

April 8, 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; 4th 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

March 29, 2021

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

Re: LCSWMA Creswell Landfill
Permit No. 100008
Manor Township, Lancaster County, Pennsylvania
Fourth 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 Fourth Quarter 2020 water quality monitoring results for Creswell Landfill (CWLF). As part of this evaluation, ARM reviewed the historic and Fourth 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 Fourth Quarter 2020 were analyzed for quarterly Form 19 parameters. The following narrative provides a summary of noteworthy observations of the results for the Fourth 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 (Fourth Quarter 2020).



The attached **Table 1** summarizes the background exceedances in the downgraded wells during the Fourth Quarter 2020. Background exceedances shown in **Table 1** denote either (1) a statistically significant increase of concentrations relative to those observed historically in the background 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 water quality changes during future sampling events to evaluate the presence of any positive or negative trends for the parameters of concern.

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 statistical flaws in calculations. In these cases, ARM substituted the laboratory and statistical limit for the reporting detection limit for the statistical background standard.

For pH, a one-sided UPL is not appropriate because of the double-sided nature of this parameter. ARM assessed the downgraded pH data by investigating time-series concentration plots for identifiable trends and comparing the Fourth Quarter 2020 results to the historical range of concentrations in both the sampled well and the upgraded well.

The most appropriate method of calculating a UPL varies according to the distribution of each statistic. After removing outliers, ARM assessed the remaining historical MP-1 concentration dataset. 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 software. After removing outliers (version 5.1.002, EPA, 2015), ARM then used ProUCL to calculate 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

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 anomalies concentrations in MP-1. ARM previously identified 82 statistical outliers at a 95% significance level in the historical dataset which did not appear to be part of a long-term concentration trend. The Fourth Quarter 2020 analytical result in MP-1 for total dissolved solids (TDS) (18 mg/l) was determined to be a statistical outlier and was removed from the UPL calculation for TDS.

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



Individual Well Summary



- MP-7 - Parameters above background in this well include alkalinity (bicarbonate and total chloride, total iron, and total manganese) (bicarbonate and total), chloride, total sodium, SpC (field and lab), and sulfate. Concentrations of bicarbonate, total sodium, and sulfate appear to be stable over time with a long-term average value of 0.19 unit higher than background. Chloride appears to be stable over time with a long-term average value of 0.19 unit higher than background. Short-term fluctuations. Chloride appears to be stable over time. PH appears to be stable over time with a long-term average value of 0.19 unit higher than background. (bicarbonate and total), total sodium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.19 unit higher than background. Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total) and total sodium, SpC (field and lab), sulfate, TDS, and TOC. All parameters noted above background appear to be slowly increasing over time except alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.76 unit higher than background. Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.76 unit higher than background. MP-8 - Benzene and 1,1-dichloroethane were detected during this event, and are, therefore, above background levels. Concentrations of both parameters appear to be decreasing over time. Therefore, above background levels. Concentrations of both parameters appear to be decreasing over time. Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.76 unit higher than background. Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.76 unit higher than background. MP-9 - Benzene; 1,1-dichloroethane; and cis 1,2-dichloroethene were detected during this event, and are, therefore, above background levels. Concentrations of both parameters appear to be decreasing over time. Other parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Alkalinity (bicarbonate and total), magnesium, and sulfate appear to be slowly increasing over time with a long-term average value of 0.76 unit higher than background. MP-10 - Parameters above background in this well include ammonia-N, alkalinity (bicarbonate and total), total calcium, COD, chloride, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Concentrations of alkalinity (bicarbonate and total), chloride, magnesium, sodium, SpC (field), and sulfate generally appear to be increasing with apparently seasonal fluctuations. Total calcium, SpC (lab), and TDs concentrations have generally remained stable over time, however. During the Fourth Quarter 2020, a suspectedly anomalously high result for SpC (lab) was noted. ARM will closely monitor future results to determine if any apparent trends develop. Concentrations of ammonia-N, COD, total potassium, and TOC appear to be decreasing over time. PH appears to be increasing with a long-term average value of 0.91 unit higher than background. MP-11 - Parameters above background in this well include alkalinity (bicarbonate and total), total calcium, COD, chloride, total iron, total manganese, total potassium, total sodium, SpC (field and lab), sulfate, TDS, and TOC. Concentrations of alkalinity (bicarbonate and total), chloride, magnesium, sodium, SpC (field), and sulfate generally appear to be increasing with apparently seasonal fluctuations. Total calcium, SpC (lab), and TDs concentrations have generally remained stable over time, however. During the Fourth Quarter 2020, a suspectedly anomalously high result for SpC (lab) was noted. ARM will closely monitor future results to determine if any apparent trends develop. Concentrations of chlorine, total iron, total manganese, sulfate, and turbidity appear to be increasing over time with a long-term average value of 0.27 units higher than background.



Trend plots for the detected VOCs noted above (benzene, 1,1-dichloroethane, and toluene) 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 metals and ion concentrations (e.g., calcium, sodium, and chloride) appear to be increasing slowly in some wells over time, but these water quality changes are generally gradual with the exception of a few abrupt increases. These increases may be the result of temporary changes and do not currently appear to be a cause for concern.

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), total calcium, COD, chloride, total magnesium, total potassium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. Concentrations of COD, total potassium, and TOC appear to be decreasing over time, while concentrations of the other noted parameters show a wide range of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. While concentrations of the other noted parameters mimic the trend of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC, pH appears to demonstrate increasing long-term trends. PH concentrations of the other noted parameters show a wide range of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. Overall, the groundwater quality at MP-18S appears similar to the historical observations from MP-17S.

MP-17S – 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-17S include alkalinity (bicarbonate and total), total calcium, COD, chloride, total magnesium, total potassium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. Concentrations of the other noted parameters show a wide range of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC, while concentrations of the other noted parameters mimic the trend of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. While concentrations of the other noted parameters show a wide range of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC, pH appears to demonstrate increasing long-term trends. Nitrate and magnesium concentrations of the other noted parameters show a wide range of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC, while concentrations of the other noted parameters mimic the trend of fluctuation in the concentrations of calcium, total magnesium, total sodium, SPC (field and lab), sulfide, TDS, and TOC. Overall, the groundwater quality at MP-17S appears slightly wider range.

MP-16 – Alkalinity (bicarbonate and total) and sulfide were the only parameters detected above background in this well. Concentrations of alkalinity (bicarbonate and total) appear to be stable over time, apart from apparent anomalies resulting from Third Quarter 2020. ARM will continue to monitor alkalinity concentrations during the next few sampling events to confirm if this result was indeed an anomaly. Sulfate concentrations appear to be stable over time and have been decreasing since the historical maximum of 14.6 mg/l observed during the second quarter 2007. PH appears to be stable over time with a long-term average value approximately 0.68 unit higher than background.

MP-16 – Alkalinity (bicarbonate and total) and sulfide were the only parameters detected above background in this well. Concentrations of alkalinity (bicarbonate and total) appear to be stable over time, apart from apparent anomalies resulting from Third Quarter 2020. ARM will detect 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 of fluctuations. The widest range of fluctuations observed in the upgradient well at levels approximately 0.68 units higher, on average.

Trip and Field Blank Analyses

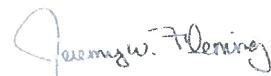
One (1) trip blank sample and one (1) field blank sample were received by the laboratory on October 19, 2020, and an additional trip blank sample was received by the laboratory on November 23, 2020. Both trip blank and field blank samples were analyzed for VOCs.

Laboratory analysis of the initial trip blank and field blank samples was completed on October 20, 2020. The trip blank accompanying the second sample submittal was analyzed on November 24, 2020. No VOC constituents were detected in any of the blank samples.

Closing

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

Sincerely,
ARM Group LLC



Jeremy Fleming
Project Geologist II



Ryan A. Brandon, P.G.
Project Manager

Enclosed: Table 1
 Attachments 1-3



TABLE

A R M G r o u p L L C



Table 1. LCSWMA Creswell Landfill Form 19 Groundwater Monitoring Well Background Standard Comparisons - 4th Quarter 2020

Parameter	Background Standard	Units	CWMP001W	CWMP002W	CWMP003W	CWMP004W	CWMP005W	CWMP007W	CWMP008W	CWMP009W	CWMP010W	CWMP012W	CWMP016W	CWMP017S	CWMP018S
<i>Quarterly Analytes</i>															
AMMONIA-NITROGEN	0.120	µg/L	<0.100	<0.100	<0.100	<0.100	0.11	8.04	29	0.23	<0.100	<0.100	<0.100	<0.100	<0.100
BICARBONATE	8	µg/L	6	88	26	22	16	15	446	552	381	67	10	634	541
CALCIUM, TOTAL	20.06	µg/L	15.0	52.7	18.1	22.2	15.2	18.2	74.3	175	81.9	32.2	5.3	99.8	88.5
COD (CHEMICAL OXYGEN DEMAND)	12**	µg/L	<15	17	<15	<15	<15	<15	46	110	25	<15	<15	20	19
CHLORIDE	32.6	mg/L	26.5	100	41.8	52.8	64.7	62.1	63.1	582	546	34.4	2.7	805	609
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	<0.20	<0.20
IRON, TOTAL	3.5	µg/L	0.48	<0.067	0.11	<0.067	0.098	<0.067	27.4	38.5	0.19	13.9	0.38	0.49	0.076
MAGNESIUM, TOTAL	12.5	mg/L	10.6	17.2	13.6	7.6	8.0	9.3	34.1	84.8	84.3	9.1	1.3	151	110
MANGANESE, TOTAL	0.13	µg/L	0.051	1.1	0.14	0.011	0.064	0.0068	15.9	13.7	0.077	0.16	0.0057	0.14	0.0070
NITRATE-NITROGEN	23.6	µg/L	18.5	3.7	5.0	6.4	8.3	9.7	<0.20	<0.20	15.0	8.8	0.92	24.0	19.5
pH-FIELD	None***	mg/L	6.72	5.29	5.37	5.50	5.03	6.98	6.20	6.18	6.77	6.39	5.22	7.87	8.30
pH-LAB	None***	mg/L	5.75	6.78	6.59	6.62	6.07	6.29	6.57	6.46	7.36	6.47	6.33	8.38	8.57
POTASSIUM, TOTAL	2.9	mg/L	2.5	2.9	7.3	1.8	2.2	2.5	9.4	37.3	20.7	1.2	<0.56	27.0	24.5
SODIUM, TOTAL	15.6	µg/L	12.8	30.0	23.1	18.2	34.6	32.6	55.1	185	322	15.2	4.3	536	386
SPEC. COND., FIELD	328	mg/L	255	595	325	294	343	349	1,084	2,900	2,626	306	61	3,939	2,971
SPEC. COND., LAB	299	mg/L	243	551	322	278	316	331	968	2,510	22,800	298	58	3,720	2,760
SULFATE	2.8	µmho/cm	2.1	21.4	39.6	6.0	4.3	21.0	4.9	5.8	47.5	4.1	8.6	63.5	42.7
ALKALINITY	7	µmho/cm	6	88	26	22	16	15	446	552	381	67	10	634	564
TDS (TOTAL DISSOLVED SOLIDS)	261	mg/L	18	328	146	234	210	140	484	1,480	1,340	190	64	2,290	1,640
TOC (TOTAL ORGANIC CARBON)	1.1	mg/L	0.53	4.9	4.2	0.75	0.66	0.84	2.5	35.6	7.8	1.1	<0.5	5.9	8.6
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	172	mg/L	7.49	0.48	1.64	0.28	0.84	<0.10	19.1	29.5	1.76	259	3.7	1.3	0.34
BENZENE	1.0*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	3.5	<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	12.2	<1.0	<1.0	<1.0	<1.0	3.2	1.7	<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	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans 1,2-DICHLOROETHENE	1.0*	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ETHYLBENZENE	1.0*	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	65.7	<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

A R M G r o u p L L C



LCSWMA Creswell Landfill 4th 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	20.06	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	3.5	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	µhos/cm
spec. cond., lab	No Distribution	299	µhos/cm
sulfate	Normal	2.8	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	172	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

A R M G r o u p L L C



	A	B	C	D	E	F	G	H	I	J	K	L
101				5% Lilliefors Critical Value	0.262		Data Not Lognormal at 5% Significance Level					
102	Data Not Lognormal at 5% Significance Level											
103												
104	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
105				Mean in Original Scale	0.048			Mean in Log Scale	-3.256			
106				SD in Original Scale	0.035			SD in Log Scale	0.668			
107				95% UTL95% Coverage	0.137			95% BCA UTL95% Coverage	0.14			
108				95% Bootstrap (%) UTL95% Coverage	0.14			95% UPL (t)	0.117			
109				90% Percentile (z)	0.0907			95% Percentile (z)	0.116			
110				99% Percentile (z)	0.182			95% USL	0.343			
111												
112	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
113				KM Mean of Logged Data	-2.279			95% KM UTL (Lognormal)95% Coverage	0.124			
114				KM SD of Logged Data	0.0995			95% KM UPL (Lognormal)	0.121			
115				95% KM Percentile Lognormal (z)	0.121			95% KM USL (Lognormal)	0.142			
116												
117	Background DL/2 Statistics Assuming Lognormal Distribution											
118				Mean in Original Scale	0.0571			Mean in Log Scale	-2.915			
119				SD in Original Scale	0.0258			SD in Log Scale	0.277			
120				95% UTL95% Coverage	0.0916			95% UPL (t)	0.0859			
121				90% Percentile (z)	0.0773			95% Percentile (z)	0.0854			
122				99% Percentile (z)	0.103			95% USL	0.134			
123	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
124												
125	Nonparametric Distribution Free Background Statistics											
126	Data do not follow a Discernible Distribution (0.05)											
127												
128	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
129				Order of Statistic, r	118			95% UTL with95% Coverage	0.14			
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	0.23			95% KM Chebyshev UPL	0.165			
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	118			Number of Missing Observations	15			
144				Number of Distinct Observations	21							
145				Number of Detects	76			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	1.278			Percent Non-Detects	35.59%			
150				Mean Detected	6.312			SD Detected	1.131			

	A	B	C	D	E	F	G	H	I	J	K	L	
201					nu hat (MLE)	3167				nu star (bias corrected)		3088	
202					MLE Mean (bias corrected)	5.489				MLE Sd (bias corrected)		1.517	
203					95% Percentile of Chisquare (2kstar)	39.09				90% Percentile		7.501	
204					95% Percentile	8.2				99% Percentile		9.62	
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				8.685	8.754			95% Approx. Gamma UPL	8.216		8.263	
209					95% Gamma USL	11.79	12.07						
210													
211	Estimates of Gamma Parameters using KM Estimates												
212					Mean (KM)	5.743				SD (KM)		1.184	
213					Variance (KM)	1.403				SE of Mean (KM)		0.11	
214					k hat (KM)	23.51				k star (KM)		22.92	
215					nu hat (KM)	5549				nu star (KM)		5409	
216					theta hat (KM)	0.244				theta star (KM)		0.251	
217					80% gamma percentile (KM)	6.721				90% gamma percentile (KM)		7.324	
218					95% gamma percentile (KM)	7.848				99% gamma percentile (KM)		8.895	
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				8.062	8.074			95% Approx. Gamma UPL	7.736		7.741	
224					95% KM Gamma Percentile	7.709	7.713			95% Gamma USL	10.15	10.24	
225													
226	Lognormal GOF Test on Detected Observations Only												
227	Shapiro Wilk Approximate Test Statistic				0.9		Shapiro Wilk GOF Test						
228					5% Shapiro Wilk P Value	1.6327E-6	Data Not Lognormal at 5% Significance Level						
229					Lilliefors Test Statistic	0.226		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				5.573					Mean in Log Scale		1.688	
235					SD in Original Scale	1.381				SD in Log Scale		0.246	
236					95% UTL95% Coverage	8.623				95% BCA UTL95% Coverage		8	
237					95% Bootstrap (%) UTL95% Coverage	8.175				95% UPL (t)		8.141	
238					90% Percentile (z)	7.409				95% Percentile (z)		8.101	
239					99% Percentile (z)	9.577				95% USL		12.06	
240													
241	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution												
242					KM Mean of Logged Data	1.729			95% KM UTL (Lognormal)95% Coverage			8.113	
243					KM SD of Logged Data	0.192			95% KM UPL (Lognormal)			7.757	
244					95% KM Percentile Lognormal (z)	7.727			95% KM USL (Lognormal)			10.55	
245													
246	Background DL/2 Statistics Assuming Lognormal Distribution												
247					Mean in Original Scale	4.961			Mean in Log Scale			1.505	
248					SD in Original Scale	2.037			SD in Log Scale			0.457	
249					95% UTL95% Coverage	10.73			95% UPL (t)			9.643	
250					90% Percentile (z)	8.093			95% Percentile (z)			9.555	

	A	B	C	D	E	F	G	H	I	J	K	L									
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		115	95% UTL with 95% Coverage			8.1														
259	Approx, f used to compute achieved CC		1.513	Approximate Actual Confidence Coefficient achieved by UTL			0.847														
260	Approximate Sample Size needed to achieve specified CC		153	95% UPL			8.005														
261	95% USL		9.5	95% KM Chebyshev UPL			10.93														
262																					
263	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.																				
264	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers																				
265	and consists of observations collected from clean unimpacted locations.																				
266	The use of USL tends to provide a balance between false positives and false negatives provided the data																				
267	represents a background data set and when many onsite observations need to be compared with the BTV.																				
268																					
269	CALCIUM, TOTAL																				
270																					
271	General Statistics																				
272	Total Number of Observations		59	Number of Distinct Observations			30														
273				Number of Missing Observations			74														
274	Minimum		12	First Quartile			14														
275	Second Largest		20.1	Median			15.4														
276	Maximum		21	Third Quartile			17.4														
277	Mean		16.08	SD			2.206														
278	Coefficient of Variation		0.137	Skewness			0.29														
279	Mean of logged Data		2.768	SD of logged Data			0.137														
280																					
281	Critical Values for Background Threshold Values (BTVs)																				
282	Tolerance Factor K (For UTL)		2.02	d2max (for USL)			3.021														
283																					
284	Normal GOF Test																				
285	Shapiro Wilk Test Statistic		0.948	Normal GOF Test																	
286	5% Shapiro Wilk P Value		0.0247	Data Not Normal at 5% Significance Level																	
287	Lilliefors Test Statistic		0.147	Lilliefors GOF Test																	
288	5% Lilliefors Critical Value		0.115	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		20.54	90% Percentile (z)			18.91														
293	95% UPL (t)		19.8	95% Percentile (z)			19.71														
294	95% USL		22.75	99% Percentile (z)			21.21														
295																					
296	Gamma GOF Test																				
297	A-D Test Statistic		0.926	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		0.136	Kolmogorov-Smirnov Gamma GOF Test																	
300	5% K-S Critical Value		0.115	Data Not Gamma Distributed at 5% Significance Level																	

	A	B	C	D	E	F	G	H	I	J	K	L	
451				90% KM Percentile (z)	10.41					95% KM Percentile (z)		11.73	
452				99% KM Percentile (z)	14.21					95% KM USL		17.73	
453													
454				DL/2 Substitution Background Statistics Assuming Normal Distribution									
455				Mean	8.512					SD		4.138	
456				95% UTL95% Coverage	16.32					95% UPL (t)		15.39	
457				90% Percentile (z)	13.81					95% Percentile (z)		15.32	
458				99% Percentile (z)	18.14					95% USL		22.14	
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		1.55	
482				Maximum	31					Median		0.01	
483				SD	4.995					CV		3.223	
484				k hat (MLE)	0.185					k star (bias corrected MLE)		0.186	
485				Theta hat (MLE)	8.356					Theta star (bias corrected MLE)		8.317	
486				nu hat (MLE)	47.86					nu star (bias corrected)		48.08	
487				MLE Mean (bias corrected)	1.55					MLE Sd (bias corrected)		3.59	
488				95% Percentile of Chisquare (2kstar)	1.955					90% Percentile		4.681	
489				95% Percentile	8.13					99% Percentile		17.74	
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	5.622	4.855				95% Approx. Gamma UPL	4.295	3.53	
494				95% Gamma USL	20.53	23.4							
495													
496				Estimates of Gamma Parameters using KM Estimates									
497				Mean (KM)	5.753					SD (KM)		3.635	
498				Variance (KM)	13.21					SE of Mean (KM)		0.382	
499				k hat (KM)	2.505					k star (KM)		2.452	
500				nu hat (KM)	646.3					nu star (KM)		632.6	

	A	B	C	D	E	F	G	H	I	J	K	L
551	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.											
552												
553												
554	CHLORIDE											
555												
556	General Statistics											
557	Total Number of Observations	131										Number of Missing Observations 2
558	Number of Distinct Observations	64										
559	Number of Detects	128										Number of Non-Detects 3
560	Number of Distinct Detects	63										Number of Distinct Non-Detects 3
561	Minimum Detect	15										Minimum Non-Detect 18
562	Maximum Detect	33.2										Maximum Non-Detect 41
563	Variance Detected	19.88										Percent Non-Detects 2.29%
564	Mean Detected	25.07										SD Detected 4.458
565	Mean of Detected Logged Data	3.205										SD of Detected Logged Data 0.188
566												
567	Critical Values for Background Threshold Values (BTVs)											
568	Tolerance Factor K (For UTL)	1.885										d2max (for USL) 3.299
569												
570	Normal GOF Test on Detects Only											
571	Shapiro Wilk Test Statistic	0.955										Normal GOF Test on Detected Observations Only
572	5% Shapiro Wilk P Value	0.00157										Data Not Normal at 5% Significance Level
573	Lilliefors Test Statistic	0.0924										Lilliefors GOF Test
574	5% Lilliefors Critical Value	0.0787										Data Not Normal at 5% Significance Level
575	Data Not Normal at 5% Significance Level											
576												
577	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
578	KM Mean	24.95										KM SD 4.512
579	95% UTL95% Coverage	33.46										95% KM UPL (t) 32.46
580	90% KM Percentile (z)	30.74										95% KM Percentile (z) 32.37
581	99% KM Percentile (z)	35.45										95% KM USL 39.84
582												
583	DL/2 Substitution Background Statistics Assuming Normal Distribution											
584	Mean	24.8										SD 4.809
585	95% UTL95% Coverage	33.87										95% UPL (t) 32.8
586	90% Percentile (z)	30.97										95% Percentile (z) 32.71
587	99% Percentile (z)	35.99										95% USL 40.67
588	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
589												
590	Gamma GOF Tests on Detected Observations Only											
591	A-D Test Statistic	1.557										Anderson-Darling GOF Test
592	5% A-D Critical Value	0.75										Data Not Gamma Distributed at 5% Significance Level
593	K-S Test Statistic	0.118										Kolmogorov-Smirnov GOF
594	5% K-S Critical Value	0.082										Data Not Gamma Distributed at 5% Significance Level
595	Data Not Gamma Distributed at 5% Significance Level											
596												
597	Gamma Statistics on Detected Data Only											
598	k hat (MLE)	29.77										k star (bias corrected MLE) 29.08
599	Theta hat (MLE)	0.842										Theta star (bias corrected MLE) 0.862
600	nu hat (MLE)	7620										nu star (bias corrected) 7443

	A	B	C	D	E	F	G	H	I	J	K	L												
751	MLE Sd (bias corrected)			0.862		95% Percentile of Chisquare (2kstar)			8.633															
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																								
759	Minimum		0.0231				Mean		1.089															
760	Maximum		3.5				Median		0.84															
761	SD		0.861				CV		0.791															
762	k hat (MLE)		1.426				k star (bias corrected MLE)		1.372															
763	Theta hat (MLE)		0.764				Theta star (bias corrected MLE)		0.794															
764	nu hat (MLE)		191.1				nu star (bias corrected)		183.8															
765	MLE Mean (bias corrected)		1.089				MLE Sd (bias corrected)		0.93															
766	95% Percentile of Chisquare (2kstar)		7.366				90% Percentile		2.32															
767	95% Percentile		2.924				99% Percentile		4.297															
768	The following statistics are computed using Gamma ROS Statistics on Imputed Data																							
769	Upper Limits using Wilson Hiltferty (WH) and Hawkins Wixley (HW) Methods																							
770			WH		HW				WH		HW													
771	95% Approx. Gamma UTL with 95% Coverage		3.509		3.784				95% Approx. Gamma UPL		2.927													
772	95% Gamma USL		6.08		7.083																			
773	Estimates of Gamma Parameters using KM Estimates																							
774																								
775	Mean (KM)		1.092				SD (KM)		0.852															
776	Variance (KM)		0.725				SE of Mean (KM)		0.105															
777	k hat (KM)		1.645				k star (KM)		1.581															
778	nu hat (KM)		220.4				nu star (KM)		211.9															
779	theta hat (KM)		0.664				theta star (KM)		0.691															
780	80% gamma percentile (KM)		1.68				90% gamma percentile (KM)		2.247															
781	95% gamma percentile (KM)		2.796				99% gamma percentile (KM)		4.031															
782	The following statistics are computed using gamma distribution and KM estimates																							
783																								
784	Upper Limits using Wilson Hiltferty (WH) and Hawkins Wixley (HW) Methods																							
785			WH		HW				WH		HW													
786	95% Approx. Gamma UTL with 95% Coverage		3.376		3.579				95% Approx. Gamma UPL		2.832													
787	95% KM Gamma Percentile		2.774		2.88				95% Gamma USL		5.758													
788	Lognormal GOF Test on Detected Observations Only																							
789																								
790	Shapiro Wilk Approximate Test Statistic		0.961				Shapiro Wilk GOF Test																	
791	5% Shapiro Wilk P Value		0.107				Detected Data appear Lognormal at 5% Significance Level																	
792	Lilliefors Test Statistic		0.0807				Lilliefors GOF Test																	
793	5% Lilliefors Critical Value		0.111				Detected Data appear Lognormal at 5% Significance Level																	
794	Detected Data appear Lognormal at 5% Significance Level																							
795	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects																							
796																								
797	Mean in Original Scale		1.094				Mean in Log Scale		-0.243															
798	SD in Original Scale		0.856				SD in Log Scale		0.883															
799	95% UTL95% Coverage		4.56				95% BCA UTL95% Coverage		3.14															
800	95% Bootstrap (%) UTL95% Coverage		3.14				95% UPL (t)		3.458															

