% Coverage					7.3	95% UPL (t)					7.312
2559	90% Percentile (z)					6.789	95% Percentile (z)					7.268
2560	99% Percentile (z)					8.258	95% USL					9.555
2561												
2562	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2563	KM Mean of Logged Data					1.721	95% KM UTL (Lognormal)95% Coverage					7.269
2564	KM SD of Logged Data					0.133	95% KM UPL (Lognormal)					6.987
2565	95% KM Percentile Lognormal (z)					6.957	95% KM USL (Lognormal)					8.45
2566												
2567	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2568	Mean in Original Scale					4.828	Mean in Log Scale					1.496
2569	SD in Original Scale					1.752	SD in Log Scale					0.419
2570	95% UTL95% Coverage					10.2	95% UPL (t)					9.008
2571	90% Percentile (z)					7.633	95% Percentile (z)					8.887
2572	99% Percentile (z)					11.82	95% USL					16.37
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					73	95% UTL with95% Coverage					7.3
2580	Approx, f used to compute achieved CC					1.921	Approximate Actual Confidence Coefficient achieved by UTL					0.89
2581	Approximate Sample Size needed to achieve specified CC					93	95% UPL					7
2582	95% USL					8	95% KM Chebyshev UPL					9.101
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					107	Number of Distinct Observations					66
2594							Number of Missing Observations					29
2595	Minimum					110	First Quartile					180
2596	Second Largest					286	Median					200
2597	Maximum					294	Third Quartile					227
2598	Mean					202	SD					35.01
2599	Coefficient of Variation					0.173	Skewness					0.169
2600	Mean of logged Data					5.293	SD of logged Data					0.178
2601												

	A	B	C	D	E	F	G	H	I	J	K	L
2602	**Critical Values for Background Threshold Values (BTVs)**											
2603					Tolerance Factor K (For UTL)	1.913				d2max (for USL)		3.232
2604												
2605	**Normal GOF Test**											
2606					Shapiro Wilk Test Statistic	0.986	**Normal GOF Test**					
2607					5% Shapiro Wilk P Value	0.81	Data appear Normal at 5% Significance Level					
2608					Lilliefors Test Statistic	0.083	**Lilliefors GOF Test**					
2609					5% Lilliefors Critical Value	0.0859	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				90% Percentile (z)		246.9
2614					95% UPL (t)	260.4				95% Percentile (z)		259.6
2615					95% USL	315.2				99% Percentile (z)		283.5
2616												
2617	**Gamma GOF Test**											
2618					A-D Test Statistic	0.28	**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	0.0624	**Kolmogorov-Smirnov Gamma GOF Test**					
2621					5% K-S Critical Value	0.0874	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)	32.84				k star (bias corrected MLE)		31.92
2626					Theta hat (MLE)	6.153				Theta star (bias corrected MLE)		6.329
2627					nu hat (MLE)	7028				nu star (bias corrected)		6832
2628					MLE Mean (bias corrected)	202				MLE Sd (bias corrected)		35.76
2629												
2630	**Background Statistics Assuming Gamma Distribution**											
2631					95% Wilson Hilferty (WH) Approx. Gamma UPL	264.6				90% Percentile		249
2632					95% Hawkins Wixley (HW) Approx. Gamma UPL	265.3				95% Percentile		264.2
2633					95% WH Approx. Gamma UTL with 95% Coverage	275.2				99% Percentile		294.4
2634					95% HW Approx. Gamma UTL with 95% Coverage	276.2						
2635					95% WH USL	336.6				95% HW USL		340.3
2636												
2637	**Lognormal GOF Test**											
2638					Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**					
2639					5% Shapiro Wilk P Value	0.589	Data appear Lognormal at 5% Significance Level					
2640					Lilliefors Test Statistic	0.0644	**Lilliefors Lognormal GOF Test**					
2641					5% Lilliefors Critical Value	0.0859	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	279.6				90% Percentile (z)		249.9
2646					95% UPL (t)	267.6				95% Percentile (z)		266.6
2647					95% USL	353.5				99% Percentile (z)		300.9
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	105				95% UTL with 95% Coverage		276
2654					Approx, f used to compute achieved CC	1.842				Approximate Actual Confidence Coefficient achieved by UTL		0.908
2655										Approximate Sample Size needed to achieve specified CC		124
2656					95% Percentile Bootstrap UTL with 95% Coverage	274.8				95% BCA Bootstrap UTL with 95% Coverage		274.8
2657					95% UPL	266.4				90% Percentile		247.4
2658					90% Chebyshev UPL	307.6				95% Percentile		260.7
2659					95% Chebyshev UPL	355.4				99% Percentile		285.4
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	131				Number of Missing Observations		5
2672					Number of Distinct Observations	18						
2673					Number of Detects	32				Number of Non-Detects		99
2674					Number of Distinct Detects	18				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	0.0993				Percent Non-Detects		75.57%
2678					Mean Detected	0.988				SD Detected		0.315
2679					Mean of Detected Logged Data	-0.0655				SD of Detected Logged Data		0.342
2680												
2681					**Critical Values for Background Threshold Values (BTVs)**							
2682					Tolerance Factor K (For UTL)	1.885				d2max (for USL)		3.299
2683												
2684					**Normal GOF Test on Detects Only**							
2685					Shapiro Wilk Test Statistic	0.942				**Shapiro Wilk GOF Test**		
2686					5% Shapiro Wilk Critical Value	0.93				Detected Data appear Normal at 5% Significance Level		
2687					Lilliefors Test Statistic	0.11				**Lilliefors GOF Test**		
2688					5% Lilliefors Critical Value	0.154				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	0.683				KM SD		0.255
2693					95% UTL95% Coverage	1.164				95% KM UPL (t)		1.108
2694					90% KM Percentile (z)	1.01				95% KM Percentile (z)		1.103
2695					99% KM Percentile (z)	1.277				95% KM USL		1.525
2696												
2697					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
2698					Mean	0.604				SD		0.278
2699					95% UTL95% Coverage	1.128				95% UPL (t)		1.066
2700					90% Percentile (z)	0.96				95% Percentile (z)		1.061
2701					99% Percentile (z)	1.251				95% USL		1.521
2702					**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							
2703												

	A	B	C	D	E	F	G	H	I	J	K	L
2704	**Gamma GOF Tests on Detected Observations Only**											
2705					A-D Test Statistic	0.774	**Anderson-Darling GOF Test**					
2706					5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level					
2707					K-S Test Statistic	0.151	**Kolmogorov-Smirnov GOF**					
2708					5% K-S Critical Value	0.155	Detected data appear Gamma Distributed at 5% Significance Level					
2709	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
2710												
2711	**Gamma Statistics on Detected Data Only**											
2712					k hat (MLE)	9.447	k star (bias corrected MLE)					8.582
2713					Theta hat (MLE)	0.105	Theta star (bias corrected MLE)					0.115
2714					nu hat (MLE)	604.6	nu star (bias corrected)					549.2
2715					MLE Mean (bias corrected)	0.988						
2716					MLE Sd (bias corrected)	0.337	95% Percentile of Chisquare (2kstar)					27.8
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					0.606
2725					Maximum	1.6	Median					0.572
2726					SD	0.34	CV					0.561
2727					k hat (MLE)	2.408	k star (bias corrected MLE)					2.357
2728					Theta hat (MLE)	0.252	Theta star (bias corrected MLE)					0.257
2729					nu hat (MLE)	630.8	nu star (bias corrected)					617.7
2730					MLE Mean (bias corrected)	0.606	MLE Sd (bias corrected)					0.394
2731					95% Percentile of Chisquare (2kstar)	10.63	90% Percentile					1.134
2732					95% Percentile	1.365	99% Percentile					1.873
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	1.512	1.605	95% Approx. Gamma UPL			1.361	1.428	
2737				95% Gamma USL	2.751	3.153						
2738												
2739	**Estimates of Gamma Parameters using KM Estimates**											
2740					Mean (KM)	0.683	SD (KM)					0.255
2741					Variance (KM)	0.0651	SE of Mean (KM)					0.0301
2742					k hat (KM)	7.179	k star (KM)					7.019
2743					nu hat (KM)	1881	nu star (KM)					1839
2744					theta hat (KM)	0.0952	theta star (KM)					0.0974
2745					80% gamma percentile (KM)	0.886	90% gamma percentile (KM)					1.028
2746					95% gamma percentile (KM)	1.155	99% gamma percentile (KM)					1.421
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	1.164	1.164	95% Approx. Gamma UPL			1.094	1.093	
2752				95% KM Gamma Percentile	1.088	1.087	95% Gamma USL			1.678	1.708	
2753												
2754	**Lognormal GOF Test on Detected Observations Only**											

2755	Shapiro Wilk Test Statistic					0.923	**Shapiro Wilk GOF Test**					
2756	5% Shapiro Wilk Critical Value					0.93	Data Not Lognormal at 5% Significance Level					
2757	Lilliefors Test Statistic					0.17	**Lilliefors GOF Test**					
2758	5% Lilliefors Critical Value					0.154	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					0.641	Mean in Log Scale					-0.543
2763	SD in Original Scale					0.296	SD in Log Scale					0.445
2764	95% UTL95% Coverage					1.346	95% BCA UTL95% Coverage					1.2
2765	95% Bootstrap (%) UTL95% Coverage					1.4	95% UPL (t)					1.219
2766	90% Percentile (z)					1.028	95% Percentile (z)					1.209
2767	99% Percentile (z)					1.638	95% USL					2.526
2768												
2769	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2770	KM Mean of Logged Data					-0.436	95% KM UTL (Lognormal)95% Coverage					1.169
2771	KM SD of Logged Data					0.314	95% KM UPL (Lognormal)					1.09
2772	95% KM Percentile Lognormal (z)					1.084	95% KM USL (Lognormal)					1.823
2773												
2774	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2775	Mean in Original Scale					0.604	Mean in Log Scale					-0.587
2776	SD in Original Scale					0.278	SD in Log Scale					0.391
2777	95% UTL95% Coverage					1.162	95% UPL (t)					1.066
2778	90% Percentile (z)					0.918	95% Percentile (z)					1.058
2779	99% Percentile (z)					1.381	95% USL					2.021
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					128	95% UTL with95% Coverage					1.5
2787	Approx, f used to compute achieved CC					1.684	Approximate Actual Confidence Coefficient achieved by UTL					0.898
2788	Approximate Sample Size needed to achieve specified CC					153	95% UPL					1.4
2789	95% USL					1.6	95% KM Chebyshev UPL					1.799
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					132	Number of Missing Observations					4
2801	Number of Distinct Observations					4						
2802	Number of Detects					2	Number of Non-Detects					130
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		98.48%
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
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)	1.884				d2max (for USL)		3.302
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	0.00526				KM SD		0.00103
2822					95% UTL95% Coverage	0.00719				95% KM UPL (t)		0.00696
2823					90% KM Percentile (z)	0.00657				95% KM Percentile (z)		0.00694
2824					99% KM Percentile (z)	0.00764				95% KM USL		0.00864
2825												
2826					DL/2 Substitution Background Statistics Assuming Normal Distribution							
2827					Mean	0.0105				SD		0.00548
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)	0.00526				SD (KM)		0.00103
2845					Variance (KM)	1.0517E-6				SE of Mean (KM)		2.5887E-4
2846					k hat (KM)	26.27				k star (KM)		25.68
2847					nu hat (KM)	6935				nu star (KM)		6779
2848					theta hat (KM)	2.0008E-4				theta star (KM)		2.0469E-4
2849					80% gamma percentile (KM)	0.0061				90% gamma percentile (KM)		0.00662
2850					95% gamma percentile (KM)	0.00707				99% gamma percentile (KM)		0.00797
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	0.00696	0.00693			95% Approx. Gamma UPL	0.00674	0.00671
2856					95% KM Gamma Percentile	0.00672	0.00669			95% Gamma USL	0.00851	0.00849

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	0.00667			Mean in Log Scale	-5.023		
2863					SD in Original Scale	0.00113			SD in Log Scale	0.168		
2864					95% UTL95% Coverage	0.00903			95% BCA UTL95% Coverage	0.00902		
2865					95% Bootstrap (%) UTL95% Coverage	0.00902			95% UPL (t)	0.0087		
2866					90% Percentile (z)	0.00816			95% Percentile (z)	0.00867		
2867					99% Percentile (z)	0.00972			95% USL	0.0114		
2868												
2869	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2870					KM Mean of Logged Data	-5.261			95% KM UTL (Lognormal)95% Coverage	0.00685		
2871					KM SD of Logged Data	0.147			95% KM UPL (Lognormal)	0.00663		
2872					95% KM Percentile Lognormal (z)	0.00661			95% KM USL (Lognormal)	0.00843		
2873												
2874	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2875					Mean in Original Scale	0.0105			Mean in Log Scale	-4.76		
2876					SD in Original Scale	0.00548			SD in Log Scale	0.719		
2877					95% UTL95% Coverage	0.0332			95% UPL (t)	0.0283		
2878					90% Percentile (z)	0.0215			95% Percentile (z)	0.028		
2879					99% Percentile (z)	0.0457			95% USL	0.0921		
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	129			95% UTL with95% Coverage	0.03		
2887					Approx, f used to compute achieved CC	1.697			Approximate Actual Confidence Coefficient achieved by UTL	0.901		
2888					Approximate Sample Size needed to achieve specified CC	153			95% UPL	0.03		
2889					95% USL	0.03			95% KM Chebyshev UPL	0.00974		
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	114			Number of Missing Observations	22		
2901					Number of Distinct Observations	110						
2902					Number of Detects	111			Number of Non-Detects	3		
2903					Number of Distinct Detects	107			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	1647			Percent Non-Detects	2.632%		
2907					Mean Detected	37.89			SD Detected	40.58		

