

April 29, 2020

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

REF: Creswell Landfill (BWM Permit #100008)
Groundwater Monitoring; 1st Quarter 2020

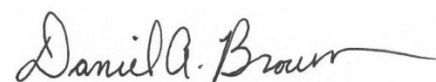
Dear Ms. Kinkaid:

Enclosed are the Form 19 reports for the sampling period completed at the above referenced facility. The laboratory results were provided to ARM Group on February 28, 2020 and 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,

A handwritten signature in black ink that reads "Daniel A. Brown".

Daniel A. Brown
Environmental Compliance Manager

Rethink. Recover. Renew.



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Enclosures

cc: LCSWMA: Environmental

ARM Group: Scott Wendling, Ryan Brandon, Jeremy Fleming

PA DEP: Randy Weiss



ARM Group LLC

Engineers and Scientists

April 28, 2020

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

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

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

To calculate the UPLs, ARM first applied the Rosner's Test for outliers in ChemStat® statistical analysis software (version 6.3.0.2, Starpoint Software, Inc., ©1996-2013) to identify potential historical anomalous concentrations in MP-1. ARM identified 82 statistical outliers at a 95% significance level in the historical dataset which did not appear to be part of a long-term concentration trend. No outliers were identified from the First Quarter 2020 analytical results.

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

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

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

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

The attached **Table 1** summarizes the background exceedances in the downgradient wells during the First Quarter 2020. Background exceedances shown in **Table 1** denote a statistically significant increase of concentrations relative to those observed historically in the upgradient well MP-1. Close attention should be paid to results from the monitoring locations with noted water quality changes during future sampling events to evaluate the presence of any positive or negative trends for the parameters of concern.



Individual Well Summary

- **MP-1** – No parameters are above statistical background, indicating that groundwater quality appears relatively stable upgradient of the site. Chloride and sodium levels appear to be slowly increasing over time, potentially because of road salt runoff from River Road. pH fluctuates over a range of approximately 1.97 units and appears to be trending slightly higher over time. All other Form 19 analytical parameters appear to be stable and within historical concentration ranges.
- **MP-2** – 1,1-dichloroethane was detected in the First Quarter 2020 and is, therefore, above background levels. The concentration of this VOC appears to be decreasing over time, apart from higher detections in 2012 and 2018.

Other parameters above background in MP-2 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, magnesium, manganese, potassium, sodium, specific conductance (SpC), sulfate, total dissolved solids (TDS), and total organic carbon (TOC). Alkalinity and sodium concentrations appear to be increasing since 2012. Concentrations of the remaining parameters generally appear to be stable since an observed increase in 2012. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.42 unit higher, on average, while fluctuating over a slightly wider range.

- **MP-3** – 1,1-dichloroethane was detected in the First Quarter 2020 and is, therefore, above background levels. The concentration of this VOC appears to be decreasing over time, apart from a higher detection in 2018.

Other parameters above background in MP-3 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, sodium, SpC, and sulfate. Concentrations of alkalinity (bicarbonate and total), chloride and sodium and SpC appear to be increasing over time with short-term fluctuations observed. TOC experienced an abrupt increase in the First Quarter 2018 but has since returned to typical historical levels and appears to be decreasing over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.27 unit higher, on average.

- **MP-4** – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, sodium, and sulfate. Concentrations of these parameters appear to be increasing slowly long-term with short-term fluctuations. TOC experienced an abrupt increase in the First Quarter 2019 but has since returned to near-average historical levels. pH appears to be trending slightly lower over time with a long-term average value approximately 0.59 unit higher than background.
- **MP-5** – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, sodium, and sulfate. Concentrations of all these parameters generally appear to be increasing over time with short-term fluctuations. pH appears to be stable over time with a long-term average value approximately 0.23 unit higher than background.



- MP-7 – Parameters above background in this well include alkalinity (bicarbonate and total), chloride, sodium, SpC, and sulfate. All parameters generally appear to be stable except for sulfate. Historical concentrations of sulfate appear to be increasing at a rate of approximately 1 mg/L per year, apart from an abrupt increase in 2018. pH appears to closely mimic the trend observed in the upgradient well at levels approximately 0.19 unit higher, on average.
- MP-8 – 1,1-dichloroethane and benzene were detected in the First Quarter 2020 and are, therefore, above background levels. Both VOCs appear to be decreasing over time with minor fluctuations that appear seasonal in nature.

Other parameters above background in MP-8 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, chemical oxygen demand (COD), iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. Magnesium, manganese, and TOC levels appear to be slowly increasing over time. Concentrations of the other noted parameters generally appear to be steady long-term with minor fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.74 unit higher, on average, while fluctuating over a slightly narrower range.

- MP-9 – 1,1-dichloroethane and benzene were detected in the First Quarter 2020 and are, therefore, above background levels. Both VOCs appear to be decreasing over time with minor fluctuations that appear seasonal in nature.

Other parameters above background in MP-9 include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, COD, iron, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. Sulfate concentrations are generally decreasing over time but have had steadily increasing concentrations since 2012. Concentrations of the other noted parameters generally appear to be steady long-term with minor fluctuations and steady increases. pH appears to be trending slightly lower over time with a long-term average value approximately 0.9 unit higher than background. The pH dataset for MP-9 does not mimic the background dataset and displays a wider range of fluctuations.

- MP-10 – Parameters above background in this well include alkalinity (bicarbonate and total), calcium, chloride, magnesium, potassium, sodium, SpC, sulfate, TDS, and TOC. Concentrations of alkalinity (bicarbonate and total), chloride, magnesium, sodium, SpC, and sulfate generally appear to be stable with slight increasing trends and fluctuations correlating to seasonal changes. Calcium and TDS concentrations have generally remained stable over time while potassium and TOC concentrations continue to decrease over time. Fluctuations correlating to seasonal changes are apparent for these parameters. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.25 units higher, on average.



- MP-12 – Parameters above background in this well include alkalinity (bicarbonate and total), calcium, chloride, iron, manganese, SpC, sulfate, TOC, and turbidity. Concentrations of chloride, iron, sulfate, TOC, and turbidity appear to be stable to increasing over time, with iron displaying the widest range of fluctuations. Turbidity fluctuations appear to be seasonal. Concentrations of the other noted parameters generally appear to be stable long-term and are decreasing. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.66 units higher, on average.
- MP-16 – Parameters above background in this well include alkalinity (bicarbonate and total) and sulfate. However, concentrations of these parameters appear to be stable long-term. pH appears to be stable over time with a long-term average value approximately 0.69 unit higher than background.
- MP-17S – Surface-water grab samples are taken from Mann’s Run at this location and analyzed for Form 19 parameters. Because of its upstream location relative to the majority of CWLF, this sampling point should be interpreted, to some extent, as a background evaluation point for evaluating downstream conditions in Mann’s Run (i.e., at MP-18S).

Parameters above statistical groundwater background levels at MP-17S include alkalinity (bicarbonate and total), calcium, chloride, magnesium, nitrate-N, potassium, sodium, SpC, sulfate, TDS, and TOC. Potassium and TOC appear to be stable or decreasing over time. Concentrations of the other noted parameters show a wide range of fluctuation in the historical results, and no long-term trends are readily apparent in the data. Nitrate-nitrogen and magnesium concentration fluctuations appear to be seasonal. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.99 units higher, on average, while fluctuating over a slightly wider range.

- MP-18S – Surface-water grab samples are taken from Mann’s Run at this downstream location and analyzed for Form 19 parameters. Parameters above statistical groundwater background levels at MP-18S include alkalinity (bicarbonate and total), ammonia-N, calcium, chloride, COD, magnesium, manganese, potassium, sodium, SpC, sulfate, TDS, and TOC. However, only ammonia-N, COD, manganese, sulfate, and TOC levels exceed those observed at the upstream sampling location MP-17S. COD levels appear to be decreasing since 2001. Manganese concentrations do not appear to have a discernible long-term trend and fluctuate over a range of 0.5 mg/L. TOC levels appear to be gradually increasing since 2009. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.57 units higher, on average.

Trend plots for the VOCs noted above (1,1-dichloroethane and benzene) are included in **Attachment 3**. Parameters not noted above are either at or below background levels. Overall, the groundwater quality at CWLF appears to be improving, especially with respect to VOC concentrations. Some metal and ion concentrations (e.g., calcium, sodium, and chloride) appear to be increasing slowly in some wells over time, but these water quality changes are generally gradual and do not appear to be a cause for concern at this time.



Trip and Field Blank Analyses

One (1) trip blank sample and one (1) field blank were received by the laboratory on January 23, 2020. Both trip blank and field blank samples were analyzed for VOCs, while additional metals and wet chemistry analyses were completed for the field blank.

Laboratory analyses for both blank samples were completed from January 24 through 29, 2020. No VOC constituents were detected in either the trip blank or field blank. Additionally, no metals were detected in the field blank. In the field blank wet chemistry results, the SpC was measured at 2 µmho/cm, and TOC (0.61 mg/L) was detected slightly above its reporting detection limit of 0.50 mg/L.

Closing

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

Sincerely,
ARM Group Inc.



Jeremy Fleming
Project Geologist II



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



Enclosed: Table 1
Attachments 1-3



TABLE



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

Parameter	Background Standard	Units	CWMP001W	CWMP002W	CWMP003W	CWMP004W	CWMP005W	CWMP007W	CWMP008W	CWMP009W	CWMP010W	CWMP012W	CWMP016W	CWMP017S	CWMP018S
1,1,1-TRICHLOROETHANE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-DICHLOROETHANE	1*	µg/L	<1	10.7	1.3	<1	<1	<1	3	1.6	<1	<1	<1	<1	<1
1,1-DICHLOROETHENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-DICHLOROETHANE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ALKALINITY	7	mg/L	<5	77	22	24	18	14	350	518	187	66	12	674	409
AMMONIA-NITROGEN	0.12	mg/L	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	6.37	25.6	<0.1	<0.1	0.1	<0.1	0.29
BENZENE	1*	µg/L	<1	<1	<1	<1	<1	<1	1.2	1.9	<1	<1	<1	<1	<1
BICARBONATE	8.02	mg/L	<5	77	22	24	18	14	350	518	187	66	12	674	409
CALCIUM, TOTAL	20.1	mg/L	14.9	51.8	24.6	21.1	14.5	17.2	65.5	162	45.5	32.2	5.1	96.5	78.5
CHLORIDE	32.6	mg/L	27.4	102	67	47.6	57.4	61.1	33.4	493	242	33.3	2.9	826	490
cis 1,2-DICHLOROETHENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
COD (CHEMICAL OXYGEN DEMAND)	11.88**	mg/L	<15	17	<15	<15	<15	<15	23	106	<15	<15	<15	<15	18
ETHYLBENZENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
FLUORIDE	0.2*	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5
IRON, TOTAL	3.765	mg/L	1.200	<0.06	<0.06	<0.06	<0.06	<0.06	25.3	36	0.300	25.4	0.35	1.10	0.18
MAGNESIUM, TOTAL	12.4	mg/L	10.2	16.1	9.1	7.4	8	8.5	29.5	76.1	40	9.1	1.2	132	81.2
MANGANESE, TOTAL	0.126	mg/L	0.050	1.1	<0.0056	0.010	0.050	<0.0056	16.2	12.5	0.110	0.17	0.0088	0.11	0.18
METHYLENE CHLORIDE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NITRATE-NITROGEN	23.57	mg/L	19.5	3.4	7.6	7.1	8.6	9.3	<0.2	<0.2	10.2	9	0.6	27.7	19.7
POTASSIUM, TOTAL	2.878	mg/L	2.2	2.9	1.9	1.6	2.4	2.1	9	33.9	6.7	1.6	<0.56	23.5	18.2
SODIUM, TOTAL	15.52	mg/L	12.7	27.5	23.4	16.7	27.7	31.3	35.7	162	151	13.5	3.2	496	296
SPEC. COND., FIELD	328.1	µmho/cm	275	607	365	292	318	372	840	2,582	1,601	312	66	3,858	2,536
SPEC. COND., LAB	299.3	µmho/cm	278	558	340	273	299	375	775	2,410	1,260	310	57	3,640	2,320
SULFATE	2.773	mg/L	2.4	16.7	5.3	6	4.7	21.7	7.3	5.9	31.2	5.2	11.6	25.4	30.7
TDS (TOTAL DISSOLVED SOLIDS)	258.7	mg/L	188	386	200	140	166	212	402	1,210	638	190	22	2,020	1,270
TETRACHLOROETHENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TOC (TOTAL ORGANIC CARBON)	1.134	mg/L	0.65	4.4	0.78	0.9	0.75	0.67	9.2	34.4	3.4	1.3	0.76	4.7	7.2
TOLUENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TOTAL PHENOLICS	0.005*	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
trans 1,2-DICHLOROETHENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TRICHLOROETHENE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TURBIDITY	178.5	NTU	18.4	<0.1	<0.1	<0.1	1.38	<0.1	15.2	34.2	1.85	258	3.7	2.26	1.02
VINYL CHLORIDE	1*	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
XYLENES (TOTAL)	3*	µg/L	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3

Notes:

* Reporting limit substituted for background standard due to lack of historical detections in CWMP001W

** COD historical background standard is lower than the current lab reporting limits.

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS



LCSWMA Creswell Landfill			
1st Quarter 2020 - Background Upper Prediction Limits (MP-1)			
Parameter	Distribution	Upper Prediction Limit	Unit
1,1,1-Trichloroethane	NA	1*	µg/L
1,1-Dichloroethane	NA	1*	µg/L
1,1-Dichloroethene	NA	1*	µg/L
1,2-Dibromoethane	NA	1*	µg/L
1,2-Dichloroethane	NA	1*	µg/L
Alkalinity	No Distribution	7	mg/L
Ammonia-Nitrogen	No Distribution	0.12	mg/L
Benzene	NA	1*	µg/L
Bicarbonate Alkalinity	No Distribution	8.02	mg/L
Calcium, Dissolved	No Distribution	19.2	mg/L
Calcium, Total	No Distribution	20.1	mg/L
Chloride	No Distribution	32.6	mg/L
Cis 1,2-Dichloroethene	NA	1*	µg/L
Chemical Oxygen Demand	Normal	11.88**	mg/L
Ethylbenzene	NA	1*	µg/L
Fluoride	NA	0.2*	mg/L
Iron, Dissolved	Lognormal	0.258	mg/L
Iron, Total	Lognormal	3.765	mg/L
Magnesium, Dissolved	No Distribution	12.43	mg/L
Magnesium, Total	No Distribution	12.4	mg/L
Manganese, Dissolved	No Distribution	0.128	mg/L
Manganese, Total	No Distribution	0.126	mg/L
Methylene Chloride	NA	1*	µg/L
Nitrate-Nitrogen	No Distribution	23.57	mg/L
pH-Field	No Distribution	None***	S.U.
pH-Lab	Normal	None***	S.U.
Potassium, Dissolved	No Distribution	3.064	mg/L
Potassium, Total	Normal	2.878	mg/L
Sodium, Dissolved	Normal	15.12	mg/L
Sodium, Total	Normal	15.52	mg/L
Spec. Cond., Field	Normal	328.1	µmhos/cm
Spec. Cond., Lab	No Distribution	299.3	µmhos/cm
Sulfate	Normal	2.773	mg/L
Total Dissolved Solids	Normal	258.7	mg/L
Tetrachloroethene	NA	1*	µg/L
Total Organic Carbon	Normal	1.134	mg/L
Toluene	NA	1*	µg/L
Total Phenolics	NA	0.005*	mg/L
Trans 1,2-Dichloroethene	NA	1*	µg/L
Trichloroethene	NA	1*	µg/L
Turbidity	Lognormal	178.5	NTU
Vinyl Chloride	NA	1*	µg/L
Total Xylenes	NA	3*	µg/L

Notes:

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

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

** 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	B	C	D	E	F	G	H	I	J	K	L
1	Background Statistics for Data Sets with Non-Detects											
2	User Selected Options											
3	Date/Time of Computation	ProUCL 5.13/17/2020 12:44:26 PM										
4	From File	MP-1 Masterlist.xls										
5	Full Precision	OFF										
6	Confidence Coefficient	95%										
7	Coverage	95%										
8	Different or Future K Observations	1										
9	Number of Bootstrap Operations	2000										
10												
11	1,1,1-TRICHLOROETHANE (ug/L)											
12												
13	General Statistics											
14	Total Number of Observations	130									Number of Missing Observations	0
15	Number of Distinct Observations	1										
16	Number of Detects	0									Number of Non-Detects	130
17	Number of Distinct Detects	0									Number of Distinct Non-Detects	1
18	Minimum Detect	N/A									Minimum Non-Detect	1
19	Maximum Detect	N/A									Maximum Non-Detect	1
20	Variance Detected	N/A									Percent Non-Detects	100%
21	Mean Detected	N/A									SD Detected	N/A
22	Mean of Detected Logged Data	N/A									SD of Detected Logged Data	N/A
23												
24	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
25	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
26	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
27												
28	The data set for variable 1,1,1-TRICHLOROETHANE (ug/L) was not processed!											
29												
30												
31	1,1-DICHLOROETHANE (ug/L)											
32												
33	General Statistics											
34	Total Number of Observations	130									Number of Missing Observations	0
35	Number of Distinct Observations	1										
36	Number of Detects	0									Number of Non-Detects	130
37	Number of Distinct Detects	0									Number of Distinct Non-Detects	1
38	Minimum Detect	N/A									Minimum Non-Detect	1
39	Maximum Detect	N/A									Maximum Non-Detect	1
40	Variance Detected	N/A									Percent Non-Detects	100%
41	Mean Detected	N/A									SD Detected	N/A
42	Mean of Detected Logged Data	N/A									SD of Detected Logged Data	N/A
43												
44	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
45	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
46	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
47												
48	The data set for variable 1,1-DICHLOROETHANE (ug/L) was not processed!											
49												
50												
51	1,1-DICHLOROETHENE (ug/L)											
52												
53	General Statistics											
54	Total Number of Observations	130									Number of Missing Observations	0
55	Number of Distinct Observations	1										

	A	B	C	D	E	F	G	H	I	J	K	L
56					Number of Detects	0				Number of Non-Detects		130
57					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
58					Minimum Detect	N/A				Minimum Non-Detect		1
59					Maximum Detect	N/A				Maximum Non-Detect		1
60					Variance Detected	N/A				Percent Non-Detects		100%
61					Mean Detected	N/A				SD Detected		N/A
62					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
63												
64	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
65	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
66	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
67												
68	The data set for variable 1,1-DICHLOROETHENE (ug/L) was not processed!											
69												
70												
71	1,2-DIBROMOETHANE (ug/L)											
72												
73	General Statistics											
74					Total Number of Observations	127				Number of Missing Observations		3
75					Number of Distinct Observations	2						
76					Number of Detects	0				Number of Non-Detects		127
77					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
78					Minimum Detect	N/A				Minimum Non-Detect		1
79					Maximum Detect	N/A				Maximum Non-Detect		2
80					Variance Detected	N/A				Percent Non-Detects		100%
81					Mean Detected	N/A				SD Detected		N/A
82					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
83												
84	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
85	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
86	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
87												
88	The data set for variable 1,2-DIBROMOETHANE (ug/L) was not processed!											
89												
90												
91	1,2-DICHLOROETHANE											
92												
93	General Statistics											
94					Total Number of Observations	130				Number of Missing Observations		0
95					Number of Distinct Observations	2						
96					Number of Detects	0				Number of Non-Detects		130
97					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
98					Minimum Detect	N/A				Minimum Non-Detect		1
99					Maximum Detect	N/A				Maximum Non-Detect		2
100					Variance Detected	N/A				Percent Non-Detects		100%
101					Mean Detected	N/A				SD Detected		N/A
102					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
103												
104	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
105	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
106	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
107												
108	The data set for variable 1,2-DICHLOROETHANE was not processed!											
109												
110												