	A	B	C	D	E	F	G	H	I	J	K	L	
801				90% Percentile (z)	2.431				95% Percentile (z)	3.351			
802				99% Percentile (z)	6.114				95% USL	11.76			
803													
804				Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution									
805				KM Mean of Logged Data	-0.264			95% KM UTL (Lognormal)95% Coverage		4.855			
806				KM SD of Logged Data	0.925			95% KM UPL (Lognormal)		3.634			
807				95% KM Percentile Lognormal (z)	3.516			95% KM USL (Lognormal)		13.11			
808													
809				Background DL/2 Statistics Assuming Lognormal Distribution									
810				Mean in Original Scale	1.091			Mean in Log Scale		-0.268			
811				SD in Original Scale	0.859			SD in Log Scale		0.937			
812				95% UTL95% Coverage	4.954			95% UPL (t)		3.694			
813				90% Percentile (z)	2.541			95% Percentile (z)		3.572			
814				99% Percentile (z)	6.764			95% USL		13.55			
815				DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.									
816													
817				Nonparametric Distribution Free Background Statistics									
818				Data appear to follow a Discernible Distribution at 5% Significance Level									
819													
820				Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)									
821				Order of Statistic, r	66			95% UTL with95% Coverage		3.2			
822				Approx, f used to compute achieved CC	1.737			Approximate Actual Confidence Coefficient achieved by UTL		0.854			
823				Approximate Sample Size needed to achieve specified CC	93			95% UPL		3			
824				95% USL	3.5			95% KM Chebyshev UPL		4.832			
825													
826				Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.									
827				Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers									
828				and consists of observations collected from clean unimpacted locations.									
829				The use of USL tends to provide a balance between false positives and false negatives provided the data									
830				represents a background data set and when many onsite observations need to be compared with the BTV.									
831													
832	IRON, DISSOLVED												
833													
834				General Statistics									
835				Total Number of Observations	105			Number of Missing Observations		26			
836				Number of Distinct Observations	15								
837				Number of Detects	16			Number of Non-Detects		89			
838				Number of Distinct Detects	13			Number of Distinct Non-Detects		3			
839				Minimum Detect	0.06			Minimum Non-Detect		0.02			
840				Maximum Detect	1.2			Maximum Non-Detect		0.06			
841				Variance Detected	0.139			Percent Non-Detects		84.76%			
842				Mean Detected	0.344			SD Detected		0.373			
843				Mean of Detected Logged Data	-1.598			SD of Detected Logged Data		1.058			
844													
845				Critical Values for Background Threshold Values (BTVs)									
846				Tolerance Factor K (For UTL)	1.916			d2max (for USL)		3.226			
847													
848				Normal GOF Test on Detects Only									
849				Shapiro Wilk Test Statistic	0.767			Shapiro Wilk GOF Test					
850				5% Shapiro Wilk Critical Value	0.887			Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L								
851	Lilliefors Test Statistic			0.27	Lilliefors GOF Test															
852	5% Lilliefors Critical Value			0.213	Data Not Normal at 5% Significance Level															
853	Data Not Normal at 5% Significance Level																			
854																				
855	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution																			
856	KM Mean			0.0694	KM SD			0.183												
857	95% UTL95% Coverage			0.42	95% KM UPL (t)			0.375												
858	90% KM Percentile (z)			0.304	95% KM Percentile (z)			0.371												
859	99% KM Percentile (z)			0.495	95% KM USL			0.66												
860																				
861	DL/2 Substitution Background Statistics Assuming Normal Distribution																			
862	Mean			0.0775	SD			0.182												
863	95% UTL95% Coverage			0.426	95% UPL (t)			0.381												
864	90% Percentile (z)			0.31	95% Percentile (z)			0.377												
865	99% Percentile (z)			0.5	95% USL			0.664												
866	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons																			
867																				
868	Gamma GOF Tests on Detected Observations Only																			
869	A-D Test Statistic			0.88	Anderson-Darling GOF Test															
870	5% A-D Critical Value			0.762	Data Not Gamma Distributed at 5% Significance Level															
871	K-S Test Statistic			0.243	Kolmogorov-Smirnov GOF															
872	5% K-S Critical Value			0.221	Data Not Gamma Distributed at 5% Significance Level															
873	Data Not Gamma Distributed at 5% Significance Level																			
874																				
875	Gamma Statistics on Detected Data Only																			
876	k hat (MLE)			1.075	k star (bias corrected MLE)			0.915												
877	Theta hat (MLE)			0.32	Theta star (bias corrected MLE)			0.376												
878	nu hat (MLE)			34.4	nu star (bias corrected)			29.29												
879	MLE Mean (bias corrected)			0.344																
880	MLE Sd (bias corrected)			0.36	95% Percentile of Chisquare (2kstar)			5.659												
881																				
882	Gamma ROS Statistics using Imputed Non-Detects																			
883	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																			
884	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)																			
885	For such situations, GROS method may yield incorrect values of UCLs and BTVs																			
886	This is especially true when the sample size is small.																			
887	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates																			
888	Minimum			0.01	Mean			0.061												
889	Maximum			1.2	Median			0.01												
890	SD			0.186	CV			3.056												
891	k hat (MLE)			0.475	k star (bias corrected MLE)			0.467												
892	Theta hat (MLE)			0.128	Theta star (bias corrected MLE)			0.13												
893	nu hat (MLE)			99.66	nu star (bias corrected)			98.15												
894	MLE Mean (bias corrected)			0.061	MLE Sd (bias corrected)			0.0892												
895	95% Percentile of Chisquare (2kstar)			3.678	90% Percentile			0.167												
896	95% Percentile			0.24	99% Percentile			0.42												
897	The following statistics are computed using Gamma ROS Statistics on Imputed Data																			
898	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																			
899	WH			0.201	WH			0.159												
900	95% Approx. Gamma UTL with 95% Coverage			0.223	95% Approx. Gamma UPL			0.179												

	A	B	C	D	E	F	G	H	I	J	K	L								
901			95% Gamma USL		0.574	0.578														
902			Estimates of Gamma Parameters using KM Estimates																	
903																				
904			Mean (KM)	0.0694						SD (KM)	0.183									
905			Variance (KM)	0.0335						SE of Mean (KM)	0.0185									
906			k hat (KM)	0.144						k star (KM)	0.146									
907			nu hat (KM)	30.2						nu star (KM)	30.67									
908			theta hat (KM)	0.483						theta star (KM)	0.475									
909			80% gamma percentile (KM)	0.0739						90% gamma percentile (KM)	0.205									
910			95% gamma percentile (KM)	0.384						99% gamma percentile (KM)	0.906									
911																				
912			The following statistics are computed using gamma distribution and KM estimates																	
913			Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																	
914				WH	HW					WH	HW									
915		95% Approx. Gamma UTL with 95% Coverage	0.238	0.218			95% Approx. Gamma UPL	0.197	0.178											
916		95% KM Gamma Percentile	0.193	0.175			95% Gamma USL	0.554	0.548											
917																				
918		Lognormal GOF Test on Detected Observations Only																		
919		Shapiro Wilk Test Statistic	0.892		Shapiro Wilk GOF Test															
920		5% Shapiro Wilk Critical Value	0.887		Detected Data appear Lognormal at 5% Significance Level															
921		Lilliefors Test Statistic	0.198		Lilliefors GOF Test															
922		5% Lilliefors Critical Value	0.213		Detected Data appear Lognormal at 5% Significance Level															
923		Detected Data appear Lognormal at 5% Significance Level																		
924																				
925		Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects																		
926		Mean in Original Scale	0.058				Mean in Log Scale	-5.725												
927		SD in Original Scale	0.187				SD in Log Scale	2.624												
928		95% UTL95% Coverage	0.498				95% BCA UTL95% Coverage	0.67												
929		95% Bootstrap (%) UTL95% Coverage	0.67				95% UPL (t)	0.259												
930		90% Percentile (z)	0.0942				95% Percentile (z)	0.244												
931		99% Percentile (z)	1.461				95% USL	15.49												
932																				
933		Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution																		
934		KM Mean of Logged Data	-3.559			95% KM UTL (Lognormal)95% Coverage	0.167													
935		KM SD of Logged Data	0.923			95% KM UPL (Lognormal)	0.133													
936		95% KM Percentile Lognormal (z)	0.13			95% KM USL (Lognormal)	0.558													
937																				
938		Background DL/2 Statistics Assuming Lognormal Distribution																		
939		Mean in Original Scale	0.0775				Mean in Log Scale	-3.235												
940		SD in Original Scale	0.182				SD in Log Scale	0.813												
941		95% UTL95% Coverage	0.187				95% UPL (t)	0.153												
942		90% Percentile (z)	0.112				95% Percentile (z)	0.15												
943		99% Percentile (z)	0.261				95% USL	0.541												
944		DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.																		
945																				
946		Nonparametric Distribution Free Background Statistics																		
947		Data appear to follow a Discernible Distribution at 5% Significance Level																		
948																				
949		Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)																		
950		Order of Statistic, r	103				95% UTL with 95% Coverage	0.69												

	A	B	C	D	E	F	G	H	I	J	K	L				
1101	Nonparametric Upper Limits for Background Threshold Values															
1102	Order of Statistic, r		76	95% UTL with 95% Coverage		12.9										
1103	Approx, f used to compute achieved CC			2	Approximate Actual Confidence Coefficient achieved by UTL		0.903									
1104					Approximate Sample Size needed to achieve specified CC		93									
1105	95% Percentile Bootstrap UTL with 95% Coverage			12.9	95% BCA Bootstrap UTL with 95% Coverage		12.66									
1106	95% UPL			12.42	90% Percentile		12									
1107	90% Chebyshev UPL			13.87	95% Percentile		12.32									
1108	95% Chebyshev UPL			15.2	99% Percentile		12.9									
1109	95% USL			12.9												
1110																
1111	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.															
1112	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers															
1113	and consists of observations collected from clean unimpacted locations.															
1114	The use of USL tends to provide a balance between false positives and false negatives provided the data															
1115	represents a background data set and when many onsite observations need to be compared with the BTV.															
1116																
1117	MANGANESE, TOTAL															
1118																
1119	General Statistics															
1120	Total Number of Observations			70	Number of Missing Observations		63									
1121	Number of Distinct Observations			12												
1122	Number of Detects			67	Number of Non-Detects		3									
1123	Number of Distinct Detects			12	Number of Distinct Non-Detects		3									
1124	Minimum Detect			0.03	Minimum Non-Detect		0.04									
1125	Maximum Detect			0.15	Maximum Non-Detect		0.06									
1126	Variance Detected			8.1217E-4	Percent Non-Detects		4.286%									
1127	Mean Detected			0.067	SD Detected		0.0285									
1128	Mean of Detected Logged Data			-2.781	SD of Detected Logged Data		0.39									
1129																
1130	Critical Values for Background Threshold Values (BTVs)															
1131	Tolerance Factor K (For UTL)			1.985	d2max (for USL)		3.084									
1132																
1133	Normal GOF Test on Detects Only															
1134	Shapiro Wilk Test Statistic			0.862	Normal GOF Test on Detected Observations Only											
1135	5% Shapiro Wilk P Value			2.7280E-8	Data Not Normal at 5% Significance Level											
1136	Lilliefors Test Statistic			0.202	Lilliefors GOF Test											
1137	5% Lilliefors Critical Value			0.108	Data Not Normal at 5% Significance Level											
1138	Data Not Normal at 5% Significance Level															
1139																
1140	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution															
1141	KM Mean			0.0657	KM SD		0.0284									
1142	95% UTL95% Coverage			0.122	95% KM UPL (t)		0.113									
1143	90% KM Percentile (z)			0.102	95% KM Percentile (z)		0.112									
1144	99% KM Percentile (z)			0.132	95% KM USL		0.153									
1145																
1146	DL/2 Substitution Background Statistics Assuming Normal Distribution															
1147	Mean			0.0652	SD		0.0292									
1148	95% UTL95% Coverage			0.123	95% UPL (t)		0.114									
1149	90% Percentile (z)			0.103	95% Percentile (z)		0.113									
1150	99% Percentile (z)			0.133	95% USL		0.155									

	A	B	C	D	E	F	G	H	I	J	K	L
1151												DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons
1152												
1153												Gamma GOF Tests on Detected Observations Only
1154						A-D Test Statistic	2.017					Anderson-Darling GOF Test
1155						5% A-D Critical Value	0.753					Data Not Gamma Distributed at 5% Significance Level
1156						K-S Test Statistic	0.196					Kolmogorov-Smirnov GOF
1157						5% K-S Critical Value	0.109					Data Not Gamma Distributed at 5% Significance Level
1158												Data Not Gamma Distributed at 5% Significance Level
1159												
1160												Gamma Statistics on Detected Data Only
1161						k hat (MLE)	6.525					k star (bias corrected MLE) 6.243
1162						Theta hat (MLE)	0.0103					Theta star (bias corrected MLE) 0.0107
1163						nu hat (MLE)	874.4					nu star (bias corrected) 836.6
1164						MLE Mean (bias corrected)	0.067					
1165						MLE Sd (bias corrected)	0.0268					95% Percentile of Chisquare (2kstar) 21.68
1166												
1167												Gamma ROS Statistics using Imputed Non-Detects
1168												GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
1169												GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
1170												For such situations, GROS method may yield incorrect values of UCLs and BTVs
1171												This is especially true when the sample size is small.
1172												For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates
1173						Minimum	0.0193					Mean 0.0655
1174						Maximum	0.15					Median 0.055
1175						SD	0.0288					CV 0.44
1176						k hat (MLE)	5.949					k star (bias corrected MLE) 5.703
1177						Theta hat (MLE)	0.011					Theta star (bias corrected MLE) 0.0115
1178						nu hat (MLE)	832.8					nu star (bias corrected) 798.4
1179						MLE Mean (bias corrected)	0.0655					MLE Sd (bias corrected) 0.0274
1180						95% Percentile of Chisquare (2kstar)	20.23					90% Percentile 0.102
1181						95% Percentile	0.116					99% Percentile 0.146
1182												The following statistics are computed using Gamma ROS Statistics on Imputed Data
1183												Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods
1184												
1185						WH	HW					95% Approx. Gamma UTL with 95% Coverage 0.129 0.131 95% Approx. Gamma UPL 0.117 0.117
1186						95% Gamma USL	0.182	0.188				
1187												
1188												Estimates of Gamma Parameters using KM Estimates
1189						Mean (KM)	0.0657					SD (KM) 0.0284
1190						Variance (KM)	8.0394E-4					SE of Mean (KM) 0.00342
1191						k hat (KM)	5.377					k star (KM) 5.156
1192						nu hat (KM)	752.8					nu star (KM) 721.9
1193						theta hat (KM)	0.0122					theta star (KM) 0.0128
1194						80% gamma percentile (KM)	0.0881					90% gamma percentile (KM) 0.105
1195						95% gamma percentile (KM)	0.119					99% gamma percentile (KM) 0.151
1196												
1197												The following statistics are computed using gamma distribution and KM estimates
1198												Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods
1199												
1200						WH	HW					95% Approx. Gamma UTL with 95% Coverage 0.127 0.128 95% Approx. Gamma UPL 0.115 0.116

	A	B	C	D	E	F	G	H	I	J	K	L
1201			95% KM Gamma Percentile		0.114	0.114			95% Gamma USL	0.178	0.183	
1202												
1203	Lognormal GOF Test on Detected Observations Only											
1204		Shapiro Wilk Approximate Test Statistic		0.93			Shapiro Wilk GOF Test					
1205		5% Shapiro Wilk P Value		0.00108			Data Not Lognormal at 5% Significance Level					
1206		Lilliefors Test Statistic		0.186			Lilliefors GOF Test					
1207		5% Lilliefors Critical Value		0.108			Data Not Lognormal at 5% Significance Level					
1208	Data Not Lognormal at 5% Significance Level											
1209												
1210	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1211		Mean in Original Scale		0.0657			Mean in Log Scale					
1212		SD in Original Scale		0.0286			SD in Log Scale					
1213		95% UTL95% Coverage		0.134			95% BCA UTL95% Coverage					
1214		95% Bootstrap (%) UTL95% Coverage		0.141			95% UPL (t)					
1215		90% Percentile (z)		0.101			95% Percentile (z)					
1216		99% Percentile (z)		0.153			95% USL					
1217												
1218	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1219		KM Mean of Logged Data		-2.804			95% KM UTL (Lognormal)95% Coverage					
1220		KM SD of Logged Data		0.395			95% KM UPL (Lognormal)					
1221		95% KM Percentile Lognormal (z)		0.116			95% KM USL (Lognormal)					
1222												
1223	Background DL/2 Statistics Assuming Lognormal Distribution											
1224		Mean in Original Scale		0.0652			Mean in Log Scale					
1225		SD in Original Scale		0.0292			SD in Log Scale					
1226		95% UTL95% Coverage		0.139			95% UPL (t)					
1227		90% Percentile (z)		0.103			95% Percentile (z)					
1228		99% Percentile (z)		0.161			95% USL					
1229	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1230												
1231	Nonparametric Distribution Free Background Statistics											
1232		Data do not follow a Discernible Distribution (0.05)										
1233												
1234	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1235		Order of Statistic, r		69			95% UTL with95% Coverage					
1236		Approx, f used to compute achieved CC		1.816			Approximate Actual Confidence Coefficient achieved by UTL					
1237		Approximate Sample Size needed to achieve specified CC		93			95% UPL					
1238		95% USL		0.15			95% KM Chebyshev UPL					
1239												
1240		Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.										
1241		Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers										
1242		and consists of observations collected from clean unimpacted locations.										
1243		The use of USL tends to provide a balance between false positives and false negatives provided the data										
1244		represents a background data set and when many onsite observations need to be compared with the BTV.										
1245												
1246	MANGANESE, DISSOLVED											
1247												
1248	General Statistics											
1249		Total Number of Observations		105			Number of Distinct Observations					
1250							Number of Missing Observations					

	A	B	C	D	E	F	G	H	I	J	K	L
1351				99% KM Percentile (z)	25.48					95% KM USL	27.51	
1352												
1353	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1354				Mean	20.38					SD	2.545	
1355				95% UTL95% Coverage	25.18					95% UPL (t)	24.61	
1356				90% Percentile (z)	23.64					95% Percentile (z)	24.57	
1357				99% Percentile (z)	26.3					95% USL	28.77	
1358	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1359												
1360	Gamma GOF Tests on Detected Observations Only											
1361				A-D Test Statistic	1.476		Anderson-Darling GOF Test					
1362				5% A-D Critical Value	0.75		Data Not Gamma Distributed at 5% Significance Level					
1363				K-S Test Statistic	0.109		Kolmogorov-Smirnov GOF					
1364				5% K-S Critical Value	0.0825		Data Not Gamma Distributed at 5% Significance Level					
1365	Data Not Gamma Distributed at 5% Significance Level											
1366												
1367	Gamma Statistics on Detected Data Only											
1368				k hat (MLE)	90.41					k star (bias corrected MLE)	88.26	
1369				Theta hat (MLE)	0.228					Theta star (bias corrected MLE)	0.233	
1370				nu hat (MLE)	22783					nu star (bias corrected)	22242	
1371				MLE Mean (bias corrected)	20.61							
1372				MLE Sd (bias corrected)	2.193					95% Percentile of Chisquare (2kstar)	208.5	
1373												
1374	Gamma ROS Statistics using Imputed Non-Detects											
1375	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1376	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1377	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1378	This is especially true when the sample size is small.											
1379	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1380				Minimum	13.6					Mean	20.58	
1381				Maximum	24.9					Median	21	
1382				SD	2.094					CV	0.102	
1383				k hat (MLE)	92.03					k star (bias corrected MLE)	89.89	
1384				Theta hat (MLE)	0.224					Theta star (bias corrected MLE)	0.229	
1385				nu hat (MLE)	23744					nu star (bias corrected)	23193	
1386				MLE Mean (bias corrected)	20.58					MLE Sd (bias corrected)	2.171	
1387				95% Percentile of Chisquare (2kstar)	212.1					90% Percentile	23.41	
1388				95% Percentile	24.28					99% Percentile	25.97	
1389	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1390	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1391				WH	HW					WH	HW	
1392	95% Approx. Gamma UTL with 95% Coverage	24.84	24.88			95% Approx. Gamma UPL	24.3	24.33				
1393	95% Gamma USL	28.43	28.58									
1394												
1395	Estimates of Gamma Parameters using KM Estimates											
1396				Mean (KM)	20.58					SD (KM)	2.104	
1397				Variance (KM)	4.428					SE of Mean (KM)	0.187	
1398				k hat (KM)	95.66					k star (KM)	93.44	
1399				nu hat (KM)	24681					nu star (KM)	24108	
1400				theta hat (KM)	0.215					theta star (KM)	0.22	

	A	B	C	D	E	F	G	H	I	J	K	L										
1451	represents a background data set and when many onsite observations need to be compared with the BTV.																					
1452	pH-FIELD																					
1453																						
1454																						
1455	General Statistics																					
1456	Total Number of Observations		119		Number of Missing Observations		14															
1457	Number of Distinct Observations		73																			
1458	Number of Detects		115		Number of Non-Detects		4															
1459	Number of Distinct Detects		69		Number of Distinct Non-Detects		4															
1460	Minimum Detect		4.15		Minimum Non-Detect		4.75															
1461	Maximum Detect		6.72		Maximum Non-Detect		5.59															
1462	Variance Detected		0.135		Percent Non-Detects		3.361%															
1463	Mean Detected		5.065		SD Detected		0.367															
1464	Mean of Detected Logged Data		1.62		SD of Detected Logged Data		0.07															
1465																						
1466	Critical Values for Background Threshold Values (BTVs)																					
1467	Tolerance Factor K (For UTL)		1.898		d2max (for USL)		3.268															
1468																						
1469	Normal GOF Test on Detects Only																					
1470	Shapiro Wilk Test Statistic		0.893		Normal GOF Test on Detected Observations Only																	
1471	5% Shapiro Wilk P Value		1.196E-11		Data Not Normal at 5% Significance Level																	
1472	Lilliefors Test Statistic		0.152		Lilliefors GOF Test																	
1473	5% Lilliefors Critical Value		0.0829		Data Not Normal at 5% Significance Level																	
1474	Data Not Normal at 5% Significance Level																					
1475																						
1476	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution																					
1477	KM Mean		5.058		KM SD		0.365															
1478	95% UTL95% Coverage		5.752		95% KM UPL (t)		5.667															
1479	90% KM Percentile (z)		5.527		95% KM Percentile (z)		5.659															
1480	99% KM Percentile (z)		5.908		95% KM USL		6.252															
1481																						
1482	DL/2 Substitution Background Statistics Assuming Normal Distribution																					
1483	Mean		4.984		SD		0.57															
1484	95% UTL95% Coverage		6.065		95% UPL (t)		5.933															
1485	90% Percentile (z)		5.714		95% Percentile (z)		5.921															
1486	99% Percentile (z)		6.31		95% USL		6.846															
1487	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons																					
1488																						
1489	Gamma GOF Tests on Detected Observations Only																					
1490	A-D Test Statistic		3.595		Anderson-Darling GOF Test																	
1491	5% A-D Critical Value		0.75		Data Not Gamma Distributed at 5% Significance Level																	
1492	K-S Test Statistic		0.141		Kolmogorov-Smirnov GOF																	
1493	5% K-S Critical Value		0.0853		Data Not Gamma Distributed at 5% Significance Level																	
1494	Data Not Gamma Distributed at 5% Significance Level																					
1495																						
1496	Gamma Statistics on Detected Data Only																					
1497	k hat (MLE)		201.7		k star (bias corrected MLE)		196.5															
1498	Theta hat (MLE)		0.0251		Theta star (bias corrected MLE)		0.0258															
1499	nu hat (MLE)		46401		nu star (bias corrected)		45192															
1500	MLE Mean (bias corrected)		5.065																			

	A	B	C	D	E	F	G	H	I	J	K	L			
1501				MLE Sd (bias corrected)	0.361				95% Percentile of Chisquare (2kstar)		440.2				
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															
1509	Minimum			4.15			Mean			5.059					
1510	Maximum			6.72			Median			5.013					
1511	SD			0.364			CV			0.072					
1512	k hat (MLE)			204.2			k star (bias corrected MLE)			199.1					
1513	Theta hat (MLE)			0.0248			Theta star (bias corrected MLE)			0.0254					
1514	nu hat (MLE)			48602			nu star (bias corrected)			47378					
1515	MLE Mean (bias corrected)			5.059			MLE Sd (bias corrected)			0.359					
1516	95% Percentile of Chisquare (2kstar)			445.7			90% Percentile			5.524					
1517	95% Percentile			5.663			99% Percentile			5.931					
1518	The following statistics are computed using Gamma ROS Statistics on Imputed Data														
1519	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods														
1520				WH	HW					WH	HW				
1521	95% Approx. Gamma UTL with 95% Coverage			5.755	5.756		95% Approx. Gamma UPL			5.665	5.666				
1522	95% Gamma USL			6.302	6.31										
1523															
1524	Estimates of Gamma Parameters using KM Estimates														
1525	Mean (KM)			5.058			SD (KM)			0.365					
1526	Variance (KM)			0.133			SE of Mean (KM)			0.0339					
1527	k hat (KM)			191.7			k star (KM)			186.9					
1528	nu hat (KM)			45634			nu star (KM)			44484					
1529	theta hat (KM)			0.0264			theta star (KM)			0.0271					
1530	80% gamma percentile (KM)			5.367			90% gamma percentile (KM)			5.538					
1531	95% gamma percentile (KM)			5.682			99% gamma percentile (KM)			5.959					
1532															
1533	The following statistics are computed using gamma distribution and KM estimates														
1534	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods														
1535				WH	HW					WH	HW				
1536	95% Approx. Gamma UTL with 95% Coverage			5.757	5.758		95% Approx. Gamma UPL			5.667	5.667				
1537	95% KM Gamma Percentile			5.659	5.659		95% Gamma USL			6.306	6.314				
1538															
1539	Lognormal GOF Test on Detected Observations Only														
1540	Shapiro Wilk Approximate Test Statistic			0.92			Shapiro Wilk GOF Test								
1541	5% Shapiro Wilk P Value			1.1157E-7			Data Not Lognormal at 5% Significance Level								
1542	Lilliefors Test Statistic			0.136			Lilliefors GOF Test								
1543	5% Lilliefors Critical Value			0.0829			Data Not Lognormal at 5% Significance Level								
1544	Data Not Lognormal at 5% Significance Level														
1545															
1546	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects														
1547	Mean in Original Scale			5.059			Mean in Log Scale			1.619					
1548	SD in Original Scale			0.364			SD in Log Scale			0.0695					
1549	95% UTL95% Coverage			5.759			95% BCA UTL95% Coverage			5.971					
1550	95% Bootstrap (%) UTL95% Coverage			5.989			95% UPL (t)			5.666					

