LCSWMA

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January 15, 2021

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

REF: Creswell Landfill (BWM Permit #100008)
Groundwater Monitoring; 3rd Quarter 2020

Dear Ms. Kinkaid:

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

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

- Enclosed, on CD, is a data export .csv file that should be in the format compatible with your LandLinks software. Additionally, the CD includes a PDF file of all the Forms 19 and PDF files of the laboratory reports.

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

Respectfully Submitted,

Daniel A. Brown
Environmental Compliance Manager

cc: LCSWMA: Environmental

ARM Group: Scott Wendling, Ryan Brandon, Jeremy Fleming

PA DEP: Randy Weiss

ARM Group LLC
Engineers and Scientists

January 15, 2020

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 2020 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 2020 water quality monitoring results for Creswell Landfill (CWLF). As part of this evaluation, ARM reviewed the historic and Third Quarter 2020 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 2020 were analyzed for quarterly Form 19 parameters. The following narrative provides a summary of noteworthy observations of the results for the Third Quarter 2020, 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 2020).

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. No outliers were identified from the Third Quarter 2020 analytical results.

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

For pH, a one-sided UPL is not appropriate because of the double-sided nature of this parameter. ARM assessed the downgradient pH data by investigating time-series concentration plots for identifiable trends and comparing the Third Quarter 2020 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 2020. 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 – Total potassium was detected above the background concentration in this upgradient well but appears to be generally stable over time, apart from minor fluctuations. pH fluctuates over a range of approximately 2.0 units and appears to be trending slightly higher over time. All other Form 19 analytical parameters appear to be stable and within historical concentration ranges.

- MP-2 – 1,1-dichloroethane was detected during this event and is, therefore, above background levels.

  Other parameters above background in this well include alkalinity (bicarbonate and total), calcium, chemical oxygen demand (COD), magnesium, manganese, potassium, sodium, specific conductance (SpC), sulfate, total dissolved solids (TDS), and total organic carbon (TOC). Many of these parameters appear to be slowly increasing over time, with exception of calcium and 1,1-dichloroethane, which appear to be decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.43 unit higher, on average, while fluctuating over a slightly wider range.

- MP-3 – 1,1-dichloroethane was detected during this event and is, therefore, above background levels. 1,1-dichloroethane concentrations appear to be decreasing over time, apart from an apparently isolated elevated detection in 2018.

  Other parameters above background in this well include alkalinity (bicarbonate and total), calcium, COD, sodium, SpC, and sulfate. Concentrations of alkalinity (bicarbonate and total), sodium, SpC, and sulfate appear to be increasing over time with short-term fluctuations observed. The remaining parameters with noted exceedances generally appear to be stable or decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.28 unit higher, on average.

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

- MP-5 – Parameters above background in this well include alkalinity (bicarbonate and total), COD, sodium, SpC, and sulfate. Concentrations of alkalinity (bicarbonate and total), COD, sodium, and SpC appear to be increasing over time with short-term fluctuations. Sulfate concentrations appear to fluctuate between approximately 2-6 mg/L but do not appear to be increasing over time. pH appears to be stable over time with a long-term average value approximately 0.23 unit higher than background.

- MP-7 – Parameters above background in this well include alkalinity (bicarbonate and total), COD, sodium, SpC, and sulfate. Concentrations of alkalinity (bicarbonate and total), sodium, and SpC appear to be increasing over time with short-term fluctuations. COD

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

- MP-8 – Benzene and 1,1-dichloroethane were detected in during this event, and are, therefore, above background levels. Concentrations of both parameters appear to be decreasing over time.

  Other parameters above background in this well include alkalinity (bicarbonate and total), ammonia-N, calcium, COD, chloride, iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, manganese, and sulfate levels appear to be slowly increasing over time. Concentrations of the other noted parameters generally appear to be stable long-term, apart from minor fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.76 unit higher, on average, while fluctuating over a slightly narrower range.

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

  Other parameters above background in this well include alkalinity (bicarbonate and total), ammonia-N, calcium, COD, iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. All parameters noted above background appear to be increasing over time except total calcium and sulfate, which appear to be stable long-term, apart from minor fluctuations. pH appears to be slightly decreasing over time with a long-term average value approximately 0.91 unit higher than background.

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

- MP-12 – Parameters above background in this well include alkalinity (bicarbonate and total, total calcium, chloride, total iron, total manganese, SpC, sulfate, TOC, and turbidity. Concentrations of chloride, iron, TOC, and turbidity appear to be increasing over time, with iron displaying the widest range of fluctuations. Turbidity fluctuations appear to be seasonal. Concentrations of the other noted parameters generally appear to be decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.68 units higher, on average.

- MP-16 – Sulfate was the only parameter detected above background in this well, and the historical concentrations appear to be stable over time. pH appears to be stable over time with a long-term average value approximately 0.68 unit higher than background.

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

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

- MP-18S – Surface-water grab samples are taken from Mann's Run at this downstream location and analyzed for Form 19 parameters. Parameters above background levels at MP-18S include alkalinity (bicarbonate and total), calcium, chloride, magnesium, potassium, sodium, SpC, sulfate, TDS, and TOC. Potassium and TOC appear to be stable over time, while concentrations of the other noted parameters show a wide range of fluctuation in the historical results and appear to demonstrate increasing long-term trends. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.46 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, 1,1-dichloroethane, and cis 1,2-dichloroethene) are included in **Attachment 3.** Parameters not noted above are either at or below background levels. Overall, the groundwater quality at CWLF appears to be improving, especially with respect to VOC concentrations. Some metal and ion concentrations (e.g., calcium, sodium, and chloride) appear to be increasing slowly in some wells over time, but these water quality changes are generally gradual and do not 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 23, 2020. Both trip blank and field blank samples were analyzed for VOCs, while additional metals and wet chemistry analyses were completed for the field blank.

Laboratory analysis for both blank samples were completed from July 24-31, 2020. No VOC constituents were detected in either the trip blank or field blank. Additionally, no metals were detected in the field blank. In the field blank wet chemistry results, SpC was measured at 1 µmho/cm and pH was 6.05 S.U.

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

Jeremy Fleming
Project Geologist II

Ryan A. Brandon, P.G.
Project Manager

Enclosed: Table 1
Attachments 1-3

TABLE

Table 1. LCSWMA Creswell Landfill Form 19 Groundwater Monitoring Well Background Standard Comparisons - 3rd Quarter 2020

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	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	7.63	27.4	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
BICARBONATE	**8**	µg/L	7	82	18	23	17	15	331	396	253	64	< 50	636	478
CALCIUM, TOTAL	**20.12**	µg/L	15.2	54.6	24.3	19.8	14.7	17.5	75.7	161	63.6	32.5	5.1	58.5	62.3
COD (CHEMICAL OXYGEN DEMAND)	**12****	µg/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	97	< 15	< 15	< 15	< 15	< 15
CHLORIDE	**32.6**	mg/L	28.0	115	68.5	45.8	63.2	60.5	52.4	559	401	35.1	3.0	683	472
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	**3.8**	µg/L	0.72	< 0.067	< 0.067	< 0.067	< 0.067	< 0.067	28.3	35.0	0.22	7.5	0.30	0.18	0.16
MAGNESIUM, TOTAL	**12.5**	mg/L	9.8	17.2	8.6	6.6	7.3	8.6	34.6	75.7	56.5	8.9	1.2	138	90.6
MANGANESE, TOTAL	**0.13**	µg/L	0.055	1.1	< 0.0056	0.0090	0.045	< 0.0056	16.8	12.3	0.12	0.15	0.025	0.12	0.025
NITRATE-NITROGEN	**23.6**	µg/L	19.4	4.2	7.5	6.2	8.3	9.7	< 0.20	< 0.20	11.2	8.9	0.90	25.5	18.0
pH-FIELD	**None*****	mg/L	4.42	5.08	4.92	5.18	4.75	5.02	5.97	6.01	6.41	5.93	5.33	8.11	8.39
pH-LAB	**None*****	mg/L	6.53	8.37	7.65	7.77	6.90	6.65	8.64	8.28	8.81	8.24	6.69	8.49	8.64
POTASSIUM, TOTAL	**2.9**	mg/L	3.0	3.1	1.8	1.6	2.9	2.7	10.4	34.1	12.0	1.7	0.85	23.6	21.4
SODIUM, TOTAL	**15.6**	µg/L	13.6	29.0	21.3	15.5	32.7	33.0	48.6	166	229	13.0	3.1	432	288
SPEC. COND., FIELD	**328**	mg/L	288	631	360	277	354	383	1,042	2,736	2,004	209	63	3,609	2,442
SPEC. COND., LAB	**299**	mg/L	265	586	332	255	325	354	896	2,380	1,830	314	59	3,240	2,260
SULFATE	**2.9**	µmho/cm	2.3	22.0	5.6	5.5	4.5	20.6	5.2	5.5	42.3	4.4	11.0	78.2	59.3
ALKALINITY	**7**	µmho/cm	7	84	18	23	17	15	366	396	291	64	< 50	651	505
TDS (TOTAL DISSOLVED SOLIDS)	**261**	mg/L	110	318	146	158	156	180	490	1,290	996	186	80	1,960	1,360
TOC (TOTAL ORGANIC CARBON)	**1.1**	mg/L	< 0.50	5.3	0.67	0.57	0.64	0.52	12.5	35.7	4.9	1.7	< 0.50	5.1	8.2
TOTAL PHENOLICS	**0.005***	µg/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	**178**	mg/L	16.9	0.14	< 0.10	< 0.10	0.21	< 0.10	55.0	74.1	1.44	231	3.61	1.03	1.69
BENZENE	**1.0***	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.7	2.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)	**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
1,1-DICHLOROETHANE	**1.0***	µg/L	< 1.0	12.7	1.1	< 1.0	< 1.0	< 1.0	2.9	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-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
1,2-DICHLOROETHANE	**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
cis 1,2-DICHLOROETHENE	**1.0***	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5	< 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***	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
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***	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-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***	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
VINYL CHLORIDE	**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
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.

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

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

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS

LCSWMA Creswell Landfill 3nd Quarter 2020 - Background Upper Prediction Limits (MP-1)			
Parameter	**Distribution**	**Upper Prediction Limit**	**Unit**
ammonia-nitrogen	No Distribution	0.120	mg/L
bicarbonate	No Distribution	8	mg/L
calcium, total	Lognormal	20.12	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	3.8	mg/L
magnesium, total	No Distribution	12.5	mg/L
manganese, total	No Distribution	0.13	mg/L
nitrate-nitrogen	No Distribution	23.6	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	328	µmhos/cm
spec. cond., lab	No Distribution	299	µmhos/cm
sulfate	Lognormal	2.9	mg/L
total alkalinity	No Distribution	7	mg/L
tds (total dissolved solids)	Normal	261	mg/L
toc (total organic carbon)	Normal	1.1	mg/L
total phenolics	NA	0.005*	mg/L
turbidity	Lognormal	178	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 5.11/14/2021 12:19:31 PM								
4		From File		3Q20 CWMP001W UCL Input Table1.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		121			Number of Missing Observations			11
15				Number of Distinct Observations		7						
16				Number of Detects		11			Number of Non-Detects			110
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		0.46			Maximum Non-Detect			0.1
20				Variance Detected		0.0107			Percent Non-Detects			90.91%
21				Mean Detected		0.165			SD Detected			0.104
22				Mean of Detected Logged Data		-1.908			SD of Detected Logged Data			0.434
23												
24					Critical Values for Background Threshold Values (BTVs)							
25				Tolerance Factor K (For UTL)		1.896			d2max (for USL)			3.273
26												
27					Normal GOF Test on Detects Only							
28				Shapiro Wilk Test Statistic		0.584			Shapiro Wilk GOF Test			
29				5% Shapiro Wilk Critical Value		0.85			Data Not Normal at 5% Significance Level			
30				Lilliefors Test Statistic		0.377			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		0.106			KM SD			0.0352
36				95% UTL95% Coverage		0.173			95% KM UPL (t)			0.165
37				90% KM Percentile (z)		0.151			95% KM Percentile (z)			0.164
38				99% KM Percentile (z)		0.188			95% KM USL			0.221
39												
40					DL/2 Substitution Background Statistics Assuming Normal Distribution							
41				Mean		0.0605			SD			0.0448
42				95% UTL95% Coverage		0.145			95% UPL (t)			0.135
43				90% Percentile (z)		0.118			95% Percentile (z)			0.134
44				99% Percentile (z)		0.165			95% USL			0.207
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		1.517			Anderson-Darling GOF Test			
49				5% A-D Critical Value		0.732			Data Not Gamma Distributed at 5% Significance Level			
50				K-S Test Statistic		0.34			Kolmogorov-Smirnov GOF			

51				5% K-S Critical Value	0.256	Data Not Gamma Distributed at 5% Significance Level						
52	Data Not Gamma Distributed at 5% Significance Level											
53												
54	**Gamma Statistics on Detected Data Only**											
55				k hat (MLE)	4.745	k star (bias corrected MLE)	3.512					
56				Theta hat (MLE)	0.0349	Theta star (bias corrected MLE)	0.0471					
57				nu hat (MLE)	104.4	nu star (bias corrected)	77.26					
58				MLE Mean (bias corrected)	0.165							
59				MLE Sd (bias corrected)	0.0883	95% Percentile of Chisquare (2kstar)	14.1					
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	0.0247					
68				Maximum	0.46	Median	0.01					
69				SD	0.0539	CV	2.187					
70				k hat (MLE)	0.925	k star (bias corrected MLE)	0.908					
71				Theta hat (MLE)	0.0266	Theta star (bias corrected MLE)	0.0272					
72				nu hat (MLE)	223.9	nu star (bias corrected)	219.7					
73				MLE Mean (bias corrected)	0.0247	MLE Sd (bias corrected)	0.0259					
74				95% Percentile of Chisquare (2kstar)	5.629	90% Percentile	0.0581					
75				95% Percentile	0.0764	99% Percentile	0.119					
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	0.079	0.0739	95% Approx. Gamma UPL			0.0674	0.0625	
80				95% Gamma USL	0.177	0.177						
81												
82	**Estimates of Gamma Parameters using KM Estimates**											
83				Mean (KM)	0.106	SD (KM)	0.0352					
84				Variance (KM)	0.00124	SE of Mean (KM)	0.00336					
85				k hat (KM)	9.036	k star (KM)	8.818					
86				nu hat (KM)	2187	nu star (KM)	2134					
87				theta hat (KM)	0.0117	theta star (KM)	0.012					
88				80% gamma percentile (KM)	0.134	90% gamma percentile (KM)	0.153					
89				95% gamma percentile (KM)	0.171	99% gamma percentile (KM)	0.206					
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	0.151	0.148	95% Approx. Gamma UPL			0.144	0.142	
95				95% KM Gamma Percentile	0.144	0.142	95% Gamma USL			0.192	0.189	
96												
97	**Lognormal GOF Test on Detected Observations Only**											
98				Shapiro Wilk Test Statistic	0.714	**Shapiro Wilk GOF Test**						
99				5% Shapiro Wilk Critical Value	0.85	Data Not Lognormal at 5% Significance Level						
100				Lilliefors Test Statistic	0.308	**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					0.0345	Mean in Log Scale					-4.071
106	SD in Original Scale					0.0544	SD in Log Scale					1.198
107	95% UTL95% Coverage					0.165	95% BCA UTL95% Coverage					0.12
108	95% Bootstrap (%) UTL95% Coverage					0.15	95% UPL (t)					0.125
109	90% Percentile (z)					0.0792	95% Percentile (z)					0.122
110	99% Percentile (z)					0.277	95% USL					0.862
111												
112	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
113	KM Mean of Logged Data					-2.267	95% KM UTL (Lognormal)95% Coverage					0.143
114	KM SD of Logged Data					0.169	95% KM UPL (Lognormal)					0.137
115	95% KM Percentile Lognormal (z)					0.137	95% KM USL (Lognormal)					0.18
116												
117	**Background DL/2 Statistics Assuming Lognormal Distribution**											
118	Mean in Original Scale					0.0605	Mean in Log Scale					-2.897
119	SD in Original Scale					0.0448	SD in Log Scale					0.338
120	95% UTL95% Coverage					0.105	95% UPL (t)					0.0969
121	90% Percentile (z)					0.0851	95% Percentile (z)					0.0962
122	99% Percentile (z)					0.121	95% USL					0.167
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					118	95% UTL with95% Coverage					0.15
130	Approx, f used to compute achieved CC					1.553	Approximate Actual Confidence Coefficient achieved by UTL					0.86
131	Approximate Sample Size needed to achieve specified CC					153	95% UPL					0.12
132	95% USL					0.46	95% KM Chebyshev UPL					0.26
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					117	Number of Missing Observations					15
144	Number of Distinct Observations					21						
145	Number of Detects					75	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					1.294	Percent Non-Detects					35.9%
150	Mean Detected					6.316	SD Detected					1.138

151	Mean of Detected Logged Data					1.828	SD of Detected Logged Data					0.175
152												
153	**Critical Values for Background Threshold Values (BTVs)**											
154	Tolerance Factor K (For UTL)					1.9	d2max (for USL)					3.262
155												
156	**Normal GOF Test on Detects Only**											
157	Shapiro Wilk Test Statistic					0.889	**Normal GOF Test on Detected Observations Only**					
158	5% Shapiro Wilk P Value					2.7602E-7	Data Not Normal at 5% Significance Level					
159	Lilliefors Test Statistic					0.249	**Lilliefors GOF Test**					
160	5% Lilliefors Critical Value					0.102	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					5.741	KM SD					1.189
165	95% UTL95% Coverage					8.001	95% KM UPL (t)					7.721
166	90% KM Percentile (z)					7.265	95% KM Percentile (z)					7.697
167	99% KM Percentile (z)					8.507	95% KM USL					9.62
168												
169	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
170	Mean					4.953	SD					2.044
171	95% UTL95% Coverage					8.836	95% UPL (t)					8.356
172	90% Percentile (z)					7.572	95% Percentile (z)					8.314
173	99% Percentile (z)					9.707	95% USL					11.62
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					2.783	**Anderson-Darling GOF Test**					
178	5% A-D Critical Value					0.749	Data Not Gamma Distributed at 5% Significance Level					
179	K-S Test Statistic					0.232	**Kolmogorov-Smirnov GOF**					
180	5% K-S Critical Value					0.103	Data Not Gamma Distributed at 5% Significance Level					
181	Data Not Gamma Distributed at 5% Significance Level											
182												
183	**Gamma Statistics on Detected Data Only**											
184	k hat (MLE)					32.79	k star (bias corrected MLE)					31.49
185	Theta hat (MLE)					0.193	Theta star (bias corrected MLE)					0.201
186	nu hat (MLE)					4919	nu star (bias corrected)					4724
187	MLE Mean (bias corrected)					6.316						
188	MLE Sd (bias corrected)					1.126	95% Percentile of Chisquare (2kstar)					82.51
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					2.268	Mean					5.48
197	Maximum					9.5	Median					5
198	SD					1.497	CV					0.273
199	k hat (MLE)					13.15	k star (bias corrected MLE)					12.82
200	Theta hat (MLE)					0.417	Theta star (bias corrected MLE)					0.427

201					nu hat (MLE)	3078				nu star (bias corrected)		3001
202					MLE Mean (bias corrected)	5.48				MLE Sd (bias corrected)		1.53
203					95% Percentile of Chisquare (2kstar)	38.45				90% Percentile		7.509
204					95% Percentile	8.215				99% Percentile		9.652
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				8.708	8.779	95% Approx. Gamma UPL				8.232	8.28
209	95% Gamma USL				11.84	12.13						
210												
211	**Estimates of Gamma Parameters using KM Estimates**											
212					Mean (KM)	5.741				SD (KM)		1.189
213					Variance (KM)	1.414				SE of Mean (KM)		0.111
214					k hat (KM)	23.3				k star (KM)		22.71
215					nu hat (KM)	5453				nu star (KM)		5315
216					theta hat (KM)	0.246				theta star (KM)		0.253
217					80% gamma percentile (KM)	6.722				90% gamma percentile (KM)		7.329
218					95% gamma percentile (KM)	7.855				99% gamma percentile (KM)		8.908
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				8.071	8.082	95% Approx. Gamma UPL				7.742	7.746
224	95% KM Gamma Percentile				7.714	7.718	95% Gamma USL				10.16	10.25
225												
226	**Lognormal GOF Test on Detected Observations Only**											
227					Shapiro Wilk Approximate Test Statistic	0.901	**Shapiro Wilk GOF Test**					
228					5% Shapiro Wilk P Value	2.2747E-6	Data Not Lognormal at 5% Significance Level					
229					Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**					
230					5% Lilliefors Critical Value	0.102	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	5.565	Mean in Log Scale					1.686
235					SD in Original Scale	1.391	SD in Log Scale					0.248
236					95% UTL95% Coverage	8.645	95% BCA UTL95% Coverage					8
237					95% Bootstrap (%) UTL95% Coverage	8.2	95% UPL (t)					8.155
238					90% Percentile (z)	7.416	95% Percentile (z)					8.114
239					99% Percentile (z)	9.607	95% USL					12.11
240												
241	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
242					KM Mean of Logged Data	1.728	95% KM UTL (Lognormal)95% Coverage					8.122
243					KM SD of Logged Data	0.193	95% KM UPL (Lognormal)					7.762
244					95% KM Percentile Lognormal (z)	7.732	95% KM USL (Lognormal)					10.56
245												
246	**Background DL/2 Statistics Assuming Lognormal Distribution**											
247					Mean in Original Scale	4.953	Mean in Log Scale					1.503
248					SD in Original Scale	2.044	SD in Log Scale					0.458
249					95% UTL95% Coverage	10.74	95% UPL (t)					9.64
250					90% Percentile (z)	8.086	95% Percentile (z)					9.55

251				99% Percentile (z)		13.05					95% USL	20.04
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		114					95% UTL with95% Coverage	8.1
259				Approx, f used to compute achieved CC		1.5					Approximate Actual Confidence Coefficient achieved by UTL	0.842
260				Approximate Sample Size needed to achieve specified CC		153					95% UPL	8.01
261				95% USL		9.5					95% KM Chebyshev UPL	10.95
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		58					Number of Distinct Observations	30
273											Number of Missing Observations	74
274				Minimum		12					First Quartile	14
275				Second Largest		20.1					Median	15.9
276				Maximum		21					Third Quartile	17.4
277				Mean		16.1					SD	2.221
278				Coefficient of Variation		0.138					Skewness	0.265
279				Mean of logged Data		2.77					SD of logged Data	0.138
280												
281	Critical Values for Background Threshold Values (BTVs)											
282				Tolerance Factor K (For UTL)		2.024					d2max (for USL)	3.014
283												
284	Normal GOF Test											
285				Shapiro Wilk Test Statistic		0.948					Normal GOF Test	
286				5% Shapiro Wilk P Value		0.028					Data Not Normal at 5% Significance Level	
287				Lilliefors Test Statistic		0.14					Lilliefors GOF Test	
288				5% Lilliefors Critical Value		0.116					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		20.6					90% Percentile (z)	18.95
293				95% UPL (t)		19.85					95% Percentile (z)	19.75
294				95% USL		22.79					99% Percentile (z)	21.27
295												
296	Gamma GOF Test											
297				A-D Test Statistic		0.903					Anderson-Darling Gamma GOF Test	
298				5% A-D Critical Value		0.748					Data Not Gamma Distributed at 5% Significance Level	
299				K-S Test Statistic		0.128					Kolmogorov-Smirnov Gamma GOF Test	
300				5% K-S Critical Value		0.116					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)	53.88			k star (bias corrected MLE)	51.1		
305					Theta hat (MLE)	0.299			Theta star (bias corrected MLE)	0.315		
306					nu hat (MLE)	6250			nu star (bias corrected)	5928		
307					MLE Mean (bias corrected)	16.1			MLE Sd (bias corrected)	2.252		
308												
309	Background Statistics Assuming Gamma Distribution											
310					95% Wilson Hilferty (WH) Approx. Gamma UPL	20.01			90% Percentile	19.05		
311					95% Hawkins Wixley (HW) Approx. Gamma UPL	20.04			95% Percentile	19.97		
312					95% WH Approx. Gamma UTL with 95% Coverage	20.89			99% Percentile	21.8		
313					95% HW Approx. Gamma UTL with 95% Coverage	20.93						
314					95% WH USL	23.6			95% HW USL	23.73		
315												
316	Lognormal GOF Test											
317					Shapiro Wilk Test Statistic	0.953			Shapiro Wilk Lognormal GOF Test			
318					5% Shapiro Wilk P Value	0.0509			Data appear Lognormal at 5% Significance Level			
319					Lilliefors Test Statistic	0.127			Lilliefors Lognormal GOF Test			
320					5% Lilliefors Critical Value	0.116			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	21.07			90% Percentile (z)	19.03		
325					95% UPL (t)	20.12			95% Percentile (z)	20		
326					95% USL	24.15			99% Percentile (z)	21.97		
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	57			95% UTL with 95% Coverage	20.1		
333					Approx, f used to compute achieved CC	1.5			Approximate Actual Confidence Coefficient achieved by UTL	0.793		
334									Approximate Sample Size needed to achieve specified CC	93		
335					95% Percentile Bootstrap UTL with 95% Coverage	20.24			95% BCA Bootstrap UTL with 95% Coverage	20.24		
336					95% UPL	20.1			90% Percentile	19.29		
337					90% Chebyshev UPL	22.82			95% Percentile	19.76		
338					95% Chebyshev UPL	25.86			99% Percentile	20.49		
339					95% USL	21						
340												
341	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
342	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
343	and consists of observations collected from clean unimpacted locations.											
344	The use of USL tends to provide a balance between false positives and false negatives provided the data											
345	represents a background data set and when many onsite observations need to be compared with the BTV.											
346												
347	CALCIUM, DISSOLVED											
348												
349	General Statistics											
350					Total Number of Observations	94			Number of Distinct Observations	43		

351											Number of Missing Observations	37
352					Minimum	10.4					First Quartile	14
353					Second Largest	20.1					Median	16.4
354					Maximum	20.1					Third Quartile	17.4
355					Mean	15.91					SD	2.217
356					Coefficient of Variation	0.139					Skewness	-0.339
357					Mean of logged Data	2.757					SD of logged Data	0.145
358												
359					**Critical Values for Background Threshold Values (BTVs)**							
360					Tolerance Factor K (For UTL)	1.933					d2max (for USL)	3.188
361												
362					**Normal GOF Test**							
363					Shapiro Wilk Test Statistic	0.948	**Normal GOF Test**					
364					5% Shapiro Wilk P Value	0.00267	Data Not Normal at 5% Significance Level					
365					Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**					
366					5% Lilliefors Critical Value	0.0916	Data Not Normal at 5% Significance Level					
367					**Data Not Normal at 5% Significance Level**							
368												
369					**Background Statistics Assuming Normal Distribution**							
370					95% UTL with 95% Coverage	20.19					90% Percentile (z)	18.75
371					95% UPL (t)	19.61					95% Percentile (z)	19.55
372					95% USL	22.97					99% Percentile (z)	21.06
373												
374					**Gamma GOF Test**							
375					A-D Test Statistic	1.881	**Anderson-Darling Gamma GOF Test**					
376					5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level					
377					K-S Test Statistic	0.136	**Kolmogorov-Smirnov Gamma GOF Test**					
378					5% K-S Critical Value	0.092	Data Not Gamma Distributed at 5% Significance Level					
379					**Data Not Gamma Distributed at 5% Significance Level**							
380												
381					**Gamma Statistics**							
382					k hat (MLE)	49.47					k star (bias corrected MLE)	47.9
383					Theta hat (MLE)	0.322					Theta star (bias corrected MLE)	0.332
384					nu hat (MLE)	9301					nu star (bias corrected)	9006
385					MLE Mean (bias corrected)	15.91					MLE Sd (bias corrected)	2.298
386												
387					**Background Statistics Assuming Gamma Distribution**							
388					95% Wilson Hilferty (WH) Approx. Gamma UPL	19.89					90% Percentile	18.91
389					95% Hawkins Wixley (HW) Approx. Gamma UPL	19.93					95% Percentile	19.87
390					95% WH Approx. Gamma UTL with 95% Coverage	20.59					99% Percentile	21.74
391					95% HW Approx. Gamma UTL with 95% Coverage	20.65						
392					95% WH USL	24.17					95% HW USL	24.36
393												
394					**Lognormal GOF Test**							
395					Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk Lognormal GOF Test**					
396					5% Shapiro Wilk P Value	9.7820E-5	Data Not Lognormal at 5% Significance Level					
397					Lilliefors Test Statistic	0.142	**Lilliefors Lognormal GOF Test**					
398					5% Lilliefors Critical Value	0.0916	Data Not Lognormal at 5% Significance Level					
399					**Data Not Lognormal at 5% Significance Level**							
400												

401	**Background Statistics assuming Lognormal Distribution**											
402				95% UTL with	95% Coverage	20.85			90% Percentile (z)	18.97		
403					95% UPL (t)	20.07			95% Percentile (z)	20		
404					95% USL	25.02			99% Percentile (z)	22.08		
405												
406	**Nonparametric Distribution Free Background Statistics**											
407	Data do not follow a Discernible Distribution (0.05)											
408												
409	**Nonparametric Upper Limits for Background Threshold Values**											
410					Order of Statistic, r	92			95% UTL with	95% Coverage	19.4	
411					Approx, f used to compute achieved CC	1.614			Approximate Actual Confidence Coefficient achieved by UTL		0.855	
412									Approximate Sample Size needed to achieve specified CC		124	
413				95% Percentile Bootstrap UTL with	95% Coverage	19.4			95% BCA Bootstrap UTL with	95% Coverage	19.4	
414					95% UPL	19.2			90% Percentile		18.5	
415					90% Chebyshev UPL	22.59			95% Percentile		19.14	
416					95% Chebyshev UPL	25.62			99% Percentile		20.1	
417					95% USL	20.1						
418												
419	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
420	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
421	and consists of observations collected from clean unimpacted locations.											
422	The use of USL tends to provide a balance between false positives and false negatives provided the data											
423	represents a background data set and when many onsite observations need to be compared with the BTV.											
424												
425	**COD (CHEMICAL OXYGEN DEMAND)**											
426												
427	**General Statistics**											
428					Total Number of Observations	128			Number of Missing Observations		4	
429					Number of Distinct Observations	9						
430					Number of Detects	6			Number of Non-Detects		122	
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		95.31%	
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)	1.888			d2max (for USL)		3.292	
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	5.757			KM SD		3.648	
450					95% UTL95% Coverage	12.64			95% KM UPL (t)		11.82	

451				90% KM Percentile (z)		10.43				95% KM Percentile (z)		11.76
452				99% KM Percentile (z)		14.24				95% KM USL		17.76
453												
454	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
455				Mean		8.52				SD		4.153
456				95% UTL95% Coverage		16.36				95% UPL (t)		15.43
457				90% Percentile (z)		13.84				95% Percentile (z)		15.35
458				99% Percentile (z)		18.18				95% USL		22.19
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		1.554
482				Maximum		31				Median		0.01
483				SD		5.008				CV		3.222
484				k hat (MLE)		0.186				k star (bias corrected MLE)		0.186
485				Theta hat (MLE)		8.375				Theta star (bias corrected MLE)		8.336
486				nu hat (MLE)		47.51				nu star (bias corrected)		47.73
487				MLE Mean (bias corrected)		1.554				MLE Sd (bias corrected)		3.599
488				95% Percentile of Chisquare (2kstar)		1.956				90% Percentile		4.694
489				95% Percentile		8.152				99% Percentile		17.78
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	5.648	4.882				95% Approx. Gamma UPL	4.311	3.546
494				95% Gamma USL	20.55	23.43						
495												
496	**Estimates of Gamma Parameters using KM Estimates**											
497				Mean (KM)		5.757				SD (KM)		3.648
498				Variance (KM)		13.31				SE of Mean (KM)		0.384
499				k hat (KM)		2.491				k star (KM)		2.438
500				nu hat (KM)		637.7				nu star (KM)		624

501	theta hat (KM)					2.311	theta star (KM)					2.362
502	80% gamma percentile (KM)					8.418	90% gamma percentile (KM)					10.7
503	95% gamma percentile (KM)					12.84	99% gamma percentile (KM)					17.55
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				10.16	9.895	95% Approx. Gamma UPL				9.494	9.257
509	95% KM Gamma Percentile				9.44	9.205	95% Gamma USL				15	14.67
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					2.387	Mean in Log Scale					-0.0997
520	SD in Original Scale					4.686	SD in Log Scale					1.391
521	95% UTL95% Coverage					12.52	95% BCA UTL95% Coverage					12.54
522	95% Bootstrap (%) UTL95% Coverage					12.54	95% UPL (t)					9.158
523	90% Percentile (z)					5.384	95% Percentile (z)					8.925
524	99% Percentile (z)					23.04	95% USL					88.26
525												
526	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
527	KM Mean of Logged Data					1.682	95% KM UTL (Lognormal)95% Coverage					9.195
528	KM SD of Logged Data					0.284	95% KM UPL (Lognormal)					8.627
529	95% KM Percentile Lognormal (z)					8.581	95% KM USL (Lognormal)					13.71
530												
531	**Background DL/2 Statistics Assuming Lognormal Distribution**											
532	Mean in Original Scale					8.52	Mean in Log Scale					2.023
533	SD in Original Scale					4.153	SD in Log Scale					0.524
534	95% UTL95% Coverage					20.34	95% UPL (t)					18.08
535	90% Percentile (z)					14.81	95% Percentile (z)					17.91
536	99% Percentile (z)					25.6	95% USL					42.46
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					125	95% UTL with95% Coverage					20
544	Approx, f used to compute achieved CC					1.645	Approximate Actual Confidence Coefficient achieved by UTL					0.887
545	Approximate Sample Size needed to achieve specified CC					153	95% UPL					20
546	95% USL					31	95% KM Chebyshev UPL					21.72
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.											