2908					Mean of Detected Logged Data	2.957				SD of Detected Logged Data		1.299
2909												
2910					**Critical Values for Background Threshold Values (BTVs)**							
2911					Tolerance Factor K (For UTL)	1.904				d2max (for USL)		3.254
2912												
2913					**Normal GOF Test on Detects Only**							
2914					Shapiro Wilk Test Statistic	0.805	**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	0.194	**Lilliefors GOF Test**					
2917					5% Lilliefors Critical Value	0.0844	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	36.94				KM SD		40.28
2922					95% UTL95% Coverage	113.6				95% KM UPL (t)		104
2923					90% KM Percentile (z)	88.57				95% KM Percentile (z)		103.2
2924					99% KM Percentile (z)	130.7				95% KM USL		168
2925												
2926					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
2927					Mean	36.93				SD		40.47
2928					95% UTL95% Coverage	114				95% UPL (t)		104.3
2929					90% Percentile (z)	88.8				95% Percentile (z)		103.5
2930					99% Percentile (z)	131.1				95% USL		168.6
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	0.965	**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	0.0744	**Kolmogorov-Smirnov GOF**					
2937					5% K-S Critical Value	0.0896	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)	0.867				k star (bias corrected MLE)		0.849
2942					Theta hat (MLE)	43.73				Theta star (bias corrected MLE)		44.62
2943					nu hat (MLE)	192.4				nu star (bias corrected)		188.5
2944					MLE Mean (bias corrected)	37.89						
2945					MLE Sd (bias corrected)	41.12				95% Percentile of Chisquare (2kstar)		5.393
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		36.9
2954					Maximum	169				Median		19.5
2955					SD	40.5				CV		1.098
2956					k hat (MLE)	0.71				k star (bias corrected MLE)		0.697
2957					Theta hat (MLE)	52				Theta star (bias corrected MLE)		52.96
2958					nu hat (MLE)	161.8				nu star (bias corrected)		158.8

	A	B	C	D	E	F	G	H	I	J	K	L
2959				MLE Mean (bias corrected)		36.9				MLE Sd (bias corrected)		44.2
2960				95% Percentile of Chisquare (2kstar)		4.751				90% Percentile		92.72
2961				95% Percentile		125.8				99% Percentile		204.8
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				143.4	160	95% Approx. Gamma UPL				120.3	130.6
2966	95% Gamma USL				331.5	429.2						
2967												
2968	**Estimates of Gamma Parameters using KM Estimates**											
2969				Mean (KM)		36.94				SD (KM)		40.28
2970				Variance (KM)		1623				SE of Mean (KM)		3.79
2971				k hat (KM)		0.841				k star (KM)		0.825
2972				nu hat (KM)		191.8				nu star (KM)		188.1
2973				theta hat (KM)		43.92				theta star (KM)		44.79
2974				80% gamma percentile (KM)		60.27				90% gamma percentile (KM)		89.17
2975				95% gamma percentile (KM)		118.5				99% gamma percentile (KM)		187.7
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				137.5	148.1	95% Approx. Gamma UPL				116	122.1
2981	95% KM Gamma Percentile				114.2	120	95% Gamma USL				311.5	381.5
2982												
2983	**Lognormal GOF Test on Detected Observations Only**											
2984				Shapiro Wilk Approximate Test Statistic		0.946	**Shapiro Wilk GOF Test**					
2985				5% Shapiro Wilk P Value		4.2531E-4	Data Not Lognormal at 5% Significance Level					
2986				Lilliefors Test Statistic		0.0609	**Lilliefors GOF Test**					
2987				5% Lilliefors Critical Value		0.0844	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		36.95				Mean in Log Scale		2.9
2992				SD in Original Scale		40.45				SD in Log Scale		1.328
2993				95% UTL95% Coverage		227.7				95% BCA UTL95% Coverage		140.1
2994				95% Bootstrap (%) UTL95% Coverage		140.1				95% UPL (t)		165.9
2995				90% Percentile (z)		99.64				95% Percentile (z)		161.4
2996				99% Percentile (z)		398.9				95% USL		1366
2997												
2998	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2999				KM Mean of Logged Data		2.894				95% KM UTL (Lognormal)95% Coverage		228.6
3000				KM SD of Logged Data		1.333				95% KM UPL (Lognormal)		166.4
3001				95% KM Percentile Lognormal (z)		161.8				95% KM USL (Lognormal)		1382
3002												
3003	**Background DL/2 Statistics Assuming Lognormal Distribution**											
3004				Mean in Original Scale		36.93				Mean in Log Scale		2.889
3005				SD in Original Scale		40.47				SD in Log Scale		1.347
3006				95% UTL95% Coverage		233.6				95% UPL (t)		169.5
3007				90% Percentile (z)		101				95% Percentile (z)		164.8
3008				99% Percentile (z)		412.5				95% USL		1438
3009	**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
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	111				95% UTL with95% Coverage	138	
3016					Approx, f used to compute achieved CC	1.461				Approximate Actual Confidence Coefficient achieved by UTL	0.827	
3017					Approximate Sample Size needed to achieve specified CC	153				95% UPL	126	
3018					95% USL	169				95% KM Chebyshev UPL	213.3	
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	136				Number of Missing Observations	0	
3030					Number of Distinct Observations	1						
3031					Number of Detects	0				Number of Non-Detects	136	
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	136				Number of Missing Observations	0	
3050					Number of Distinct Observations	1						
3051					Number of Detects	0				Number of Non-Detects	136	
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				136		Number of Missing Observations				0	
3070	Number of Distinct Observations				1							
3071	Number of Detects				0		Number of Non-Detects				136	
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				136		Number of Missing Observations				0	
3090	Number of Distinct Observations				2							
3091	Number of Detects				0		Number of Non-Detects				136	
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				133		Number of Missing Observations				3	
3110	Number of Distinct Observations				2							
3111	Number of Detects				0		Number of Non-Detects				133	

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!											
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	136				Number of Missing Observations		0
3130					Number of Distinct Observations	1						
3131					Number of Detects	0				Number of Non-Detects		136
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	136				Number of Missing Observations		0
3150					Number of Distinct Observations	1						
3151					Number of Detects	0				Number of Non-Detects		136
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					136	Number of Missing Observations					0
3170	Number of Distinct Observations					2						
3171	Number of Detects					0	Number of Non-Detects					136
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					136	Number of Missing Observations					0
3190	Number of Distinct Observations					1						
3191	Number of Detects					0	Number of Non-Detects					136
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					134	Number of Missing Observations					2
3210	Number of Distinct Observations					1						
3211	Number of Detects					0	Number of Non-Detects					134
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												
3225												
3226	1,1,1-TRICHLOROETHANE											
3227												
3228	General Statistics											
3229					Total Number of Observations	136				Number of Missing Observations		0
3230					Number of Distinct Observations	1						
3231					Number of Detects	0				Number of Non-Detects		136
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	136				Number of Missing Observations		0
3250					Number of Distinct Observations	1						
3251					Number of Detects	0				Number of Non-Detects		136
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												

VINYL CHLORIDE

General Statistics

Total Number of Observations	130	Number of Missing Observations	6
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	130
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1
Maximum Detect	N/A	Maximum Non-Detect	1
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 VINYL CHLORIDE was not processed!

XYLENES (TOTAL)

General Statistics

Total Number of Observations	133	Number of Missing Observations	3
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	133
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	1
Maximum Detect	N/A	Maximum Non-Detect	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!

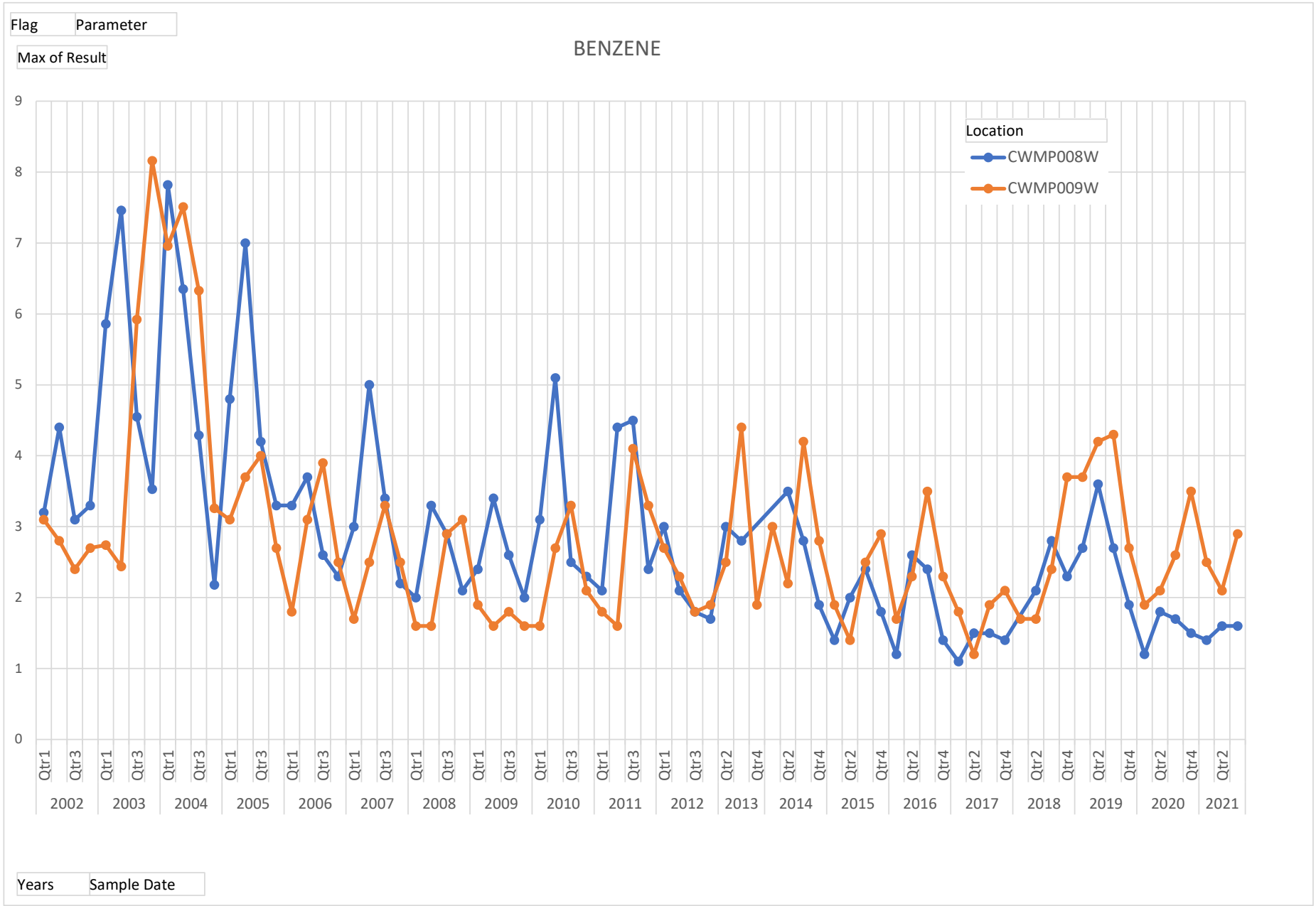
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

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

The data set for variable XYLENES (TOTAL) was not processed!