	A	B	C	D	E	F	G	H	I	J	K	L
1551					90% Percentile (z)	5.517				95% Percentile (z)	5.658	
1552					99% Percentile (z)	5.933				95% USL	6.334	
1553												
1554												
1555					KM Mean of Logged Data	1.619				95% KM UTL (Lognormal)95% Coverage	5.761	
1556					KM SD of Logged Data	0.0699				95% KM UPL (Lognormal)	5.668	
1557					95% KM Percentile Lognormal (z)	5.66				95% KM USL (Lognormal)	6.34	
1558												
1559												
1560					Background DL/2 Statistics Assuming Lognormal Distribution							
1561					Mean in Original Scale	4.984				Mean in Log Scale	1.598	
1562					SD in Original Scale	0.57				SD in Log Scale	0.137	
1563					95% UTL95% Coverage	6.415				95% UPL (t)	6.213	
1564					90% Percentile (z)	5.894				95% Percentile (z)	6.196	
1565					99% Percentile (z)	6.804				95% USL	7.743	
1566												
1567												
1568												
1569												
1570												
1571												
1572					Nonparametric Distribution Free Background Statistics							
1573					Data do not follow a Discernible Distribution (0.05)							
1574												
1575												
1576												
1577					Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.							
1578					Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers							
1579					and consists of observations collected from clean unimpacted locations.							
1580					The use of USL tends to provide a balance between false positives and false negatives provided the data							
1581					represents a background data set and when many onsite observations need to be compared with the BTV.							
1582	pH-LAB											
1583												
1584					General Statistics							
1585					Total Number of Observations	127				Number of Missing Observations	6	
1586					Number of Distinct Observations	78						
1587					Number of Detects	123				Number of Non-Detects	4	
1588					Number of Distinct Detects	76				Number of Distinct Non-Detects	4	
1589					Minimum Detect	4.43				Minimum Non-Detect	5.22	
1590					Maximum Detect	7.08				Maximum Non-Detect	5.67	
1591					Variance Detected	0.113				Percent Non-Detects	3.15%	
1592					Mean Detected	5.639				SD Detected	0.336	
1593					Mean of Detected Logged Data	1.728				SD of Detected Logged Data	0.0589	
1594												
1595												
1596					Critical Values for Background Threshold Values (BTVs)							
1597					Tolerance Factor K (For UTL)	1.889				d2max (for USL)	3.289	
1598												
1599												
1600					Normal GOF Test on Detects Only							
					Shapiro Wilk Test Statistic	0.96				Normal GOF Test on Detected Observations Only		
					5% Shapiro Wilk P Value	0.00885				Data Not Normal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
1601					Lilliefors Test Statistic	0.075					Lilliefors GOF Test	
1602					5% Lilliefors Critical Value	0.0802					Detected Data appear Normal at 5% Significance Level	
1603											Detected Data appear Approximate Normal at 5% Significance Level	
1604												
1605					Kaplan Meier (KM) Background Statistics Assuming Normal Distribution							
1606					KM Mean	5.625					KM SD	0.341
1607					95% UTL95% Coverage	6.27					95% KM UPL (t)	6.193
1608					90% KM Percentile (z)	6.062					95% KM Percentile (z)	6.186
1609					99% KM Percentile (z)	6.419					95% KM USL	6.748
1610												
1611					DL/2 Substitution Background Statistics Assuming Normal Distribution							
1612					Mean	5.546					SD	0.613
1613					95% UTL95% Coverage	6.704					95% UPL (t)	6.566
1614					90% Percentile (z)	6.332					95% Percentile (z)	6.555
1615					99% Percentile (z)	6.973					95% USL	7.563
1616					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons							
1617												
1618					Gamma GOF Tests on Detected Observations Only							
1619					A-D Test Statistic	1.063					Anderson-Darling GOF Test	
1620					5% A-D Critical Value	0.75					Data Not Gamma Distributed at 5% Significance Level	
1621					K-S Test Statistic	0.0702					Kolmogorov-Smirnov GOF	
1622					5% K-S Critical Value	0.0833					Detected data appear Gamma Distributed at 5% Significance Level	
1623					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
1624												
1625					Gamma Statistics on Detected Data Only							
1626					k hat (MLE)	288.9					k star (bias corrected MLE)	281.8
1627					Theta hat (MLE)	0.0195					Theta star (bias corrected MLE)	0.02
1628					nu hat (MLE)	71058					nu star (bias corrected)	69326
1629					MLE Mean (bias corrected)	5.639						
1630					MLE Sd (bias corrected)	0.336					95% Percentile of Chisquare (2kstar)	620
1631												
1632					Gamma ROS Statistics using Imputed Non-Detects							
1633					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1634					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
1635					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
1636					This is especially true when the sample size is small.							
1637					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1638					Minimum	4.43					Mean	5.625
1639					Maximum	7.08					Median	5.57
1640					SD	0.341					CV	0.0607
1641					k hat (MLE)	278.7					k star (bias corrected MLE)	272.1
1642					Theta hat (MLE)	0.0202					Theta star (bias corrected MLE)	0.0207
1643					nu hat (MLE)	70788					nu star (bias corrected)	69117
1644					MLE Mean (bias corrected)	5.625					MLE Sd (bias corrected)	0.341
1645					95% Percentile of Chisquare (2kstar)	599.6					90% Percentile	6.066
1646					95% Percentile	6.197					99% Percentile	6.448
1647					The following statistics are computed using Gamma ROS Statistics on Imputed Data							
1648					Upper Limits using Wilson Hilderty (WH) and Hawkins Wixley (HW) Methods							
1649					WH	HW					WH	HW
1650					95% Approx. Gamma UTL with 95% Coverage	6.281	6.282				95% Approx. Gamma UPL	6.199

	A	B	C	D	E	F	G	H	I	J	K	L
1651				95% Gamma USL	6.804	6.813						
1652	Estimates of Gamma Parameters using KM Estimates											
1653	Estimates of Gamma Parameters using KM Estimates											
1654				Mean (KM)	5.625					SD (KM)	0.341	
1655				Variance (KM)	0.117					SE of Mean (KM)	0.0307	
1656				k hat (KM)	271.6					k star (KM)	265.1	
1657				nu hat (KM)	68975					nu star (KM)	67347	
1658				theta hat (KM)	0.0207					theta star (KM)	0.0212	
1659				80% gamma percentile (KM)	5.914					90% gamma percentile (KM)	6.072	
1660				95% gamma percentile (KM)	6.205					99% gamma percentile (KM)	6.46	
1661												
1662	The following statistics are computed using gamma distribution and KM estimates											
1663	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1664				WH	HW					WH	HW	
1665	95% Approx. Gamma UTL with 95% Coverage			6.283	6.285				95% Approx. Gamma UPL	6.201	6.202	
1666	95% KM Gamma Percentile			6.194	6.195				95% Gamma USL	6.808	6.816	
1667												
1668	Lognormal GOF Test on Detected Observations Only											
1669	Shapiro Wilk Approximate Test Statistic			0.969					Shapiro Wilk GOF Test			
1670	5% Shapiro Wilk P Value			0.075					Detected Data appear Lognormal at 5% Significance Level			
1671	Lilliefors Test Statistic			0.0696					Lilliefors GOF Test			
1672	5% Lilliefors Critical Value			0.0802					Detected Data appear Lognormal at 5% Significance Level			
1673	Detected Data appear Lognormal at 5% Significance Level											
1674												
1675	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1676	Mean in Original Scale			5.625					Mean in Log Scale	1.725		
1677	SD in Original Scale			0.341					SD in Log Scale	0.0599		
1678	95% UTL95% Coverage			6.287					95% BCA UTL95% Coverage	6.341		
1679	95% Bootstrap (%) UTL95% Coverage			6.41					95% UPL (t)	6.203		
1680	90% Percentile (z)			6.063					95% Percentile (z)	6.196		
1681	99% Percentile (z)			6.454					95% USL	6.837		
1682												
1683	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1684	KM Mean of Logged Data			1.725					95% KM UTL (Lognormal)95% Coverage	6.291		
1685	KM SD of Logged Data			0.0602					95% KM UPL (Lognormal)	6.206		
1686	95% KM Percentile Lognormal (z)			6.199					95% KM USL (Lognormal)	6.844		
1687												
1688	Background DL/2 Statistics Assuming Lognormal Distribution											
1689	Mean in Original Scale			5.546					Mean in Log Scale	1.705		
1690	SD in Original Scale			0.613					SD in Log Scale	0.142		
1691	95% UTL95% Coverage			7.188					95% UPL (t)	6.962		
1692	90% Percentile (z)			6.595					95% Percentile (z)	6.944		
1693	99% Percentile (z)			7.648					95% USL	8.767		
1694	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1695												
1696	Nonparametric Distribution Free Background Statistics											
1697	Data appear to follow a Discernible Distribution at 5% Significance Level											
1698												
1699	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1700	Order of Statistic, r	124							95% UTL with 95% Coverage	6.41		

	A	B	C	D	E	F	G	H	I	J	K	L							
1851	Nonparametric Upper Limits for Background Threshold Values																		
1852	Order of Statistic, r			71	95% UTL with 95% Coverage			3.1											
1853	Approx, f used to compute achieved CC			1.868	Approximate Actual Confidence Coefficient achieved by UTL			0.881											
1854					Approximate Sample Size needed to achieve specified CC			93											
1855	95% Percentile Bootstrap UTL with 95% Coverage			3.1	95% BCA Bootstrap UTL with 95% Coverage			3.1											
1856	95% UPL			3.064	90% Percentile			2.7											
1857	90% Chebyshev UPL			3.208	95% Percentile			2.972											
1858	95% Chebyshev UPL			3.582	99% Percentile			3.112											
1859	95% USL			3.14															
1860																			
1861	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.																		
1862	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers																		
1863	and consists of observations collected from clean unimpacted locations.																		
1864	The use of USL tends to provide a balance between false positives and false negatives provided the data																		
1865	represents a background data set and when many onsite observations need to be compared with the BTV.																		
1866																			
1867	SODIUM, TOTAL																		
1868																			
1869	General Statistics																		
1870	Total Number of Observations			75	Number of Missing Observations			58											
1871	Number of Distinct Observations			30															
1872	Number of Detects			72	Number of Non-Detects			3											
1873	Number of Distinct Detects			30	Number of Distinct Non-Detects			1											
1874	Minimum Detect			7.6	Minimum Non-Detect			11											
1875	Maximum Detect			16.4	Maximum Non-Detect			11											
1876	Variance Detected			2.729	Percent Non-Detects			4%											
1877	Mean Detected			12.77	SD Detected			1.652											
1878	Mean of Detected Logged Data			2.538	SD of Detected Logged Data			0.135											
1879																			
1880	Critical Values for Background Threshold Values (BTVs)																		
1881	Tolerance Factor K (For UTL)			1.972	d2max (for USL)			3.109											
1882																			
1883	Normal GOF Test on Detects Only																		
1884	Shapiro Wilk Test Statistic			0.968	Normal GOF Test on Detected Observations Only														
1885	5% Shapiro Wilk P Value			0.18	Detected Data appear Normal at 5% Significance Level														
1886	Lilliefors Test Statistic			0.141	Lilliefors GOF Test														
1887	5% Lilliefors Critical Value			0.104	Data Not Normal at 5% Significance Level														
1888	Detected Data appear Approximate Normal at 5% Significance Level																		
1889																			
1890	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution																		
1891	KM Mean			12.62	KM SD			1.773											
1892	95% UTL95% Coverage			16.12	95% KM UPL (t)			15.59											
1893	90% KM Percentile (z)			14.89	95% KM Percentile (z)			15.54											
1894	99% KM Percentile (z)			16.75	95% KM USL			18.13											
1895																			
1896	DL/2 Substitution Background Statistics Assuming Normal Distribution																		
1897	Mean			12.48	SD			2.162											
1898	95% UTL95% Coverage			16.74	95% UPL (t)			16.1											
1899	90% Percentile (z)			15.25	95% Percentile (z)			16.03											
1900	99% Percentile (z)			17.51	95% USL			19.2											

	A	B	C	D	E	F	G	H	I	J	K	L
1951			95% KM Gamma Percentile		15.78	15.82			95% Gamma USL	19.11	19.27	
1952												
1953	Lognormal GOF Test on Detected Observations Only											
1954		Shapiro Wilk Approximate Test Statistic		0.945			Shapiro Wilk GOF Test					
1955		5% Shapiro Wilk P Value		0.00678			Data Not Lognormal at 5% Significance Level					
1956		Lilliefors Test Statistic		0.166			Lilliefors GOF Test					
1957		5% Lilliefors Critical Value		0.104			Data Not Lognormal at 5% Significance Level					
1958	Data Not Lognormal at 5% Significance Level											
1959												
1960	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1961		Mean in Original Scale		12.65			Mean in Log Scale					
1962		SD in Original Scale		1.721			SD in Log Scale					
1963		95% UTL95% Coverage		16.57			95% BCA UTL95% Coverage					
1964		95% Bootstrap (%) UTL95% Coverage		15.9			95% UPL (t)					
1965		90% Percentile (z)		15.02			95% Percentile (z)					
1966		99% Percentile (z)		17.42			95% USL					
1967												
1968	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1969		KM Mean of Logged Data		2.525			95% KM UTL (Lognormal)95% Coverage					
1970		KM SD of Logged Data		0.149			95% KM UPL (Lognormal)					
1971		95% KM Percentile Lognormal (z)		15.95			95% KM USL (Lognormal)					
1972												
1973	Background DL/2 Statistics Assuming Lognormal Distribution											
1974		Mean in Original Scale		12.48			Mean in Log Scale					
1975		SD in Original Scale		2.162			SD in Log Scale					
1976		95% UTL95% Coverage		18.56			95% UPL (t)					
1977		90% Percentile (z)		16.04			95% Percentile (z)					
1978		99% Percentile (z)		20			95% USL					
1979	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1980												
1981	Nonparametric Distribution Free Background Statistics											
1982	Data appear to follow a Discernible Distribution at 5% Significance Level											
1983												
1984	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1985		Order of Statistic, r		74			95% UTL with95% Coverage					
1986		Approx, f used to compute achieved CC		1.947			Approximate Actual Confidence Coefficient achieved by UTL					
1987		Approximate Sample Size needed to achieve specified CC		93			95% UPL					
1988		95% USL		16.4			95% KM Chebyshev UPL					
1989												
1990	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1991	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1992	and consists of observations collected from clean unimpacted locations.											
1993	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1994	represents a background data set and when many onsite observations need to be compared with the BTV.											
1995												
1996	SODIUM, DISSOLVED											
1997												
1998	General Statistics											
1999		Total Number of Observations		98			Number of Distinct Observations					
2000							Number of Missing Observations					

	A	B	C	D	E	F	G	H	I	J	K	L
2101				99% KM Percentile (z)	348.8					95% KM USL	379	
2102												
2103				DL/2 Substitution Background Statistics Assuming Normal Distribution								
2104				Mean	270.6					SD	40.79	
2105				95% UTL95% Coverage	348					95% UPL (t)	338.5	
2106				90% Percentile (z)	322.9					95% Percentile (z)	337.7	
2107				99% Percentile (z)	365.5					95% USL	403.9	
2108				DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons								
2109												
2110				Gamma GOF Tests on Detected Observations Only								
2111				A-D Test Statistic	1.175		Anderson-Darling GOF Test					
2112				5% A-D Critical Value	0.75		Data Not Gamma Distributed at 5% Significance Level					
2113				K-S Test Statistic	0.0747		Kolmogorov-Smirnov GOF					
2114				5% K-S Critical Value	0.0853		Detected data appear Gamma Distributed at 5% Significance Level					
2115				Detected data follow Appr. Gamma Distribution at 5% Significance Level								
2116												
2117				Gamma Statistics on Detected Data Only								
2118				k hat (MLE)	70.92					k star (bias corrected MLE)	69.08	
2119				Theta hat (MLE)	3.884					Theta star (bias corrected MLE)	3.987	
2120				nu hat (MLE)	16313					nu star (bias corrected)	15889	
2121				MLE Mean (bias corrected)	275.5							
2122				MLE Sd (bias corrected)	33.14					95% Percentile of Chisquare (2kstar)	166.6	
2123												
2124				Gamma ROS Statistics using Imputed Non-Detects								
2125				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
2126				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)								
2127				For such situations, GROS method may yield incorrect values of UCLs and BTVs								
2128				This is especially true when the sample size is small.								
2129				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
2130				Minimum	173					Mean	274.3	
2131				Maximum	358					Median	276	
2132				SD	31.8					CV	0.116	
2133				k hat (MLE)	70.65					k star (bias corrected MLE)	68.88	
2134				Theta hat (MLE)	3.883					Theta star (bias corrected MLE)	3.983	
2135				nu hat (MLE)	16816					nu star (bias corrected)	16393	
2136				MLE Mean (bias corrected)	274.3					MLE Sd (bias corrected)	33.06	
2137				95% Percentile of Chisquare (2kstar)	166.1					90% Percentile	317.5	
2138				95% Percentile	330.9					99% Percentile	357	
2139				The following statistics are computed using Gamma ROS Statistics on Imputed Data								
2140				Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods								
2141					WH	HW				WH	HW	
2142				95% Approx. Gamma UTL with 95% Coverage	339.9	340.7			95% Approx. Gamma UPL	331.1	331.7	
2143				95% Gamma USL	394.3	396.9						
2144												
2145				Estimates of Gamma Parameters using KM Estimates								
2146				Mean (KM)	274.2					SD (KM)	32.07	
2147				Variance (KM)	1029					SE of Mean (KM)	2.981	
2148				k hat (KM)	73.1					k star (KM)	71.26	
2149				nu hat (KM)	17397					nu star (KM)	16960	
2150				theta hat (KM)	3.751					theta star (KM)	3.848	

	A	B	C	D	E	F	G	H	I	J	K	L										
2251				MLE Sd (bias corrected)		17.77			95% Percentile of Chisquare (2kstar)			518.7										
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																						
2259	Minimum			218	Mean			271.2														
2260	Maximum			310	Median			270														
2261	SD			17.43	CV			0.0643														
2262	k hat (MLE)			238.3	k star (bias corrected MLE)			232.7														
2263	Theta hat (MLE)			1.138	Theta star (bias corrected MLE)			1.166														
2264	nu hat (MLE)			60522	nu star (bias corrected)			59094														
2265	MLE Mean (bias corrected)			271.2	MLE Sd (bias corrected)			17.78														
2266	95% Percentile of Chisquare (2kstar)			516.6	90% Percentile			294.2														
2267	95% Percentile			301	99% Percentile			314.2														
2268	The following statistics are computed using Gamma ROS Statistics on Imputed Data																					
2269	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																					
2270				WH	HW				WH	HW												
2271	95% Approx. Gamma UTL with 95% Coverage			305.4	305.6	95% Approx. Gamma UPL			301.2	301.3												
2272	95% Gamma USL			333	333.6																	
2273	Estimates of Gamma Parameters using KM Estimates																					
2274																						
2275	Mean (KM)			271.1	SD (KM)			17.51														
2276	Variance (KM)			306.7	SE of Mean (KM)			1.57														
2277	k hat (KM)			239.7	k star (KM)			234														
2278	nu hat (KM)			60874	nu star (KM)			59437														
2279	theta hat (KM)			1.131	theta star (KM)			1.159														
2280	80% gamma percentile (KM)			285.9	90% gamma percentile (KM)			294.1														
2281	95% gamma percentile (KM)			300.9	99% gamma percentile (KM)			314														
2282	The following statistics are computed using gamma distribution and KM estimates																					
2283																						
2284	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																					
2285				WH	HW				WH	HW												
2286	95% Approx. Gamma UTL with 95% Coverage			305.6	305.8	95% Approx. Gamma UPL			301.3	301.4												
2287	95% KM Gamma Percentile			300.9	301.1	95% Gamma USL			333.3	333.9												
2288	Lognormal GOF Test on Detected Observations Only																					
2289																						
2290	Shapiro Wilk Approximate Test Statistic			0.955	Shapiro Wilk GOF Test																	
2291	5% Shapiro Wilk P Value			0.00246	Data Not Lognormal at 5% Significance Level																	
2292	Lilliefors Test Statistic			0.103	Lilliefors GOF Test																	
2293	5% Lilliefors Critical Value			0.0799	Data Not Lognormal at 5% Significance Level																	
2294	Data Not Lognormal at 5% Significance Level																					
2295																						
2296	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects																					
2297	Mean in Original Scale			271.2	Mean in Log Scale			5.601														
2298	SD in Original Scale			17.44	SD in Log Scale			0.0655														
2299	95% UTL95% Coverage			306.2	95% BCA UTL95% Coverage			303.4														
2300	95% Bootstrap (%) UTL95% Coverage			305.8	95% UPL (t)			301.7														

	A	B	C	D	E	F	G	H	I	J	K	L
2301				90% Percentile (z)	294.3				95% Percentile (z)	301.4		
2302				99% Percentile (z)	315.1				95% USL	335.7		
2303												
2304				Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution								
2305				KM Mean of Logged Data	5.6		95% KM UTL (Lognormal)	95% Coverage	306.4			
2306				KM SD of Logged Data	0.0659		95% KM UPL (Lognormal)	301.9				
2307				95% KM Percentile Lognormal (z)	301.5		95% KM USL (Lognormal)	336				
2308												
2309				Background DL/2 Statistics Assuming Lognormal Distribution								
2310				Mean in Original Scale	268.3		Mean in Log Scale	5.585				
2311				SD in Original Scale	27.2		SD in Log Scale	0.126				
2312				95% UTL95% Coverage	338.2		95% UPL (t)	328.7				
2313				90% Percentile (z)	313.2		95% Percentile (z)	327.9				
2314				99% Percentile (z)	357.3		95% USL	403.4				
2315				DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.								
2316												
2317				Nonparametric Distribution Free Background Statistics								
2318				Data do not follow a Discernible Distribution (0.05)								
2319												
2320				Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)								
2321				Order of Statistic, r	124		95% UTL with95% Coverage	307				
2322				Approx, f used to compute achieved CC	1.632		Approximate Actual Confidence Coefficient achieved by UTL	0.884				
2323				Approximate Sample Size needed to achieve specified CC	153		95% UPL	298.8				
2324				95% USL	310		95% KM Chebyshev UPL	347.8				
2325												
2326				Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.								
2327				Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers								
2328				and consists of observations collected from clean unimpacted locations.								
2329				The use of USL tends to provide a balance between false positives and false negatives provided the data								
2330				represents a background data set and when many onsite observations need to be compared with the BTV.								
2331												
2332	SULFATE											
2333												
2334				General Statistics								
2335				Total Number of Observations	92		Number of Missing Observations	41				
2336				Number of Distinct Observations	17							
2337				Number of Detects	32		Number of Non-Detects	60				
2338				Number of Distinct Detects	16		Number of Distinct Non-Detects	2				
2339				Minimum Detect	1.1		Minimum Non-Detect	2				
2340				Maximum Detect	4.4		Maximum Non-Detect	5				
2341				Variance Detected	0.402		Percent Non-Detects	65.22%				
2342				Mean Detected	1.9		SD Detected	0.634				
2343				Mean of Detected Logged Data	0.597		SD of Detected Logged Data	0.296				
2344												
2345				Critical Values for Background Threshold Values (BTVs)								
2346				Tolerance Factor K (For UTL)	1.937		d2max (for USL)	3.181				
2347												
2348				Normal GOF Test on Detects Only								
2349				Shapiro Wilk Test Statistic	0.828		Shapiro Wilk GOF Test					
2350				5% Shapiro Wilk Critical Value	0.93		Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L								
2351	Lilliefors Test Statistic			0.139	Lilliefors GOF Test															
2352	5% Lilliefors Critical Value			0.154	Detected Data appear Normal at 5% Significance Level															
2353	Detected Data appear Approximate Normal at 5% Significance Level																			
2354	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution																			
2355																				
2356	KM Mean			1.798	KM SD			0.591												
2357	95% UTL95% Coverage			2.943	95% KM UPL (t)			2.786												
2358	90% KM Percentile (z)			2.556	95% KM Percentile (z)			2.771												
2359	99% KM Percentile (z)			3.173	95% KM USL			3.678												
2360	DL/2 Substitution Background Statistics Assuming Normal Distribution																			
2361																				
2362	Mean			2.145	SD			0.599												
2363	95% UTL95% Coverage			3.304	95% UPL (t)			3.145												
2364	90% Percentile (z)			2.912	95% Percentile (z)			3.129												
2365	99% Percentile (z)			3.537	95% USL			4.049												
2366	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons																			
2367																				
2368	Gamma GOF Tests on Detected Observations Only																			
2369	A-D Test Statistic			0.83	Anderson-Darling GOF Test															
2370	5% A-D Critical Value			0.746	Data Not Gamma Distributed at 5% Significance Level															
2371	K-S Test Statistic			0.152	Kolmogorov-Smirnov GOF															
2372	5% K-S Critical Value			0.155	Detected data appear Gamma Distributed at 5% Significance Level															
2373	Detected data follow Appr. Gamma Distribution at 5% Significance Level																			
2374																				
2375	Gamma Statistics on Detected Data Only																			
2376	k hat (MLE)			11.24	k star (bias corrected MLE)			10.21												
2377	Theta hat (MLE)			0.169	Theta star (bias corrected MLE)			0.186												
2378	nu hat (MLE)			719.3	nu star (bias corrected)			653.2												
2379	MLE Mean (bias corrected)			1.9																
2380	MLE Sd (bias corrected)			0.595	95% Percentile of Chisquare (2kstar)			31.93												
2381	Gamma ROS Statistics using Imputed Non-Detects																			
2382																				
2383	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																			
2384	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)																			
2385	For such situations, GROS method may yield incorrect values of UCLs and BTVs																			
2386	This is especially true when the sample size is small.																			
2387	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates																			
2388	Minimum			0.756	Mean			1.795												
2389	Maximum			4.4	Median			1.718												
2390	SD			0.58	CV			0.323												
2391	k hat (MLE)			10.48	k star (bias corrected MLE)			10.14												
2392	Theta hat (MLE)			0.171	Theta star (bias corrected MLE)			0.177												
2393	nu hat (MLE)			1928	nu star (bias corrected)			1867												
2394	MLE Mean (bias corrected)			1.795	MLE Sd (bias corrected)			0.563												
2395	95% Percentile of Chisquare (2kstar)			31.78	90% Percentile			2.544												
2396	95% Percentile			2.811	99% Percentile			3.358												
2397	The following statistics are computed using Gamma ROS Statistics on Imputed Data																			
2398	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																			
2399	WH			HW				WH												
2400	95% Approx. Gamma UTL with 95% Coverage			3.022	95% Approx. Gamma UPL			2.817												

	A	B	C	D	E	F	G	H	I	J	K	L
2401				95% Gamma USL	4.114	4.214						
2402	Estimates of Gamma Parameters using KM Estimates											
2403	Estimates of Gamma Parameters using KM Estimates											
2404				Mean (KM)	1.798					SD (KM)	0.591	
2405				Variance (KM)	0.349					SE of Mean (KM)	0.0956	
2406				k hat (KM)	9.26					k star (KM)	8.965	
2407				nu hat (KM)	1704					nu star (KM)	1650	
2408				theta hat (KM)	0.194					theta star (KM)	0.201	
2409				80% gamma percentile (KM)	2.275					90% gamma percentile (KM)	2.598	
2410				95% gamma percentile (KM)	2.887					99% gamma percentile (KM)	3.481	
2411												
2412	The following statistics are computed using gamma distribution and KM estimates											
2413	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2414				WH	HW					WH	HW	
2415	95% Approx. Gamma UTL with 95% Coverage			2.949	2.955				95% Approx. Gamma UPL	2.758	2.759	
2416	95% KM Gamma Percentile			2.74	2.74				95% Gamma USL	3.957	4.016	
2417												
2418	Lognormal GOF Test on Detected Observations Only											
2419	Shapiro Wilk Test Statistic			0.932					Shapiro Wilk GOF Test			
2420	5% Shapiro Wilk Critical Value			0.93					Detected Data appear Lognormal at 5% Significance Level			
2421	Lilliefors Test Statistic			0.154					Lilliefors GOF Test			
2422	5% Lilliefors Critical Value			0.154					Detected Data appear Lognormal at 5% Significance Level			
2423	Detected Data appear Lognormal at 5% Significance Level											
2424												
2425	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2426	Mean in Original Scale			1.797					Mean in Log Scale	0.545		
2427	SD in Original Scale			0.548					SD in Log Scale	0.284		
2428	95% UTL95% Coverage			2.987					95% BCA UTL95% Coverage	2.93		
2429	95% Bootstrap (%) UTL95% Coverage			2.93					95% UPL (t)	2.77		
2430	90% Percentile (z)			2.48					95% Percentile (z)	2.75		
2431	99% Percentile (z)			3.336					95% USL	4.252		
2432												
2433	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2434	KM Mean of Logged Data			0.543					95% KM UTL (Lognormal)95% Coverage	2.983		
2435	KM SD of Logged Data			0.284					95% KM UPL (Lognormal)	2.766		
2436	95% KM Percentile Lognormal (z)			2.746					95% KM USL (Lognormal)	4.247		
2437												
2438	Background DL/2 Statistics Assuming Lognormal Distribution											
2439	Mean in Original Scale			2.145					Mean in Log Scale	0.715		
2440	SD in Original Scale			0.599					SD in Log Scale	0.329		
2441	95% UTL95% Coverage			3.866					95% UPL (t)	3.543		
2442	90% Percentile (z)			3.117					95% Percentile (z)	3.513		
2443	99% Percentile (z)			4.395					95% USL	5.821		
2444	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2445												
2446	Nonparametric Distribution Free Background Statistics											
2447	Data appear to follow a Discernible Distribution at 5% Significance Level											
2448												
2449	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2450	Order of Statistic, r			90					95% UTL with 95% Coverage	5		