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

CHLORIDE

General Statistics

Total Number of Observations	130	Number of Missing Observations	2
Number of Distinct Observations	64		
Number of Detects	127	Number of Non-Detects	3
Number of Distinct Detects	63	Number of Distinct Non-Detects	3
Minimum Detect	15	Minimum Non-Detect	18
Maximum Detect	33.2	Maximum Non-Detect	41
Variance Detected	20.02	Percent Non-Detects	2.308%
Mean Detected	25.06	SD Detected	4.474
Mean of Detected Logged Data	3.204	SD of Detected Logged Data	0.189

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	1.886	d2max (for USL)	3.297

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.955	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0.00166	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0913	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.079	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	24.94	KM SD	4.527
95% UTL95% Coverage	33.48	95% KM UPL (t)	32.47
90% KM Percentile (z)	30.74	95% KM Percentile (z)	32.39
99% KM Percentile (z)	35.47	95% KM USL	39.87

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	24.79	SD	4.825
95% UTL95% Coverage	33.89	95% UPL (t)	32.82
90% Percentile (z)	30.97	95% Percentile (z)	32.73
99% Percentile (z)	36.02	95% USL	40.7

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.513	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.117	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0823	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	29.56	k star (bias corrected MLE)	28.86
Theta hat (MLE)	0.848	Theta star (bias corrected MLE)	0.868
nu hat (MLE)	7508	nu star (bias corrected)	7332

601					MLE Mean (bias corrected)	25.06						
602					MLE Sd (bias corrected)	4.665				95% Percentile of Chisquare (2kstar)		76.47
603												
604	**Gamma ROS Statistics using Imputed Non-Detects**											
605	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
606	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
607	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
608	This is especially true when the sample size is small.											
609	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
610					Minimum	15				Mean		24.96
611					Maximum	33.2				Median		25.4
612					SD	4.496				CV		0.18
613					k hat (MLE)	29.14				k star (bias corrected MLE)		28.47
614					Theta hat (MLE)	0.857				Theta star (bias corrected MLE)		0.877
615					nu hat (MLE)	7575				nu star (bias corrected)		7402
616					MLE Mean (bias corrected)	24.96				MLE Sd (bias corrected)		4.678
617					95% Percentile of Chisquare (2kstar)	75.55				90% Percentile		31.11
618					95% Percentile	33.12				99% Percentile		37.11
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	34.42	34.58			95% Approx. Gamma UPL	33.16	33.27
623					95% Gamma USL	43.2	43.79					
624												
625	**Estimates of Gamma Parameters using KM Estimates**											
626					Mean (KM)	24.94				SD (KM)		4.527
627					Variance (KM)	20.49				SE of Mean (KM)		0.4
628					k hat (KM)	30.35				k star (KM)		29.66
629					nu hat (KM)	7892				nu star (KM)		7711
630					theta hat (KM)	0.822				theta star (KM)		0.841
631					80% gamma percentile (KM)	28.69				90% gamma percentile (KM)		30.96
632					95% gamma percentile (KM)	32.92				99% gamma percentile (KM)		36.81
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	34.49	34.66			95% Approx. Gamma UPL	33.22	33.33
638					95% KM Gamma Percentile	33.11	33.23			95% Gamma USL	43.36	43.97
639												
640	**Lognormal GOF Test on Detected Observations Only**											
641					Shapiro Wilk Approximate Test Statistic	0.934				**Shapiro Wilk GOF Test**		
642					5% Shapiro Wilk P Value	1.8695E-6				Data Not Lognormal at 5% Significance Level		
643					Lilliefors Test Statistic	0.13				**Lilliefors GOF Test**		
644					5% Lilliefors Critical Value	0.079				Data Not Lognormal at 5% Significance Level		
645	Data Not Lognormal at 5% Significance Level											
646												
647	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
648					Mean in Original Scale	24.95				Mean in Log Scale		3.2
649					SD in Original Scale	4.499				SD in Log Scale		0.19
650					95% UTL95% Coverage	35.12				95% BCA UTL95% Coverage		32.71

651	95% Bootstrap (%) UTL95% Coverage					32.71	95% UPL (t)					33.66
652	90% Percentile (z)					31.3	95% Percentile (z)					33.54
653	99% Percentile (z)					38.19	95% USL					45.94
654												
655	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
656	KM Mean of Logged Data					3.199	95% KM UTL (Lognormal)95% Coverage					35.21
657	KM SD of Logged Data					0.192	95% KM UPL (Lognormal)					33.73
658	95% KM Percentile Lognormal (z)					33.61	95% KM USL (Lognormal)					46.17
659												
660	**Background DL/2 Statistics Assuming Lognormal Distribution**											
661	Mean in Original Scale					24.79	Mean in Log Scale					3.189
662	SD in Original Scale					4.825	SD in Log Scale					0.22
663	95% UTL95% Coverage					36.73	95% UPL (t)					34.97
664	90% Percentile (z)					32.16	95% Percentile (z)					34.83
665	99% Percentile (z)					40.47	95% USL					50.1
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					127	95% UTL with95% Coverage					33
673	Approx, f used to compute achieved CC					1.671	Approximate Actual Confidence Coefficient achieved by UTL					0.894
674	Approximate Sample Size needed to achieve specified CC					153	95% UPL					32.6
675	95% USL					41	95% KM Chebyshev UPL					44.75
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					92	Number of Missing Observations					40
687	Number of Distinct Observations					4						
688	Number of Detects					1	Number of Non-Detects					91
689	Number of Distinct Detects					1	Number of Distinct Non-Detects					4
690	Minimum Detect					0.1	Minimum Non-Detect					0.1
691	Maximum Detect					0.1	Maximum Non-Detect					0.5
692	Variance Detected					N/A	Percent Non-Detects					98.91%
693	Mean Detected					0.1	SD Detected					N/A
694	Mean of Detected Logged Data					-2.303	SD of Detected Logged Data					N/A
695												
696	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
697	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
698												
699	**The data set for variable FLUORIDE was not processed!**											
700												

	A	B	C	D	E	F	G	H	I	J	K	L
701												
702	**IRON, TOTAL**											
703												
704	**General Statistics**											
705	Total Number of Observations					66	Number of Missing Observations					66
706	Number of Distinct Observations					45						
707	Number of Detects					63	Number of Non-Detects					3
708	Number of Distinct Detects					42	Number of Distinct Non-Detects					3
709	Minimum Detect					0.06	Minimum Non-Detect					0.12
710	Maximum Detect					3.5	Maximum Non-Detect					0.34
711	Variance Detected					0.73	Percent Non-Detects					4.545%
712	Mean Detected					1.148	SD Detected					0.854
713	Mean of Detected Logged Data					-0.162	SD of Detected Logged Data					0.84
714												
715	**Critical Values for Background Threshold Values (BTVs)**											
716	Tolerance Factor K (For UTL)					1.997	d2max (for USL)					3.062
717												
718	**Normal GOF Test on Detects Only**											
719	Shapiro Wilk Test Statistic					0.879	**Normal GOF Test on Detected Observations Only**					
720	5% Shapiro Wilk P Value					1.0406E-6	Data Not Normal at 5% Significance Level					
721	Lilliefors Test Statistic					0.149	**Lilliefors GOF Test**					
722	5% Lilliefors Critical Value					0.111	Data Not Normal at 5% Significance Level					
723	Data Not Normal at 5% Significance Level											
724												
725	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
726	KM Mean					1.102	KM SD					0.855
727	95% UTL95% Coverage					2.809	95% KM UPL (t)					2.539
728	90% KM Percentile (z)					2.197	95% KM Percentile (z)					2.508
729	99% KM Percentile (z)					3.09	95% KM USL					3.719
730												
731	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
732	Mean					1.1	SD					0.862
733	95% UTL95% Coverage					2.823	95% UPL (t)					2.55
734	90% Percentile (z)					2.206	95% Percentile (z)					2.519
735	99% Percentile (z)					3.107	95% USL					3.742
736	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
737												
738	**Gamma GOF Tests on Detected Observations Only**											
739	A-D Test Statistic					0.518	**Anderson-Darling GOF Test**					
740	5% A-D Critical Value					0.765	Detected data appear Gamma Distributed at 5% Significance Level					
741	K-S Test Statistic					0.0761	**Kolmogorov-Smirnov GOF**					
742	5% K-S Critical Value					0.114	Detected data appear Gamma Distributed at 5% Significance Level					
743	Detected data appear Gamma Distributed at 5% Significance Level											
744												
745	**Gamma Statistics on Detected Data Only**											
746	k hat (MLE)					1.814	k star (bias corrected MLE)					1.738
747	Theta hat (MLE)					0.633	Theta star (bias corrected MLE)					0.66
748	nu hat (MLE)					228.6	nu star (bias corrected)					219
749	MLE Mean (bias corrected)					1.148						
750	MLE Sd (bias corrected)					0.871	95% Percentile of Chisquare (2kstar)					8.625

	A	B	C	D	E	F	G	H	I	J	K	L
751												
752	**Gamma ROS Statistics using Imputed Non-Detects**											
753	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
754	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)											
755	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
756	This is especially true when the sample size is small.											
757	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
758					Minimum	0.0299				Mean		1.099
759					Maximum	3.5				Median		0.84
760					SD	0.864				CV		0.786
761					k hat (MLE)	1.448				k star (bias corrected MLE)		1.392
762					Theta hat (MLE)	0.759				Theta star (bias corrected MLE)		0.789
763					nu hat (MLE)	191.1				nu star (bias corrected)		183.8
764					MLE Mean (bias corrected)	1.099				MLE Sd (bias corrected)		0.931
765					95% Percentile of Chisquare (2kstar)	7.437				90% Percentile		2.332
766					95% Percentile	2.935				99% Percentile		4.305
767	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
768	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
769					WH	HW					WH	HW
770				95% Approx. Gamma UTL with 95% Coverage	3.53	3.798			95% Approx. Gamma UPL		2.943	3.099
771				95% Gamma USL	6.079	7.053						
772												
773	**Estimates of Gamma Parameters using KM Estimates**											
774					Mean (KM)	1.102				SD (KM)		0.855
775					Variance (KM)	0.731				SE of Mean (KM)		0.106
776					k hat (KM)	1.661				k star (KM)		1.595
777					nu hat (KM)	219.2				nu star (KM)		210.6
778					theta hat (KM)	0.663				theta star (KM)		0.69
779					80% gamma percentile (KM)	1.693				90% gamma percentile (KM)		2.261
780					95% gamma percentile (KM)	2.811				99% gamma percentile (KM)		4.048
781												
782	**The following statistics are computed using gamma distribution and KM estimates**											
783	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
784					WH	HW					WH	HW
785				95% Approx. Gamma UTL with 95% Coverage	3.416	3.626			95% Approx. Gamma UPL		2.861	2.98
786				95% KM Gamma Percentile	2.802	2.912			95% Gamma USL		5.805	6.599
787												
788	**Lognormal GOF Test on Detected Observations Only**											
789					Shapiro Wilk Approximate Test Statistic	0.961			**Shapiro Wilk GOF Test**			
790					5% Shapiro Wilk P Value	0.102			Detected Data appear Lognormal at 5% Significance Level			
791					Lilliefors Test Statistic	0.0812			**Lilliefors GOF Test**			
792					5% Lilliefors Critical Value	0.111			Detected Data appear Lognormal at 5% Significance Level			
793	Detected Data appear Lognormal at 5% Significance Level											
794												
795	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
796					Mean in Original Scale	1.104				Mean in Log Scale		-0.235
797					SD in Original Scale	0.859				SD in Log Scale		0.887
798					95% UTL95% Coverage	4.645				95% BCA UTL95% Coverage		3.15
799					95% Bootstrap (%) UTL95% Coverage	3.2				95% UPL (t)		3.511
800					90% Percentile (z)	2.463				95% Percentile (z)		3.399

801					99% Percentile (z)	6.221					95% USL	11.95
802												
803	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
804					KM Mean of Logged Data	-0.257					95% KM UTL (Lognormal)95% Coverage	4.955
805					KM SD of Logged Data	0.93					95% KM UPL (Lognormal)	3.694
806					95% KM Percentile Lognormal (z)	3.571					95% KM USL (Lognormal)	13.34
807												
808	**Background DL/2 Statistics Assuming Lognormal Distribution**											
809					Mean in Original Scale	1.1					Mean in Log Scale	-0.261
810					SD in Original Scale	0.862					SD in Log Scale	0.942
811					95% UTL95% Coverage	5.057					95% UPL (t)	3.756
812					90% Percentile (z)	2.577					95% Percentile (z)	3.629
813					99% Percentile (z)	6.898					95% USL	13.8
814	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
815												
816	**Nonparametric Distribution Free Background Statistics**											
817	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
818												
819	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
820					Order of Statistic, r	65					95% UTL with95% Coverage	3.2
821					Approx, f used to compute achieved CC	1.711					Approximate Actual Confidence Coefficient achieved by UTL	0.848
822					Approximate Sample Size needed to achieve specified CC	93					95% UPL	3
823					95% USL	3.5					95% KM Chebyshev UPL	4.856
824												
825	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
826	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
827	and consists of observations collected from clean unimpacted locations.											
828	The use of USL tends to provide a balance between false positives and false negatives provided the data											
829	represents a background data set and when many onsite observations need to be compared with the BTV.											
830												
831	**IRON, DISSOLVED**											
832												
833	**General Statistics**											
834					Total Number of Observations	105					Number of Missing Observations	26
835					Number of Distinct Observations	15						
836					Number of Detects	16					Number of Non-Detects	89
837					Number of Distinct Detects	13					Number of Distinct Non-Detects	3
838					Minimum Detect	0.06					Minimum Non-Detect	0.02
839					Maximum Detect	1.2					Maximum Non-Detect	0.06
840					Variance Detected	0.139					Percent Non-Detects	84.76%
841					Mean Detected	0.344					SD Detected	0.373
842					Mean of Detected Logged Data	-1.598					SD of Detected Logged Data	1.058
843												
844	**Critical Values for Background Threshold Values (BTVs)**											
845					Tolerance Factor K (For UTL)	1.916					d2max (for USL)	3.226
846												
847	**Normal GOF Test on Detects Only**											
848					Shapiro Wilk Test Statistic	0.767					**Shapiro Wilk GOF Test**	
849					5% Shapiro Wilk Critical Value	0.887					Data Not Normal at 5% Significance Level	
850					Lilliefors Test Statistic	0.27					**Lilliefors GOF Test**	

851				5% Lilliefors Critical Value		0.213	Data Not Normal at 5% Significance Level					
852	Data Not Normal at 5% Significance Level											
853												
854	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
855				KM Mean		0.0694				KM SD		0.183
856				95% UTL95% Coverage		0.42				95% KM UPL (t)		0.375
857				90% KM Percentile (z)		0.304				95% KM Percentile (z)		0.371
858				99% KM Percentile (z)		0.495				95% KM USL		0.66
859												
860	DL/2 Substitution Background Statistics Assuming Normal Distribution											
861				Mean		0.0775				SD		0.182
862				95% UTL95% Coverage		0.426				95% UPL (t)		0.381
863				90% Percentile (z)		0.31				95% Percentile (z)		0.377
864				99% Percentile (z)		0.5				95% USL		0.664
865	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
866												
867	Gamma GOF Tests on Detected Observations Only											
868				A-D Test Statistic		0.88	Anderson-Darling GOF Test					
869				5% A-D Critical Value		0.762	Data Not Gamma Distributed at 5% Significance Level					
870				K-S Test Statistic		0.243	Kolmogorov-Smirnov GOF					
871				5% K-S Critical Value		0.221	Data Not Gamma Distributed at 5% Significance Level					
872	Data Not Gamma Distributed at 5% Significance Level											
873												
874	Gamma Statistics on Detected Data Only											
875				k hat (MLE)		1.075				k star (bias corrected MLE)		0.915
876				Theta hat (MLE)		0.32				Theta star (bias corrected MLE)		0.376
877				nu hat (MLE)		34.4				nu star (bias corrected)		29.29
878				MLE Mean (bias corrected)		0.344						
879				MLE Sd (bias corrected)		0.36				95% Percentile of Chisquare (2kstar)		5.659
880												
881	Gamma ROS Statistics using Imputed Non-Detects											
882	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
883	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)											
884	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
885	This is especially true when the sample size is small.											
886	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
887				Minimum		0.01				Mean		0.061
888				Maximum		1.2				Median		0.01
889				SD		0.186				CV		3.056
890				k hat (MLE)		0.475				k star (bias corrected MLE)		0.467
891				Theta hat (MLE)		0.128				Theta star (bias corrected MLE)		0.13
892				nu hat (MLE)		99.66				nu star (bias corrected)		98.15
893				MLE Mean (bias corrected)		0.061				MLE Sd (bias corrected)		0.0892
894				95% Percentile of Chisquare (2kstar)		3.678				90% Percentile		0.167
895				95% Percentile		0.24				99% Percentile		0.42
896	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
897	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
898					WH	HW					WH	HW
899				95% Approx. Gamma UTL with 95% Coverage	0.223	0.201				95% Approx. Gamma UPL	0.179	0.159
900				95% Gamma USL	0.574	0.578						

	A	B	C	D	E	F	G	H	I	J	K	L
901												
902	**Estimates of Gamma Parameters using KM Estimates**											
903					Mean (KM)	0.0694				SD (KM)		0.183
904					Variance (KM)	0.0335				SE of Mean (KM)		0.0185
905					k hat (KM)	0.144				k star (KM)		0.146
906					nu hat (KM)	30.2				nu star (KM)		30.67
907					theta hat (KM)	0.483				theta star (KM)		0.475
908					80% gamma percentile (KM)	0.0739				90% gamma percentile (KM)		0.205
909					95% gamma percentile (KM)	0.384				99% gamma percentile (KM)		0.906
910												
911	**The following statistics are computed using gamma distribution and KM estimates**											
912	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
913						WH	HW				WH	HW
914					95% Approx. Gamma UTL with 95% Coverage	0.238	0.218			95% Approx. Gamma UPL	0.197	0.178
915					95% KM Gamma Percentile	0.193	0.175			95% Gamma USL	0.554	0.548
916												
917	**Lognormal GOF Test on Detected Observations Only**											
918					Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**					
919					5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level					
920					Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**					
921					5% Lilliefors Critical Value	0.213	Detected Data appear Lognormal at 5% Significance Level					
922	**Detected Data appear Lognormal at 5% Significance Level**											
923												
924	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
925					Mean in Original Scale	0.058				Mean in Log Scale		-5.725
926					SD in Original Scale	0.187				SD in Log Scale		2.624
927					95% UTL95% Coverage	0.498				95% BCA UTL95% Coverage		0.67
928					95% Bootstrap (%) UTL95% Coverage	0.67				95% UPL (t)		0.259
929					90% Percentile (z)	0.0942				95% Percentile (z)		0.244
930					99% Percentile (z)	1.461				95% USL		15.49
931												
932	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
933					KM Mean of Logged Data	-3.559				95% KM UTL (Lognormal)95% Coverage		0.167
934					KM SD of Logged Data	0.923				95% KM UPL (Lognormal)		0.133
935					95% KM Percentile Lognormal (z)	0.13				95% KM USL (Lognormal)		0.558
936												
937	**Background DL/2 Statistics Assuming Lognormal Distribution**											
938					Mean in Original Scale	0.0775				Mean in Log Scale		-3.235
939					SD in Original Scale	0.182				SD in Log Scale		0.813
940					95% UTL95% Coverage	0.187				95% UPL (t)		0.153
941					90% Percentile (z)	0.112				95% Percentile (z)		0.15
942					99% Percentile (z)	0.261				95% USL		0.541
943	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
944												
945	**Nonparametric Distribution Free Background Statistics**											
946	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
947												
948	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
949					Order of Statistic, r	103				95% UTL with95% Coverage		0.69
950					Approx, f used to compute achieved CC	1.807				Approximate Actual Confidence Coefficient achieved by UTL		0.901

951	Approximate Sample Size needed to achieve specified CC					124					95% UPL	0.453
952					95% USL	1.2					95% KM Chebyshev UPL	0.871
953												
954	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
955	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
956	and consists of observations collected from clean unimpacted locations.											
957	The use of USL tends to provide a balance between false positives and false negatives provided the data											
958	represents a background data set and when many onsite observations need to be compared with the BTV.											
959												
960	**MAGNESIUM, TOTAL**											
961												
962	**General Statistics**											
963					Total Number of Observations	42					Number of Distinct Observations	24
964											Number of Missing Observations	90
965					Minimum	8.9					First Quartile	10
966					Second Largest	12.5					Median	11.05
967					Maximum	12.5					Third Quartile	11.8
968					Mean	11.01					SD	1.005
969					Coefficient of Variation	0.0913					Skewness	-0.358
970					Mean of logged Data	2.395					SD of logged Data	0.0933
971												
972	**Critical Values for Background Threshold Values (BTVs)**											
973					Tolerance Factor K (For UTL)	2.104					d2max (for USL)	2.887
974												
975	**Normal GOF Test**											
976					Shapiro Wilk Test Statistic	0.88					**Shapiro Wilk GOF Test**	
977					5% Shapiro Wilk Critical Value	0.942					Data Not Normal at 5% Significance Level	
978					Lilliefors Test Statistic	0.149					**Lilliefors GOF Test**	
979					5% Lilliefors Critical Value	0.135					Data Not Normal at 5% Significance Level	
980	Data Not Normal at 5% Significance Level											
981												
982	**Background Statistics Assuming Normal Distribution**											
983					95% UTL with 95% Coverage	13.13					90% Percentile (z)	12.3
984					95% UPL (t)	12.73					95% Percentile (z)	12.67
985					95% USL	13.92					99% Percentile (z)	13.35
986												
987	**Gamma GOF Test**											
988					A-D Test Statistic	0.985					**Anderson-Darling Gamma GOF Test**	
989					5% A-D Critical Value	0.747					Data Not Gamma Distributed at 5% Significance Level	
990					K-S Test Statistic	0.155					**Kolmogorov-Smirnov Gamma GOF Test**	
991					5% K-S Critical Value	0.136					Data Not Gamma Distributed at 5% Significance Level	
992	Data Not Gamma Distributed at 5% Significance Level											
993												
994	**Gamma Statistics**											
995					k hat (MLE)	119.6					k star (bias corrected MLE)	111.1
996					Theta hat (MLE)	0.0921					Theta star (bias corrected MLE)	0.0991
997					nu hat (MLE)	10049					nu star (bias corrected)	9332
998					MLE Mean (bias corrected)	11.01					MLE Sd (bias corrected)	1.045
999												
1000	**Background Statistics Assuming Gamma Distribution**											

	A	B	C	D	E	F	G	H	I	J	K	L
1001	95% Wilson Hilferty (WH) Approx. Gamma UPL					12.81	90% Percentile					12.37
1002	95% Hawkins Wixley (HW) Approx. Gamma UPL					12.82	95% Percentile					12.79
1003	95% WH Approx. Gamma UTL with 95% Coverage					13.27	99% Percentile					13.59
1004	95% HW Approx. Gamma UTL with 95% Coverage					13.29						
1005	95% WH USL					14.19	95% HW USL					14.23
1006												
1007	**Lognormal GOF Test**											
1008	Shapiro Wilk Test Statistic					0.874	**Shapiro Wilk Lognormal GOF Test**					
1009	5% Shapiro Wilk Critical Value					0.942	Data Not Lognormal at 5% Significance Level					
1010	Lilliefors Test Statistic					0.154	**Lilliefors Lognormal GOF Test**					
1011	5% Lilliefors Critical Value					0.135	Data Not Lognormal at 5% Significance Level					
1012	Data Not Lognormal at 5% Significance Level											
1013												
1014	**Background Statistics assuming Lognormal Distribution**											
1015	95% UTL with 95% Coverage					13.35	90% Percentile (z)					12.36
1016	95% UPL (t)					12.86	95% Percentile (z)					12.79
1017	95% USL					14.36	99% Percentile (z)					13.63
1018												
1019	**Nonparametric Distribution Free Background Statistics**											
1020	Data do not follow a Discernible Distribution (0.05)											
1021												
1022	**Nonparametric Upper Limits for Background Threshold Values**											
1023	Order of Statistic, r					42	95% UTL with 95% Coverage					12.5
1024	Approx, f used to compute achieved CC					2.211	Approximate Actual Confidence Coefficient achieved by UTL					0.884
1025							Approximate Sample Size needed to achieve specified CC					59
1026	95% Percentile Bootstrap UTL with 95% Coverage					12.5	95% BCA Bootstrap UTL with 95% Coverage					12.5
1027	95% UPL					12.49	90% Percentile					12.1
1028	90% Chebyshev UPL					14.07	95% Percentile					12.4
1029	95% Chebyshev UPL					15.45	99% Percentile					12.5
1030	95% USL					12.5						
1031												
1032	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1033	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1034	and consists of observations collected from clean unimpacted locations.											
1035	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1036	represents a background data set and when many onsite observations need to be compared with the BTV.											
1037												
1038	**MAGNESIUM, DISSOLVED**											
1039												
1040	**General Statistics**											
1041	Total Number of Observations					77	Number of Distinct Observations					34
1042							Number of Missing Observations					54
1043	Minimum					7.9	First Quartile					10.6
1044	Second Largest					12.9	Median					11.1
1045	Maximum					12.9	Third Quartile					11.5
1046	Mean					10.94	SD					0.972
1047	Coefficient of Variation					0.0888	Skewness					-0.837
1048	Mean of logged Data					2.388	SD of logged Data					0.0934
1049												
1050	**Critical Values for Background Threshold Values (BTVs)**											

1051					Tolerance Factor K (For UTL)	1.967				d2max (for USL)		3.118
1052												
1053					**Normal GOF Test**							
1054					Shapiro Wilk Test Statistic	0.941	**Normal GOF Test**					
1055					5% Shapiro Wilk P Value	0.00243	Data Not Normal at 5% Significance Level					
1056					Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**					
1057					5% Lilliefors Critical Value	0.101	Data Not Normal at 5% Significance Level					
1058					Data Not Normal at 5% Significance Level							
1059												
1060					**Background Statistics Assuming Normal Distribution**							
1061					95% UTL with 95% Coverage	12.85				90% Percentile (z)		12.18
1062					95% UPL (t)	12.57				95% Percentile (z)		12.54
1063					95% USL	13.97				99% Percentile (z)		13.2
1064												
1065					**Gamma GOF Test**							
1066					A-D Test Statistic	1.913	**Anderson-Darling Gamma GOF Test**					
1067					5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level					
1068					K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**					
1069					5% K-S Critical Value	0.101	Data Not Gamma Distributed at 5% Significance Level					
1070					Data Not Gamma Distributed at 5% Significance Level							
1071												
1072					**Gamma Statistics**							
1073					k hat (MLE)	120.4				k star (bias corrected MLE)		115.8
1074					Theta hat (MLE)	0.0908				Theta star (bias corrected MLE)		0.0945
1075					nu hat (MLE)	18547				nu star (bias corrected)		17826
1076					MLE Mean (bias corrected)	10.94				MLE Sd (bias corrected)		1.017
1077												
1078					**Background Statistics Assuming Gamma Distribution**							
1079					95% Wilson Hilferty (WH) Approx. Gamma UPL	12.68				90% Percentile		12.26
1080					95% Hawkins Wixley (HW) Approx. Gamma UPL	12.69				95% Percentile		12.66
1081					95% WH Approx. Gamma UTL with 95% Coverage	13				99% Percentile		13.44
1082					95% HW Approx. Gamma UTL with 95% Coverage	13.02						
1083					95% WH USL	14.34				95% HW USL		14.4
1084												
1085					**Lognormal GOF Test**							
1086					Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk Lognormal GOF Test**					
1087					5% Shapiro Wilk P Value	1.0804E-5	Data Not Lognormal at 5% Significance Level					
1088					Lilliefors Test Statistic	0.164	**Lilliefors Lognormal GOF Test**					
1089					5% Lilliefors Critical Value	0.101	Data Not Lognormal at 5% Significance Level					
1090					Data Not Lognormal at 5% Significance Level							
1091												
1092					**Background Statistics assuming Lognormal Distribution**							
1093					95% UTL with 95% Coverage	13.09				90% Percentile (z)		12.28
1094					95% UPL (t)	12.74				95% Percentile (z)		12.7
1095					95% USL	14.58				99% Percentile (z)		13.54
1096												
1097					**Nonparametric Distribution Free Background Statistics**							
1098					Data do not follow a Discernible Distribution (0.05)							
1099												
1100					**Nonparametric Upper Limits for Background Threshold Values**							

1101					Order of Statistic, r	76				95% UTL with 95% Coverage		12.9
1102					Approx, f used to compute achieved CC	2				Approximate Actual Confidence Coefficient achieved by UTL		0.903
1103										Approximate Sample Size needed to achieve specified CC		93
1104					95% Percentile Bootstrap UTL with 95% Coverage	12.9				95% BCA Bootstrap UTL with 95% Coverage		12.66
1105					95% UPL	12.42				90% Percentile		12
1106					90% Chebyshev UPL	13.87				95% Percentile		12.32
1107					95% Chebyshev UPL	15.2				99% Percentile		12.9
1108					95% USL	12.9						
1109												
1110	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1111	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1112	and consists of observations collected from clean unimpacted locations.											
1113	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1114	represents a background data set and when many onsite observations need to be compared with the BTV.											
1115												
1116	**MANGANESE, TOTAL**											
1117												
1118	**General Statistics**											
1119					Total Number of Observations	69				Number of Missing Observations		63
1120					Number of Distinct Observations	12						
1121					Number of Detects	66				Number of Non-Detects		3
1122					Number of Distinct Detects	12				Number of Distinct Non-Detects		3
1123					Minimum Detect	0.03				Minimum Non-Detect		0.04
1124					Maximum Detect	0.15				Maximum Non-Detect		0.06
1125					Variance Detected	8.2014E-4				Percent Non-Detects		4.348%
1126					Mean Detected	0.0673				SD Detected		0.0286
1127					Mean of Detected Logged Data	-2.778				SD of Detected Logged Data		0.392
1128												
1129	**Critical Values for Background Threshold Values (BTVs)**											
1130					Tolerance Factor K (For UTL)	1.988				d2max (for USL)		3.079
1131												
1132	**Normal GOF Test on Detects Only**											
1133					Shapiro Wilk Test Statistic	0.865				**Normal GOF Test on Detected Observations Only**		
1134					5% Shapiro Wilk P Value	6.5352E-8				Data Not Normal at 5% Significance Level		
1135					Lilliefors Test Statistic	0.196				**Lilliefors GOF Test**		
1136					5% Lilliefors Critical Value	0.109				Data Not Normal at 5% Significance Level		
1137	Data Not Normal at 5% Significance Level											
1138												
1139	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1140					KM Mean	0.066				KM SD		0.0285
1141					95% UTL95% Coverage	0.123				95% KM UPL (t)		0.114
1142					90% KM Percentile (z)	0.102				95% KM Percentile (z)		0.113
1143					99% KM Percentile (z)	0.132				95% KM USL		0.154
1144												
1145	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1146					Mean	0.0654				SD		0.0293
1147					95% UTL95% Coverage	0.124				95% UPL (t)		0.115
1148					90% Percentile (z)	0.103				95% Percentile (z)		0.114
1149					99% Percentile (z)	0.134				95% USL		0.156
1150	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
1151												
1152	**Gamma GOF Tests on Detected Observations Only**											
1153					A-D Test Statistic	1.889	**Anderson-Darling GOF Test**					
1154					5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level					
1155					K-S Test Statistic	0.191	**Kolmogorov-Smirnov GOF**					
1156					5% K-S Critical Value	0.11	Data Not Gamma Distributed at 5% Significance Level					
1157	**Data Not Gamma Distributed at 5% Significance Level**											
1158												
1159	**Gamma Statistics on Detected Data Only**											
1160					k hat (MLE)	6.478	k star (bias corrected MLE)	6.193				
1161					Theta hat (MLE)	0.0104	Theta star (bias corrected MLE)	0.0109				
1162					nu hat (MLE)	855.1	nu star (bias corrected)	817.5				
1163					MLE Mean (bias corrected)	0.0673						
1164					MLE Sd (bias corrected)	0.027	95% Percentile of Chisquare (2kstar)	21.54				
1165												
1166	**Gamma ROS Statistics using Imputed Non-Detects**											
1167	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1168	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)											
1169	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1170	This is especially true when the sample size is small.											
1171	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1172					Minimum	0.0194	Mean	0.0658				
1173					Maximum	0.15	Median	0.06				
1174					SD	0.029	CV	0.441				
1175					k hat (MLE)	5.901	k star (bias corrected MLE)	5.654				
1176					Theta hat (MLE)	0.0111	Theta star (bias corrected MLE)	0.0116				
1177					nu hat (MLE)	814.4	nu star (bias corrected)	780.3				
1178					MLE Mean (bias corrected)	0.0658	MLE Sd (bias corrected)	0.0277				
1179					95% Percentile of Chisquare (2kstar)	20.09	90% Percentile	0.103				
1180					95% Percentile	0.117	99% Percentile	0.146				
1181	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1182	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1183						WH	HW				WH	HW
1184				95% Approx. Gamma UTL with 95% Coverage		0.13	0.132	95% Approx. Gamma UPL			0.117	0.118
1185				95% Gamma USL		0.183	0.189					
1186												
1187	**Estimates of Gamma Parameters using KM Estimates**											
1188					Mean (KM)	0.066	SD (KM)	0.0285				
1189					Variance (KM)	8.1205E-4	SE of Mean (KM)	0.00346				
1190					k hat (KM)	5.36	k star (KM)	5.137				
1191					nu hat (KM)	739.7	nu star (KM)	708.8				
1192					theta hat (KM)	0.0123	theta star (KM)	0.0128				
1193					80% gamma percentile (KM)	0.0884	90% gamma percentile (KM)	0.105				
1194					95% gamma percentile (KM)	0.12	99% gamma percentile (KM)	0.152				
1195												
1196	**The following statistics are computed using gamma distribution and KM estimates**											
1197	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1198						WH	HW				WH	HW
1199				95% Approx. Gamma UTL with 95% Coverage		0.128	0.129	95% Approx. Gamma UPL			0.116	0.116
1200				95% KM Gamma Percentile		0.114	0.115	95% Gamma USL			0.178	0.184