	A	B	C	D	E	F	G	H	I	J	K	L
111	ALKALINITY (mg/L)											
112												
113	General Statistics											
114	Total Number of Observations					69	Number of Missing Observations					61
115	Number of Distinct Observations					5						
116	Number of Detects					45	Number of Non-Detects					24
117	Number of Distinct Detects					5	Number of Distinct Non-Detects					1
118	Minimum Detect					5	Minimum Non-Detect					5
119	Maximum Detect					8	Maximum Non-Detect					5
120	Variance Detected					0.607	Percent Non-Detects					34.78%
121	Mean Detected					5.851	SD Detected					0.779
122	Mean of Detected Logged Data					1.758	SD of Detected Logged Data					0.13
123												
124	Critical Values for Background Threshold Values (BTVs)											
125	Tolerance Factor K (For UTL)					1.988	d2max (for USL)					3.079
126												
127	Normal GOF Test on Detects Only											
128	Shapiro Wilk Test Statistic					0.82	Shapiro Wilk GOF Test					
129	5% Shapiro Wilk Critical Value					0.945	Data Not Normal at 5% Significance Level					
130	Lilliefors Test Statistic					0.246	Lilliefors GOF Test					
131	5% Lilliefors Critical Value					0.131	Data Not Normal at 5% Significance Level					
132	Data Not Normal at 5% Significance Level											
133												
134	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
135	KM Mean					5.555	KM SD					0.742
136	95% UTL95% Coverage					7.031	95% KM UPL (t)					6.802
137	90% KM Percentile (z)					6.507	95% KM Percentile (z)					6.776
138	99% KM Percentile (z)					7.282	95% KM USL					7.841
139												
140	DL/2 Substitution Background Statistics Assuming Normal Distribution											
141	Mean					4.686	SD					1.726
142	95% UTL95% Coverage					8.116	95% UPL (t)					7.584
143	90% Percentile (z)					6.897	95% Percentile (z)					7.524
144	99% Percentile (z)					8.7	95% USL					9.998
145	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
146												
147	Gamma GOF Tests on Detected Observations Only											
148	A-D Test Statistic					3.494	Anderson-Darling GOF Test					
149	5% A-D Critical Value					0.747	Data Not Gamma Distributed at 5% Significance Level					
150	K-S Test Statistic					0.239	Kolmogorov-Smirnov GOF					
151	5% K-S Critical Value					0.131	Data Not Gamma Distributed at 5% Significance Level					
152	Data Not Gamma Distributed at 5% Significance Level											
153												
154	Gamma Statistics on Detected Data Only											
155	k hat (MLE)					59.74	k star (bias corrected MLE)					55.77
156	Theta hat (MLE)					0.0979	Theta star (bias corrected MLE)					0.105
157	nu hat (MLE)					5377	nu star (bias corrected)					5019
158	MLE Mean (bias corrected)					5.851						
159	MLE Sd (bias corrected)					0.783	95% Percentile of Chisquare (2kstar)					137.2
160												
161	Gamma ROS Statistics using Imputed Non-Detects											
162	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
163	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)											
164	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
165	This is especially true when the sample size is small.											

	A	B	C	D	E	F	G	H	I	J	K	L
166	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
167					Minimum	3.096					Mean	5.269
168					Maximum	8					Median	5
169					SD	1.053					CV	0.2
170					k hat (MLE)	25.1					k star (bias corrected MLE)	24.02
171					Theta hat (MLE)	0.21					Theta star (bias corrected MLE)	0.219
172					nu hat (MLE)	3464					nu star (bias corrected)	3315
173					MLE Mean (bias corrected)	5.269					MLE Sd (bias corrected)	1.075
174					95% Percentile of Chisquare (2kstar)	65.21					90% Percentile	6.685
175					95% Percentile	7.153					99% Percentile	8.087
176	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
177	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
178					WH	HW					WH	HW
179	% Approx. Gamma UTL with 95% Coverage				7.579	7.615	95% Approx. Gamma UPL				7.17	7.192
180	95% Gamma USL				9.149	9.26						
181												
182	Estimates of Gamma Parameters using KM Estimates											
183					Mean (KM)	5.555					SD (KM)	0.742
184					Variance (KM)	0.551					SE of Mean (KM)	0.0904
185					k hat (KM)	55.99					k star (KM)	53.56
186					nu hat (KM)	7726					nu star (KM)	7392
187					theta hat (KM)	0.0992					theta star (KM)	0.104
188					80% gamma percentile (KM)	6.182					90% gamma percentile (KM)	6.547
189					95% gamma percentile (KM)	6.86					99% gamma percentile (KM)	7.472
190												
191	The following statistics are computed using gamma distribution and KM estimates											
192	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
193					WH	HW					WH	HW
194	% Approx. Gamma UTL with 95% Coverage				7.057	7.061	95% Approx. Gamma UPL				6.803	6.803
195	95% KM Gamma Percentile				6.775	6.775	95% Gamma USL				8.008	8.033
196												
197	Lognormal GOF Test on Detected Observations Only											
198					Shapiro Wilk Test Statistic	0.821					Shapiro Wilk GOF Test	
199					5% Shapiro Wilk Critical Value	0.945					Data Not Lognormal at 5% Significance Level	
200					Lilliefors Test Statistic	0.246					Lilliefors GOF Test	
201					5% Lilliefors Critical Value	0.131					Data Not Lognormal at 5% Significance Level	
202	Data Not Lognormal at 5% Significance Level											
203												
204	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
205					Mean in Original Scale	5.315					Mean in Log Scale	1.653
206					SD in Original Scale	0.994					SD in Log Scale	0.186
207					95% UTL95% Coverage	7.566					95% BCA UTL95% Coverage	7
208					95% Bootstrap (%) UTL95% Coverage	7.3					95% UPL (t)	7.143
209					90% Percentile (z)	6.633					95% Percentile (z)	7.097
210					99% Percentile (z)	8.057					95% USL	9.269
211												
212	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
213					KM Mean of Logged Data	1.706					95% KM UTL (Lognormal)95% Coverage	7.075
214					KM SD of Logged Data	0.126					95% KM UPL (Lognormal)	6.806
215					95% KM Percentile Lognormal (z)	6.776					95% KM USL (Lognormal)	8.115
216												
217	Background DL/2 Statistics Assuming Lognormal Distribution											
218					Mean in Original Scale	4.686					Mean in Log Scale	1.465
219					SD in Original Scale	1.726					SD in Log Scale	0.417
220					95% UTL95% Coverage	9.924					95% UPL (t)	8.726

	A	B	C	D	E	F	G	H	I	J	K	L
221					90% Percentile (z)	7.39				95% Percentile (z)		8.6
222					99% Percentile (z)	11.43				95% USL		15.64
223	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
224												
225	Nonparametric Distribution Free Background Statistics											
226	Data do not follow a Discernible Distribution (0.05)											
227												
228	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
229					Order of Statistic, r	68				95% UTL with 95% Coverage		7.3
230					Approx, f used to compute achieved CC	1.789				Approximate Actual Confidence Coefficient achieved by UTL		0.866
231					Approximate Sample Size needed to achieve specified CC	93				95% UPL		7
232					95% USL	8				95% KM Chebyshev UPL		8.815
233												
234	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
235	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
236	and consists of observations collected from clean unimpacted locations.											
237	The use of USL tends to provide a balance between false positives and false negatives provided the data											
238	represents a background data set and when many onsite observations need to be compared with the BTV.											
239												
240	AMMONIA-NITROGEN (mg/L)											
241												
242	General Statistics											
243					Total Number of Observations	118				Number of Missing Observations		12
244					Number of Distinct Observations	6						
245					Number of Detects	10				Number of Non-Detects		108
246					Number of Distinct Detects	5				Number of Distinct Non-Detects		1
247					Minimum Detect	0.11				Minimum Non-Detect		0.1
248					Maximum Detect	0.23				Maximum Non-Detect		0.1
249					Variance Detected	0.00134				Percent Non-Detects		91.53%
250					Mean Detected	0.136				SD Detected		0.0366
251					Mean of Detected Logged Data	-2.021				SD of Detected Logged Data		0.229
252												
253	Critical Values for Background Threshold Values (BTVs)											
254					Tolerance Factor K (For UTL)	1.899				d2max (for USL)		3.265
255												
256	Normal GOF Test on Detects Only											
257					Shapiro Wilk Test Statistic	0.719				Shapiro Wilk GOF Test		
258					5% Shapiro Wilk Critical Value	0.842				Data Not Normal at 5% Significance Level		
259					Lilliefors Test Statistic	0.269				Lilliefors GOF Test		
260					5% Lilliefors Critical Value	0.262				Data Not Normal at 5% Significance Level		
261	Data Not Normal at 5% Significance Level											
262												
263	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
264					KM Mean	0.103				KM SD		0.0142
265					95% UTL 95% Coverage	0.13				95% KM UPL (t)		0.127
266					90% KM Percentile (z)	0.121				95% KM Percentile (z)		0.126
267					99% KM Percentile (z)	0.136				95% KM USL		0.15
268												
269	DL/2 Substitution Background Statistics Assuming Normal Distribution											
270					Mean	0.0573				SD		0.0261
271					95% UTL 95% Coverage	0.107				95% UPL (t)		0.101
272					90% Percentile (z)	0.0907				95% Percentile (z)		0.1
273					99% Percentile (z)	0.118				95% USL		0.143
274	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
275												

	A	B	C	D	E	F	G	H	I	J	K	L	
276	Gamma GOF Tests on Detected Observations Only												
277	A-D Test Statistic					0.912	Anderson-Darling GOF Test						
278	5% A-D Critical Value					0.725	Data Not Gamma Distributed at 5% Significance Level						
279	K-S Test Statistic					0.278	Kolmogorov-Smirnov GOF						
280	5% K-S Critical Value					0.266	Data Not Gamma Distributed at 5% Significance Level						
281	Data Not Gamma Distributed at 5% Significance Level												
282													
283	Gamma Statistics on Detected Data Only												
284	k hat (MLE)					19.28	k star (bias corrected MLE)					13.56	
285	Theta hat (MLE)					0.00706	Theta star (bias corrected MLE)					0.01	
286	nu hat (MLE)					385.5	nu star (bias corrected)					271.2	
287	MLE Mean (bias corrected)					0.136							
288	MLE Sd (bias corrected)					0.0369	95% Percentile of Chisquare (2kstar)					40.26	
289													
290	Gamma ROS Statistics using Imputed Non-Detects												
291	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
292	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)												
293	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
294	This is especially true when the sample size is small.												
295	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
296	Minimum					0.01	Mean					0.0284	
297	Maximum					0.23	Median					0.01	
298	SD					0.0387	CV					1.362	
299	k hat (MLE)					1.092	k star (bias corrected MLE)					1.07	
300	Theta hat (MLE)					0.026	Theta star (bias corrected MLE)					0.0266	
301	nu hat (MLE)					257.8	nu star (bias corrected)					252.5	
302	MLE Mean (bias corrected)					0.0284	MLE Sd (bias corrected)					0.0275	
303	95% Percentile of Chisquare (2kstar)					6.26	90% Percentile					0.0644	
304	95% Percentile					0.0831	99% Percentile					0.127	
305	The following statistics are computed using Gamma ROS Statistics on Imputed Data												
306	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
307						WH						HW	
308	% Approx. Gamma UTL with 95% Coverage					0.0924	95% Approx. Gamma UPL					0.0793	0.0778
309	95% Gamma USL					0.199							
310													
311	Estimates of Gamma Parameters using KM Estimates												
312	Mean (KM)					0.103	SD (KM)					0.0142	
313	Variance (KM)					2.0256E-4	SE of Mean (KM)					0.00138	
314	k hat (KM)					52.43	k star (KM)					51.1	
315	nu hat (KM)					12373	nu star (KM)					12060	
316	theta hat (KM)					0.00197	theta star (KM)					0.00202	
317	80% gamma percentile (KM)					0.115	90% gamma percentile (KM)					0.122	
318	95% gamma percentile (KM)					0.128	99% gamma percentile (KM)					0.14	
319													
320	The following statistics are computed using gamma distribution and KM estimates												
321	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
322						WH						WH	HW
323	% Approx. Gamma UTL with 95% Coverage					0.126	95% Approx. Gamma UPL					0.123	0.122
324	95% KM Gamma Percentile					0.123	95% Gamma USL					0.144	0.144
325													
326	Lognormal GOF Test on Detected Observations Only												
327	Shapiro Wilk Test Statistic					0.791	Shapiro Wilk GOF Test						
328	5% Shapiro Wilk Critical Value					0.842	Data Not Lognormal at 5% Significance Level						
329	Lilliefors Test Statistic					0.267	Lilliefors GOF Test						
330	5% Lilliefors Critical Value					0.262	Data Not Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
331	Data Not Lognormal at 5% Significance Level											
332												
333	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
334	Mean in Original Scale				0.0486		Mean in Log Scale				-3.243	
335	SD in Original Scale				0.0352		SD in Log Scale				0.665	
336	95% UTL95% Coverage				0.138		95% BCA UTL95% Coverage				0.14	
337	95% Bootstrap (%) UTL95% Coverage				0.142		95% UPL (t)				0.118	
338	90% Percentile (z)				0.0916		95% Percentile (z)				0.117	
339	99% Percentile (z)				0.183		95% USL				0.342	
340												
341	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
342	KM Mean of Logged Data				-2.279		95% KM UTL (Lognormal)95% Coverage				0.124	
343	KM SD of Logged Data				0.101		95% KM UPL (Lognormal)				0.121	
344	95% KM Percentile Lognormal (z)				0.121		95% KM USL (Lognormal)				0.142	
345												
346	Background DL/2 Statistics Assuming Lognormal Distribution											
347	Mean in Original Scale				0.0573		Mean in Log Scale				-2.913	
348	SD in Original Scale				0.0261		SD in Log Scale				0.28	
349	95% UTL95% Coverage				0.0924		95% UPL (t)				0.0865	
350	90% Percentile (z)				0.0777		95% Percentile (z)				0.086	
351	99% Percentile (z)				0.104		95% USL				0.135	
352	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
353												
354	Nonparametric Distribution Free Background Statistics											
355	Data do not follow a Discernible Distribution (0.05)											
356												
357	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
358	Order of Statistic, r				115		95% UTL with95% Coverage				0.14	
359	Approx, f used to compute achieved CC				1.513		Approximate Actual Confidence Coefficient achieved by UTL				0.847	
360	Approximate Sample Size needed to achieve specified CC				153		95% UPL				0.12	
361	95% USL				0.23		95% KM Chebyshev UPL				0.165	
362												
363	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
364	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
365	and consists of observations collected from clean unimpacted locations.											
366	The use of USL tends to provide a balance between false positives and false negatives provided the data											
367	represents a background data set and when many onsite observations need to be compared with the BTV.											
368												
369	BENZENE (ug/L)											
370												
371	General Statistics											
372	Total Number of Observations				130		Number of Missing Observations				0	
373	Number of Distinct Observations				1							
374	Number of Detects				0		Number of Non-Detects				130	
375	Number of Distinct Detects				0		Number of Distinct Non-Detects				1	
376	Minimum Detect				N/A		Minimum Non-Detect				1	
377	Maximum Detect				N/A		Maximum Non-Detect				1	
378	Variance Detected				N/A		Percent Non-Detects				100%	
379	Mean Detected				N/A		SD Detected				N/A	
380	Mean of Detected Logged Data				N/A		SD of Detected Logged Data				N/A	
381												
382	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
383	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
384	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
385												