ATTACHMENT 3

VOC TREND PLOTS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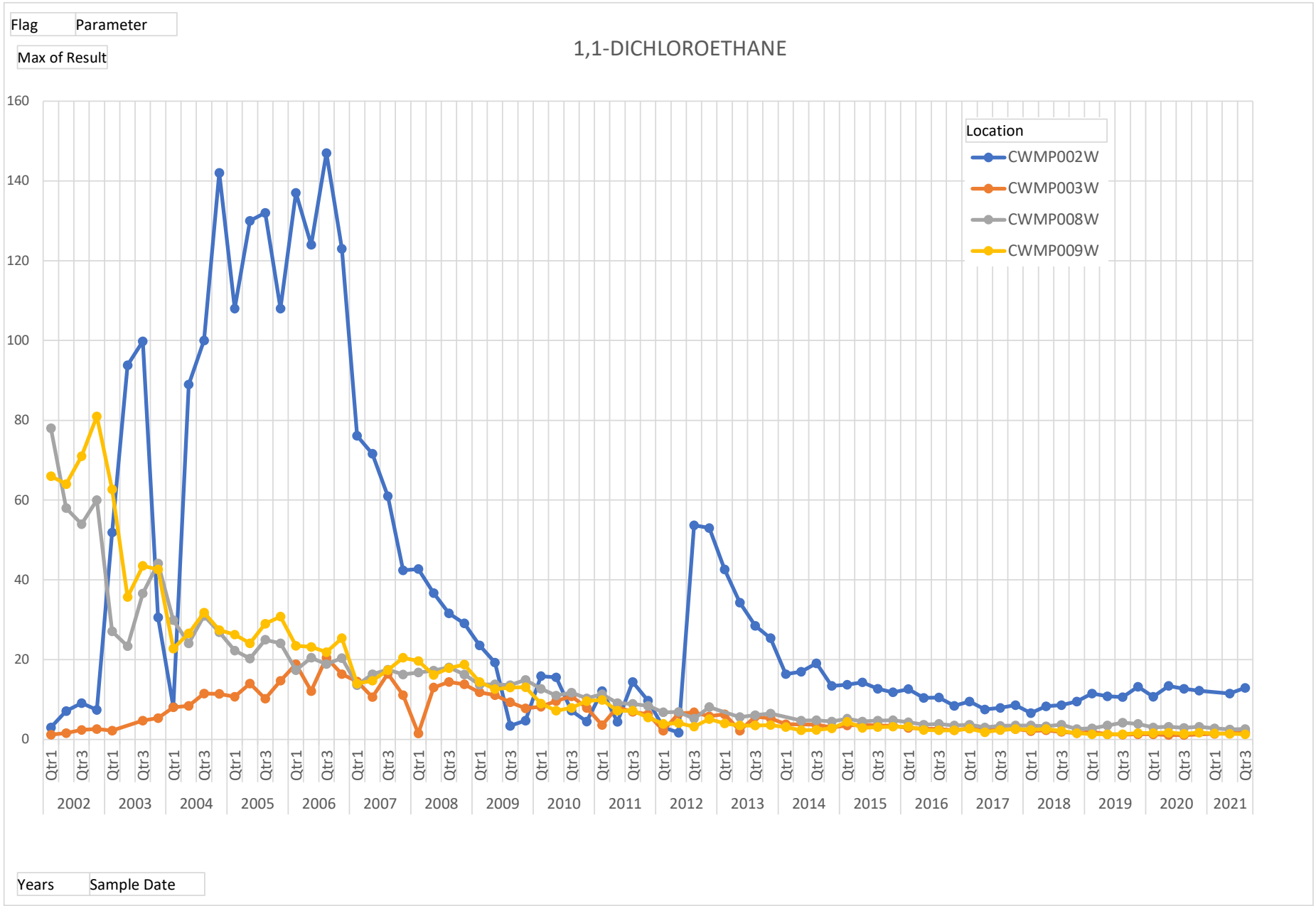
Parameter
BENZENE
Max of Result
Location
CWMP008W
CWMP009W
9
8
7
6
5
4
3
2
1
0
Qtr1
Qtr3
Qtr2
Qtr4
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Years
Sample Date


Flag
Parameter
Max of Result
1,1-DICHLOROETHANE
160
140
120
100
80
60
40
20
0
Location
CWMP002W
CWMP003W
CWMP008W
CWMP009W
Qtr1
Qtr3
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Years
Sample Date

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/31/2021
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: 7.88 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.50 ft — Elevation of Water Level: 445.52 ft./MSL

Sampling Depth: 33 ft — Volume of Water Column: 42.03 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 2.4

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/19/2021 — Sample Collection Time: 10:38

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): 3189192001 — Final Lab Analysis CompletionDate: 8/5/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	7/19/2021

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	0.188	EPA 350.3
BICARBONATE	239	SM18-2321
CALCIUM, TOTAL	19.4	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	67.3	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	10.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	7.7	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	10	EPA 300.0
pH-FIELD (SU)	5.02	FIELD
pH-LAB (SU)	5.64	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	33.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	533	FIELD
SPEC. COND., LAB (umhos/cm)	324	EPA 120.1
SULFATE	20.5	EPA 300.0
ALKALINITY	14	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	266	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.33	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	7/19/2021

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
08/31/2021
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: 27.97 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.23 ft — Elevation of Water Level: 487.16 ft./MSL

Sampling Depth: 57 ft — Volume of Water Column: 56.29 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): 7/19/2021 — Sample Collection Time: 11:57

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): 3189192002 — Final Lab Analysis CompletionDate: 8/5/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	7/19/2021

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	0.116	EPA 350.3
BICARBONATE	7	SM18-2321
CALCIUM, TOTAL	14.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	27.3	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	560	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	10.7	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	55	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	18.7	EPA 300.0
pH-FIELD (SU)	5.15	FIELD
pH-LAB (SU)	5.5	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	369	FIELD
SPEC. COND., LAB (umhos/cm)	224	EPA 120.1
SULFATE	2.3	EPA 300.0
ALKALINITY	7	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	208	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	6.09	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	7/19/2021

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
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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: 40.18 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -0.37 ft — Elevation of Water Level: 473.25 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 146.60 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.2

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/19/2021 — Sample Collection Time: 13:27

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): 3189192003 — Final Lab Analysis CompletionDate: 8/5/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	7/19/2021

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	19	SM18-2321
CALCIUM, TOTAL	13.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	56.3	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	7.4	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	50	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.3	EPA 300.0
pH-FIELD (SU)	5.08	FIELD
pH-LAB (SU)	5.64	EPA 150.1
POTASSIUM, TOTAL	2.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	29.9	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	426	FIELD
SPEC. COND., LAB (umhos/cm)	254	EPA 120.1
SULFATE	4.9	EPA 300.0
ALKALINITY	19	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	212	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.86	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	7/19/2021

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.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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

Casing Stickup: 1.90 ft — Elevation of Water Level: 317.45 ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: 53.83 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): 7/22/2021 — Sample Collection Time: 10:40

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): 3190080001 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	7/22/2021

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	86	SM18-2321
CALCIUM, TOTAL	32	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	34.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	16200	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	9.4	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	320	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.9	EPA 300.0
pH-FIELD (SU)	5.91	FIELD
pH-LAB (SU)	6.57	EPA 150.1
POTASSIUM, TOTAL	1.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	467	FIELD
SPEC. COND., LAB (umhos/cm)	283	EPA 120.1
SULFATE	5.4	EPA 300.0
ALKALINITY	86	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	224	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.94	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	183	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	7/22/2021

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
08/31/2021
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: 96.14 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.19 ft — Elevation of Water Level: 429.67 ft./MSL

Sampling Depth: 85 ft — Volume of Water Column: 5.67 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): 7/22/2021 — Sample Collection Time: 11:30

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): 3190080002 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	7/22/2021

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	125	SM18-2321
CALCIUM, TOTAL	51.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	102	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	16.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	1100	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	4.3	EPA 300.0
pH-FIELD (SU)	5.6	FIELD
pH-LAB (SU)	6.18	EPA 150.1
POTASSIUM, TOTAL	2.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	29.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	760	FIELD
SPEC. COND., LAB (umhos/cm)	530	EPA 120.1
SULFATE	21.7	EPA 300.0
ALKALINITY	125	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	432	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	5.51	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	7/22/2021

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	12.9	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/31/2021
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: 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: 109.67 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.29 ft — Elevation of Water Level: 414.54 ft./MSL

Sampling Depth: 100 ft — Volume of Water Column: -50.92 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): 7/22/2021 — Sample Collection Time: 11:45

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): 3190080003 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	7/22/2021

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	22	SM18-2321
CALCIUM, TOTAL	22.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	62.5	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	8.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	6.1	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7	EPA 300.0
pH-FIELD (SU)	5.24	FIELD
pH-LAB (SU)	5.91	EPA 150.1
POTASSIUM, TOTAL	1.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	20.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	434	FIELD
SPEC. COND., LAB (umhos/cm)	279	EPA 120.1
SULFATE	5.2	EPA 300.0
ALKALINITY	22	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	258	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	2.79	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	7/22/2021

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	1.8	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.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/31/2021
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: 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: 110.49 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.37 ft — Elevation of Water Level: 419.04 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 43.34 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): 7/22/2021 — Sample Collection Time: 11:56

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): 3190080004 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	7/22/2021

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	31	SM18-2321
CALCIUM, TOTAL	18.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	46.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	6.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	8.3	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	5.7	EPA 300.0
pH-FIELD (SU)	5.32	FIELD
pH-LAB (SU)	6.09	EPA 150.1
POTASSIUM, TOTAL	1.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	15.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	354	FIELD
SPEC. COND., LAB (umhos/cm)	228	EPA 120.1
SULFATE	5.9	EPA 300.0
ALKALINITY	31	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	218	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.61	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.21	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	7/22/2021

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
08/31/2021
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: CWMP016W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

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

Depth to Water Level: 14.3 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.53 ft — Elevation of Water Level: 297.67 ft./MSL

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

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

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/21/2021 — Sample Collection Time: 10:47

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): 3190082001 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	7/21/2021

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	0.1 ND	EPA 350.3
BICARBONATE	11	SM18-2321
CALCIUM, TOTAL	5.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	3.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	2000	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	1.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	15	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	2.1	EPA 300.0
pH-FIELD (SU)	5.31	FIELD
pH-LAB (SU)	6.2	EPA 150.1
POTASSIUM, TOTAL	0.56 ND	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	3.4	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	91	FIELD
SPEC. COND., LAB (umhos/cm)	57	EPA 120.1
SULFATE	9.9	EPA 300.0
ALKALINITY	11	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	57	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	4.54	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	7/21/2021

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 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
08/31/2021
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: 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: 8.64 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.10 ft — Elevation of Water Level: 352.26 ft./MSL

Sampling Depth: 17 ft — Volume of Water Column: 7.15 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.2

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/21/2021 — Sample Collection Time: 11:18

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): 3190082002 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	7/21/2021

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	0.1 ND	EPA 350.3
BICARBONATE	367	SM18-2321
CALCIUM, TOTAL	74.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	598	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	300	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	68.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	380	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	16.3	EPA 300.0
pH-FIELD (SU)	6.67	FIELD
pH-LAB (SU)	7.18	EPA 150.1
POTASSIUM, TOTAL	17.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	295	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3409	FIELD
SPEC. COND., LAB (umhos/cm)	2190	EPA 120.1
SULFATE	44.8	EPA 300.0
ALKALINITY	367	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1310	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	6	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.63	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	7/21/2021

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 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
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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: 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: 9.36 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.70 ft — Elevation of Water Level: 394.84 ft./MSL

Sampling Depth: 16 ft — Volume of Water Column: 6.75 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 4.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/21/2021 — Sample Collection Time: 11:56

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): 3190082003 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	7/21/2021

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	28	EPA 350.3
BICARBONATE	472	SM18-2321
CALCIUM, TOTAL	163	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	105	EPA 410.4
CHLORIDE	645	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	37100	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	77.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	12900	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.06	FIELD
pH-LAB (SU)	6.68	EPA 150.1
POTASSIUM, TOTAL	36	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	180	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	4020	FIELD
SPEC. COND., LAB (umhos/cm)	2210	EPA 120.1
SULFATE	6.2	EPA 300.0
ALKALINITY	472	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1230	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	34.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	37.6	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	7/21/2021

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	2.9	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.3	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/31/2021
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: 3.49 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.80 ft — Elevation of Water Level: 418.81 ft./MSL

Sampling Depth: 19 ft — Volume of Water Column: 3.15 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 6.1

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/21/2021 — Sample Collection Time: 13:42

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): 3190082004 — Final Lab Analysis CompletionDate: 8/4/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	7/21/2021

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	7.16	EPA 350.3
BICARBONATE	436	SM18-2321
CALCIUM, TOTAL	74.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	32	EPA 410.4
CHLORIDE	62.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	28700	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	36.7	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	17400	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	5.91	FIELD
pH-LAB (SU)	6.68	EPA 150.1
POTASSIUM, TOTAL	10.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	53.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1467	FIELD
SPEC. COND., LAB (umhos/cm)	887	EPA 120.1
SULFATE	5.6	EPA 300.0
ALKALINITY	436	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	520	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	12.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	20.8	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	7/21/2021

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1.6	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	2.6	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/31/2021
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): 7/23/2021 — 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): 3190408001 — Final Lab Analysis CompletionDate: 8/5/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	7/23/2021

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	336	SM18-2321
CALCIUM, TOTAL	84.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	644	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	110	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	74.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	17.4	EPA 300.0
pH-FIELD (SU)	8.47	FIELD
pH-LAB (SU)	8.47	EPA 150.1
POTASSIUM, TOTAL	22.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	320	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3768	FIELD
SPEC. COND., LAB (umhos/cm)	2550	EPA 120.1
SULFATE	57.6	EPA 300.0
ALKALINITY	358	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1480	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.58	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	7/23/2021

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
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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: 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): 7/23/2021 — Sample Collection Time: 10:25

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): 3190408002 — Final Lab Analysis CompletionDate: 8/5/2021

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	7/23/2021

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	0.408	EPA 350.3
BICARBONATE	456	SM18-2321
CALCIUM, TOTAL	84.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	794	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	270	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	87.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	140	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	25.4	EPA 300.0
pH-FIELD (SU)	7.93	FIELD
pH-LAB (SU)	8.05	EPA 150.1
POTASSIUM, TOTAL	19.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	407	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	5119	FIELD
SPEC. COND., LAB (umhos/cm)	3120	EPA 120.1
SULFATE	93.1	EPA 300.0
ALKALINITY	456	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1710	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5.4	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.32	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	7/23/2021

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.