	A	B	C	D	E	F	G	H	I	J	K	L
2451					Approx, f used to compute achieved CC	1.579		Approximate Actual Confidence Coefficient achieved by UTL				0.844
2452					Approximate Sample Size needed to achieve specified CC	124				95% UPL		5
2453					95% USL	5			95% KM Chebyshev UPL			4.389
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												
2461					ALKALINITY							
2462												
2463							General Statistics					
2464					Total Number of Observations	71		Number of Missing Observations				62
2465					Number of Distinct Observations	5						
2466					Number of Detects	47		Number of Non-Detects				24
2467					Number of Distinct Detects	5		Number of Distinct Non-Detects				1
2468					Minimum Detect	5		Minimum Non-Detect				5
2469					Maximum Detect	8		Maximum Non-Detect				5
2470					Variance Detected	0.617		Percent Non-Detects				33.8%
2471					Mean Detected	5.921		SD Detected				0.786
2472					Mean of Detected Logged Data	1.77		SD of Detected Logged Data				0.131
2473												
2474							Critical Values for Background Threshold Values (BTVs)					
2475					Tolerance Factor K (For UTL)	1.983		d2max (for USL)				3.089
2476												
2477							Normal GOF Test on Detects Only					
2478					Shapiro Wilk Test Statistic	0.833		Shapiro Wilk GOF Test				
2479					5% Shapiro Wilk Critical Value	0.946		Data Not Normal at 5% Significance Level				
2480					Lilliefors Test Statistic	0.247		Lilliefors GOF Test				
2481					5% Lilliefors Critical Value	0.128		Data Not Normal at 5% Significance Level				
2482							Data Not Normal at 5% Significance Level					
2483												
2484							Kaplan Meier (KM) Background Statistics Assuming Normal Distribution					
2485					KM Mean	5.61		KM SD				0.768
2486					95% UTL95% Coverage	7.133		95% KM UPL (t)				6.899
2487					90% KM Percentile (z)	6.594		95% KM Percentile (z)				6.873
2488					99% KM Percentile (z)	7.397		95% KM USL				7.982
2489												
2490							DL/2 Substitution Background Statistics Assuming Normal Distribution					
2491					Mean	4.765		SD				1.75
2492					95% UTL95% Coverage	8.234		95% UPL (t)				7.702
2493					90% Percentile (z)	7.007		95% Percentile (z)				7.643
2494					99% Percentile (z)	8.836		95% USL				10.17
2495							DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons					
2496												
2497							Gamma GOF Tests on Detected Observations Only					
2498					A-D Test Statistic	3.423		Anderson-Darling GOF Test				
2499					5% A-D Critical Value	0.747		Data Not Gamma Distributed at 5% Significance Level				
2500					K-S Test Statistic	0.239		Kolmogorov-Smirnov GOF				

	A	B	C	D	E	F	G	H	I	J	K	L								
2501				5% K-S Critical Value		0.129	Data Not Gamma Distributed at 5% Significance Level													
2502				Data Not Gamma Distributed at 5% Significance Level																
2503																				
2504				Gamma Statistics on Detected Data Only																
2505				k hat (MLE)	59.35		k star (bias corrected MLE)		55.58											
2506				Theta hat (MLE)	0.0998		Theta star (bias corrected MLE)		0.107											
2507				nu hat (MLE)	5579		nu star (bias corrected)		5224											
2508				MLE Mean (bias corrected)	5.921															
2509				MLE Sd (bias corrected)	0.794		95% Percentile of Chisquare (2kstar)		136.8											
2510																				
2511				Gamma ROS Statistics using Imputed Non-Detects																
2512				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																
2513				GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)																
2514				For such situations, GROS method may yield incorrect values of UCLs and BTVs																
2515				This is especially true when the sample size is small.																
2516				For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates																
2517				Minimum	3.175		Mean		5.355											
2518				Maximum	8		Median		5											
2519				SD	1.054		CV		0.197											
2520				k hat (MLE)	25.81		k star (bias corrected MLE)		24.73											
2521				Theta hat (MLE)	0.207		Theta star (bias corrected MLE)		0.217											
2522				nu hat (MLE)	3665		nu star (bias corrected)		3511											
2523				MLE Mean (bias corrected)	5.355		MLE Sd (bias corrected)		1.077											
2524				95% Percentile of Chisquare (2kstar)	66.87		90% Percentile		6.773											
2525				95% Percentile	7.24		99% Percentile		8.173											
2526				The following statistics are computed using Gamma ROS Statistics on Imputed Data																
2527				Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																
2528					WH	HW			WH		HW									
2529				95% Approx. Gamma UTL with 95% Coverage	7.659	7.694	95% Approx. Gamma UPL		7.257	7.279										
2530				95% Gamma USL	9.25	9.36														
2531																				
2532				Estimates of Gamma Parameters using KM Estimates																
2533				Mean (KM)	5.61		SD (KM)		0.768											
2534				Variance (KM)	0.59		SE of Mean (KM)		0.0921											
2535				k hat (KM)	53.35		k star (KM)		51.1											
2536				nu hat (KM)	7576		nu star (KM)		7257											
2537				theta hat (KM)	0.105		theta star (KM)		0.11											
2538				80% gamma percentile (KM)	6.257		90% gamma percentile (KM)		6.636											
2539				95% gamma percentile (KM)	6.96		99% gamma percentile (KM)		7.595											
2540																				
2541				The following statistics are computed using gamma distribution and KM estimates																
2542				Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																
2543					WH	HW			WH		HW									
2544				95% Approx. Gamma UTL with 95% Coverage	7.17	7.176	95% Approx. Gamma UPL		6.909	6.91										
2545				95% KM Gamma Percentile	6.88	6.881	95% Gamma USL		8.179	8.209										
2546																				
2547				Lognormal GOF Test on Detected Observations Only																
2548				Shapiro Wilk Test Statistic	0.831		Shapiro Wilk GOF Test													
2549				5% Shapiro Wilk Critical Value	0.946		Data Not Lognormal at 5% Significance Level													
2550				Lilliefors Test Statistic	0.247		Lilliefors GOF Test													

	A	B	C	D	E	F	G	H	I	J	K	L
2551					5% Lilliefors Critical Value	0.128		Data Not Lognormal at 5% Significance Level				
2552	Data Not Lognormal at 5% Significance Level											
2553												
2554	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2555					Mean in Original Scale	5.395			Mean in Log Scale	1.668		
2556					SD in Original Scale	1.002			SD in Log Scale	0.186		
2557					95% UTL95% Coverage	7.662			95% BCA UTL95% Coverage	6.5		
2558					95% Bootstrap (%) UTL95% Coverage	7.3			95% UPL (t)	7.242		
2559					90% Percentile (z)	6.728			95% Percentile (z)	7.197		
2560					99% Percentile (z)	8.167			95% USL	9.408		
2561												
2562	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2563					KM Mean of Logged Data	1.716			95% KM UTL (Lognormal)95% Coverage	7.195		
2564					KM SD of Logged Data	0.13			95% KM UPL (Lognormal)	6.916		
2565					95% KM Percentile Lognormal (z)	6.886			95% KM USL (Lognormal)	8.307		
2566												
2567	Background DL/2 Statistics Assuming Lognormal Distribution											
2568					Mean in Original Scale	4.765			Mean in Log Scale	1.481		
2569					SD in Original Scale	1.75			SD in Log Scale	0.42		
2570					95% UTL95% Coverage	10.12			95% UPL (t)	8.91		
2571					90% Percentile (z)	7.54			95% Percentile (z)	8.784		
2572					99% Percentile (z)	11.7			95% USL	16.12		
2573	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2574												
2575	Nonparametric Distribution Free Background Statistics											
2576	Data do not follow a Discernible Distribution (0.05)											
2577												
2578	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2579					Order of Statistic, r	70			95% UTL with95% Coverage	7.3		
2580					Approx, f used to compute achieved CC	1.842			Approximate Actual Confidence Coefficient achieved by UTL	0.876		
2581					Approximate Sample Size needed to achieve specified CC	93			95% UPL	7		
2582					95% USL	8			95% KM Chebyshev UPL	8.981		
2583												
2584	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2585	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2586	and consists of observations collected from clean unimpacted locations.											
2587	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2588	represents a background data set and when many onsite observations need to be compared with the BTV.											
2589												
2590	TDS (TOTAL DISSOLVED SOLIDS)											
2591												
2592	General Statistics											
2593					Total Number of Observations	105			Number of Distinct Observations	66		
2594									Number of Missing Observations	28		
2595					Minimum	18			First Quartile	180		
2596					Second Largest	286			Median	200		
2597					Maximum	294			Third Quartile	228		
2598					Mean	200.5			SD	39.49		
2599					Coefficient of Variation	0.197			Skewness	-0.747		
2600					Mean of logged Data	5.271			SD of logged Data	0.295		

	A	B	C	D	E	F	G	H	I	J	K	L												
2651	Nonparametric Upper Limits for Background Threshold Values																							
2652																								
2653	Order of Statistic, r																							
2654	Approx, f used to compute achieved CC			1.03		95% UTL with 95% Coverage		276																
2655						Approximate Actual Confidence Coefficient achieved by UTL		0.901																
2656						Approximate Sample Size needed to achieve specified CC		124																
2657	95% Percentile Bootstrap UTL with 95% Coverage			275.2		95% BCA Bootstrap UTL with 95% Coverage		275.2																
2658				95% UPL		267.3		90% Percentile		247.6														
2659	90% Chebyshev UPL			319.6				95% Percentile		260.8														
2660	95% Chebyshev UPL			373.5				99% Percentile		285.6														
2661																								
2662	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.																							
2663	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers																							
2664	and consists of observations collected from clean unimpacted locations.																							
2665	The use of USL tends to provide a balance between false positives and false negatives provided the data																							
2666	represents a background data set and when many onsite observations need to be compared with the BTV.																							
2667																								
2668	TOC (TOTAL ORGANIC CARBON)																							
2669																								
2670	General Statistics																							
2671	Total Number of Observations			128		Number of Missing Observations		5																
2672	Number of Distinct Observations			17																				
2673	Number of Detects			30		Number of Non-Detects		98																
2674	Number of Distinct Detects			17		Number of Distinct Non-Detects		3																
2675	Minimum Detect			0.5		Minimum Non-Detect		0.5																
2676	Maximum Detect			1.6		Maximum Non-Detect		1.5																
2677	Variance Detected			0.0938		Percent Non-Detects		76.56%																
2678	Mean Detected			1.016		SD Detected		0.306																
2679	Mean of Detected Logged Data			-0.0335		SD of Detected Logged Data		0.329																
2680																								
2681	Critical Values for Background Threshold Values (BTVs)																							
2682	Tolerance Factor K (For UTL)			1.888		d2max (for USL)		3.292																
2683																								
2684	Normal GOF Test on Detects Only																							
2685	Shapiro Wilk Test Statistic			0.956		Shapiro Wilk GOF Test																		
2686	5% Shapiro Wilk Critical Value			0.927		Detected Data appear Normal at 5% Significance Level																		
2687	Lilliefors Test Statistic			0.113		Lilliefors GOF Test																		
2688	5% Lilliefors Critical Value			0.159		Detected Data appear Normal at 5% Significance Level																		
2689	Detected Data appear Normal at 5% Significance Level																							
2690																								
2691	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution																							
2692	KM Mean			0.691		KM SD		0.258																
2693	95% UTL95% Coverage			1.178		95% KM UPL (t)		1.12																
2694	90% KM Percentile (z)			1.021		95% KM Percentile (z)		1.115																
2695	99% KM Percentile (z)			1.291		95% KM USL		1.54																
2696																								
2697	DL/2 Substitution Background Statistics Assuming Normal Distribution																							
2698	Mean			0.607		SD		0.279																
2699	95% UTL95% Coverage			1.135		95% UPL (t)		1.072																
2700	90% Percentile (z)			0.965		95% Percentile (z)		1.067																

	A	B	C	D	E	F	G	H	I	J	K	L						
2701					99% Percentile (z)	1.257					95% USL	1.527						
2702	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons																	
2703																		
2704	Gamma GOF Tests on Detected Observations Only																	
2705				A-D Test Statistic	0.638		Anderson-Darling GOF Test											
2706				5% A-D Critical Value	0.745		Detected data appear Gamma Distributed at 5% Significance Level											
2707				K-S Test Statistic	0.155		Kolmogorov-Smirnov GOF											
2708				5% K-S Critical Value	0.16		Detected data appear Gamma Distributed at 5% Significance Level											
2709	Detected data appear Gamma Distributed at 5% Significance Level																	
2710																		
2711	Gamma Statistics on Detected Data Only																	
2712				k hat (MLE)	10.36			k star (bias corrected MLE)			9.344							
2713				Theta hat (MLE)	0.0981			Theta star (bias corrected MLE)			0.109							
2714				nu hat (MLE)	621.5			nu star (bias corrected)			560.7							
2715				MLE Mean (bias corrected)	1.016													
2716				MLE Sd (bias corrected)	0.332			95% Percentile of Chisquare (2kstar)			29.75							
2717																		
2718	Gamma ROS Statistics using Imputed Non-Detects																	
2719	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																	
2720	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)																	
2721	For such situations, GROS method may yield incorrect values of UCLs and BTVs																	
2722	This is especially true when the sample size is small.																	
2723	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates																	
2724				Minimum	0.01			Mean			0.615							
2725				Maximum	1.6			Median			0.585							
2726				SD	0.34			CV			0.552							
2727				k hat (MLE)	2.477			k star (bias corrected MLE)			2.424							
2728				Theta hat (MLE)	0.248			Theta star (bias corrected MLE)			0.254							
2729				nu hat (MLE)	634.2			nu star (bias corrected)			620.6							
2730				MLE Mean (bias corrected)	0.615			MLE Sd (bias corrected)			0.395							
2731				95% Percentile of Chisquare (2kstar)	10.84			90% Percentile			1.144							
2732				95% Percentile	1.375			99% Percentile			1.88							
2733	The following statistics are computed using Gamma ROS Statistics on Imputed Data																	
2734	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																	
2735				WH	HW			WH			HW							
2736	95% Approx. Gamma UTL with 95% Coverage			1.524	1.615		95% Approx. Gamma UPL		1.371		1.437							
2737	95% Gamma USL			2.743	3.136													
2738																		
2739	Estimates of Gamma Parameters using KM Estimates																	
2740				Mean (KM)	0.691			SD (KM)			0.258							
2741				Variance (KM)	0.0666			SE of Mean (KM)			0.0325							
2742				k hat (KM)	7.161			k star (KM)			6.999							
2743				nu hat (KM)	1833			nu star (KM)			1792							
2744				theta hat (KM)	0.0964			theta star (KM)			0.0987							
2745				80% gamma percentile (KM)	0.895			90% gamma percentile (KM)			1.039							
2746				95% gamma percentile (KM)	1.168			99% gamma percentile (KM)			1.438							
2747																		
2748	The following statistics are computed using gamma distribution and KM estimates																	
2749	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods																	
2750				WH	HW			WH			HW							

	A	B	C	D	E	F	G	H	I	J	K	L
2751	95% Approx. Gamma UTL with 95% Coverage				1.183	1.185			95% Approx. Gamma UPL	1.11	1.11	
2752		95% KM Gamma Percentile			1.105	1.104			95% Gamma USL	1.707	1.739	
2753	Lognormal GOF Test on Detected Observations Only											
2754												
2755	Shapiro Wilk Test Statistic											
2756	5% Shapiro Wilk Critical Value											
2757	Lilliefors Test Statistic											
2758	5% Lilliefors Critical Value											
2759	Detected Data appear Approximate Lognormal at 5% Significance Level											
2760												
2761	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2762	Mean in Original Scale											
2763	SD in Original Scale											
2764	95% UTL95% Coverage											
2765	95% Bootstrap (%) UTL95% Coverage											
2766	90% Percentile (z)											
2767	99% Percentile (z)											
2768												
2769	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2770	KM Mean of Logged Data											
2771	KM SD of Logged Data											
2772	95% KM Percentile Lognormal (z)											
2773												
2774	Background DL/2 Statistics Assuming Lognormal Distribution											
2775	Mean in Original Scale											
2776	SD in Original Scale											
2777	95% UTL95% Coverage											
2778	90% Percentile (z)											
2779	99% Percentile (z)											
2780	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2781												
2782	Nonparametric Distribution Free Background Statistics											
2783	Data appear to follow a Discernible Distribution at 5% Significance Level											
2784												
2785	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2786	Order of Statistic, r											
2787	Approx, f used to compute achieved CC											
2788	Approximate Sample Size needed to achieve specified CC											
2789	95% USL											
2790												
2791	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2792	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2793	and consists of observations collected from clean unimpacted locations.											
2794	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2795	represents a background data set and when many onsite observations need to be compared with the BTV.											
2796												
2797	TOTAL PHENOLICS											
2798												
2799	General Statistics											
2800	Total Number of Observations											
					129				Number of Missing Observations	4		

	A	B	C	D	E	F	G	H	I	J	K	L			
2801					Number of Distinct Observations	4									
2802					Number of Detects	2				Number of Non-Detects	127				
2803					Number of Distinct Detects	2				Number of Distinct Non-Detects	3				
2804					Minimum Detect	0.009				Minimum Non-Detect	0.005				
2805					Maximum Detect	0.01				Maximum Non-Detect	0.03				
2806					Variance Detected	5.0000E-7				Percent Non-Detects	98.45%				
2807					Mean Detected	0.0095				SD Detected	7.0711E-4				
2808					Mean of Detected Logged Data	-4.658				SD of Detected Logged Data	0.0745				
2809															
2810					Warning: Data set has only 2 Detected Values.										
2811					This is not enough to compute meaningful or reliable statistics and estimates.										
2812															
2813															
2814					Critical Values for Background Threshold Values (BTVs)										
2815					Tolerance Factor K (For UTL)	1.887				d2max (for USL)	3.294				
2816															
2817					Normal GOF Test on Detects Only										
2818					Not Enough Data to Perform GOF Test										
2819															
2820					Kaplan Meier (KM) Background Statistics Assuming Normal Distribution										
2821					KM Mean	0.00528				KM SD	0.00108				
2822					95% UTL95% Coverage	0.00731				95% KM UPL (t)	0.00707				
2823					90% KM Percentile (z)	0.00666				95% KM Percentile (z)	0.00705				
2824					99% KM Percentile (z)	0.00779				95% KM USL	0.00883				
2825															
2826					DL/2 Substitution Background Statistics Assuming Normal Distribution										
2827					Mean	0.0107				SD	0.0054				
2828					95% UTL95% Coverage	0.0209				95% UPL (t)	0.0197				
2829					90% Percentile (z)	0.0176				95% Percentile (z)	0.0196				
2830					99% Percentile (z)	0.0233				95% USL	0.0285				
2831					DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons										
2832															
2833					Gamma GOF Tests on Detected Observations Only										
2834					Not Enough Data to Perform GOF Test										
2835															
2836					Gamma Statistics on Detected Data Only										
2837					k hat (MLE)	360.7				k star (bias corrected MLE)	N/A				
2838					Theta hat (MLE)	2.6340E-5				Theta star (bias corrected MLE)	N/A				
2839					nu hat (MLE)	1443				nu star (bias corrected)	N/A				
2840					MLE Mean (bias corrected)	N/A									
2841					MLE Sd (bias corrected)	N/A				95% Percentile of Chisquare (2kstar)	N/A				
2842															
2843					Estimates of Gamma Parameters using KM Estimates										
2844					Mean (KM)	0.00528				SD (KM)	0.00108				
2845					Variance (KM)	1.1561E-6				SE of Mean (KM)	2.8959E-4				
2846					k hat (KM)	24.16				k star (KM)	23.6				
2847					nu hat (KM)	6233				nu star (KM)	6089				
2848					theta hat (KM)	2.1875E-4				theta star (KM)	2.2391E-4				
2849					80% gamma percentile (KM)	0.00617				90% gamma percentile (KM)	0.00672				
2850					95% gamma percentile (KM)	0.00719				99% gamma percentile (KM)	0.00814				

A R M G r o u p L L C



Parameter

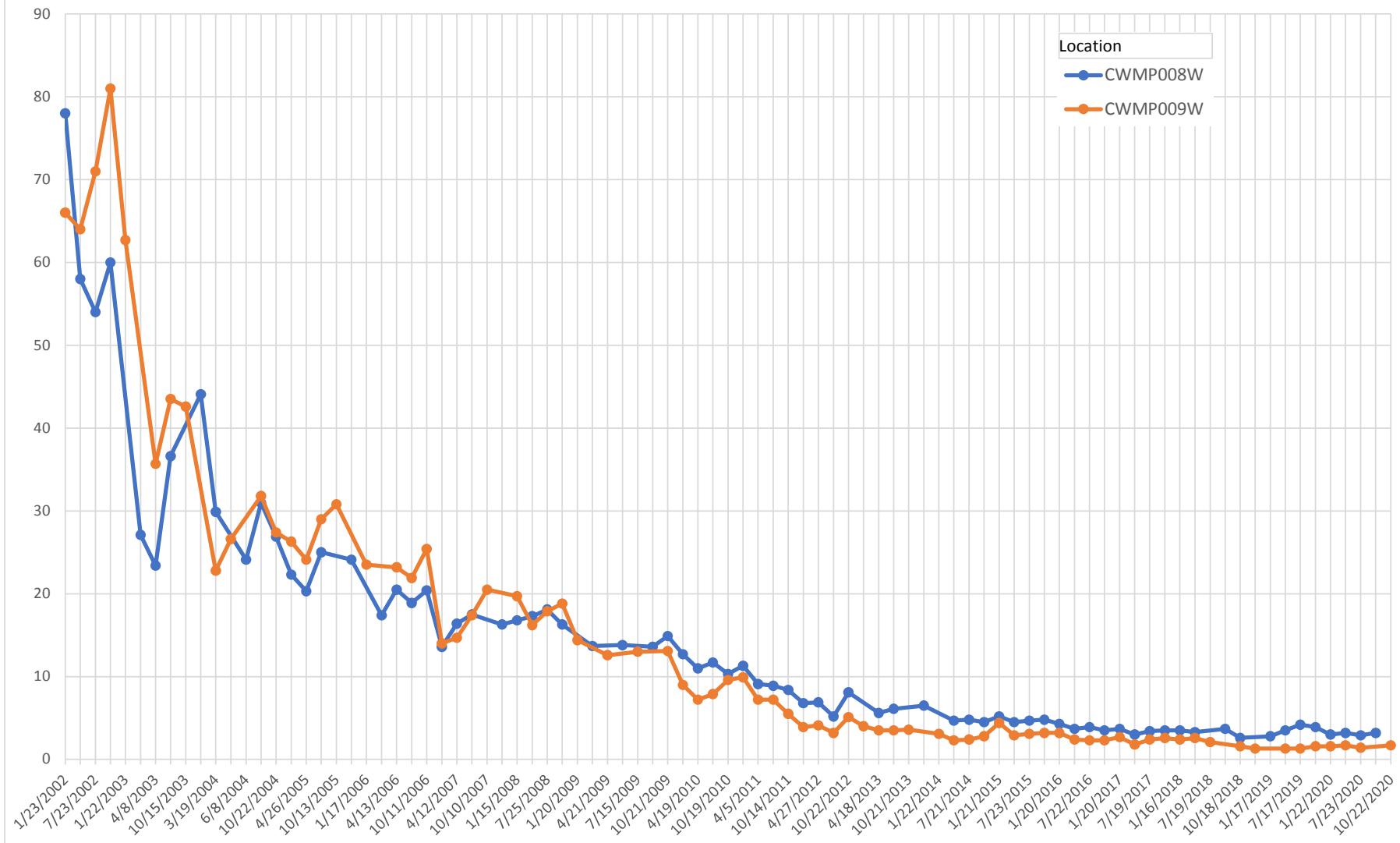
Max of Result

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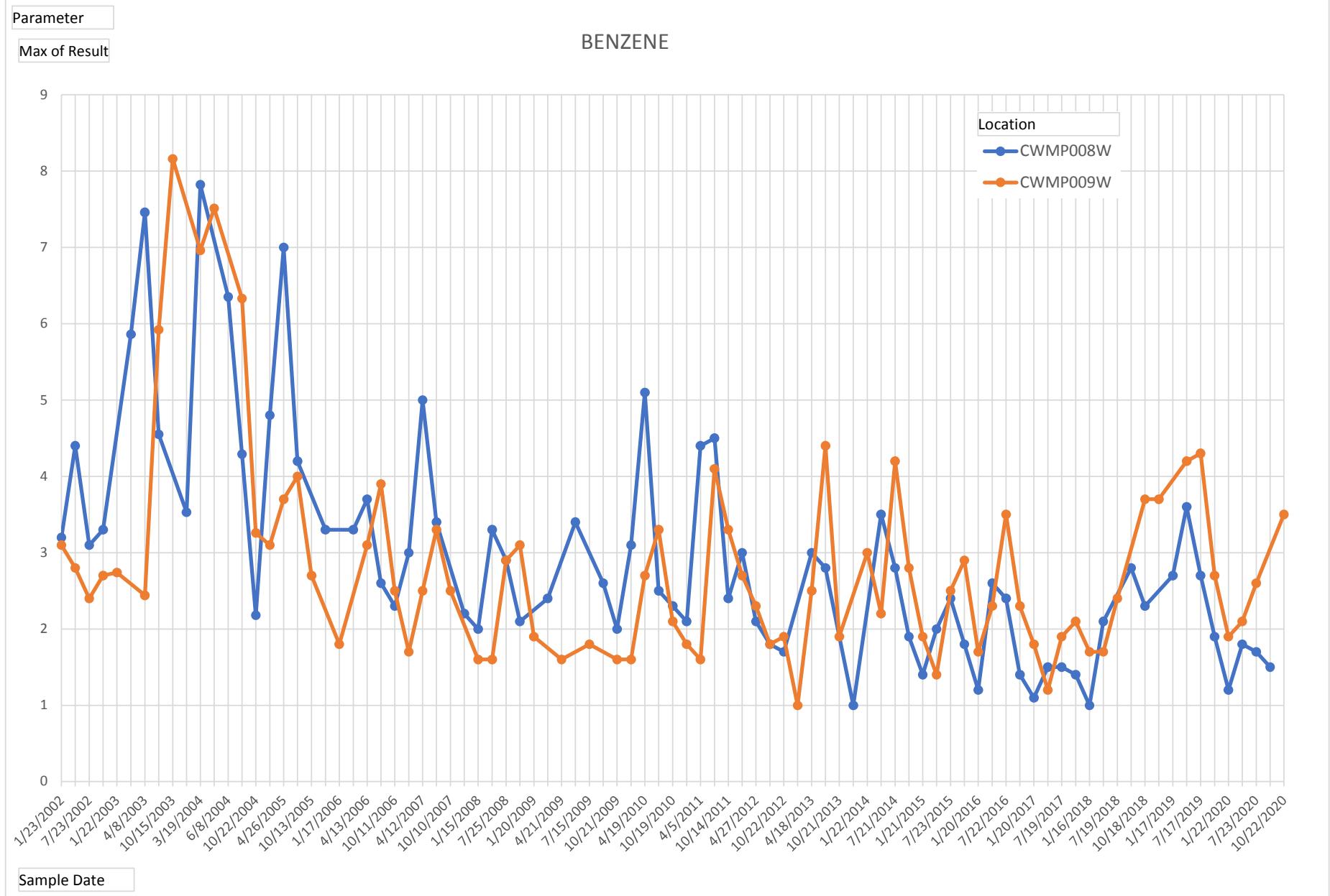
Location