	A	B	C	D	E	F	G	H	I	J	K	L
386	The data set for variable BENZENE (ug/L) was not processed!											
387												
388												
389	BICARBONATE ALKALINITY (mg/L)											
390												
391	General Statistics											
392	Total Number of Observations					115	Number of Missing Observations					15
393	Number of Distinct Observations					21						
394	Number of Detects					73	Number of Non-Detects					42
395	Number of Distinct Detects					19	Number of Distinct Non-Detects					3
396	Minimum Detect					4.7	Minimum Non-Detect					5
397	Maximum Detect					9.5	Maximum Non-Detect					6.2
398	Variance Detected					1.317	Percent Non-Detects					36.52%
399	Mean Detected					6.297	SD Detected					1.147
400	Mean of Detected Logged Data					1.825	SD of Detected Logged Data					0.176
401												
402	Critical Values for Background Threshold Values (BTVs)											
403	Tolerance Factor K (For UTL)					1.903	d2max (for USL)					3.257
404												
405	Normal GOF Test on Detects Only											
406	Shapiro Wilk Test Statistic					0.881	Normal GOF Test on Detected Observations Only					
407	5% Shapiro Wilk P Value					1.1408E-7	Data Not Normal at 5% Significance Level					
408	Lilliefors Test Statistic					0.26	Lilliefors GOF Test					
409	5% Lilliefors Critical Value					0.104	Data Not Normal at 5% Significance Level					
410	Data Not Normal at 5% Significance Level											
411												
412	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
413	KM Mean					5.719	KM SD					1.188
414	95% UTL95% Coverage					7.979	95% KM UPL (t)					7.697
415	90% KM Percentile (z)					7.241	95% KM Percentile (z)					7.673
416	99% KM Percentile (z)					8.482	95% KM USL					9.587
417												
418	DL/2 Substitution Background Statistics Assuming Normal Distribution											
419	Mean					4.917	SD					2.043
420	95% UTL95% Coverage					8.805	95% UPL (t)					8.32
421	90% Percentile (z)					7.536	95% Percentile (z)					8.278
422	99% Percentile (z)					9.671	95% USL					11.57
423	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
424												
425	Gamma GOF Tests on Detected Observations Only											
426	A-D Test Statistic					2.941	Anderson-Darling GOF Test					
427	5% A-D Critical Value					0.749	Data Not Gamma Distributed at 5% Significance Level					
428	K-S Test Statistic					0.242	Kolmogorov-Smirnov GOF					
429	5% K-S Critical Value					0.104	Data Not Gamma Distributed at 5% Significance Level					
430	Data Not Gamma Distributed at 5% Significance Level											
431												
432	Gamma Statistics on Detected Data Only											
433	k hat (MLE)					32.24	k star (bias corrected MLE)					30.92
434	Theta hat (MLE)					0.195	Theta star (bias corrected MLE)					0.204
435	nu hat (MLE)					4707	nu star (bias corrected)					4515
436	MLE Mean (bias corrected)					6.297						
437	MLE Sd (bias corrected)					1.132	95% Percentile of Chisquare (2kstar)					81.2
438												
439	Gamma ROS Statistics using Imputed Non-Detects											
440	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
441	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)											
442	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
443	This is especially true when the sample size is small.											
444	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
445		Minimum	2.207							Mean	5.439	
446		Maximum	9.5							Median	5	
447		SD	1.512							CV	0.278	
448		k hat (MLE)	12.71							k star (bias corrected MLE)	12.39	
449		Theta hat (MLE)	0.428							Theta star (bias corrected MLE)	0.439	
450		nu hat (MLE)	2924							nu star (bias corrected)	2849	
451		MLE Mean (bias corrected)	5.439							MLE Sd (bias corrected)	1.545	
452		95% Percentile of Chisquare (2kstar)	37.37							90% Percentile	7.49	
453		95% Percentile	8.205							99% Percentile	9.663	
454	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
455	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
456			WH			HW				WH	HW	
457	% Approx. Gamma UTL with 95% Coverage		8.71			8.784			95% Approx. Gamma UPL	8.222	8.272	
458		95% Gamma USL	11.87			12.17						
459												
460	Estimates of Gamma Parameters using KM Estimates											
461		Mean (KM)	5.719							SD (KM)	1.188	
462		Variance (KM)	1.411							SE of Mean (KM)	0.112	
463		k hat (KM)	23.18							k star (KM)	22.58	
464		nu hat (KM)	5332							nu star (KM)	5194	
465		theta hat (KM)	0.247							theta star (KM)	0.253	
466		80% gamma percentile (KM)	6.699							90% gamma percentile (KM)	7.305	
467		95% gamma percentile (KM)	7.831							99% gamma percentile (KM)	8.884	
468												
469	The following statistics are computed using gamma distribution and KM estimates											
470	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
471			WH			HW				WH	HW	
472	% Approx. Gamma UTL with 95% Coverage		8.041			8.052			95% Approx. Gamma UPL	7.711	7.714	
473		95% KM Gamma Percentile	7.683			7.685			95% Gamma USL	10.11	10.19	
474												
475	Lognormal GOF Test on Detected Observations Only											
476		Shapiro Wilk Approximate Test Statistic	0.895							Shapiro Wilk GOF Test		
477		5% Shapiro Wilk P Value	1.2260E-6							Data Not Lognormal at 5% Significance Level		
478		Lilliefors Test Statistic	0.231							Lilliefors GOF Test		
479		5% Lilliefors Critical Value	0.104							Data Not Lognormal at 5% Significance Level		
480	Data Not Lognormal at 5% Significance Level											
481												
482	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
483		Mean in Original Scale	5.53							Mean in Log Scale	1.679	
484		SD in Original Scale	1.4							SD in Log Scale	0.25	
485		95% UTL95% Coverage	8.632							95% BCA UTL95% Coverage	8	
486		95% Bootstrap (%) UTL95% Coverage	8.25							95% UPL (t)	8.134	
487		90% Percentile (z)	7.389							95% Percentile (z)	8.092	
488		99% Percentile (z)	9.598							95% USL	12.11	
489												
490	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
491		KM Mean of Logged Data	1.724							95% KM UTL (Lognormal)95% Coverage	8.087	
492		KM SD of Logged Data	0.192							95% KM UPL (Lognormal)	7.727	
493		95% KM Percentile Lognormal (z)	7.696							95% KM USL (Lognormal)	10.49	
494												
495	Background DL/2 Statistics Assuming Lognormal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
496					Mean in Original Scale	4.917				Mean in Log Scale		1.495
497					SD in Original Scale	2.043				SD in Log Scale		0.458
498					95% UTL	10.67				95% UPL (t)		9.57
499					90% Percentile (z)	8.026				95% Percentile (z)		9.48
500					99% Percentile (z)	12.96				95% USL		19.85
501	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
502												
503	Nonparametric Distribution Free Background Statistics											
504	Data do not follow a Discernible Distribution (0.05)											
505												
506	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
507					Order of Statistic, r	112				95% UTL with 95% Coverage		8.1
508					Approx, f used to compute achieved CC	1.474				Approximate Actual Confidence Coefficient achieved by UTL		0.832
509					Approximate Sample Size needed to achieve specified CC	153				95% UPL		8.02
510					95% USL	9.5				95% KM Chebyshev UPL		10.92
511												
512	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
513	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
514	and consists of observations collected from clean unimpacted locations.											
515	The use of USL tends to provide a balance between false positives and false negatives provided the data											
516	represents a background data set and when many onsite observations need to be compared with the BTV.											
517												
518	CALCIUM, DISSOLVED (mg/L)											
519												
520	General Statistics											
521					Total Number of Observations	93				Number of Distinct Observations		42
522					Minimum	10.4				First Quartile		14
523					Second Largest	20.1				Median		16.4
524					Maximum	20.1				Third Quartile		17.4
525					Mean	15.93				SD		2.221
526					Coefficient of Variation	0.139				Skewness		-0.362
527					Mean of logged Data	2.758				SD of logged Data		0.146
528												
529	Critical Values for Background Threshold Values (BTVs)											
530					Tolerance Factor K (For UTL)	1.935				d2max (for USL)		3.185
531												
532	Normal GOF Test											
533					Shapiro Wilk Test Statistic	0.947				Normal GOF Test		
534					5% Shapiro Wilk P Value	0.00213				Data Not Normal at 5% Significance Level		
535					Lilliefors Test Statistic	0.122				Lilliefors GOF Test		
536					5% Lilliefors Critical Value	0.0921				Data Not Normal at 5% Significance Level		
537	Data Not Normal at 5% Significance Level											
538												
539	Background Statistics Assuming Normal Distribution											
540					95% UTL with 95% Coverage	20.22				90% Percentile (z)		18.77
541					95% UPL (t)	19.64				95% Percentile (z)		19.58
542					95% USL	23				99% Percentile (z)		21.09
543												
544	Gamma GOF Test											
545					A-D Test Statistic	1.945				Anderson-Darling Gamma GOF Test		
546					5% A-D Critical Value	0.751				Data Not Gamma Distributed at 5% Significance Level		
547					K-S Test Statistic	0.138				Kolmogorov-Smirnov Gamma GOF Test		
548					5% K-S Critical Value	0.0925				Data Not Gamma Distributed at 5% Significance Level		
549	Data Not Gamma Distributed at 5% Significance Level											
550												

	A	B	C	D	E	F	G	H	I	J	K	L		
551	Gamma Statistics													
552					k hat (MLE)		49.31					k star (bias corrected MLE)		47.73
553					Theta hat (MLE)		0.323					Theta star (bias corrected MLE)		0.334
554					nu hat (MLE)		9172					nu star (bias corrected)		8878
555					MLE Mean (bias corrected)		15.93					MLE Sd (bias corrected)		2.305
556														
557	Background Statistics Assuming Gamma Distribution													
558					95% Wilson Hilferty (WH) Approx. Gamma UPL		19.92					90% Percentile		18.94
559					95% Hawkins Wixley (HW) Approx. Gamma UPL		19.97					95% Percentile		19.9
560					95% WH Approx. Gamma UTL with 95% Coverage		20.63					99% Percentile		21.77
561					95% HW Approx. Gamma UTL with 95% Coverage		20.69							
562					95% WH USL		24.21					95% HW USL		24.4
563														
564	Lognormal GOF Test													
565					Shapiro Wilk Test Statistic		0.931					Shapiro Wilk Lognormal GOF Test		
566					5% Shapiro Wilk P Value		6.4625E-5					Data Not Lognormal at 5% Significance Level		
567					Lilliefors Test Statistic		0.145					Lilliefors Lognormal GOF Test		
568					5% Lilliefors Critical Value		0.0921					Data Not Lognormal at 5% Significance Level		
569	Data Not Lognormal at 5% Significance Level													
570														
571	Background Statistics assuming Lognormal Distribution													
572					95% UTL with 95% Coverage		20.9					90% Percentile (z)		19
573					95% UPL (t)		20.11					95% Percentile (z)		20.03
574					95% USL		25.07					99% Percentile (z)		22.12
575														
576	Nonparametric Distribution Free Background Statistics													
577	Data do not follow a Discernible Distribution (0.05)													
578														
579	Nonparametric Upper Limits for Background Threshold Values													
580					Order of Statistic, r		91					95% UTL with 95% Coverage		19.4
581					Approx, f used to compute achieved CC		1.596					Approximate Actual Confidence Coefficient achieved by UTL		0.85
582												Approximate Sample Size needed to achieve specified CC		124
583					95% Percentile Bootstrap UTL with 95% Coverage		19.4					95% BCA Bootstrap UTL with 95% Coverage		19.4
584					95% UPL		19.2					90% Percentile		18.5
585					90% Chebyshev UPL		22.62					95% Percentile		19.14
586					95% Chebyshev UPL		25.66					99% Percentile		20.1
587					95% USL		20.1							
588														
589	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.													
590	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers													
591	and consists of observations collected from clean unimpacted locations.													
592	The use of USL tends to provide a balance between false positives and false negatives provided the data													
593	represents a background data set and when many onsite observations need to be compared with the BTV.													
594														
595	CALCIUM, TOTAL (mg/L)													
596														
597	General Statistics													
598					Total Number of Observations		56					Number of Distinct Observations		28
599												Number of Missing Observations		74
600					Minimum		12					First Quartile		14
601					Second Largest		20.1					Median		16.4
602					Maximum		21					Third Quartile		17.45
603					Mean		16.13					SD		2.254
604					Coefficient of Variation		0.14					Skewness		0.22
605					Mean of logged Data		2.771					SD of logged Data		0.14

	A	B	C	D	E	F	G	H	I	J	K	L	
606													
607	Critical Values for Background Threshold Values (BTVs)												
608	Tolerance Factor K (For UTL)					2.032		d2max (for USL)					3.001
609													
610	Normal GOF Test												
611	Shapiro Wilk Test Statistic					0.947		Normal GOF Test					
612	5% Shapiro Wilk P Value					0.0268		Data Not Normal at 5% Significance Level					
613	Lilliefors Test Statistic					0.157		Lilliefors GOF Test					
614	5% Lilliefors Critical Value					0.118		Data Not Normal at 5% Significance Level					
615	Data Not Normal at 5% Significance Level												
616													
617	Background Statistics Assuming Normal Distribution												
618	95% UTL with 95% Coverage				20.71		90% Percentile (z)				19.02		
619	95% UPL (t)				19.94		95% Percentile (z)				19.84		
620	95% USL				22.9		99% Percentile (z)				21.38		
621													
622	Gamma GOF Test												
623	A-D Test Statistic					0.936		Anderson-Darling Gamma GOF Test					
624	5% A-D Critical Value					0.748		Data Not Gamma Distributed at 5% Significance Level					
625	K-S Test Statistic					0.147		Kolmogorov-Smirnov Gamma GOF Test					
626	5% K-S Critical Value					0.119		Data Not Gamma Distributed at 5% Significance Level					
627	Data Not Gamma Distributed at 5% Significance Level												
628													
629	Gamma Statistics												
630	k hat (MLE)				52.39		k star (bias corrected MLE)				49.6		
631	Theta hat (MLE)				0.308		Theta star (bias corrected MLE)				0.325		
632	nu hat (MLE)				5868		nu star (bias corrected)				5555		
633	MLE Mean (bias corrected)				16.13		MLE Sd (bias corrected)				2.291		
634													
635	Background Statistics Assuming Gamma Distribution												
636	95% Wilson Hilferty (WH) Approx. Gamma UPL				20.12		90% Percentile				19.13		
637	95% Hawkins Wixley (HW) Approx. Gamma UPL				20.14		95% Percentile				20.08		
638	95% WH Approx. Gamma UTL with 95% Coverage				21.03		99% Percentile				21.94		
639	95% HW Approx. Gamma UTL with 95% Coverage				21.07								
640	95% WH USL				23.74		95% HW USL				23.87		
641													
642	Lognormal GOF Test												
643	Shapiro Wilk Test Statistic					0.95		Shapiro Wilk Lognormal GOF Test					
644	5% Shapiro Wilk P Value					0.0393		Data Not Lognormal at 5% Significance Level					
645	Lilliefors Test Statistic					0.139		Lilliefors Lognormal GOF Test					
646	5% Lilliefors Critical Value					0.118		Data Not Lognormal at 5% Significance Level					
647	Data Not Lognormal at 5% Significance Level												
648													
649	Background Statistics assuming Lognormal Distribution												
650	95% UTL with 95% Coverage				21.23		90% Percentile (z)				19.11		
651	95% UPL (t)				20.23		95% Percentile (z)				20.11		
652	95% USL				24.3		99% Percentile (z)				22.12		
653													
654	Nonparametric Distribution Free Background Statistics												
655	Data do not follow a Discernible Distribution (0.05)												
656													
657	Nonparametric Upper Limits for Background Threshold Values												
658	Order of Statistic, r				55		95% UTL with 95% Coverage				20.1		
659	Approx, f used to compute achieved CC				1.447		Approximate Actual Confidence Coefficient achieved by UTL				0.777		
660					Approximate Sample Size needed to achieve specified CC				93				

	A	B	C	D	E	F	G	H	I	J	K	L
661	95% Percentile Bootstrap UTL with 95% Coverage					20.33	95% BCA Bootstrap UTL with 95% Coverage					20.33
662	95% UPL					20.1	90% Percentile					19.35
663	90% Chebyshev UPL					22.95	95% Percentile					19.8
664	95% Chebyshev UPL					26.04	99% Percentile					20.51
665	95% USL					21						
666												
667	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
668	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
669	and consists of observations collected from clean unimpacted locations.											
670	The use of USL tends to provide a balance between false positives and false negatives provided the data											
671	represents a background data set and when many onsite observations need to be compared with the BTV.											
672												
673	CHLORIDE (mg/L)											
674												
675	General Statistics											
676	Total Number of Observations					128	Number of Missing Observations					2
677	Number of Distinct Observations					63						
678	Number of Detects					125	Number of Non-Detects					3
679	Number of Distinct Detects					62	Number of Distinct Non-Detects					3
680	Minimum Detect					15	Minimum Non-Detect					18
681	Maximum Detect					33.2	Maximum Non-Detect					41
682	Variance Detected					20.21	Percent Non-Detects					2.344%
683	Mean Detected					25.02	SD Detected					4.496
684	Mean of Detected Logged Data					3.202	SD of Detected Logged Data					0.19
685												
686	Critical Values for Background Threshold Values (BTVs)											
687	Tolerance Factor K (For UTL)					1.888	d2max (for USL)					3.292
688												
689	Normal GOF Test on Detects Only											
690	Shapiro Wilk Test Statistic					0.955	Normal GOF Test on Detected Observations Only					
691	5% Shapiro Wilk P Value					0.00222	Data Not Normal at 5% Significance Level					
692	Lilliefors Test Statistic					0.0905	Lilliefors GOF Test					
693	5% Lilliefors Critical Value					0.0796	Data Not Normal at 5% Significance Level					
694	Data Not Normal at 5% Significance Level											
695												
696	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
697	KM Mean					24.9	KM SD					4.548
698	95% UTL95% Coverage					33.48	95% KM UPL (t)					32.46
699	90% KM Percentile (z)					30.72	95% KM Percentile (z)					32.38
700	99% KM Percentile (z)					35.48	95% KM USL					39.87
701												
702	DL/2 Substitution Background Statistics Assuming Normal Distribution											
703	Mean					24.74	SD					4.848
704	95% UTL95% Coverage					33.89	95% UPL (t)					32.81
705	90% Percentile (z)					30.96	95% Percentile (z)					32.72
706	99% Percentile (z)					36.02	95% USL					40.7
707	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
708												
709	Gamma GOF Tests on Detected Observations Only											
710	A-D Test Statistic					1.397	Anderson-Darling GOF Test					
711	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
712	K-S Test Statistic					0.116	Kolmogorov-Smirnov GOF					
713	5% K-S Critical Value					0.0828	Data Not Gamma Distributed at 5% Significance Level					
714	Data Not Gamma Distributed at 5% Significance Level											
715												

	A	B	C	D	E	F	G	H	I	J	K	L	
716	Gamma Statistics on Detected Data Only												
717	k hat (MLE)				29.25		k star (bias corrected MLE)				28.56		
718	Theta hat (MLE)				0.855		Theta star (bias corrected MLE)				0.876		
719	nu hat (MLE)				7313		nu star (bias corrected)				7139		
720	MLE Mean (bias corrected)				25.02								
721	MLE Sd (bias corrected)				4.681		95% Percentile of Chisquare (2kstar)				75.75		
722													
723	Gamma ROS Statistics using Imputed Non-Detects												
724	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
725	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)												
726	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
727	This is especially true when the sample size is small.												
728	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
729	Minimum				15		Mean				24.91		
730	Maximum				33.2		Median				25.3		
731	SD				4.517		CV				0.181		
732	k hat (MLE)				28.83		k star (bias corrected MLE)				28.16		
733	Theta hat (MLE)				0.864		Theta star (bias corrected MLE)				0.885		
734	nu hat (MLE)				7381		nu star (bias corrected)				7210		
735	MLE Mean (bias corrected)				24.91		MLE Sd (bias corrected)				4.694		
736	95% Percentile of Chisquare (2kstar)				74.85		90% Percentile				31.09		
737	95% Percentile				33.1		99% Percentile				37.11		
738	The following statistics are computed using Gamma ROS Statistics on Imputed Data												
739	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
740				WH		HW					WH		HW
741	% Approx. Gamma UTL with 95% Coverage			34.43		34.58		95% Approx. Gamma UPL			33.14		33.26
742	95% Gamma USL			43.19		43.79							
743													
744	Estimates of Gamma Parameters using KM Estimates												
745	Mean (KM)				24.9		SD (KM)				4.548		
746	Variance (KM)				20.68		SE of Mean (KM)				0.405		
747	k hat (KM)				29.97		k star (KM)				29.27		
748	nu hat (KM)				7672		nu star (KM)				7494		
749	theta hat (KM)				0.831		theta star (KM)				0.85		
750	80% gamma percentile (KM)				28.66		90% gamma percentile (KM)				30.94		
751	95% gamma percentile (KM)				32.92		99% gamma percentile (KM)				36.83		
752													
753	The following statistics are computed using gamma distribution and KM estimates												
754	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
755				WH		HW					WH		HW
756	% Approx. Gamma UTL with 95% Coverage			34.49		34.66		95% Approx. Gamma UPL			33.2		33.32
757	95% KM Gamma Percentile			33.09		33.21		95% Gamma USL			43.36		43.96
758													
759	Lognormal GOF Test on Detected Observations Only												
760	Shapiro Wilk Approximate Test Statistic				0.936		Shapiro Wilk GOF Test						
761	5% Shapiro Wilk P Value				4.6342E-6		Data Not Lognormal at 5% Significance Level						
762	Lilliefors Test Statistic				0.129		Lilliefors GOF Test						
763	5% Lilliefors Critical Value				0.0796		Data Not Lognormal at 5% Significance Level						
764	Data Not Lognormal at 5% Significance Level												
765													
766	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects												
767	Mean in Original Scale				24.91		Mean in Log Scale				3.198		
768	SD in Original Scale				4.52		SD in Log Scale				0.191		
769	95% UTL95% Coverage				35.12		95% BCA UTL95% Coverage				32.8		
770	95% Bootstrap (%) UTL95% Coverage				32.8		95% UPL (t)				33.64		