	A	B	C	D	E	F	G	H	I	J	K	L
1201												
1202	**Lognormal GOF Test on Detected Observations Only**											
1203	Shapiro Wilk Approximate Test Statistic					0.932	**Shapiro Wilk GOF Test**					
1204	5% Shapiro Wilk P Value					0.00166	Data Not Lognormal at 5% Significance Level					
1205	Lilliefors Test Statistic					0.18	**Lilliefors GOF Test**					
1206	5% Lilliefors Critical Value					0.109	Data Not Lognormal at 5% Significance Level					
1207	Data Not Lognormal at 5% Significance Level											
1208												
1209	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1210	Mean in Original Scale					0.0659	Mean in Log Scale					-2.802
1211	SD in Original Scale					0.0287	SD in Log Scale					0.402
1212	95% UTL95% Coverage					0.135	95% BCA UTL95% Coverage					0.138
1213	95% Bootstrap (%) UTL95% Coverage					0.15	95% UPL (t)					0.119
1214	90% Percentile (z)					0.102	95% Percentile (z)					0.118
1215	99% Percentile (z)					0.155	95% USL					0.209
1216												
1217	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1218	KM Mean of Logged Data					-2.801	95% KM UTL (Lognormal)95% Coverage					0.134
1219	KM SD of Logged Data					0.397	95% KM UPL (Lognormal)					0.118
1220	95% KM Percentile Lognormal (z)					0.117	95% KM USL (Lognormal)					0.207
1221												
1222	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1223	Mean in Original Scale					0.0654	Mean in Log Scale					-2.818
1224	SD in Original Scale					0.0293	SD in Log Scale					0.429
1225	95% UTL95% Coverage					0.14	95% UPL (t)					0.123
1226	90% Percentile (z)					0.103	95% Percentile (z)					0.121
1227	99% Percentile (z)					0.162	95% USL					0.224
1228	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1229												
1230	**Nonparametric Distribution Free Background Statistics**											
1231	Data do not follow a Discernible Distribution (0.05)											
1232												
1233	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1234	Order of Statistic, r					68	95% UTL with95% Coverage					0.15
1235	Approx, f used to compute achieved CC					1.789	Approximate Actual Confidence Coefficient achieved by UTL					0.866
1236	Approximate Sample Size needed to achieve specified CC					93	95% UPL					0.125
1237	95% USL					0.15	95% KM Chebyshev UPL					0.191
1238												
1239	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1240	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1241	and consists of observations collected from clean unimpacted locations.											
1242	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1243	represents a background data set and when many onsite observations need to be compared with the BTV.											
1244												
1245	**MANGANESE, DISSOLVED**											
1246												
1247	**General Statistics**											
1248	Total Number of Observations					105	Number of Distinct Observations					15
1249							Number of Missing Observations					26
1250	Minimum					0.03	First Quartile					0.05

1251					Second Largest	0.16					Median	0.06
1252					Maximum	0.17					Third Quartile	0.07
1253					Mean	0.0654					SD	0.0266
1254					Coefficient of Variation	0.407					Skewness	1.815
1255					Mean of logged Data	-2.792					SD of logged Data	0.347
1256												
1257					**Critical Values for Background Threshold Values (BTVs)**							
1258					Tolerance Factor K (For UTL)	1.916					d2max (for USL)	3.226
1259												
1260					**Normal GOF Test**							
1261					Shapiro Wilk Test Statistic	0.807	**Normal GOF Test**					
1262					5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level					
1263					Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**					
1264					5% Lilliefors Critical Value	0.0867	Data Not Normal at 5% Significance Level					
1265					Data Not Normal at 5% Significance Level							
1266												
1267					**Background Statistics Assuming Normal Distribution**							
1268				95% UTL with	95% Coverage	0.116					90% Percentile (z)	0.0996
1269					95% UPL (t)	0.11					95% Percentile (z)	0.109
1270					95% USL	0.151					99% Percentile (z)	0.127
1271												
1272					**Gamma GOF Test**							
1273					A-D Test Statistic	4.063	**Anderson-Darling Gamma GOF Test**					
1274					5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level					
1275					K-S Test Statistic	0.233	**Kolmogorov-Smirnov Gamma GOF Test**					
1276					5% K-S Critical Value	0.0882	Data Not Gamma Distributed at 5% Significance Level					
1277					Data Not Gamma Distributed at 5% Significance Level							
1278												
1279					**Gamma Statistics**							
1280					k hat (MLE)	7.822					k star (bias corrected MLE)	7.604
1281					Theta hat (MLE)	0.00837					Theta star (bias corrected MLE)	0.0086
1282					nu hat (MLE)	1643					nu star (bias corrected)	1597
1283					MLE Mean (bias corrected)	0.0654					MLE Sd (bias corrected)	0.0237
1284												
1285					**Background Statistics Assuming Gamma Distribution**							
1286					95% Wilson Hilferty (WH) Approx. Gamma UPL	0.109					90% Percentile	0.0971
1287					95% Hawkins Wixley (HW) Approx. Gamma UPL	0.109					95% Percentile	0.109
1288				95% WH Approx. Gamma UTL with	95% Coverage	0.117					99% Percentile	0.133
1289				95% HW Approx. Gamma UTL with	95% Coverage	0.118						
1290					95% WH USL	0.169					95% HW USL	0.172
1291												
1292					**Lognormal GOF Test**							
1293					Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**					
1294					5% Shapiro Wilk P Value	4.7463E-7	Data Not Lognormal at 5% Significance Level					
1295					Lilliefors Test Statistic	0.21	**Lilliefors Lognormal GOF Test**					
1296					5% Lilliefors Critical Value	0.0867	Data Not Lognormal at 5% Significance Level					
1297					Data Not Lognormal at 5% Significance Level							
1298												
1299					**Background Statistics assuming Lognormal Distribution**							
1300				95% UTL with	95% Coverage	0.119					90% Percentile (z)	0.0957

1301					95% UPL (t)	0.109				95% Percentile (z)		0.109
1302					95% USL	0.188				99% Percentile (z)		0.138
1303												
1304						**Nonparametric Distribution Free Background Statistics**							
1305						Data do not follow a Discernible Distribution (0.05)							
1306												
1307						**Nonparametric Upper Limits for Background Threshold Values**							
1308					Order of Statistic, r	103				95% UTL with 95% Coverage		0.15
1309					Approx, f used to compute achieved CC	1.807				Approximate Actual Confidence Coefficient achieved by UTL		0.901
1310										Approximate Sample Size needed to achieve specified CC		124
1311					95% Percentile Bootstrap UTL with 95% Coverage	0.148				95% BCA Bootstrap UTL with 95% Coverage		0.14
1312					95% UPL	0.127				90% Percentile		0.1
1313					90% Chebyshev UPL	0.146				95% Percentile		0.118
1314					95% Chebyshev UPL	0.182				99% Percentile		0.16
1315					95% USL	0.17						
1316												
1317						Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1318						Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1319						and consists of observations collected from clean unimpacted locations.							
1320						The use of USL tends to provide a balance between false positives and false negatives provided the data							
1321						represents a background data set and when many onsite observations need to be compared with the BTV.							
1322												
1323	**NITRATE-NITROGEN**											
1324												
1325						**General Statistics**							
1326					Total Number of Observations	128				Number of Missing Observations		4
1327					Number of Distinct Observations	48						
1328					Number of Detects	125				Number of Non-Detects		3
1329					Number of Distinct Detects	48				Number of Distinct Non-Detects		3
1330					Minimum Detect	13.6				Minimum Non-Detect		21
1331					Maximum Detect	24.9				Maximum Non-Detect		23
1332					Variance Detected	4.464				Percent Non-Detects		2.344%
1333					Mean Detected	20.62				SD Detected		2.113
1334					Mean of Detected Logged Data	3.021				SD of Detected Logged Data		0.108
1335												
1336						**Critical Values for Background Threshold Values (BTVs)**							
1337					Tolerance Factor K (For UTL)	1.888				d2max (for USL)		3.292
1338												
1339						**Normal GOF Test on Detects Only**							
1340					Shapiro Wilk Test Statistic	0.962				**Normal GOF Test on Detected Observations Only**		
1341					5% Shapiro Wilk P Value	0.014				Data Not Normal at 5% Significance Level		
1342					Lilliefors Test Statistic	0.0989				**Lilliefors GOF Test**		
1343					5% Lilliefors Critical Value	0.0796				Data Not Normal at 5% Significance Level		
1344						Data Not Normal at 5% Significance Level						
1345												
1346						**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
1347					KM Mean	20.6				KM SD		2.104
1348					95% UTL95% Coverage	24.57				95% KM UPL (t)		24.1
1349					90% KM Percentile (z)	23.29				95% KM Percentile (z)		24.06
1350					99% KM Percentile (z)	25.49				95% KM USL		27.52

1351												
1352	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1353					Mean	20.4				SD	2.549	
1354					95% UTL95% Coverage	25.21				95% UPL (t)	24.64	
1355					90% Percentile (z)	23.66				95% Percentile (z)	24.59	
1356					99% Percentile (z)	26.33				95% USL	28.79	
1357	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
1358												
1359	**Gamma GOF Tests on Detected Observations Only**											
1360					A-D Test Statistic	1.529	**Anderson-Darling GOF Test**					
1361					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
1362					K-S Test Statistic	0.11	**Kolmogorov-Smirnov GOF**					
1363					5% K-S Critical Value	0.0828	Data Not Gamma Distributed at 5% Significance Level					
1364	**Data Not Gamma Distributed at 5% Significance Level**											
1365												
1366	**Gamma Statistics on Detected Data Only**											
1367					k hat (MLE)	90.42				k star (bias corrected MLE)	88.26	
1368					Theta hat (MLE)	0.228				Theta star (bias corrected MLE)	0.234	
1369					nu hat (MLE)	22606				nu star (bias corrected)	22065	
1370					MLE Mean (bias corrected)	20.62						
1371					MLE Sd (bias corrected)	2.195				95% Percentile of Chisquare (2kstar)	208.5	
1372												
1373	**Gamma ROS Statistics using Imputed Non-Detects**											
1374	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1375	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)											
1376	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1377	This is especially true when the sample size is small.											
1378	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1379					Minimum	13.6				Mean	20.6	
1380					Maximum	24.9				Median	21	
1381					SD	2.094				CV	0.102	
1382					k hat (MLE)	92.05				k star (bias corrected MLE)	89.9	
1383					Theta hat (MLE)	0.224				Theta star (bias corrected MLE)	0.229	
1384					nu hat (MLE)	23565				nu star (bias corrected)	23014	
1385					MLE Mean (bias corrected)	20.6				MLE Sd (bias corrected)	2.173	
1386					95% Percentile of Chisquare (2kstar)	212.1				90% Percentile	23.43	
1387					95% Percentile	24.3				99% Percentile	25.99	
1388	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1389	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1390						WH	HW				WH	HW
1391					95% Approx. Gamma UTL with 95% Coverage	24.86	24.9			95% Approx. Gamma UPL	24.31	24.35
1392					95% Gamma USL	28.45	28.6					
1393												
1394	**Estimates of Gamma Parameters using KM Estimates**											
1395					Mean (KM)	20.6				SD (KM)	2.104	
1396					Variance (KM)	4.428				SE of Mean (KM)	0.188	
1397					k hat (KM)	95.8				k star (KM)	93.56	
1398					nu hat (KM)	24525				nu star (KM)	23952	
1399					theta hat (KM)	0.215				theta star (KM)	0.22	
1400					80% gamma percentile (KM)	22.36				90% gamma percentile (KM)	23.37	

1401	95% gamma percentile (KM)					24.22	99% gamma percentile (KM)					25.87
1402												
1403	**The following statistics are computed using gamma distribution and KM estimates**											
1404	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1405					WH	HW					WH	HW
1406	95% Approx. Gamma UTL with 95% Coverage				24.88	24.93	95% Approx. Gamma UPL				24.33	24.37
1407	95% KM Gamma Percentile				24.29	24.32	95% Gamma USL				28.5	28.65
1408												
1409	**Lognormal GOF Test on Detected Observations Only**											
1410	Shapiro Wilk Approximate Test Statistic					0.939	**Shapiro Wilk GOF Test**					
1411	5% Shapiro Wilk P Value					1.6566E-5	Data Not Lognormal at 5% Significance Level					
1412	Lilliefors Test Statistic					0.115	**Lilliefors GOF Test**					
1413	5% Lilliefors Critical Value					0.0796	Data Not Lognormal at 5% Significance Level					
1414	**Data Not Lognormal at 5% Significance Level**											
1415												
1416	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1417	Mean in Original Scale					20.6	Mean in Log Scale					3.02
1418	SD in Original Scale					2.095	SD in Log Scale					0.107
1419	95% UTL95% Coverage					25.05	95% BCA UTL95% Coverage					23.6
1420	95% Bootstrap (%) UTL95% Coverage					24	95% UPL (t)					24.46
1421	90% Percentile (z)					23.48	95% Percentile (z)					24.41
1422	99% Percentile (z)					26.25	95% USL					29.09
1423												
1424	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1425	KM Mean of Logged Data					3.02	95% KM UTL (Lognormal)95% Coverage					25.08
1426	KM SD of Logged Data					0.107	95% KM UPL (Lognormal)					24.48
1427	95% KM Percentile Lognormal (z)					24.43	95% KM USL (Lognormal)					29.15
1428												
1429	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1430	Mean in Original Scale					20.4	Mean in Log Scale					3.006
1431	SD in Original Scale					2.549	SD in Log Scale					0.142
1432	95% UTL95% Coverage					26.45	95% UPL (t)					25.61
1433	90% Percentile (z)					24.26	95% Percentile (z)					25.55
1434	99% Percentile (z)					28.15	95% USL					32.3
1435	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1436												
1437	**Nonparametric Distribution Free Background Statistics**											
1438	**Data do not follow a Discernible Distribution (0.05)**											
1439												
1440	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1441	Order of Statistic, r					125	95% UTL with95% Coverage					24
1442	Approx, f used to compute achieved CC					1.645	Approximate Actual Confidence Coefficient achieved by UTL					0.887
1443	Approximate Sample Size needed to achieve specified CC					153	95% UPL					23.56
1444	95% USL					24.9	95% KM Chebyshev UPL					29.81
1445												
1446	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1447	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1448	and consists of observations collected from clean unimpacted locations.											
1449	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1450	represents a background data set and when many onsite observations need to be compared with the BTV.											

	A	B	C	D	E	F	G	H	I	J	K	L
1451												
1452	**pH-FIELD**											
1453												
1454	**General Statistics**											
1455	Total Number of Observations					118	Number of Missing Observations					14
1456	Number of Distinct Observations					72						
1457	Number of Detects					114	Number of Non-Detects					4
1458	Number of Distinct Detects					68	Number of Distinct Non-Detects					4
1459	Minimum Detect					4.15	Minimum Non-Detect					4.75
1460	Maximum Detect					6.27	Maximum Non-Detect					5.59
1461	Variance Detected					0.112	Percent Non-Detects					3.39%
1462	Mean Detected					5.051	SD Detected					0.334
1463	Mean of Detected Logged Data					1.617	SD of Detected Logged Data					0.065
1464												
1465	**Critical Values for Background Threshold Values (BTVs)**											
1466	Tolerance Factor K (For UTL)					1.899	d2max (for USL)					3.265
1467												
1468	**Normal GOF Test on Detects Only**											
1469	Shapiro Wilk Test Statistic					0.92	**Normal GOF Test on Detected Observations Only**					
1470	5% Shapiro Wilk P Value					1.6047E-7	Data Not Normal at 5% Significance Level					
1471	Lilliefors Test Statistic					0.135	**Lilliefors GOF Test**					
1472	5% Lilliefors Critical Value					0.0833	Data Not Normal at 5% Significance Level					
1473	**Data Not Normal at 5% Significance Level**											
1474												
1475	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
1476	KM Mean					5.044	KM SD					0.333
1477	95% UTL95% Coverage					5.677	95% KM UPL (t)					5.599
1478	90% KM Percentile (z)					5.471	95% KM Percentile (z)					5.592
1479	99% KM Percentile (z)					5.819	95% KM USL					6.132
1480												
1481	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
1482	Mean					4.969	SD					0.549
1483	95% UTL95% Coverage					6.012	95% UPL (t)					5.883
1484	90% Percentile (z)					5.673	95% Percentile (z)					5.872
1485	99% Percentile (z)					6.247	95% USL					6.762
1486	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
1487												
1488	**Gamma GOF Tests on Detected Observations Only**											
1489	A-D Test Statistic					2.766	**Anderson-Darling GOF Test**					
1490	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
1491	K-S Test Statistic					0.125	**Kolmogorov-Smirnov GOF**					
1492	5% K-S Critical Value					0.0856	Data Not Gamma Distributed at 5% Significance Level					
1493	**Data Not Gamma Distributed at 5% Significance Level**											
1494												
1495	**Gamma Statistics on Detected Data Only**											
1496	k hat (MLE)					236.9	k star (bias corrected MLE)					230.7
1497	Theta hat (MLE)					0.0213	Theta star (bias corrected MLE)					0.0219
1498	nu hat (MLE)					54009	nu star (bias corrected)					52589
1499	MLE Mean (bias corrected)					5.051						
1500	MLE Sd (bias corrected)					0.333	95% Percentile of Chisquare (2kstar)					512.4

	A	B	C	D	E	F	G	H	I	J	K	L
1501												
1502	**Gamma ROS Statistics using Imputed Non-Detects**											
1503	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1504	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)											
1505	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1506	This is especially true when the sample size is small.											
1507	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1508					Minimum	4.15				Mean	5.045	
1509					Maximum	6.27				Median	5.01	
1510					SD	0.332				CV	0.0657	
1511					k hat (MLE)	239.8				k star (bias corrected MLE)	233.7	
1512					Theta hat (MLE)	0.021				Theta star (bias corrected MLE)	0.0216	
1513					nu hat (MLE)	56587				nu star (bias corrected)	55150	
1514					MLE Mean (bias corrected)	5.045				MLE Sd (bias corrected)	0.33	
1515					95% Percentile of Chisquare (2kstar)	518.8				90% Percentile	5.473	
1516					95% Percentile	5.6				99% Percentile	5.845	
1517	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1518	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1519					WH	HW				WH	HW	
1520				95% Approx. Gamma UTL with 95% Coverage	5.685	5.686			95% Approx. Gamma UPL	5.602	5.603	
1521				95% Gamma USL	6.183	6.19						
1522												
1523	**Estimates of Gamma Parameters using KM Estimates**											
1524					Mean (KM)	5.044				SD (KM)	0.333	
1525					Variance (KM)	0.111				SE of Mean (KM)	0.031	
1526					k hat (KM)	229.3				k star (KM)	223.4	
1527					nu hat (KM)	54107				nu star (KM)	52733	
1528					theta hat (KM)	0.022				theta star (KM)	0.0226	
1529					80% gamma percentile (KM)	5.326				90% gamma percentile (KM)	5.481	
1530					95% gamma percentile (KM)	5.612				99% gamma percentile (KM)	5.862	
1531												
1532	**The following statistics are computed using gamma distribution and KM estimates**											
1533	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1534					WH	HW				WH	HW	
1535				95% Approx. Gamma UTL with 95% Coverage	5.688	5.689			95% Approx. Gamma UPL	5.605	5.605	
1536				95% KM Gamma Percentile	5.597	5.598			95% Gamma USL	6.189	6.197	
1537												
1538	**Lognormal GOF Test on Detected Observations Only**											
1539					Shapiro Wilk Approximate Test Statistic	0.936			**Shapiro Wilk GOF Test**			
1540					5% Shapiro Wilk P Value	1.9588E-5			Data Not Lognormal at 5% Significance Level			
1541					Lilliefors Test Statistic	0.121			**Lilliefors GOF Test**			
1542					5% Lilliefors Critical Value	0.0833			Data Not Lognormal at 5% Significance Level			
1543	Data Not Lognormal at 5% Significance Level											
1544												
1545	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1546					Mean in Original Scale	5.045				Mean in Log Scale	1.616	
1547					SD in Original Scale	0.331				SD in Log Scale	0.0645	
1548					95% UTL95% Coverage	5.691				95% BCA UTL95% Coverage	5.94	
1549					95% Bootstrap (%) UTL95% Coverage	5.943				95% UPL (t)	5.606	
1550					90% Percentile (z)	5.469				95% Percentile (z)	5.598	

1551					99% Percentile (z)	5.85					95% USL	6.215
1552												
1553	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1554					KM Mean of Logged Data	1.616					95% KM UTL (Lognormal)95% Coverage	5.694
1555					KM SD of Logged Data	0.065					95% KM UPL (Lognormal)	5.609
1556					95% KM Percentile Lognormal (z)	5.601					95% KM USL (Lognormal)	6.223
1557												
1558	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1559					Mean in Original Scale	4.969					Mean in Log Scale	1.595
1560					SD in Original Scale	0.549					SD in Log Scale	0.135
1561					95% UTL95% Coverage	6.37					95% UPL (t)	6.172
1562					90% Percentile (z)	5.861					95% Percentile (z)	6.156
1563					99% Percentile (z)	6.749					95% USL	7.66
1564	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1565												
1566	**Nonparametric Distribution Free Background Statistics**											
1567	**Data do not follow a Discernible Distribution (0.05)**											
1568												
1569	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1570					Order of Statistic, r	115					95% UTL with95% Coverage	5.94
1571					Approx, f used to compute achieved CC	1.513					Approximate Actual Confidence Coefficient achieved by UTL	0.847
1572					Approximate Sample Size needed to achieve specified CC	153					95% UPL	5.629
1573					95% USL	6.27					95% KM Chebyshev UPL	6.503
1574												
1575	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1576	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1577	and consists of observations collected from clean unimpacted locations.											
1578	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1579	represents a background data set and when many onsite observations need to be compared with the BTV.											
1580												
1581	**pH-LAB**											
1582												
1583	**General Statistics**											
1584					Total Number of Observations	126					Number of Missing Observations	6
1585					Number of Distinct Observations	78						
1586					Number of Detects	122					Number of Non-Detects	4
1587					Number of Distinct Detects	76					Number of Distinct Non-Detects	4
1588					Minimum Detect	4.43					Minimum Non-Detect	5.22
1589					Maximum Detect	7.08					Maximum Non-Detect	5.67
1590					Variance Detected	0.114					Percent Non-Detects	3.175%
1591					Mean Detected	5.638					SD Detected	0.337
1592					Mean of Detected Logged Data	1.728					SD of Detected Logged Data	0.0591
1593												
1594	**Critical Values for Background Threshold Values (BTVs)**											
1595					Tolerance Factor K (For UTL)	1.89					d2max (for USL)	3.287
1596												
1597	**Normal GOF Test on Detects Only**											
1598					Shapiro Wilk Test Statistic	0.959					**Normal GOF Test on Detected Observations Only**	
1599					5% Shapiro Wilk P Value	0.00792					Data Not Normal at 5% Significance Level	
1600					Lilliefors Test Statistic	0.076					**Lilliefors GOF Test**	

1601	5% Lilliefors Critical Value				0.0806	Detected Data appear Normal at 5% Significance Level						
1602	Detected Data appear Approximate Normal at 5% Significance Level											
1603												
1604	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1605	KM Mean				5.624	KM SD						0.343
1606	95% UTL95% Coverage				6.271	95% KM UPL (t)						6.194
1607	90% KM Percentile (z)				6.063	95% KM Percentile (z)						6.187
1608	99% KM Percentile (z)				6.421	95% KM USL						6.75
1609												
1610	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1611	Mean				5.544	SD						0.615
1612	95% UTL95% Coverage				6.707	95% UPL (t)						6.568
1613	90% Percentile (z)				6.333	95% Percentile (z)						6.557
1614	99% Percentile (z)				6.976	95% USL						7.567
1615	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1616												
1617	Gamma GOF Tests on Detected Observations Only											
1618	A-D Test Statistic				1.091	Anderson-Darling GOF Test						
1619	5% A-D Critical Value				0.75	Data Not Gamma Distributed at 5% Significance Level						
1620	K-S Test Statistic				0.0713	Kolmogorov-Smirnov GOF						
1621	5% K-S Critical Value				0.0835	Detected data appear Gamma Distributed at 5% Significance Level						
1622	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
1623												
1624	Gamma Statistics on Detected Data Only											
1625	k hat (MLE)				286.8	k star (bias corrected MLE)						279.7
1626	Theta hat (MLE)				0.0197	Theta star (bias corrected MLE)						0.0202
1627	nu hat (MLE)				69971	nu star (bias corrected)						68252
1628	MLE Mean (bias corrected)				5.638							
1629	MLE Sd (bias corrected)				0.337	95% Percentile of Chisquare (2kstar)						615.6
1630												
1631	Gamma ROS Statistics using Imputed Non-Detects											
1632	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1633	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)											
1634	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1635	This is especially true when the sample size is small.											
1636	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1637	Minimum				4.43	Mean						5.624
1638	Maximum				7.08	Median						5.57
1639	SD				0.342	CV						0.0609
1640	k hat (MLE)				276.7	k star (bias corrected MLE)						270.1
1641	Theta hat (MLE)				0.0203	Theta star (bias corrected MLE)						0.0208
1642	nu hat (MLE)				69727	nu star (bias corrected)						68068
1643	MLE Mean (bias corrected)				5.624	MLE Sd (bias corrected)						0.342
1644	95% Percentile of Chisquare (2kstar)				595.4	90% Percentile						6.066
1645	95% Percentile				6.198	99% Percentile						6.45
1646	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1647	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1648			WH	HW						WH	HW	
1649	95% Approx. Gamma UTL with 95% Coverage		6.282	6.284		95% Approx. Gamma UPL				6.2	6.201	
1650	95% Gamma USL		6.807	6.815								

	A	B	C	D	E	F	G	H	I	J	K	L
1651												
1652	**Estimates of Gamma Parameters using KM Estimates**											
1653					Mean (KM)	5.624				SD (KM)	0.343	
1654					Variance (KM)	0.117				SE of Mean (KM)	0.0309	
1655					k hat (KM)	269.6				k star (KM)	263.2	
1656					nu hat (KM)	67941				nu star (KM)	66325	
1657					theta hat (KM)	0.0209				theta star (KM)	0.0214	
1658					80% gamma percentile (KM)	5.914				90% gamma percentile (KM)	6.073	
1659					95% gamma percentile (KM)	6.206				99% gamma percentile (KM)	6.462	
1660												
1661	**The following statistics are computed using gamma distribution and KM estimates**											
1662	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1663						WH	HW				WH	HW
1664					95% Approx. Gamma UTL with 95% Coverage	6.284	6.286			95% Approx. Gamma UPL	6.202	6.203
1665					95% KM Gamma Percentile	6.195	6.196			95% Gamma USL	6.81	6.818
1666												
1667	**Lognormal GOF Test on Detected Observations Only**											
1668					Shapiro Wilk Approximate Test Statistic	0.969				**Shapiro Wilk GOF Test**		
1669					5% Shapiro Wilk P Value	0.0694				Detected Data appear Lognormal at 5% Significance Level		
1670					Lilliefors Test Statistic	0.0707				**Lilliefors GOF Test**		
1671					5% Lilliefors Critical Value	0.0806				Detected Data appear Lognormal at 5% Significance Level		
1672	**Detected Data appear Lognormal at 5% Significance Level**											
1673												
1674	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1675					Mean in Original Scale	5.624				Mean in Log Scale	1.725	
1676					SD in Original Scale	0.342				SD in Log Scale	0.0601	
1677					95% UTL95% Coverage	6.289				95% BCA UTL95% Coverage	6.41	
1678					95% Bootstrap (%) UTL95% Coverage	6.41				95% UPL (t)	6.204	
1679					90% Percentile (z)	6.063				95% Percentile (z)	6.197	
1680					99% Percentile (z)	6.456				95% USL	6.84	
1681												
1682	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1683					KM Mean of Logged Data	1.725				95% KM UTL (Lognormal)95% Coverage	6.292	
1684					KM SD of Logged Data	0.0604				95% KM UPL (Lognormal)	6.207	
1685					95% KM Percentile Lognormal (z)	6.2				95% KM USL (Lognormal)	6.846	
1686												
1687	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1688					Mean in Original Scale	5.544				Mean in Log Scale	1.704	
1689					SD in Original Scale	0.615				SD in Log Scale	0.142	
1690					95% UTL95% Coverage	7.194				95% UPL (t)	6.966	
1691					90% Percentile (z)	6.597				95% Percentile (z)	6.947	
1692					99% Percentile (z)	7.654				95% USL	8.775	
1693	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1694												
1695	**Nonparametric Distribution Free Background Statistics**											
1696	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1697												
1698	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1699					Order of Statistic, r	123				95% UTL with95% Coverage	6.41	
1700					Approx, f used to compute achieved CC	1.618				Approximate Actual Confidence Coefficient achieved by UTL	0.88	

1701	Approximate Sample Size needed to achieve specified CC					153					95% UPL	6.143
1702					95% USL	7.08					95% KM Chebyshev UPL	7.123
1703												
1704	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1705	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1706	and consists of observations collected from clean unimpacted locations.											
1707	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1708	represents a background data set and when many onsite observations need to be compared with the BTV.											
1709												
1710	**POTASSIUM, TOTAL**											
1711												
1712	**General Statistics**											
1713					Total Number of Observations	45					Number of Distinct Observations	20
1714											Number of Missing Observations	87
1715					Minimum	1.7					First Quartile	2.2
1716					Second Largest	3					Median	2.4
1717					Maximum	3.1					Third Quartile	2.6
1718					Mean	2.396					SD	0.304
1719					Coefficient of Variation	0.127					Skewness	0.112
1720					Mean of logged Data	0.866					SD of logged Data	0.128
1721												
1722	**Critical Values for Background Threshold Values (BTVs)**											
1723					Tolerance Factor K (For UTL)	2.085					d2max (for USL)	2.915
1724												
1725	**Normal GOF Test**											
1726					Shapiro Wilk Test Statistic	0.983					**Shapiro Wilk GOF Test**	
1727					5% Shapiro Wilk Critical Value	0.945					Data appear Normal at 5% Significance Level	
1728					Lilliefors Test Statistic	0.0957					**Lilliefors GOF Test**	
1729					5% Lilliefors Critical Value	0.131					Data appear Normal at 5% Significance Level	
1730	Data appear Normal at 5% Significance Level											
1731												
1732	**Background Statistics Assuming Normal Distribution**											
1733					95% UTL with 95% Coverage	3.029					90% Percentile (z)	2.785
1734					95% UPL (t)	2.912					95% Percentile (z)	2.895
1735					95% USL	3.281					99% Percentile (z)	3.102
1736												
1737	**Gamma GOF Test**											
1738					A-D Test Statistic	0.33					**Anderson-Darling Gamma GOF Test**	
1739					5% A-D Critical Value	0.747					Detected data appear Gamma Distributed at 5% Significance Level	
1740					K-S Test Statistic	0.1					**Kolmogorov-Smirnov Gamma GOF Test**	
1741					5% K-S Critical Value	0.131					Detected data appear Gamma Distributed at 5% Significance Level	
1742	Detected data appear Gamma Distributed at 5% Significance Level											
1743												
1744	**Gamma Statistics**											
1745					k hat (MLE)	62.97					k star (bias corrected MLE)	58.79
1746					Theta hat (MLE)	0.038					Theta star (bias corrected MLE)	0.0408
1747					nu hat (MLE)	5667					nu star (bias corrected)	5291
1748					MLE Mean (bias corrected)	2.396					MLE Sd (bias corrected)	0.312
1749												
1750	**Background Statistics Assuming Gamma Distribution**											