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August 17, 2021

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

Certificate of Analysis

Revised Report - 8/17/2021 12:30:40 AM - See workorder comment section for explanation

Project Name:	**CRESWELL**	Workorder:	**3190080**
Purchase Order:	**PO-1000246**	Workorder ID:	**3rd QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Thursday, July 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: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3190080001	CWMP012W	Ground Water	7/22/2021 10:40	7/22/2021 13:48	Mr. Brian G Shade
3190080002	CWMP002W	Ground Water	7/22/2021 11:30	7/22/2021 13:48	Mr. Brian G Shade
3190080003	CWMP003W	Ground Water	7/22/2021 11:45	7/22/2021 13:48	Mr. Brian G Shade
3190080004	CWMP004W	Ground Water	7/22/2021 11:56	7/22/2021 13:48	Mr. Brian G Shade
3190080005	Field Blank	Water	7/22/2021 12:30	7/22/2021 13:48	Mr. Brian G Shade
3190080006	Trip Blank	Water	7/22/2021 13:48	7/22/2021 13:48	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3190080 3rd 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: 3190080 3rd 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: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080001** Date Collected: 7/22/2021 10:40 Matrix: Ground Water

Sample ID: **CWMP012W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/27/21 04:02	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:02	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	94.4	C	%	62 - 133	SW846 8260B			7/27/21 04:02	PDK	G
4-Bromofluorobenzene (S)	95.6	C	%	79 - 114	SW846 8260B			7/27/21 04:02	PDK	G
Dibromofluoromethane (S)	88.4	C	%	78 - 116	SW846 8260B			7/27/21 04:02	PDK	G
Toluene-d8 (S)	89.5	C	%	76 - 127	SW846 8260B			7/27/21 04:02	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	86	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	86	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/28/21 19:54	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	34.7	C	mg/L	2.0	EPA 300.0			7/23/21 09:34	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 09:34	MBW	B
Nitrate-N	7.9	C	mg/L	0.20	EPA 300.0			7/23/21 09:34	MBW	B
pH	6.57	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	283	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	5.4	C	mg/L	2.0	EPA 300.0			7/23/21 09:34	MBW	B
Total Dissolved Solids	224	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	0.94	C	mg/L	0.50	SW846 9060A			7/29/21 00:05	PAG	D
Turbidity	183	C	NTU	0.10	SM2130B-2011			7/23/21 08:35	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080001** Date Collected: 7/22/2021 10:40 Matrix: Ground Water

Sample ID: **CWMP012W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	32.0	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
Iron, Total	16.2	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
Magnesium, Total	9.4	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
Manganese, Total	0.32	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
Potassium, Total	1.4	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
Sodium, Total	13.8	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:58	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	65.25	C	Feet		Field			7/22/21 10:40	BGS	C
Dissolved Oxygen	3.23	C	mg/L	0.01	Field			7/22/21 10:40	BGS	C
Oxidation-Reduction Potential	211	C	mV		Field			7/22/21 10:40	BGS	C
pH, Field (SM4500B)	5.91	C	pH_Units		Field			7/22/21 10:40	BGS	C
Specific Conductance, Field	467	C	umhos/cm	1	Field			7/22/21 10:40	BGS	C
Temperature	16.64	C	Deg. C		Field			7/22/21 10:40	BGS	C
Turbidity, Field	132	C	NTU	1	Field			7/22/21 10:40	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080002** Date Collected: 7/22/2021 11:30 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Bromoform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Bromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Chlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Chloroethane	64.7	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Chloroform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,4-Dichlorobenzene	1.2	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,1-Dichloroethane	12.9	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:24	PDK	D
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Styrene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2,4-Trichlorobenzene	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:24	PDK	D
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D
1,2,3-Trichloropropane	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:24	PDK	D
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:24	PDK	D

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

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080002** Date Collected: 7/22/2021 11:30 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	94.6	C	%	62 - 133	SW846 8260B			7/27/21 04:24	PDK	D
4-Bromofluorobenzene (S)	97.4	C	%	79 - 114	SW846 8260B			7/27/21 04:24	PDK	D
Dibromofluoromethane (S)	89	C	%	78 - 116	SW846 8260B			7/27/21 04:24	PDK	D
Toluene-d8 (S)	88	C	%	76 - 127	SW846 8260B			7/27/21 04:24	PDK	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	125	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	125	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/29/21 00:12	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	102	C	mg/L	2.0	EPA 300.0			7/23/21 09:48	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 09:48	MBW	B
Nitrate-N	4.3	C	mg/L	0.20	EPA 300.0			7/23/21 09:48	MBW	B
pH	6.18	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	530	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	21.7	C	mg/L	2.0	EPA 300.0			7/23/21 09:48	MBW	B
Total Dissolved Solids	432	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	4.2	C	mg/L	0.50	SW846 9060A			7/29/21 00:05	PAG	D
Turbidity	5.51	C	NTU	0.10	SM2130B-2011			7/23/21 08:35	MBS	B
METALS										
Calcium, Total	51.8	C	mg/L	0.11	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
Magnesium, Total	16.8	C	mg/L	0.11	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
Manganese, Total	1.1	C	mg/L	0.0056	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
Potassium, Total	2.9	C	mg/L	0.56	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
Sodium, Total	29.7	C	mg/L	0.56	SW846 6010C	7/31/21 12:56	AHI	8/4/21 14:02	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	96.14	C	Feet		Field			7/22/21 11:30	BGS	C
Dissolved Oxygen	3.57	C	mg/L	0.01	Field			7/22/21 11:30	BGS	C
Elev Top MW Casing above MSL	525.81	C	Feet		Field			7/22/21 11:30	BGS	C
Ground Water Elevation	429.67	C	ft/MSL		Field			7/22/21 11:30	BGS	C
Oxidation-Reduction Potential	247	C	mV		Field			7/22/21 11:30	BGS	C
pH, Field (SM4500B)	5.60	C	pH_Units		Field			7/22/21 11:30	BGS	C
Sample Depth	85.00	C	Feet		Field			7/22/21 11:30	BGS	C
Specific Conductance, Field	760	C	umhos/cm	1	Field			7/22/21 11:30	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080002** Date Collected: 7/22/2021 11:30 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
Temperature	14.18	C	Deg. C		Field			7/22/21 11:30	BGS	C
Total Well Depth	100.00	C	Feet		Field			7/22/21 11:30	BGS	C
Turbidity, Field	1645	C	NTU	1	Field			7/22/21 11:30	BGS	C

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080003** Date Collected: 7/22/2021 11:45 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Bromoform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Bromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Chlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Chloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Chloroform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,4-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,1-Dichloroethane	1.8	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:47	PDK	D
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Styrene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2,4-Trichlorobenzene	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:47	PDK	D
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D
1,2,3-Trichloropropane	ND	C	ug/L	2.0	SW846 8260B			7/27/21 04:47	PDK	D
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 04:47	PDK	D

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

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080003** Date Collected: 7/22/2021 11:45 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	93.3	C	%	62 - 133	SW846 8260B			7/27/21 04:47	PDK	D
4-Bromofluorobenzene (S)	96.3	C	%	79 - 114	SW846 8260B			7/27/21 04:47	PDK	D
Dibromofluoromethane (S)	87.4	C	%	78 - 116	SW846 8260B			7/27/21 04:47	PDK	D
Toluene-d8 (S)	89.3	C	%	76 - 127	SW846 8260B			7/27/21 04:47	PDK	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	22	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	22	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/29/21 03:36	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	62.5	C	mg/L	2.0	EPA 300.0			7/23/21 10:02	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 10:02	MBW	B
Nitrate-N	7.0	C	mg/L	0.20	EPA 300.0			7/23/21 10:02	MBW	B
pH	5.91	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	279	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	5.2	C	mg/L	2.0	EPA 300.0			7/23/21 10:02	MBW	B
Total Dissolved Solids	258	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/29/21 00:05	PAG	D
Turbidity	2.79	C	NTU	0.10	SM2130B-2011			7/23/21 08:35	MBS	B
METALS										
Calcium, Total	22.2	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
Magnesium, Total	8.5	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
Manganese, Total	0.0061	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
Potassium, Total	1.7	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
Sodium, Total	20.2	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:06	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	109.67	C	Feet		Field			7/22/21 11:45	BGS	C
Dissolved Oxygen	9.37	C	mg/L	0.01	Field			7/22/21 11:45	BGS	C
Elev Top MW Casing above MSL	524.21	C	Feet		Field			7/22/21 11:45	BGS	C
Ground Water Elevation	414.54	C	ft/MSL		Field			7/22/21 11:45	BGS	C
Oxidation-Reduction Potential	245	C	mV		Field			7/22/21 11:45	BGS	C
pH, Field (SM4500B)	5.24	C	pH_Units		Field			7/22/21 11:45	BGS	C
Sample Depth	100.00	C	Feet		Field			7/22/21 11:45	BGS	C
Specific Conductance, Field	434	C	umhos/cm	1	Field			7/22/21 11:45	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080003** Date Collected: 7/22/2021 11:45 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
Temperature	14.93	C	Deg. C		Field			7/22/21 11:45	BGS	C
Total Well Depth	140.00	C	Feet		Field			7/22/21 11:45	BGS	C
Turbidity, Field	69	C	NTU	1	Field			7/22/21 11:45	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080004** Date Collected: 7/22/2021 11:56 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Bromodichloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Bromoform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Bromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Carbon Tetrachloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Chlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Chlorodibromomethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Chloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Chloroform	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Chloromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,3-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,4-Dichlorobenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2-Dichloropropane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,3-Dichloropropene, Total	ND	C	ug/L	2.0	SW846 8260B			7/27/21 05:10	PDK	D
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Styrene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,1,2,2-Tetrachloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2,4-Trichlorobenzene	ND	C	ug/L	2.0	SW846 8260B			7/27/21 05:10	PDK	D
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,1,2-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
Trichlorofluoromethane	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D
1,2,3-Trichloropropane	ND	C	ug/L	2.0	SW846 8260B			7/27/21 05:10	PDK	D
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/27/21 05:10	PDK	D

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

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080004** Date Collected: 7/22/2021 11:56 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	95.1	C	%	62 - 133	SW846 8260B			7/27/21 05:10	PDK	D
4-Bromofluorobenzene (S)	96	C	%	79 - 114	SW846 8260B			7/27/21 05:10	PDK	D
Dibromofluoromethane (S)	87.9	C	%	78 - 116	SW846 8260B			7/27/21 05:10	PDK	D
Toluene-d8 (S)	89.2	C	%	76 - 127	SW846 8260B			7/27/21 05:10	PDK	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	31	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	31	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/29/21 03:50	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/27/21 16:30	ALK	A
Chloride	46.1	C	mg/L	2.0	EPA 300.0			7/23/21 10:17	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 10:17	MBW	B
Nitrate-N	5.7	C	mg/L	0.20	EPA 300.0			7/23/21 10:17	MBW	B
pH	6.09	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	228	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	5.9	C	mg/L	2.0	EPA 300.0			7/23/21 10:17	MBW	B
Total Dissolved Solids	218	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	0.61	C	mg/L	0.50	SW846 9060A			7/29/21 00:05	PAG	D
Turbidity	1.21	C	NTU	0.10	SM2130B-2011			7/23/21 08:35	MBS	B
METALS										
Calcium, Total	18.7	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
Magnesium, Total	6.8	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
Manganese, Total	0.0083	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
Potassium, Total	1.4	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
Sodium, Total	15.8	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:09	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	110.49	C	Feet		Field			7/22/21 11:56	BGS	C
Dissolved Oxygen	6.83	C	mg/L	0.01	Field			7/22/21 11:56	BGS	C
Elev Top MW Casing above MSL	529.53	C	Feet		Field			7/22/21 11:56	BGS	C
Ground Water Elevation	419.04	C	ft/MSL		Field			7/22/21 11:56	BGS	C
Oxidation-Reduction Potential	268	C	mV		Field			7/22/21 11:56	BGS	C
pH, Field (SM4500B)	5.32	C	pH_Units		Field			7/22/21 11:56	BGS	C
Sample Depth	130.00	C	Feet		Field			7/22/21 11:56	BGS	C
Specific Conductance, Field	354	C	umhos/cm	1	Field			7/22/21 11:56	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080004** Date Collected: 7/22/2021 11:56 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
Temperature	14.27	C	Deg. C		Field			7/22/21 11:56	BGS	C
Total Well Depth	140.00	C	Feet		Field			7/22/21 11:56	BGS	C
Turbidity, Field	53	C	NTU	1	Field			7/22/21 11:56	BGS	C