	A	B	C	D	E	F	G	H	I	J	K	L
771					90% Percentile (z)	31.27				95% Percentile (z)		33.52
772					99% Percentile (z)	38.19				95% USL		45.93
773												
774	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
775					KM Mean of Logged Data	3.197				95% KM UTL (Lognormal)	95% Coverage	35.2
776					KM SD of Logged Data	0.193				95% KM UPL (Lognormal)		33.71
777					95% KM Percentile Lognormal (z)	33.59				95% KM USL (Lognormal)		46.16
778												
779	Background DL/2 Statistics Assuming Lognormal Distribution											
780					Mean in Original Scale	24.74				Mean in Log Scale		3.186
781					SD in Original Scale	4.848				SD in Log Scale		0.221
782					95% UTL	36.74				95% UPL (t)		34.96
783					90% Percentile (z)	32.13				95% Percentile (z)		34.82
784					99% Percentile (z)	40.48				95% USL		50.11
785	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
786												
787	Nonparametric Distribution Free Background Statistics											
788	Data do not follow a Discernible Distribution (0.05)											
789												
790	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
791					Order of Statistic, r	125				95% UTL with	95% Coverage	33
792					Approx, f used to compute achieved CC	1.645				Approximate Actual Confidence Coefficient achieved by UTL		0.887
793					Approximate Sample Size needed to achieve specified CC	153				95% UPL		32.6
794					95% USL	41				95% KM Chebyshev UPL		44.8
795												
796	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
797	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
798	and consists of observations collected from clean unimpacted locations.											
799	The use of USL tends to provide a balance between false positives and false negatives provided the data											
800	represents a background data set and when many onsite observations need to be compared with the BTV.											
801												
802	CIS 1,2-DICHLOROETHENE (ug/L)											
803												
804	General Statistics											
805					Total Number of Observations	127				Number of Missing Observations		3
806					Number of Distinct Observations	2						
807					Number of Detects	0				Number of Non-Detects		127
808					Number of Distinct Detects	0				Number of Distinct Non-Detects		2
809					Minimum Detect	N/A				Minimum Non-Detect		1
810					Maximum Detect	N/A				Maximum Non-Detect		2
811					Variance Detected	N/A				Percent Non-Detects		100%
812					Mean Detected	N/A				SD Detected		N/A
813					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
814												
815	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
816	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
817	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
818												
819	The data set for variable CIS 1,2-DICHLOROETHENE (ug/L) was not processed!											
820												
821												
822	Chemical Oxygen Demand (mg/L)											
823												
824	General Statistics											
825					Total Number of Observations	126				Number of Missing Observations		4

	A	B	C	D	E	F	G	H	I	J	K	L
826	Number of Distinct Observations					9						
827	Number of Detects					6	Number of Non-Detects					120
828	Number of Distinct Detects					6	Number of Distinct Non-Detects					4
829	Minimum Detect					5	Minimum Non-Detect					5
830	Maximum Detect					31	Maximum Non-Detect					20
831	Variance Detected					149.5	Percent Non-Detects					95.24%
832	Mean Detected					17.67	SD Detected					12.23
833	Mean of Detected Logged Data					2.61	SD of Detected Logged Data					0.838
834												
835	Critical Values for Background Threshold Values (BTVs)											
836	Tolerance Factor K (For UTL)					1.89	d2max (for USL)					3.287
837												
838	Normal GOF Test on Detects Only											
839	Shapiro Wilk Test Statistic					0.814	Shapiro Wilk GOF Test					
840	5% Shapiro Wilk Critical Value					0.788	Detected Data appear Normal at 5% Significance Level					
841	Lilliefors Test Statistic					0.261	Lilliefors GOF Test					
842	5% Lilliefors Critical Value					0.325	Detected Data appear Normal at 5% Significance Level					
843	Detected Data appear Normal at 5% Significance Level											
844												
845	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
846	KM Mean					5.766	KM SD					3.675
847	95% UTL95% Coverage					12.71	95% KM UPL (t)					11.88
848	90% KM Percentile (z)					10.48	95% KM Percentile (z)					11.81
849	99% KM Percentile (z)					14.31	95% KM USL					17.84
850												
851	DL/2 Substitution Background Statistics Assuming Normal Distribution											
852	Mean					8.536	SD					4.184
853	95% UTL95% Coverage					16.44	95% UPL (t)					15.5
854	90% Percentile (z)					13.9	95% Percentile (z)					15.42
855	99% Percentile (z)					18.27	95% USL					22.29
856	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
857												
858	Gamma GOF Tests on Detected Observations Only											
859	A-D Test Statistic					0.61	Anderson-Darling GOF Test					
860	5% A-D Critical Value					0.704	Detected data appear Gamma Distributed at 5% Significance Level					
861	K-S Test Statistic					0.294	Kolmogorov-Smirnov GOF					
862	5% K-S Critical Value					0.336	Detected data appear Gamma Distributed at 5% Significance Level					
863	Detected data appear Gamma Distributed at 5% Significance Level											
864												
865	Gamma Statistics on Detected Data Only											
866	k hat (MLE)					2.059	k star (bias corrected MLE)					1.141
867	Theta hat (MLE)					8.579	Theta star (bias corrected MLE)					15.49
868	nu hat (MLE)					24.71	nu star (bias corrected)					13.69
869	MLE Mean (bias corrected)					17.67						
870	MLE Sd (bias corrected)					16.54	95% Percentile of Chisquare (2kstar)					6.526
871												
872	Gamma ROS Statistics using Imputed Non-Detects											
873	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
874	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)											
875	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
876	This is especially true when the sample size is small.											
877	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
878	Minimum					0.01	Mean					1.562
879	Maximum					31	Median					0.01
880	SD					5.033	CV					3.222

	A	B	C	D	E	F	G	H	I	J	K	L
881					k hat (MLE)	0.186				k star (bias corrected MLE)		0.187
882					Theta hat (MLE)	8.413				Theta star (bias corrected MLE)		8.373
883					nu hat (MLE)	46.78				nu star (bias corrected)		47
884					MLE Mean (bias corrected)	1.562				MLE Sd (bias corrected)		3.616
885					95% Percentile of Chisquare (2kstar)	1.956				90% Percentile		4.717
886					95% Percentile	8.191				99% Percentile		17.87
887	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
888	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
889					WH		HW				WH	HW
890	% Approx. Gamma UTL with 95% Coverage				5.688		4.918			95% Approx. Gamma UPL	4.333	3.564
891		95% Gamma USL			20.57		23.42					
892												
893	Estimates of Gamma Parameters using KM Estimates											
894					Mean (KM)	5.766				SD (KM)		3.675
895					Variance (KM)	13.5				SE of Mean (KM)		0.389
896					k hat (KM)	2.462				k star (KM)		2.409
897					nu hat (KM)	620.4				nu star (KM)		607
898					theta hat (KM)	2.342				theta star (KM)		2.394
899					80% gamma percentile (KM)	8.443				90% gamma percentile (KM)		10.74
900					95% gamma percentile (KM)	12.91				99% gamma percentile (KM)		17.67
901												
902	The following statistics are computed using gamma distribution and KM estimates											
903	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
904					WH		HW				WH	HW
905	% Approx. Gamma UTL with 95% Coverage				10.21		9.945			95% Approx. Gamma UPL	9.534	9.295
906		95% KM Gamma Percentile			9.479		9.242			95% Gamma USL	15.08	14.74
907												
908	Lognormal GOF Test on Detected Observations Only											
909					Shapiro Wilk Test Statistic	0.831				Shapiro Wilk GOF Test		
910					5% Shapiro Wilk Critical Value	0.788				Detected Data appear Lognormal at 5% Significance Level		
911					Lilliefors Test Statistic	0.28				Lilliefors GOF Test		
912					5% Lilliefors Critical Value	0.325				Detected Data appear Lognormal at 5% Significance Level		
913	Detected Data appear Lognormal at 5% Significance Level											
914												
915	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
916					Mean in Original Scale	2.394				Mean in Log Scale		-0.102
917					SD in Original Scale	4.713				SD in Log Scale		1.395
918					95% UTL95% Coverage	12.61				95% BCA UTL95% Coverage		12.53
919					95% Bootstrap (%) UTL95% Coverage	11.92				95% UPL (t)		9.197
920					90% Percentile (z)	5.397				95% Percentile (z)		8.959
921					99% Percentile (z)	23.18				95% USL		88.51
922												
923	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
924					KM Mean of Logged Data	1.683				95% KM UTL (Lognormal)95% Coverage		9.238
925					KM SD of Logged Data	0.286				95% KM UPL (Lognormal)		8.659
926					95% KM Percentile Lognormal (z)	8.612				95% KM USL (Lognormal)		13.78
927												
928	Background DL/2 Statistics Assuming Lognormal Distribution											
929					Mean in Original Scale	8.536				Mean in Log Scale		2.023
930					SD in Original Scale	4.184				SD in Log Scale		0.528
931					95% UTL95% Coverage	20.53				95% UPL (t)		18.22
932					90% Percentile (z)	14.89				95% Percentile (z)		18.04
933					99% Percentile (z)	25.85				95% USL		42.93
934	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
935												

	A	B	C	D	E	F	G	H	I	J	K	L
936	Nonparametric Distribution Free Background Statistics											
937	Data appear to follow a Discernible Distribution at 5% Significance Level											
938												
939	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
940	Order of Statistic, r					123	95% UTL with 95% Coverage					20
941	Approx, f used to compute achieved CC					1.618	Approximate Actual Confidence Coefficient achieved by UTL					0.88
942	Approximate Sample Size needed to achieve specified CC					153	95% UPL					20
943	95% USL					31	95% KM Chebyshev UPL					21.85
944												
945	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
946	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
947	and consists of observations collected from clean unimpacted locations.											
948	The use of USL tends to provide a balance between false positives and false negatives provided the data											
949	represents a background data set and when many onsite observations need to be compared with the BTV.											
950												
951	ETHYLBENZENE (mg/L)											
952												
953	General Statistics											
954	Total Number of Observations					130	Number of Missing Observations					0
955	Number of Distinct Observations					1						
956	Number of Detects					0	Number of Non-Detects					130
957	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
958	Minimum Detect					N/A	Minimum Non-Detect					1
959	Maximum Detect					N/A	Maximum Non-Detect					1
960	Variance Detected					N/A	Percent Non-Detects					100%
961	Mean Detected					N/A	SD Detected					N/A
962	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
963												
964	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
965	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
966	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
967												
968	The data set for variable ETHYLBENZENE (mg/L) was not processed!											
969												
970												
971	FLUORIDE (mg/L)											
972												
973	General Statistics											
974	Total Number of Observations					90	Number of Missing Observations					40
975	Number of Distinct Observations					4						
976	Number of Detects					0	Number of Non-Detects					90
977	Number of Distinct Detects					0	Number of Distinct Non-Detects					4
978	Minimum Detect					N/A	Minimum Non-Detect					0.1
979	Maximum Detect					N/A	Maximum Non-Detect					0.5
980	Variance Detected					N/A	Percent Non-Detects					100%
981	Mean Detected					N/A	SD Detected					N/A
982	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
983												
984	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
985	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
986	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
987												
988	The data set for variable FLUORIDE (mg/L) was not processed!											
989												
990												

	A	B	C	D	E	F	G	H	I	J	K	L
991	IRON, DISSOLVED (mg/L)											
992												
993	General Statistics											
994	Total Number of Observations					105	Number of Missing Observations					0
995	Number of Distinct Observations					16						
996	Number of Detects					16	Number of Non-Detects					89
997	Number of Distinct Detects					13	Number of Distinct Non-Detects					4
998	Minimum Detect					0.06	Minimum Non-Detect					0.02
999	Maximum Detect					1.2	Maximum Non-Detect					60
1000	Variance Detected					0.139	Percent Non-Detects					84.76%
1001	Mean Detected					0.344	SD Detected					0.373
1002	Mean of Detected Logged Data					-1.598	SD of Detected Logged Data					1.058
1003												
1004	Critical Values for Background Threshold Values (BTVs)											
1005	Tolerance Factor K (For UTL)					1.916	d2max (for USL)					3.226
1006												
1007	Normal GOF Test on Detects Only											
1008	Shapiro Wilk Test Statistic					0.767	Shapiro Wilk GOF Test					
1009	5% Shapiro Wilk Critical Value					0.887	Data Not Normal at 5% Significance Level					
1010	Lilliefors Test Statistic					0.27	Lilliefors GOF Test					
1011	5% Lilliefors Critical Value					0.213	Data Not Normal at 5% Significance Level					
1012	Data Not Normal at 5% Significance Level											
1013												
1014	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1015	KM Mean					0.0699	KM SD					0.184
1016	95% UTL95% Coverage					0.422	95% KM UPL (t)					0.377
1017	90% KM Percentile (z)					0.306	95% KM Percentile (z)					0.372
1018	99% KM Percentile (z)					0.498	95% KM USL					0.663
1019												
1020	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1021	Mean					0.363	SD					2.926
1022	95% UTL95% Coverage					5.969	95% UPL (t)					5.242
1023	90% Percentile (z)					4.112	95% Percentile (z)					5.175
1024	99% Percentile (z)					7.169	95% USL					9.802
1025	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1026												
1027	Gamma GOF Tests on Detected Observations Only											
1028	A-D Test Statistic					0.88	Anderson-Darling GOF Test					
1029	5% A-D Critical Value					0.762	Data Not Gamma Distributed at 5% Significance Level					
1030	K-S Test Statistic					0.243	Kolmogorov-Smirnov GOF					
1031	5% K-S Critical Value					0.221	Data Not Gamma Distributed at 5% Significance Level					
1032	Data Not Gamma Distributed at 5% Significance Level											
1033												
1034	Gamma Statistics on Detected Data Only											
1035	k hat (MLE)					1.075	k star (bias corrected MLE)					0.915
1036	Theta hat (MLE)					0.32	Theta star (bias corrected MLE)					0.376
1037	nu hat (MLE)					34.4	nu star (bias corrected)					29.29
1038	MLE Mean (bias corrected)					0.344						
1039	MLE Sd (bias corrected)					0.36	95% Percentile of Chisquare (2kstar)					5.659
1040												
1041	Gamma ROS Statistics using Imputed Non-Detects											
1042	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1043	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)											
1044	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1045	This is especially true when the sample size is small.											

	A	B	C	D	E	F	G	H	I	J	K	L				
1046	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates															
1047	Minimum				0.01		Mean				0.061					
1048	Maximum				1.2		Median				0.01					
1049	SD				0.186		CV				3.056					
1050	k hat (MLE)				0.475		k star (bias corrected MLE)				0.467					
1051	Theta hat (MLE)				0.128		Theta star (bias corrected MLE)				0.13					
1052	nu hat (MLE)				99.66		nu star (bias corrected)				98.15					
1053	MLE Mean (bias corrected)				0.061		MLE Sd (bias corrected)				0.0892					
1054	95% Percentile of Chisquare (2kstar)				3.678		90% Percentile				0.167					
1055	95% Percentile				0.24		99% Percentile				0.42					
1056	The following statistics are computed using Gamma ROS Statistics on Imputed Data															
1057	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods															
1058					WH		HW						WH		HW	
1059	% Approx. Gamma UTL with 95% Coverage				0.223		0.201		95% Approx. Gamma UPL				0.179		0.159	
1060	95% Gamma USL				0.574		0.578									
1061																
1062	Estimates of Gamma Parameters using KM Estimates															
1063	Mean (KM)				0.0699		SD (KM)				0.184					
1064	Variance (KM)				0.0338		SE of Mean (KM)				0.0186					
1065	k hat (KM)				0.145		k star (KM)				0.147					
1066	nu hat (KM)				30.35		nu star (KM)				30.81					
1067	theta hat (KM)				0.484		theta star (KM)				0.476					
1068	80% gamma percentile (KM)				0.0747		90% gamma percentile (KM)				0.207					
1069	95% gamma percentile (KM)				0.386		99% gamma percentile (KM)				0.91					
1070																
1071	The following statistics are computed using gamma distribution and KM estimates															
1072	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods															
1073					WH		HW						WH		HW	
1074	% Approx. Gamma UTL with 95% Coverage				0.24		0.22		95% Approx. Gamma UPL				0.198		0.18	
1075	95% KM Gamma Percentile				0.195		0.176		95% Gamma USL				0.559		0.554	
1076																
1077	Lognormal GOF Test on Detected Observations Only															
1078	Shapiro Wilk Test Statistic				0.892		Shapiro Wilk GOF Test									
1079	5% Shapiro Wilk Critical Value				0.887		Detected Data appear Lognormal at 5% Significance Level									
1080	Lilliefors Test Statistic				0.198		Lilliefors GOF Test									
1081	5% Lilliefors Critical Value				0.213		Detected Data appear Lognormal at 5% Significance Level									
1082	Detected Data appear Lognormal at 5% Significance Level															
1083																
1084	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects															
1085	Mean in Original Scale				0.058		Mean in Log Scale				-5.704					
1086	SD in Original Scale				0.187		SD in Log Scale				2.608					
1087	95% UTL95% Coverage				0.493		95% BCA UTL95% Coverage				0.67					
1088	95% Bootstrap (%) UTL95% Coverage				0.67		95% UPL (t)				0.258					
1089	90% Percentile (z)				0.0942		95% Percentile (z)				0.243					
1090	99% Percentile (z)				1.437		95% USL				15.01					
1091																
1092	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution															
1093	KM Mean of Logged Data				-3.556		95% KM UTL (Lognormal)95% Coverage				0.168					
1094	KM SD of Logged Data				0.926		95% KM UPL (Lognormal)				0.134					
1095	95% KM Percentile Lognormal (z)				0.131		95% KM USL (Lognormal)				0.567					
1096																
1097	Background DL/2 Statistics Assuming Lognormal Distribution															
1098	Mean in Original Scale				0.363		Mean in Log Scale				-3.167					
1099	SD in Original Scale				2.926		SD in Log Scale				1.038					
1100	95% UTL95% Coverage				0.308		95% UPL (t)				0.238					