1751	95% Wilson Hilferty (WH) Approx. Gamma UPL					2.938					90% Percentile	2.804
1752	95% Hawkins Wixley (HW) Approx. Gamma UPL					2.942					95% Percentile	2.932
1753	95% WH Approx. Gamma UTL with 95% Coverage					3.075					99% Percentile	3.182
1754	95% HW Approx. Gamma UTL with 95% Coverage					3.082						
1755					95% WH USL	3.384					95% HW USL	3.4
1756												
1757	**Lognormal GOF Test**											
1758					Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**					
1759					5% Shapiro Wilk Critical Value	0.945	Data appear Lognormal at 5% Significance Level					
1760					Lilliefors Test Statistic	0.108	**Lilliefors Lognormal GOF Test**					
1761					5% Lilliefors Critical Value	0.131	Data appear Lognormal at 5% Significance Level					
1762	Data appear Lognormal at 5% Significance Level											
1763												
1764	**Background Statistics assuming Lognormal Distribution**											
1765					95% UTL with 95% Coverage	3.105					90% Percentile (z)	2.801
1766					95% UPL (t)	2.955					95% Percentile (z)	2.935
1767					95% USL	3.454					99% Percentile (z)	3.203
1768												
1769	**Nonparametric Distribution Free Background Statistics**											
1770	Data appear Normal at 5% Significance Level											
1771												
1772	**Nonparametric Upper Limits for Background Threshold Values**											
1773					Order of Statistic, r	44					95% UTL with 95% Coverage	3
1774					Approx, f used to compute achieved CC	1.158					Approximate Actual Confidence Coefficient achieved by UTL	0.665
1775											Approximate Sample Size needed to achieve specified CC	93
1776	95% Percentile Bootstrap UTL with 95% Coverage					3.06					95% BCA Bootstrap UTL with 95% Coverage	3
1777					95% UPL	2.97					90% Percentile	2.772
1778					90% Chebyshev UPL	3.317					95% Percentile	2.88
1779					95% Chebyshev UPL	3.734					99% Percentile	3.056
1780					95% USL	3.1						
1781												
1782	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1783	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1784	and consists of observations collected from clean unimpacted locations.											
1785	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1786	represents a background data set and when many onsite observations need to be compared with the BTV.											
1787												
1788	**POTASSIUM, DISSOLVED**											
1789												
1790	**General Statistics**											
1791					Total Number of Observations	72					Number of Distinct Observations	35
1792											Number of Missing Observations	59
1793					Minimum	1.7					First Quartile	2.238
1794					Second Largest	3.1					Median	2.3
1795					Maximum	3.14					Third Quartile	2.5
1796					Mean	2.381					SD	0.274
1797					Coefficient of Variation	0.115					Skewness	0.673
1798					Mean of logged Data	0.861					SD of logged Data	0.113
1799												
1800	**Critical Values for Background Threshold Values (BTVs)**											

1801	Tolerance Factor K (For UTL)					1.98	d2max (for USL)					3.094
1802												
1803	**Normal GOF Test**											
1804	Shapiro Wilk Test Statistic					0.932	**Normal GOF Test**					
1805	5% Shapiro Wilk P Value					7.7522E-4	Data Not Normal at 5% Significance Level					
1806	Lilliefors Test Statistic					0.18	**Lilliefors GOF Test**					
1807	5% Lilliefors Critical Value					0.104	Data Not Normal at 5% Significance Level					
1808	Data Not Normal at 5% Significance Level											
1809												
1810	**Background Statistics Assuming Normal Distribution**											
1811	95% UTL with 95% Coverage					2.923	90% Percentile (z)					2.732
1812	95% UPL (t)					2.84	95% Percentile (z)					2.831
1813	95% USL					3.228	99% Percentile (z)					3.018
1814												
1815	**Gamma GOF Test**											
1816	A-D Test Statistic					1.663	**Anderson-Darling Gamma GOF Test**					
1817	5% A-D Critical Value					0.749	Data Not Gamma Distributed at 5% Significance Level					
1818	K-S Test Statistic					0.165	**Kolmogorov-Smirnov Gamma GOF Test**					
1819	5% K-S Critical Value					0.105	Data Not Gamma Distributed at 5% Significance Level					
1820	Data Not Gamma Distributed at 5% Significance Level											
1821												
1822	**Gamma Statistics**											
1823	k hat (MLE)					78.73	k star (bias corrected MLE)					75.45
1824	Theta hat (MLE)					0.0302	Theta star (bias corrected MLE)					0.0315
1825	nu hat (MLE)					11336	nu star (bias corrected)					10865
1826	MLE Mean (bias corrected)					2.381	MLE Sd (bias corrected)					0.274
1827												
1828	**Background Statistics Assuming Gamma Distribution**											
1829	95% Wilson Hilferty (WH) Approx. Gamma UPL					2.852	90% Percentile					2.738
1830	95% Hawkins Wixley (HW) Approx. Gamma UPL					2.854	95% Percentile					2.849
1831	95% WH Approx. Gamma UTL with 95% Coverage					2.945	99% Percentile					3.064
1832	95% HW Approx. Gamma UTL with 95% Coverage					2.948						
1833	95% WH USL					3.305	95% HW USL					3.318
1834												
1835	**Lognormal GOF Test**											
1836	Shapiro Wilk Test Statistic					0.949	**Shapiro Wilk Lognormal GOF Test**					
1837	5% Shapiro Wilk P Value					0.0131	Data Not Lognormal at 5% Significance Level					
1838	Lilliefors Test Statistic					0.157	**Lilliefors Lognormal GOF Test**					
1839	5% Lilliefors Critical Value					0.104	Data Not Lognormal at 5% Significance Level					
1840	Data Not Lognormal at 5% Significance Level											
1841												
1842	**Background Statistics assuming Lognormal Distribution**											
1843	95% UTL with 95% Coverage					2.96	90% Percentile (z)					2.735
1844	95% UPL (t)					2.86	95% Percentile (z)					2.85
1845	95% USL					3.358	99% Percentile (z)					3.078
1846												
1847	**Nonparametric Distribution Free Background Statistics**											
1848	Data do not follow a Discernible Distribution (0.05)											
1849												
1850	**Nonparametric Upper Limits for Background Threshold Values**											

1851					Order of Statistic, r	71				95% UTL with 95% Coverage		3.1
1852					Approx, f used to compute achieved CC	1.868				Approximate Actual Confidence Coefficient achieved by UTL		0.881
1853										Approximate Sample Size needed to achieve specified CC		93
1854					95% Percentile Bootstrap UTL with 95% Coverage	3.1				95% BCA Bootstrap UTL with 95% Coverage		3.1
1855					95% UPL	3.064				90% Percentile		2.7
1856					90% Chebyshev UPL	3.208				95% Percentile		2.972
1857					95% Chebyshev UPL	3.582				99% Percentile		3.112
1858					95% USL	3.14						
1859												
1860					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1861					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1862					and consists of observations collected from clean unimpacted locations.							
1863					The use of USL tends to provide a balance between false positives and false negatives provided the data							
1864					represents a background data set and when many onsite observations need to be compared with the BTV.							
1865												
1866	**SODIUM, TOTAL**											
1867												
1868					**General Statistics**							
1869					Total Number of Observations	74				Number of Missing Observations		58
1870					Number of Distinct Observations	30						
1871					Number of Detects	71				Number of Non-Detects		3
1872					Number of Distinct Detects	30				Number of Distinct Non-Detects		1
1873					Minimum Detect	7.6				Minimum Non-Detect		11
1874					Maximum Detect	16.4				Maximum Non-Detect		11
1875					Variance Detected	2.768				Percent Non-Detects		4.054%
1876					Mean Detected	12.77				SD Detected		1.664
1877					Mean of Detected Logged Data	2.538				SD of Detected Logged Data		0.136
1878												
1879					**Critical Values for Background Threshold Values (BTVs)**							
1880					Tolerance Factor K (For UTL)	1.975				d2max (for USL)		3.104
1881												
1882					**Normal GOF Test on Detects Only**							
1883					Shapiro Wilk Test Statistic	0.967				**Normal GOF Test on Detected Observations Only**		
1884					5% Shapiro Wilk P Value	0.177				Detected Data appear Normal at 5% Significance Level		
1885					Lilliefors Test Statistic	0.139				**Lilliefors GOF Test**		
1886					5% Lilliefors Critical Value	0.105				Data Not Normal at 5% Significance Level		
1887					**Detected Data appear Approximate Normal at 5% Significance Level**							
1888												
1889					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
1890					KM Mean	12.62				KM SD		1.785
1891					95% UTL95% Coverage	16.14				95% KM UPL (t)		15.61
1892					90% KM Percentile (z)	14.91				95% KM Percentile (z)		15.55
1893					99% KM Percentile (z)	16.77				95% KM USL		18.16
1894												
1895					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
1896					Mean	12.47				SD		2.176
1897					95% UTL95% Coverage	16.77				95% UPL (t)		16.12
1898					90% Percentile (z)	15.26				95% Percentile (z)		16.05
1899					99% Percentile (z)	17.53				95% USL		19.23
1900					**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**							

1901												
1902	**Gamma GOF Tests on Detected Observations Only**											
1903				A-D Test Statistic		0.886	**Anderson-Darling GOF Test**					
1904				5% A-D Critical Value		0.749	Data Not Gamma Distributed at 5% Significance Level					
1905				K-S Test Statistic		0.155	**Kolmogorov-Smirnov GOF**					
1906				5% K-S Critical Value		0.105	Data Not Gamma Distributed at 5% Significance Level					
1907	**Data Not Gamma Distributed at 5% Significance Level**											
1908												
1909	**Gamma Statistics on Detected Data Only**											
1910				k hat (MLE)		56.9	k star (bias corrected MLE)					54.51
1911				Theta hat (MLE)		0.224	Theta star (bias corrected MLE)					0.234
1912				nu hat (MLE)		8080	nu star (bias corrected)					7740
1913				MLE Mean (bias corrected)		12.77						
1914				MLE Sd (bias corrected)		1.729	95% Percentile of Chisquare (2kstar)					134.4
1915												
1916	**Gamma ROS Statistics using Imputed Non-Detects**											
1917	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1918	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)											
1919	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1920	This is especially true when the sample size is small.											
1921	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1922				Minimum		7.6	Mean					12.65
1923				Maximum		16.4	Median					12.6
1924				SD		1.735	CV					0.137
1925				k hat (MLE)		51.43	k star (bias corrected MLE)					49.35
1926				Theta hat (MLE)		0.246	Theta star (bias corrected MLE)					0.256
1927				nu hat (MLE)		7611	nu star (bias corrected)					7304
1928				MLE Mean (bias corrected)		12.65	MLE Sd (bias corrected)					1.8
1929				95% Percentile of Chisquare (2kstar)		122.9	90% Percentile					15
1930				95% Percentile		15.74	99% Percentile					17.21
1931	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1932	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1933					WH	HW					WH	HW
1934				95% Approx. Gamma UTL with 95% Coverage	16.39	16.44	95% Approx. Gamma UPL				15.77	15.8
1935				95% Gamma USL	18.89	19.03						
1936												
1937	**Estimates of Gamma Parameters using KM Estimates**											
1938				Mean (KM)		12.62	SD (KM)					1.785
1939				Variance (KM)		3.187	SE of Mean (KM)					0.211
1940				k hat (KM)		49.95	k star (KM)					47.93
1941				nu hat (KM)		7393	nu star (KM)					7094
1942				theta hat (KM)		0.253	theta star (KM)					0.263
1943				80% gamma percentile (KM)		14.12	90% gamma percentile (KM)					15
1944				95% gamma percentile (KM)		15.76	99% gamma percentile (KM)					17.24
1945												
1946	**The following statistics are computed using gamma distribution and KM estimates**											
1947	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1948					WH	HW					WH	HW
1949				95% Approx. Gamma UTL with 95% Coverage	16.52	16.58	95% Approx. Gamma UPL				15.87	15.91
1950				95% KM Gamma Percentile	15.8	15.84	95% Gamma USL				19.14	19.3

	A	B	C	D	E	F	G	H	I	J	K	L
1951												
1952	**Lognormal GOF Test on Detected Observations Only**											
1953	Shapiro Wilk Approximate Test Statistic					0.945	**Shapiro Wilk GOF Test**					
1954	5% Shapiro Wilk P Value					0.00726	Data Not Lognormal at 5% Significance Level					
1955	Lilliefors Test Statistic					0.165	**Lilliefors GOF Test**					
1956	5% Lilliefors Critical Value					0.105	Data Not Lognormal at 5% Significance Level					
1957	Data Not Lognormal at 5% Significance Level											
1958												
1959	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1960	Mean in Original Scale					12.65	Mean in Log Scale					2.528
1961	SD in Original Scale					1.734	SD in Log Scale					0.143
1962	95% UTL95% Coverage					16.6	95% BCA UTL95% Coverage					15.9
1963	95% Bootstrap (%) UTL95% Coverage					15.9	95% UPL (t)					15.91
1964	90% Percentile (z)					15.04	95% Percentile (z)					15.84
1965	99% Percentile (z)					17.45	95% USL					19.5
1966												
1967	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1968	KM Mean of Logged Data					2.524	95% KM UTL (Lognormal)95% Coverage					16.78
1969	KM SD of Logged Data					0.15	95% KM UPL (Lognormal)					16.05
1970	95% KM Percentile Lognormal (z)					15.97	95% KM USL (Lognormal)					19.87
1971												
1972	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1973	Mean in Original Scale					12.47	Mean in Log Scale					2.504
1974	SD in Original Scale					2.176	SD in Log Scale					0.212
1975	95% UTL95% Coverage					18.61	95% UPL (t)					17.47
1976	90% Percentile (z)					16.06	95% Percentile (z)					17.35
1977	99% Percentile (z)					20.05	95% USL					23.65
1978	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1979												
1980	**Nonparametric Distribution Free Background Statistics**											
1981	Data appear to follow a Discernible Distribution at 5% Significance Level											
1982												
1983	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1984	Order of Statistic, r					73	95% UTL with95% Coverage					15.9
1985	Approx, f used to compute achieved CC					1.921	Approximate Actual Confidence Coefficient achieved by UTL					0.89
1986	Approximate Sample Size needed to achieve specified CC					93	95% UPL					15.8
1987	95% USL					16.4	95% KM Chebyshev UPL					20.45
1988												
1989	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1990	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1991	and consists of observations collected from clean unimpacted locations.											
1992	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1993	represents a background data set and when many onsite observations need to be compared with the BTV.											
1994												
1995	**SODIUM, DISSOLVED**											
1996												
1997	**General Statistics**											
1998	Total Number of Observations					98	Number of Distinct Observations					36
1999							Number of Missing Observations					33
2000	Minimum					10.7	First Quartile					12.33

2001					Second Largest	16					Median	13.05
2002					Maximum	16.4					Third Quartile	13.95
2003					Mean	13.11					SD	1.203
2004					Coefficient of Variation	0.0918					Skewness	0.118
2005					Mean of logged Data	2.569					SD of logged Data	0.0922
2006												
2007					**Critical Values for Background Threshold Values (BTVs)**							
2008					Tolerance Factor K (For UTL)	1.927					d2max (for USL)	3.203
2009												
2010					**Normal GOF Test**							
2011					Shapiro Wilk Test Statistic	0.967	**Normal GOF Test**					
2012					5% Shapiro Wilk P Value	0.0924	Data appear Normal at 5% Significance Level					
2013					Lilliefors Test Statistic	0.0866	**Lilliefors GOF Test**					
2014					5% Lilliefors Critical Value	0.0897	Data appear Normal at 5% Significance Level					
2015					Data appear Normal at 5% Significance Level							
2016												
2017					**Background Statistics Assuming Normal Distribution**							
2018					95% UTL with 95% Coverage	15.43					90% Percentile (z)	14.65
2019					95% UPL (t)	15.12					95% Percentile (z)	15.09
2020					95% USL	16.96					99% Percentile (z)	15.91
2021												
2022					**Gamma GOF Test**							
2023					A-D Test Statistic	0.726	**Anderson-Darling Gamma GOF Test**					
2024					5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level					
2025					K-S Test Statistic	0.0986	**Kolmogorov-Smirnov Gamma GOF Test**					
2026					5% K-S Critical Value	0.0901	Data Not Gamma Distributed at 5% Significance Level					
2027					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
2028												
2029					**Gamma Statistics**							
2030					k hat (MLE)	119.5					k star (bias corrected MLE)	115.8
2031					Theta hat (MLE)	0.11					Theta star (bias corrected MLE)	0.113
2032					nu hat (MLE)	23415					nu star (bias corrected)	22699
2033					MLE Mean (bias corrected)	13.11					MLE Sd (bias corrected)	1.218
2034												
2035					**Background Statistics Assuming Gamma Distribution**							
2036					95% Wilson Hilferty (WH) Approx. Gamma UPL	15.18					90% Percentile	14.69
2037					95% Hawkins Wixley (HW) Approx. Gamma UPL	15.19					95% Percentile	15.17
2038					95% WH Approx. Gamma UTL with 95% Coverage	15.53					99% Percentile	16.11
2039					95% HW Approx. Gamma UTL with 95% Coverage	15.54						
2040					95% WH USL	17.32					95% HW USL	17.37
2041												
2042					**Lognormal GOF Test**							
2043					Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk Lognormal GOF Test**					
2044					5% Shapiro Wilk P Value	0.0485	Data Not Lognormal at 5% Significance Level					
2045					Lilliefors Test Statistic	0.105	**Lilliefors Lognormal GOF Test**					
2046					5% Lilliefors Critical Value	0.0897	Data Not Lognormal at 5% Significance Level					
2047					Data Not Lognormal at 5% Significance Level							
2048												
2049					**Background Statistics assuming Lognormal Distribution**							
2050					95% UTL with 95% Coverage	15.59					90% Percentile (z)	14.69

2051					95% UPL (t)	15.23				95% Percentile (z)		15.19
2052					95% USL	17.54				99% Percentile (z)		16.18
2053												
2054	**Nonparametric Distribution Free Background Statistics**											
2055	Data appear Normal at 5% Significance Level											
2056												
2057	**Nonparametric Upper Limits for Background Threshold Values**											
2058					Order of Statistic, r	96				95% UTL with 95% Coverage		15.8
2059					Approx, f used to compute achieved CC	1.684				Approximate Actual Confidence Coefficient achieved by UTL		0.873
2060										Approximate Sample Size needed to achieve specified CC		124
2061					95% Percentile Bootstrap UTL with 95% Coverage	15.8				95% BCA Bootstrap UTL with 95% Coverage		15.8
2062					95% UPL	15.21				90% Percentile		14.53
2063					90% Chebyshev UPL	16.74				95% Percentile		15.03
2064					95% Chebyshev UPL	18.38				99% Percentile		16.01
2065					95% USL	16.4						
2066												
2067	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2068	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2069	and consists of observations collected from clean unimpacted locations.											
2070	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2071	represents a background data set and when many onsite observations need to be compared with the BTV.											
2072												
2073	**SPEC. COND., FIELD**											
2074												
2075	**General Statistics**											
2076					Total Number of Observations	118				Number of Missing Observations		14
2077					Number of Distinct Observations	70						
2078					Number of Detects	114				Number of Non-Detects		4
2079					Number of Distinct Detects	70				Number of Distinct Non-Detects		4
2080					Minimum Detect	173				Minimum Non-Detect		254
2081					Maximum Detect	358				Maximum Non-Detect		266
2082					Variance Detected	1014				Percent Non-Detects		3.39%
2083					Mean Detected	275.6				SD Detected		31.84
2084					Mean of Detected Logged Data	5.612				SD of Detected Logged Data		0.122
2085												
2086	**Critical Values for Background Threshold Values (BTVs)**											
2087					Tolerance Factor K (For UTL)	1.899				d2max (for USL)		3.265
2088												
2089	**Normal GOF Test on Detects Only**											
2090					Shapiro Wilk Test Statistic	0.971				**Normal GOF Test on Detected Observations Only**		
2091					5% Shapiro Wilk P Value	0.12				Detected Data appear Normal at 5% Significance Level		
2092					Lilliefors Test Statistic	0.0634				**Lilliefors GOF Test**		
2093					5% Lilliefors Critical Value	0.0833				Detected Data appear Normal at 5% Significance Level		
2094	Detected Data appear Normal at 5% Significance Level											
2095												
2096	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2097					KM Mean	274.4				KM SD		32.17
2098					95% UTL95% Coverage	335.5				95% KM UPL (t)		327.9
2099					90% KM Percentile (z)	315.6				95% KM Percentile (z)		327.3
2100					99% KM Percentile (z)	349.2				95% KM USL		379.4

	A	B	C	D	E	F	G	H	I	J	K	L
2101												
2102	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2103					Mean	270.7				SD		40.94
2104					95% UTL95% Coverage	348.5				95% UPL (t)		338.9
2105					90% Percentile (z)	323.2				95% Percentile (z)		338
2106					99% Percentile (z)	366				95% USL		404.4
2107	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
2108												
2109	**Gamma GOF Tests on Detected Observations Only**											
2110					A-D Test Statistic	1.193	**Anderson-Darling GOF Test**					
2111					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
2112					K-S Test Statistic	0.0725	**Kolmogorov-Smirnov GOF**					
2113					5% K-S Critical Value	0.0856	Detected data appear Gamma Distributed at 5% Significance Level					
2114	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
2115												
2116	**Gamma Statistics on Detected Data Only**											
2117					k hat (MLE)	70.56				k star (bias corrected MLE)		68.71
2118					Theta hat (MLE)	3.906				Theta star (bias corrected MLE)		4.011
2119					nu hat (MLE)	16088				nu star (bias corrected)		15666
2120					MLE Mean (bias corrected)	275.6						
2121					MLE Sd (bias corrected)	33.25				95% Percentile of Chisquare (2kstar)		165.8
2122												
2123	**Gamma ROS Statistics using Imputed Non-Detects**											
2124	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2125	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)											
2126	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2127	This is especially true when the sample size is small.											
2128	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2129					Minimum	173				Mean		274.5
2130					Maximum	358				Median		276.5
2131					SD	31.89				CV		0.116
2132					k hat (MLE)	70.26				k star (bias corrected MLE)		68.48
2133					Theta hat (MLE)	3.907				Theta star (bias corrected MLE)		4.008
2134					nu hat (MLE)	16582				nu star (bias corrected)		16162
2135					MLE Mean (bias corrected)	274.5				MLE Sd (bias corrected)		33.17
2136					95% Percentile of Chisquare (2kstar)	165.3				90% Percentile		317.8
2137					95% Percentile	331.2				99% Percentile		357.5
2138	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2139	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2140					WH	HW				WH		HW
2141			95% Approx. Gamma UTL with 95% Coverage		340.3	341.1			95% Approx. Gamma UPL	331.5		332.1
2142			95% Gamma USL		394.8	397.4						
2143												
2144	**Estimates of Gamma Parameters using KM Estimates**											
2145					Mean (KM)	274.4				SD (KM)		32.17
2146					Variance (KM)	1035				SE of Mean (KM)		3.004
2147					k hat (KM)	72.73				k star (KM)		70.88
2148					nu hat (KM)	17163				nu star (KM)		16728
2149					theta hat (KM)	3.773				theta star (KM)		3.871
2150					80% gamma percentile (KM)	301.4				90% gamma percentile (KM)		316.9

2151	95% gamma percentile (KM)					330.1	99% gamma percentile (KM)					355.8
2152												
2153	**The following statistics are computed using gamma distribution and KM estimates**											
2154	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2155					WH	HW					WH	HW
2156	95% Approx. Gamma UTL with 95% Coverage				341	341.9	95% Approx. Gamma UPL				332.1	332.7
2157	95% KM Gamma Percentile				331.3	331.9	95% Gamma USL				396.3	399
2158												
2159	**Lognormal GOF Test on Detected Observations Only**											
2160	Shapiro Wilk Approximate Test Statistic					0.935	**Shapiro Wilk GOF Test**					
2161	5% Shapiro Wilk P Value					1.3563E-5	Data Not Lognormal at 5% Significance Level					
2162	Lilliefors Test Statistic					0.0805	**Lilliefors GOF Test**					
2163	5% Lilliefors Critical Value					0.0833	Detected Data appear Lognormal at 5% Significance Level					
2164	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2165												
2166	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2167	Mean in Original Scale					274.5	Mean in Log Scale					5.608
2168	SD in Original Scale					31.93	SD in Log Scale					0.122
2169	95% UTL95% Coverage					343.8	95% BCA UTL95% Coverage					326.5
2170	95% Bootstrap (%) UTL95% Coverage					329.6	95% UPL (t)					334.1
2171	90% Percentile (z)					318.8	95% Percentile (z)					333.3
2172	99% Percentile (z)					362.3	95% USL					406.4
2173												
2174	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2175	KM Mean of Logged Data					5.607	95% KM UTL (Lognormal)95% Coverage					344.7
2176	KM SD of Logged Data					0.124	95% KM UPL (Lognormal)					334.8
2177	95% KM Percentile Lognormal (z)					334	95% KM USL (Lognormal)					408.3
2178												
2179	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2180	Mean in Original Scale					270.7	Mean in Log Scale					5.587
2181	SD in Original Scale					40.94	SD in Log Scale					0.181
2182	95% UTL95% Coverage					376.1	95% UPL (t)					360.5
2183	90% Percentile (z)					336.4	95% Percentile (z)					359.2
2184	99% Percentile (z)					406.2	95% USL					481.3
2185	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2186												
2187	**Nonparametric Distribution Free Background Statistics**											
2188	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2189												
2190	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2191	Order of Statistic, r					115	95% UTL with95% Coverage					329
2192	Approx, f used to compute achieved CC					1.513	Approximate Actual Confidence Coefficient achieved by UTL					0.847
2193	Approximate Sample Size needed to achieve specified CC					153	95% UPL					326.1
2194	95% USL					358	95% KM Chebyshev UPL					415.2
2195												
2196	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2197	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2198	and consists of observations collected from clean unimpacted locations.											
2199	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2200	represents a background data set and when many onsite observations need to be compared with the BTV.											

	A	B	C	D	E	F	G	H	I	J	K	L
2201												
2202	**SPEC. COND., LAB**											
2203												
2204	**General Statistics**											
2205					Total Number of Observations	126			Number of Missing Observations	6		
2206					Number of Distinct Observations	47						
2207					Number of Detects	123			Number of Non-Detects	3		
2208					Number of Distinct Detects	47			Number of Distinct Non-Detects	2		
2209					Minimum Detect	218			Minimum Non-Detect	260		
2210					Maximum Detect	310			Maximum Non-Detect	270		
2211					Variance Detected	298.4			Percent Non-Detects	2.381%		
2212					Mean Detected	271.8			SD Detected	17.28		
2213					Mean of Detected Logged Data	5.603			SD of Detected Logged Data	0.0649		
2214												
2215	**Critical Values for Background Threshold Values (BTVs)**											
2216					Tolerance Factor K (For UTL)	1.89			d2max (for USL)	3.287		
2217												
2218	**Normal GOF Test on Detects Only**											
2219					Shapiro Wilk Test Statistic	0.966		**Normal GOF Test on Detected Observations Only**				
2220					5% Shapiro Wilk P Value	0.0359		Data Not Normal at 5% Significance Level				
2221					Lilliefors Test Statistic	0.0893		**Lilliefors GOF Test**				
2222					5% Lilliefors Critical Value	0.0802		Data Not Normal at 5% Significance Level				
2223	**Data Not Normal at 5% Significance Level**											
2224												
2225	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2226					KM Mean	271.3			KM SD	17.4		
2227					95% UTL95% Coverage	304.2			95% KM UPL (t)	300.3		
2228					90% KM Percentile (z)	293.6			95% KM Percentile (z)	300		
2229					99% KM Percentile (z)	311.8			95% KM USL	328.5		
2230												
2231	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2232					Mean	268.5			SD	27.22		
2233					95% UTL95% Coverage	320			95% UPL (t)	313.8		
2234					90% Percentile (z)	303.4			95% Percentile (z)	313.3		
2235					99% Percentile (z)	331.8			95% USL	358		
2236	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
2237												
2238	**Gamma GOF Tests on Detected Observations Only**											
2239					A-D Test Statistic	1.247		**Anderson-Darling GOF Test**				
2240					5% A-D Critical Value	0.75		Data Not Gamma Distributed at 5% Significance Level				
2241					K-S Test Statistic	0.0979		**Kolmogorov-Smirnov GOF**				
2242					5% K-S Critical Value	0.0833		Data Not Gamma Distributed at 5% Significance Level				
2243	**Data Not Gamma Distributed at 5% Significance Level**											
2244												
2245	**Gamma Statistics on Detected Data Only**											
2246					k hat (MLE)	243.1			k star (bias corrected MLE)	237.2		
2247					Theta hat (MLE)	1.118			Theta star (bias corrected MLE)	1.146		
2248					nu hat (MLE)	59813			nu star (bias corrected)	58355		
2249					MLE Mean (bias corrected)	271.8						
2250					MLE Sd (bias corrected)	17.65			95% Percentile of Chisquare (2kstar)	526.2		

	A	B	C	D	E	F	G	H	I	J	K	L
2251												
2252	**Gamma ROS Statistics using Imputed Non-Detects**											
2253	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2254	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)											
2255	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2256	This is especially true when the sample size is small.											
2257	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2258					Minimum	218				Mean	271.4	
2259					Maximum	310				Median	270	
2260					SD	17.31				CV	0.0638	
2261					k hat (MLE)	241.8				k star (bias corrected MLE)	236	
2262					Theta hat (MLE)	1.122				Theta star (bias corrected MLE)	1.15	
2263					nu hat (MLE)	60934				nu star (bias corrected)	59484	
2264					MLE Mean (bias corrected)	271.4				MLE Sd (bias corrected)	17.66	
2265					95% Percentile of Chisquare (2kstar)	523.7				90% Percentile	294.3	
2266					95% Percentile	301.1				99% Percentile	314.2	
2267	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2268	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2269					WH	HW				WH	HW	
2270				95% Approx. Gamma UTL with 95% Coverage	305.5	305.7			95% Approx. Gamma UPL	301.2	301.3	
2271				95% Gamma USL	332.7	333.3						
2272												
2273	**Estimates of Gamma Parameters using KM Estimates**											
2274					Mean (KM)	271.3				SD (KM)	17.4	
2275					Variance (KM)	302.7				SE of Mean (KM)	1.567	
2276					k hat (KM)	243.2				k star (KM)	237.4	
2277					nu hat (KM)	61292				nu star (KM)	59834	
2278					theta hat (KM)	1.116				theta star (KM)	1.143	
2279					80% gamma percentile (KM)	286				90% gamma percentile (KM)	294.1	
2280					95% gamma percentile (KM)	300.9				99% gamma percentile (KM)	314	
2281												
2282	**The following statistics are computed using gamma distribution and KM estimates**											
2283	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2284					WH	HW				WH	HW	
2285				95% Approx. Gamma UTL with 95% Coverage	305.6	305.8			95% Approx. Gamma UPL	301.3	301.5	
2286				95% KM Gamma Percentile	301	301.1			95% Gamma USL	333.1	333.7	
2287												
2288	**Lognormal GOF Test on Detected Observations Only**											
2289					Shapiro Wilk Approximate Test Statistic	0.953			**Shapiro Wilk GOF Test**			
2290					5% Shapiro Wilk P Value	0.00146			Data Not Lognormal at 5% Significance Level			
2291					Lilliefors Test Statistic	0.103			**Lilliefors GOF Test**			
2292					5% Lilliefors Critical Value	0.0802			Data Not Lognormal at 5% Significance Level			
2293	Data Not Lognormal at 5% Significance Level											
2294												
2295	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2296					Mean in Original Scale	271.4				Mean in Log Scale	5.601	
2297					SD in Original Scale	17.32				SD in Log Scale	0.0651	
2298					95% UTL95% Coverage	306.3				95% BCA UTL95% Coverage	303	
2299					95% Bootstrap (%) UTL95% Coverage	306				95% UPL (t)	301.8	
2300					90% Percentile (z)	294.4				95% Percentile (z)	301.4	