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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

ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080005** Date Collected: 7/22/2021 12:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Methylene Chloride	3.0	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/26/21 23:08	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/26/21 23:08	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	92.3	C	%	62 - 133	SW846 8260B			7/26/21 23:08	PDK	G
4-Bromofluorobenzene (S)	95.1	C	%	79 - 114	SW846 8260B			7/26/21 23:08	PDK	G
Dibromofluoromethane (S)	87.1	C	%	78 - 116	SW846 8260B			7/26/21 23:08	PDK	G
Toluene-d8 (S)	89.2	C	%	76 - 127	SW846 8260B			7/26/21 23:08	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	ND	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/28/21 04:44	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/27/21 16:30	ALK	A
Chloride	ND	C	mg/L	1.0	EPA 300.0			7/23/21 10:31	MBW	B
Fluoride	ND	C	mg/L	0.10	EPA 300.0			7/23/21 10:31	MBW	B
Nitrate-N	ND	C	mg/L	0.10	EPA 300.0			7/23/21 10:31	MBW	B
pH	5.45	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	1	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	ND	C	mg/L	1.0	EPA 300.0			7/23/21 10:31	MBW	B
Total Dissolved Solids	ND	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/29/21 00:05	PAG	D
Turbidity	0.13	C	NTU	0.10	SM2130B-2011			7/23/21 08:35	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080005** Date Collected: 7/22/2021 12:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	ND	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1
Magnesium, Total	ND	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1
Manganese, Total	ND	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1
Potassium, Total	ND	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1
Sodium, Total	ND	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 14:27	SRT	J1

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190080006** Date Collected: 7/22/2021 13:48 Matrix: Water

Sample ID: **Trip Blank** Date Received: 7/22/2021 13:48

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/26/21 22:46	PDK	A
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/26/21 22:46	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	92.4	C	%	62 - 133	SW846 8260B			7/26/21 22:46	PDK	A
4-Bromofluorobenzene (S)	97.2	C	%	79 - 114	SW846 8260B			7/26/21 22:46	PDK	A
Dibromofluoromethane (S)	88	C	%	78 - 116	SW846 8260B			7/26/21 22:46	PDK	A
Toluene-d8 (S)	90	C	%	76 - 127	SW846 8260B			7/26/21 22:46	PDK	A

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ANALYTICAL RESULTS

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3190080001	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.				
3190080001	2	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190080002	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.				
3190080002	2	CWMP002W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190080003	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.				
3190080003	2	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190080004	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.				
3190080004	2	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190080005	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.				
3190080005	2	Field Blank	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: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3190080001	CWMP012W	ASTM D6919-09		
3190080001	CWMP012W	EPA 300.0		
3190080001	CWMP012W	EPA 410.4		
3190080001	CWMP012W	Field		
3190080001	CWMP012W	S2540C-11		
3190080001	CWMP012W	S4500HB-11		
3190080001	CWMP012W	SM2130B-2011		
3190080001	CWMP012W	SM2320B-2011		
3190080001	CWMP012W	SW846 6010C	SW846 3015	
3190080001	CWMP012W	SW846 8260B		
3190080001	CWMP012W	SW846 9050A		
3190080001	CWMP012W	SW846 9060A		
3190080001	CWMP012W	SW846 9066	420.4/9066	
3190080002	CWMP002W	ASTM D6919-09		
3190080002	CWMP002W	EPA 300.0		
3190080002	CWMP002W	EPA 410.4		
3190080002	CWMP002W	Field		
3190080002	CWMP002W	S2540C-11		
3190080002	CWMP002W	S4500HB-11		
3190080002	CWMP002W	SM2130B-2011		
3190080002	CWMP002W	SM2320B-2011		
3190080002	CWMP002W	SW846 6010C	SW846 3015	
3190080002	CWMP002W	SW846 8260B		
3190080002	CWMP002W	SW846 9050A		
3190080002	CWMP002W	SW846 9060A		
3190080002	CWMP002W	SW846 9066	420.4/9066	
3190080003	CWMP003W	ASTM D6919-09		
3190080003	CWMP003W	EPA 300.0		
3190080003	CWMP003W	EPA 410.4		
3190080003	CWMP003W	Field		
3190080003	CWMP003W	S2540C-11		
3190080003	CWMP003W	S4500HB-11		
3190080003	CWMP003W	SM2130B-2011		
3190080003	CWMP003W	SM2320B-2011		
3190080003	CWMP003W	SW846 6010C	SW846 3015	
3190080003	CWMP003W	SW846 8260B		
3190080003	CWMP003W	SW846 9050A		
3190080003	CWMP003W	SW846 9060A		
3190080003	CWMP003W	SW846 9066	420.4/9066	
3190080004	CWMP004W	ASTM D6919-09		
3190080004	CWMP004W	EPA 300.0		
3190080004	CWMP004W	EPA 410.4		
3190080004	CWMP004W	Field		
3190080004	CWMP004W	S2540C-11		
3190080004	CWMP004W	S4500HB-11		
3190080004	CWMP004W	SM2130B-2011		

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3190080 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3190080004	CWMP004W	SM2320B-2011		
3190080004	CWMP004W	SW846 6010C	SW846 3015	
3190080004	CWMP004W	SW846 8260B		
3190080004	CWMP004W	SW846 9050A		
3190080004	CWMP004W	SW846 9060A		
3190080004	CWMP004W	SW846 9066	420.4/9066	
3190080005	Field Blank	ASTM D6919-09		
3190080005	Field Blank	EPA 300.0		
3190080005	Field Blank	EPA 410.4		
3190080005	Field Blank	S2540C-11		
3190080005	Field Blank	S4500HB-11		
3190080005	Field Blank	SM2130B-2011		
3190080005	Field Blank	SM2320B-2011		
3190080005	Field Blank	SW846 6010C	SW846 3015	
3190080005	Field Blank	SW846 8260B		
3190080005	Field Blank	SW846 9050A		
3190080005	Field Blank	SW846 9060A		
3190080005	Field Blank	SW846 9066	420.4/9066	
3190080006	Trip Blank	SW846 8260B		

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3190080

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

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. CWMP012W	07/22/21	1040	G	GW	2	1	2	X	X	1	1	1	1	
2. CWMP002W	07/22/21	1130	G	GW	2	1	2	X	X	1	1	1	1	
3. CWMP003W	07/22/21	1145	G	GW	2	1	2	X	X	1	1	1	1	
4. CWMP004W	07/22/21	1156	G	GW	2	1	2	X	X	1	1	1	1	
5. Field Blank	07/22/21	1230	G	GW	2	1	2			1	1	1	1	
6. Trip Blank	07/22/21	1348	G	GW			2							
7														
8														
9														
10														

(Lab Use Only) Received by Receiving Lab)

Cooler Temp: 6 Therm ID: 573

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	7-22-21	1348	2 RFC	7/22/21	1348
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

ALS

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

3190080

Lancaster County Solid Waste Authority

ition of Sample Receipt Form

Client:

Initials: AS Date: 7/25/21

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): 6

Thermometer ID: 573

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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August 8, 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:	**3190408**
Purchase Order:	**PO-1000246**	Workorder ID:	**3rd QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Friday, July 23, 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

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

SAMPLE SUMMARY

Workorder: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3190408001	CWMP018S	Ground Water	7/23/2021 10:08	7/23/2021 13:00	Mr. Brian G Shade
3190408002	CWMP017S	Ground Water	7/23/2021 10:25	7/23/2021 13:00	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3190408 3rd 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: 3190408 3rd 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: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190408001** Date Collected: 7/23/2021 10:08 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 7/23/2021 13:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/28/21 03:31	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:31	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97	C	%	62 - 133	SW846 8260B			7/28/21 03:31	PDK	G
4-Bromofluorobenzene (S)	97.7	C	%	79 - 114	SW846 8260B			7/28/21 03:31	PDK	G
Dibromofluoromethane (S)	85.7	C	%	78 - 116	SW846 8260B			7/28/21 03:31	PDK	G
Toluene-d8 (S)	87.6	C	%	76 - 127	SW846 8260B			7/28/21 03:31	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	336	C	mg/L	5	SM2320B-2011			8/5/21 23:56	MBS	B
Alkalinity, Total	358	C,2	mg/L	5	SM2320B-2011			8/5/21 23:56	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/29/21 08:49	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	644	C	mg/L	5.0	EPA 300.0			7/24/21 09:16	MBW	B
Fluoride	ND	C	mg/L	0.50	EPA 300.0			7/24/21 09:16	MBW	B
Nitrate-N	17.4	C	mg/L	0.50	EPA 300.0			7/24/21 09:16	MBW	B
pH	8.47	C,1	pH_Units		S4500HB-11			8/3/21 23:49	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:30	MXF	7/27/21 10:10	MXF	F
Specific Conductance	2550	C	umhos/cm	5	SW846 9050A			8/4/21 16:45	MBS	B
Sulfate	57.6	C	mg/L	5.0	EPA 300.0			7/24/21 09:16	MBW	B
Total Dissolved Solids	1480	C	mg/L	25	S2540C-11			7/29/21 10:53	BBD	B
Total Organic Carbon (TOC)	7.0	C	mg/L	0.50	SW846 9060A			7/29/21 02:58	PAG	D
Turbidity	0.58	C	NTU	0.10	SM2130B-2011			7/24/21 08:15	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190408001** Date Collected: 7/23/2021 10:08 Matrix: Ground Water

Sample ID: **CWMP018S** Date Received: 7/23/2021 13:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	84.8	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
Iron, Total	0.11	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
Magnesium, Total	74.9	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
Manganese, Total	ND	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
Potassium, Total	22.1	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
Sodium, Total	320	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 16:07	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	8.80	C	mg/L	0.01	Field			7/23/21 10:08	BGS	C
pH, Field (SM4500B)	8.47	C	pH_Units		Field			7/23/21 10:08	BGS	C
Specific Conductance, Field	3768	C	umhos/cm	1	Field			7/23/21 10:08	BGS	C
Temperature	20.86	C	Deg. C		Field			7/23/21 10:08	BGS	C

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190408002** Date Collected: 7/23/2021 10:25 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 7/23/2021 13:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/28/21 03:54	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/28/21 03:54	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97.3	C	%	62 - 133	SW846 8260B			7/28/21 03:54	PDK	G
4-Bromofluorobenzene (S)	97	C	%	79 - 114	SW846 8260B			7/28/21 03:54	PDK	G
Dibromofluoromethane (S)	87.1	C	%	78 - 116	SW846 8260B			7/28/21 03:54	PDK	G
Toluene-d8 (S)	87.1	C	%	76 - 127	SW846 8260B			7/28/21 03:54	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	456	C	mg/L	5	SM2320B-2011			8/5/21 23:56	MBS	B
Alkalinity, Total	456	C,2	mg/L	50	SM2320B-2011			8/5/21 23:56	MBS	I
Ammonia-N	0.408	C	mg/L	0.100	ASTM D6919-09			7/29/21 06:19	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/29/21 14:00	ALK	A
Chloride	794	C	mg/L	5.0	EPA 300.0			7/24/21 09:29	MBW	B
Fluoride	ND	C	mg/L	0.50	EPA 300.0			7/24/21 09:29	MBW	B
Nitrate-N	25.4	C	mg/L	0.50	EPA 300.0			7/24/21 09:29	MBW	B
pH	8.05	C,1	pH_Units		S4500HB-11			8/3/21 23:49	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:30	MXF	7/27/21 10:10	MXF	F
Specific Conductance	3120	C	umhos/cm	5	SW846 9050A			8/4/21 16:45	MBS	B
Sulfate	93.1	C	mg/L	5.0	EPA 300.0			7/24/21 09:29	MBW	B
Total Dissolved Solids	1710	C	mg/L	25	S2540C-11			7/29/21 10:53	BBD	B
Total Organic Carbon (TOC)	5.4	C	mg/L	0.50	SW846 9060A			7/29/21 16:11	PAG	D
Turbidity	1.32	C	NTU	0.10	SM2130B-2011			7/24/21 08:15	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190408002** Date Collected: 7/23/2021 10:25 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 7/23/2021 13:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	84.3	C	mg/L	0.11	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
Iron, Total	0.27	C	mg/L	0.067	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
Magnesium, Total	87.8	C	mg/L	0.11	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
Manganese, Total	0.14	C	mg/L	0.0056	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
Potassium, Total	19.2	C	mg/L	0.56	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
Sodium, Total	407	C	mg/L	0.56	SW846 6010C	7/31/21 15:30	AHI	8/4/21 16:11	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	7.71	C	mg/L	0.01	Field			7/23/21 10:25	BGS	C
pH, Field (SM4500B)	7.93	C	pH_Units		Field			7/23/21 10:25	BGS	C
Specific Conductance, Field	5119	C	umhos/cm	1	Field			7/23/21 10:25	BGS	C
Temperature	23.89	C	Deg. C		Field			7/23/21 10:25	BGS	C