	A	B	C	D	E	F	G	H	I	J	K	L
1101					90% Percentile (z)	0.159				95% Percentile (z)		0.232
1102					99% Percentile (z)	0.471				95% USL		1.198
1103	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1104												
1105	Nonparametric Distribution Free Background Statistics											
1106	Data appear to follow a Discernible Distribution at 5% Significance Level											
1107												
1108	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1109					Order of Statistic, r	103				95% UTL with 95% Coverage		1.1
1110					Approx, f used to compute achieved CC	1.807				Approximate Actual Confidence Coefficient achieved by UTL		0.901
1111					Approximate Sample Size needed to achieve specified CC	124				95% UPL		0.557
1112					95% USL	60				95% KM Chebyshev UPL		0.875
1113												
1114	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1115	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1116	and consists of observations collected from clean unimpacted locations.											
1117	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1118	represents a background data set and when many onsite observations need to be compared with the BTV.											
1119												
1120	IRON, TOTAL (mg/L)											
1121												
1122	General Statistics											
1123					Total Number of Observations	64				Number of Missing Observations		66
1124					Number of Distinct Observations	44						
1125					Number of Detects	61				Number of Non-Detects		3
1126					Number of Distinct Detects	41				Number of Distinct Non-Detects		3
1127					Minimum Detect	0.06				Minimum Non-Detect		0.12
1128					Maximum Detect	3.5				Maximum Non-Detect		0.34
1129					Variance Detected	0.751				Percent Non-Detects		4.688%
1130					Mean Detected	1.156				SD Detected		0.867
1131					Mean of Detected Logged Data	-0.164				SD of Detected Logged Data		0.853
1132												
1133	Critical Values for Background Threshold Values (BTVs)											
1134					Tolerance Factor K (For UTL)	2.003				d2max (for USL)		3.051
1135												
1136	Normal GOF Test on Detects Only											
1137					Shapiro Wilk Test Statistic	0.879				Normal GOF Test on Detected Observations Only		
1138					5% Shapiro Wilk P Value	1.8380E-6				Data Not Normal at 5% Significance Level		
1139					Lilliefors Test Statistic	0.146				Lilliefors GOF Test		
1140					5% Lilliefors Critical Value	0.113				Data Not Normal at 5% Significance Level		
1141	Data Not Normal at 5% Significance Level											
1142												
1143	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1144					KM Mean	1.108				KM SD		0.867
1145					95% UTL 95% Coverage	2.844				95% KM UPL (t)		2.566
1146					90% KM Percentile (z)	2.218				95% KM Percentile (z)		2.533
1147					99% KM Percentile (z)	3.124				95% KM USL		3.752
1148												
1149	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1150					Mean	1.106				SD		0.875
1151					95% UTL 95% Coverage	2.859				95% UPL (t)		2.578
1152					90% Percentile (z)	2.227				95% Percentile (z)		2.545
1153					99% Percentile (z)	3.141				95% USL		3.775
1154	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1155												

	A	B	C	D	E	F	G	H	I	J	K	L	
1156	Gamma GOF Tests on Detected Observations Only												
1157	A-D Test Statistic					0.565	Anderson-Darling GOF Test						
1158	5% A-D Critical Value					0.766	Detected data appear Gamma Distributed at 5% Significance Level						
1159	K-S Test Statistic					0.0825	Kolmogorov-Smirnov GOF						
1160	5% K-S Critical Value					0.116	Detected data appear Gamma Distributed at 5% Significance Level						
1161	Detected data appear Gamma Distributed at 5% Significance Level												
1162													
1163	Gamma Statistics on Detected Data Only												
1164	k hat (MLE)					1.769	k star (bias corrected MLE)					1.693	
1165	Theta hat (MLE)					0.653	Theta star (bias corrected MLE)					0.683	
1166	nu hat (MLE)					215.8	nu star (bias corrected)					206.5	
1167	MLE Mean (bias corrected)					1.156							
1168	MLE Sd (bias corrected)					0.888	95% Percentile of Chisquare (2kstar)					8.473	
1169													
1170	Gamma ROS Statistics using Imputed Non-Detects												
1171	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1172	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)												
1173	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
1174	This is especially true when the sample size is small.												
1175	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1176	Minimum					0.0305	Mean					1.105	
1177	Maximum					3.5	Median					0.84	
1178	SD					0.877	CV					0.793	
1179	k hat (MLE)					1.414	k star (bias corrected MLE)					1.358	
1180	Theta hat (MLE)					0.781	Theta star (bias corrected MLE)					0.813	
1181	nu hat (MLE)					181	nu star (bias corrected)					173.9	
1182	MLE Mean (bias corrected)					1.105	MLE Sd (bias corrected)					0.948	
1183	95% Percentile of Chisquare (2kstar)					7.318	90% Percentile					2.359	
1184	95% Percentile					2.976	99% Percentile					4.379	
1185	The following statistics are computed using Gamma ROS Statistics on Imputed Data												
1186	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
1187						WH	HW					WH	HW
1188	% Approx. Gamma UTL with 95% Coverage					3.598	95% Approx. Gamma UPL					2.985	3.146
1189	95% Gamma USL					6.168							
1190													
1191	Estimates of Gamma Parameters using KM Estimates												
1192	Mean (KM)					1.108	SD (KM)					0.867	
1193	Variance (KM)					0.751	SE of Mean (KM)					0.109	
1194	k hat (KM)					1.633	k star (KM)					1.567	
1195	nu hat (KM)					209	nu star (KM)					200.6	
1196	theta hat (KM)					0.678	theta star (KM)					0.707	
1197	80% gamma percentile (KM)					1.705	90% gamma percentile (KM)					2.284	
1198	95% gamma percentile (KM)					2.843	99% gamma percentile (KM)					4.104	
1199													
1200	The following statistics are computed using gamma distribution and KM estimates												
1201	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
1202						WH	HW					WH	HW
1203	% Approx. Gamma UTL with 95% Coverage					3.481	95% Approx. Gamma UPL					2.903	3.026
1204	95% KM Gamma Percentile					2.84	95% Gamma USL					5.891	6.708
1205													
1206	Lognormal GOF Test on Detected Observations Only												
1207	Shapiro Wilk Approximate Test Statistic					0.959	Shapiro Wilk GOF Test						
1208	5% Shapiro Wilk P Value					0.0866	Detected Data appear Lognormal at 5% Significance Level						
1209	Lilliefors Test Statistic					0.0875	Lilliefors GOF Test						
1210	5% Lilliefors Critical Value					0.113	Detected Data appear Lognormal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
1211	Detected Data appear Lognormal at 5% Significance Level											
1212												
1213	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1214	Mean in Original Scale				1.11		Mean in Log Scale				-0.239	
1215	SD in Original Scale				0.871		SD in Log Scale				0.901	
1216	95% UTL95% Coverage				4.785		95% BCA UTL95% Coverage				3.17	
1217	95% Bootstrap (%) UTL95% Coverage				3.2		95% UPL (t)				3.584	
1218	90% Percentile (z)				2.498		95% Percentile (z)				3.465	
1219	99% Percentile (z)				6.402		95% USL				12.3	
1220												
1221	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1222	KM Mean of Logged Data				-0.261		95% KM UTL (Lognormal)95% Coverage				5.096	
1223	KM SD of Logged Data				0.943		95% KM UPL (Lognormal)				3.765	
1224	95% KM Percentile Lognormal (z)				3.634		95% KM USL (Lognormal)				13.69	
1225												
1226	Background DL/2 Statistics Assuming Lognormal Distribution											
1227	Mean in Original Scale				1.106		Mean in Log Scale				-0.266	
1228	SD in Original Scale				0.875		SD in Log Scale				0.956	
1229	95% UTL95% Coverage				5.205		95% UPL (t)				3.83	
1230	90% Percentile (z)				2.611		95% Percentile (z)				3.695	
1231	99% Percentile (z)				7.089		95% USL				14.17	
1232	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1233												
1234	Nonparametric Distribution Free Background Statistics											
1235	Data appear to follow a Discernible Distribution at 5% Significance Level											
1236												
1237	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1238	Order of Statistic, r				63		95% UTL with95% Coverage				3.2	
1239	Approx, f used to compute achieved CC				1.658		Approximate Actual Confidence Coefficient achieved by UTL				0.836	
1240	Approximate Sample Size needed to achieve specified CC				93		95% UPL				3	
1241	95% USL				3.5		95% KM Chebyshev UPL				4.915	
1242												
1243	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1244	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1245	and consists of observations collected from clean unimpacted locations.											
1246	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1247	represents a background data set and when many onsite observations need to be compared with the BTV.											
1248												
1249	MAGNESIUM, DISSOLVED (mg/L)											
1250												
1251	General Statistics											
1252	Total Number of Observations				76		Number of Distinct Observations				34	
1253	Minimum				7.9		First Quartile				10.6	
1254	Second Largest				12.9		Median				11.1	
1255	Maximum				12.9		Third Quartile				11.5	
1256	Mean				10.94		SD				0.978	
1257	Coefficient of Variation				0.0894		Skewness				-0.838	
1258	Mean of logged Data				2.388		SD of logged Data				0.094	
1259												
1260	Critical Values for Background Threshold Values (BTVs)											
1261	Tolerance Factor K (For UTL)				1.97		d2max (for USL)				3.114	
1262												
1263	Normal GOF Test											
1264	Shapiro Wilk Test Statistic				0.941		Normal GOF Test					
1265	5% Shapiro Wilk P Value				0.00274		Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
1266					Lilliefors Test Statistic	0.14			Lilliefors GOF Test			
1267					5% Lilliefors Critical Value	0.102			Data Not Normal at 5% Significance Level			
1268	Data Not Normal at 5% Significance Level											
1269												
1270	Background Statistics Assuming Normal Distribution											
1271					95% UTL with 95% Coverage	12.87				90% Percentile (z)		12.19
1272					95% UPL (t)	12.58				95% Percentile (z)		12.55
1273					95% USL	13.99				99% Percentile (z)		13.22
1274												
1275	Gamma GOF Test											
1276					A-D Test Statistic	1.884			Anderson-Darling Gamma GOF Test			
1277					5% A-D Critical Value	0.749			Data Not Gamma Distributed at 5% Significance Level			
1278					K-S Test Statistic	0.153			Kolmogorov-Smirnov Gamma GOF Test			
1279					5% K-S Critical Value	0.102			Data Not Gamma Distributed at 5% Significance Level			
1280	Data Not Gamma Distributed at 5% Significance Level											
1281												
1282	Gamma Statistics											
1283					k hat (MLE)	118.9				k star (bias corrected MLE)		114.2
1284					Theta hat (MLE)	0.092				Theta star (bias corrected MLE)		0.0958
1285					nu hat (MLE)	18074				nu star (bias corrected)		17362
1286					MLE Mean (bias corrected)	10.94				MLE Sd (bias corrected)		1.024
1287												
1288	Background Statistics Assuming Gamma Distribution											
1289					95% Wilson Hilferty (WH) Approx. Gamma UPL	12.69				90% Percentile		12.27
1290					95% Hawkins Wixley (HW) Approx. Gamma UPL	12.71				95% Percentile		12.68
1291					95% WH Approx. Gamma UTL with 95% Coverage	13.02				99% Percentile		13.46
1292					95% HW Approx. Gamma UTL with 95% Coverage	13.04						
1293					95% WH USL	14.36				95% HW USL		14.42
1294												
1295	Lognormal GOF Test											
1296					Shapiro Wilk Test Statistic	0.912			Shapiro Wilk Lognormal GOF Test			
1297					5% Shapiro Wilk P Value	1.3458E-5			Data Not Lognormal at 5% Significance Level			
1298					Lilliefors Test Statistic	0.16			Lilliefors Lognormal GOF Test			
1299					5% Lilliefors Critical Value	0.102			Data Not Lognormal at 5% Significance Level			
1300	Data Not Lognormal at 5% Significance Level											
1301												
1302	Background Statistics assuming Lognormal Distribution											
1303					95% UTL with 95% Coverage	13.11				90% Percentile (z)		12.29
1304					95% UPL (t)	12.76				95% Percentile (z)		12.72
1305					95% USL	14.6				99% Percentile (z)		13.56
1306												
1307	Nonparametric Distribution Free Background Statistics											
1308	Data do not follow a Discernible Distribution (0.05)											
1309												
1310	Nonparametric Upper Limits for Background Threshold Values											
1311					Order of Statistic, r	75				95% UTL with 95% Coverage		12.9
1312					Approx, f used to compute achieved CC	1.974			Approximate Actual Confidence Coefficient achieved by UTL			0.899
1313									Approximate Sample Size needed to achieve specified CC			93
1314					95% Percentile Bootstrap UTL with 95% Coverage	12.9				95% BCA Bootstrap UTL with 95% Coverage		12.9
1315					95% UPL	12.43				90% Percentile		12
1316					90% Chebyshev UPL	13.89				95% Percentile		12.33
1317					95% Chebyshev UPL	15.23				99% Percentile		12.9
1318					95% USL	12.9						
1319												
1320	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											

	A	B	C	D	E	F	G	H	I	J	K	L
1321	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1322	and consists of observations collected from clean unimpacted locations.											
1323	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1324	represents a background data set and when many onsite observations need to be compared with the BTV.											
1325												
1326	MAGNESIUM, TOTAL (mg/L)											
1327												
1328	General Statistics											
1329	Total Number of Observations					40	Number of Distinct Observations					24
1330							Number of Missing Observations					90
1331	Minimum					8.9	First Quartile					10
1332	Second Largest					12.4	Median					11.05
1333	Maximum					12.5	Third Quartile					11.8
1334	Mean					11.01	SD					0.984
1335	Coefficient of Variation					0.0894	Skewness					-0.423
1336	Mean of logged Data					2.395	SD of logged Data					0.0916
1337												
1338	Critical Values for Background Threshold Values (BTVs)											
1339	Tolerance Factor K (For UTL)					2.117	d2max (for USL)					2.868
1340												
1341	Normal GOF Test											
1342	Shapiro Wilk Test Statistic					0.933	Shapiro Wilk GOF Test					
1343	5% Shapiro Wilk Critical Value					0.94	Data Not Normal at 5% Significance Level					
1344	Lilliefors Test Statistic					0.151	Lilliefors GOF Test					
1345	5% Lilliefors Critical Value					0.139	Data Not Normal at 5% Significance Level					
1346	Data Not Normal at 5% Significance Level											
1347												
1348	Background Statistics Assuming Normal Distribution											
1349	95% UTL with 95% Coverage					13.09	90% Percentile (z)					12.27
1350	95% UPL (t)					12.69	95% Percentile (z)					12.63
1351	95% USL					13.83	99% Percentile (z)					13.3
1352												
1353	Gamma GOF Test											
1354	A-D Test Statistic					0.958	Anderson-Darling Gamma GOF Test					
1355	5% A-D Critical Value					0.747	Data Not Gamma Distributed at 5% Significance Level					
1356	K-S Test Statistic					0.157	Kolmogorov-Smirnov Gamma GOF Test					
1357	5% K-S Critical Value					0.139	Data Not Gamma Distributed at 5% Significance Level					
1358	Data Not Gamma Distributed at 5% Significance Level											
1359												
1360	Gamma Statistics											
1361	k hat (MLE)					124.5	k star (bias corrected MLE)					115.2
1362	Theta hat (MLE)					0.0884	Theta star (bias corrected MLE)					0.0956
1363	nu hat (MLE)					9960	nu star (bias corrected)					9214
1364	MLE Mean (bias corrected)					11.01	MLE Sd (bias corrected)					1.026
1365												
1366	Background Statistics Assuming Gamma Distribution											
1367	95% Wilson Hilferty (WH) Approx. Gamma UPL					12.77	90% Percentile					12.34
1368	95% Hawkins Wixley (HW) Approx. Gamma UPL					12.78	95% Percentile					12.75
1369	95% WH Approx. Gamma UTL with 95% Coverage					13.23	99% Percentile					13.53
1370	95% HW Approx. Gamma UTL with 95% Coverage					13.25						
1371	95% WH USL					14.09	95% HW USL					14.13
1372												
1373	Lognormal GOF Test											
1374	Shapiro Wilk Test Statistic					0.925	Shapiro Wilk Lognormal GOF Test					
1375	5% Shapiro Wilk Critical Value					0.94	Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
1376					Lilliefors Test Statistic	0.156		Lilliefors Lognormal GOF Test				
1377					5% Lilliefors Critical Value	0.139		Data Not Lognormal at 5% Significance Level				
1378	Data Not Lognormal at 5% Significance Level											
1379												
1380	Background Statistics assuming Lognormal Distribution											
1381					95% UTL with 95% Coverage	13.31				90% Percentile (z)		12.33
1382					95% UPL (t)	12.82				95% Percentile (z)		12.75
1383					95% USL	14.26				99% Percentile (z)		13.57
1384												
1385	Nonparametric Distribution Free Background Statistics											
1386	Data do not follow a Discernible Distribution (0.05)											
1387												
1388	Nonparametric Upper Limits for Background Threshold Values											
1389					Order of Statistic, r	40				95% UTL with 95% Coverage		12.5
1390					Approx, f used to compute achieved CC	2.105		Approximate Actual Confidence Coefficient achieved by UTL				0.871
1391								Approximate Sample Size needed to achieve specified CC				59
1392					95% Percentile Bootstrap UTL with 95% Coverage	12.5				95% BCA Bootstrap UTL with 95% Coverage		12.5
1393					95% UPL	12.4				90% Percentile		12.1
1394					90% Chebyshev UPL	14				95% Percentile		12.31
1395					95% Chebyshev UPL	15.35				99% Percentile		12.46
1396					95% USL	12.5						
1397												
1398	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1399	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1400	and consists of observations collected from clean unimpacted locations.											
1401	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1402	represents a background data set and when many onsite observations need to be compared with the BTV.											
1403												
1404	MANGANESE, DISSOLVED (mg/L)											
1405												
1406	General Statistics											
1407					Total Number of Observations	104				Number of Distinct Observations		15
1408					Minimum	0.03				First Quartile		0.05
1409					Second Largest	0.16				Median		0.06
1410					Maximum	0.17				Third Quartile		0.07
1411					Mean	0.0657				SD		0.0266
1412					Coefficient of Variation	0.406				Skewness		1.811
1413					Mean of logged Data	-2.788				SD of logged Data		0.346
1414												
1415	Critical Values for Background Threshold Values (BTVs)											
1416					Tolerance Factor K (For UTL)	1.917				d2max (for USL)		3.223
1417												
1418	Normal GOF Test											
1419					Shapiro Wilk Test Statistic	0.807		Normal GOF Test				
1420					5% Shapiro Wilk P Value	0		Data Not Normal at 5% Significance Level				
1421					Lilliefors Test Statistic	0.267		Lilliefors GOF Test				
1422					5% Lilliefors Critical Value	0.0872		Data Not Normal at 5% Significance Level				
1423	Data Not Normal at 5% Significance Level											
1424												
1425	Background Statistics Assuming Normal Distribution											
1426					95% UTL with 95% Coverage	0.117				90% Percentile (z)		0.0998
1427					95% UPL (t)	0.11				95% Percentile (z)		0.11
1428					95% USL	0.152				99% Percentile (z)		0.128
1429												
1430	Gamma GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L
1431					A-D Test Statistic	4.067	Anderson-Darling Gamma GOF Test					
1432					5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level					
1433					K-S Test Statistic	0.234	Kolmogorov-Smirnov Gamma GOF Test					
1434					5% K-S Critical Value	0.0885	Data Not Gamma Distributed at 5% Significance Level					
1435	Data Not Gamma Distributed at 5% Significance Level											
1436												
1437	Gamma Statistics											
1438					k hat (MLE)	7.866					k star (bias corrected MLE)	7.645
1439					Theta hat (MLE)	0.00835					Theta star (bias corrected MLE)	0.00859
1440					nu hat (MLE)	1636					nu star (bias corrected)	1590
1441					MLE Mean (bias corrected)	0.0657					MLE Sd (bias corrected)	0.0238
1442												
1443	Background Statistics Assuming Gamma Distribution											
1444					95% Wilson Hilferty (WH) Approx. Gamma UPL	0.109					90% Percentile	0.0974
1445					95% Hawkins Wixley (HW) Approx. Gamma UPL	0.109					95% Percentile	0.109
1446					95% WH Approx. Gamma UTL with 95% Coverage	0.118					99% Percentile	0.133
1447					95% HW Approx. Gamma UTL with 95% Coverage	0.118						
1448					95% WH USL	0.169					95% HW USL	0.173
1449												
1450	Lognormal GOF Test											
1451					Shapiro Wilk Test Statistic	0.919	Shapiro Wilk Lognormal GOF Test					
1452					5% Shapiro Wilk P Value	5.9027E-7	Data Not Lognormal at 5% Significance Level					
1453					Lilliefors Test Statistic	0.212	Lilliefors Lognormal GOF Test					
1454					5% Lilliefors Critical Value	0.0872	Data Not Lognormal at 5% Significance Level					
1455	Data Not Lognormal at 5% Significance Level											
1456												
1457	Background Statistics assuming Lognormal Distribution											
1458					95% UTL with 95% Coverage	0.12					90% Percentile (z)	0.0959
1459					95% UPL (t)	0.11					95% Percentile (z)	0.109
1460					95% USL	0.188					99% Percentile (z)	0.138
1461												
1462	Nonparametric Distribution Free Background Statistics											
1463	Data do not follow a Discernible Distribution (0.05)											
1464												
1465	Nonparametric Upper Limits for Background Threshold Values											
1466					Order of Statistic, r	102					95% UTL with 95% Coverage	0.15
1467					Approx, f used to compute achieved CC	1.789	Approximate Actual Confidence Coefficient achieved by UTL					0.897
1468							Approximate Sample Size needed to achieve specified CC					124
1469					95% Percentile Bootstrap UTL with 95% Coverage	0.149	95% BCA Bootstrap UTL with 95% Coverage					0.14
1470					95% UPL	0.128					90% Percentile	0.1
1471					90% Chebyshev UPL	0.146					95% Percentile	0.119
1472					95% Chebyshev UPL	0.182					99% Percentile	0.16
1473					95% USL	0.17						
1474												
1475	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1476	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1477	and consists of observations collected from clean unimpacted locations.											
1478	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1479	represents a background data set and when many onsite observations need to be compared with the BTV.											
1480												
1481	MANGANESE, TOTAL (mg/L)											
1482												
1483	General Statistics											
1484					Total Number of Observations	67					Number of Missing Observations	63
1485					Number of Distinct Observations	12						