2301					99% Percentile (z)	315.1					95% USL	335.4
2302												
2303	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2304					KM Mean of Logged Data	5.601					95% KM UTL (Lognormal)95% Coverage	306.4
2305					KM SD of Logged Data	0.0655					95% KM UPL (Lognormal)	301.9
2306					95% KM Percentile Lognormal (z)	301.6					95% KM USL (Lognormal)	335.8
2307												
2308	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2309					Mean in Original Scale	268.5					Mean in Log Scale	5.586
2310					SD in Original Scale	27.22					SD in Log Scale	0.126
2311					95% UTL95% Coverage	338.6					95% UPL (t)	329.1
2312					90% Percentile (z)	313.6					95% Percentile (z)	328.3
2313					99% Percentile (z)	357.8					95% USL	403.9
2314	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2315												
2316	**Nonparametric Distribution Free Background Statistics**											
2317	**Data do not follow a Discernible Distribution (0.05)**											
2318												
2319	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2320					Order of Statistic, r	123					95% UTL with95% Coverage	307
2321					Approx, f used to compute achieved CC	1.618					Approximate Actual Confidence Coefficient achieved by UTL	0.88
2322					Approximate Sample Size needed to achieve specified CC	153					95% UPL	299
2323					95% USL	310					95% KM Chebyshev UPL	347.5
2324												
2325	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2326	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2327	and consists of observations collected from clean unimpacted locations.											
2328	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2329	represents a background data set and when many onsite observations need to be compared with the BTV.											
2330												
2331	**SULFATE**											
2332												
2333	**General Statistics**											
2334					Total Number of Observations	91					Number of Missing Observations	41
2335					Number of Distinct Observations	17						
2336					Number of Detects	32					Number of Non-Detects	59
2337					Number of Distinct Detects	17					Number of Distinct Non-Detects	2
2338					Minimum Detect	1.1					Minimum Non-Detect	2
2339					Maximum Detect	5					Maximum Non-Detect	5
2340					Variance Detected	0.702					Percent Non-Detects	64.84%
2341					Mean Detected	1.991					SD Detected	0.838
2342					Mean of Detected Logged Data	0.624					SD of Detected Logged Data	0.346
2343												
2344	**Critical Values for Background Threshold Values (BTVs)**											
2345					Tolerance Factor K (For UTL)	1.938					d2max (for USL)	3.177
2346												
2347	**Normal GOF Test on Detects Only**											
2348					Shapiro Wilk Test Statistic	0.76					**Shapiro Wilk GOF Test**	
2349					5% Shapiro Wilk Critical Value	0.93					Data Not Normal at 5% Significance Level	
2350					Lilliefors Test Statistic	0.2					**Lilliefors GOF Test**	

2351				5% Lilliefors Critical Value		0.154	Data Not Normal at 5% Significance Level					
2352	Data Not Normal at 5% Significance Level											
2353												
2354	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2355				KM Mean		1.826				KM SD		0.681
2356				95% UTL95% Coverage		3.146				95% KM UPL (t)		2.964
2357				90% KM Percentile (z)		2.699				95% KM Percentile (z)		2.946
2358				99% KM Percentile (z)		3.41				95% KM USL		3.99
2359												
2360	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2361				Mean		2.173				SD		0.671
2362				95% UTL95% Coverage		3.474				95% UPL (t)		3.294
2363				90% Percentile (z)		3.033				95% Percentile (z)		3.277
2364				99% Percentile (z)		3.734				95% USL		4.305
2365	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2366												
2367	**Gamma GOF Tests on Detected Observations Only**											
2368				A-D Test Statistic		1.156	**Anderson-Darling GOF Test**					
2369				5% A-D Critical Value		0.747	Data Not Gamma Distributed at 5% Significance Level					
2370				K-S Test Statistic		0.141	**Kolmogorov-Smirnov GOF**					
2371				5% K-S Critical Value		0.156	Detected data appear Gamma Distributed at 5% Significance Level					
2372	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
2373												
2374	**Gamma Statistics on Detected Data Only**											
2375				k hat (MLE)		7.899				k star (bias corrected MLE)		7.179
2376				Theta hat (MLE)		0.252				Theta star (bias corrected MLE)		0.277
2377				nu hat (MLE)		505.5				nu star (bias corrected)		459.5
2378				MLE Mean (bias corrected)		1.991						
2379				MLE Sd (bias corrected)		0.743				95% Percentile of Chisquare (2kstar)		24.16
2380												
2381	**Gamma ROS Statistics using Imputed Non-Detects**											
2382	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2383	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)											
2384	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2385	This is especially true when the sample size is small.											
2386	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2387				Minimum		0.611				Mean		1.823
2388				Maximum		5				Median		1.714
2389				SD		0.719				CV		0.394
2390				k hat (MLE)		7.395				k star (bias corrected MLE)		7.159
2391				Theta hat (MLE)		0.247				Theta star (bias corrected MLE)		0.255
2392				nu hat (MLE)		1346				nu star (bias corrected)		1303
2393				MLE Mean (bias corrected)		1.823				MLE Sd (bias corrected)		0.681
2394				95% Percentile of Chisquare (2kstar)		24.1				90% Percentile		2.733
2395				95% Percentile		3.069				99% Percentile		3.769
2396	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2397	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2398					WH	HW					WH	HW
2399				95% Approx. Gamma UTL with 95% Coverage	3.338	3.371				95% Approx. Gamma UPL	3.076	3.094
2400				95% Gamma USL	4.749	4.9						

	A	B	C	D	E	F	G	H	I	J	K	L
2401												
2402	**Estimates of Gamma Parameters using KM Estimates**											
2403						Mean (KM)	1.826			SD (KM)	0.681	
2404						Variance (KM)	0.464			SE of Mean (KM)	0.103	
2405						k hat (KM)	7.192			k star (KM)	6.962	
2406						nu hat (KM)	1309			nu star (KM)	1267	
2407						theta hat (KM)	0.254			theta star (KM)	0.262	
2408						80% gamma percentile (KM)	2.369			90% gamma percentile (KM)	2.75	
2409						95% gamma percentile (KM)	3.093			99% gamma percentile (KM)	3.808	
2410												
2411	**The following statistics are computed using gamma distribution and KM estimates**											
2412	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2413					WH	HW					WH	HW
2414				95% Approx. Gamma UTL with 95% Coverage	3.112	3.115				95% Approx. Gamma UPL	2.895	2.891
2415				95% KM Gamma Percentile	2.874	2.87				95% Gamma USL	4.261	4.323
2416												
2417	**Lognormal GOF Test on Detected Observations Only**											
2418						Shapiro Wilk Test Statistic	0.907			**Shapiro Wilk GOF Test**		
2419						5% Shapiro Wilk Critical Value	0.93			Data Not Lognormal at 5% Significance Level		
2420						Lilliefors Test Statistic	0.141			**Lilliefors GOF Test**		
2421						5% Lilliefors Critical Value	0.154			Detected Data appear Lognormal at 5% Significance Level		
2422	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2423												
2424	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2425						Mean in Original Scale	1.832			Mean in Log Scale	0.553	
2426						SD in Original Scale	0.658			SD in Log Scale	0.316	
2427						95% UTL95% Coverage	3.208			95% BCA UTL95% Coverage	3.221	
2428						95% Bootstrap (%) UTL95% Coverage	3.221			95% UPL (t)	2.948	
2429						90% Percentile (z)	2.607			95% Percentile (z)	2.924	
2430						99% Percentile (z)	3.626			95% USL	4.745	
2431												
2432	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2433						KM Mean of Logged Data	0.55			95% KM UTL (Lognormal)95% Coverage	3.132	
2434						KM SD of Logged Data	0.305			95% KM UPL (Lognormal)	2.887	
2435						95% KM Percentile Lognormal (z)	2.864			95% KM USL (Lognormal)	4.571	
2436												
2437	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2438						Mean in Original Scale	2.173			Mean in Log Scale	0.723	
2439						SD in Original Scale	0.671			SD in Log Scale	0.343	
2440						95% UTL95% Coverage	4.006			95% UPL (t)	3.655	
2441						90% Percentile (z)	3.198			95% Percentile (z)	3.622	
2442						99% Percentile (z)	4.576			95% USL	6.128	
2443	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2444												
2445	**Nonparametric Distribution Free Background Statistics**											
2446	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2447												
2448	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2449						Order of Statistic, r	89			95% UTL with95% Coverage	5	
2450						Approx, f used to compute achieved CC	1.561			Approximate Actual Confidence Coefficient achieved by UTL	0.839	

2451	Approximate Sample Size needed to achieve specified CC					124					95% UPL	5
2452					95% USL	5					95% KM Chebyshev UPL	4.811
2453												
2454	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2455	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2456	and consists of observations collected from clean unimpacted locations.											
2457	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2458	represents a background data set and when many onsite observations need to be compared with the BTV.											
2459												
2460	**ALKALINITY**											
2461												
2462	**General Statistics**											
2463	Total Number of Observations					71	Number of Missing Observations					61
2464	Number of Distinct Observations					5						
2465	Number of Detects					47	Number of Non-Detects					24
2466	Number of Distinct Detects					5	Number of Distinct Non-Detects					1
2467	Minimum Detect					5	Minimum Non-Detect					5
2468	Maximum Detect					8	Maximum Non-Detect					5
2469	Variance Detected					0.635	Percent Non-Detects					33.8%
2470	Mean Detected					5.9	SD Detected					0.797
2471	Mean of Detected Logged Data					1.766	SD of Detected Logged Data					0.133
2472												
2473	**Critical Values for Background Threshold Values (BTVs)**											
2474	Tolerance Factor K (For UTL)					1.983	d2max (for USL)					3.089
2475												
2476	**Normal GOF Test on Detects Only**											
2477	Shapiro Wilk Test Statistic					0.831	**Shapiro Wilk GOF Test**					
2478	5% Shapiro Wilk Critical Value					0.946	Data Not Normal at 5% Significance Level					
2479	Lilliefors Test Statistic					0.237	**Lilliefors GOF Test**					
2480	5% Lilliefors Critical Value					0.128	Data Not Normal at 5% Significance Level					
2481	Data Not Normal at 5% Significance Level											
2482												
2483	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2484	KM Mean					5.596	KM SD					0.77
2485	95% UTL95% Coverage					7.122	95% KM UPL (t)					6.888
2486	90% KM Percentile (z)					6.582	95% KM Percentile (z)					6.862
2487	99% KM Percentile (z)					7.387	95% KM USL					7.974
2488												
2489	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2490	Mean					4.751	SD					1.744
2491	95% UTL95% Coverage					8.208	95% UPL (t)					7.678
2492	90% Percentile (z)					6.986	95% Percentile (z)					7.619
2493	99% Percentile (z)					8.808	95% USL					10.14
2494	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2495												
2496	**Gamma GOF Tests on Detected Observations Only**											
2497	A-D Test Statistic					3.405	**Anderson-Darling GOF Test**					
2498	5% A-D Critical Value					0.747	Data Not Gamma Distributed at 5% Significance Level					
2499	K-S Test Statistic					0.228	**Kolmogorov-Smirnov GOF**					
2500	5% K-S Critical Value					0.129	Data Not Gamma Distributed at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
2501	Data Not Gamma Distributed at 5% Significance Level											
2502												
2503	Gamma Statistics on Detected Data Only											
2504					k hat (MLE)	57.45			k star (bias corrected MLE)			53.8
2505					Theta hat (MLE)	0.103			Theta star (bias corrected MLE)			0.11
2506					nu hat (MLE)	5401			nu star (bias corrected)			5057
2507					MLE Mean (bias corrected)	5.9						
2508					MLE Sd (bias corrected)	0.804			95% Percentile of Chisquare (2kstar)			132.8
2509												
2510	Gamma ROS Statistics using Imputed Non-Detects											
2511	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2512	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)											
2513	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2514	This is especially true when the sample size is small.											
2515	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2516					Minimum	3.11			Mean			5.324
2517					Maximum	8			Median			5
2518					SD	1.071			CV			0.201
2519					k hat (MLE)	24.71			k star (bias corrected MLE)			23.68
2520					Theta hat (MLE)	0.215			Theta star (bias corrected MLE)			0.225
2521					nu hat (MLE)	3509			nu star (bias corrected)			3362
2522					MLE Mean (bias corrected)	5.324			MLE Sd (bias corrected)			1.094
2523					95% Percentile of Chisquare (2kstar)	64.42			90% Percentile			6.765
2524					95% Percentile	7.242			99% Percentile			8.194
2525	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2526	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2527						WH	HW				WH	HW
2528					95% Approx. Gamma UTL with 95% Coverage	7.67	7.707		95% Approx. Gamma UPL		7.259	7.282
2529					95% Gamma USL	9.295	9.411					
2530												
2531	Estimates of Gamma Parameters using KM Estimates											
2532					Mean (KM)	5.596			SD (KM)			0.77
2533					Variance (KM)	0.593			SE of Mean (KM)			0.0924
2534					k hat (KM)	52.82			k star (KM)			50.6
2535					nu hat (KM)	7501			nu star (KM)			7185
2536					theta hat (KM)	0.106			theta star (KM)			0.111
2537					80% gamma percentile (KM)	6.245			90% gamma percentile (KM)			6.625
2538					95% gamma percentile (KM)	6.949			99% gamma percentile (KM)			7.587
2539												
2540	The following statistics are computed using gamma distribution and KM estimates											
2541	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2542						WH	HW				WH	HW
2543					95% Approx. Gamma UTL with 95% Coverage	7.157	7.163		95% Approx. Gamma UPL		6.895	6.897
2544					95% KM Gamma Percentile	6.867	6.868		95% Gamma USL		8.167	8.196
2545												
2546	Lognormal GOF Test on Detected Observations Only											
2547					Shapiro Wilk Test Statistic	0.829			Shapiro Wilk GOF Test			
2548					5% Shapiro Wilk Critical Value	0.946			Data Not Lognormal at 5% Significance Level			
2549					Lilliefors Test Statistic	0.236			Lilliefors GOF Test			
2550					5% Lilliefors Critical Value	0.128			Data Not Lognormal at 5% Significance Level			

2551	Data Not Lognormal at 5% Significance Level											
2552												
2553	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2554						Mean in Original Scale	5.366			Mean in Log Scale	1.663	
2555						SD in Original Scale	1.015			SD in Log Scale	0.189	
2556						95% UTL95% Coverage	7.669			95% BCA UTL95% Coverage	6.5	
2557						95% Bootstrap (%) UTL95% Coverage	7.3			95% UPL (t)	7.241	
2558						90% Percentile (z)	6.718			95% Percentile (z)	7.195	
2559						99% Percentile (z)	8.184			95% USL	9.452	
2560												
2561	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2562						KM Mean of Logged Data	1.713			95% KM UTL (Lognormal)95% Coverage	7.18	
2563						KM SD of Logged Data	0.13			95% KM UPL (Lognormal)	6.901	
2564						95% KM Percentile Lognormal (z)	6.871			95% KM USL (Lognormal)	8.292	
2565												
2566	Background DL/2 Statistics Assuming Lognormal Distribution											
2567						Mean in Original Scale	4.751			Mean in Log Scale	1.479	
2568						SD in Original Scale	1.744			SD in Log Scale	0.419	
2569						95% UTL95% Coverage	10.07			95% UPL (t)	8.866	
2570						90% Percentile (z)	7.507			95% Percentile (z)	8.742	
2571						99% Percentile (z)	11.63			95% USL	16.01	
2572	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2573												
2574	Nonparametric Distribution Free Background Statistics											
2575	Data do not follow a Discernible Distribution (0.05)											
2576												
2577	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2578						Order of Statistic, r	70			95% UTL with95% Coverage	7.3	
2579						Approx, f used to compute achieved CC	1.842			Approximate Actual Confidence Coefficient achieved by UTL	0.876	
2580						Approximate Sample Size needed to achieve specified CC	93			95% UPL	7	
2581						95% USL	8			95% KM Chebyshev UPL	8.975	
2582												
2583	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2584	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2585	and consists of observations collected from clean unimpacted locations.											
2586	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2587	represents a background data set and when many onsite observations need to be compared with the BTV.											
2588												
2589	TDS (TOTAL DISSOLVED SOLIDS)											
2590												
2591	General Statistics											
2592						Total Number of Observations	104			Number of Distinct Observations	65	
2593										Number of Missing Observations	28	
2594						Minimum	110			First Quartile	180	
2595						Second Largest	286			Median	200	
2596						Maximum	294			Third Quartile	228	
2597						Mean	202.3			SD	35.33	
2598						Coefficient of Variation	0.175			Skewness	0.16	
2599						Mean of logged Data	5.294			SD of logged Data	0.179	
2600												

	A	B	C	D	E	F	G	H	I	J	K	L
2601	**Critical Values for Background Threshold Values (BTVs)**											
2602					Tolerance Factor K (For UTL)	1.917				d2max (for USL)		3.223
2603												
2604	**Normal GOF Test**											
2605					Shapiro Wilk Test Statistic	0.985	**Normal GOF Test**					
2606					5% Shapiro Wilk P Value	0.796	Data appear Normal at 5% Significance Level					
2607					Lilliefors Test Statistic	0.0801	**Lilliefors GOF Test**					
2608					5% Lilliefors Critical Value	0.0872	Data appear Normal at 5% Significance Level					
2609	Data appear Normal at 5% Significance Level											
2610												
2611	**Background Statistics Assuming Normal Distribution**											
2612				95% UTL with	95% Coverage	270				90% Percentile (z)		247.6
2613					95% UPL (t)	261.2				95% Percentile (z)		260.4
2614					95% USL	316.1				99% Percentile (z)		284.5
2615												
2616	**Gamma GOF Test**											
2617					A-D Test Statistic	0.295	**Anderson-Darling Gamma GOF Test**					
2618					5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level					
2619					K-S Test Statistic	0.0566	**Kolmogorov-Smirnov Gamma GOF Test**					
2620					5% K-S Critical Value	0.0882	Detected data appear Gamma Distributed at 5% Significance Level					
2621	Detected data appear Gamma Distributed at 5% Significance Level											
2622												
2623	**Gamma Statistics**											
2624					k hat (MLE)	32.3				k star (bias corrected MLE)		31.37
2625					Theta hat (MLE)	6.263				Theta star (bias corrected MLE)		6.448
2626					nu hat (MLE)	6718				nu star (bias corrected)		6525
2627					MLE Mean (bias corrected)	202.3				MLE Sd (bias corrected)		36.11
2628												
2629	**Background Statistics Assuming Gamma Distribution**											
2630					95% Wilson Hilferty (WH) Approx. Gamma UPL	265.5				90% Percentile		249.7
2631					95% Hawkins Wixley (HW) Approx. Gamma UPL	266.2				95% Percentile		265.1
2632				95% WH Approx. Gamma UTL with	95% Coverage	276.3				99% Percentile		295.6
2633				95% HW Approx. Gamma UTL with	95% Coverage	277.4						
2634					95% WH USL	337.9				95% HW USL		341.6
2635												
2636	**Lognormal GOF Test**											
2637					Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**					
2638					5% Shapiro Wilk P Value	0.552	Data appear Lognormal at 5% Significance Level					
2639					Lilliefors Test Statistic	0.0653	**Lilliefors Lognormal GOF Test**					
2640					5% Lilliefors Critical Value	0.0872	Data appear Lognormal at 5% Significance Level					
2641	Data appear Lognormal at 5% Significance Level											
2642												
2643	**Background Statistics assuming Lognormal Distribution**											
2644				95% UTL with	95% Coverage	280.9				90% Percentile (z)		250.6
2645					95% UPL (t)	268.6				95% Percentile (z)		267.5
2646					95% USL	355.1				99% Percentile (z)		302.3
2647												
2648	**Nonparametric Distribution Free Background Statistics**											
2649	Data appear Normal at 5% Significance Level											
2650												

2651	**Nonparametric Upper Limits for Background Threshold Values**											
2652					Order of Statistic, r	102				95% UTL with 95% Coverage		276
2653					Approx, f used to compute achieved CC	1.789				Approximate Actual Confidence Coefficient achieved by UTL		0.897
2654										Approximate Sample Size needed to achieve specified CC		124
2655					95% Percentile Bootstrap UTL with 95% Coverage	275.4				95% BCA Bootstrap UTL with 95% Coverage		275.4
2656					95% UPL	267.8				90% Percentile		247.7
2657					90% Chebyshev UPL	308.8				95% Percentile		260.9
2658					95% Chebyshev UPL	357				99% Percentile		285.7
2659					95% USL	294						
2660												
2661	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2662	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2663	and consists of observations collected from clean unimpacted locations.											
2664	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2665	represents a background data set and when many onsite observations need to be compared with the BTV.											
2666												
2667	**TOC (TOTAL ORGANIC CARBON)**											
2668												
2669	**General Statistics**											
2670					Total Number of Observations	127				Number of Missing Observations		5
2671					Number of Distinct Observations	16						
2672					Number of Detects	29				Number of Non-Detects		98
2673					Number of Distinct Detects	16				Number of Distinct Non-Detects		3
2674					Minimum Detect	0.5				Minimum Non-Detect		0.5
2675					Maximum Detect	1.6				Maximum Non-Detect		1.5
2676					Variance Detected	0.0885				Percent Non-Detects		77.17%
2677					Mean Detected	1.032				SD Detected		0.297
2678					Mean of Detected Logged Data	-0.0128				SD of Detected Logged Data		0.314
2679												
2680	**Critical Values for Background Threshold Values (BTVs)**											
2681					Tolerance Factor K (For UTL)	1.889				d2max (for USL)		3.289
2682												
2683	**Normal GOF Test on Detects Only**											
2684					Shapiro Wilk Test Statistic	0.962				**Shapiro Wilk GOF Test**		
2685					5% Shapiro Wilk Critical Value	0.926				Detected Data appear Normal at 5% Significance Level		
2686					Lilliefors Test Statistic	0.112				**Lilliefors GOF Test**		
2687					5% Lilliefors Critical Value	0.161				Detected Data appear Normal at 5% Significance Level		
2688	**Detected Data appear Normal at 5% Significance Level**											
2689												
2690	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2691					KM Mean	0.694				KM SD		0.259
2692					95% UTL95% Coverage	1.183				95% KM UPL (t)		1.125
2693					90% KM Percentile (z)	1.026				95% KM Percentile (z)		1.12
2694					99% KM Percentile (z)	1.296				95% KM USL		1.545
2695												
2696	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2697					Mean	0.608				SD		0.28
2698					95% UTL95% Coverage	1.138				95% UPL (t)		1.074
2699					90% Percentile (z)	0.967				95% Percentile (z)		1.069
2700					99% Percentile (z)	1.26				95% USL		1.53

	A	B	C	D	E	F	G	H	I	J	K	L
2701	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2702												
2703	Gamma GOF Tests on Detected Observations Only											
2704					A-D Test Statistic	0.581	Anderson-Darling GOF Test					
2705					5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level					
2706					K-S Test Statistic	0.152	Kolmogorov-Smirnov GOF					
2707					5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level					
2708	Detected data appear Gamma Distributed at 5% Significance Level											
2709												
2710	Gamma Statistics on Detected Data Only											
2711					k hat (MLE)	11.36			k star (bias corrected MLE)	10.21		
2712					Theta hat (MLE)	0.0909			Theta star (bias corrected MLE)	0.101		
2713					nu hat (MLE)	658.8			nu star (bias corrected)	592		
2714					MLE Mean (bias corrected)	1.032						
2715					MLE Sd (bias corrected)	0.323			95% Percentile of Chisquare (2kstar)	31.93		
2716												
2717	Gamma ROS Statistics using Imputed Non-Detects											
2718	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2719	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)											
2720	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2721	This is especially true when the sample size is small.											
2722	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2723					Minimum	0.01			Mean	0.62		
2724					Maximum	1.6			Median	0.59		
2725					SD	0.339			CV	0.547		
2726					k hat (MLE)	2.498			k star (bias corrected MLE)	2.444		
2727					Theta hat (MLE)	0.248			Theta star (bias corrected MLE)	0.254		
2728					nu hat (MLE)	634.5			nu star (bias corrected)	620.8		
2729					MLE Mean (bias corrected)	0.62			MLE Sd (bias corrected)	0.397		
2730					95% Percentile of Chisquare (2kstar)	10.9			90% Percentile	1.151		
2731					95% Percentile	1.382			99% Percentile	1.889		
2732	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2733	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2734						WH	HW			WH	HW	
2735					95% Approx. Gamma UTL with 95% Coverage	1.532	1.625		95% Approx. Gamma UPL	1.378	1.445	
2736					95% Gamma USL	2.749	3.143					
2737												
2738	Estimates of Gamma Parameters using KM Estimates											
2739					Mean (KM)	0.694			SD (KM)	0.259		
2740					Variance (KM)	0.0669			SE of Mean (KM)	0.0333		
2741					k hat (KM)	7.209			k star (KM)	7.044		
2742					nu hat (KM)	1831			nu star (KM)	1789		
2743					theta hat (KM)	0.0963			theta star (KM)	0.0986		
2744					80% gamma percentile (KM)	0.9			90% gamma percentile (KM)	1.044		
2745					95% gamma percentile (KM)	1.173			99% gamma percentile (KM)	1.443		
2746												
2747	The following statistics are computed using gamma distribution and KM estimates											
2748	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2749						WH	HW			WH	HW	
2750					95% Approx. Gamma UTL with 95% Coverage	1.19	1.192		95% Approx. Gamma UPL	1.117	1.117	

2751	95% KM Gamma Percentile				1.111	1.111	95% Gamma USL				1.717	1.75
2752												
2753	**Lognormal GOF Test on Detected Observations Only**											
2754	Shapiro Wilk Test Statistic					0.936	**Shapiro Wilk GOF Test**					
2755	5% Shapiro Wilk Critical Value					0.926	Detected Data appear Lognormal at 5% Significance Level					
2756	Lilliefors Test Statistic					0.171	**Lilliefors GOF Test**					
2757	5% Lilliefors Critical Value					0.161	Data Not Lognormal at 5% Significance Level					
2758	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2759												
2760	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2761	Mean in Original Scale					0.66	Mean in Log Scale					-0.508
2762	SD in Original Scale					0.293	SD in Log Scale					0.43
2763	95% UTL95% Coverage					1.356	95% BCA UTL95% Coverage					1.2
2764	95% Bootstrap (%) UTL95% Coverage					1.4	95% UPL (t)					1.23
2765	90% Percentile (z)					1.044	95% Percentile (z)					1.22
2766	99% Percentile (z)					1.636	95% USL					2.475
2767												
2768	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2769	KM Mean of Logged Data					-0.421	95% KM UTL (Lognormal)95% Coverage					1.201
2770	KM SD of Logged Data					0.32	95% KM UPL (Lognormal)					1.118
2771	95% KM Percentile Lognormal (z)					1.111	95% KM USL (Lognormal)					1.881
2772												
2773	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2774	Mean in Original Scale					0.608	Mean in Log Scale					-0.581
2775	SD in Original Scale					0.28	SD in Log Scale					0.391
2776	95% UTL95% Coverage					1.17	95% UPL (t)					1.072
2777	90% Percentile (z)					0.923	95% Percentile (z)					1.064
2778	99% Percentile (z)					1.388	95% USL					2.023
2779	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2780												
2781	**Nonparametric Distribution Free Background Statistics**											
2782	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2783												
2784	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2785	Order of Statistic, r					124	95% UTL with95% Coverage					1.5
2786	Approx, f used to compute achieved CC					1.632	Approximate Actual Confidence Coefficient achieved by UTL					0.884
2787	Approximate Sample Size needed to achieve specified CC					153	95% UPL					1.4
2788	95% USL					1.6	95% KM Chebyshev UPL					1.826
2789												
2790	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2791	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2792	and consists of observations collected from clean unimpacted locations.											
2793	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2794	represents a background data set and when many onsite observations need to be compared with the BTV.											
2795												
2796	**TOTAL PHENOLICS**											
2797												
2798	**General Statistics**											
2799	Total Number of Observations					128	Number of Missing Observations					4
2800	Number of Distinct Observations					4						

2801					Number of Detects	2					Number of Non-Detects	126
2802					Number of Distinct Detects	2					Number of Distinct Non-Detects	3
2803					Minimum Detect	0.009					Minimum Non-Detect	0.005
2804					Maximum Detect	0.01					Maximum Non-Detect	0.03
2805					Variance Detected	5.0000E-7					Percent Non-Detects	98.44%
2806					Mean Detected	0.0095					SD Detected	7.0711E-4
2807					Mean of Detected Logged Data	-4.658					SD of Detected Logged Data	0.0745
2808												
2809					Warning: Data set has only 2 Detected Values.							
2810					This is not enough to compute meaningful or reliable statistics and estimates.							
2811												
2812												
2813					Critical Values for Background Threshold Values (BTVs)							
2814					Tolerance Factor K (For UTL)	1.888					d2max (for USL)	3.292
2815												
2816					Normal GOF Test on Detects Only							
2817					Not Enough Data to Perform GOF Test							
2818												
2819					Kaplan Meier (KM) Background Statistics Assuming Normal Distribution							
2820					KM Mean	0.0053					KM SD	0.00109
2821					95% UTL95% Coverage	0.00736					95% KM UPL (t)	0.00712
2822					90% KM Percentile (z)	0.0067					95% KM Percentile (z)	0.0071
2823					99% KM Percentile (z)	0.00784					95% KM USL	0.0089
2824												
2825					DL/2 Substitution Background Statistics Assuming Normal Distribution							
2826					Mean	0.0108					SD	0.00537
2827					95% UTL95% Coverage	0.0209					95% UPL (t)	0.0197
2828					90% Percentile (z)	0.0177					95% Percentile (z)	0.0196
2829					99% Percentile (z)	0.0233					95% USL	0.0285
2830					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
2831												
2832					Gamma GOF Tests on Detected Observations Only							
2833					Not Enough Data to Perform GOF Test							
2834												
2835					Gamma Statistics on Detected Data Only							
2836					k hat (MLE)	360.7					k star (bias corrected MLE)	N/A
2837					Theta hat (MLE)	2.6340E-5					Theta star (bias corrected MLE)	N/A
2838					nu hat (MLE)	1443					nu star (bias corrected)	N/A
2839					MLE Mean (bias corrected)	N/A						
2840					MLE Sd (bias corrected)	N/A					95% Percentile of Chisquare (2kstar)	N/A
2841												
2842					Estimates of Gamma Parameters using KM Estimates							
2843					Mean (KM)	0.0053					SD (KM)	0.00109
2844					Variance (KM)	1.1964E-6					SE of Mean (KM)	3.0175E-4
2845					k hat (KM)	23.44					k star (KM)	22.9
2846					nu hat (KM)	6002					nu star (KM)	5862
2847					theta hat (KM)	2.2590E-4					theta star (KM)	2.3127E-4
2848					80% gamma percentile (KM)	0.0062					90% gamma percentile (KM)	0.00675
2849					95% gamma percentile (KM)	0.00724					99% gamma percentile (KM)	0.0082
2850												

2851	**The following statistics are computed using gamma distribution and KM estimates**											
2852	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2853					WH	HW					WH	HW
2854	95% Approx. Gamma UTL with 95% Coverage				0.00714	0.00711	95% Approx. Gamma UPL				0.00689	0.00686
2855	95% KM Gamma Percentile				0.00687	0.00684	95% Gamma USL				0.00881	0.00879
2856												
2857	**Lognormal GOF Test on Detected Observations Only**											
2858	Not Enough Data to Perform GOF Test											
2859												
2860	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2861	Mean in Original Scale				0.00685		Mean in Log Scale				-4.996	
2862	SD in Original Scale				0.00109		SD in Log Scale				0.159	
2863	95% UTL95% Coverage				0.00912		95% BCA UTL95% Coverage				0.00911	
2864	95% Bootstrap (%) UTL95% Coverage				0.00911		95% UPL (t)				0.0088	
2865	90% Percentile (z)				0.00829		95% Percentile (z)				0.00878	
2866	99% Percentile (z)				0.00978		95% USL				0.0114	
2867												
2868	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2869	KM Mean of Logged Data				-5.256		95% KM UTL (Lognormal)95% Coverage				0.00702	
2870	KM SD of Logged Data				0.157		95% KM UPL (Lognormal)				0.00678	
2871	95% KM Percentile Lognormal (z)				0.00676		95% KM USL (Lognormal)				0.00876	
2872												
2873	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2874	Mean in Original Scale				0.0108		Mean in Log Scale				-4.722	
2875	SD in Original Scale				0.00537		SD in Log Scale				0.696	
2876	95% UTL95% Coverage				0.0331		95% UPL (t)				0.0283	
2877	90% Percentile (z)				0.0217		95% Percentile (z)				0.028	
2878	99% Percentile (z)				0.0449		95% USL				0.088	
2879	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2880												
2881	**Nonparametric Distribution Free Background Statistics**											
2882	Data do not follow a Discernible Distribution (0.05)											
2883												
2884	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2885	Order of Statistic, r				125		95% UTL with95% Coverage				0.03	
2886	Approx, f used to compute achieved CC				1.645		Approximate Actual Confidence Coefficient achieved by UTL				0.887	
2887	Approximate Sample Size needed to achieve specified CC				153		95% UPL				0.03	
2888	95% USL				0.03		95% KM Chebyshev UPL				0.0101	
2889												
2890	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2891	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2892	and consists of observations collected from clean unimpacted locations.											
2893	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2894	represents a background data set and when many onsite observations need to be compared with the BTV.											
2895												
2896	**TURBIDITY**											
2897												
2898	**General Statistics**											
2899	Total Number of Observations				110		Number of Missing Observations				22	
2900	Number of Distinct Observations				106							

2901					Number of Detects	107				Number of Non-Detects		3
2902					Number of Distinct Detects	103				Number of Distinct Non-Detects		3
2903					Minimum Detect	1.23				Minimum Non-Detect		2.5
2904					Maximum Detect	169				Maximum Non-Detect		3.6
2905					Variance Detected	1681				Percent Non-Detects		2.727%
2906					Mean Detected	38.88				SD Detected		41
2907					Mean of Detected Logged Data	2.98				SD of Detected Logged Data		1.315
2908												
2909					**Critical Values for Background Threshold Values (BTVs)**							
2910					Tolerance Factor K (For UTL)	1.909				d2max (for USL)		3.242
2911												
2912					**Normal GOF Test on Detects Only**							
2913					Shapiro Wilk Test Statistic	0.813				**Normal GOF Test on Detected Observations Only**		
2914					5% Shapiro Wilk P Value	0				Data Not Normal at 5% Significance Level		
2915					Lilliefors Test Statistic	0.188				**Lilliefors GOF Test**		
2916					5% Lilliefors Critical Value	0.0859				Data Not Normal at 5% Significance Level		
2917					Data Not Normal at 5% Significance Level							
2918												
2919					**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**							
2920					KM Mean	37.87				KM SD		40.7
2921					95% UTL95% Coverage	115.6				95% KM UPL (t)		105.7
2922					90% KM Percentile (z)	90.03				95% KM Percentile (z)		104.8
2923					99% KM Percentile (z)	132.5				95% KM USL		169.8
2924												
2925					**DL/2 Substitution Background Statistics Assuming Normal Distribution**							
2926					Mean	37.86				SD		40.89
2927					95% UTL95% Coverage	115.9				95% UPL (t)		106
2928					90% Percentile (z)	90.27				95% Percentile (z)		105.1
2929					99% Percentile (z)	133				95% USL		170.4
2930					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
2931												
2932					**Gamma GOF Tests on Detected Observations Only**							
2933					A-D Test Statistic	0.85				**Anderson-Darling GOF Test**		
2934					5% A-D Critical Value	0.79				Data Not Gamma Distributed at 5% Significance Level		
2935					K-S Test Statistic	0.0728				**Kolmogorov-Smirnov GOF**		
2936					5% K-S Critical Value	0.0907				Detected data appear Gamma Distributed at 5% Significance Level		
2937					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
2938												
2939					**Gamma Statistics on Detected Data Only**							
2940					k hat (MLE)	0.863				k star (bias corrected MLE)		0.845
2941					Theta hat (MLE)	45.04				Theta star (bias corrected MLE)		45.99
2942					nu hat (MLE)	184.7				nu star (bias corrected)		180.9
2943					MLE Mean (bias corrected)	38.88						
2944					MLE Sd (bias corrected)	42.29				95% Percentile of Chisquare (2kstar)		5.377
2945												
2946					**Gamma ROS Statistics using Imputed Non-Detects**							
2947					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
2948					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)							
2949					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
2950					This is especially true when the sample size is small.							