CWMP008W

CWMP009W



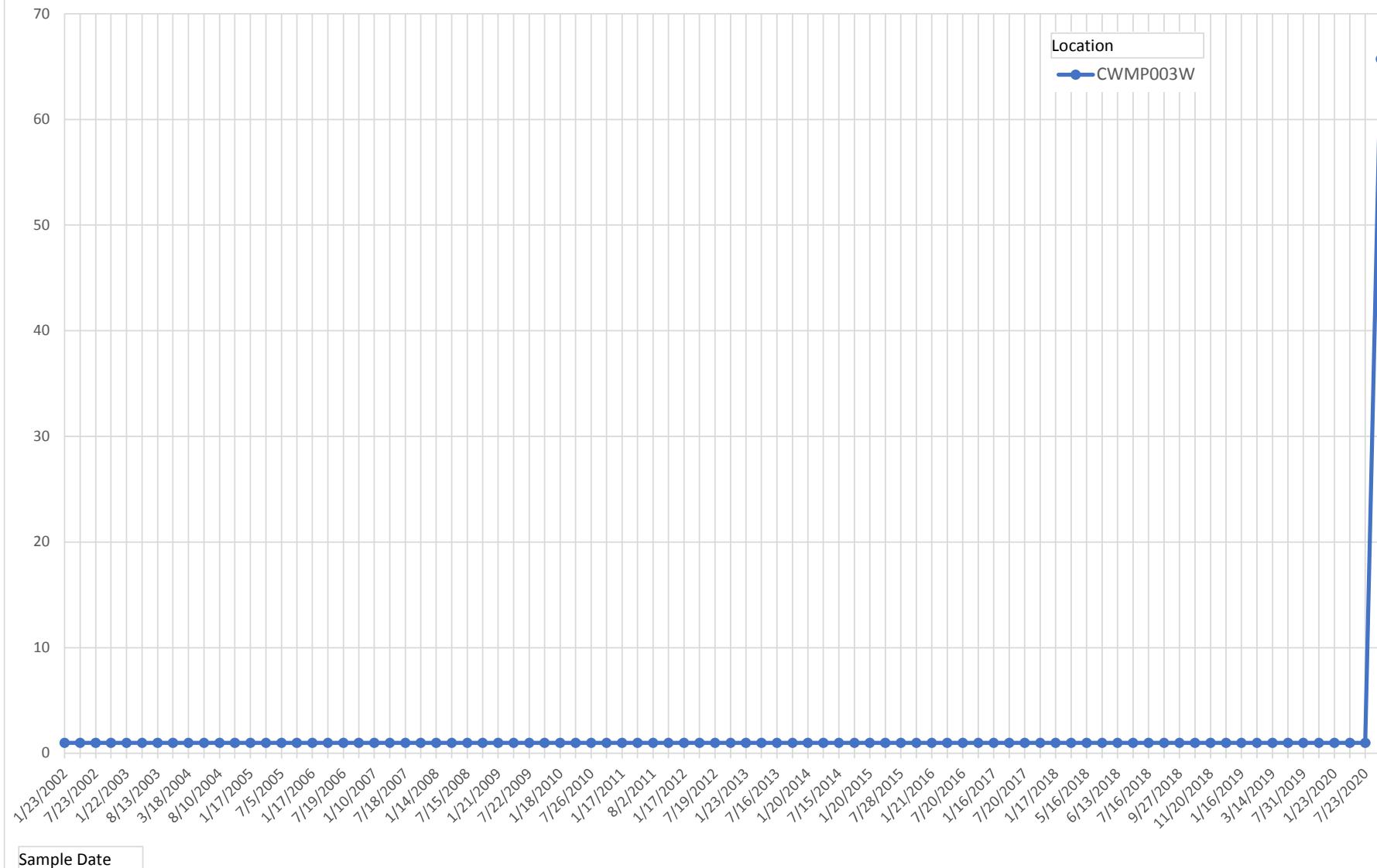
Sample Date



Parameter

Max of Result

TOLUENE



Sample Date

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT



Date Prepared/Revised

01/13/2021

DEP USE ONLY

Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

Monitoring Point Number: CWMP007W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 24.53" Longitude: 76 ° 26' 33.28"Depth to Water Level: 8.13 ft Measured from: Land Surface TOCCasing Stickup: 1.50 ft Elevation of Water Level: 445.27 ft./MSLSampling Depth: 33 ft Volume of Water Column: 41.67 galTotal Well Depth: 36.5 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 1.6Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/19/2020 Sample Collection Time: 11:58Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3135363001 Final Lab Analysis Completion Date: 10/27/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP007W
Sample Date	10/19/2020

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	0.114	EPA 350.3
BICARBONATE	15	SM18-2321
CALCIUM, TOTAL	18.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	62.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	9.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	6.8	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.7	EPA 300.0
pH-FIELD (SU)	6.98	FIELD
pH-LAB (SU)	6.29	EPA 150.1
POTASSIUM, TOTAL	2.5	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	32.6	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	349	FIELD
SPEC. COND., LAB (umhos/cm)	331	EPA 120.1
SULFATE	21	EPA 300.0
ALKALINITY	15	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	140	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.84	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	10/19/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

Monitoring Point Number: CWMP001W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 27.43" Longitude: 76 ° 26' 14.4"Depth to Water Level: 28.88 ft Measured from: Land Surface TOCCasing Stickup: 1.23 ft Elevation of Water Level: 486.25 ft./MSLSampling Depth: 57 ft Volume of Water Column: 54.96 galTotal Well Depth: 66.3 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 2.0Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/19/2020 Sample Collection Time: 13:23Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3135363002 Final Lab Analysis Completion Date: 10/27/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	10/19/2020

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	6	SM18-2321
CALCIUM, TOTAL	15	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	26.5	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	480	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	10.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	51	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	18.5	EPA 300.0
pH-FIELD (SU)	6.72	FIELD
pH-LAB (SU)	5.75	EPA 150.1
POTASSIUM, TOTAL	2.5	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	12.8	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	255	FIELD
SPEC. COND., LAB (umhos/cm)	243	EPA 120.1
SULFATE	2.1	EPA 300.0
ALKALINITY	6	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	18	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.53	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	7.49	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP001W
Sample Date	10/19/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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

General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

Monitoring Point Number: CWMP010W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 2.38" Longitude: 76 ° 26' 57.92"Depth to Water Level: 8.63 ft Measured from: Land Surface TOCCasing Stickup: 2.10 ft Elevation of Water Level: 352.27 ft./MSLSampling Depth: 17 ft Volume of Water Column: 7.16 galTotal Well Depth: 19.6 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 1.6Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/22/2020 Sample Collection Time: 14:32Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136298001 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. BrownComments:

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	10/22/2020

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	0.23	EPA 350.3
BICARBONATE	381	SM18-2321
CALCIUM, TOTAL	81.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	25	EPA 410.4
CHLORIDE	546	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	190	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	84.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	77	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	15	EPA 300.0
pH-FIELD (SU)	6.77	FIELD
pH-LAB (SU)	7.36	EPA 150.1
POTASSIUM, TOTAL	20.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	322	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2626	FIELD
SPEC. COND., LAB (umhos/cm)	22800	EPA 120.1
SULFATE	47.5	EPA 300.0
ALKALINITY	381	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1340	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	7.8	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.76	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP010W
Sample Date	10/22/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 10.82" Longitude: 76 ° 26' 55.8"Depth to Water Level: 9.18 ft Measured from: Land Surface TOCCasing Stickup: 2.70 ft Elevation of Water Level: 395.02 ft./MSLSampling Depth: 16 ft Volume of Water Column: 6.87 galTotal Well Depth: 19.7 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 4.8Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/22/2020 Sample Collection Time: 15:04Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136298002 Final Lab Analysis Completion Date: 11/3/2020Name/Affiliation of Person who Filled Out Form: Daniel A. BrownComments:

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	10/22/2020

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	29	EPA 350.3
BICARBONATE	552	SM18-2321
CALCIUM, TOTAL	175	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	110	EPA 410.4
CHLORIDE	582	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	38500	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	84.8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	13700	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.18	FIELD
pH-LAB (SU)	6.46	EPA 150.1
POTASSIUM, TOTAL	37.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	185	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2900	FIELD
SPEC. COND., LAB (umhos/cm)	2510	EPA 120.1
SULFATE	5.8	EPA 300.0
ALKALINITY	552	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1480	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	35.6	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	29.5	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP009W
Sample Date	10/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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

ANALYTE	VALUE ^T	ANALYSIS METHOD NUMBER
BENZENE	3.5	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D)	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.7	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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 11.17" Longitude: 76 ° 26' 7.08"Depth to Water Level: 43.61 ft Measured from: Land Surface TOCCasing Stickup: -0.37 ft Elevation of Water Level: 469.82 ft./MSLSampling Depth: 130 ft Volume of Water Column: 141.56 galTotal Well Depth: 140 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 2.0Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 13:06Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466001 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	10/23/2020

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	16	SM18-2321
CALCIUM, TOTAL	15.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	64.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	98	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	64	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.3	EPA 300.0
pH-FIELD (SU)	5.03	FIELD
pH-LAB (SU)	6.07	EPA 150.1
POTASSIUM, TOTAL	2.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	34.6	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	343	FIELD
SPEC. COND., LAB (umhos/cm)	316	EPA 120.1
SULFATE	4.3	EPA 300.0
ALKALINITY	16	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	210	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.66	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.84	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP005W
Sample Date	10/23/2020

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
XYLEMES (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

01/13/2021

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FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 1.48" Longitude: 76 ° 26' 36.02"Depth to Water Level: 61.21 ft Measured from: Land Surface TOCCasing Stickup: 1.90 ft Elevation of Water Level: 321.49 ft./MSLSampling Depth: 0 ft Volume of Water Column: 59.76 galTotal Well Depth: 101.9 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 12:55Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466002 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	10/23/2020

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	67	SM18-2321
CALCIUM, TOTAL	32.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	34.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	13900	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	9.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	160	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.8	EPA 300.0
pH-FIELD (SU)	6.39	FIELD
pH-LAB (SU)	6.47	EPA 150.1
POTASSIUM, TOTAL	1.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	15.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	306	FIELD
SPEC. COND., LAB (umhos/cm)	298	EPA 120.1
SULFATE	4.1	EPA 300.0
ALKALINITY	67	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	190	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	1.1	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	259	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP012W
Sample Date	10/23/2020

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
XYLEMES (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**



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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

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 56' 55.57" Longitude: 76 ° 26' 50.59"Depth to Water Level: 11.93 ft Measured from: Land Surface TOCCasing Stickup: 2.53 ft Elevation of Water Level: 300.04 ft./MSLSampling Depth: 71 ft Volume of Water Column: _____ galTotal Well Depth: 78.03 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 1.9Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 14:55Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466003 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	10/23/2020

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	10	SM18-2321
CALCIUM, TOTAL	5.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	2.7	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	380	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	1.3	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.7	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.92	EPA 300.0
pH-FIELD (SU)	5.22	FIELD
pH-LAB (SU)	6.33	EPA 150.1
POTASSIUM, TOTAL	0.56 ND	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	4.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	61	FIELD
SPEC. COND., LAB (umhos/cm)	58	EPA 120.1
SULFATE	8.6	EPA 300.0
ALKALINITY	10	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	64	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	3.7	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP016W
Sample Date	10/23/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: ManorSampling Point: Latitude: 39 ° 56' 55.11" Longitude: 76 ° 26' 51.66"Depth to Water Level: _____ ft Measured from: _____ Land Surface TOC

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

Sampling Depth: 0 ft Volume of Water Column: #Error galTotal Well Depth: _____ ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 14:11Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466004 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	10/23/2020

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	541	SM18-2321
CALCIUM, TOTAL	88.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	19	EPA 410.4
CHLORIDE	609	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	76	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	110	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	7	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	19.5	EPA 300.0
pH-FIELD (SU)	8.3	FIELD
pH-LAB (SU)	8.57	EPA 150.1
POTASSIUM, TOTAL	24.5	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	386	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2971	FIELD
SPEC. COND., LAB (umhos/cm)	2760	EPA 120.1
SULFATE	42.7	EPA 300.0
ALKALINITY	564	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1640	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	8.6	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.34	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP018S
Sample Date	10/23/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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

General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 20.41" Longitude: 76 ° 26' 45.1"Depth to Water Level: _____ ft Measured from: _____ Land Surface TOC

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

Sampling Depth: 0 ft Volume of Water Column: #Error galTotal Well Depth: _____ ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 14:21Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466005 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	10/23/2020

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	634	SM18-2321
CALCIUM, TOTAL	99.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	20	EPA 410.4
CHLORIDE	805	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	490	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	151	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	140	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	24	EPA 300.0
pH-FIELD (SU)	7.87	FIELD
pH-LAB (SU)	8.38	EPA 150.1
POTASSIUM, TOTAL	27	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	536	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3939	FIELD
SPEC. COND., LAB (umhos/cm)	3720	EPA 120.1
SULFATE	63.5	EPA 300.0
ALKALINITY	634	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	2290	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	5.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.3	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP017S
Sample Date	10/23/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

Monitoring Point Number: CWMP008W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 16.97" Longitude: 76 ° 26' 47.58"Depth to Water Level: 3.92 ft Measured from: Land Surface TOCCasing Stickup: 2.80 ft Elevation of Water Level: 418.38 ft./MSLSampling Depth: 19 ft Volume of Water Column: 3.08 galTotal Well Depth: 22.8 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: 5.8Sample Field Filtered (must be 0.45 micron)?: Yes NoSpring Flow Rate: gpmSample Date (mm/dd/yy): 10/23/2020 Sample Collection Time: 15:34Sample Collector's Name: Mr. Brian G ShadeSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3136466006 Final Lab Analysis Completion Date: 11/2/2020Name/Affiliation of Person who Filled Out Form: Daniel A. BrownComments:

I.D. No	100008
Monitoring Point No.	CWMP008W
Sample Date	10/23/2020

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	8.04	EPA 350.3
BICARBONATE	446	SM18-2321
CALCIUM, TOTAL	74.3	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	46	EPA 410.4
CHLORIDE	63.1	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	27400	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	34.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	15900	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.2	FIELD
pH-LAB (SU)	6.57	EPA 150.1
POTASSIUM, TOTAL	9.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	55.1	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1084	FIELD
SPEC. COND., LAB (umhos/cm)	968	EPA 120.1
SULFATE	4.9	EPA 300.0
ALKALINITY	446	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	484	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	2.5	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	19.1	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.	CWMP008W
Sample Date	10/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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

ANALYTE	VALUE ^T	ANALYSIS METHOD NUMBER
BENZENE	1.5	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D)	1 ND	SW846 8260B
1,1-DICHLOROETHANE	3.2	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility ID (as issued by DEP): 100008

SECTION B. FACILITY INFORMATION

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

Monitoring Point Number: CWMP002W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 19.97" Longitude: 76 ° 26' 12.3"Depth to Water Level: 64.27 ft Measured from: Land Surface TOCCasing Stickup: -1.19 ft Elevation of Water Level: 461.54 ft./MSLSampling Depth: 85 ft Volume of Water Column: 52.47 galTotal Well Depth: 100 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 11/19/2020 Sample Collection Time: 16:03Sample Collector's Name: JACK BORDENSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3142031001 Final Lab Analysis Completion Date: 12/3/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	11/19/2020

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	88	SM18-2321
CALCIUM, TOTAL	52.7	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	17	EPA 410.4
CHLORIDE	100	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	3.7	EPA 300.0
pH-FIELD (SU)	5.29	FIELD
pH-LAB (SU)	6.78	EPA 150.1
POTASSIUM, TOTAL	2.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	30	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	595	FIELD
SPEC. COND., LAB (umhos/cm)	551	EPA 120.1
SULFATE	21.4	EPA 300.0
ALKALINITY	88	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	328	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.48	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

** Total and dissolved analysis required only in conjunction with additional annual metals sampling (see page 4).

Remaining quarterly samples only require total metals analysis.

I.D. No	100008
Monitoring Point No.	CWMP002W
Sample Date	11/19/2020

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	12.2	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

General Reference: Section 273.284

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

Facility 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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 17.9" Longitude: 76 ° 26' 7.05"Depth to Water Level: 61.41 ft Measured from: Land Surface TOCCasing Stickup: -1.37 ft Elevation of Water Level: 468.12 ft./MSLSampling Depth: 130 ft Volume of Water Column: 115.42 galTotal Well Depth: 140 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 11/23/2020 Sample Collection Time: 13:15Sample Collector's Name: JACK BORDENSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3142570002 Final Lab Analysis Completion Date: 12/7/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP004W
Sample Date	11/23/2020

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	22	SM18-2321
CALCIUM, TOTAL	22.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	52.8	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	7.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	11	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	6.4	EPA 300.0
pH-FIELD (SU)	5.5	FIELD
pH-LAB (SU)	6.62	EPA 150.1
POTASSIUM, TOTAL	1.8	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	18.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	294	FIELD
SPEC. COND., LAB (umhos/cm)	278	EPA 120.1
SULFATE	6	EPA 300.0
ALKALINITY	22	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	234	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.75	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.28	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	11/23/2020

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
XYLEMES (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

01/13/2021

DEP USE ONLY

Date Received

FORM 19

**MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES**

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Site Name: Creswell Landfill

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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 Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor TownshipSampling Point: Latitude: 39 ° 57' 20.17" Longitude: 76 ° 26' 8.37"Depth to Water Level: 64.36 ft Measured from: Land Surface TOCCasing Stickup: -1.29 ft Elevation of Water Level: 459.85 ft./MSLSampling Depth: 100 ft Volume of Water Column: 15.63 galTotal Well Depth: 75 ft Sampling Method: Pumped Bailed GrabWell Purged: Yes No Well Volumes Purged: _____Sample Field Filtered (must be 0.45 micron)?: Yes No

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 11/23/2020 Sample Collection Time: 16:21Sample Collector's Name: JACK BORDENSample Collector's Affiliation: ALSLaboratory(ies) Performing Analysis: ALS EnvironmentalWere any holding times exceeded?: Yes No If yes, please explain in comments field.Lab Accreditation Number(s): 22-293Lab Sample Number(s): 3142570003 Final Lab Analysis Completion Date: 12/7/2020Name/Affiliation of Person who Filled Out Form: Daniel A. Brown

Comments: _____

I.D. No	100008
Monitoring Point No.	CWMP003W
Sample Date	11/23/2020

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	26	SM18-2321
CALCIUM, TOTAL	18.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	41.8	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	110	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	13.6	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	140	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	5	EPA 300.0
pH-FIELD (SU)	5.37	FIELD
pH-LAB (SU)	6.59	EPA 150.1
POTASSIUM, TOTAL	7.3	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	23.1	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	325	FIELD
SPEC. COND., LAB (umhos/cm)	322	EPA 120.1
SULFATE	39.6	EPA 300.0
ALKALINITY	26	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	146	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.64	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	11/23/2020

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	65.7	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLEMES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.



Environmental



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

November 30, 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:	3135363
Purchase Order:	PO1000127	Workorder ID:	4th QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, October 19, 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.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3135363001	CWMP007W	Ground Water	10/19/2020 11:58	10/19/2020 16:28	Mr. Brian G Shade
3135363002	CWMP001W	Ground Water	10/19/2020 13:23	10/19/2020 16:28	Mr. Brian G Shade
3135363003	Field Blank	Water	10/19/2020 14:30	10/19/2020 16:28	Mr. Brian G Shade
3135363004	Trip Blank	Water	10/19/2020 16:28	10/19/2020 16:28	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3135363 4th 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: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363001	Date Collected:	10/19/2020 11:58	Matrix:	Ground Water
Sample ID:	CWMP007W	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/20/20 16:16	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 16:16	DPC	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	108		%	62 - 133	SW846 8260B			10/20/20 16:16	DPC	G
4-Bromofluorobenzene (S)	102		%	79 - 114	SW846 8260B			10/20/20 16:16	DPC	G
Dibromofluoromethane (S)	105		%	78 - 116	SW846 8260B			10/20/20 16:16	DPC	G
Toluene-d8 (S)	99.7		%	76 - 127	SW846 8260B			10/20/20 16:16	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	15		mg/L	5	SM2320B-2011			10/23/20 04:56	R2B	B
Alkalinity, Total	15	2	mg/L	5	SM2320B-2011			10/23/20 04:56	R2B	I
Ammonia-N	0.114		mg/L	0.100	ASTM D6919-09			10/27/20 13:52	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/26/20 06:26	JAM	A
Chloride	62.1		mg/L	2.0	EPA 300.0			10/20/20 08:54	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/20/20 08:54	MBW	B
Nitrate-N	9.7		mg/L	0.20	EPA 300.0			10/20/20 08:54	MBW	B
pH	6.29	1	pH_Units		S4500HB-11			10/23/20 04:56	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/20 12:52	C_D	10/22/20 04:50	C_D	F
Specific Conductance	331		umhos/cm	1	SW846 9050A			10/23/20 04:56	R2B	B
Sulfate	21.0		mg/L	2.0	EPA 300.0			10/20/20 08:54	MBW	B
Total Dissolved Solids	140		mg/L	5	S2540C-11			10/21/20 10:56	KXH	B
Total Organic Carbon (TOC)	0.84		mg/L	0.50	SW846 9060A			10/20/20 22:56	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			10/20/20 04:54	R2B	B

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363001	Date Collected:	10/19/2020 11:58	Matrix:	Ground Water
Sample ID:	CWMP007W	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	18.2		mg/L	0.11	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
Iron, Total	ND		mg/L	0.067	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
Magnesium, Total	9.3		mg/L	0.11	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
Manganese, Total	0.0068		mg/L	0.0056	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
Potassium, Total	2.5		mg/L	0.56	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
Sodium, Total	32.6		mg/L	0.56	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:06 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	8.13		Feet		Field		10/19/20 11:58 BGS	C	
Elev Top MW Casing above MSL	453.40		Feet		Field		10/19/20 11:58 BGS	C	
Flow Rate	1.13		gal/min		Field		10/19/20 11:58 BGS	C	
Ground Water Elevation	445.27		ft/MSL		Field		10/19/20 11:58 BGS	C	
pH, Field (SM4500B)	6.98		pH_Units		Field		10/19/20 11:58 BGS	C	
Sample Depth	33.00		Feet		Field		10/19/20 11:58 BGS	C	
Specific Conductance, Field	349		umhos/cm	1	Field		10/19/20 11:58 BGS	C	
Temperature	13.64		Deg. C		Field		10/19/20 11:58 BGS	C	
Total Well Depth	36.50		Feet		Field		10/19/20 11:58 BGS	C	
Volume in Water Column	41.70		Gallons		Field		10/19/20 11:58 BGS	C	
Water Level After Purge	8.28		Feet		Field		10/19/20 11:58 BGS	C	
Well Volumes Purged	1.62		Vol		Field		10/19/20 11:58 BGS	C	

Ms. Susan J Scherer

Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363002	Date Collected:	10/19/2020 13:23	Matrix:	Ground Water
Sample ID:	CWMP001W	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/20/20 16:38	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 16:38	DPC	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	109		%	62 - 133	SW846 8260B			10/20/20 16:38	DPC	G
4-Bromofluorobenzene (S)	103		%	79 - 114	SW846 8260B			10/20/20 16:38	DPC	G
Dibromofluoromethane (S)	107		%	78 - 116	SW846 8260B			10/20/20 16:38	DPC	G
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/20/20 16:38	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	6		mg/L	5	SM2320B-2011			10/23/20 04:56	R2B	B
Alkalinity, Total	6	3	mg/L	5	SM2320B-2011			10/23/20 04:56	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			10/27/20 16:23	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			10/26/20 06:26	JAM	A
Chloride	26.5		mg/L	2.0	EPA 300.0			10/20/20 09:10	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/20/20 09:10	MBW	B
Nitrate-N	18.5		mg/L	0.20	EPA 300.0			10/20/20 09:10	MBW	B
pH	5.75	1	pH_Units		S4500HB-11			10/23/20 04:56	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/21/20 12:52	C_D	10/22/20 04:50	C_D	F
Specific Conductance	243		umhos/cm	1	SW846 9050A			10/23/20 04:56	R2B	B
Sulfate	2.1		mg/L	2.0	EPA 300.0			10/20/20 09:10	MBW	B
Total Dissolved Solids	18	2	mg/L	5	S2540C-11			10/21/20 10:56	KXH	B
Total Organic Carbon (TOC)	0.53		mg/L	0.50	SW846 9060A			10/20/20 22:56	PAG	D
Turbidity	7.49		NTU	0.10	SM2130B-2011			10/20/20 04:54	R2B	B

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363002	Date Collected:	10/19/2020 13:23	Matrix:	Ground Water
Sample ID:	CWMP001W	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	15.0		mg/L	0.11	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
Iron, Total	0.48		mg/L	0.067	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
Magnesium, Total	10.6		mg/L	0.11	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
Manganese, Total	0.051		mg/L	0.0056	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
Potassium, Total	2.5		mg/L	0.56	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
Sodium, Total	12.8		mg/L	0.56	SW846 6010C	10/26/20 20:25 SXC	10/27/20 10:10 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	28.88		Feet		Field		10/19/20 13:23 BGS	C	
Elev Top MW Casing above MSL	515.13		Feet		Field		10/19/20 13:23 BGS	C	
Flow Rate	1.78		gal/min		Field		10/19/20 13:23 BGS	C	
Ground Water Elevation	486.25		ft/MSL		Field		10/19/20 13:23 BGS	C	
pH, Field (SM4500B)	6.72		pH_Units		Field		10/19/20 13:23 BGS	C	
Sample Depth	57.00		Feet		Field		10/19/20 13:23 BGS	C	
Specific Conductance, Field	255		umhos/cm	1	Field		10/19/20 13:23 BGS	C	
Temperature	13.69		Deg. C		Field		10/19/20 13:23 BGS	C	
Total Well Depth	66.30		Feet		Field		10/19/20 13:23 BGS	C	
Volume in Water Column	55.01		Gallons		Field		10/19/20 13:23 BGS	C	
Water Level After Purge	46.32		Feet		Field		10/19/20 13:23 BGS	C	
Well Volumes Purged	1.95		Vol		Field		10/19/20 13:23 BGS	C	