	A	B	C	D	E	F	G	H	I	J	K	L
1486					Number of Detects	64				Number of Non-Detects		3
1487					Number of Distinct Detects	12				Number of Distinct Non-Detects		3
1488					Minimum Detect	0.03				Minimum Non-Detect		0.04
1489					Maximum Detect	0.15				Maximum Non-Detect		0.06
1490					Variance Detected	8.4045E-4				Percent Non-Detects		4.478%
1491					Mean Detected	0.0677				SD Detected		0.029
1492					Mean of Detected Logged Data	-2.774				SD of Detected Logged Data		0.397
1493												
1494	Critical Values for Background Threshold Values (BTVs)											
1495					Tolerance Factor K (For UTL)	1.994				d2max (for USL)		3.068
1496												
1497	Normal GOF Test on Detects Only											
1498					Shapiro Wilk Test Statistic	0.869			Normal GOF Test on Detected Observations Only			
1499					5% Shapiro Wilk P Value	2.1673E-7			Data Not Normal at 5% Significance Level			
1500					Lilliefors Test Statistic	0.197			Lilliefors GOF Test			
1501					5% Lilliefors Critical Value	0.111			Data Not Normal at 5% Significance Level			
1502	Data Not Normal at 5% Significance Level											
1503												
1504	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1505					KM Mean	0.0663				KM SD		0.0288
1506					95% UTL95% Coverage	0.124				95% KM UPL (t)		0.115
1507					90% KM Percentile (z)	0.103				95% KM Percentile (z)		0.114
1508					99% KM Percentile (z)	0.133				95% KM USL		0.155
1509												
1510	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1511					Mean	0.0657				SD		0.0297
1512					95% UTL95% Coverage	0.125				95% UPL (t)		0.116
1513					90% Percentile (z)	0.104				95% Percentile (z)		0.115
1514					99% Percentile (z)	0.135				95% USL		0.157
1515	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1516												
1517	Gamma GOF Tests on Detected Observations Only											
1518					A-D Test Statistic	1.769			Anderson-Darling GOF Test			
1519					5% A-D Critical Value	0.753			Data Not Gamma Distributed at 5% Significance Level			
1520					K-S Test Statistic	0.191			Kolmogorov-Smirnov GOF			
1521					5% K-S Critical Value	0.112			Data Not Gamma Distributed at 5% Significance Level			
1522	Data Not Gamma Distributed at 5% Significance Level											
1523												
1524	Gamma Statistics on Detected Data Only											
1525					k hat (MLE)	6.342				k star (bias corrected MLE)		6.055
1526					Theta hat (MLE)	0.0107				Theta star (bias corrected MLE)		0.0112
1527					nu hat (MLE)	811.8				nu star (bias corrected)		775.1
1528					MLE Mean (bias corrected)	0.0677						
1529					MLE Sd (bias corrected)	0.0275				95% Percentile of Chisquare (2kstar)		21.17
1530												
1531	Gamma ROS Statistics using Imputed Non-Detects											
1532	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1533	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)											
1534	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1535	This is especially true when the sample size is small.											
1536	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1537					Minimum	0.0193				Mean		0.0661
1538					Maximum	0.15				Median		0.06
1539					SD	0.0293				CV		0.444
1540					k hat (MLE)	5.773				k star (bias corrected MLE)		5.525

	A	B	C	D	E	F	G	H	I	J	K	L
1541					Theta hat (MLE)	0.0114				Theta star (bias corrected MLE)		0.012
1542					nu hat (MLE)	773.6				nu star (bias corrected)		740.3
1543					MLE Mean (bias corrected)	0.0661				MLE Sd (bias corrected)		0.0281
1544					95% Percentile of Chisquare (2kstar)	19.74				90% Percentile		0.104
1545					95% Percentile	0.118				99% Percentile		0.148
1546	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1547	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1548					WH	HW				WH	HW	
1549	% Approx. Gamma UTL with 95% Coverage				0.132	0.134			95% Approx. Gamma UPL	0.119	0.119	
1550		95% Gamma USL			0.185	0.192						
1551												
1552	Estimates of Gamma Parameters using KM Estimates											
1553					Mean (KM)	0.0663				SD (KM)		0.0288
1554					Variance (KM)	8.3197E-4				SE of Mean (KM)		0.00355
1555					k hat (KM)	5.283				k star (KM)		5.057
1556					nu hat (KM)	708				nu star (KM)		677.6
1557					theta hat (KM)	0.0125				theta star (KM)		0.0131
1558					80% gamma percentile (KM)	0.089				90% gamma percentile (KM)		0.106
1559					95% gamma percentile (KM)	0.121				99% gamma percentile (KM)		0.153
1560												
1561	The following statistics are computed using gamma distribution and KM estimates											
1562	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1563					WH	HW				WH	HW	
1564	% Approx. Gamma UTL with 95% Coverage				0.13	0.131			95% Approx. Gamma UPL	0.117	0.118	
1565		95% KM Gamma Percentile			0.116	0.116			95% Gamma USL	0.18	0.186	
1566												
1567	Lognormal GOF Test on Detected Observations Only											
1568					Shapiro Wilk Approximate Test Statistic	0.933				Shapiro Wilk GOF Test		
1569					5% Shapiro Wilk P Value	0.00226				Data Not Lognormal at 5% Significance Level		
1570					Lilliefors Test Statistic	0.18				Lilliefors GOF Test		
1571					5% Lilliefors Critical Value	0.111				Data Not Lognormal at 5% Significance Level		
1572	Data Not Lognormal at 5% Significance Level											
1573												
1574	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1575					Mean in Original Scale	0.0663				Mean in Log Scale		-2.799
1576					SD in Original Scale	0.0291				SD in Log Scale		0.408
1577					95% UTL95% Coverage	0.137				95% BCA UTL95% Coverage		0.141
1578					95% Bootstrap (%) UTL95% Coverage	0.144				95% UPL (t)		0.121
1579					90% Percentile (z)	0.103				95% Percentile (z)		0.119
1580					99% Percentile (z)	0.157				95% USL		0.213
1581												
1582	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1583					KM Mean of Logged Data	-2.798				95% KM UTL (Lognormal)95% Coverage		0.136
1584					KM SD of Logged Data	0.403				95% KM UPL (Lognormal)		0.12
1585					95% KM Percentile Lognormal (z)	0.118				95% KM USL (Lognormal)		0.21
1586												
1587	Background DL/2 Statistics Assuming Lognormal Distribution											
1588					Mean in Original Scale	0.0657				Mean in Log Scale		-2.816
1589					SD in Original Scale	0.0297				SD in Log Scale		0.435
1590					95% UTL95% Coverage	0.143				95% UPL (t)		0.124
1591					90% Percentile (z)	0.105				95% Percentile (z)		0.122
1592					99% Percentile (z)	0.165				95% USL		0.227
1593	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1594												
1595	Nonparametric Distribution Free Background Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
1596	Data do not follow a Discernible Distribution (0.05)											
1597												
1598	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1599	Order of Statistic, r					66	95% UTL with 95% Coverage					0.15
1600	Approx, f used to compute achieved CC					1.737	Approximate Actual Confidence Coefficient achieved by UTL					0.854
1601	Approximate Sample Size needed to achieve specified CC					93	95% UPL					0.126
1602	95% USL					0.15	95% KM Chebyshev UPL					0.193
1603												
1604	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1605	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1606	and consists of observations collected from clean unimpacted locations.											
1607	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1608	represents a background data set and when many onsite observations need to be compared with the BTV.											
1609												
1610	METHYLENE CHLORIDE (ug/L)											
1611												
1612	General Statistics											
1613	Total Number of Observations					130	Number of Missing Observations					0
1614	Number of Distinct Observations					2						
1615	Number of Detects					0	Number of Non-Detects					130
1616	Number of Distinct Detects					0	Number of Distinct Non-Detects					2
1617	Minimum Detect					N/A	Minimum Non-Detect					1
1618	Maximum Detect					N/A	Maximum Non-Detect					2
1619	Variance Detected					N/A	Percent Non-Detects					100%
1620	Mean Detected					N/A	SD Detected					N/A
1621	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
1622												
1623	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
1624	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
1625	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
1626												
1627	The data set for variable METHYLENE CHLORIDE (ug/L) was not processed!											
1628												
1629												
1630	NITRATE-NITROGEN (mg/L)											
1631												
1632	General Statistics											
1633	Total Number of Observations					126	Number of Missing Observations					4
1634	Number of Distinct Observations					47						
1635	Number of Detects					123	Number of Non-Detects					3
1636	Number of Distinct Detects					47	Number of Distinct Non-Detects					3
1637	Minimum Detect					13.6	Minimum Non-Detect					21
1638	Maximum Detect					24.9	Maximum Non-Detect					23
1639	Variance Detected					4.512	Percent Non-Detects					2.381%
1640	Mean Detected					20.64	SD Detected					2.124
1641	Mean of Detected Logged Data					3.022	SD of Detected Logged Data					0.108
1642												
1643	Critical Values for Background Threshold Values (BTVs)											
1644	Tolerance Factor K (For UTL)					1.89	d2max (for USL)					3.287
1645												
1646	Normal GOF Test on Detects Only											
1647	Shapiro Wilk Test Statistic					0.96	Normal GOF Test on Detected Observations Only					
1648	5% Shapiro Wilk P Value					0.00784	Data Not Normal at 5% Significance Level					
1649	Lilliefors Test Statistic					0.103	Lilliefors GOF Test					
1650	5% Lilliefors Critical Value					0.0802	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
1651	Data Not Normal at 5% Significance Level											
1652												
1653	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1654		KM Mean	20.62							KM SD	2.116	
1655		95% UTL95% Coverage	24.62							95% KM UPL (t)	24.14	
1656		90% KM Percentile (z)	23.33							95% KM Percentile (z)	24.1	
1657		99% KM Percentile (z)	25.54							95% KM USL	27.57	
1658												
1659	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1660		Mean	20.41							SD	2.566	
1661		95% UTL95% Coverage	25.26							95% UPL (t)	24.68	
1662		90% Percentile (z)	23.7							95% Percentile (z)	24.63	
1663		99% Percentile (z)	26.38							95% USL	28.85	
1664	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1665												
1666	Gamma GOF Tests on Detected Observations Only											
1667		A-D Test Statistic	1.665							Anderson-Darling GOF Test		
1668		5% A-D Critical Value	0.75							Data Not Gamma Distributed at 5% Significance Level		
1669		K-S Test Statistic	0.115							Kolmogorov-Smirnov GOF		
1670		5% K-S Critical Value	0.0833							Data Not Gamma Distributed at 5% Significance Level		
1671	Data Not Gamma Distributed at 5% Significance Level											
1672												
1673	Gamma Statistics on Detected Data Only											
1674		k hat (MLE)	89.46							k star (bias corrected MLE)	87.28	
1675		Theta hat (MLE)	0.231							Theta star (bias corrected MLE)	0.236	
1676		nu hat (MLE)	22007							nu star (bias corrected)	21472	
1677		MLE Mean (bias corrected)	20.64									
1678		MLE Sd (bias corrected)	2.209							95% Percentile of Chisquare (2kstar)	206.4	
1679												
1680	Gamma ROS Statistics using Imputed Non-Detects											
1681	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1682	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)											
1683	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1684	This is especially true when the sample size is small.											
1685	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1686		Minimum	13.6							Mean	20.62	
1687		Maximum	24.9							Median	21	
1688		SD	2.105							CV	0.102	
1689		k hat (MLE)	91.08							k star (bias corrected MLE)	88.91	
1690		Theta hat (MLE)	0.226							Theta star (bias corrected MLE)	0.232	
1691		nu hat (MLE)	22951							nu star (bias corrected)	22406	
1692		MLE Mean (bias corrected)	20.62							MLE Sd (bias corrected)	2.187	
1693		95% Percentile of Chisquare (2kstar)	209.9							90% Percentile	23.47	
1694		95% Percentile	24.34							99% Percentile	26.04	
1695	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1696	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1697			WH			HW				WH	HW	
1698	% Approx. Gamma UTL with 95% Coverage		24.91			24.96			95% Approx. Gamma UPL	24.36	24.39	
1699	95% Gamma USL		28.51			28.66						
1700												
1701	Estimates of Gamma Parameters using KM Estimates											
1702		Mean (KM)	20.62							SD (KM)	2.116	
1703		Variance (KM)	4.478							SE of Mean (KM)	0.191	
1704		k hat (KM)	94.93							k star (KM)	92.67	
1705		nu hat (KM)	23921							nu star (KM)	23353	

	A	B	C	D	E	F	G	H	I	J	K	L
1706					theta hat (KM)	0.217				theta star (KM)		0.222
1707					80% gamma percentile (KM)	22.39				90% gamma percentile (KM)		23.4
1708					95% gamma percentile (KM)	24.26				99% gamma percentile (KM)		25.92
1709												
1710	The following statistics are computed using gamma distribution and KM estimates											
1711	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1712					WH	HW					WH	HW
1713	% Approx. Gamma UTL with 95% Coverage				24.93	24.98				95% Approx. Gamma UPL	24.38	24.41
1714	95% KM Gamma Percentile				24.33	24.37				95% Gamma USL	28.56	28.71
1715												
1716	Lognormal GOF Test on Detected Observations Only											
1717					Shapiro Wilk Approximate Test Statistic	0.936				Shapiro Wilk GOF Test		
1718					5% Shapiro Wilk P Value	7.1315E-6				Data Not Lognormal at 5% Significance Level		
1719					Lilliefors Test Statistic	0.12				Lilliefors GOF Test		
1720					5% Lilliefors Critical Value	0.0802				Data Not Lognormal at 5% Significance Level		
1721	Data Not Lognormal at 5% Significance Level											
1722												
1723	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1724					Mean in Original Scale	20.62				Mean in Log Scale		3.021
1725					SD in Original Scale	2.106				SD in Log Scale		0.107
1726					95% UTL95% Coverage	25.11				95% BCA UTL95% Coverage		23.6
1727					95% Bootstrap (%) UTL95% Coverage	24				95% UPL (t)		24.51
1728					90% Percentile (z)	23.52				95% Percentile (z)		24.46
1729					99% Percentile (z)	26.31				95% USL		29.16
1730												
1731	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1732					KM Mean of Logged Data	3.02				95% KM UTL (Lognormal)95% Coverage		25.13
1733					KM SD of Logged Data	0.108				95% KM UPL (Lognormal)		24.53
1734					95% KM Percentile Lognormal (z)	24.48				95% KM USL (Lognormal)		29.22
1735												
1736	Background DL/2 Statistics Assuming Lognormal Distribution											
1737					Mean in Original Scale	20.41				Mean in Log Scale		3.007
1738					SD in Original Scale	2.566				SD in Log Scale		0.143
1739					95% UTL95% Coverage	26.52				95% UPL (t)		25.68
1740					90% Percentile (z)	24.31				95% Percentile (z)		25.61
1741					99% Percentile (z)	28.24				95% USL		32.41
1742	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1743												
1744	Nonparametric Distribution Free Background Statistics											
1745	Data do not follow a Discernible Distribution (0.05)											
1746												
1747	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1748					Order of Statistic, r	123				95% UTL with95% Coverage		24
1749					Approx, f used to compute achieved CC	1.618				Approximate Actual Confidence Coefficient achieved by UTL		0.88
1750					Approximate Sample Size needed to achieve specified CC	153				95% UPL		23.57
1751					95% USL	24.9				95% KM Chebyshev UPL		29.88
1752												
1753	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1754	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1755	and consists of observations collected from clean unimpacted locations.											
1756	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1757	represents a background data set and when many onsite observations need to be compared with the BTV.											
1758												
1759	pH-FIELD (SU)											
1760												

	A	B	C	D	E	F	G	H	I	J	K	L
1761	General Statistics											
1762	Total Number of Observations					116	Number of Missing Observations					14
1763	Number of Distinct Observations					72						
1764	Number of Detects					112	Number of Non-Detects					4
1765	Number of Distinct Detects					68	Number of Distinct Non-Detects					4
1766	Minimum Detect					4.15	Minimum Non-Detect					4.75
1767	Maximum Detect					6.27	Maximum Non-Detect					5.59
1768	Variance Detected					0.11	Percent Non-Detects					3.448%
1769	Mean Detected					5.057	SD Detected					0.332
1770	Mean of Detected Logged Data					1.619	SD of Detected Logged Data					0.0643
1771												
1772	Critical Values for Background Threshold Values (BTVs)											
1773	Tolerance Factor K (For UTL)					1.901	d2max (for USL)					3.259
1774												
1775	Normal GOF Test on Detects Only											
1776	Shapiro Wilk Test Statistic					0.918	Normal GOF Test on Detected Observations Only					
1777	5% Shapiro Wilk P Value					9.6096E-8	Data Not Normal at 5% Significance Level					
1778	Lilliefors Test Statistic					0.136	Lilliefors GOF Test					
1779	5% Lilliefors Critical Value					0.084	Data Not Normal at 5% Significance Level					
1780	Data Not Normal at 5% Significance Level											
1781												
1782	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1783	KM Mean					5.05	KM SD					0.331
1784	95% UTL95% Coverage					5.679	95% KM UPL (t)					5.601
1785	90% KM Percentile (z)					5.474	95% KM Percentile (z)					5.594
1786	99% KM Percentile (z)					5.82	95% KM USL					6.128
1787												
1788	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1789	Mean					4.973	SD					0.552
1790	95% UTL95% Coverage					6.022	95% UPL (t)					5.892
1791	90% Percentile (z)					5.68	95% Percentile (z)					5.881
1792	99% Percentile (z)					6.257	95% USL					6.771
1793	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1794												
1795	Gamma GOF Tests on Detected Observations Only											
1796	A-D Test Statistic					2.769	Anderson-Darling GOF Test					
1797	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
1798	K-S Test Statistic					0.127	Kolmogorov-Smirnov GOF					
1799	5% K-S Critical Value					0.0861	Data Not Gamma Distributed at 5% Significance Level					
1800	Data Not Gamma Distributed at 5% Significance Level											
1801												
1802	Gamma Statistics on Detected Data Only											
1803	k hat (MLE)					241.4	k star (bias corrected MLE)					234.9
1804	Theta hat (MLE)					0.021	Theta star (bias corrected MLE)					0.0215
1805	nu hat (MLE)					54068	nu star (bias corrected)					52621
1806	MLE Mean (bias corrected)					5.057						
1807	MLE Sd (bias corrected)					0.33	95% Percentile of Chisquare (2kstar)					521.4
1808												
1809	Gamma ROS Statistics using Imputed Non-Detects											
1810	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1811	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)											
1812	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1813	This is especially true when the sample size is small.											
1814	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1815	Minimum					4.15	Mean					5.051