	A	B	C	D	E	F	G	H	I	J	K	L
2951	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2952					Minimum	0.01				Mean		37.82
2953					Maximum	169				Median		22
2954					SD	40.93				CV		1.082
2955					k hat (MLE)	0.741				k star (bias corrected MLE)		0.727
2956					Theta hat (MLE)	51.03				Theta star (bias corrected MLE)		52.02
2957					nu hat (MLE)	163.1				nu star (bias corrected)		160
2958					MLE Mean (bias corrected)	37.82				MLE Sd (bias corrected)		44.36
2959					95% Percentile of Chisquare (2kstar)	4.882				90% Percentile		94.1
2960					95% Percentile	127				99% Percentile		205.3
2961	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2962	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2963					WH	HW					WH	HW
2964				95% Approx. Gamma UTL with 95% Coverage	146.7	162.5				95% Approx. Gamma UPL	122.8	132.5
2965				95% Gamma USL	334.6	427.4						
2966												
2967	**Estimates of Gamma Parameters using KM Estimates**											
2968					Mean (KM)	37.87				SD (KM)		40.7
2969					Variance (KM)	1656				SE of Mean (KM)		3.899
2970					k hat (KM)	0.866				k star (KM)		0.848
2971					nu hat (KM)	190.5				nu star (KM)		186.6
2972					theta hat (KM)	43.74				theta star (KM)		44.64
2973					80% gamma percentile (KM)	61.68				90% gamma percentile (KM)		90.78
2974					95% gamma percentile (KM)	120.3				99% gamma percentile (KM)		189.7
2975												
2976	**The following statistics are computed using gamma distribution and KM estimates**											
2977	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2978					WH	HW					WH	HW
2979				95% Approx. Gamma UTL with 95% Coverage	142	153.5				95% Approx. Gamma UPL	119.4	126.1
2980				95% KM Gamma Percentile	117.5	123.8				95% Gamma USL	318.8	392.1
2981												
2982	**Lognormal GOF Test on Detected Observations Only**											
2983					Shapiro Wilk Approximate Test Statistic	0.942				**Shapiro Wilk GOF Test**		
2984					5% Shapiro Wilk P Value	1.9898E-4				Data Not Lognormal at 5% Significance Level		
2985					Lilliefors Test Statistic	0.0698				**Lilliefors GOF Test**		
2986					5% Lilliefors Critical Value	0.0859				Detected Data appear Lognormal at 5% Significance Level		
2987	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2988												
2989	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2990					Mean in Original Scale	37.88				Mean in Log Scale		2.921
2991					SD in Original Scale	40.87				SD in Log Scale		1.344
2992					95% UTL95% Coverage	241.4				95% BCA UTL95% Coverage		141.3
2993					95% Bootstrap (%) UTL95% Coverage	141.3				95% UPL (t)		174.2
2994					90% Percentile (z)	103.9				95% Percentile (z)		169.2
2995					99% Percentile (z)	422.9				95% USL		1447
2996												
2997	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2998					KM Mean of Logged Data	2.914				95% KM UTL (Lognormal)95% Coverage		242.6
2999					KM SD of Logged Data	1.35				95% KM UPL (Lognormal)		174.8
3000					95% KM Percentile Lognormal (z)	169.8				95% KM USL (Lognormal)		1467

3001												
3002	**Background DL/2 Statistics Assuming Lognormal Distribution**											
3003					Mean in Original Scale	37.86				Mean in Log Scale	2.909	
3004					SD in Original Scale	40.89				SD in Log Scale	1.365	
3005					95% UTL95% Coverage	248.1				95% UPL (t)	178.2	
3006					90% Percentile (z)	105.4				95% Percentile (z)	173	
3007					99% Percentile (z)	438.5				95% USL	1529	
3008	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
3009												
3010	**Nonparametric Distribution Free Background Statistics**											
3011	Data appear to follow a Discernible Distribution at 5% Significance Level											
3012												
3013	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
3014					Order of Statistic, r	108				95% UTL with95% Coverage	144	
3015					Approx, f used to compute achieved CC	1.895				Approximate Actual Confidence Coefficient achieved by UTL	0.917	
3016					Approximate Sample Size needed to achieve specified CC	124				95% UPL	126.8	
3017					95% USL	169				95% KM Chebyshev UPL	216.1	
3018												
3019	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
3020	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
3021	and consists of observations collected from clean unimpacted locations.											
3022	The use of USL tends to provide a balance between false positives and false negatives provided the data											
3023	represents a background data set and when many onsite observations need to be compared with the BTV.											
3024												
3025	**BENZENE**											
3026												
3027	**General Statistics**											
3028					Total Number of Observations	132				Number of Missing Observations	0	
3029					Number of Distinct Observations	1						
3030					Number of Detects	0				Number of Non-Detects	132	
3031					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
3032					Minimum Detect	N/A				Minimum Non-Detect	1	
3033					Maximum Detect	N/A				Maximum Non-Detect	1	
3034					Variance Detected	N/A				Percent Non-Detects	100%	
3035					Mean Detected	N/A				SD Detected	N/A	
3036					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
3037												
3038	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3039	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3040	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3041												
3042	The data set for variable BENZENE was not processed!											
3043												
3044												
3045	**1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)**											
3046												
3047	**General Statistics**											
3048					Total Number of Observations	128				Number of Missing Observations	4	
3049					Number of Distinct Observations	1						
3050					Number of Detects	0				Number of Non-Detects	128	

3051	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3052	Minimum Detect					N/A	Minimum Non-Detect					1
3053	Maximum Detect					N/A	Maximum Non-Detect					1
3054	Variance Detected					N/A	Percent Non-Detects					100%
3055	Mean Detected					N/A	SD Detected					N/A
3056	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3057												
3058	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3059	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3060	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3061												
3062	The data set for variable 1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE) was not processed!											
3063												
3064												
3065	**1,1-DICHLOROETHANE**											
3066												
3067	**General Statistics**											
3068	Total Number of Observations					132	Number of Missing Observations					0
3069	Number of Distinct Observations					1						
3070	Number of Detects					0	Number of Non-Detects					132
3071	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3072	Minimum Detect					N/A	Minimum Non-Detect					1
3073	Maximum Detect					N/A	Maximum Non-Detect					1
3074	Variance Detected					N/A	Percent Non-Detects					100%
3075	Mean Detected					N/A	SD Detected					N/A
3076	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3077												
3078	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3079	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3080	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3081												
3082	The data set for variable 1,1-DICHLOROETHANE was not processed!											
3083												
3084												
3085	**1,1-DICHLOROETHENE**											
3086												
3087	**General Statistics**											
3088	Total Number of Observations					132	Number of Missing Observations					0
3089	Number of Distinct Observations					1						
3090	Number of Detects					0	Number of Non-Detects					132
3091	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3092	Minimum Detect					N/A	Minimum Non-Detect					1
3093	Maximum Detect					N/A	Maximum Non-Detect					1
3094	Variance Detected					N/A	Percent Non-Detects					100%
3095	Mean Detected					N/A	SD Detected					N/A
3096	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3097												
3098	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3099	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3100	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											

3101												
3102	The data set for variable 1,1-DICHLOROETHENE was not processed!											
3103												
3104												
3105	1,2-DICHLOROETHANE											
3106												
3107	General Statistics											
3108						Total Number of Observations	132			Number of Missing Observations	0	
3109						Number of Distinct Observations	2					
3110						Number of Detects	0			Number of Non-Detects	132	
3111						Number of Distinct Detects	0			Number of Distinct Non-Detects	2	
3112						Minimum Detect	N/A			Minimum Non-Detect	1	
3113						Maximum Detect	N/A			Maximum Non-Detect	2	
3114						Variance Detected	N/A			Percent Non-Detects	100%	
3115						Mean Detected	N/A			SD Detected	N/A	
3116						Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A	
3117												
3118	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3119	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3120	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3121												
3122	The data set for variable 1,2-DICHLOROETHANE was not processed!											
3123												
3124												
3125	cis 1,2-DICHLOROETHENE											
3126												
3127	General Statistics											
3128						Total Number of Observations	129			Number of Missing Observations	3	
3129						Number of Distinct Observations	2					
3130						Number of Detects	0			Number of Non-Detects	129	
3131						Number of Distinct Detects	0			Number of Distinct Non-Detects	2	
3132						Minimum Detect	N/A			Minimum Non-Detect	1	
3133						Maximum Detect	N/A			Maximum Non-Detect	2	
3134						Variance Detected	N/A			Percent Non-Detects	100%	
3135						Mean Detected	N/A			SD Detected	N/A	
3136						Mean of Detected Logged Data	N/A			SD of Detected Logged Data	N/A	
3137												
3138	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3139	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3140	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3141												
3142	The data set for variable cis 1,2-DICHLOROETHENE was not processed!											
3143												
3144												
3145	trans 1,2-DICHLOROETHENE											
3146												
3147	General Statistics											
3148						Total Number of Observations	132			Number of Missing Observations	0	
3149						Number of Distinct Observations	1					
3150						Number of Detects	0			Number of Non-Detects	132	

3151					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
3152					Minimum Detect	N/A					Minimum Non-Detect	1
3153					Maximum Detect	N/A					Maximum Non-Detect	1
3154					Variance Detected	N/A					Percent Non-Detects	100%
3155					Mean Detected	N/A					SD Detected	N/A
3156					Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A
3157												
3158	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3159	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3160	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3161												
3162	The data set for variable trans 1,2-DICHLOROETHENE was not processed!											
3163												
3164												
3165	**ETHYLBENZENE**											
3166												
3167	**General Statistics**											
3168					Total Number of Observations	132					Number of Missing Observations	0
3169					Number of Distinct Observations	1						
3170					Number of Detects	0					Number of Non-Detects	132
3171					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
3172					Minimum Detect	N/A					Minimum Non-Detect	1
3173					Maximum Detect	N/A					Maximum Non-Detect	1
3174					Variance Detected	N/A					Percent Non-Detects	100%
3175					Mean Detected	N/A					SD Detected	N/A
3176					Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A
3177												
3178	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3179	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3180	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3181												
3182	The data set for variable ETHYLBENZENE was not processed!											
3183												
3184												
3185	**METHYLENE CHLORIDE**											
3186												
3187	**General Statistics**											
3188					Total Number of Observations	132					Number of Missing Observations	0
3189					Number of Distinct Observations	2						
3190					Number of Detects	0					Number of Non-Detects	132
3191					Number of Distinct Detects	0					Number of Distinct Non-Detects	2
3192					Minimum Detect	N/A					Minimum Non-Detect	1
3193					Maximum Detect	N/A					Maximum Non-Detect	2
3194					Variance Detected	N/A					Percent Non-Detects	100%
3195					Mean Detected	N/A					SD Detected	N/A
3196					Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A
3197												
3198	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3199	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3200	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											

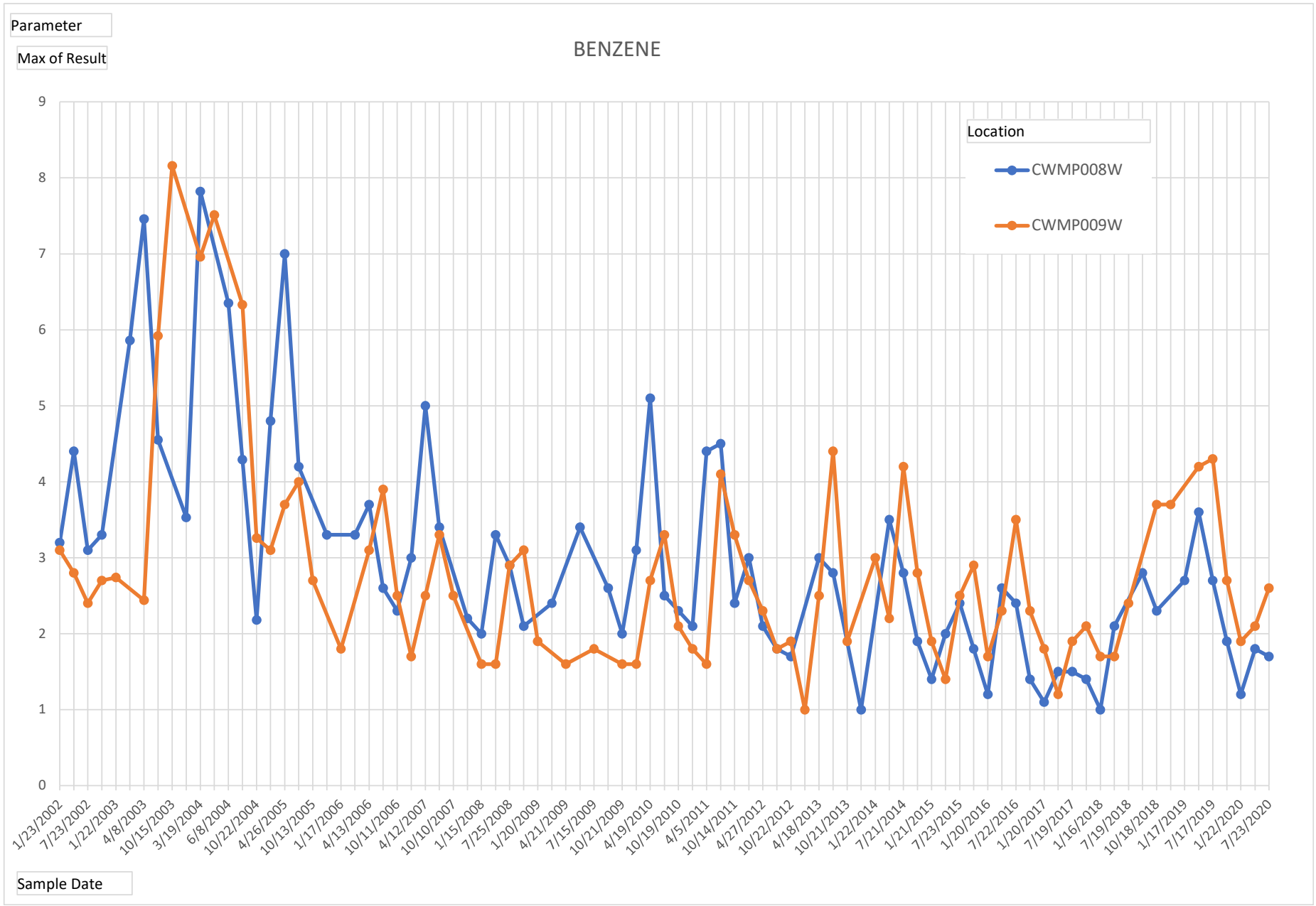
	A	B	C	D	E	F	G	H	I	J	K	L
3201												
3202	The data set for variable METHYLENE CHLORIDE was not processed!											
3203												
3204												
3205	**TETRACHLOROETHENE**											
3206												
3207	**General Statistics**											
3208	Total Number of Observations					132	Number of Missing Observations					0
3209	Number of Distinct Observations					1						
3210	Number of Detects					0	Number of Non-Detects					132
3211	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3212	Minimum Detect					N/A	Minimum Non-Detect					1
3213	Maximum Detect					N/A	Maximum Non-Detect					1
3214	Variance Detected					N/A	Percent Non-Detects					100%
3215	Mean Detected					N/A	SD Detected					N/A
3216	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3217												
3218	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3219	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3220	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3221												
3222	The data set for variable TETRACHLOROETHENE was not processed!											
3223												
3224												
3225	**TOLUENE**											
3226												
3227	**General Statistics**											
3228	Total Number of Observations					130	Number of Missing Observations					2
3229	Number of Distinct Observations					1						
3230	Number of Detects					0	Number of Non-Detects					130
3231	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3232	Minimum Detect					N/A	Minimum Non-Detect					1
3233	Maximum Detect					N/A	Maximum Non-Detect					1
3234	Variance Detected					N/A	Percent Non-Detects					100%
3235	Mean Detected					N/A	SD Detected					N/A
3236	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3237												
3238	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3239	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3240	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3241												
3242	The data set for variable TOLUENE was not processed!											
3243												
3244												
3245	**1,1,1-TRICHLOROETHANE**											
3246												
3247	**General Statistics**											
3248	Total Number of Observations					132	Number of Missing Observations					0
3249	Number of Distinct Observations					1						
3250	Number of Detects					0	Number of Non-Detects					132

3251					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
3252					Minimum Detect	N/A				Minimum Non-Detect	1	
3253					Maximum Detect	N/A				Maximum Non-Detect	1	
3254					Variance Detected	N/A				Percent Non-Detects	100%	
3255					Mean Detected	N/A				SD Detected	N/A	
3256					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
3257												
3258	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3259	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3260	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3261												
3262	The data set for variable 1,1,1-TRICHLOROETHANE was not processed!											
3263												
3264												
3265	**TRICHLOROETHENE**											
3266												
3267	**General Statistics**											
3268					Total Number of Observations	132				Number of Missing Observations	0	
3269					Number of Distinct Observations	1						
3270					Number of Detects	0				Number of Non-Detects	132	
3271					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
3272					Minimum Detect	N/A				Minimum Non-Detect	1	
3273					Maximum Detect	N/A				Maximum Non-Detect	1	
3274					Variance Detected	N/A				Percent Non-Detects	100%	
3275					Mean Detected	N/A				SD Detected	N/A	
3276					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
3277												
3278	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3279	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3280	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3281												
3282	The data set for variable TRICHLOROETHENE was not processed!											
3283												
3284												
3285	**VINYL CHLORIDE**											
3286												
3287	**General Statistics**											
3288					Total Number of Observations	127				Number of Missing Observations	5	
3289					Number of Distinct Observations	1						
3290					Number of Detects	0				Number of Non-Detects	127	
3291					Number of Distinct Detects	0				Number of Distinct Non-Detects	1	
3292					Minimum Detect	N/A				Minimum Non-Detect	1	
3293					Maximum Detect	N/A				Maximum Non-Detect	1	
3294					Variance Detected	N/A				Percent Non-Detects	100%	
3295					Mean Detected	N/A				SD Detected	N/A	
3296					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
3297												
3298	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3299	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3300	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											

	A	B	C	D	E	F	G	H	I	J	K	L
3301												
3302	The data set for variable VINYL CHLORIDE was not processed!											
3303												
3304												
3305	XYLENES (TOTAL)											
3306												
3307	General Statistics											
3308	Total Number of Observations					129	Number of Missing Observations					3
3309	Number of Distinct Observations					4						
3310	Number of Detects					0	Number of Non-Detects					129
3311	Number of Distinct Detects					0	Number of Distinct Non-Detects					4
3312	Minimum Detect					N/A	Minimum Non-Detect					1
3313	Maximum Detect					N/A	Maximum Non-Detect					5
3314	Variance Detected					N/A	Percent Non-Detects					100%
3315	Mean Detected					N/A	SD Detected					N/A
3316	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3317												
3318	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3319	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3320	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3321												
3322	The data set for variable XYLENES (TOTAL) was not processed!											
3323												

ATTACHMENT 3

VOC TREND PLOTS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CWMP009W
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8
7
6
5
4
3
2
1
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7/23/2002
1/22/2003
4/8/2003
10/15/2003
3/19/2004
6/8/2004
10/22/2004
4/26/2005
10/13/2005
1/17/2006
4/13/2006
10/11/2006
4/12/2007
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1/15/2008
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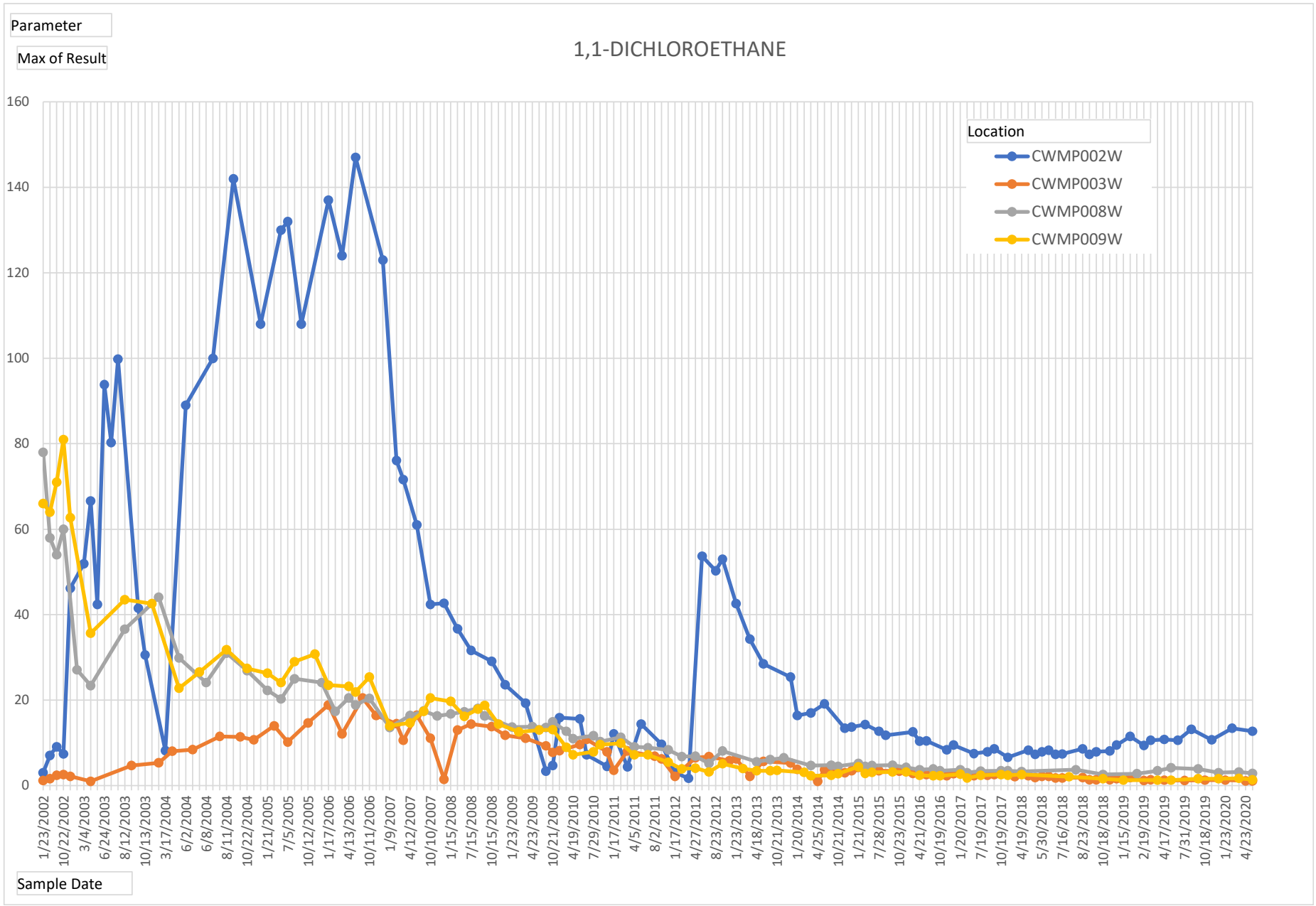
1/17/2019
7/17/2019
1/22/2020
7/23/2020
Sample Date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140
120
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Location
CWMP002W
CWMP003W
CWMP008W
CWMP009W
1/23/2002
10/22/2002
3/4/2003
6/24/2003
8/12/2003
10/13/2003
3/17/2004
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6/8/2004
8/11/2004
10/22/2004
1/21/2005
7/5/2005
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4/19/2010
7/29/2010
1/17/2011
4/5/2011
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7/16/2018
8/23/2018
10/18/2018
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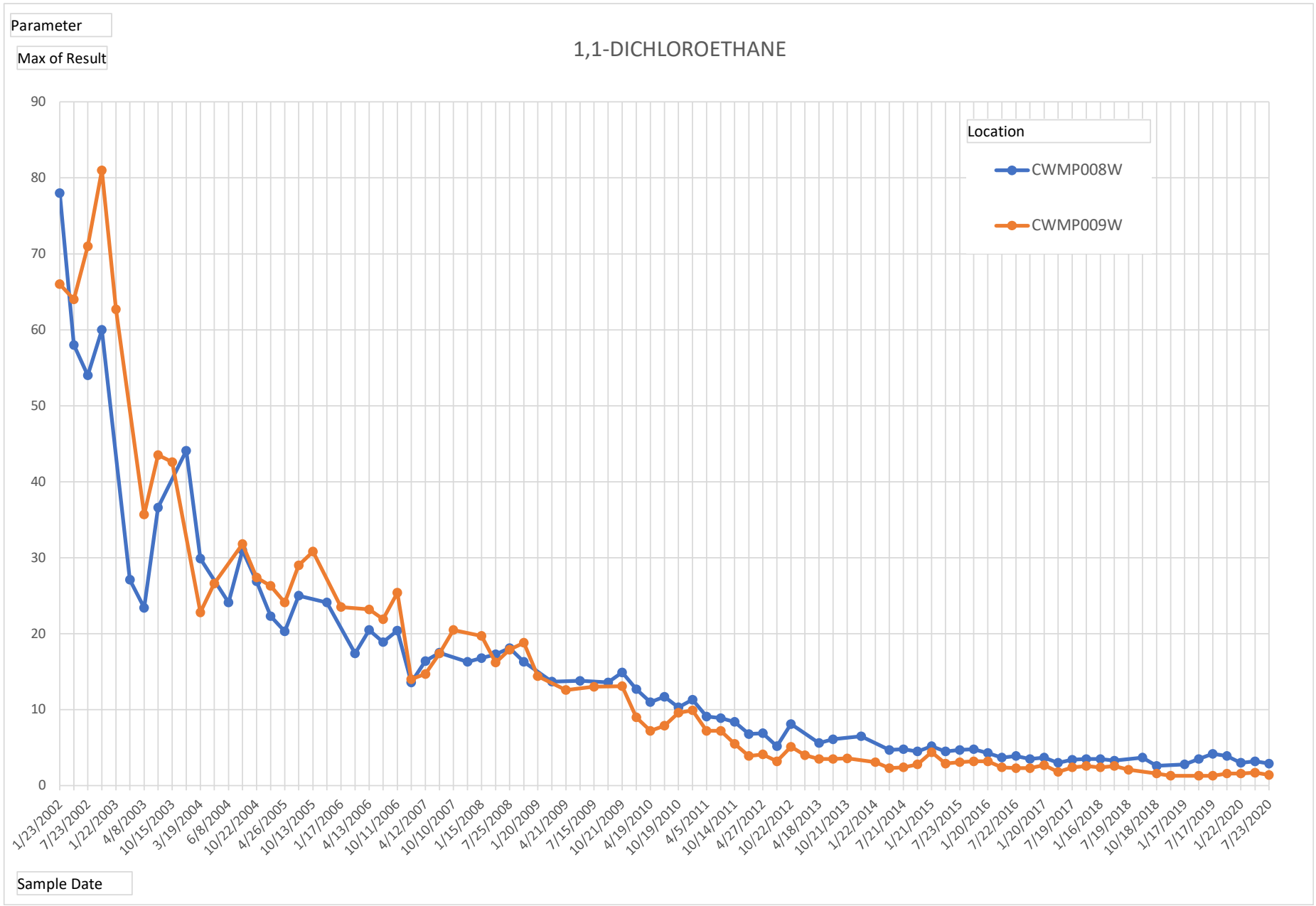
2/19/2019
4/17/2019
7/31/2019
10/18/2019
1/23/2020
4/23/2020
Sample Date


Parameter
Max of Result
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CWMP008W
CWMP009W
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80
70
60
50
40
30
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7/22/2016
1/20/2017
7/19/2017
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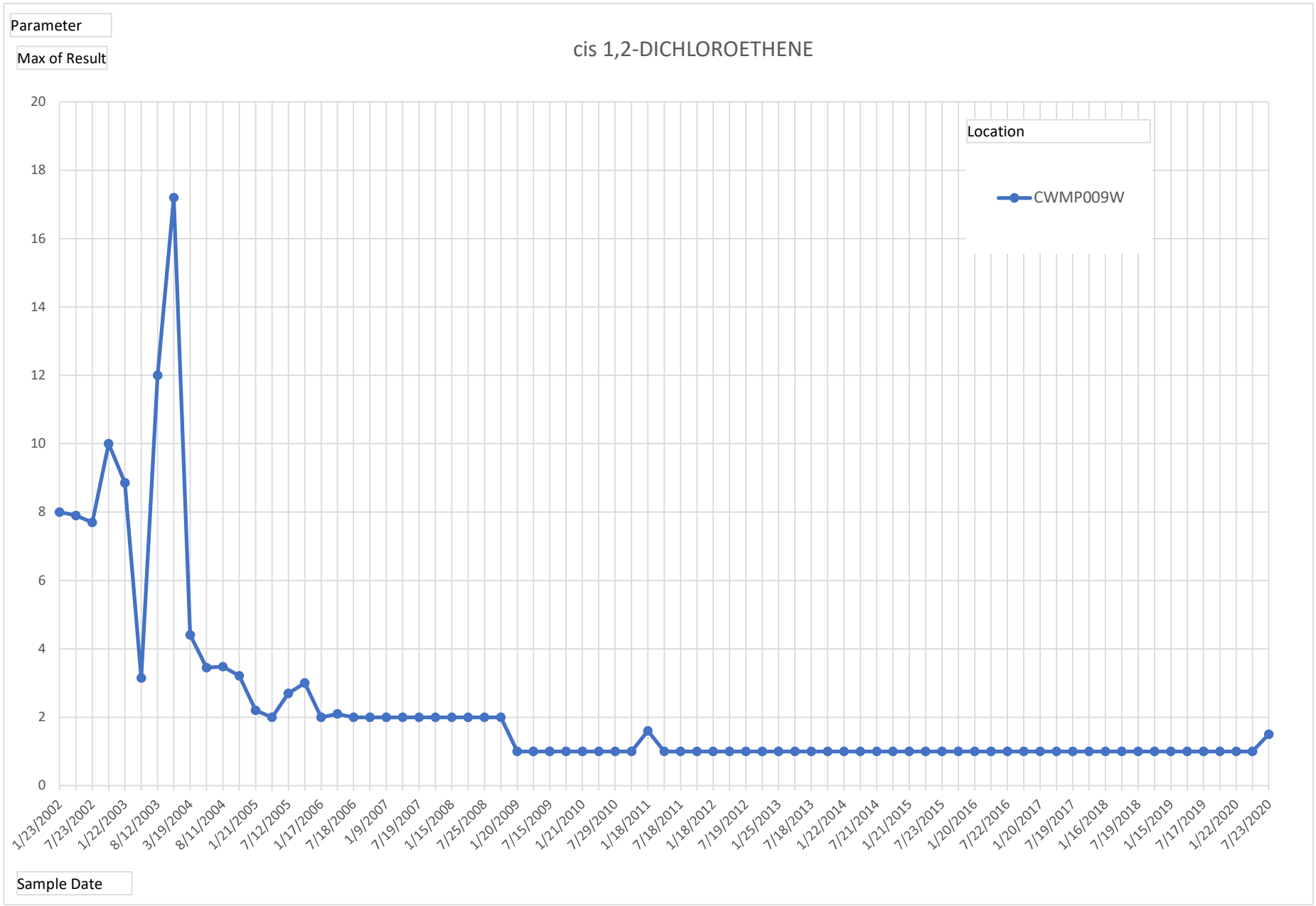
7/19/2018
10/18/2018
1/17/2019
7/17/2019
1/22/2020
7/23/2020
Sample Date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Max of Result
cis 1,2-DICHLOROETHENE
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CWMP009W
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18
16
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12
10
8
6
4
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1/21/2005
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7/23/2015
1/20/2016
7/22/2016
1/20/2017
7/19/2017
1/16/2018
7/19/2018
1/15/2019
7/17/2019
1/22/2020
7/23/2020
Sample Date