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190408 3rd QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3190408001	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.				
3190408001	2	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190408002	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.				
3190408002	2	CWMP017S	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: 3190408 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3190408001	CWMP018S	ASTM D6919-09		
3190408001	CWMP018S	EPA 300.0		
3190408001	CWMP018S	EPA 410.4		
3190408001	CWMP018S	Field		
3190408001	CWMP018S	S2540C-11		
3190408001	CWMP018S	S4500HB-11		
3190408001	CWMP018S	SM2130B-2011		
3190408001	CWMP018S	SM2320B-2011		
3190408001	CWMP018S	SW846 6010C	SW846 3015	
3190408001	CWMP018S	SW846 8260B		
3190408001	CWMP018S	SW846 9050A		
3190408001	CWMP018S	SW846 9060A		
3190408001	CWMP018S	SW846 9066	420.4/9066	
3190408002	CWMP017S	ASTM D6919-09		
3190408002	CWMP017S	EPA 300.0		
3190408002	CWMP017S	EPA 410.4		
3190408002	CWMP017S	Field		
3190408002	CWMP017S	S2540C-11		
3190408002	CWMP017S	S4500HB-11		
3190408002	CWMP017S	SM2130B-2011		
3190408002	CWMP017S	SM2320B-2011		
3190408002	CWMP017S	SW846 6010C	SW846 3015	
3190408002	CWMP017S	SW846 8260B		
3190408002	CWMP017S	SW846 9050A		
3190408002	CWMP017S	SW846 9060A		
3190408002	CWMP017S	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3190408

1 of 1

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

(Lab Use Only - Receiving 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: 1 Therm ID: 573

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	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP018S	07/23/21	1008	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP017S	07/23/21	1025	G	GW	2	1	2	x	x	1	1	1	1	
3														
4														
5														
6														
7														
8														
9														
10														

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	7-23-21	1300	2 [signature]	7/23/21	1304
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE ☐ Navy ☐ ☐

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

Reportable to PADEP? Yes ☐ PWSID # _____

Sample Disposal: Lab [X] Special ☐

EDDS: Format Type- _____

* G=Grab; C=Composite

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

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

Rev 8/04

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

3190408 ition of Sample Receipt Form

Lancaster County Solid Waste Authority

Client: V Initials: KSB Date: 7/24/21

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: S73

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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August 17, 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:	**3190082**
Purchase Order:	**PO-1000246**	Workorder ID:	**3rd QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, July 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 , 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: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3190082001	CWMP016W	Ground Water	7/21/2021 10:47	7/21/2021 15:03	Mr. Brian G Shade
3190082002	CWMP010W	Ground Water	7/21/2021 11:18	7/21/2021 15:03	Mr. Brian G Shade
3190082003	CWMP009W	Ground Water	7/21/2021 11:56	7/21/2021 15:03	Mr. Brian G Shade
3190082004	CWMP008W	Ground Water	7/21/2021 13:42	7/21/2021 15:03	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3190082 3rd 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: 3190082 3rd 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: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082001** Date Collected: 7/21/2021 10:47 Matrix: Ground Water
Sample ID: **CWMP016W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/24/21 05:01	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:01	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	89.9	C	%	62 - 133	SW846 8260B			7/24/21 05:01	PDK	G
4-Bromofluorobenzene (S)	96.6	C	%	79 - 114	SW846 8260B			7/24/21 05:01	PDK	G
Dibromofluoromethane (S)	86.3	C	%	78 - 116	SW846 8260B			7/24/21 05:01	PDK	G
Toluene-d8 (S)	88.8	C	%	76 - 127	SW846 8260B			7/24/21 05:01	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	11	C	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	11	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/28/21 19:41	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	3.1	C	mg/L	2.0	EPA 300.0			7/23/21 02:05	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:05	MBW	B
Nitrate-N	2.1	C	mg/L	0.20	EPA 300.0			7/23/21 02:05	MBW	B
pH	6.20	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	57	C	umhos/cm	1	SW846 9050A			7/29/21 23:52	MBS	B
Sulfate	9.9	C	mg/L	2.0	EPA 300.0			7/23/21 02:05	MBW	B
Total Dissolved Solids	57	C	mg/L	25	S2540C-11			7/28/21 11:27	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/28/21 21:12	PAG	D
Turbidity	4.54	C	NTU	0.10	SM2130B-2011			7/22/21 09:50	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082001** Date Collected: 7/21/2021 10:47 Matrix: Ground Water

Sample ID: **CWMP016W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	5.7	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
Iron, Total	2.0	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
Magnesium, Total	1.5	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
Manganese, Total	0.015	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
Potassium, Total	ND	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
Sodium, Total	3.4	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:43	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	14.30	C	Feet		Field			7/21/21 10:47	BGS	C
Dissolved Oxygen	9.02	C	mg/L	0.01	Field			7/21/21 10:47	BGS	C
Elev Top MW Casing above MSL	311.97	C	Feet		Field			7/21/21 10:47	BGS	C
Flow Rate	2.22	C	gal/min		Field			7/21/21 10:47	BGS	C
Ground Water Elevation	297.67	C	ft/MSL		Field			7/21/21 10:47	BGS	C
Oxidation-Reduction Potential	289	C	mV		Field			7/21/21 10:47	BGS	C
pH, Field (SM4500B)	5.31	C	pH_Units		Field			7/21/21 10:47	BGS	C
Sample Depth	71.00	C	Feet		Field			7/21/21 10:47	BGS	C
Specific Conductance, Field	91	C	umhos/cm	1	Field			7/21/21 10:47	BGS	C
Temperature	12.44	C	Deg. C		Field			7/21/21 10:47	BGS	C
Total Well Depth	73.52	C	Feet		Field			7/21/21 10:47	BGS	C
Turbidity, Field	13	C	NTU	1	Field			7/21/21 10:47	BGS	C
Volume in Water Column	87.05	C	Gallons		Field			7/21/21 10:47	BGS	C
Water Level After Purge	20.89	C	Feet		Field			7/21/21 10:47	BGS	C
Well Volumes Purged	1.91	C	Vol		Field			7/21/21 10:47	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082002** Date Collected: 7/21/2021 11:18 Matrix: Ground Water
Sample ID: **CWMP010W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/24/21 05:23	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:23	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	91.8	C	%	62 - 133	SW846 8260B			7/24/21 05:23	PDK	G
4-Bromofluorobenzene (S)	99.2	C	%	79 - 114	SW846 8260B			7/24/21 05:23	PDK	G
Dibromofluoromethane (S)	86.6	C	%	78 - 116	SW846 8260B			7/24/21 05:23	PDK	G
Toluene-d8 (S)	90	C	%	76 - 127	SW846 8260B			7/24/21 05:23	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	367	C	mg/L	50	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	367	C,2	mg/L	50	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			7/29/21 01:34	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/27/21 16:30	ALK	A
Chloride	598	C	mg/L	2.0	EPA 300.0			7/23/21 02:17	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:17	MBW	B
Nitrate-N	16.3	C	mg/L	0.20	EPA 300.0			7/23/21 02:17	MBW	B
pH	7.18	C,1	pH_Units		S4500HB-11			7/29/21 23:52	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	2190	C	umhos/cm	10	SW846 9050A			7/30/21 16:41	MBS	B
Sulfate	44.8	C	mg/L	2.0	EPA 300.0			7/23/21 02:17	MBW	B
Total Dissolved Solids	1310	C	mg/L	25	S2540C-11			7/28/21 10:52	BBD	B
Total Organic Carbon (TOC)	6.0	C	mg/L	0.50	SW846 9060A			7/28/21 21:12	PAG	D
Turbidity	0.63	C	NTU	0.10	SM2130B-2011			7/22/21 09:50	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082002** Date Collected: 7/21/2021 11:18 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	74.9	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
Iron, Total	0.30	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
Magnesium, Total	68.6	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
Manganese, Total	0.38	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
Potassium, Total	17.3	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
Sodium, Total	295	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:47	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	8.64	C	Feet		Field			7/21/21 11:18	BGS	C
Dissolved Oxygen	2.91	C	mg/L	0.01	Field			7/21/21 11:18	BGS	C
Elev Top MW Casing above MSL	360.90	C	Feet		Field			7/21/21 11:18	BGS	C
Flow Rate	1.04	C	gal/min		Field			7/21/21 11:18	BGS	C
Ground Water Elevation	352.26	C	ft/MSL		Field			7/21/21 11:18	BGS	C
Oxidation-Reduction Potential	86	C	mV		Field			7/21/21 11:18	BGS	C
pH, Field (SM4500B)	6.67	C	pH_Units		Field			7/21/21 11:18	BGS	C
Sample Depth	17.00	C	Feet		Field			7/21/21 11:18	BGS	C
Specific Conductance, Field	3409	C	umhos/cm	1	Field			7/21/21 11:18	BGS	C
Temperature	15.99	C	Deg. C		Field			7/21/21 11:18	BGS	C
Total Well Depth	19.60	C	Feet		Field			7/21/21 11:18	BGS	C
Turbidity, Field	2	C	NTU	1	Field			7/21/21 11:18	BGS	C
Volume in Water Column	7.12	C	Gallons		Field			7/21/21 11:18	BGS	C
Water Level After Purge	16.35	C	Feet		Field			7/21/21 11:18	BGS	C
Well Volumes Purged	1.17	C	Vol		Field			7/21/21 11:18	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082003** Date Collected: 7/21/2021 11:56 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	2.9	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
1,1-Dichloroethane	1.3	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/24/21 05:46	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 05:46	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96.8	C	%	62 - 133	SW846 8260B			7/24/21 05:46	PDK	G
4-Bromofluorobenzene (S)	103	C	%	79 - 114	SW846 8260B			7/24/21 05:46	PDK	G
Dibromofluoromethane (S)	93.1	C	%	78 - 116	SW846 8260B			7/24/21 05:46	PDK	G
Toluene-d8 (S)	94.3	C	%	76 - 127	SW846 8260B			7/24/21 05:46	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	472	C	mg/L	50	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	472	C,2	mg/L	5	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	28.0	C	mg/L	0.100	ASTM D6919-09			7/28/21 19:27	ALK	A
Chemical Oxygen Demand (COD)	105	C	mg/L	15	EPA 410.4			7/27/21 16:30	ALK	A
Chloride	645	C	mg/L	2.0	EPA 300.0			7/23/21 02:53	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:53	MBW	B
Nitrate-N	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:53	MBW	B
pH	6.68	C,1	pH_Units		S4500HB-11			7/30/21 00:46	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	2210	C	umhos/cm	10	SW846 9050A			7/30/21 16:41	MBS	B
Sulfate	6.2	C	mg/L	2.0	EPA 300.0			7/23/21 02:53	MBW	B
Total Dissolved Solids	1230	C	mg/L	25	S2540C-11			7/28/21 10:52	BBD	B
Total Organic Carbon (TOC)	34.9	C	mg/L	2.5	SW846 9060A			7/28/21 21:12	PAG	D
Turbidity	37.6	C	NTU	0.10	SM2130B-2011			7/22/21 09:50	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082003** Date Collected: 7/21/2021 11:56 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	163	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
Iron, Total	37.1	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
Magnesium, Total	77.9	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
Manganese, Total	12.9	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
Potassium, Total	36.0	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
Sodium, Total	180	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:51	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	9.36	C	Feet		Field			7/21/21 11:56	BGS	C
Dissolved Oxygen	0.06	C	mg/L	0.01	Field			7/21/21 11:56	BGS	C
Elev Top MW Casing above MSL	404.20	C	Feet		Field			7/21/21 11:56	BGS	C
Flow Rate	1.44	C	gal/min		Field			7/21/21 11:56	BGS	C
Ground Water Elevation	394.84	C	ft/MSL		Field			7/21/21 11:56	BGS	C
Oxidation-Reduction Potential	-48	C	mV		Field			7/21/21 11:56	BGS	C
pH, Field (SM4500B)	6.06	C	pH_Units		Field			7/21/21 11:56	BGS	C
Sample Depth	16.00	C	Feet		Field			7/21/21 11:56	BGS	C
Specific Conductance, Field	4020	C	umhos/cm	1	Field			7/21/21 11:56	BGS	C
Temperature	15.43	C	Deg. C		Field			7/21/21 11:56	BGS	C
Total Well Depth	19.70	C	Feet		Field			7/21/21 11:56	BGS	C
Turbidity, Field	ND	C	NTU	1	Field			7/21/21 11:56	BGS	C
Volume in Water Column	6.72	C	Gallons		Field			7/21/21 11:56	BGS	C
Water Level After Purge	11.24	C	Feet		Field			7/21/21 11:56	BGS	C
Well Volumes Purged	4.30	C	Vol		Field			7/21/21 11:56	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082004** Date Collected: 7/21/2021 13:42 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.6	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
1,1-Dichloroethane	2.6	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/24/21 06:09	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/24/21 06:09	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	93.7	C	%	62 - 133	SW846 8260B			7/24/21 06:09	PDK	G
4-Bromofluorobenzene (S)	100	C	%	79 - 114	SW846 8260B			7/24/21 06:09	PDK	G
Dibromofluoromethane (S)	89.7	C	%	78 - 116	SW846 8260B			7/24/21 06:09	PDK	G
Toluene-d8 (S)	91.5	C	%	76 - 127	SW846 8260B			7/24/21 06:09	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	436	C	mg/L	50	SM2320B-2011			7/30/21 16:41	MBS	B
Alkalinity, Total	436	C,2	mg/L	50	SM2320B-2011			7/30/21 16:41	MBS	I
Ammonia-N	7.16	C	mg/L	0.100	ASTM D6919-09			7/29/21 00:40	ALK	A
Chemical Oxygen Demand (COD)	32	C	mg/L	15	EPA 410.4			7/28/21 12:00	ALK	A
Chloride	62.7	C	mg/L	2.0	EPA 300.0			7/23/21 02:29	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:29	MBW	B
Nitrate-N	ND	C	mg/L	0.20	EPA 300.0			7/23/21 02:29	MBW	B
pH	6.68	C,1	pH_Units		S4500HB-11			7/30/21 00:46	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/27/21 09:42	MXF	7/27/21 10:10	MXF	F
Specific Conductance	887	C	umhos/cm	1	SW846 9050A			7/30/21 00:46	MBS	B
Sulfate	5.6	C	mg/L	2.0	EPA 300.0			7/23/21 02:29	MBW	B
Total Dissolved Solids	520	C	mg/L	25	S2540C-11			7/28/21 10:52	BBD	B
Total Organic Carbon (TOC)	12.2	C	mg/L	2.5	SW846 9060A			7/28/21 21:12	PAG	D
Turbidity	20.8	C	NTU	0.10	SM2130B-2011			7/22/21 09:50	MBS	B