	A	B	C	D	E	F	G	H	I	J	K	L
1816					Maximum	6.27					Median	5.014
1817					SD	0.329					CV	0.0652
1818					k hat (MLE)	244.2					k star (bias corrected MLE)	237.9
1819					Theta hat (MLE)	0.0207					Theta star (bias corrected MLE)	0.0212
1820					nu hat (MLE)	56651					nu star (bias corrected)	55187
1821					MLE Mean (bias corrected)	5.051					MLE Sd (bias corrected)	0.327
1822					95% Percentile of Chisquare (2kstar)	527.6					90% Percentile	5.475
1823					95% Percentile	5.602					99% Percentile	5.844
1824	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1825	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1826					WH						WH	HW
1827	% Approx. Gamma UTL with 95% Coverage				5.686					95% Approx. Gamma UPL	5.604	5.605
1828					95% Gamma USL	6.177						
1829												
1830	Estimates of Gamma Parameters using KM Estimates											
1831					Mean (KM)	5.05					SD (KM)	0.331
1832					Variance (KM)	0.109					SE of Mean (KM)	0.0311
1833					k hat (KM)	233.2					k star (KM)	227.2
1834					nu hat (KM)	54106					nu star (KM)	52708
1835					theta hat (KM)	0.0217					theta star (KM)	0.0222
1836					80% gamma percentile (KM)	5.33					90% gamma percentile (KM)	5.484
1837					95% gamma percentile (KM)	5.614					99% gamma percentile (KM)	5.862
1838												
1839	The following statistics are computed using gamma distribution and KM estimates											
1840	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1841					WH						WH	HW
1842	% Approx. Gamma UTL with 95% Coverage				5.689					95% Approx. Gamma UPL	5.606	5.607
1843					95% KM Gamma Percentile	5.599				95% Gamma USL	6.182	6.19
1844												
1845	Lognormal GOF Test on Detected Observations Only											
1846					Shapiro Wilk Approximate Test Statistic	0.934					Shapiro Wilk GOF Test	
1847					5% Shapiro Wilk P Value	1.3550E-5					Data Not Lognormal at 5% Significance Level	
1848					Lilliefors Test Statistic	0.123					Lilliefors GOF Test	
1849					5% Lilliefors Critical Value	0.084					Data Not Lognormal at 5% Significance Level	
1850	Data Not Lognormal at 5% Significance Level											
1851												
1852	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1853					Mean in Original Scale	5.051					Mean in Log Scale	1.618
1854					SD in Original Scale	0.329					SD in Log Scale	0.0639
1855					95% UTL95% Coverage	5.692					95% BCA UTL95% Coverage	5.94
1856					95% Bootstrap (%) UTL95% Coverage	5.945					95% UPL (t)	5.607
1857					90% Percentile (z)	5.471					95% Percentile (z)	5.599
1858					99% Percentile (z)	5.849					95% USL	6.208
1859												
1860	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1861					KM Mean of Logged Data	1.617					95% KM UTL (Lognormal)95% Coverage	5.695
1862					KM SD of Logged Data	0.0643					95% KM UPL (Lognormal)	5.61
1863					95% KM Percentile Lognormal (z)	5.602					95% KM USL (Lognormal)	6.215
1864												
1865	Background DL/2 Statistics Assuming Lognormal Distribution											
1866					Mean in Original Scale	4.973					Mean in Log Scale	1.596
1867					SD in Original Scale	0.552					SD in Log Scale	0.136
1868					95% UTL95% Coverage	6.387					95% UPL (t)	6.186
1869					90% Percentile (z)	5.872					95% Percentile (z)	6.168
1870					99% Percentile (z)	6.766					95% USL	7.68

	A	B	C	D	E	F	G	H	I	J	K	L
1871	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
1872												
1873	Nonparametric Distribution Free Background Statistics											
1874	Data do not follow a Discernible Distribution (0.05)											
1875												
1876	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
1877	Order of Statistic, r					113	95% UTL with 95% Coverage					5.94
1878	Approx. f used to compute achieved CC					1.487	Approximate Actual Confidence Coefficient achieved by UTL					0.837
1879	Approximate Sample Size needed to achieve specified CC					153	95% UPL					5.647
1880	95% USL					6.27	95% KM Chebyshev UPL					6.498
1881												
1882	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1883	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1884	and consists of observations collected from clean unimpacted locations.											
1885	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1886	represents a background data set and when many onsite observations need to be compared with the BTV.											
1887												
1888	pH-LAB (SU)											
1889												
1890	General Statistics											
1891	Total Number of Observations					124	Number of Missing Observations					6
1892	Number of Distinct Observations					76						
1893	Number of Detects					120	Number of Non-Detects					4
1894	Number of Distinct Detects					74	Number of Distinct Non-Detects					4
1895	Minimum Detect					4.43	Minimum Non-Detect					5.22
1896	Maximum Detect					7.08	Maximum Non-Detect					5.67
1897	Variance Detected					0.106	Percent Non-Detects					3.226%
1898	Mean Detected					5.626	SD Detected					0.326
1899	Mean of Detected Logged Data					1.726	SD of Detected Logged Data					0.0574
1900												
1901	Critical Values for Background Threshold Values (BTVs)											
1902	Tolerance Factor K (For UTL)					1.892	d2max (for USL)					3.281
1903												
1904	Normal GOF Test on Detects Only											
1905	Shapiro Wilk Test Statistic					0.958	Normal GOF Test on Detected Observations Only					
1906	5% Shapiro Wilk P Value					0.00632	Data Not Normal at 5% Significance Level					
1907	Lilliefors Test Statistic					0.0746	Lilliefors GOF Test					
1908	5% Lilliefors Critical Value					0.0812	Detected Data appear Normal at 5% Significance Level					
1909	Detected Data appear Approximate Normal at 5% Significance Level											
1910												
1911	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
1912	KM Mean					5.612	KM SD					0.332
1913	95% UTL 95% Coverage					6.24	95% KM UPL (t)					6.164
1914	90% KM Percentile (z)					6.037	95% KM Percentile (z)					6.158
1915	99% KM Percentile (z)					6.384	95% KM USL					6.7
1916												
1917	DL/2 Substitution Background Statistics Assuming Normal Distribution											
1918	Mean					5.531	SD					0.611
1919	95% UTL 95% Coverage					6.688	95% UPL (t)					6.548
1920	90% Percentile (z)					6.315	95% Percentile (z)					6.537
1921	99% Percentile (z)					6.953	95% USL					7.537
1922	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
1923												
1924	Gamma GOF Tests on Detected Observations Only											
1925	A-D Test Statistic					1.016	Anderson-Darling GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
1926					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
1927					K-S Test Statistic	0.0701	Kolmogorov-Smirnov GOF					
1928					5% K-S Critical Value	0.084	Detected data appear Gamma Distributed at 5% Significance Level					
1929	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
1930												
1931	Gamma Statistics on Detected Data Only											
1932					k hat (MLE)	304.9					k star (bias corrected MLE)	297.3
1933					Theta hat (MLE)	0.0185					Theta star (bias corrected MLE)	0.0189
1934					nu hat (MLE)	73180					nu star (bias corrected)	71352
1935					MLE Mean (bias corrected)	5.626						
1936					MLE Sd (bias corrected)	0.326					95% Percentile of Chisquare (2kstar)	652.4
1937												
1938	Gamma ROS Statistics using Imputed Non-Detects											
1939	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1940	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)											
1941	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1942	This is especially true when the sample size is small.											
1943	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1944					Minimum	4.43					Mean	5.612
1945					Maximum	7.08					Median	5.57
1946					SD	0.331					CV	0.059
1947					k hat (MLE)	294.4					k star (bias corrected MLE)	287.3
1948					Theta hat (MLE)	0.0191					Theta star (bias corrected MLE)	0.0195
1949					nu hat (MLE)	73021					nu star (bias corrected)	71256
1950					MLE Mean (bias corrected)	5.612					MLE Sd (bias corrected)	0.331
1951					95% Percentile of Chisquare (2kstar)	631.5					90% Percentile	6.04
1952					95% Percentile	6.167					99% Percentile	6.411
1953	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
1954	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1955					WH		HW				WH	HW
1956	% Approx. Gamma UTL with 95% Coverage				6.25		6.251			95% Approx. Gamma UPL	6.169	6.17
1957	95% Gamma USL				6.753		6.76					
1958												
1959	Estimates of Gamma Parameters using KM Estimates											
1960					Mean (KM)	5.612					SD (KM)	0.332
1961					Variance (KM)	0.11					SE of Mean (KM)	0.0302
1962					k hat (KM)	286.4					k star (KM)	279.5
1963					nu hat (KM)	71039					nu star (KM)	69321
1964					theta hat (KM)	0.0196					theta star (KM)	0.0201
1965					80% gamma percentile (KM)	5.893					90% gamma percentile (KM)	6.047
1966					95% gamma percentile (KM)	6.176					99% gamma percentile (KM)	6.423
1967												
1968	The following statistics are computed using gamma distribution and KM estimates											
1969	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
1970					WH		HW				WH	HW
1971	% Approx. Gamma UTL with 95% Coverage				6.252		6.254			95% Approx. Gamma UPL	6.172	6.173
1972	95% KM Gamma Percentile				6.165		6.166			95% Gamma USL	6.757	6.766
1973												
1974	Lognormal GOF Test on Detected Observations Only											
1975					Shapiro Wilk Approximate Test Statistic	0.967					Shapiro Wilk GOF Test	
1976					5% Shapiro Wilk P Value	0.0499					Data Not Lognormal at 5% Significance Level	
1977					Lilliefors Test Statistic	0.0697					Lilliefors GOF Test	
1978					5% Lilliefors Critical Value	0.0812					Detected Data appear Lognormal at 5% Significance Level	
1979	Detected Data appear Approximate Lognormal at 5% Significance Level											
1980												

	A	B	C	D	E	F	G	H	I	J	K	L
1981	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
1982	Mean in Original Scale				5.612	Mean in Log Scale				1.723		
1983	SD in Original Scale				0.331	SD in Log Scale				0.0583		
1984	95% UTL95% Coverage				6.256	95% BCA UTL95% Coverage				6.153		
1985	95% Bootstrap (%) UTL95% Coverage				6.16	95% UPL (t)				6.173		
1986	90% Percentile (z)				6.037	95% Percentile (z)				6.167		
1987	99% Percentile (z)				6.416	95% USL				6.784		
1988												
1989	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
1990	KM Mean of Logged Data				1.723	95% KM UTL (Lognormal)95% Coverage				6.26		
1991	KM SD of Logged Data				0.0587	95% KM UPL (Lognormal)				6.177		
1992	95% KM Percentile Lognormal (z)				6.17	95% KM USL (Lognormal)				6.792		
1993												
1994	Background DL/2 Statistics Assuming Lognormal Distribution											
1995	Mean in Original Scale				5.531	Mean in Log Scale				1.702		
1996	SD in Original Scale				0.611	SD in Log Scale				0.142		
1997	95% UTL95% Coverage				7.178	95% UPL (t)				6.949		
1998	90% Percentile (z)				6.581	95% Percentile (z)				6.93		
1999	99% Percentile (z)				7.635	95% USL				8.745		
2000	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2001												
2002	Nonparametric Distribution Free Background Statistics											
2003	Data appear to follow a Discernible Distribution at 5% Significance Level											
2004												
2005	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2006	Order of Statistic, r				121	95% UTL with95% Coverage				6.16		
2007	Approx, f used to compute achieved CC				1.592	Approximate Actual Confidence Coefficient achieved by UTL				0.872		
2008	Approximate Sample Size needed to achieve specified CC				153	95% UPL				6.093		
2009	95% USL				7.08	95% KM Chebyshev UPL				7.063		
2010												
2011	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2012	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2013	and consists of observations collected from clean unimpacted locations.											
2014	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2015	represents a background data set and when many onsite observations need to be compared with the BTV.											
2016												
2017	POTASSIUM, DISSOLVED (mg/L)											
2018												
2019	General Statistics											
2020	Total Number of Observations				71	Number of Distinct Observations				35		
2021	Minimum				1.7	First Quartile				2.235		
2022	Second Largest				3.1	Median				2.3		
2023	Maximum				3.14	Third Quartile				2.5		
2024	Mean				2.382	SD				0.276		
2025	Coefficient of Variation				0.116	Skewness				0.657		
2026	Mean of logged Data				0.861	SD of logged Data				0.114		
2027												
2028	Critical Values for Background Threshold Values (BTVs)											
2029	Tolerance Factor K (For UTL)				1.983	d2max (for USL)				3.089		
2030												
2031	Normal GOF Test											
2032	Shapiro Wilk Test Statistic				0.934	Normal GOF Test						
2033	5% Shapiro Wilk P Value				0.00135	Data Not Normal at 5% Significance Level						
2034	Lilliefors Test Statistic				0.178	Lilliefors GOF Test						
2035	5% Lilliefors Critical Value				0.105	Data Not Normal at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L	
2036	Data Not Normal at 5% Significance Level												
2037													
2038	Background Statistics Assuming Normal Distribution												
2039	95% UTL with 95% Coverage				2.928						90% Percentile (z)		2.735
2040	95% UPL (t)				2.844						95% Percentile (z)		2.835
2041	95% USL				3.233						99% Percentile (z)		3.023
2042													
2043	Gamma GOF Test												
2044	A-D Test Statistic				1.546		Anderson-Darling Gamma GOF Test						
2045	5% A-D Critical Value				0.749		Data Not Gamma Distributed at 5% Significance Level						
2046	K-S Test Statistic				0.162		Kolmogorov-Smirnov Gamma GOF Test						
2047	5% K-S Critical Value				0.105		Data Not Gamma Distributed at 5% Significance Level						
2048	Data Not Gamma Distributed at 5% Significance Level												
2049													
2050	Gamma Statistics												
2051	k hat (MLE)				77.74		k star (bias corrected MLE)				74.46		
2052	Theta hat (MLE)				0.0306		Theta star (bias corrected MLE)				0.032		
2053	nu hat (MLE)				11038		nu star (bias corrected)				10573		
2054	MLE Mean (bias corrected)				2.382		MLE Sd (bias corrected)				0.276		
2055													
2056	Background Statistics Assuming Gamma Distribution												
2057	95% Wilson Hilferty (WH) Approx. Gamma UPL				2.857		90% Percentile				2.742		
2058	95% Hawkins Wixley (HW) Approx. Gamma UPL				2.859		95% Percentile				2.853		
2059	95% WH Approx. Gamma UTL with 95% Coverage				2.951		99% Percentile				3.07		
2060	95% HW Approx. Gamma UTL with 95% Coverage				2.954								
2061	95% WH USL				3.312		95% HW USL				3.324		
2062													
2063	Lognormal GOF Test												
2064	Shapiro Wilk Test Statistic				0.951		Shapiro Wilk Lognormal GOF Test						
2065	5% Shapiro Wilk P Value				0.02		Data Not Lognormal at 5% Significance Level						
2066	Lilliefors Test Statistic				0.155		Lilliefors Lognormal GOF Test						
2067	5% Lilliefors Critical Value				0.105		Data Not Lognormal at 5% Significance Level						
2068	Data Not Lognormal at 5% Significance Level												
2069													
2070	Background Statistics assuming Lognormal Distribution												
2071	95% UTL with 95% Coverage				2.966		90% Percentile (z)				2.739		
2072	95% UPL (t)				2.865		95% Percentile (z)				2.854		
2073	95% USL				3.365		99% Percentile (z)				3.085		
2074													
2075	Nonparametric Distribution Free Background Statistics												
2076	Data do not follow a Discernible Distribution (0.05)												
2077													
2078	Nonparametric Upper Limits for Background Threshold Values												
2079	Order of Statistic, r				70		95% UTL with 95% Coverage				3.1		
2080	Approx, f used to compute achieved CC				1.842		Approximate Actual Confidence Coefficient achieved by UTL				0.876		
2081							Approximate Sample Size needed to achieve specified CC				93		
2082	95% Percentile Bootstrap UTL with 95% Coverage				3.1		95% BCA Bootstrap UTL with 95% Coverage				3.1		
2083	95% UPL				3.064		90% Percentile				2.7		
2084	90% Chebyshev UPL				3.214		95% Percentile				2.98		
2085	95% Chebyshev UPL				3.592		99% Percentile				3.112		
2086	95% USL				3.14								
2087													
2088	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.												
2089	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers												
2090	and consists of observations collected from clean unimpacted locations.												