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/13/2020
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 (Do 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 o 57 ' 24.53 " — Longitude: 76 o 26 ' 33.28 "

Depth to Water Level: 7.48 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.50 ft — Elevation of Water Level: 445.92 ft./MSL

Sampling Depth: 33 ft — Volume of Water Column: 42.62 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 5.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/20/2020 — Sample Collection Time: 10:42

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): 3115533001 — Final Lab Analysis CompletionDate: 7/24/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	7/20/2020

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

ANALYTES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	15	SM18-2321
CALCIUM, TOTAL	17.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	60.5	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	8.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.7	EPA 300.0
pH-FIELD (SU)	5.02	FIELD
pH-LAB (SU)	6.65	EPA 150.1
POTASSIUM, TOTAL	2.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	33	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	383	FIELD
SPEC. COND., LAB (umhos/cm)	354	EPA 120.1
SULFATE	20.6	EPA 300.0
ALKALINITY	15	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	180	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.52	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	7/20/2020

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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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/13/2020
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 (Do 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 o 57 ' 27.43 " — Longitude: 76 o 26 ' 14.4 "

Depth to Water Level: 27.76 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.23 ft — Elevation of Water Level: 487.37 ft./MSL

Sampling Depth: 57 ft — Volume of Water Column: 56.60 gal

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

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/20/2020 — Sample Collection Time: 11:55

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): 3115533002 — Final Lab Analysis CompletionDate: 7/24/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	7/20/2020

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	7	SM18-2321
CALCIUM, TOTAL	15.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	28	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	720	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	9.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	55	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	19.4	EPA 300.0
pH-FIELD (SU)	4.42	FIELD
pH-LAB (SU)	6.53	EPA 150.1
POTASSIUM, TOTAL	3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13.6	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	288	FIELD
SPEC. COND., LAB (umhos/cm)	265	EPA 120.1
SULFATE	2.3	EPA 300.0
ALKALINITY	7	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	110	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	16.9	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	7/20/2020

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: CWMP005W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

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

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

Depth to Water Level: 41.09 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -0.37 ft — Elevation of Water Level: 472.34 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 145.26 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.5

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/20/2020 — Sample Collection Time: 13:30

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): 3115533003 — Final Lab Analysis CompletionDate: 7/24/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	7/20/2020

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	17	SM18-2321
CALCIUM, TOTAL	14.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	63.2	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	7.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	45	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.3	EPA 300.0
pH-FIELD (SU)	4.75	FIELD
pH-LAB (SU)	6.9	EPA 150.1
POTASSIUM, TOTAL	2.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	32.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	354	FIELD
SPEC. COND., LAB (umhos/cm)	325	EPA 120.1
SULFATE	4.5	EPA 300.0
ALKALINITY	17	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	156	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.64	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.21	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.	CWMP005W
Sample Date	7/20/2020

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
08/13/2020
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: 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): 7/22/2020 — Sample Collection Time: 9:23

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3116253001 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	7/22/2020

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	478	SM18-2321
CALCIUM, TOTAL	62.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	472	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	160	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	90.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	25	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	18	EPA 300.0
pH-FIELD (SU)	8.39	FIELD
pH-LAB (SU)	8.64	EPA 150.1
POTASSIUM, TOTAL	21.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	288	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2442	FIELD
SPEC. COND., LAB (umhos/cm)	2260	EPA 120.1
SULFATE	59.3	EPA 300.0
ALKALINITY	505	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1360	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	8.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.69	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	7/22/2020

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
08/13/2020
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

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

___ Upgradient/Upstream X Downgradient/Downstream

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

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

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

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

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

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

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

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

Spring Flow Rate: _ gpm

Sample Date (mm/dd/yy): 7/22/2020 — Sample Collection Time: 9:48

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3116253002 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	7/22/2020

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	636	SM18-2321
CALCIUM, TOTAL	58.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	683	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	180	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	138	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	120	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	25.5	EPA 300.0
pH-FIELD (SU)	8.11	FIELD
pH-LAB (SU)	8.49	EPA 150.1
POTASSIUM, TOTAL	23.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	432	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3609	FIELD
SPEC. COND., LAB (umhos/cm)	3240	EPA 120.1
SULFATE	78.2	EPA 300.0
ALKALINITY	651	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1960	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5.1	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.03	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	7/22/2020

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
08/13/2020
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

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

___ Upgradient/Upstream X Downgradient/Downstream

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

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

Depth to Water Level: 11.69 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.53 ft — Elevation of Water Level: 300.28 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: 3.2

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/22/2020 — Sample Collection Time: 13:02

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3116253003 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	7/22/2020

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	50 ND	SM18-2321
CALCIUM, TOTAL	5.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	3	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	1.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	25	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.9	EPA 300.0
pH-FIELD (SU)	5.33	FIELD
pH-LAB (SU)	6.69	EPA 150.1
POTASSIUM, TOTAL	0.85	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	3.1	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	63	FIELD
SPEC. COND., LAB (umhos/cm)	59	EPA 120.1
SULFATE	11	EPA 300.0
ALKALINITY	50 ND	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	80	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	3.61	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	7/22/2020

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
08/13/2020
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 (Do 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 o 57 ' 2.38 " — Longitude: 76 o 26 ' 57.92 "

Depth to Water Level: 8.62 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.10 ft — Elevation of Water Level: 352.28 ft./MSL

Sampling Depth: 17 ft — Volume of Water Column: 7.17 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/23/2020 — Sample Collection Time: 9:54

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): 3116595001 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	7/23/2020

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	253	SM18-2321
CALCIUM, TOTAL	63.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	401	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	220	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	56.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	120	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	11.2	EPA 300.0
pH-FIELD (SU)	6.41	FIELD
pH-LAB (SU)	8.81	EPA 150.1
POTASSIUM, TOTAL	12	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	229	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2004	FIELD
SPEC. COND., LAB (umhos/cm)	1830	EPA 120.1
SULFATE	42.3	EPA 300.0
ALKALINITY	291	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	996	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.44	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	7/23/2020

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
08/13/2020
DEP USE ONLY
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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: 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: 9.22 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.70 ft — Elevation of Water Level: 394.98 ft./MSL

Sampling Depth: 16 ft — Volume of Water Column: 6.84 gal

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

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/23/2020 — 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): 3116595002 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	7/23/2020

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	27.4	EPA 350.3
BICARBONATE	396	SM18-2321
CALCIUM, TOTAL	161	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	97	EPA 410.4
CHLORIDE	559	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	35000	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	75.7	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	12300	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.01	FIELD
pH-LAB (SU)	8.28	EPA 150.1
POTASSIUM, TOTAL	34.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	166	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2736	FIELD
SPEC. COND., LAB (umhos/cm)	2380	EPA 120.1
SULFATE	5.5	EPA 300.0
ALKALINITY	396	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1290	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	35.7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	74.1	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	7/23/2020

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	2.6	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.4	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1.5	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
08/13/2020
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 (Do 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 o 57 ' 16.97 " — Longitude: 76 o 26 ' 47.58 "

Depth to Water Level: 3.78 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.80 ft — Elevation of Water Level: 418.52 ft./MSL

Sampling Depth: 19 ft — Volume of Water Column: 3.10 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 5.4

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 7/23/2020 — Sample Collection Time: 11:01

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): 3116595003 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	7/23/2020

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	7.63	EPA 350.3
BICARBONATE	331	SM18-2321
CALCIUM, TOTAL	75.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	52.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	28300	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	34.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	16800	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	5.97	FIELD
pH-LAB (SU)	8.64	EPA 150.1
POTASSIUM, TOTAL	10.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	48.6	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1042	FIELD
SPEC. COND., LAB (umhos/cm)	896	EPA 120.1
SULFATE	5.2	EPA 300.0
ALKALINITY	366	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	490	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	12.5	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	55	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	7/23/2020

FORM 19

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1.7	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	2.9	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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
08/13/2020
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

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

___ Upgradient/Upstream X Downgradient/Downstream

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

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

Depth to Water Level: 64.48 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.90 ft — Elevation of Water Level: 318.22 ft./MSL

Sampling Depth: 0 ft — Volume of Water Column: 54.96 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): 7/23/2020 — Sample Collection Time: 11:55

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): 3116595004 — Final Lab Analysis CompletionDate: 8/4/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	7/23/2020

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	64	SM18-2321
CALCIUM, TOTAL	32.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	35.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	7500	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8.9	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	150	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.9	EPA 300.0
pH-FIELD (SU)	5.93	FIELD
pH-LAB (SU)	8.24	EPA 150.1
POTASSIUM, TOTAL	1.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	209	FIELD
SPEC. COND., LAB (umhos/cm)	314	EPA 120.1
SULFATE	4.4	EPA 300.0
ALKALINITY	64	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	186	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	1.7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	231	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	7/23/2020

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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DEP USE ONLY
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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 (Do 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 o 57 ' 19.97 " — Longitude: 76 o 26 ' 12.3 "

Depth to Water Level: 92.11 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.19 ft — Elevation of Water Level: 433.70 ft./MSL

Sampling Depth: 85 ft — Volume of Water Column: 11.59 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): 7/23/2020 — Sample Collection Time: 12:32

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): 3116595005 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	7/23/2020

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	82	SM18-2321
CALCIUM, TOTAL	54.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	115	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	17.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	1100	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	4.2	EPA 300.0
pH-FIELD (SU)	5.08	FIELD
pH-LAB (SU)	8.37	EPA 150.1
POTASSIUM, TOTAL	3.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	29	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	631	FIELD
SPEC. COND., LAB (umhos/cm)	586	EPA 120.1
SULFATE	22	EPA 300.0
ALKALINITY	84	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	318	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5.3	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.14	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.
T Please indicate detection limit if analyte is not detected.
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I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	7/23/2020

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	12.7	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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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: 103.25 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.29 ft — Elevation of Water Level: 420.96 ft./MSL

Sampling Depth: 100 ft — Volume of Water Column: -41.49 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): 7/23/2020 — Sample Collection Time: 12:54

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): 3116595006 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	7/23/2020

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	18	SM18-2321
CALCIUM, TOTAL	24.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	68.5	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	8.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.5	EPA 300.0
pH-FIELD (SU)	4.92	FIELD
pH-LAB (SU)	7.65	EPA 150.1
POTASSIUM, TOTAL	1.8	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	21.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	360	FIELD
SPEC. COND., LAB (umhos/cm)	332	EPA 120.1
SULFATE	5.6	EPA 300.0
ALKALINITY	18	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	146	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.67	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	7/23/2020

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	1.1	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
08/13/2020
DEP USE ONLY
Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facitlity ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

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

___ Upgradient/Upstream X Downgradient/Downstream

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

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

Depth to Water Level: 104.81 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: -1.37 ft — Elevation of Water Level: 424.72 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 51.68 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): 7/23/2020 — Sample Collection Time: 13:02

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3116595007 — Final Lab Analysis CompletionDate: 7/31/2020

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

Comments:

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	7/23/2020

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	23	SM18-2321
CALCIUM, TOTAL	19.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	45.8	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	6.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	9	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	6.2	EPA 300.0
pH-FIELD (SU)	5.18	FIELD
pH-LAB (SU)	7.77	EPA 150.1
POTASSIUM, TOTAL	1.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	15.5	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	277	FIELD
SPEC. COND., LAB (umhos/cm)	255	EPA 120.1
SULFATE	5.5	EPA 300.0
ALKALINITY	23	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	158	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.57	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	SM 2130B

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

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	7/23/2020

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.

ALS Environmental

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

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

July 28, 2020

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:	**3115533**
Purchase Order:	**PO1000127**	Workorder ID:	**3rd QTR 2020 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, July 20, 2020.

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.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

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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SAMPLE SUMMARY

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3115533001	CWMP007W	Ground Water	7/20/2020 10:42	7/20/2020 15:49	Mr. Brian G Shade
3115533002	CWMP001W	Ground Water	7/20/2020 11:55	7/20/2020 15:49	Mr. Brian G Shade
3115533003	CWMP005W	Ground Water	7/20/2020 13:30	7/20/2020 15:49	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533001** Date Collected: 7/20/2020 10:42 Matrix: Ground Water
Sample ID: **CWMP007W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/22/20 21:09	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:09	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	104		%	62 - 133	SW846 8260B			7/22/20 21:09	DPC	G
4-Bromofluorobenzene (S)	105		%	79 - 114	SW846 8260B			7/22/20 21:09	DPC	G
Dibromofluoromethane (S)	107		%	78 - 116	SW846 8260B			7/22/20 21:09	DPC	G
Toluene-d8 (S)	96.2		%	76 - 127	SW846 8260B			7/22/20 21:09	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	15		mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	B
Alkalinity, Total	15	2	mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/23/20 13:44	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/22/20 21:10	JAM	A
Chloride	60.5		mg/L	2.0	EPA 300.0			7/21/20 06:49	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/21/20 06:49	MBW	B
Nitrate-N	9.7		mg/L	0.20	EPA 300.0			7/21/20 06:49	MBW	B
pH	6.65	1	pH_Units		S4500HB-11			7/23/20 02:10	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/21/20 12:00	VXF	7/22/20 06:39	VXF	F
Specific Conductance	354		umhos/cm	1	SW846 9050A			7/23/20 02:10	R2B	B
Sulfate	20.6		mg/L	2.0	EPA 300.0			7/21/20 06:49	MBW	B
Total Dissolved Solids	180		mg/L	5	S2540C-11			7/21/20 11:05	KXH	B
Total Organic Carbon (TOC)	0.52		mg/L	0.50	SW846 9060A			7/22/20 05:42	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			7/22/20 07:59	R2B	B

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533001** Date Collected: 7/20/2020 10:42 Matrix: Ground Water
Sample ID: **CWMP007W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	17.5		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
Magnesium, Total	8.6		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
Potassium, Total	2.7		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
Sodium, Total	33.0		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:51	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	7.48		Feet		Field			7/20/20 10:42	BGS	C
Elev Top MW Casing above MSL	453.40		Feet		Field			7/20/20 10:42	BGS	C
Flow Rate	3.21		gal/min		Field			7/20/20 10:42	BGS	C
Ground Water Elevation	445.92		ft/MSL		Field			7/20/20 10:42	BGS	C
pH, Field (SM4500B)	5.02		pH_Units		Field			7/20/20 10:42	BGS	C
Sample Depth	33.00		Feet		Field			7/20/20 10:42	BGS	C
Specific Conductance, Field	383		umhos/cm	1	Field			7/20/20 10:42	BGS	C
Temperature	9.66		Deg. C		Field			7/20/20 10:42	BGS	C
Total Well Depth	36.50		Feet		Field			7/20/20 10:42	BGS	C
Volume in Water Column	42.66		Gallons		Field			7/20/20 10:42	BGS	C
Water Level After Purge	7.91		Feet		Field			7/20/20 10:42	BGS	C
Well Volumes Purged	5.26		Vol		Field			7/20/20 10:42	BGS	C

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533002** Date Collected: 7/20/2020 11:55 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/22/20 21:31	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:31	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	106		%	62 - 133	SW846 8260B			7/22/20 21:31	DPC	G
4-Bromofluorobenzene (S)	105		%	79 - 114	SW846 8260B			7/22/20 21:31	DPC	G
Dibromofluoromethane (S)	109		%	78 - 116	SW846 8260B			7/22/20 21:31	DPC	G
Toluene-d8 (S)	95.8		%	76 - 127	SW846 8260B			7/22/20 21:31	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	7		mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	B
Alkalinity, Total	7	2	mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/23/20 13:30	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/22/20 21:10	JAM	A
Chloride	28.0		mg/L	2.0	EPA 300.0			7/21/20 07:05	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/21/20 07:05	MBW	B
Nitrate-N	19.4		mg/L	0.20	EPA 300.0			7/21/20 07:05	MBW	B
pH	6.53	1	pH_Units		S4500HB-11			7/23/20 02:10	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/21/20 12:00	VXF	7/22/20 06:39	VXF	F
Specific Conductance	265		umhos/cm	1	SW846 9050A			7/23/20 02:10	R2B	B
Sulfate	2.3		mg/L	2.0	EPA 300.0			7/21/20 07:05	MBW	B
Total Dissolved Solids	110		mg/L	5	S2540C-11			7/21/20 11:05	KXH	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			7/22/20 05:42	PAG	D
Turbidity	16.9		NTU	0.10	SM2130B-2011			7/22/20 07:59	R2B	B

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533002** Date Collected: 7/20/2020 11:55 Matrix: Ground Water

Sample ID: **CWMP001W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	15.2		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
Iron, Total	0.72		mg/L	0.067	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
Magnesium, Total	9.8		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
Manganese, Total	0.055		mg/L	0.0056	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
Potassium, Total	3.0		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
Sodium, Total	13.6		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:02	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	27.76		Feet		Field			7/20/20 11:55	BGS	C
Elev Top MW Casing above MSL	515.13		Feet		Field			7/20/20 11:55	BGS	C
Flow Rate	1.89		gal/min		Field			7/20/20 11:55	BGS	C
Ground Water Elevation	487.37		ft/MSL		Field			7/20/20 11:55	BGS	C
pH, Field (SM4500B)	4.42		pH_Units		Field			7/20/20 11:55	BGS	C
Sample Depth	57.00		Feet		Field			7/20/20 11:55	BGS	C
Specific Conductance, Field	288		umhos/cm	1	Field			7/20/20 11:55	BGS	C
Temperature	10.79		Deg. C		Field			7/20/20 11:55	BGS	C
Total Well Depth	66.30		Feet		Field			7/20/20 11:55	BGS	C
Volume in Water Column	56.65		Gallons		Field			7/20/20 11:55	BGS	C
Water Level After Purge	48.81		Feet		Field			7/20/20 11:55	BGS	C
Well Volumes Purged	2.00		Vol		Field			7/20/20 11:55	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533003** Date Collected: 7/20/2020 13:30 Matrix: Ground Water
Sample ID: **CWMP005W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/22/20 21:54	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/22/20 21:54	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	107		%	62 - 133	SW846 8260B			7/22/20 21:54	DPC	G
4-Bromofluorobenzene (S)	105		%	79 - 114	SW846 8260B			7/22/20 21:54	DPC	G
Dibromofluoromethane (S)	109		%	78 - 116	SW846 8260B			7/22/20 21:54	DPC	G
Toluene-d8 (S)	96.1		%	76 - 127	SW846 8260B			7/22/20 21:54	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	17		mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	B
Alkalinity, Total	17	3	mg/L	5	SM2320B-2011			7/23/20 02:10	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/23/20 23:08	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/22/20 21:10	JAM	A
Chloride	63.2		mg/L	2.0	EPA 300.0			7/21/20 07:20	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/21/20 07:20	MBW	B
Nitrate-N	8.3		mg/L	0.20	EPA 300.0			7/21/20 07:20	MBW	B
pH	6.90	1,2	pH_Units		S4500HB-11			7/23/20 02:10	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/21/20 12:00	VXF	7/22/20 06:39	VXF	F
Specific Conductance	325		umhos/cm	1	SW846 9050A			7/23/20 02:10	R2B	B
Sulfate	4.5		mg/L	2.0	EPA 300.0			7/21/20 07:20	MBW	B
Total Dissolved Solids	156		mg/L	5	S2540C-11			7/21/20 11:05	KXH	B
Total Organic Carbon (TOC)	0.64		mg/L	0.50	SW846 9060A			7/22/20 05:42	PAG	D
Turbidity	0.21		NTU	0.10	SM2130B-2011			7/22/20 07:59	R2B	B

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3115533003** Date Collected: 7/20/2020 13:30 Matrix: Ground Water

Sample ID: **CWMP005W** Date Received: 7/20/2020 15:49

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	14.7		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
Magnesium, Total	7.3		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
Manganese, Total	0.045		mg/L	0.0056	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
Potassium, Total	2.9		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
Sodium, Total	32.7		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:06	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	41.09		Feet		Field			7/20/20 13:30	BGS	C
Elev Top MW Casing above MSL	513.43		Feet		Field			7/20/20 13:30	BGS	C
Flow Rate	3.08		gal/min		Field			7/20/20 13:30	BGS	C
Ground Water Elevation	472.34		ft/MSL		Field			7/20/20 13:30	BGS	C
pH, Field (SM4500B)	4.75		pH_Units		Field			7/20/20 13:30	BGS	C
Sample Depth	130.00		Feet		Field			7/20/20 13:30	BGS	C
Specific Conductance, Field	354		umhos/cm	1	Field			7/20/20 13:30	BGS	C
Temperature	9.89		Deg. C		Field			7/20/20 13:30	BGS	C
Total Well Depth	138.92		Feet		Field			7/20/20 13:30	BGS	C
Volume in Water Column	143.81		Gallons		Field			7/20/20 13:30	BGS	C
Water Level After Purge	42.61		Feet		Field			7/20/20 13:30	BGS	C
Well Volumes Purged	1.50		Vol		Field			7/20/20 13:30	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3115533 3rd QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3115533001	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.				
3115533001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3115533002	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.				
3115533002	2	CWMP001W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3115533003	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.				
3115533003	2	CWMP005W	S4500HB-11	pH
The QC sample type DUP for method SM4500H+B was outside the control limits for the analyte pH. The Recovery was reported as 0.233 and the control limits were 0.100 pH units.				
3115533003	3	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: 3115533 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3115533001	CWMP007W	ASTM D6919-09		
3115533001	CWMP007W	EPA 300.0		
3115533001	CWMP007W	EPA 410.4		
3115533001	CWMP007W	Field		
3115533001	CWMP007W	S2540C-11		
3115533001	CWMP007W	S4500HB-11		
3115533001	CWMP007W	SM2130B-2011		
3115533001	CWMP007W	SM2320B-2011		
3115533001	CWMP007W	SW846 6010C	SW846 3015	
3115533001	CWMP007W	SW846 8260B		
3115533001	CWMP007W	SW846 9050A		
3115533001	CWMP007W	SW846 9060A		
3115533001	CWMP007W	SW846 9066	420.4/9066	
3115533002	CWMP001W	ASTM D6919-09		
3115533002	CWMP001W	EPA 300.0		
3115533002	CWMP001W	EPA 410.4		
3115533002	CWMP001W	Field		
3115533002	CWMP001W	S2540C-11		
3115533002	CWMP001W	S4500HB-11		
3115533002	CWMP001W	SM2130B-2011		
3115533002	CWMP001W	SM2320B-2011		
3115533002	CWMP001W	SW846 6010C	SW846 3015	
3115533002	CWMP001W	SW846 8260B		
3115533002	CWMP001W	SW846 9050A		
3115533002	CWMP001W	SW846 9060A		
3115533002	CWMP001W	SW846 9066	420.4/9066	
3115533003	CWMP005W	ASTM D6919-09		
3115533003	CWMP005W	EPA 300.0		
3115533003	CWMP005W	EPA 410.4		
3115533003	CWMP005W	Field		
3115533003	CWMP005W	S2540C-11		
3115533003	CWMP005W	S4500HB-11		
3115533003	CWMP005W	SM2130B-2011		
3115533003	CWMP005W	SM2320B-2011		
3115533003	CWMP005W	SW846 6010C	SW846 3015	
3115533003	CWMP005W	SW846 8260B		
3115533003	CWMP005W	SW846 9050A		
3115533003	CWMP005W	SW846 9060A		
3115533003	CWMP005W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

1 of 1

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

* 3 1 1 5 5 3 3 *

Client Name: Lancaster County Solid Waste MA

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

Contact: Dan Brown

Phone#: (717) 735-0193

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

Bill To: Lancaster County Solid Waste MA

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

Date Required: _____ Approved By: _____

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

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

Container Type	AG	AN	CG	—	—	PL	PL	PL	P
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.

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	07/20/20	1042	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP001W	07/20/20	1155	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP005W	07/20/20	1330	G	GW	2	1	2	x	x	1	1	1	1	
4														
5														
6														
7														
8														
9														
10														

(Completed by Receiving Lab)

Cooler Temp: 6 Therm ID: 527

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 #:

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	7-20-20	1549	2 [signature]	7/20/20	1549
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE [ ] Navy [ ] [ ]

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

Reportable to PADEP? Yes [ ]

PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type: _____

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

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

Rev 8/04

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

Condition of Sample Receipt Form

Client: LCSWMA | Work Order #: 3118533 | Initials: TS | Date: 7/28/20

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: 513

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 4, 2020

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:	**3116595**
Purchase Order:	**PO1000127**	Workorder ID:	**3rd QTR 2020 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Thursday, July 23, 2020.

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.

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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: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3116595001	CWMP010W	Ground Water	7/23/2020 09:54	7/23/2020 14:44	Mr. Brian G Shade
3116595002	CWMP009W	Ground Water	7/23/2020 10:25	7/23/2020 14:44	Mr. Brian G Shade
3116595003	CWMP008W	Ground Water	7/23/2020 11:01	7/23/2020 14:44	Mr. Brian G Shade
3116595004	CWMP012W	Ground Water	7/23/2020 11:55	7/23/2020 14:44	Mr. Brian G Shade
3116595005	CWMP002W	Ground Water	7/23/2020 12:32	7/23/2020 14:44	Mr. Brian G Shade
3116595006	CWMP003W	Ground Water	7/23/2020 12:54	7/23/2020 14:44	Mr. Brian G Shade
3116595007	CWMP004W	Ground Water	7/23/2020 13:02	7/23/2020 14:44	Mr. Brian G Shade
3116595008	Field Blank	Water	7/23/2020 11:30	7/23/2020 14:44	Mr. Brian G Shade
3116595009	Trip Blank	Water	7/23/2020 14:44	7/23/2020 14:44	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595001** Date Collected: 7/23/2020 09:54 Matrix: Ground Water
Sample ID: **CWMP010W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 14:12	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 14:12	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	79.9		%	62 - 133	SW846 8260B			7/29/20 14:12	DPC	G
4-Bromofluorobenzene (S)	113		%	79 - 114	SW846 8260B			7/29/20 14:12	DPC	G
Dibromofluoromethane (S)	81		%	78 - 116	SW846 8260B			7/29/20 14:12	DPC	G
Toluene-d8 (S)	91.4		%	76 - 127	SW846 8260B			7/29/20 14:12	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	253		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	291	2	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 01:12	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	401		mg/L	10.0	EPA 300.0			7/28/20 03:50	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 09:49	MBW	B
Nitrate-N	11.2		mg/L	0.20	EPA 300.0			7/24/20 09:49	MBW	B
pH	8.81	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	1830		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	42.3		mg/L	2.0	EPA 300.0			7/24/20 09:49	MBW	B
Total Dissolved Solids	996		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	4.9		mg/L	0.50	SW846 9060A			7/27/20 19:44	PAG	D
Turbidity	1.44		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595001** Date Collected: 7/23/2020 09:54 Matrix: Ground Water

Sample ID: **CWMP010W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	63.6		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
Iron, Total	0.22		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
Magnesium, Total	56.5		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
Manganese, Total	0.12		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
Potassium, Total	12.0		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
Sodium, Total	229		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:30	SRT	J
FIELD PARAMETERS										
Depth to Water Level	8.62		Feet		Field			7/23/20 09:54	BGS	C
Elev Top MW Casing above MSL	360.90		Feet		Field			7/23/20 09:54	BGS	C
Flow Rate	1.12		gal/min		Field			7/23/20 09:54	BGS	C
Ground Water Elevation	352.28		ft/MSL		Field			7/23/20 09:54	BGS	C
pH, Field (SM4500B)	6.41		pH_Units		Field			7/23/20 09:54	BGS	C
Sample Depth	17.00		Feet		Field			7/23/20 09:54	BGS	C
Specific Conductance, Field	2004		umhos/cm	1	Field			7/23/20 09:54	BGS	C
Temperature	12.38		Deg. C		Field			7/23/20 09:54	BGS	C
Total Well Depth	19.60		Feet		Field			7/23/20 09:54	BGS	C
Volume in Water Column	7.14		Gallons		Field			7/23/20 09:54	BGS	C
Water Level After Purge	15.95		Feet		Field			7/23/20 09:54	BGS	C
Well Volumes Purged	1.57		Vol		Field			7/23/20 09:54	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595002** Date Collected: 7/23/2020 10:25 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	2.6		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
1,1-Dichloroethane	1.4		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
cis-1,2-Dichloroethene	1.5		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Toluene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/30/20 23:20	VLM	H
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/30/20 23:20	VLM	H
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			7/30/20 23:20	VLM	H
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			7/30/20 23:20	VLM	H
Dibromofluoromethane (S)	117	4	%	78 - 116	SW846 8260B			7/30/20 23:20	VLM	H
Toluene-d8 (S)	105		%	76 - 127	SW846 8260B			7/30/20 23:20	VLM	H
WET CHEMISTRY										
Alkalinity, Bicarbonate	396		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	396	3	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	27.4		mg/L	0.100	ASTM D6919-09			7/29/20 03:43	JXL	A
Chemical Oxygen Demand (COD)	97		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	559		mg/L	10.0	EPA 300.0			7/28/20 04:05	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 10:04	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			7/24/20 10:04	MBW	B
pH	8.28	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	2380		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	5.5		mg/L	2.0	EPA 300.0			7/24/20 10:04	MBW	B
Total Dissolved Solids	1290		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	35.7		mg/L	5.0	SW846 9060A			7/29/20 16:34	PAG	D
Turbidity	74.1		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595002** Date Collected: 7/23/2020 10:25 Matrix: Ground Water

Sample ID: **CWMP009W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	161		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
Iron, Total	35.0		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
Magnesium, Total	75.7		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
Manganese, Total	12.3		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
Potassium, Total	34.1		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
Sodium, Total	166		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:34	SRT	J
FIELD PARAMETERS										
Depth to Water Level	9.22		Feet		Field			7/23/20 10:25	BGS	C
Elev Top MW Casing above MSL	404.20		Feet		Field			7/23/20 10:25	BGS	C
Flow Rate	1.56		gal/min		Field			7/23/20 10:25	BGS	C
Ground Water Elevation	394.98		ft/MSL		Field			7/23/20 10:25	BGS	C
pH, Field (SM4500B)	6.01		pH_Units		Field			7/23/20 10:25	BGS	C
Sample Depth	16.00		Feet		Field			7/23/20 10:25	BGS	C
Specific Conductance, Field	2736		umhos/cm	1	Field			7/23/20 10:25	BGS	C
Temperature	11.72		Deg. C		Field			7/23/20 10:25	BGS	C
Total Well Depth	19.70		Feet		Field			7/23/20 10:25	BGS	C
Volume in Water Column	6.81		Gallons		Field			7/23/20 10:25	BGS	C
Water Level After Purge	10.40		Feet		Field			7/23/20 10:25	BGS	C
Well Volumes Purged	4.58		Vol		Field			7/23/20 10:25	BGS	C

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595003** Date Collected: 7/23/2020 11:01 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.7		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
1,1-Dichloroethane	2.9		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Toluene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/30/20 23:43	VLM	H
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/30/20 23:43	VLM	H
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	110		%	62 - 133	SW846 8260B			7/30/20 23:43	VLM	H
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			7/30/20 23:43	VLM	H
Dibromofluoromethane (S)	114		%	78 - 116	SW846 8260B			7/30/20 23:43	VLM	H
Toluene-d8 (S)	105		%	76 - 127	SW846 8260B			7/30/20 23:43	VLM	H
WET CHEMISTRY										
Alkalinity, Bicarbonate	331		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	366	6	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	7.63		mg/L	0.100	ASTM D6919-09			7/29/20 02:34	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	52.4		mg/L	2.0	EPA 300.0			7/24/20 10:20	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 10:20	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			7/24/20 10:20	MBW	B
pH	8.64	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/30/20 13:24	C_D	7/30/20 14:23	C_D	F
Specific Conductance	896		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	5.2		mg/L	2.0	EPA 300.0			7/24/20 10:20	MBW	B
Total Dissolved Solids	490		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	12.5		mg/L	2.5	SW846 9060A			7/29/20 16:34	PAG	D
Turbidity	55.0		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595003** Date Collected: 7/23/2020 11:01 Matrix: Ground Water