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363003	Date Collected:	10/19/2020 14:30	Matrix:	Water
Sample ID:	Field Blank	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/20/20 17:01	DPC	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 17:01	DPC	A
<i>Surrogate Recoveries</i>										
1,2-Dichloroethane-d4 (S)	111		%	62 - 133	SW846 8260B			10/20/20 17:01	DPC	A
4-Bromofluorobenzene (S)	102		%	79 - 114	SW846 8260B			10/20/20 17:01	DPC	A
Dibromofluoromethane (S)	106		%	78 - 116	SW846 8260B			10/20/20 17:01	DPC	A
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B			10/20/20 17:01	DPC	A

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3135363004	Date Collected:	10/19/2020 16:28	Matrix:	Water
Sample ID:	Trip Blank	Date Received:	10/19/2020 16:28		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Toluene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/20/20 17:23	DPC	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/20/20 17:23	DPC	A
<i>Surrogate Recoveries</i>										
1,2-Dichloroethane-d4 (S)	110		%	62 - 133	SW846 8260B			10/20/20 17:23	DPC	A
4-Bromofluorobenzene (S)	103		%	79 - 114	SW846 8260B			10/20/20 17:23	DPC	A
Dibromofluoromethane (S)	105		%	78 - 116	SW846 8260B			10/20/20 17:23	DPC	A
Toluene-d8 (S)	99.5		%	76 - 127	SW846 8260B			10/20/20 17:23	DPC	A

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ANALYTICAL RESULTS

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3135363001	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.				
3135363001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3135363002	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.				
3135363002	2	CWMP001W	S2540C-11	Total Dissolved Solids
The method requires a minimum filter weight after drying of 0.0025g. The sample did not meet these requirements. A bias may exist with the result.				
3135363002	3	CWMP001W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3135363 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3135363001	CWMP007W	ASTM D6919-09		
3135363001	CWMP007W	EPA 300.0		
3135363001	CWMP007W	EPA 410.4		
3135363001	CWMP007W	Field		
3135363001	CWMP007W	S2540C-11		
3135363001	CWMP007W	S4500HB-11		
3135363001	CWMP007W	SM2130B-2011		
3135363001	CWMP007W	SM2320B-2011		
3135363001	CWMP007W	SW846 6010C	SW846 3015	
3135363001	CWMP007W	SW846 8260B		
3135363001	CWMP007W	SW846 9050A		
3135363001	CWMP007W	SW846 9060A		
3135363001	CWMP007W	SW846 9066	420.4/9066	
3135363002	CWMP001W	ASTM D6919-09		
3135363002	CWMP001W	EPA 300.0		
3135363002	CWMP001W	EPA 410.4		
3135363002	CWMP001W	Field		
3135363002	CWMP001W	S2540C-11		
3135363002	CWMP001W	S4500HB-11		
3135363002	CWMP001W	SM2130B-2011		
3135363002	CWMP001W	SM2320B-2011		
3135363002	CWMP001W	SW846 6010C	SW846 3015	
3135363002	CWMP001W	SW846 8260B		
3135363002	CWMP001W	SW846 9050A		
3135363002	CWMP001W	SW846 9060A		
3135363002	CWMP001W	SW846 9066	420.4/9066	
3135363003	Field Blank	SW846 8260B		
3135363004	Trip Blank	SW846 8260B		

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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COC #

ALS Q



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

Date Required: Approved By: _____

Email? -Y mreider@LCSWMA.com

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

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml
Preservative	HCl	H ₂ SO ₄	HCl	—	—	H ₂ SO ₄	HNO ₃	None	None

ANALYSES/METHOD REQUESTED

	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, NO ₃ , Cl, F, SpC, SO ₄ , Turb, TDS	Alkalinity, HCO ₃
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, NO ₃ , Cl, F, SpC, SO ₄ , Turb, TDS	Alkalinity, HCO ₃	Courier/Tracking #:	Sample/COC Comments
1. CWMP007W	10/19/20	1158	G	GW	2	1	2	X	X	1	1	1	1	
2. CWMP001W	10/19/20	1323	G	GW	2	1	2	X	X	1	1	1	1	
3. Field Blank	10/19/20	1430	G	GW			2							
4. Trip Blank	10/19/20	1628	G	GW			2							
5														
6														
7														
8														
9														ALS Field Services: <input type="checkbox"/> Pickup <input type="checkbox"/> Labor <input type="checkbox"/> Composite_Sampling <input type="checkbox"/> Rental_Equipment <input type="checkbox"/> Other:
10														

Project Comments:		LOGGED BY (signature):				DATE		TIME		Data Deliverables		Special Processing		State Samples Collected In	
		REVIEWED BY (signature):				DATE		TIME							
Relinquished By Company Name		Date	Time	Received By / Company Name				Date	Time						
1	XJOSWAD	ACW	10/19/20	1628	2	TS		10/19/20	1628	<input type="checkbox"/>	NY				
3					4					<input type="checkbox"/>	NJ				
5					6					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PA
7					8					<input type="checkbox"/>	NC				
9					10					<input type="checkbox"/>					

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

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Rev 8/04



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Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
LC ShmA	S363	TS	10/19/20
1. Were airbills / tracking numbers present and recorded?.....			
Tracking number: _____			
<input checked="" type="radio"/> NONE YES NO			
2. Are Custody Seals on shipping containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
3. Are Custody Seals on sample containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
4. Is there a COC (Chain-of-Custody) present?.....			
<input checked="" type="radio"/> YES NO			
5. Are the COC and bottle labels complete, legible and in agreement?.....			
<input checked="" type="radio"/> YES NO			
5a. Does the COC contain sample locations?.....			
<input checked="" type="radio"/> YES NO			
5b. Does the COC contain date and time of sample collection for all samples?.....			
<input checked="" type="radio"/> YES NO			
5c. Does the COC contain sample collectors name?.....			
<input checked="" type="radio"/> YES NO			
5d. Does the COC note the type(s) of preservation for all bottles?.....			
<input checked="" type="radio"/> YES NO			
5e. Does the COC note the number of bottles submitted for each sample?.....			
<input checked="" type="radio"/> YES NO			
5f. Does the COC note the type of sample, composite or grab?.....			
<input checked="" type="radio"/> YES NO			
5g. Does the COC note the matrix of the sample(s)?.....			
<input checked="" type="radio"/> YES NO			
6. Are all aqueous samples requiring preservation preserved correctly?^.....			
N/A <input checked="" type="radio"/> YES NO			
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?.....			
<input checked="" type="radio"/> YES NO			
8. Are all samples within holding times for the requested analyses?.....			
<input checked="" type="radio"/> YES NO			
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.).....			
<input checked="" type="radio"/> 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?.....			
<input checked="" type="radio"/> YES NO			
12. Were sample temperatures measured at 0.0-6.0°C.....			
<input checked="" type="radio"/> YES NO			
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below.....			
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: 204 _____

Radiological (µCi): _____

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

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



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December 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:	3142031
Purchase Order:	PO1000127	Workorder ID:	4th QTR 2020 CWMP & OB/PAIRED

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Thursday, November 19, 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.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3142031001	CWMP002W	Ground Water	11/19/2020 16:03	11/19/2020 17:30	JACK BORDEN
3142031002	CWOB091W	Ground Water	11/19/2020 16:20	11/19/2020 17:30	JACK BORDEN

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SAMPLE SUMMARY

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

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: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142031001	Date Collected:	11/19/2020 16:03	Matrix:	Ground Water
Sample ID:	CWMP002W	Date Received:	11/19/2020 17:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Bromoform	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Chloroethane	53.7		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Chloroform	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,4-Dichlorobenzene	1.1		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,1-Dichloroethane	12.2		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			11/23/20 04:10	PDK G	
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Styrene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			11/23/20 04:10	PDK G	
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
1,2,3-Trichloropropene	ND		ug/L	2.0	SW846 8260B			11/23/20 04:10	PDK G	
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/20 04:10	PDK G	
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>	<i>Cntr</i>

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142031001	Date Collected:	11/19/2020 16:03	Matrix:	Ground Water
Sample ID:	CWMP002W	Date Received:	11/19/2020 17:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
1,2-Dichloroethane-d4 (S)	95		%	62 - 133	SW846 8260B		11/23/20 04:10	PDK	G	
4-Bromofluorobenzene (S)	106		%	79 - 114	SW846 8260B		11/23/20 04:10	PDK	G	
Dibromofluoromethane (S)	93.6		%	78 - 116	SW846 8260B		11/23/20 04:10	PDK	G	
Toluene-d8 (S)	92.4		%	76 - 127	SW846 8260B		11/23/20 04:10	PDK	G	
WET CHEMISTRY										
Alkalinity, Bicarbonate	88		mg/L	5	SM2320B-2011		11/22/20 07:50	R2B	B	
Alkalinity, Total	88	2	mg/L	5	SM2320B-2011		11/22/20 07:50	R2B	I	
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09		12/3/20 00:47	JXL	A	
Chemical Oxygen Demand (COD)	17		mg/L	15	EPA 410.4		12/3/20 14:31	AK	A	
Chloride	100		mg/L	2.0	EPA 300.0		11/20/20 14:22	MBW	B	
Fluoride	ND		mg/L	0.20	EPA 300.0		11/20/20 14:22	MBW	B	
Nitrate-N	3.7		mg/L	0.20	EPA 300.0		11/20/20 14:22	MBW	B	
pH	6.78	1	pH_Units		S4500HB-11		11/22/20 07:50	R2B	B	
Phenolics	ND		mg/L	0.005	SW846 9066	11/20/20 13:06	C_D	11/23/20 14:53	VXF	F
Specific Conductance	551		umhos/cm	1	SW846 9050A		11/22/20 07:50	R2B	B	
Sulfate	21.4		mg/L	2.0	EPA 300.0		11/20/20 14:22	MBW	B	
Total Dissolved Solids	328		mg/L	5	S2540C-11		11/23/20 12:46	KXH	B	
Total Organic Carbon (TOC)	4.9		mg/L	0.50	SW846 9060A		11/25/20 01:09	PAG	D	
Turbidity	0.48		NTU	0.10	SM2130B-2011		11/20/20 08:12	DXC	B	
METALS										
Calcium, Total	52.7		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
Magnesium, Total	17.2		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
Manganese, Total	1.1		mg/L	0.0056	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
Potassium, Total	2.9		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
Sodium, Total	30.0		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 11:13	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	64.27		Feet		Field		11/19/20 16:03	BGS	C	
Elev Top MW Casing above MSL	525.81		Feet		Field		11/19/20 16:03	BGS	C	
Ground Water Elevation	461.54		ft/MSL		Field		11/19/20 16:03	BGS	C	
pH, Field (SM4500B)	5.29		pH_Units		Field		11/19/20 16:03	BGS	C	
Sample Depth	85.00		Feet		Field		11/19/20 16:03	BGS	C	
Specific Conductance, Field	595		umhos/cm	1	Field		11/19/20 16:03	BGS	C	
Temperature	9.97		Deg. C		Field		11/19/20 16:03	BGS	C	
Total Well Depth	100.00		Feet		Field		11/19/20 16:03	BGS	C	

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142031001** Date Collected: 11/19/2020 16:03 Matrix: Ground Water
Sample ID: **CWMP002W** Date Received: 11/19/2020 17:30

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	Cntr
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Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142031002	Date Collected:	11/19/2020 16:20	Matrix:	Ground Water
Sample ID:	CWOB091W	Date Received:	11/19/2020 17:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
VOLATILE ORGANICS										
Benzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Bromodichloromethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Bromoform	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Bromomethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Carbon Tetrachloride	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Chlorobenzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Chlorodibromomethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Chloroethane	232		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Chloroform	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Chloromethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2-Dibromoethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2-Dichlorobenzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,3-Dichlorobenzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,4-Dichlorobenzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,1-Dichloroethane	10.2		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2-Dichloroethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,1-Dichloroethene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
cis-1,2-Dichloroethene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
trans-1,2-Dichloroethene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2-Dichloropropane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,3-Dichloropropene, Total	ND		ug/L	10.0	SW846 8260B			11/23/20 23:29	VLM H	
Ethylbenzene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Methylene Chloride	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Styrene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,1,2,2-Tetrachloroethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Tetrachloroethene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Toluene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Total Xylenes	ND		ug/L	15.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2,4-Trichlorobenzene	ND		ug/L	10.0	SW846 8260B			11/23/20 23:29	VLM H	
1,1,1-Trichloroethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,1,2-Trichloroethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Trichloroethene	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
Trichlorofluoromethane	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
1,2,3-Trichloropropane	ND		ug/L	10.0	SW846 8260B			11/23/20 23:29	VLM H	
Vinyl Chloride	ND		ug/L	5.0	SW846 8260B			11/23/20 23:29	VLM H	
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>	<i>Cntr</i>

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142031002	Date Collected:	11/19/2020 16:20	Matrix:	Ground Water
Sample ID:	CWOB091W	Date Received:	11/19/2020 17:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
1,2-Dichloroethane-d4 (S)	72.5		%	62 - 133	SW846 8260B		11/23/20 23:29	VLM	H
4-Bromofluorobenzene (S)	99.4		%	79 - 114	SW846 8260B		11/23/20 23:29	VLM	H
Dibromofluoromethane (S)	87.3		%	78 - 116	SW846 8260B		11/23/20 23:29	VLM	H
Toluene-d8 (S)	101		%	76 - 127	SW846 8260B		11/23/20 23:29	VLM	H
WET CHEMISTRY									
Alkalinity, Bicarbonate	295		mg/L	5	SM2320B-2011		11/22/20 07:50	R2B	B
Alkalinity, Total	295	2	mg/L	5	SM2320B-2011		11/22/20 07:50	R2B	I
Ammonia-N	0.737		mg/L	0.100	ASTM D6919-09		12/3/20 01:01	JXL	A
Chemical Oxygen Demand (COD)	23		mg/L	15	EPA 410.4		12/3/20 14:31	AK	A
Chloride	69.8		mg/L	2.0	EPA 300.0		11/20/20 14:38	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0		11/20/20 14:38	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0		11/20/20 14:38	MBW	B
pH	6.86	1	pH_Units		S4500HB-11		11/22/20 07:50	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/20/20 13:06 C_D	11/23/20 14:53	VXF	F
Specific Conductance	758		umhos/cm	1	SW846 9050A		11/22/20 07:50	R2B	B
Sulfate	25.2		mg/L	2.0	EPA 300.0		11/20/20 14:38	MBW	B
Total Dissolved Solids	436		mg/L	5	S2540C-11		11/23/20 12:46	KXH	B
Total Organic Carbon (TOC)	7.5		mg/L	0.50	SW846 9060A		11/25/20 01:09	PAG	D
Turbidity	0.90		NTU	0.10	SM2130B-2011		11/20/20 08:12	DXC	B
METALS									
Calcium, Total	72.2		mg/L	0.11	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
Iron, Total	9.7		mg/L	0.067	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
Magnesium, Total	27.6		mg/L	0.11	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
Manganese, Total	12.8		mg/L	0.0056	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
Potassium, Total	3.7		mg/L	0.56	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
Sodium, Total	43.6		mg/L	0.56	SW846 6010C	11/28/20 14:08 AHI	12/2/20 11:16	SRT	J1
FIELD PARAMETERS									
Depth to Water Level	50.38		Feet		Field		11/19/20 16:20	BGS	C
Elev Top MW Casing above MSL	537.98		Feet		Field		11/19/20 16:20	BGS	C
Ground Water Elevation	487.60		ft/MSL		Field		11/19/20 16:20	BGS	C
pH, Field (SM4500B)	5.44		pH_Units		Field		11/19/20 16:20	BGS	C
Sample Depth	154.70		Feet		Field		11/19/20 16:20	BGS	C
Specific Conductance, Field	824		umhos/cm	1	Field		11/19/20 16:20	BGS	C
Temperature	9.46		Deg. C		Field		11/19/20 16:20	BGS	C
Total Well Depth	175.80		Feet		Field		11/19/20 16:20	BGS	C

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142031002** Date Collected: 11/19/2020 16:20 Matrix: Ground Water
Sample ID: **CWOB091W** Date Received: 11/19/2020 17:30

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
Water Level After Purge	86.49		Feet		Field			11/19/20 16:20	BGS C

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3142031001	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.				
3142031001	2	CWMP002W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3142031002	1	CWOB091W	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.				
3142031002	2	CWOB091W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3142031 4th QTR 2020 CWMP & OB/PAIRED

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3142031001	CWMP002W	ASTM D6919-09		
3142031001	CWMP002W	EPA 300.0		
3142031001	CWMP002W	EPA 410.4		
3142031001	CWMP002W	Field		
3142031001	CWMP002W	S2540C-11		
3142031001	CWMP002W	S4500HB-11		
3142031001	CWMP002W	SM2130B-2011		
3142031001	CWMP002W	SM2320B-2011		
3142031001	CWMP002W	SW846 6010C	SW846 3015	
3142031001	CWMP002W	SW846 8260B		
3142031001	CWMP002W	SW846 9050A		
3142031001	CWMP002W	SW846 9060A		
3142031001	CWMP002W	SW846 9066	420.4/9066	
3142031002	CWOB091W	ASTM D6919-09		
3142031002	CWOB091W	EPA 300.0		
3142031002	CWOB091W	EPA 410.4		
3142031002	CWOB091W	Field		
3142031002	CWOB091W	S2540C-11		
3142031002	CWOB091W	S4500HB-11		
3142031002	CWOB091W	SM2130B-2011		
3142031002	CWOB091W	SM2320B-2011		
3142031002	CWOB091W	SW846 6010C	SW846 3015	
3142031002	CWOB091W	SW846 8260B		
3142031002	CWOB091W	SW846 9050A		
3142031002	CWOB091W	SW846 9060A		
3142031002	CWOB091W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS



1
of
1

* 3 1 4 2 0 3 1 *

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

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Client Name: Lancaster County Solid Waste MA

Address: 1299 Harrisburg Pike, P.O. Box 4424

Lancaster, PA 17604

Contact: Mark Reider

Phone#: (717) 735-0193

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

Bill To: Lancaster County Solid Waste MA

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

Date Required: Approved By: _____

Email? -Y mreider@LCSWMA.com

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

Sample Description/Location
(as it will appear on the lab report)

Sample
Date
Time

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

ANALYSES/METHOD REQUESTED

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
	G or C								

Enter Number of Containers Per Sample or Field Results Below.

1. CWMP ØØZW	11-19-20	1603	G GW	2	1	2	X	X	1	1	1	1	
2. CNOB Ø91W	11-19-20	1620	G GW	Z	1	Z	X	X	1	1	1	1	
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

Project Comments:

Jake B.
S.A. B.

LOGGED BY(signature):

DATE

TIME

REVIEWED BY(signature):

DATE

TIME

Relinquished By / Company Name

Date

Time

Received By / Company Name

Date

Time

1 ~~ALS~~ ALS

11-19-20

1730

Com

11/19/19

172

3

4

5

6

7

8

9

10

* G=Grab; C=Composite

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

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.										by Receiving Lab)			
										Cooler Temp: <u>0</u> Therm ID: <u>525</u> No. of Coolers: <u> </u> Y <u> </u> N Initial Custody Seals Present? <u> </u> (If present) Seals Intact? <u> </u> Received on Ice? <u> </u> COC/Labels Complete/Accurate? <u> </u> Cont. In Good Cond.? <u> </u> Correct Containers? <u> </u> Correct Sample Volumes? <u> </u> Correct Preservation? <u> </u> Headspace/Volatiles? <u> </u> Courier/Tracking #: <u> </u> Sample/COC Comments			
										ALS Field Services: <input type="checkbox"/> Pickup <input type="checkbox"/> Labor <input type="checkbox"/> Composite_Sampling <input type="checkbox"/> Rental_Equipment <input type="checkbox"/> Other:			
										Data Deliverables: <input type="checkbox"/> Standard <input type="checkbox"/> CLP-like <input type="checkbox"/> USACE <input type="checkbox"/> USACE Reportable to PADEP? Yes <input type="checkbox"/> PWSID # <u> </u> Sample Disposal Lab <input checked="" type="checkbox"/> Special <input type="checkbox"/> EODS: Format Type- <u> </u>			
										State Samples Collected In NY <input type="checkbox"/> NJ <input type="checkbox"/> PA <input checked="" type="checkbox"/> NC <input type="checkbox"/>			

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

Rev 8/04



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Middletown, PA 17057
P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
CCSWA	3142031	G	11/20/20
1. Were airbills / tracking numbers present and recorded?.....			
Tracking number: _____			
NONE YES NO			
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 YES NO			
5. Are the COC and bottle labels complete, legible and in agreement?.....			
YES YES NO			
5a. Does the COC contain sample locations?.....			
YES YES NO			
5b. Does the COC contain date and time of sample collection for all samples?.....			
YES YES NO			
5c. Does the COC contain sample collectors name?.....			
YES YES NO			
5d. Does the COC note the type(s) of preservation for all bottles?.....			
YES YES NO			
5e. Does the COC note the number of bottles submitted for each sample?.....			
YES YES NO			
5f. Does the COC note the type of sample, composite or grab?.....			
YES YES NO			
5g. Does the COC note the matrix of the sample(s)?.....			
YES 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 YES NO			
8. Are all samples within holding times for the requested analyses?.....			
YES YES NO			
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.).....			
YES 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?.....			
NO YES NO			
12. Were sample temperatures measured at 0.0-6.0°C.....			
YES YES NO			
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below.			
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): D _____

Thermometer ID: 505 _____

Radiological (μ Ci): _____

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

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



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December 8, 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:	3142570
Purchase Order:	PO1000127	Workorder ID:	4th QTR 2020 CWMP & OB/PAIRED

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, November 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.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3142570001	CWOB089W	Ground Water	11/23/2020 10:21	11/23/2020 17:27	JACK BORDEN
3142570002	CWMP004W	Ground Water	11/23/2020 13:15	11/23/2020 17:27	JACK BORDEN
3142570003	CWMP003W	Ground Water	11/23/2020 16:21	11/23/2020 17:27	JACK BORDEN
3142570004	Trip Blank	Water	11/23/2020 10:21	11/23/2020 17:27	JACK BORDEN

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SAMPLE SUMMARY

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

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: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570001	Date Collected:	11/23/2020 10:21	Matrix:	Ground Water
Sample ID:	CWOB089W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Bromoform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Chloroethane	1.4		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Chloroform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,1-Dichloroethane	12.6		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			11/24/20 23:13	PDK G	
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Styrene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Toluene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:13	PDK G	
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
1,2,3-Trichloropropene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:13	PDK G	
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:13	PDK G	
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>	<i>Cntr</i>

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570001	Date Collected:	11/23/2020 10:21	Matrix:	Ground Water
Sample ID:	CWOB089W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
1,2-Dichloroethane-d4 (S)	104		%	62 - 133	SW846 8260B		11/24/20 23:13	PDK	G	
4-Bromofluorobenzene (S)	89.1		%	79 - 114	SW846 8260B		11/24/20 23:13	PDK	G	
Dibromofluoromethane (S)	98.1		%	78 - 116	SW846 8260B		11/24/20 23:13	PDK	G	
Toluene-d8 (S)	92.3		%	76 - 127	SW846 8260B		11/24/20 23:13	PDK	G	
WET CHEMISTRY										
Alkalinity, Bicarbonate	103		mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	B	
Alkalinity, Total	103	2	mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	I	
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09		12/7/20 18:19	JXL	A	
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4		12/3/20 17:16	AK	A	
Chloride	37.5		mg/L	2.0	EPA 300.0		11/24/20 06:23	MBW	B	
Fluoride	ND		mg/L	0.20	EPA 300.0		11/24/20 06:23	MBW	B	
Nitrate-N	ND		mg/L	0.20	EPA 300.0		11/24/20 06:23	MBW	B	
pH	8.10	1	pH_Units		S4500HB-11		11/26/20 02:21	R2B	B	
Phenolics	ND		mg/L	0.005	SW846 9066	12/1/20 16:00	VXF	12/2/20 16:09	VXF	F
Specific Conductance	303		umhos/cm	1	SW846 9050A		11/26/20 02:21	R2B	B	
Sulfate	4.6		mg/L	2.0	EPA 300.0		11/24/20 06:23	MBW	B	
Total Dissolved Solids	238		mg/L	5	S2540C-11		11/25/20 11:20	KXH	B	
Total Organic Carbon (TOC)	1.2		mg/L	0.50	SW846 9060A		11/30/20 23:19	PAG	D	
Turbidity	54.7		NTU	0.50	SM2130B-2011		11/24/20 05:30	R2B	B	
METALS										
Calcium, Total	43.6		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
Iron, Total	4.1		mg/L	0.067	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
Magnesium, Total	6.8		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
Manganese, Total	0.20		mg/L	0.0056	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
Potassium, Total	2.3		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
Sodium, Total	9.4		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 15:00	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	43.82		Feet		Field		11/23/20 10:21	BGS	C	
Elev Top MW Casing above MSL	526.06		Feet		Field		11/23/20 10:21	BGS	C	
Flow Rate	2.38		gal/min		Field		11/23/20 10:21	BGS	C	
Ground Water Elevation	482.24		ft/MSL		Field		11/23/20 10:21	BGS	C	
pH, Field (SM4500B)	6.80		pH_Units		Field		11/23/20 10:21	BGS	C	
Sample Depth	135.00		Feet		Field		11/23/20 10:21	BGS	C	
Specific Conductance, Field	363		umhos/cm	1	Field		11/23/20 10:21	BGS	C	
Temperature	9.62		Deg. C		Field		11/23/20 10:21	BGS	C	

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

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142570001** Date Collected: 11/23/2020 10:21 Matrix: Ground Water
Sample ID: **CWOB089W** Date Received: 11/23/2020 17:27

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
Total Well Depth	138.74		Feet		Field		11/23/20 10:21	BGS	C
Volume in Water Column	139.53		Gallons		Field		11/23/20 10:21	BGS	C
Water Level After Purge	84.45		Feet		Field		11/23/20 10:21	BGS	C
Well Volumes Purged	0.51		Vol		Field		11/23/20 10:21	BGS	C

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Project Coordinator**ALS Environmental Laboratory Locations Across North America**

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570002	Date Collected:	11/23/2020 13:15	Matrix:	Ground Water
Sample ID:	CWMP004W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Bromoform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Chloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Chloroform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			11/24/20 23:36	PDK G	
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Styrene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Toluene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:36	PDK G	
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
1,2,3-Trichloropropene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:36	PDK G	
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:36	PDK G	
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>	<i>Cntr</i>