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3190082004** Date Collected: 7/21/2021 13:42 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 7/21/2021 15:03

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	74.6	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
Iron, Total	28.7	C	mg/L	0.067	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
Magnesium, Total	36.7	C	mg/L	0.11	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
Manganese, Total	17.4	C	mg/L	0.0056	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
Potassium, Total	10.1	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
Sodium, Total	53.3	C	mg/L	0.56	SW846 6010C	7/31/21 12:47	AHI	8/4/21 13:55	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	3.49	C	Feet		Field			7/19/21 13:42	BGS	C
Dissolved Oxygen	0.38	C	mg/L	0.01	Field			7/19/21 13:42	BGS	C
Elev Top MW Casing above MSL	422.30	C	Feet		Field			7/19/21 13:42	BGS	C
Flow Rate	0.93	C	gal/min		Field			7/19/21 13:42	BGS	C
Ground Water Elevation	418.81	C	ft/MSL		Field			7/19/21 13:42	BGS	C
Oxidation-Reduction Potential	-24	C	mV		Field			7/19/21 13:42	BGS	C
pH, Field (SM4500B)	5.91	C	pH_Units		Field			7/19/21 13:42	BGS	C
Sample Depth	19.00	C	Feet		Field			7/19/21 13:42	BGS	C
Specific Conductance, Field	1467	C	umhos/cm	1	Field			7/19/21 13:42	BGS	C
Temperature	15.64	C	Deg. C		Field			7/19/21 13:42	BGS	C
Total Well Depth	22.80	C	Feet		Field			7/19/21 13:42	BGS	C
Turbidity, Field	ND	C	NTU	1	Field			7/19/21 13:42	BGS	C
Volume in Water Column	3.09	C	Gallons		Field			7/19/21 13:42	BGS	C
Water Level After Purge	15.00	C	Feet		Field			7/19/21 13:42	BGS	C
Well Volumes Purged	6.05	C	Vol		Field			7/19/21 13:42	BGS	C

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ANALYTICAL RESULTS

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3190082001	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.				
3190082001	2	CWMP016W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190082002	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.				
3190082002	2	CWMP010W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190082003	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.				
3190082003	2	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3190082004	1	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.				
3190082004	2	CWMP008W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3190082001	CWMP016W	ASTM D6919-09		
3190082001	CWMP016W	EPA 300.0		
3190082001	CWMP016W	EPA 410.4		
3190082001	CWMP016W	Field		
3190082001	CWMP016W	S2540C-11		
3190082001	CWMP016W	S4500HB-11		
3190082001	CWMP016W	SM2130B-2011		
3190082001	CWMP016W	SM2320B-2011		
3190082001	CWMP016W	SW846 6010C	SW846 3015	
3190082001	CWMP016W	SW846 8260B		
3190082001	CWMP016W	SW846 9050A		
3190082001	CWMP016W	SW846 9060A		
3190082001	CWMP016W	SW846 9066	420.4/9066	
3190082002	CWMP010W	ASTM D6919-09		
3190082002	CWMP010W	EPA 300.0		
3190082002	CWMP010W	EPA 410.4		
3190082002	CWMP010W	Field		
3190082002	CWMP010W	S2540C-11		
3190082002	CWMP010W	S4500HB-11		
3190082002	CWMP010W	SM2130B-2011		
3190082002	CWMP010W	SM2320B-2011		
3190082002	CWMP010W	SW846 6010C	SW846 3015	
3190082002	CWMP010W	SW846 8260B		
3190082002	CWMP010W	SW846 9050A		
3190082002	CWMP010W	SW846 9060A		
3190082002	CWMP010W	SW846 9066	420.4/9066	
3190082003	CWMP009W	ASTM D6919-09		
3190082003	CWMP009W	EPA 300.0		
3190082003	CWMP009W	EPA 410.4		
3190082003	CWMP009W	Field		
3190082003	CWMP009W	S2540C-11		
3190082003	CWMP009W	S4500HB-11		
3190082003	CWMP009W	SM2130B-2011		
3190082003	CWMP009W	SM2320B-2011		
3190082003	CWMP009W	SW846 6010C	SW846 3015	
3190082003	CWMP009W	SW846 8260B		
3190082003	CWMP009W	SW846 9050A		
3190082003	CWMP009W	SW846 9060A		
3190082003	CWMP009W	SW846 9066	420.4/9066	
3190082004	CWMP008W	ASTM D6919-09		
3190082004	CWMP008W	EPA 300.0		
3190082004	CWMP008W	EPA 410.4		
3190082004	CWMP008W	Field		
3190082004	CWMP008W	S2540C-11		
3190082004	CWMP008W	S4500HB-11		
3190082004	CWMP008W	SM2130B-2011		

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3190082 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3190082004	CWMP008W	SM2320B-2011		
3190082004	CWMP008W	SW846 6010C	SW846 3015	
3190082004	CWMP008W	SW846 8260B		
3190082004	CWMP008W	SW846 9050A		
3190082004	CWMP008W	SW846 9060A		
3190082004	CWMP008W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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3190082

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. CWMP016W	07/21/21	1047	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP010W	07/21/21	1118	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP009W	07/21/21	1156	G	GW	2	1	2	x	x	1	1	1	1	
4. CWMP008W	07/21/21	1342	G	GW	2	1	2	x	x	1	1	1	1	
5														
6														
7														
8														
9														
10														

(Lab Use Only) Received by Receiving Lab)

Cooler Temp: 3 Therm ID: 573

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 RG Rhoads ALS	7-21-21	1509	2 [illegible] /ALS	7/21/21	1503
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

3190082

Lancaster County Solid Waste Authority

ion of Sample Receipt Form

Client: Wc

Initials: AS Date: 7/25/21

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: 573

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

ALS Environmental

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August 6, 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:	**3189192**
Purchase Order:	**PO-1000246**	Workorder ID:	**3rd QTR 2021 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, July 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: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3189192001	CWMP007W	Ground Water	7/19/2021 10:38	7/19/2021 16:00	Mr. Brian G Shade
3189192002	CWMP001W	Ground Water	7/19/2021 11:57	7/19/2021 16:00	Mr. Brian G Shade
3189192003	CWMP005W	Ground Water	7/19/2021 13:27	7/19/2021 16:00	Mr. Brian G Shade
3189192004	Field Blank	Water	7/19/2021 14:55	7/19/2021 16:00	Mr. Brian G Shade
3189192005	Trip Blank	Water	7/19/2021 16:00	7/19/2021 16:00	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3189192 3rd 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: 3189192 3rd 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.

Sample Comments

Lab ID: 3189192001 **Sample ID:** CWMP007W **Sample Type:** SAMPLE

Methods for the analysis of volatile organics require that the sample be preserved to a pH less than 2 using HCl. This sample had a pH greater than 2 when received by the lab.

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192001** Date Collected: 7/19/2021 10:38 Matrix: Ground Water
Sample ID: **CWMP007W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/22/21 00:15	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:15	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			7/22/21 00:15	PDK	G
4-Bromofluorobenzene (S)	101	C	%	79 - 114	SW846 8260B			7/22/21 00:15	PDK	G
Dibromofluoromethane (S)	94.4	C	%	78 - 116	SW846 8260B			7/22/21 00:15	PDK	G
Toluene-d8 (S)	97.9	C	%	76 - 127	SW846 8260B			7/22/21 00:15	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	239	C	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	B
Alkalinity, Total	14	C,2	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	I
Ammonia-N	0.188	C	mg/L	0.100	ASTM D6919-09			8/5/21 04:25	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/30/21 16:15	ALK	A
Chloride	67.3	C	mg/L	2.0	EPA 300.0			7/20/21 06:21	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/20/21 06:21	MBW	B
Nitrate-N	10.0	C	mg/L	0.20	EPA 300.0			7/20/21 06:21	MBW	B
pH	5.64	C,1	pH_Units		S4500HB-11			7/26/21 21:42	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/20/21 11:55	MXF	7/22/21 08:37	MXF	F
Specific Conductance	324	C	umhos/cm	1	SW846 9050A			7/26/21 21:42	MBS	B
Sulfate	20.5	C	mg/L	2.0	EPA 300.0			7/20/21 06:21	MBW	B
Total Dissolved Solids	266	C	mg/L	25	S2540C-11			7/22/21 10:15	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/27/21 11:24	PAG	D
Turbidity	0.33	C	NTU	0.10	SM2130B-2011			7/20/21 08:00	MBS	B

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192001** Date Collected: 7/19/2021 10:38 Matrix: Ground Water

Sample ID: **CWMP007W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	19.4	C	mg/L	0.11	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
Magnesium, Total	10.1	C	mg/L	0.11	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
Manganese, Total	0.0077	C	mg/L	0.0056	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
Potassium, Total	2.4	C	mg/L	0.56	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
Sodium, Total	33.8	C	mg/L	0.56	SW846 6010C	7/29/21 17:50	SXC	7/30/21 09:24	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	7.88	C	Feet		Field			7/19/21 10:38	BGS	C
Dissolved Oxygen	5.28	C	mg/L	0.01	Field			7/19/21 10:38	BGS	C
Elev Top MW Casing above MSL	453.40	C	Feet		Field			7/19/21 10:38	BGS	C
Flow Rate	1.46	C	gal/min		Field			7/19/21 10:38	BGS	C
Ground Water Elevation	445.52	C	ft/MSL		Field			7/19/21 10:38	BGS	C
Oxidation-Reduction Potential	355	C	mV		Field			7/19/21 10:38	BGS	C
pH, Field (SM4500B)	5.02	C	pH_Units		Field			7/19/21 10:38	BGS	C
Sample Depth	33.00	C	Feet		Field			7/19/21 10:38	BGS	C
Specific Conductance, Field	533	C	umhos/cm	1	Field			7/19/21 10:38	BGS	C
Temperature	13.01	C	Deg. C		Field			7/19/21 10:38	BGS	C
Total Well Depth	36.50	C	Feet		Field			7/19/21 10:38	BGS	C
Turbidity, Field	ND	C	NTU	1	Field			7/19/21 10:38	BGS	C
Volume in Water Column	42.07	C	Gallons		Field			7/19/21 10:38	BGS	C
Water Level After Purge	8.53	C	Feet		Field			7/19/21 10:38	BGS	C
Well Volumes Purged	2.44	C	Vol		Field			7/19/21 10:38	BGS	C