Sample ID: **CWMP008W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	75.7		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
Iron, Total	28.3		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
Magnesium, Total	34.6		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
Manganese, Total	16.8		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
Potassium, Total	10.4		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
Sodium, Total	48.6		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:37	SRT	J
FIELD PARAMETERS										
Depth to Water Level	3.78		Feet		Field			7/23/20 11:01	BGS	C
Elev Top MW Casing above MSL	422.30		Feet		Field			7/23/20 11:01	BGS	C
Flow Rate	0.82		gal/min		Field			7/23/20 11:01	BGS	C
Ground Water Elevation	418.52		ft/MSL		Field			7/23/20 11:01	BGS	C
pH, Field (SM4500B)	5.97		pH_Units		Field			7/23/20 11:01	BGS	C
Sample Depth	19.00		Feet		Field			7/23/20 11:01	BGS	C
Specific Conductance, Field	1042		umhos/cm	1	Field			7/23/20 11:01	BGS	C
Temperature	11.72		Deg. C		Field			7/23/20 11:01	BGS	C
Total Well Depth	22.80		Feet		Field			7/23/20 11:01	BGS	C
Volume in Water Column	3.04		Gallons		Field			7/23/20 11:01	BGS	C
Water Level After Purge	10.59		Feet		Field			7/23/20 11:01	BGS	C
Well Volumes Purged	5.40		Vol		Field			7/23/20 11:01	BGS	C

Susan J. Scherer

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595004** Date Collected: 7/23/2020 11:55 Matrix: Ground Water
Sample ID: **CWMP012W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND	2	ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/28/20 18:55	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/28/20 18:55	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97.1		%	62 - 133	SW846 8260B			7/28/20 18:55	DPC	G
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			7/28/20 18:55	DPC	G
Dibromofluoromethane (S)	88.2		%	78 - 116	SW846 8260B			7/28/20 18:55	DPC	G
Toluene-d8 (S)	105		%	76 - 127	SW846 8260B			7/28/20 18:55	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	64		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	64	3	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 03:56	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			8/4/20 05:15	JAM	A
Chloride	35.1		mg/L	2.0	EPA 300.0			7/24/20 10:35	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 10:35	MBW	B
Nitrate-N	8.9		mg/L	0.20	EPA 300.0			7/24/20 10:35	MBW	B
pH	8.24	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	314		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	4.4		mg/L	2.0	EPA 300.0			7/24/20 10:35	MBW	B
Total Dissolved Solids	186		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	1.7		mg/L	0.50	SW846 9060A			7/27/20 19:44	PAG	D
Turbidity	231		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595004** Date Collected: 7/23/2020 11:55 Matrix: Ground Water
Sample ID: **CWMP012W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	32.5		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
Iron, Total	7.5		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
Magnesium, Total	8.9		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
Manganese, Total	0.15		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
Potassium, Total	1.7		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
Sodium, Total	13.0		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:48	SRT	J
FIELD PARAMETERS										
Depth to Water Level	64.48		Feet		Field			7/23/20 11:55	BGS	C
pH, Field (SM4500B)	5.93		pH_Units		Field			7/23/20 11:55	BGS	C
Specific Conductance, Field	209		umhos/cm	1	Field			7/23/20 11:55	BGS	C
Temperature	15.05		Deg. C		Field			7/23/20 11:55	BGS	C

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595005** Date Collected: 7/23/2020 12:32 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Bromoform	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Bromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Chloroethane	40.3		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Chloroform	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Chloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,4-Dichlorobenzene	1.2		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,1-Dichloroethane	12.7		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			7/29/20 15:22	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Styrene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			7/29/20 15:22	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			7/29/20 15:22	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:22	DPC	G

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595005** Date Collected: 7/23/2020 12:32 Matrix: Ground Water

Sample ID: **CWMP002W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	79.6		%	62 - 133	SW846 8260B			7/29/20 15:22	DPC	G
4-Bromofluorobenzene (S)	113		%	79 - 114	SW846 8260B			7/29/20 15:22	DPC	G
Dibromofluoromethane (S)	82.3		%	78 - 116	SW846 8260B			7/29/20 15:22	DPC	G
Toluene-d8 (S)	91.4		%	76 - 127	SW846 8260B			7/29/20 15:22	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	82		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	84	2	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 02:48	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	115		mg/L	2.0	EPA 300.0			7/24/20 10:50	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 10:50	MBW	B
Nitrate-N	4.2		mg/L	0.20	EPA 300.0			7/24/20 10:50	MBW	B
pH	8.37	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	586		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	22.0		mg/L	2.0	EPA 300.0			7/24/20 10:50	MBW	B
Total Dissolved Solids	318		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	5.3		mg/L	0.50	SW846 9060A			7/27/20 19:44	PAG	D
Turbidity	0.14		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B
METALS										
Calcium, Total	54.6		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
Magnesium, Total	17.2		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
Manganese, Total	1.1		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
Potassium, Total	3.1		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
Sodium, Total	29.0		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:52	SRT	J
FIELD PARAMETERS										
Depth to Water Level	92.11		Feet		Field			7/23/20 12:32	BGS	C
Elev Top MW Casing above MSL	525.81		Feet		Field			7/23/20 12:32	BGS	C
Ground Water Elevation	433.70		ft/MSL		Field			7/23/20 12:32	BGS	C
pH, Field (SM4500B)	5.08		pH_Units		Field			7/23/20 12:32	BGS	C
Sample Depth	85.00		Feet		Field			7/23/20 12:32	BGS	C
Specific Conductance, Field	631		umhos/cm	1	Field			7/23/20 12:32	BGS	C
Temperature	10.70		Deg. C		Field			7/23/20 12:32	BGS	C
Total Well Depth	100.00		Feet		Field			7/23/20 12:32	BGS	C

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID:	**3116595005**	Date Collected:	7/23/2020 12:32	Matrix:	Ground Water
Sample ID:	**CWMP002W**	Date Received:	7/23/2020 14:44		

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595006** Date Collected: 7/23/2020 12:54 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Bromoform	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Bromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Chloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Chloroform	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Chloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,1-Dichloroethane	1.1		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			7/29/20 15:46	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Styrene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			7/29/20 15:46	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			7/29/20 15:46	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 15:46	DPC	G

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595006** Date Collected: 7/23/2020 12:54 Matrix: Ground Water

Sample ID: **CWMP003W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	80.2		%	62 - 133	SW846 8260B			7/29/20 15:46	DPC	G
4-Bromofluorobenzene (S)	117	3	%	79 - 114	SW846 8260B			7/29/20 15:46	DPC	G
Dibromofluoromethane (S)	81.7		%	78 - 116	SW846 8260B			7/29/20 15:46	DPC	G
Toluene-d8 (S)	93.7		%	76 - 127	SW846 8260B			7/29/20 15:46	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	18		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	18	2	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 03:29	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	68.5		mg/L	2.0	EPA 300.0			7/24/20 12:38	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 12:38	MBW	B
Nitrate-N	7.5		mg/L	0.20	EPA 300.0			7/24/20 12:38	MBW	B
pH	7.65	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	332		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	5.6		mg/L	2.0	EPA 300.0			7/24/20 12:38	MBW	B
Total Dissolved Solids	146		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	0.67		mg/L	0.50	SW846 9060A			7/27/20 19:44	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B
METALS										
Calcium, Total	24.3		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
Magnesium, Total	8.6		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
Potassium, Total	1.8		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
Sodium, Total	21.3		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 15:56	SRT	J
FIELD PARAMETERS										
Depth to Water Level	103.25		Feet		Field			7/23/20 12:54	BGS	C
Elev Top MW Casing above MSL	524.21		Feet		Field			7/23/20 12:54	BGS	C
Ground Water Elevation	420.96		ft/MSL		Field			7/23/20 12:54	BGS	C
pH, Field (SM4500B)	4.92		pH_Units		Field			7/23/20 12:54	BGS	C
Sample Depth	100.00		Feet		Field			7/23/20 12:54	BGS	C
Specific Conductance, Field	360		umhos/cm	1	Field			7/23/20 12:54	BGS	C
Temperature	11.04		Deg. C		Field			7/23/20 12:54	BGS	C
Total Well Depth	140.00		Feet		Field			7/23/20 12:54	BGS	C

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID:	**3116595006**	Date Collected:	7/23/2020 12:54	Matrix:	Ground Water
Sample ID:	**CWMP003W**	Date Received:	7/23/2020 14:44		

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

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595007** Date Collected: 7/23/2020 13:02 Matrix: Ground Water

Sample ID: **CWMP004W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Bromoform	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Bromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Chloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Chloroform	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Chloromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			7/29/20 16:09	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Styrene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			7/29/20 16:09	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			7/29/20 16:09	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 16:09	DPC	G

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595007** Date Collected: 7/23/2020 13:02 Matrix: Ground Water
Sample ID: **CWMP004W** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
1,2-Dichloroethane-d4 (S)	79.9		%	62 - 133	SW846 8260B			7/29/20 16:09	DPC	G
4-Bromofluorobenzene (S)	116	3	%	79 - 114	SW846 8260B			7/29/20 16:09	DPC	G
Dibromofluoromethane (S)	81.7		%	78 - 116	SW846 8260B			7/29/20 16:09	DPC	G
Toluene-d8 (S)	92.7		%	76 - 127	SW846 8260B			7/29/20 16:09	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	23		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	23	2	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 03:15	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	45.8		mg/L	2.0	EPA 300.0			7/24/20 12:54	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/24/20 12:54	MBW	B
Nitrate-N	6.2		mg/L	0.20	EPA 300.0			7/24/20 12:54	MBW	B
pH	7.77	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	255		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	5.5		mg/L	2.0	EPA 300.0			7/24/20 12:54	MBW	B
Total Dissolved Solids	158		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	0.57		mg/L	0.50	SW846 9060A			7/28/20 07:06	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B
METALS										
Calcium, Total	19.8		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
Magnesium, Total	6.6		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
Manganese, Total	0.0090		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
Potassium, Total	1.6		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
Sodium, Total	15.5		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:00	SRT	J
FIELD PARAMETERS										
Depth to Water Level	104.81		Feet		Field			7/23/20 13:02	BGS	C
Elev Top MW Casing above MSL	529.53		Feet		Field			7/23/20 13:02	BGS	C
Ground Water Elevation	424.72		ft/MSL		Field			7/23/20 13:02	BGS	C
pH, Field (SM4500B)	5.18		pH_Units		Field			7/23/20 13:02	BGS	C
Sample Depth	130.00		Feet		Field			7/23/20 13:02	BGS	C
Specific Conductance, Field	277		umhos/cm	1	Field			7/23/20 13:02	BGS	C
Temperature	10.80		Deg. C		Field			7/23/20 13:02	BGS	C
Total Well Depth	140.00		Feet		Field			7/23/20 13:02	BGS	C

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID:	**3116595007**	Date Collected:	7/23/2020 13:02	Matrix:	Ground Water
Sample ID:	**CWMP004W**	Date Received:	7/23/2020 14:44		

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

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595008** Date Collected: 7/23/2020 11:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 12:14	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 12:14	DPC	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	78.1		%	62 - 133	SW846 8260B			7/29/20 12:14	DPC	G
4-Bromofluorobenzene (S)	112		%	79 - 114	SW846 8260B			7/29/20 12:14	DPC	G
Dibromofluoromethane (S)	80.7		%	78 - 116	SW846 8260B			7/29/20 12:14	DPC	G
Toluene-d8 (S)	91.2		%	76 - 127	SW846 8260B			7/29/20 12:14	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	B
Alkalinity, Total	ND	2	mg/L	5	SM2320B-2011			7/29/20 21:42	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/29/20 06:41	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/29/20 02:55	JAM	A
Chloride	ND		mg/L	1.0	EPA 300.0			7/24/20 13:09	MBW	B
Fluoride	ND		mg/L	0.10	EPA 300.0			7/24/20 13:09	MBW	B
Nitrate-N	ND		mg/L	0.10	EPA 300.0			7/24/20 13:09	MBW	B
pH	6.05	1	pH_Units		S4500HB-11			7/29/20 21:42	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	1		umhos/cm	1	SW846 9050A			7/31/20 02:40	R2B	B
Sulfate	ND		mg/L	1.0	EPA 300.0			7/24/20 13:09	MBW	B
Total Dissolved Solids	ND		mg/L	5	S2540C-11			7/24/20 14:07	KXH	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			7/27/20 19:44	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			7/24/20 07:14	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595008** Date Collected: 7/23/2020 11:30 Matrix: Water

Sample ID: **Field Blank** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	ND		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J
Iron, Total	ND		mg/L	0.067	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J
Magnesium, Total	ND		mg/L	0.11	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J
Potassium, Total	ND		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J
Sodium, Total	ND		mg/L	0.56	SW846 6010C	7/27/20 21:15	SXC	7/28/20 16:03	SRT	J

Susan J. Scherer

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ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116595009** Date Collected: 7/23/2020 14:44 Matrix: Water

Sample ID: **Trip Blank** Date Received: 7/23/2020 14:44

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Toluene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/29/20 12:37	DPC	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/29/20 12:37	DPC	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	78		%	62 - 133	SW846 8260B			7/29/20 12:37	DPC	A
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			7/29/20 12:37	DPC	A
Dibromofluoromethane (S)	80		%	78 - 116	SW846 8260B			7/29/20 12:37	DPC	A
Toluene-d8 (S)	91		%	76 - 127	SW846 8260B			7/29/20 12:37	DPC	A

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3116595001	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.				
3116595001	2	CWMP010W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595002	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.				
3116595002	3	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595002	4	CWMP009W	SW846 8260B	Dibromofluoromethane
The surrogate Dibromofluoromethane for method SW846 8260B was outside of control limits. The % Recovery was reported as 117 and the control limits were 78 to 116. This result was reported at a dilution of 1.				
3116595003	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.				
3116595003	6	CWMP008W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595004	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.				
3116595004	2	CWMP012W	SW846 8260B	Benzene
The reporting limits for GCMS volatile analytes were raised due to the dilution of the sample caused by matrix.				
3116595004	3	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595005	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.				
3116595005	2	CWMP002W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595006	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.				
3116595006	2	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595006	3	CWMP003W	SW846 8260B	4-Bromofluorobenzene
The surrogate 4-Bromofluorobenzene for method SW846 8260B was outside of control limits. The % Recovery was reported as 117 and the control limits were 79 to 114. This result was reported at a dilution of 1.				
3116595007	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.				

ANALYTICAL RESULTS

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

3116595007	2	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116595007	3	CWMP004W	SW846 8260B	4-Bromofluorobenzene
The surrogate 4-Bromofluorobenzene for method SW846 8260B was outside of control limits. The % Recovery was reported as 116 and the control limits were 79 to 114. This result was reported at a dilution of 1.				
3116595008	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.				
3116595008	2	Field Blank	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: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3116595001	CWMP010W	ASTM D6919-09		
3116595001	CWMP010W	EPA 300.0		
3116595001	CWMP010W	EPA 410.4		
3116595001	CWMP010W	Field		
3116595001	CWMP010W	S2540C-11		
3116595001	CWMP010W	S4500HB-11		
3116595001	CWMP010W	SM2130B-2011		
3116595001	CWMP010W	SM2320B-2011		
3116595001	CWMP010W	SW846 6010C	SW846 3015	
3116595001	CWMP010W	SW846 8260B		
3116595001	CWMP010W	SW846 9050A		
3116595001	CWMP010W	SW846 9060A		
3116595001	CWMP010W	SW846 9066	420.4/9066	
3116595002	CWMP009W	ASTM D6919-09		
3116595002	CWMP009W	EPA 300.0		
3116595002	CWMP009W	EPA 410.4		
3116595002	CWMP009W	Field		
3116595002	CWMP009W	S2540C-11		
3116595002	CWMP009W	S4500HB-11		
3116595002	CWMP009W	SM2130B-2011		
3116595002	CWMP009W	SM2320B-2011		
3116595002	CWMP009W	SW846 6010C	SW846 3015	
3116595002	CWMP009W	SW846 8260B		
3116595002	CWMP009W	SW846 9050A		
3116595002	CWMP009W	SW846 9060A		
3116595002	CWMP009W	SW846 9066	420.4/9066	
3116595003	CWMP008W	ASTM D6919-09		
3116595003	CWMP008W	EPA 300.0		
3116595003	CWMP008W	EPA 410.4		
3116595003	CWMP008W	Field		
3116595003	CWMP008W	S2540C-11		
3116595003	CWMP008W	S4500HB-11		
3116595003	CWMP008W	SM2130B-2011		
3116595003	CWMP008W	SM2320B-2011		
3116595003	CWMP008W	SW846 6010C	SW846 3015	
3116595003	CWMP008W	SW846 8260B		
3116595003	CWMP008W	SW846 9050A		
3116595003	CWMP008W	SW846 9060A		
3116595003	CWMP008W	SW846 9066	420.4/9066	
3116595004	CWMP012W	ASTM D6919-09		
3116595004	CWMP012W	EPA 300.0		
3116595004	CWMP012W	EPA 410.4		
3116595004	CWMP012W	Field		
3116595004	CWMP012W	S2540C-11		
3116595004	CWMP012W	S4500HB-11		
3116595004	CWMP012W	SM2130B-2011		

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3116595004	CWMP012W	SM2320B-2011		
3116595004	CWMP012W	SW846 6010C	SW846 3015	
3116595004	CWMP012W	SW846 8260B		
3116595004	CWMP012W	SW846 9050A		
3116595004	CWMP012W	SW846 9060A		
3116595004	CWMP012W	SW846 9066	420.4/9066	
3116595005	CWMP002W	ASTM D6919-09		
3116595005	CWMP002W	EPA 300.0		
3116595005	CWMP002W	EPA 410.4		
3116595005	CWMP002W	Field		
3116595005	CWMP002W	S2540C-11		
3116595005	CWMP002W	S4500HB-11		
3116595005	CWMP002W	SM2130B-2011		
3116595005	CWMP002W	SM2320B-2011		
3116595005	CWMP002W	SW846 6010C	SW846 3015	
3116595005	CWMP002W	SW846 8260B		
3116595005	CWMP002W	SW846 9050A		
3116595005	CWMP002W	SW846 9060A		
3116595005	CWMP002W	SW846 9066	420.4/9066	
3116595006	CWMP003W	ASTM D6919-09		
3116595006	CWMP003W	EPA 300.0		
3116595006	CWMP003W	EPA 410.4		
3116595006	CWMP003W	Field		
3116595006	CWMP003W	S2540C-11		
3116595006	CWMP003W	S4500HB-11		
3116595006	CWMP003W	SM2130B-2011		
3116595006	CWMP003W	SM2320B-2011		
3116595006	CWMP003W	SW846 6010C	SW846 3015	
3116595006	CWMP003W	SW846 8260B		
3116595006	CWMP003W	SW846 9050A		
3116595006	CWMP003W	SW846 9060A		
3116595006	CWMP003W	SW846 9066	420.4/9066	
3116595007	CWMP004W	ASTM D6919-09		
3116595007	CWMP004W	EPA 300.0		
3116595007	CWMP004W	EPA 410.4		
3116595007	CWMP004W	Field		
3116595007	CWMP004W	S2540C-11		
3116595007	CWMP004W	S4500HB-11		
3116595007	CWMP004W	SM2130B-2011		
3116595007	CWMP004W	SM2320B-2011		
3116595007	CWMP004W	SW846 6010C	SW846 3015	
3116595007	CWMP004W	SW846 8260B		
3116595007	CWMP004W	SW846 9050A		
3116595007	CWMP004W	SW846 9060A		
3116595007	CWMP004W	SW846 9066	420.4/9066	
3116595008	Field Blank	ASTM D6919-09		

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

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3116595 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3116595008	Field Blank	EPA 300.0		
3116595008	Field Blank	EPA 410.4		
3116595008	Field Blank	S2540C-11		
3116595008	Field Blank	S4500HB-11		
3116595008	Field Blank	SM2130B-2011		
3116595008	Field Blank	SM2320B-2011		
3116595008	Field Blank	SW846 6010C	SW846 3015	
3116595008	Field Blank	SW846 8260B		
3116595008	Field Blank	SW846 9050A		
3116595008	Field Blank	SW846 9060A		
3116595008	Field Blank	SW846 9066	420.4/9066	
3116595009	Trip Blank	SW846 8260B		

Tuesday, August 04, 2020 10:45:44 PM

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

31165 95

1 of 1

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

Client Name: Lancaster County Solid Waste MA

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

Contact: Dan Brown

Phone#: (717) 735-0193

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

Bill To: Lancaster County Solid Waste MA

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

Date Required: _____ Approved By: _____

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

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

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

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO3, Cl, F, SpC, SO4, Turb, TDS	Alkalinity, HCO3	
					Enter Number of Containers Per Sample or Field Results Below.									
1. CWMP010W	07/23/20	0954	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP009W	07/23/20	1025	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP008W	07/23/20	1101	G	GW	2	1	2	x	x	1	1	1	1	
4. CWMP012W	07/23/20	1155	G	GW	2	1	2	x	x	1	1	1	1	
5. CWMP002W	07/23/20	1232	G	GW	2	1	2	x	x	1	1	1	1	
6. CWMP003W	07/23/20	1254	G	GW	2	1	2	x	x	1	1	1	1	
7. CWMP004W	07/23/20	1302	G	GW	2	1	2	x	x	1	1	1	1	
8. Field Blank	07/23/20	1130	G	GW	2	1	2			1	1	1	1	
9. Trip Blank	07/23/20	1444	G	GW			2							
10														

(Completed by Receiving Lab)

Cooler Temp: 7° Therm ID: 309

No. of Coolers: _____

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

Courier/Tracking #:

Sample/COC Comments

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

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	7-22-20	1444	2 [signature]	7/23/20	1444
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

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

Rev 8/04

ALS

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

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
Lancaster County SW	3116595	SEC	7/23/20

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):	7°							
Thermometer ID:	309							
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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State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

July 31, 2020

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:	**3116253**
Purchase Order:	**PO1000127**	Workorder ID:	**3rd QTR 2020 CWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, July 22, 2020.

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.

This laboratory report may not be reproduced, except in full, without the written approval of ALS Environmental.

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

SAMPLE SUMMARY

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3116253001	CWMP018S	Ground Water	7/22/2020 09:23	7/22/2020 15:15	Mr. Brian G Shade
3116253002	CWMP017S	Ground Water	7/22/2020 09:48	7/22/2020 15:15	Mr. Brian G Shade
3116253003	CWMP016W	Ground Water	7/22/2020 13:02	7/22/2020 15:15	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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

ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253001** Date Collected: 7/22/2020 09:23 Matrix: Ground Water
Sample ID: **CWMP018S** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/25/20 03:16	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 03:16	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	112		%	62 - 133	SW846 8260B			7/25/20 03:16	VLM	G
4-Bromofluorobenzene (S)	101		%	79 - 114	SW846 8260B			7/25/20 03:16	VLM	G
Dibromofluoromethane (S)	114		%	78 - 116	SW846 8260B			7/25/20 03:16	VLM	G
Toluene-d8 (S)	94.2		%	76 - 127	SW846 8260B			7/25/20 03:16	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	478		mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	B
Alkalinity, Total	505	2	mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/27/20 16:00	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/28/20 22:50	JAM	A
Chloride	472		mg/L	5.0	EPA 300.0			7/23/20 16:32	MBW	B
Fluoride	ND		mg/L	0.50	EPA 300.0			7/23/20 16:32	MBW	B
Nitrate-N	18.0		mg/L	0.50	EPA 300.0			7/23/20 16:32	MBW	B
pH	8.64	1	pH_Units		S4500HB-11			7/25/20 01:40	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	2260		umhos/cm	1	SW846 9050A			7/25/20 01:40	R2B	B
Sulfate	59.3		mg/L	5.0	EPA 300.0			7/23/20 16:32	MBW	B
Total Dissolved Solids	1360		mg/L	5	S2540C-11			7/24/20 11:44	KXH	B
Total Organic Carbon (TOC)	8.2		mg/L	0.50	SW846 9060A			7/23/20 18:40	PAG	D
Turbidity	1.69		NTU	0.10	SM2130B-2011			7/23/20 05:50	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253001** Date Collected: 7/22/2020 09:23 Matrix: Ground Water
Sample ID: **CWMP018S** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	62.3		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
Iron, Total	0.16		mg/L	0.067	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
Magnesium, Total	90.6		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
Manganese, Total	0.025		mg/L	0.0056	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
Potassium, Total	21.4		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
Sodium, Total	288		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 12:47	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	8.49		mg/L	0.01	Field			7/22/20 09:23	BGS	C
pH, Field (SM4500B)	8.39		pH_Units		Field			7/22/20 09:23	BGS	C
Specific Conductance, Field	2442		umhos/cm	1	Field			7/22/20 09:23	BGS	C
Temperature	20.03		Deg. C		Field			7/22/20 09:23	BGS	C

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253002** Date Collected: 7/22/2020 09:48 Matrix: Ground Water

Sample ID: **CWMP017S** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/25/20 03:39	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 03:39	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			7/25/20 03:39	VLM	G
4-Bromofluorobenzene (S)	101		%	79 - 114	SW846 8260B			7/25/20 03:39	VLM	G
Dibromofluoromethane (S)	114		%	78 - 116	SW846 8260B			7/25/20 03:39	VLM	G
Toluene-d8 (S)	94.2		%	76 - 127	SW846 8260B			7/25/20 03:39	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	636		mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	B
Alkalinity, Total	651	2	mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/27/20 15:32	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/28/20 22:50	JAM	A
Chloride	683		mg/L	10.0	EPA 300.0			7/25/20 05:02	MBW	B
Fluoride	ND		mg/L	0.50	EPA 300.0			7/23/20 16:47	MBW	B
Nitrate-N	25.5		mg/L	0.50	EPA 300.0			7/23/20 16:47	MBW	B
pH	8.49	1	pH_Units		S4500HB-11			7/25/20 01:40	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	3240		umhos/cm	1	SW846 9050A			7/25/20 01:40	R2B	B
Sulfate	78.2		mg/L	5.0	EPA 300.0			7/23/20 16:47	MBW	B
Total Dissolved Solids	1960		mg/L	5	S2540C-11			7/24/20 11:44	KXH	B
Total Organic Carbon (TOC)	5.1		mg/L	0.50	SW846 9060A			7/23/20 18:40	PAG	D
Turbidity	1.03		NTU	0.10	SM2130B-2011			7/23/20 05:50	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253002** Date Collected: 7/22/2020 09:48 Matrix: Ground Water
Sample ID: **CWMP017S** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	58.5		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
Iron, Total	0.18		mg/L	0.067	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
Magnesium, Total	138		mg/L	0.11	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
Manganese, Total	0.12		mg/L	0.0056	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
Potassium, Total	23.6		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
Sodium, Total	432		mg/L	0.56	SW846 6010C	7/23/20 17:15	SXC	7/24/20 13:28	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	7.45		mg/L	0.01	Field			7/22/20 09:48	BGS	C
pH, Field (SM4500B)	8.11		pH_Units		Field			7/22/20 09:48	BGS	C
Specific Conductance, Field	3609		umhos/cm	1	Field			7/22/20 09:48	BGS	C
Temperature	23.39		Deg. C		Field			7/22/20 09:48	BGS	C

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ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253003** Date Collected: 7/22/2020 13:02 Matrix: Ground Water
Sample ID: **CWMP016W** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			7/25/20 04:02	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			7/25/20 04:02	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	111		%	62 - 133	SW846 8260B			7/25/20 04:02	VLM	G
4-Bromofluorobenzene (S)	101		%	79 - 114	SW846 8260B			7/25/20 04:02	VLM	G
Dibromofluoromethane (S)	114		%	78 - 116	SW846 8260B			7/25/20 04:02	VLM	G
Toluene-d8 (S)	93.5		%	76 - 127	SW846 8260B			7/25/20 04:02	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	B
Alkalinity, Total	ND	2	mg/L	50	SM2320B-2011			7/31/20 02:40	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			7/27/20 15:19	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			7/28/20 22:50	JAM	A
Chloride	3.0		mg/L	2.0	EPA 300.0			7/23/20 17:03	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			7/23/20 17:03	MBW	B
Nitrate-N	0.90		mg/L	0.20	EPA 300.0			7/23/20 17:03	MBW	B
pH	6.69	1	pH_Units		S4500HB-11			7/25/20 01:40	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	7/27/20 14:00	VXF	7/28/20 15:25	VXF	F
Specific Conductance	59		umhos/cm	1	SW846 9050A			7/25/20 01:40	R2B	B
Sulfate	11.0		mg/L	2.0	EPA 300.0			7/23/20 17:03	MBW	B
Total Dissolved Solids	80		mg/L	5	S2540C-11			7/24/20 11:44	KXH	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			7/23/20 18:40	PAG	D
Turbidity	3.61		NTU	0.10	SM2130B-2011			7/23/20 05:50	R2B	B

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ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID: **3116253003** Date Collected: 7/22/2020 13:02 Matrix: Ground Water
Sample ID: **CWMP016W** Date Received: 7/22/2020 15:15

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	5.1		mg/L	0.11	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
Iron, Total	0.30		mg/L	0.067	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
Magnesium, Total	1.2		mg/L	0.11	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
Manganese, Total	0.025		mg/L	0.0056	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
Potassium, Total	0.85		mg/L	0.56	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
Sodium, Total	3.1		mg/L	0.56	SW846 6010C	7/27/20 17:15	SXC	7/28/20 14:19	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	11.69		Feet		Field			7/22/20 13:02	BGS	C
Elev Top MW Casing above MSL	311.97		Feet		Field			7/22/20 13:02	BGS	C
Flow Rate	2.51		gal/min		Field			7/22/20 13:02	BGS	C
Ground Water Elevation	300.28		ft/MSL		Field			7/22/20 13:02	BGS	C
pH, Field (SM4500B)	5.33		pH_Units		Field			7/22/20 13:02	BGS	C
Sample Depth	71.00		Feet		Field			7/22/20 13:02	BGS	C
Specific Conductance, Field	63		umhos/cm	1	Field			7/22/20 13:02	BGS	C
Temperature	8.98		Deg. C		Field			7/22/20 13:02	BGS	C
Total Well Depth	73.52		Feet		Field			7/22/20 13:02	BGS	C
Volume in Water Column	90.89		Gallons		Field			7/22/20 13:02	BGS	C
Water Level After Purge	21.57		Feet		Field			7/22/20 13:02	BGS	C
Well Volumes Purged	3.18		Vol		Field			7/22/20 13:02	BGS	C

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3116253 3rd QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3116253001	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.				
3116253001	2	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116253002	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.				
3116253002	2	CWMP017S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3116253003	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.				
3116253003	2	CWMP016W	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: 3116253 3rd QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3116253001	CWMP018S	ASTM D6919-09		
3116253001	CWMP018S	EPA 300.0		
3116253001	CWMP018S	EPA 410.4		
3116253001	CWMP018S	Field		
3116253001	CWMP018S	S2540C-11		
3116253001	CWMP018S	S4500HB-11		
3116253001	CWMP018S	SM2130B-2011		
3116253001	CWMP018S	SM2320B-2011		
3116253001	CWMP018S	SW846 6010C	SW846 3015	
3116253001	CWMP018S	SW846 8260B		
3116253001	CWMP018S	SW846 9050A		
3116253001	CWMP018S	SW846 9060A		
3116253001	CWMP018S	SW846 9066	420.4/9066	
3116253002	CWMP017S	ASTM D6919-09		
3116253002	CWMP017S	EPA 300.0		
3116253002	CWMP017S	EPA 410.4		
3116253002	CWMP017S	Field		
3116253002	CWMP017S	S2540C-11		
3116253002	CWMP017S	S4500HB-11		
3116253002	CWMP017S	SM2130B-2011		
3116253002	CWMP017S	SM2320B-2011		
3116253002	CWMP017S	SW846 6010C	SW846 3015	
3116253002	CWMP017S	SW846 8260B		
3116253002	CWMP017S	SW846 9050A		
3116253002	CWMP017S	SW846 9060A		
3116253002	CWMP017S	SW846 9066	420.4/9066	
3116253003	CWMP016W	ASTM D6919-09		
3116253003	CWMP016W	EPA 300.0		
3116253003	CWMP016W	EPA 410.4		
3116253003	CWMP016W	Field		
3116253003	CWMP016W	S2540C-11		
3116253003	CWMP016W	S4500HB-11		
3116253003	CWMP016W	SM2130B-2011		
3116253003	CWMP016W	SM2320B-2011		
3116253003	CWMP016W	SW846 6010C	SW846 3015	
3116253003	CWMP016W	SW846 8260B		
3116253003	CWMP016W	SW846 9050A		
3116253003	CWMP016W	SW846 9060A		
3116253003	CWMP016W	SW846 9066	420.4/9066	

ALS Environmental
301 Fulling Mill Road • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

COC #: 1

ALS Quote

* 3 1 1 6 2 5 3 *

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		Recei
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml		Cooler Temp:
Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None		No. of Coolers:

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	07/22/20	0923	G	GW	2	1	2	x	x	1	1	1	1	
2. CWMP017S	07/22/20	0948	G	GW	2	1	2	x	x	1	1	1	1	
3. CWMP016W	07/22/20	1302	G	GW	2	1	2	x	x	1	1	1	1	
4														
5														
6														
7														
8														
9														
10														

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

Courier/Tracking #:

Sample/COC Comments

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

Project Comments:

LOGGED BY(signature): DATE TIME
REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	7-22-20	1515	2 [signature]	7/22/20	1515
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

ALS

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

Condition of Sample Receipt Form

Client: LCSW Work Order #: 6253 Initials: DN Date: 7/23

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

Cooler #:								
Temperature (°C):	4							
Thermometer ID:	523							
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