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570002	Date Collected:	11/23/2020 13:15	Matrix:	Ground Water
Sample ID:	CWMP004W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
1,2-Dichloroethane-d4 (S)	107		%	62 - 133	SW846 8260B		11/24/20 23:36	PDK	G	
4-Bromofluorobenzene (S)	91		%	79 - 114	SW846 8260B		11/24/20 23:36	PDK	G	
Dibromofluoromethane (S)	99.3		%	78 - 116	SW846 8260B		11/24/20 23:36	PDK	G	
Toluene-d8 (S)	92.7		%	76 - 127	SW846 8260B		11/24/20 23:36	PDK	G	
WET CHEMISTRY										
Alkalinity, Bicarbonate	22		mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	B	
Alkalinity, Total	22	2	mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	I	
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09		12/7/20 18:33	JXL	A	
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4		12/3/20 17:16	AK	A	
Chloride	52.8		mg/L	2.0	EPA 300.0		11/24/20 06:43	MBW	B	
Fluoride	ND		mg/L	0.20	EPA 300.0		11/24/20 06:43	MBW	B	
Nitrate-N	6.4		mg/L	0.20	EPA 300.0		11/24/20 06:43	MBW	B	
pH	6.62	1	pH_Units		S4500HB-11		11/26/20 02:21	R2B	B	
Phenolics	ND		mg/L	0.005	SW846 9066	12/1/20 16:00	VXF	12/2/20 16:09	VXF	F
Specific Conductance	278		umhos/cm	1	SW846 9050A		11/26/20 02:21	R2B	B	
Sulfate	6.0		mg/L	2.0	EPA 300.0		11/24/20 06:43	MBW	B	
Total Dissolved Solids	234		mg/L	5	S2540C-11		11/25/20 11:20	KXH	B	
Total Organic Carbon (TOC)	0.75		mg/L	0.50	SW846 9060A		11/30/20 23:19	PAG	D	
Turbidity	0.28		NTU	0.10	SM2130B-2011		11/24/20 05:30	R2B	B	
METALS										
Calcium, Total	22.2		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
Magnesium, Total	7.6		mg/L	0.11	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
Manganese, Total	0.011		mg/L	0.0056	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
Potassium, Total	1.8		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
Sodium, Total	18.2		mg/L	0.56	SW846 6010C	11/28/20 14:08	AHI	12/2/20 16:18	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	61.41		Feet		Field		11/23/20 13:15	BGS	C	
Elev Top MW Casing above MSL	529.53		Feet		Field		11/23/20 13:15	BGS	C	
Ground Water Elevation	468.12		ft/MSL		Field		11/23/20 13:15	BGS	C	
pH, Field (SM4500B)	5.50		pH_Units		Field		11/23/20 13:15	BGS	C	
Sample Depth	130.00		Feet		Field		11/23/20 13:15	BGS	C	
Specific Conductance, Field	294		umhos/cm	1	Field		11/23/20 13:15	BGS	C	
Temperature	10.28		Deg. C		Field		11/23/20 13:15	BGS	C	
Total Well Depth	140.00		Feet		Field		11/23/20 13:15	BGS	C	

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142570002** Date Collected: 11/23/2020 13:15 Matrix: Ground Water
Sample ID: **CWMP004W** Date Received: 11/23/2020 17:27

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	Cntr
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Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570003	Date Collected:	11/23/2020 16:21	Matrix:	Ground Water
Sample ID:	CWMP003W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr	
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Bromoform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Chloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Chloroform	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			11/24/20 23:59	PDK G	
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Styrene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Toluene	65.7		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:59	PDK G	
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
1,2,3-Trichloropropene	ND		ug/L	2.0	SW846 8260B			11/24/20 23:59	PDK G	
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 23:59	PDK G	
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>	<i>Cntr</i>

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570003	Date Collected:	11/23/2020 16:21	Matrix:	Ground Water
Sample ID:	CWMP003W	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
1,2-Dichloroethane-d4 (S)	104		%	62 - 133	SW846 8260B		11/24/20 23:59	PDK	G
4-Bromofluorobenzene (S)	90.9		%	79 - 114	SW846 8260B		11/24/20 23:59	PDK	G
Dibromofluoromethane (S)	98.7		%	78 - 116	SW846 8260B		11/24/20 23:59	PDK	G
Toluene-d8 (S)	92.1		%	76 - 127	SW846 8260B		11/24/20 23:59	PDK	G
WET CHEMISTRY									
Alkalinity, Bicarbonate	26		mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	B
Alkalinity, Total	26	2	mg/L	5	SM2320B-2011		11/26/20 02:21	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09		12/7/20 18:48	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4		12/3/20 17:16	AK	A
Chloride	41.8		mg/L	2.0	EPA 300.0		11/24/20 07:04	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0		11/24/20 07:04	MBW	B
Nitrate-N	5.0		mg/L	0.20	EPA 300.0		11/24/20 07:04	MBW	B
pH	6.59	1	pH_Units		S4500HB-11		11/26/20 02:21	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/1/20 16:00 VXF	12/2/20 16:09	VXF	F
Specific Conductance	322		umhos/cm	1	SW846 9050A		11/26/20 02:21	R2B	B
Sulfate	39.6		mg/L	2.0	EPA 300.0		11/24/20 07:04	MBW	B
Total Dissolved Solids	146	3	mg/L	5	S2540C-11		12/2/20 11:12	KXH	B
Total Organic Carbon (TOC)	4.2		mg/L	0.50	SW846 9060A		11/30/20 23:19	PAG	D
Turbidity	1.64		NTU	0.10	SM2130B-2011		11/24/20 05:30	R2B	B
METALS									
Calcium, Total	18.1		mg/L	0.11	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
Iron, Total	0.11		mg/L	0.067	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
Magnesium, Total	13.6		mg/L	0.11	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
Manganese, Total	0.14		mg/L	0.0056	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
Potassium, Total	7.3		mg/L	0.56	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
Sodium, Total	23.1		mg/L	0.56	SW846 6010C	11/28/20 14:08 AHI	12/2/20 15:08	SRT	J1
FIELD PARAMETERS									
Depth to Water Level	64.36		Feet		Field		11/23/20 16:21	BGS	C
Elev Top MW Casing above MSL	524.21		Feet		Field		11/23/20 16:21	BGS	C
Ground Water Elevation	459.85		ft/MSL		Field		11/23/20 16:21	BGS	C
pH, Field (SM4500B)	5.37		pH_Units		Field		11/23/20 16:21	BGS	C
Sample Depth	100.00		Feet		Field		11/23/20 16:21	BGS	C
Specific Conductance, Field	325		umhos/cm	1	Field		11/23/20 16:21	BGS	C
Temperature	10.12		Deg. C		Field		11/23/20 16:21	BGS	C
Total Well Depth	140.00		Feet		Field		11/23/20 16:21	BGS	C

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142570003** Date Collected: 11/23/2020 16:21 Matrix: Ground Water
Sample ID: **CWMP003W** Date Received: 11/23/2020 17:27

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	Cntr
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Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID:	3142570004	Date Collected:	11/23/2020 10:21	Matrix:	Water
Sample ID:	Trip Blank	Date Received:	11/23/2020 17:27		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
VOLATILE ORGANICS									
Benzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Bromoform	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Chloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Chloroform	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			11/24/20 22:28	PDK A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Styrene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Toluene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/24/20 22:28	PDK A
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			11/24/20 22:28	PDK A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
1,2,3-Trichloropropene	ND		ug/L	2.0	SW846 8260B			11/24/20 22:28	PDK A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/24/20 22:28	PDK A
<i>Surrogate Recoveries</i>	<i>Results</i>	<i>Flag</i>	<i>Units</i>	<i>Limits</i>	<i>Method</i>	<i>Prepared</i>	<i>By</i>	<i>Analyzed</i>	<i>By</i>

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

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID: **3142570004** Date Collected: 11/23/2020 10:21 Matrix: Water
Sample ID: **Trip Blank** Date Received: 11/23/2020 17:27

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
1,2-Dichloroethane-d4 (S)	103		%	62 - 133	SW846 8260B		11/24/20 22:28	PDK	A
4-Bromofluorobenzene (S)	89.4		%	79 - 114	SW846 8260B		11/24/20 22:28	PDK	A
Dibromofluoromethane (S)	97.6		%	78 - 116	SW846 8260B		11/24/20 22:28	PDK	A
Toluene-d8 (S)	91.2		%	76 - 127	SW846 8260B		11/24/20 22:28	PDK	A

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Project Coordinator**ALS Environmental Laboratory Locations Across North America**

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ANALYTICAL RESULTS

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3142570001	1	CWOB089W	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.				
3142570001	2	CWOB089W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3142570002	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.				
3142570002	2	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3142570003	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.				
3142570003	2	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3142570003	3	CWMP003W	S2540C-11	Total Dissolved Solids
The sample was originally run within hold time, but required further analysis that exceeded hold time.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3142570 4th QTR 2020 CWMP & OB/PAIRED

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3142570001	CWOB089W	ASTM D6919-09		
3142570001	CWOB089W	EPA 300.0		
3142570001	CWOB089W	EPA 410.4		
3142570001	CWOB089W	Field		
3142570001	CWOB089W	S2540C-11		
3142570001	CWOB089W	S4500HB-11		
3142570001	CWOB089W	SM2130B-2011		
3142570001	CWOB089W	SM2320B-2011		
3142570001	CWOB089W	SW846 6010C	SW846 3015	
3142570001	CWOB089W	SW846 8260B		
3142570001	CWOB089W	SW846 9050A		
3142570001	CWOB089W	SW846 9060A		
3142570001	CWOB089W	SW846 9066	420.4/9066	
3142570002	CWMP004W	ASTM D6919-09		
3142570002	CWMP004W	EPA 300.0		
3142570002	CWMP004W	EPA 410.4		
3142570002	CWMP004W	Field		
3142570002	CWMP004W	S2540C-11		
3142570002	CWMP004W	S4500HB-11		
3142570002	CWMP004W	SM2130B-2011		
3142570002	CWMP004W	SM2320B-2011		
3142570002	CWMP004W	SW846 6010C	SW846 3015	
3142570002	CWMP004W	SW846 8260B		
3142570002	CWMP004W	SW846 9050A		
3142570002	CWMP004W	SW846 9060A		
3142570002	CWMP004W	SW846 9066	420.4/9066	
3142570003	CWMP003W	ASTM D6919-09		
3142570003	CWMP003W	EPA 300.0		
3142570003	CWMP003W	EPA 410.4		
3142570003	CWMP003W	Field		
3142570003	CWMP003W	S2540C-11		
3142570003	CWMP003W	S4500HB-11		
3142570003	CWMP003W	SM2130B-2011		
3142570003	CWMP003W	SM2320B-2011		
3142570003	CWMP003W	SW846 6010C	SW846 3015	
3142570003	CWMP003W	SW846 8260B		
3142570003	CWMP003W	SW846 9050A		
3142570003	CWMP003W	SW846 9060A		
3142570003	CWMP003W	SW846 9066	420.4/9066	
3142570004	Trip Blank	SW846 8260B		

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

Client Name: Lancaster County Solid Waste MA

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

Contact: Mark Reider

Phone#: (717) 735-0193

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

Bill To: Lancaster County Solid Waste MA

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

Date Required: Approved By: _____

Email? -Y mreider@LCSWMA.com

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

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL
Container Size	40 ml	500 ml	40 ml	—	—	500 ml	500 ml	1 L	500 ml
Preservative	HCl	H ₂ SO ₄	HCl	—	—	H ₂ SO ₄	HNO ₃	None	None

ANALYSES/METHOD REQUESTED

	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH ₃ -N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	pH, NO ₃ , Cl, F, SpC, SO ₄ , Turb, TDS	Alkalinity, HCO ₃
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Sample Description/Location (as it will appear on the lab report)			Sample Date	Time	*G or C **Matrix	Enter Number of Containers Per Sample or Field Results Below.								Sample/COC Comments		
1. CWOBØ89W	11/23/20	1021	G	GW	2	1	2	X	X	1	1	1	1			
2. CWMPØØ4W	11/23/20	1315	G	GW	2	1	2	X	X	1	1	1	1			
3. CWMPØØ3W	11/23/20	1621	G	GW	2	1	2	X	X	1	1	1	1			
4. TRIP BLANK									2							
5.																
6.																
7.																
8.																
9.																
10.																
Project Comments:			LOGGED BY(signature):								DATE:	TIME:	ALS Field Services: <input type="checkbox"/> Pickup <input type="checkbox"/> Labor <input type="checkbox"/> Composite_Sampling <input type="checkbox"/> Rental_Equipment <input type="checkbox"/> Other:			
			REVIEWED BY(signature):								DATE:	TIME:				
Relinquished By / Company Name			Date	Time	Received By / Company Name				Date	Time	Data Deliverables					
1. <i>ALS</i>	11/23/20	1727	2		TS 11/23/2018 27						<input type="checkbox"/> Standard	<input type="checkbox"/> Special Processing	USACE <input type="checkbox"/>	State Samples Collected In		
3.			4								<input type="checkbox"/> CLP-like		Navy <input type="checkbox"/>	NY <input type="checkbox"/>		
5.			6								<input type="checkbox"/> USACE		NC <input type="checkbox"/>	NJ <input type="checkbox"/>		
7.			8								<input type="checkbox"/>		PA <input checked="" type="checkbox"/>	PA <input type="checkbox"/>		
9.			10										Special <input type="checkbox"/>	Special <input type="checkbox"/>		
Reportable to PADEP? Yes <input type="checkbox"/> PWSID # _____																
Sample Disposal Lab <input checked="" type="checkbox"/> Special <input type="checkbox"/>																
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: <i>LCSW MA</i>	Work Order #: <i>3142570</i>	Initials: <i>Gom</i>	Date: <i>11/24/2020</i>
1. Were airbills / tracking numbers present and recorded?.....			
Tracking number: _____			
<input checked="" type="radio"/> NONE YES NO			
2. Are Custody Seals on shipping containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
3. Are Custody Seals on sample containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
4. Is there a COC (Chain-of-Custody) present?.....			
<input checked="" type="radio"/> YES NO			
5. Are the COC and bottle labels complete, legible and in agreement?.....			
<input checked="" type="radio"/> YES NO			
5a. Does the COC contain sample locations?.....			
<input checked="" type="radio"/> YES NO			
5b. Does the COC contain date and time of sample collection for all samples?.....			
<input checked="" type="radio"/> YES NO			
5c. Does the COC contain sample collectors name?.....			
<input checked="" type="radio"/> YES NO			
5d. Does the COC note the type(s) of preservation for all bottles?.....			
<input checked="" type="radio"/> YES NO			
5e. Does the COC note the number of bottles submitted for each sample?.....			
<input checked="" type="radio"/> YES NO			
5f. Does the COC note the type of sample, composite or grab?.....			
<input checked="" type="radio"/> YES NO			
5g. Does the COC note the matrix of the sample(s)?.....			
<input checked="" type="radio"/> YES NO			
6. Are all aqueous samples requiring preservation preserved correctly? ¹			
N/A <input checked="" type="radio"/> YES NO			
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?.....			
<i>Part out of well</i> <input checked="" type="radio"/> YES NO			
8. Are all samples within holding times for the requested analyses?.....			
<input checked="" type="radio"/> YES NO			
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.).....			
<input checked="" type="radio"/> YES NO			
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?.....			
<i>N/A</i> <input checked="" type="radio"/> YES NO			
11. Were the samples received on ice?.....			
<input checked="" type="radio"/> YES NO			
12. Were sample temperatures measured at 0.0-6.0°C.....			
<input checked="" type="radio"/> YES NO			
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below.			
13a. Are the samples required for SDWA compliance reporting?.....			
<input checked="" type="radio"/> YES NO			
13b. Did the client provide a SDWA PWS ID#?.....			
<input checked="" type="radio"/> YES NO			
13c. Are all aqueous unpreserved SDWA samples pH 5-9?.....			
<input checked="" type="radio"/> YES NO			
13d. Did the client provide the SDWA sample location ID/Description?.....			
<input checked="" type="radio"/> YES NO			
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?.....			
<input checked="" type="radio"/> YES NO			

Cooler #: _____

Temperature (°C): *0* _____

Thermometer ID: *525* _____

Radiological (μ Ci): _____

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

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



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December 1, 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:	3136466
Purchase Order:	PO1000127	Workorder ID:	4th QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

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

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.

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3136466001	CWMP005W	Ground Water	10/23/2020 13:06	10/23/2020 16:52	Mr. Brian G Shade
3136466002	CWMP012W	Ground Water	10/23/2020 12:55	10/23/2020 16:52	Mr. Brian G Shade
3136466003	CWMP016W	Ground Water	10/23/2020 14:55	10/23/2020 16:52	Mr. Brian G Shade
3136466004	CWMP018S	Ground Water	10/23/2020 14:11	10/23/2020 16:52	Mr. Brian G Shade
3136466005	CWMP017S	Ground Water	10/23/2020 14:21	10/23/2020 16:52	Mr. Brian G Shade
3136466006	CWMP008W	Ground Water	10/23/2020 15:34	10/23/2020 16:52	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3136466 4th 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: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466001	Date Collected:	10/23/2020 13:06	Matrix:	Ground Water
Sample ID:	CWMP005W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/26/20 13:39	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 13:39	DPC	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	93.2		%	62 - 133	SW846 8260B			10/26/20 13:39	DPC	G
4-Bromofluorobenzene (S)	106		%	79 - 114	SW846 8260B			10/26/20 13:39	DPC	G
Dibromofluoromethane (S)	87.3		%	78 - 116	SW846 8260B			10/26/20 13:39	DPC	G
Toluene-d8 (S)	91.2		%	76 - 127	SW846 8260B			10/26/20 13:39	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	16		mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	B
Alkalinity, Total	16	2	mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			11/2/20 21:28	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	64.7		mg/L	2.0	EPA 300.0			10/24/20 10:52	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 10:52	MBW	B
Nitrate-N	8.3		mg/L	0.20	EPA 300.0			10/24/20 10:52	MBW	B
pH	6.07	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	316		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	4.3		mg/L	2.0	EPA 300.0			10/24/20 10:52	MBW	B
Total Dissolved Solids	210		mg/L	5	S2540C-11			10/27/20 11:35	KXH	B
Total Organic Carbon (TOC)	0.66		mg/L	0.50	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	0.84		NTU	0.10	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466001	Date Collected:	10/23/2020 13:06	Matrix:	Ground Water
Sample ID:	CWMP005W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	15.2		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
Iron, Total	0.098		mg/L	0.067	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
Magnesium, Total	8.0		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
Manganese, Total	0.064		mg/L	0.0056	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
Potassium, Total	2.2		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
Sodium, Total	34.6		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:05 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	43.61		Feet		Field		10/23/20 13:11 BGS	C	
Elev Top MW Casing above MSL	513.43		Feet		Field		10/23/20 13:11 BGS	C	
Flow Rate	4.38		gal/min		Field		10/23/20 13:11 BGS	C	
Ground Water Elevation	469.82		ft/MSL		Field		10/23/20 13:11 BGS	C	
pH, Field (SM4500B)	5.03		pH_Units		Field		10/23/20 13:11 BGS	C	
Sample Depth	130.00		Feet		Field		10/23/20 13:11 BGS	C	
Specific Conductance, Field	343		umhos/cm	1	Field		10/23/20 13:11 BGS	C	
Temperature	13.12		Deg. C		Field		10/23/20 13:11 BGS	C	
Total Well Depth	138.92		Feet		Field		10/23/20 13:11 BGS	C	
Volume in Water Column	140.11		Gallons		Field		10/23/20 13:11 BGS	C	
Water Level After Purge	44.32		Feet		Field		10/23/20 13:11 BGS	C	
Well Volumes Purged	2.03		Vol		Field		10/23/20 13:11 BGS	C	

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466002	Date Collected:	10/23/2020 12:55	Matrix:	Ground Water
Sample ID:	CWMP012W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/27/20 01:35	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 01:35	VLM	G
Surrogate Recoveries	Results	Flag	Units	Limits	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	103		%	62 - 133	SW846 8260B			10/27/20 01:35	VLM	G
4-Bromofluorobenzene (S)	86.9		%	79 - 114	SW846 8260B			10/27/20 01:35	VLM	G
Dibromofluoromethane (S)	101		%	78 - 116	SW846 8260B			10/27/20 01:35	VLM	G
Toluene-d8 (S)	82.4		%	76 - 127	SW846 8260B			10/27/20 01:35	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	67		mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	B
Alkalinity, Total	67	2	mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			11/2/20 21:41	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	34.4		mg/L	2.0	EPA 300.0			10/24/20 11:12	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 11:12	MBW	B
Nitrate-N	8.8		mg/L	0.20	EPA 300.0			10/24/20 11:12	MBW	B
pH	6.47	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	298		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	4.1		mg/L	2.0	EPA 300.0			10/24/20 11:12	MBW	B
Total Dissolved Solids	190		mg/L	5	S2540C-11			10/27/20 11:35	KXH	B
Total Organic Carbon (TOC)	1.1		mg/L	0.50	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	259		NTU	1.00	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466002	Date Collected:	10/23/2020 12:55	Matrix:	Ground Water
Sample ID:	CWMP012W	Date Received:	10/23/2020 16:52		

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

Calcium, Total	32.2	mg/L	0.11	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1
Iron, Total	13.9	mg/L	0.067	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1
Magnesium, Total	9.1	mg/L	0.11	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1
Manganese, Total	0.16	mg/L	0.0056	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1
Potassium, Total	1.2	mg/L	0.56	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1
Sodium, Total	15.2	mg/L	0.56	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:09	SRT	J1

FIELD PARAMETERS

Depth to Water Level	61.21	Feet	Field		10/23/20 12:25	BGS	C
pH, Field (SM4500B)	6.39	pH_Units	Field		10/23/20 12:25	BGS	C
Specific Conductance, Field	306	umhos/cm	1	Field	10/23/20 12:25	BGS	C
Temperature	14.12	Deg. C	Field		10/23/20 12:25	BGS	C

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466003	Date Collected:	10/23/2020 14:55	Matrix:	Ground Water
Sample ID:	CWMP016W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/27/20 01:59	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 01:59	VLM	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	105		%	62 - 133	SW846 8260B			10/27/20 01:59	VLM	G
4-Bromofluorobenzene (S)	88.5		%	79 - 114	SW846 8260B			10/27/20 01:59	VLM	G
Dibromofluoromethane (S)	103		%	78 - 116	SW846 8260B			10/27/20 01:59	VLM	G
Toluene-d8 (S)	83.5		%	76 - 127	SW846 8260B			10/27/20 01:59	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	10		mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	B
Alkalinity, Total	10	2	mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			11/2/20 21:55	JXL	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	2.7		mg/L	2.0	EPA 300.0			10/24/20 11:31	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 11:31	MBW	B
Nitrate-N	0.92		mg/L	0.20	EPA 300.0			10/24/20 11:31	MBW	B
pH	6.33	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	58		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	8.6		mg/L	2.0	EPA 300.0			10/24/20 11:31	MBW	B
Total Dissolved Solids	64		mg/L	5	S2540C-11			10/27/20 11:35	KXH	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	3.70		NTU	0.10	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466003	Date Collected:	10/23/2020 14:55	Matrix:	Ground Water
Sample ID:	CWMP016W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	5.3		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
Iron, Total	0.38		mg/L	0.067	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
Magnesium, Total	1.3		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
Manganese, Total	0.0057		mg/L	0.0056	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
Potassium, Total	ND		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
Sodium, Total	4.3		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:12 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	11.93		Feet		Field		10/23/20 14:50 BGS	C	
Elev Top MW Casing above MSL	311.97		Feet		Field		10/23/20 14:50 BGS	C	
Flow Rate	2.46		gal/min		Field		10/23/20 14:50 BGS	C	
Ground Water Elevation	300.04		ft/MSL		Field		10/23/20 14:50 BGS	C	
pH, Field (SM4500B)	5.22		pH_Units		Field		10/23/20 14:50 BGS	C	
Sample Depth	71.00		Feet		Field		10/23/20 14:50 BGS	C	
Specific Conductance, Field	61		umhos/cm	1	Field		10/23/20 14:50 BGS	C	
Temperature	12.51		Deg. C		Field		10/23/20 14:50 BGS	C	
Total Well Depth	73.52		Feet		Field		10/23/20 14:50 BGS	C	
Volume in Water Column	90.54		Gallons		Field		10/23/20 14:50 BGS	C	
Water Level After Purge	20.21		Feet		Field		10/23/20 14:50 BGS	C	
Well Volumes Purged	1.90		Vol		Field		10/23/20 14:50 BGS	C	

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466004	Date Collected:	10/23/2020 14:11	Matrix:	Ground Water
Sample ID:	CWMP018S	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/27/20 02:22	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 02:22	VLM	G
Surrogate Recoveries	Results	Flag	Units	Limits	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	104		%	62 - 133	SW846 8260B			10/27/20 02:22	VLM	G
4-Bromofluorobenzene (S)	87.5		%	79 - 114	SW846 8260B			10/27/20 02:22	VLM	G
Dibromofluoromethane (S)	96.2		%	78 - 116	SW846 8260B			10/27/20 02:22	VLM	G
Toluene-d8 (S)	84.8		%	76 - 127	SW846 8260B			10/27/20 02:22	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	541		mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	B
Alkalinity, Total	564	2	mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			11/2/20 22:09	JXL	A
Chemical Oxygen Demand (COD)	19		mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	609		mg/L	10.0	EPA 300.0			10/28/20 04:19	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 13:47	MBW	B
Nitrate-N	19.5		mg/L	0.20	EPA 300.0			10/24/20 13:47	MBW	B
pH	8.57	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	2760		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	42.7		mg/L	2.0	EPA 300.0			10/24/20 13:47	MBW	B
Total Dissolved Solids	1640		mg/L	5	S2540C-11			10/27/20 11:35	KXH	B
Total Organic Carbon (TOC)	8.6		mg/L	0.50	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	0.34		NTU	0.10	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466004	Date Collected:	10/23/2020 14:11	Matrix:	Ground Water
Sample ID:	CWMP018S	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	88.5		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
Iron, Total	0.076		mg/L	0.067	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
Magnesium, Total	110		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
Manganese, Total	0.0070		mg/L	0.0056	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
Potassium, Total	24.5		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
Sodium, Total	386		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 12:21 SRT	J1	
FIELD PARAMETERS									
Dissolved Oxygen	9.26		mg/L	0.01	Field		10/23/20 14:11 BGS	C	
pH, Field (SM4500B)	8.30		pH_Units		Field		10/23/20 14:11 BGS	C	
Specific Conductance, Field	2971		umhos/cm	1	Field		10/23/20 14:11 BGS	C	
Temperature	15.45		Deg. C		Field		10/23/20 14:11 BGS	C	