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192002** Date Collected: 7/19/2021 11:57 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/22/21 00:37	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:37	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103	C	%	62 - 133	SW846 8260B			7/22/21 00:37	PDK	G
4-Bromofluorobenzene (S)	103	C	%	79 - 114	SW846 8260B			7/22/21 00:37	PDK	G
Dibromofluoromethane (S)	93.2	C	%	78 - 116	SW846 8260B			7/22/21 00:37	PDK	G
Toluene-d8 (S)	99.2	C	%	76 - 127	SW846 8260B			7/22/21 00:37	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	7	C	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	B
Alkalinity, Total	7	C,2	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	I
Ammonia-N	0.116	C	mg/L	0.100	ASTM D6919-09			8/5/21 03:03	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/30/21 16:15	ALK	A
Chloride	27.3	C	mg/L	2.0	EPA 300.0			7/20/21 06:36	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/20/21 06:36	MBW	B
Nitrate-N	18.7	C	mg/L	0.20	EPA 300.0			7/20/21 06:36	MBW	B
pH	5.50	C,1	pH_Units		S4500HB-11			7/26/21 21:42	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/20/21 11:55	MXF	7/22/21 08:37	MXF	F
Specific Conductance	224	C	umhos/cm	1	SW846 9050A			7/26/21 21:42	MBS	B
Sulfate	2.3	C	mg/L	2.0	EPA 300.0			7/20/21 06:36	MBW	B
Total Dissolved Solids	208	C	mg/L	25	S2540C-11			7/22/21 10:15	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/27/21 11:24	PAG	D
Turbidity	6.09	C	NTU	0.10	SM2130B-2011			7/20/21 08:00	MBS	B

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192002** Date Collected: 7/19/2021 11:57 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	14.8	C	mg/L	0.11	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
Iron, Total	0.56	C	mg/L	0.067	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
Magnesium, Total	10.7	C	mg/L	0.11	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
Manganese, Total	0.055	C	mg/L	0.0056	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
Potassium, Total	2.4	C	mg/L	0.56	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
Sodium, Total	13.0	C	mg/L	0.56	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:34	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	27.97	C	Feet		Field			7/19/21 11:57	BGS	C
Dissolved Oxygen	8.70	C	mg/L	0.01	Field			7/19/21 11:57	BGS	C
Elev Top MW Casing above MSL	515.13	C	Feet		Field			7/19/21 11:57	BGS	C
Flow Rate	1.72	C	gal/min		Field			7/19/21 11:57	BGS	C
Ground Water Elevation	487.16	C	ft/MSL		Field			7/19/21 11:57	BGS	C
Oxidation-Reduction Potential	353	C	mV		Field			7/19/21 11:57	BGS	C
pH, Field (SM4500B)	5.15	C	pH_Units		Field			7/19/21 11:57	BGS	C
Sample Depth	57.00	C	Feet		Field			7/19/21 11:57	BGS	C
Specific Conductance, Field	369	C	umhos/cm	1	Field			7/19/21 11:57	BGS	C
Temperature	14.30	C	Deg. C		Field			7/19/21 11:57	BGS	C
Total Well Depth	66.30	C	Feet		Field			7/19/21 11:57	BGS	C
Turbidity, Field	19	C	NTU	1	Field			7/19/21 11:57	BGS	C
Volume in Water Column	56.35	C	Gallons		Field			7/19/21 11:57	BGS	C
Water Level After Purge	49.02	C	Feet		Field			7/19/21 11:57	BGS	C
Well Volumes Purged	1.83	C	Vol		Field			7/19/21 11:57	BGS	C

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192003** Date Collected: 7/19/2021 13:27 Matrix: Ground Water
Sample ID: **CWMP005W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/22/21 00:59	PDK	G
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	PDK	G
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/22/21 00:59	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			7/22/21 00:59	PDK	G
4-Bromofluorobenzene (S)	104	C	%	79 - 114	SW846 8260B			7/22/21 00:59	PDK	G
Dibromofluoromethane (S)	92.5	C	%	78 - 116	SW846 8260B			7/22/21 00:59	PDK	G
Toluene-d8 (S)	99.9	C	%	76 - 127	SW846 8260B			7/22/21 00:59	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	19	C	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	B
Alkalinity, Total	19	C,2	mg/L	5	SM2320B-2011			7/26/21 21:42	MBS	I
Ammonia-N	ND	C	mg/L	0.100	ASTM D6919-09			8/5/21 04:52	ALK	A
Chemical Oxygen Demand (COD)	ND	C	mg/L	15	EPA 410.4			7/30/21 16:15	ALK	A
Chloride	56.3	C	mg/L	2.0	EPA 300.0			7/20/21 08:01	MBW	B
Fluoride	ND	C	mg/L	0.20	EPA 300.0			7/20/21 08:01	MBW	B
Nitrate-N	8.3	C	mg/L	0.20	EPA 300.0			7/20/21 08:01	MBW	B
pH	5.64	C,1	pH_Units		S4500HB-11			7/26/21 21:42	MBS	B
Phenolics	ND	C	mg/L	0.005	SW846 9066	7/20/21 11:55	MXF	7/22/21 08:37	MXF	F
Specific Conductance	254	C	umhos/cm	1	SW846 9050A			7/26/21 21:42	MBS	B
Sulfate	4.9	C	mg/L	2.0	EPA 300.0			7/20/21 08:01	MBW	B
Total Dissolved Solids	212	C	mg/L	25	S2540C-11			7/22/21 10:15	BBD	B
Total Organic Carbon (TOC)	ND	C	mg/L	0.50	SW846 9060A			7/27/21 11:24	PAG	D
Turbidity	0.86	C	NTU	0.10	SM2130B-2011			7/20/21 08:00	MBS	B

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192003** Date Collected: 7/19/2021 13:27 Matrix: Ground Water

Sample ID: **CWMP005W** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	13.6	C	mg/L	0.11	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
Iron, Total	ND	C	mg/L	0.067	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
Magnesium, Total	7.4	C	mg/L	0.11	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
Manganese, Total	0.050	C	mg/L	0.0056	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
Potassium, Total	2.1	C	mg/L	0.56	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
Sodium, Total	29.9	C	mg/L	0.56	SW846 6010C	7/31/21 16:15	AHI	8/4/21 10:38	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	40.18	C	Feet		Field			7/19/21 13:27	BGS	C
Dissolved Oxygen	7.15	C	mg/L	0.01	Field			7/19/21 13:27	BGS	C
Elev Top MW Casing above MSL	513.43	C	Feet		Field			7/19/21 13:27	BGS	C
Flow Rate	2.41	C	gal/min		Field			7/19/21 13:27	BGS	C
Ground Water Elevation	473.25	C	ft/MSL		Field			7/19/21 13:27	BGS	C
Oxidation-Reduction Potential	342	C	mV		Field			7/19/21 13:27	BGS	C
pH, Field (SM4500B)	5.08	C	pH_Units		Field			7/19/21 13:27	BGS	C
Sample Depth	130.00	C	Feet		Field			7/19/21 13:27	BGS	C
Specific Conductance, Field	426	C	umhos/cm	1	Field			7/19/21 13:27	BGS	C
Temperature	13.38	C	Deg. C		Field			7/19/21 13:27	BGS	C
Total Well Depth	138.92	C	Feet		Field			7/19/21 13:27	BGS	C
Turbidity, Field	ND	C	NTU	1	Field			7/19/21 13:27	BGS	C
Volume in Water Column	145.15	C	Gallons		Field			7/19/21 13:27	BGS	C
Water Level After Purge	44.02	C	Feet		Field			7/19/21 13:27	BGS	C
Well Volumes Purged	1.16	C	Vol		Field			7/19/21 13:27	BGS	C

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192004** Date Collected: 7/19/2021 14:55 Matrix: Water

Sample ID: **Field Blank** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/21/21 23:30	PDK	A
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:30	PDK	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	99.1	C	%	62 - 133	SW846 8260B			7/21/21 23:30	PDK	A
4-Bromofluorobenzene (S)	106	C	%	79 - 114	SW846 8260B			7/21/21 23:30	PDK	A
Dibromofluoromethane (S)	94.6	C	%	78 - 116	SW846 8260B			7/21/21 23:30	PDK	A
Toluene-d8 (S)	98.5	C	%	76 - 127	SW846 8260B			7/21/21 23:30	PDK	A

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID: **3189192005** Date Collected: 7/19/2021 16:00 Matrix: Water

Sample ID: **Trip Blank** Date Received: 7/19/2021 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
1,2-Dibromoethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
1,1-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
1,2-Dichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
1,1-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
cis-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
trans-1,2-Dichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Ethylbenzene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Methylene Chloride	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Tetrachloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Toluene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Total Xylenes	ND	C	ug/L	3.0	SW846 8260B			7/21/21 23:08	PDK	A
1,1,1-Trichloroethane	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Trichloroethene	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A
Vinyl Chloride	ND	C	ug/L	1.0	SW846 8260B			7/21/21 23:08	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	101	C	%	62 - 133	SW846 8260B			7/21/21 23:08	PDK	A
4-Bromofluorobenzene (S)	104	C	%	79 - 114	SW846 8260B			7/21/21 23:08	PDK	A
Dibromofluoromethane (S)	96.4	C	%	78 - 116	SW846 8260B			7/21/21 23:08	PDK	A
Toluene-d8 (S)	99.8	C	%	76 - 127	SW846 8260B			7/21/21 23:08	PDK	A

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ANALYTICAL RESULTS

Workorder: 3189192 3rd QTR 2021 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3189192001	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.				
3189192001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3189192002	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.				
3189192002	2	CWMP001W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3189192003	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.				
3189192003	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: 3189192 3rd QTR 2021 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3189192001	CWMP007W	ASTM D6919-09		
3189192001	CWMP007W	EPA 300.0		
3189192001	CWMP007W	EPA 410.4		
3189192001	CWMP007W	Field		
3189192001	CWMP007W	S2540C-11		
3189192001	CWMP007W	S4500HB-11		
3189192001	CWMP007W	SM2130B-2011		
3189192001	CWMP007W	SM2320B-2011		
3189192001	CWMP007W	SW846 6010C	SW846 3015	
3189192001	CWMP007W	SW846 8260B		
3189192001	CWMP007W	SW846 9050A		
3189192001	CWMP007W	SW846 9060A		
3189192001	CWMP007W	SW846 9066	420.4/9066	
3189192002	CWMP001W	ASTM D6919-09		
3189192002	CWMP001W	EPA 300.0		
3189192002	CWMP001W	EPA 410.4		
3189192002	CWMP001W	Field		
3189192002	CWMP001W	S2540C-11		
3189192002	CWMP001W	S4500HB-11		
3189192002	CWMP001W	SM2130B-2011		
3189192002	CWMP001W	SM2320B-2011		
3189192002	CWMP001W	SW846 6010C	SW846 3015	
3189192002	CWMP001W	SW846 8260B		
3189192002	CWMP001W	SW846 9050A		
3189192002	CWMP001W	SW846 9060A		
3189192002	CWMP001W	SW846 9066	420.4/9066	
3189192003	CWMP005W	ASTM D6919-09		
3189192003	CWMP005W	EPA 300.0		
3189192003	CWMP005W	EPA 410.4		
3189192003	CWMP005W	Field		
3189192003	CWMP005W	S2540C-11		
3189192003	CWMP005W	S4500HB-11		
3189192003	CWMP005W	SM2130B-2011		
3189192003	CWMP005W	SM2320B-2011		
3189192003	CWMP005W	SW846 6010C	SW846 3015	
3189192003	CWMP005W	SW846 8260B		
3189192003	CWMP005W	SW846 9050A		
3189192003	CWMP005W	SW846 9060A		
3189192003	CWMP005W	SW846 9066	420.4/9066	
3189192004	Field Blank	SW846 8260B		
3189192005	Trip Blank	SW846 8260B		

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

3189192

2 — 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

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

(Completed by Receiving Lab)

Cooler Temp: 3 Therm ID: 574

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 #:

ANALYSES/METHOD REQUESTED

Enter Number of Containers Per Sample or Field Results Below.

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
1. CWMP007W	07/19/21	1038	G	GW	2	1	2	x	x	1	1	1	1		
2. CWMP001W	07/19/21	1157	G	GW	2	1	2	x	x	1	1	1	1		
3. CWMP005W	07/19/21	1327	G	GW	2	1	2	x	x	1	1	1	1		
4. Field Blank	07/19/21	1455	G	GW			2								
5. Trip Blank	07/19/21	1600	G	GW			2								
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] ALS	7-19-21	1600	2 [signature]	7-19-21	1600
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 - Al=Air; DW=Drinking Water; GW=Groundwater; Ol=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

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

3189192

Lancaster County Solid Waste Authority

dition of Sample Receipt Form

Client: Initials: SHC Date: 7/21/21

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? None = UNP		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: 574

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