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466005	Date Collected:	10/23/2020 14:21	Matrix:	Ground Water
Sample ID:	CWMP017S	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/27/20 02:46	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 02:46	VLM	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	101		%	62 - 133	SW846 8260B			10/27/20 02:46	VLM	G
4-Bromofluorobenzene (S)	88.3		%	79 - 114	SW846 8260B			10/27/20 02:46	VLM	G
Dibromofluoromethane (S)	94.7		%	78 - 116	SW846 8260B			10/27/20 02:46	VLM	G
Toluene-d8 (S)	85.2		%	76 - 127	SW846 8260B			10/27/20 02:46	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	634		mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	B
Alkalinity, Total	634	2	mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			11/2/20 22:22	JXL	A
Chemical Oxygen Demand (COD)	20		mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	805		mg/L	25.0	EPA 300.0			10/28/20 04:34	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 14:06	MBW	B
Nitrate-N	24.0	3	mg/L	2.5	EPA 300.0			10/28/20 04:34	MBW	B
pH	8.38	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	3720		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	63.5		mg/L	2.0	EPA 300.0			10/24/20 14:06	MBW	B
Total Dissolved Solids	2290		mg/L	5	S2540C-11			10/27/20 11:35	KXH	B
Total Organic Carbon (TOC)	5.9		mg/L	0.50	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	1.30		NTU	0.10	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466005	Date Collected:	10/23/2020 14:21	Matrix:	Ground Water
Sample ID:	CWMP017S	Date Received:	10/23/2020 16:52		

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

Calcium, Total	99.8	mg/L	0.11	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1
Iron, Total	0.49	mg/L	0.067	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1
Magnesium, Total	151	mg/L	0.11	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1
Manganese, Total	0.14	mg/L	0.0056	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1
Potassium, Total	27.0	mg/L	0.56	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1
Sodium, Total	536	mg/L	0.56	SW846 6010C	10/28/20 21:05	SXC	10/29/20 12:25	SRT	J1

FIELD PARAMETERS

Dissolved Oxygen	7.53	mg/L	0.01	Field			10/23/20 14:21	BGS	C
pH, Field (SM4500B)	7.87	pH_Units		Field			10/23/20 14:21	BGS	C
Specific Conductance, Field	3939	umhos/cm	1	Field			10/23/20 14:21	BGS	C
Temperature	19.93	Deg. C		Field			10/23/20 14:21	BGS	C

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466006	Date Collected:	10/23/2020 15:34	Matrix:	Ground Water
Sample ID:	CWMP008W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.5		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
1,1-Dichloroethane	3.2		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/27/20 03:09	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/27/20 03:09	VLM	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	108		%	62 - 133	SW846 8260B			10/27/20 03:09	VLM	G
4-Bromofluorobenzene (S)	88		%	79 - 114	SW846 8260B			10/27/20 03:09	VLM	G
Dibromofluoromethane (S)	104		%	78 - 116	SW846 8260B			10/27/20 03:09	VLM	G
Toluene-d8 (S)	86.5		%	76 - 127	SW846 8260B			10/27/20 03:09	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	446		mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	B
Alkalinity, Total	446	3	mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	I
Ammonia-N	8.04		mg/L	0.100	ASTM D6919-09			11/2/20 22:36	JXL	A
Chemical Oxygen Demand (COD)	46	1	mg/L	15	EPA 410.4			11/2/20 20:45	JAM	A
Chloride	63.1		mg/L	2.0	EPA 300.0			10/24/20 14:25	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/24/20 14:25	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			10/24/20 14:25	MBW	B
pH	6.57	2	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:41	C_D	10/28/20 07:17	C_D	F
Specific Conductance	968		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	4.9		mg/L	2.0	EPA 300.0			10/24/20 14:25	MBW	B
Total Dissolved Solids	484		mg/L	5	S2540C-11			10/30/20 10:06	KXH	B
Total Organic Carbon (TOC)	2.5		mg/L	0.50	SW846 9060A			10/28/20 01:45	PAG	D
Turbidity	19.1		NTU	0.10	SM2130B-2011			10/24/20 05:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136466006	Date Collected:	10/23/2020 15:34	Matrix:	Ground Water
Sample ID:	CWMP008W	Date Received:	10/23/2020 16:52		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	74.3		mg/L	0.11	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
Iron, Total	27.4		mg/L	0.067	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
Magnesium, Total	34.1		mg/L	0.11	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
Manganese, Total	15.9		mg/L	0.0056	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
Potassium, Total	9.4		mg/L	0.56	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
Sodium, Total	55.1		mg/L	0.56	SW846 6010C	10/30/20 13:40 AHI	11/2/20 11:18	SRT	J1
FIELD PARAMETERS									
Depth to Water Level	3.92		Feet		Field		10/23/20 15:34	BGS	C
Elev Top MW Casing above MSL	422.30		Feet		Field		10/23/20 15:34	BGS	C
Flow Rate	0.87		gal/min		Field		10/23/20 15:34	BGS	C
Ground Water Elevation	418.38		ft/MSL		Field		10/23/20 15:34	BGS	C
pH, Field (SM4500B)	6.20		pH_Units		Field		10/23/20 15:34	BGS	C
Sample Depth	19.00		Feet		Field		10/23/20 15:34	BGS	C
Specific Conductance, Field	1084		umhos/cm	1	Field		10/23/20 15:34	BGS	C
Temperature	16.01		Deg. C		Field		10/23/20 15:34	BGS	C
Total Well Depth	22.80		Feet		Field		10/23/20 15:34	BGS	C
Volume in Water Column	3.02		Gallons		Field		10/23/20 15:34	BGS	C
Water Level After Purge	11.81		Feet		Field		10/23/20 15:34	BGS	C
Well Volumes Purged	5.79		Vol		Field		10/23/20 15:34	BGS	C

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ANALYTICAL RESULTS

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3136466001	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.				
3136466001	2	CWMP005W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3136466002	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.				
3136466002	2	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3136466003	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.				
3136466003	2	CWMP016W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3136466004	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.				
3136466004	2	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3136466005	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.				
3136466005	2	CWMP017S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3136466005	3	CWMP017S	EPA 300.0	Nitrate-N
The sample was originally run within hold time, but required further analysis that exceeded hold time.				
3136466006	1	CWMP008W	EPA 410.4	Chemical Oxygen Demand (COD)
The QC sample type MSLO for method EPA 410.4 was outside the control limits for the analyte Chemical Oxygen Demand (COD). The % Recovery was reported as 112 and the control limits were 90 to 110.				
3136466006	2	CWMP008W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3136466006	3	CWMP008W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3136466001	CWMP005W	ASTM D6919-09		
3136466001	CWMP005W	EPA 300.0		
3136466001	CWMP005W	EPA 410.4		
3136466001	CWMP005W	Field		
3136466001	CWMP005W	S2540C-11		
3136466001	CWMP005W	S4500HB-11		
3136466001	CWMP005W	SM2130B-2011		
3136466001	CWMP005W	SM2320B-2011		
3136466001	CWMP005W	SW846 6010C	SW846 3015	
3136466001	CWMP005W	SW846 8260B		
3136466001	CWMP005W	SW846 9050A		
3136466001	CWMP005W	SW846 9060A		
3136466001	CWMP005W	SW846 9066	420.4/9066	
3136466002	CWMP012W	ASTM D6919-09		
3136466002	CWMP012W	EPA 300.0		
3136466002	CWMP012W	EPA 410.4		
3136466002	CWMP012W	Field		
3136466002	CWMP012W	S2540C-11		
3136466002	CWMP012W	S4500HB-11		
3136466002	CWMP012W	SM2130B-2011		
3136466002	CWMP012W	SM2320B-2011		
3136466002	CWMP012W	SW846 6010C	SW846 3015	
3136466002	CWMP012W	SW846 8260B		
3136466002	CWMP012W	SW846 9050A		
3136466002	CWMP012W	SW846 9060A		
3136466002	CWMP012W	SW846 9066	420.4/9066	
3136466003	CWMP016W	ASTM D6919-09		
3136466003	CWMP016W	EPA 300.0		
3136466003	CWMP016W	EPA 410.4		
3136466003	CWMP016W	Field		
3136466003	CWMP016W	S2540C-11		
3136466003	CWMP016W	S4500HB-11		
3136466003	CWMP016W	SM2130B-2011		
3136466003	CWMP016W	SM2320B-2011		
3136466003	CWMP016W	SW846 6010C	SW846 3015	
3136466003	CWMP016W	SW846 8260B		
3136466003	CWMP016W	SW846 9050A		
3136466003	CWMP016W	SW846 9060A		
3136466003	CWMP016W	SW846 9066	420.4/9066	
3136466004	CWMP018S	ASTM D6919-09		
3136466004	CWMP018S	EPA 300.0		
3136466004	CWMP018S	EPA 410.4		
3136466004	CWMP018S	Field		
3136466004	CWMP018S	S2540C-11		
3136466004	CWMP018S	S4500HB-11		
3136466004	CWMP018S	SM2130B-2011		

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3136466 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3136466004	CWMP018S	SM2320B-2011		
3136466004	CWMP018S	SW846 6010C	SW846 3015	
3136466004	CWMP018S	SW846 8260B		
3136466004	CWMP018S	SW846 9050A		
3136466004	CWMP018S	SW846 9060A		
3136466004	CWMP018S	SW846 9066	420.4/9066	
3136466005	CWMP017S	ASTM D6919-09		
3136466005	CWMP017S	EPA 300.0		
3136466005	CWMP017S	EPA 410.4		
3136466005	CWMP017S	Field		
3136466005	CWMP017S	S2540C-11		
3136466005	CWMP017S	S4500HB-11		
3136466005	CWMP017S	SM2130B-2011		
3136466005	CWMP017S	SM2320B-2011		
3136466005	CWMP017S	SW846 6010C	SW846 3015	
3136466005	CWMP017S	SW846 8260B		
3136466005	CWMP017S	SW846 9050A		
3136466005	CWMP017S	SW846 9060A		
3136466005	CWMP017S	SW846 9066	420.4/9066	
3136466006	CWMP008W	ASTM D6919-09		
3136466006	CWMP008W	EPA 300.0		
3136466006	CWMP008W	EPA 410.4		
3136466006	CWMP008W	Field		
3136466006	CWMP008W	S2540C-11		
3136466006	CWMP008W	S4500HB-11		
3136466006	CWMP008W	SM2130B-2011		
3136466006	CWMP008W	SM2320B-2011		
3136466006	CWMP008W	SW846 6010C	SW846 3015	
3136466006	CWMP008W	SW846 8260B		
3136466006	CWMP008W	SW846 9050A		
3136466006	CWMP008W	SW846 9060A		
3136466006	CWMP008W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS



1
of
1

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

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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/ID: Creswell/GWMP Form 19Q Wells

Bill To: Lancaster County Solid Waste MA

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

Date Required: Approved By: _____

Email? -Y mreider@LCSWMA.com

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

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml
Preservative	HCl	H ₂ SO ₄	HCl	—	—	H ₂ SO ₄	HNO ₃	None	None

ANALYSES/METHOD REQUESTED

G or C	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, NO ₃ , Cl, F, Spc, SO ₄ , Turb, TDS	Alkalinity, HCO ₃
Enter Number of Containers Per Sample or Field Results Below.									

Sample Description/Location
(as it will appear on the lab report)

Sample Date

Time

****Matrix**

1. CWMP005W

10/23/20

1306

G

GW

2

1

2

X

X

1

1

1

1

1

2. CWMP012W

10/23/20

1255

G

GW

2

1

2

X

X

1

1

1

1

3. CWMP016W

10/23/20

1455

G

GW

2

1

2

X

X

1

1

1

1

4. CWMP018S

10/23/20

1411

G

GW

2

1

2

X

X

1

1

1

1

5. CWMP017S

10/23/20

1421

G

GW

2

1

2

X

X

1

1

1

1

6. CWMP008W

10/23/20

1534

G

GW

2

1

2

X

X

1

1

1

1

7

8

9

10

Project Comments:

LOGGED BY (signature):

DATE

TIME

REVIEWED BY (signature):

DATE

TIME

Relinquished By / Company Name

Date

Time

Received By / Company Name

Date

Time

1. *[Signature]* ALS

10/23/20

1652

Com

10/23/20

1652

3

5

7

9

4

6

8

10

Data

Deliverables

Standard

CLP-like

USACE

USACE

Special Processing

USACE

Navy

NY

NJ

PA

NC

Reportable to PADEP?

Yes

PWSID # _____

EDDS: Format Type- _____

Sample Disposal

Lab

Special

* 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, MIDDLETON, PA 17057

Rev 8/04

ed by Receiving Lab

Cooler Temp: 4 Therm ID: 44

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:



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P: (717) 944-5541
F: (717) 944-1430

Condition of Sample Receipt Form

Client: LCSWMA	Work Order #: 3136466	Initials: Gon	Date: 10/23/20
1. Were airbills / tracking numbers present and recorded?.....			
Tracking number: _____			
<input checked="" type="radio"/> NONE YES NO			
2. Are Custody Seals on shipping containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
3. Are Custody Seals on sample containers intact?.....			
<input checked="" type="radio"/> NONE YES NO			
4. Is there a COC (Chain-of-Custody) present?.....			
<input checked="" type="radio"/> YES NO			
5. Are the COC and bottle labels complete, legible and in agreement?.....			
<input checked="" type="radio"/> YES NO			
5a. Does the COC contain sample locations?.....			
<input checked="" type="radio"/> YES NO			
5b. Does the COC contain date and time of sample collection for all samples?.....			
<input checked="" type="radio"/> YES NO			
5c. Does the COC contain sample collectors name?.....			
<input checked="" type="radio"/> YES NO			
5d. Does the COC note the type(s) of preservation for all bottles?.....			
<input checked="" type="radio"/> YES NO			
5e. Does the COC note the number of bottles submitted for each sample?.....			
<input checked="" type="radio"/> YES NO			
5f. Does the COC note the type of sample, composite or grab?.....			
<input checked="" type="radio"/> YES NO			
5g. Does the COC note the matrix of the sample(s)?.....			
<input checked="" type="radio"/> YES NO			
6. Are all aqueous samples requiring preservation preserved correctly?^.....			
<input checked="" type="radio"/> N/A YES NO			
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?.....			
<input checked="" type="radio"/> YES NO			
8. Are all samples within holding times for the requested analyses?.....			
<input checked="" type="radio"/> YES NO			
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.).....			
<input checked="" type="radio"/> YES NO			
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?.....			
<input checked="" type="radio"/> N/A YES NO			
11. Were the samples received on ice?.....			
<input checked="" type="radio"/> YES NO			
12. Were sample temperatures measured at 0.0-6.0°C.....			
<input checked="" type="radio"/> YES NO			
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below.			
13a. Are the samples required for SDWA compliance reporting?.....			
<input checked="" type="radio"/> N/A YES NO			
13b. Did the client provide a SDWA PWS ID#?.....			
<input checked="" type="radio"/> N/A YES NO			
13c. Are all aqueous unpreserved SDWA samples pH 5-9?.....			
<input checked="" type="radio"/> N/A YES NO			
13d. Did the client provide the SDWA sample location ID/Description?.....			
<input checked="" type="radio"/> N/A YES NO			
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?.....			
<input checked="" type="radio"/> N/A YES NO			

Cooler #: _____

Temperature (°C): **4** _____

Thermometer ID: **44** _____

Radiological (μCi): _____

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

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



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November 30, 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:	3136298
Purchase Order:	PO1000127	Workorder ID:	4th QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

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

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3136298001	CWMP010W	Ground Water	10/22/2020 14:32	10/22/2020 16:30	Mr. Brian G Shade
3136298002	CWMP009W	Ground Water	10/22/2020 15:04	10/22/2020 16:30	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3136298 4th 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: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136298001	Date Collected:	10/22/2020 14:32	Matrix:	Ground Water
Sample ID:	CWMP010W	Date Received:	10/22/2020 16:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/26/20 16:16	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 16:16	DPC	G
Surrogate Recoveries	Results	Flag	Units	Limits	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	94.6		%	62 - 133	SW846 8260B			10/26/20 16:16	DPC	G
4-Bromofluorobenzene (S)	104		%	79 - 114	SW846 8260B			10/26/20 16:16	DPC	G
Dibromofluoromethane (S)	90.9		%	78 - 116	SW846 8260B			10/26/20 16:16	DPC	G
Toluene-d8 (S)	90.4		%	76 - 127	SW846 8260B			10/26/20 16:16	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	381		mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	B
Alkalinity, Total	381	3	mg/L	5	SM2320B-2011			10/24/20 21:23	R2B	I
Ammonia-N	0.230		mg/L	0.100	ASTM D6919-09			11/2/20 17:09	JXL	A
Chemical Oxygen Demand (COD)	25		mg/L	15	EPA 410.4			10/27/20 04:04	JAM	A
Chloride	546		mg/L	10.0	EPA 300.0			10/27/20 04:12	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/23/20 08:45	MBW	B
Nitrate-N	15.0		mg/L	0.20	EPA 300.0			10/23/20 08:45	MBW	B
pH	7.36	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND	2	mg/L	0.005	SW846 9066	10/26/20 13:37	C_D	10/28/20 07:17	C_D	F
Specific Conductance	22800		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	47.5		mg/L	2.0	EPA 300.0			10/23/20 08:45	MBW	B
Total Dissolved Solids	1340		mg/L	5	S2540C-11			10/27/20 11:14	KXH	B
Total Organic Carbon (TOC)	7.8		mg/L	0.50	SW846 9060A			10/27/20 06:57	PAG	D
Turbidity	1.76		NTU	0.10	SM2130B-2011			10/23/20 05:48	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136298001	Date Collected:	10/22/2020 14:32	Matrix:	Ground Water
Sample ID:	CWMP010W	Date Received:	10/22/2020 16:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	81.9		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
Iron, Total	0.19		mg/L	0.067	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
Magnesium, Total	84.3		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
Manganese, Total	0.077		mg/L	0.0056	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
Potassium, Total	20.7		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
Sodium, Total	322		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:52 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	8.63		Feet		Field		10/22/20 14:32 BGS	C	
Elev Top MW Casing above MSL	360.90		Feet		Field		10/22/20 14:32 BGS	C	
Flow Rate	1.14		gal/min		Field		10/22/20 14:32 BGS	C	
Ground Water Elevation	352.27		ft/MSL		Field		10/22/20 14:32 BGS	C	
pH, Field (SM4500B)	6.77		pH_Units		Field		10/22/20 14:32 BGS	C	
Sample Depth	17.00		Feet		Field		10/22/20 14:32 BGS	C	
Specific Conductance, Field	2626		umhos/cm	1	Field		10/22/20 14:32 BGS	C	
Temperature	16.15		Deg. C		Field		10/22/20 14:32 BGS	C	
Total Well Depth	19.60		Feet		Field		10/22/20 14:32 BGS	C	
Volume in Water Column	7.13		Gallons		Field		10/22/20 14:32 BGS	C	
Water Level After Purge	16.09		Feet		Field		10/22/20 14:32 BGS	C	
Well Volumes Purged	1.60		Vol		Field		10/22/20 14:32 BGS	C	

Ms. Susan J Scherer

Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136298002	Date Collected:	10/22/2020 15:04	Matrix:	Ground Water
Sample ID:	CWMP009W	Date Received:	10/22/2020 16:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	3.5		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
1,1-Dichloroethane	1.7		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Toluene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			10/26/20 16:39	DPC	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			10/26/20 16:39	DPC	G
Surrogate Recoveries										
1,2-Dichloroethane-d4 (S)	94.9		%	62 - 133	SW846 8260B			10/26/20 16:39	DPC	G
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			10/26/20 16:39	DPC	G
Dibromofluoromethane (S)	91.8		%	78 - 116	SW846 8260B			10/26/20 16:39	DPC	G
Toluene-d8 (S)	92.5		%	76 - 127	SW846 8260B			10/26/20 16:39	DPC	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	552		mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	B
Alkalinity, Total	552	2	mg/L	50	SM2320B-2011			10/27/20 16:54	R2B	I
Ammonia-N	29.0		mg/L	0.100	ASTM D6919-09			11/3/20 01:07	JXL	A
Chemical Oxygen Demand (COD)	110		mg/L	15	EPA 410.4			10/27/20 04:04	JAM	A
Chloride	582		mg/L	10.0	EPA 300.0			10/27/20 04:28	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			10/23/20 09:00	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			10/23/20 09:00	MBW	B
pH	6.46	1	pH_Units		S4500HB-11			10/24/20 21:23	R2B	B
Phenolics	ND		mg/L	0.005	SW846 9066	10/26/20 13:37	C_D	10/28/20 07:17	C_D	F
Specific Conductance	2510		umhos/cm	1	SW846 9050A			10/24/20 21:23	R2B	B
Sulfate	5.8		mg/L	2.0	EPA 300.0			10/23/20 09:00	MBW	B
Total Dissolved Solids	1480		mg/L	5	S2540C-11			10/27/20 11:14	KXH	B
Total Organic Carbon (TOC)	35.6		mg/L	5.0	SW846 9060A			10/27/20 20:36	PAG	D
Turbidity	29.5		NTU	0.10	SM2130B-2011			10/23/20 05:48	R2B	B

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ANALYTICAL RESULTS

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID:	3136298002	Date Collected:	10/22/2020 15:04	Matrix:	Ground Water
Sample ID:	CWMP009W	Date Received:	10/22/2020 16:30		

Parameters	Results	Flag	Units	RDL	Method	Prepared By	Analyzed By	By	Cntr
METALS									
Calcium, Total	175		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
Iron, Total	38.5		mg/L	0.067	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
Magnesium, Total	84.8		mg/L	0.11	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
Manganese, Total	13.7		mg/L	0.0056	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
Potassium, Total	37.3		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
Sodium, Total	185		mg/L	0.56	SW846 6010C	10/28/20 21:05 SXC	10/29/20 11:56 SRT	J1	
FIELD PARAMETERS									
Depth to Water Level	9.18		Feet		Field		10/22/20 15:04 BGS	C	
Elev Top MW Casing above MSL	404.20		Feet		Field		10/22/20 15:04 BGS	C	
Flow Rate	1.63		gal/min		Field		10/22/20 15:04 BGS	C	
Ground Water Elevation	395.02		ft/MSL		Field		10/22/20 15:04 BGS	C	
pH, Field (SM4500B)	6.18		pH_Units		Field		10/22/20 15:04 BGS	C	
Sample Depth	16.00		Feet		Field		10/22/20 15:04 BGS	C	
Specific Conductance, Field	2900		umhos/cm	1	Field		10/22/20 15:04 BGS	C	
Temperature	15.17		Deg. C		Field		10/22/20 15:04 BGS	C	
Total Well Depth	19.70		Feet		Field		10/22/20 15:04 BGS	C	
Volume in Water Column	6.84		Gallons		Field		10/22/20 15:04 BGS	C	
Water Level After Purge	10.23		Feet		Field		10/22/20 15:04 BGS	C	
Well Volumes Purged	4.76		Vol		Field		10/22/20 15:04 BGS	C	

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ANALYTICAL RESULTS

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3136298001	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.				
3136298001	2	CWMP010W	SW846 9066	Phenolics
The QC sample type MS for method 420.4/9066 was outside the control limits for the analyte Phenolics. The % Recovery was reported as 111 and the control limits were 90 to 110.				
3136298001	3	CWMP010W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				
3136298002	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.				
3136298002	2	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO ₃ /L.				

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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

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3136298 4th QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method	Leachate Method
3136298001	CWMP010W	ASTM D6919-09		
3136298001	CWMP010W	EPA 300.0		
3136298001	CWMP010W	EPA 410.4		
3136298001	CWMP010W	Field		
3136298001	CWMP010W	S2540C-11		
3136298001	CWMP010W	S4500HB-11		
3136298001	CWMP010W	SM2130B-2011		
3136298001	CWMP010W	SM2320B-2011		
3136298001	CWMP010W	SW846 6010C	SW846 3015	
3136298001	CWMP010W	SW846 8260B		
3136298001	CWMP010W	SW846 9050A		
3136298001	CWMP010W	SW846 9060A		
3136298001	CWMP010W	SW846 9066	420.4/9066	
3136298002	CWMP009W	ASTM D6919-09		
3136298002	CWMP009W	EPA 300.0		
3136298002	CWMP009W	EPA 410.4		
3136298002	CWMP009W	Field		
3136298002	CWMP009W	S2540C-11		
3136298002	CWMP009W	S4500HB-11		
3136298002	CWMP009W	SM2130B-2011		
3136298002	CWMP009W	SM2320B-2011		
3136298002	CWMP009W	SW846 6010C	SW846 3015	
3136298002	CWMP009W	SW846 8260B		
3136298002	CWMP009W	SW846 9050A		
3136298002	CWMP009W	SW846 9060A		
3136298002	CWMP009W	SW846 9066	420.4/9066	

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS



1
of
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ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT /
SAMPLER. INSTRUCTIONS ON THE BACK.

* 3 1 3 6 2 9 8 *

by Receiving Lab)

Client Name: Lancaster County Solid Waste MA			Container Type	AG	AN	CG	—	—	PL	PL	PL	PL						
Address: 1299 Harrisburg Pike, P.O. Box 4424 Lancaster, PA 17604			Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml						
			Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None						
Contact: Dan Brown			ANALYSES/METHOD REQUESTED															
Phone#: (717) 735-0193			*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, ND3, Cl, F, SpC, SO4, Turb, TDS Alkalinity, HCO3															
Project Name#: Creswell/GWMP Form 19Q Wells																		
Bill To: Lancaster County Solid Waste MA																		
TAT <input checked="" type="checkbox"/> Normal-Standard TAT is 10-12 business days. <input type="checkbox"/> Rush-Subject to ALS approval and surcharges.																		
Date Required: Approved By: _____																		
Email? <input checked="" type="checkbox"/> -Y mreider@LCSWMA.com																		
Fax? <input checked="" type="checkbox"/> -Y No.: (717) 397-9973																		
Sample Description/Location (as it will appear on the lab report)				Sample Date	Time	Enter Number of Containers Per Sample or Field Results Below.												
1. CWMP010W				10/22/20	1432	G	GW	2	1	2	X	X	1	1	1	1		
2. CWMP009W				10/22/20	1504	G	GW	2	1	2	X	X	1	1	1	1		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
Project Comments:			LOGGED BY(signature):						DATE		TIME		ALS Field Services: <input type="checkbox"/> Pickup <input type="checkbox"/> Labor <input type="checkbox"/> Composite_Sampling <input type="checkbox"/> Rental_Equipment <input type="checkbox"/> Other:					
			REVIEWED BY(signature):						DATE		TIME							
Relinquished By / Company Name			Date	Time	Received By / Company Name						Date	Time						
1 <i>M. Reider ACS</i>			10-22-20	1630	TS 10-22-20 1630													
3																		
5																		
7																		
9																		
Data Deliverables: <input type="checkbox"/> Standard <input type="checkbox"/> Special Processing <input type="checkbox"/> CLP-like <input type="checkbox"/> USACE <input type="checkbox"/> USACE <input type="checkbox"/> USACE															State Samples Collected In			
Reportable to PADEP? Yes <input type="checkbox"/>															NY <input type="checkbox"/>			
PWSID # _____															NJ <input type="checkbox"/>			
EDDS: Format Type- _____															PA <input checked="" type="checkbox"/>			
															NC <input type="checkbox"/>			

* G=Grab; C=Composite **Matrix - A=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, MIDDLETON, PA 17057

Rev 8/04



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

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
1 CSwMA			WK2320
1. Were airbills / tracking numbers present and recorded?.....			
Tracking number: _____			
YES NO			
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 #: 1 _____

Temperature (°C): 0 _____

Thermometer ID: 294 _____

Radiological (μ Ci): _____

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

¹Final 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