	A	B	C	D	E	F	G	H	I	J	K	L
2091	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2092	represents a background data set and when many onsite observations need to be compared with the BTV.											
2093												
2094	POTASSIUM, TOTAL (mg/L)											
2095												
2096	General Statistics											
2097	Total Number of Observations					43	Number of Distinct Observations					19
2098							Number of Missing Observations					87
2099	Minimum					1.7	First Quartile					2.17
2100	Second Largest					2.9	Median					2.4
2101	Maximum					3.1	Third Quartile					2.6
2102	Mean					2.377	SD					0.294
2103	Coefficient of Variation					0.124	Skewness					0.106
2104	Mean of logged Data					0.858	SD of logged Data					0.125
2105												
2106	Critical Values for Background Threshold Values (BTVs)											
2107	Tolerance Factor K (For UTL)					2.097	d2max (for USL)					2.897
2108												
2109	Normal GOF Test											
2110	Shapiro Wilk Test Statistic					0.987	Shapiro Wilk GOF Test					
2111	5% Shapiro Wilk Critical Value					0.943	Data appear Normal at 5% Significance Level					
2112	Lilliefors Test Statistic					0.098	Lilliefors GOF Test					
2113	5% Lilliefors Critical Value					0.134	Data appear Normal at 5% Significance Level					
2114	Data appear Normal at 5% Significance Level											
2115												
2116	Background Statistics Assuming Normal Distribution											
2117	95% UTL with 95% Coverage					2.994	90% Percentile (z)					2.754
2118	95% UPL (t)					2.878	95% Percentile (z)					2.861
2119	95% USL					3.229	99% Percentile (z)					3.062
2120												
2121	Gamma GOF Test											
2122	A-D Test Statistic					0.33	Anderson-Darling Gamma GOF Test					
2123	5% A-D Critical Value					0.747	Detected data appear Gamma Distributed at 5% Significance Level					
2124	K-S Test Statistic					0.106	Kolmogorov-Smirnov Gamma GOF Test					
2125	5% K-S Critical Value					0.134	Detected data appear Gamma Distributed at 5% Significance Level					
2126	Detected data appear Gamma Distributed at 5% Significance Level											
2127												
2128	Gamma Statistics											
2129	k hat (MLE)					66.08	k star (bias corrected MLE)					61.49
2130	Theta hat (MLE)					0.036	Theta star (bias corrected MLE)					0.0387
2131	nu hat (MLE)					5683	nu star (bias corrected)					5288
2132	MLE Mean (bias corrected)					2.377	MLE Sd (bias corrected)					0.303
2133												
2134	Background Statistics Assuming Gamma Distribution											
2135	95% Wilson Hilferty (WH) Approx. Gamma UPL					2.903	90% Percentile					2.773
2136	95% Hawkins Wixley (HW) Approx. Gamma UPL					2.907	95% Percentile					2.896
2137	95% WH Approx. Gamma UTL with 95% Coverage					3.039	99% Percentile					3.138
2138	95% HW Approx. Gamma UTL with 95% Coverage					3.045						
2139	95% WH USL					3.326	95% HW USL					3.341
2140												
2141	Lognormal GOF Test											
2142	Shapiro Wilk Test Statistic					0.985	Shapiro Wilk Lognormal GOF Test					
2143	5% Shapiro Wilk Critical Value					0.943	Data appear Lognormal at 5% Significance Level					
2144	Lilliefors Test Statistic					0.113	Lilliefors Lognormal GOF Test					
2145	5% Lilliefors Critical Value					0.134	Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
2146	Data appear Lognormal at 5% Significance Level												
2147													
2148	Background Statistics assuming Lognormal Distribution												
2149	95% UTL with 95% Coverage				3.067						90% Percentile (z)		2.769
2150	95% UPL (t)				2.919						95% Percentile (z)		2.898
2151	95% USL				3.39						99% Percentile (z)		3.156
2152													
2153	Nonparametric Distribution Free Background Statistics												
2154	Data appear Normal at 5% Significance Level												
2155													
2156	Nonparametric Upper Limits for Background Threshold Values												
2157	Order of Statistic, r			43			95% UTL with 95% Coverage				3.1		
2158	Approx, f used to compute achieved CC			2.263			Approximate Actual Confidence Coefficient achieved by UTL				0.89		
2159							Approximate Sample Size needed to achieve specified CC				59		
2160	95% Percentile Bootstrap UTL with 95% Coverage				3.07		95% BCA Bootstrap UTL with 95% Coverage				2.9		
2161	95% UPL				2.88		90% Percentile				2.724		
2162	90% Chebyshev UPL				3.27		95% Percentile				2.8		
2163	95% Chebyshev UPL				3.675		99% Percentile				3.016		
2164	95% USL				3.1								
2165													
2166	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.												
2167	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers												
2168	and consists of observations collected from clean unimpacted locations.												
2169	The use of USL tends to provide a balance between false positives and false negatives provided the data												
2170	represents a background data set and when many onsite observations need to be compared with the BTV.												
2171													
2172	SODIUM, DISSOLVED (mg/L)												
2173													
2174	General Statistics												
2175	Total Number of Observations			97			Number of Distinct Observations				36		
2176	Minimum			10.7			First Quartile				12.3		
2177	Second Largest			16			Median				13		
2178	Maximum			16.4			Third Quartile				14		
2179	Mean			13.11			SD				1.209		
2180	Coefficient of Variation			0.0923			Skewness				0.125		
2181	Mean of logged Data			2.569			SD of logged Data				0.0927		
2182													
2183	Critical Values for Background Threshold Values (BTVs)												
2184	Tolerance Factor K (For UTL)			1.928			d2max (for USL)				3.199		
2185													
2186	Normal GOF Test												
2187	Shapiro Wilk Test Statistic			0.967			Normal GOF Test						
2188	5% Shapiro Wilk P Value			0.0951			Data appear Normal at 5% Significance Level						
2189	Lilliefors Test Statistic			0.0839			Lilliefors GOF Test						
2190	5% Lilliefors Critical Value			0.0902			Data appear Normal at 5% Significance Level						
2191	Data appear Normal at 5% Significance Level												
2192													
2193	Background Statistics Assuming Normal Distribution												
2194	95% UTL with 95% Coverage				15.44		90% Percentile (z)				14.65		
2195	95% UPL (t)				15.12		95% Percentile (z)				15.09		
2196	95% USL				16.97		99% Percentile (z)				15.92		
2197													
2198	Gamma GOF Test												
2199	A-D Test Statistic			0.7			Anderson-Darling Gamma GOF Test						
2200	5% A-D Critical Value			0.75			Detected data appear Gamma Distributed at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L
2201					K-S Test Statistic	0.0959	Kolmogorov-Smirnov Gamma GOF Test					
2202					5% K-S Critical Value	0.0906	Data Not Gamma Distributed at 5% Significance Level					
2203	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
2204												
2205	Gamma Statistics											
2206					k hat (MLE)	118.3					k star (bias corrected MLE)	114.7
2207					Theta hat (MLE)	0.111					Theta star (bias corrected MLE)	0.114
2208					nu hat (MLE)	22954					nu star (bias corrected)	22245
2209					MLE Mean (bias corrected)	13.11					MLE Sd (bias corrected)	1.224
2210												
2211	Background Statistics Assuming Gamma Distribution											
2212					95% Wilson Hilferty (WH) Approx. Gamma UPL	15.19					90% Percentile	14.7
2213					95% Hawkins Wixley (HW) Approx. Gamma UPL	15.2					95% Percentile	15.18
2214					95% WH Approx. Gamma UTL with 95% Coverage	15.54					99% Percentile	16.12
2215					95% HW Approx. Gamma UTL with 95% Coverage	15.56						
2216					95% WH USL	17.33					95% HW USL	17.38
2217												
2218	Lognormal GOF Test											
2219					Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Lognormal GOF Test					
2220					5% Shapiro Wilk P Value	0.0523	Data appear Lognormal at 5% Significance Level					
2221					Lilliefors Test Statistic	0.102	Lilliefors Lognormal GOF Test					
2222					5% Lilliefors Critical Value	0.0902	Data Not Lognormal at 5% Significance Level					
2223	Data appear Approximate Lognormal at 5% Significance Level											
2224												
2225	Background Statistics assuming Lognormal Distribution											
2226					95% UTL with 95% Coverage	15.6					90% Percentile (z)	14.7
2227					95% UPL (t)	15.23					95% Percentile (z)	15.2
2228					95% USL	17.55					99% Percentile (z)	16.19
2229												
2230	Nonparametric Distribution Free Background Statistics											
2231	Data appear Normal at 5% Significance Level											
2232												
2233	Nonparametric Upper Limits for Background Threshold Values											
2234					Order of Statistic, r	95					95% UTL with 95% Coverage	15.8
2235					Approx, f used to compute achieved CC	1.667					Approximate Actual Confidence Coefficient achieved by UTL	0.869
2236											Approximate Sample Size needed to achieve specified CC	124
2237					95% Percentile Bootstrap UTL with 95% Coverage	15.8					95% BCA Bootstrap UTL with 95% Coverage	15.8
2238					95% UPL	15.22					90% Percentile	14.54
2239					90% Chebyshev UPL	16.75					95% Percentile	15.04
2240					95% Chebyshev UPL	18.4					99% Percentile	16.02
2241					95% USL	16.4						
2242												
2243	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2244	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2245	and consists of observations collected from clean unimpacted locations.											
2246	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2247	represents a background data set and when many onsite observations need to be compared with the BTV.											
2248												
2249	SODIUM, TOTAL (mg/L)											
2250												
2251	General Statistics											
2252					Total Number of Observations	72					Number of Missing Observations	58
2253					Number of Distinct Observations	30						
2254					Number of Detects	69					Number of Non-Detects	3
2255					Number of Distinct Detects	30					Number of Distinct Non-Detects	1

	A	B	C	D	E	F	G	H	I	J	K	L
2256					Minimum Detect	7.6				Minimum Non-Detect		11
2257					Maximum Detect	16.4				Maximum Non-Detect		11
2258					Variance Detected	2.701				Percent Non-Detects		4.167%
2259					Mean Detected	12.71				SD Detected		1.643
2260					Mean of Detected Logged Data	2.534				SD of Detected Logged Data		0.135
2261												
2262	Critical Values for Background Threshold Values (BTVs)											
2263					Tolerance Factor K (For UTL)	1.98				d2max (for USL)		3.094
2264												
2265	Normal GOF Test on Detects Only											
2266					Shapiro Wilk Test Statistic	0.968				Normal GOF Test on Detected Observations Only		
2267					5% Shapiro Wilk P Value	0.199				Detected Data appear Normal at 5% Significance Level		
2268					Lilliefors Test Statistic	0.144				Lilliefors GOF Test		
2269					5% Lilliefors Critical Value	0.107				Data Not Normal at 5% Significance Level		
2270	Detected Data appear Approximate Normal at 5% Significance Level											
2271												
2272	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2273					KM Mean	12.56				KM SD		1.766
2274					95% UTL95% Coverage	16.06				95% KM UPL (t)		15.52
2275					90% KM Percentile (z)	14.82				95% KM Percentile (z)		15.46
2276					99% KM Percentile (z)	16.67				95% KM USL		18.02
2277												
2278	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2279					Mean	12.41				SD		2.166
2280					95% UTL95% Coverage	16.7				95% UPL (t)		16.05
2281					90% Percentile (z)	15.19				95% Percentile (z)		15.97
2282					99% Percentile (z)	17.45				95% USL		19.11
2283	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2284												
2285	Gamma GOF Tests on Detected Observations Only											
2286					A-D Test Statistic	0.917				Anderson-Darling GOF Test		
2287					5% A-D Critical Value	0.749				Data Not Gamma Distributed at 5% Significance Level		
2288					K-S Test Statistic	0.16				Kolmogorov-Smirnov GOF		
2289					5% K-S Critical Value	0.107				Data Not Gamma Distributed at 5% Significance Level		
2290	Data Not Gamma Distributed at 5% Significance Level											
2291												
2292	Gamma Statistics on Detected Data Only											
2293					k hat (MLE)	57.8				k star (bias corrected MLE)		55.3
2294					Theta hat (MLE)	0.22				Theta star (bias corrected MLE)		0.23
2295					nu hat (MLE)	7977				nu star (bias corrected)		7631
2296					MLE Mean (bias corrected)	12.71						
2297					MLE Sd (bias corrected)	1.709				95% Percentile of Chisquare (2kstar)		136.1
2298												
2299	Gamma ROS Statistics using Imputed Non-Detects											
2300	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2301	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)											
2302	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2303	This is especially true when the sample size is small.											
2304	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2305					Minimum	7.6				Mean		12.59
2306					Maximum	16.4				Median		12.35
2307					SD	1.715				CV		0.136
2308					k hat (MLE)	52.18				k star (bias corrected MLE)		50.02
2309					Theta hat (MLE)	0.241				Theta star (bias corrected MLE)		0.252
2310					nu hat (MLE)	7514				nu star (bias corrected)		7203

	A	B	C	D	E	F	G	H	I	J	K	L
2311					MLE Mean (bias corrected)	12.59				MLE Sd (bias corrected)		1.78
2312					95% Percentile of Chisquare (2kstar)	124.4				90% Percentile		14.92
2313					95% Percentile	15.65				99% Percentile		17.09
2314	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2315	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2316					WH	HW				WH	HW	
2317	% Approx. Gamma UTL with 95% Coverage				16.3	16.35			95% Approx. Gamma UPL	15.68		15.71
2318		95% Gamma USL			18.73	18.87						
2319												
2320	Estimates of Gamma Parameters using KM Estimates											
2321					Mean (KM)	12.56				SD (KM)		1.766
2322					Variance (KM)	3.118				SE of Mean (KM)		0.212
2323					k hat (KM)	50.59				k star (KM)		48.49
2324					nu hat (KM)	7284				nu star (KM)		6982
2325					theta hat (KM)	0.248				theta star (KM)		0.259
2326					80% gamma percentile (KM)	14.05			90% gamma percentile (KM)			14.92
2327					95% gamma percentile (KM)	15.67			99% gamma percentile (KM)			17.13
2328												
2329	The following statistics are computed using gamma distribution and KM estimates											
2330	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2331					WH	HW				WH	HW	
2332	% Approx. Gamma UTL with 95% Coverage				16.43	16.49			95% Approx. Gamma UPL	15.78		15.82
2333		95% KM Gamma Percentile			15.71	15.75			95% Gamma USL	18.98		19.14
2334												
2335	Lognormal GOF Test on Detected Observations Only											
2336					Shapiro Wilk Approximate Test Statistic	0.944				Shapiro Wilk GOF Test		
2337					5% Shapiro Wilk P Value	0.0077				Data Not Lognormal at 5% Significance Level		
2338					Lilliefors Test Statistic	0.17				Lilliefors GOF Test		
2339					5% Lilliefors Critical Value	0.107				Data Not Lognormal at 5% Significance Level		
2340	Data Not Lognormal at 5% Significance Level											
2341												
2342	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2343					Mean in Original Scale	12.59				Mean in Log Scale		2.523
2344					SD in Original Scale	1.714				SD in Log Scale		0.142
2345					95% UTL95% Coverage	16.51				95% BCA UTL95% Coverage		15.9
2346					95% Bootstrap (%) UTL95% Coverage	15.85				95% UPL (t)		15.82
2347					90% Percentile (z)	14.95				95% Percentile (z)		15.74
2348					99% Percentile (z)	17.34				95% USL		19.33
2349												
2350	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2351					KM Mean of Logged Data	2.52				95% KM UTL (Lognormal)95% Coverage		16.69
2352					KM SD of Logged Data	0.149				95% KM UPL (Lognormal)		15.96
2353					95% KM Percentile Lognormal (z)	15.88				95% KM USL (Lognormal)		19.7
2354												
2355	Background DL/2 Statistics Assuming Lognormal Distribution											
2356					Mean in Original Scale	12.41				Mean in Log Scale		2.499
2357					SD in Original Scale	2.166				SD in Log Scale		0.213
2358					95% UTL95% Coverage	18.55				95% UPL (t)		17.4
2359					90% Percentile (z)	15.99				95% Percentile (z)		17.27
2360					99% Percentile (z)	19.97				95% USL		23.51
2361	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2362												
2363	Nonparametric Distribution Free Background Statistics											
2364	Data appear to follow a Discernible Distribution at 5% Significance Level											
2365												

	A	B	C	D	E	F	G	H	I	J	K	L
2366	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2367	Order of Statistic, r					71	95% UTL with 95% Coverage					15.9
2368	Approx, f used to compute achieved CC					1.868	Approximate Actual Confidence Coefficient achieved by UTL					0.881
2369	Approximate Sample Size needed to achieve specified CC					93	95% UPL					15.67
2370	95% USL					16.4	95% KM Chebyshev UPL					20.31
2371												
2372	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2373	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2374	and consists of observations collected from clean unimpacted locations.											
2375	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2376	represents a background data set and when many onsite observations need to be compared with the BTV.											
2377												
2378	SPEC. COND., FIELD (umhos/cm)											
2379												
2380	General Statistics											
2381	Total Number of Observations					116	Number of Missing Observations					14
2382	Number of Distinct Observations					69						
2383	Number of Detects					112	Number of Non-Detects					4
2384	Number of Distinct Detects					69	Number of Distinct Non-Detects					4
2385	Minimum Detect					173	Minimum Non-Detect					254
2386	Maximum Detect					358	Maximum Non-Detect					266
2387	Variance Detected					1029	Percent Non-Detects					3.448%
2388	Mean Detected					275.4	SD Detected					32.08
2389	Mean of Detected Logged Data					5.611	SD of Detected Logged Data					0.123
2390												
2391	Critical Values for Background Threshold Values (BTVs)											
2392	Tolerance Factor K (For UTL)					1.901	d2max (for USL)					3.259
2393												
2394	Normal GOF Test on Detects Only											
2395	Shapiro Wilk Test Statistic					0.972	Normal GOF Test on Detected Observations Only					
2396	5% Shapiro Wilk P Value					0.149	Detected Data appear Normal at 5% Significance Level					
2397	Lilliefors Test Statistic					0.0632	Lilliefors GOF Test					
2398	5% Lilliefors Critical Value					0.084	Detected Data appear Normal at 5% Significance Level					
2399	Detected Data appear Normal at 5% Significance Level											
2400												
2401	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2402	KM Mean					274.1	KM SD					32.4
2403	95% UTL 95% Coverage					335.8	95% KM UPL (t)					328.1
2404	90% KM Percentile (z)					315.7	95% KM Percentile (z)					327.4
2405	99% KM Percentile (z)					349.5	95% KM USL					379.8
2406												
2407	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2408	Mean					270.4	SD					41.23
2409	95% UTL 95% Coverage					348.8	95% UPL (t)					339.1
2410	90% Percentile (z)					323.3	95% Percentile (z)					338.2
2411	99% Percentile (z)					366.3	95% USL					404.8
2412	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2413												
2414	Gamma GOF Tests on Detected Observations Only											
2415	A-D Test Statistic					1.108	Anderson-Darling GOF Test					
2416	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
2417	K-S Test Statistic					0.0736	Kolmogorov-Smirnov GOF					
2418	5% K-S Critical Value					0.0861	Detected data appear Gamma Distributed at 5% Significance Level					
2419	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
2420												

	A	B	C	D	E	F	G	H	I	J	K	L				
2421	Gamma Statistics on Detected Data Only															
2422	k hat (MLE)				69.49		k star (bias corrected MLE)				67.63					
2423	Theta hat (MLE)				3.964		Theta star (bias corrected MLE)				4.072					
2424	nu hat (MLE)				15565		nu star (bias corrected)				15149					
2425	MLE Mean (bias corrected)				275.4											
2426	MLE Sd (bias corrected)				33.49		95% Percentile of Chisquare (2kstar)				163.4					
2427																
2428	Gamma ROS Statistics using Imputed Non-Detects															
2429	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs															
2430	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)															
2431	For such situations, GROS method may yield incorrect values of UCLs and BTVs															
2432	This is especially true when the sample size is small.															
2433	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates															
2434	Minimum				173		Mean				274.3					
2435	Maximum				358		Median				275.5					
2436	SD				32.13		CV				0.117					
2437	k hat (MLE)				69.23		k star (bias corrected MLE)				67.44					
2438	Theta hat (MLE)				3.962		Theta star (bias corrected MLE)				4.067					
2439	nu hat (MLE)				16061		nu star (bias corrected)				15647					
2440	MLE Mean (bias corrected)				274.3		MLE Sd (bias corrected)				33.4					
2441	95% Percentile of Chisquare (2kstar)				163		90% Percentile				317.8					
2442	95% Percentile				331.4		99% Percentile				357.9					
2443	The following statistics are computed using Gamma ROS Statistics on Imputed Data															
2444	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods															
2445					WH		HW						WH		HW	
2446	% Approx. Gamma UTL with 95% Coverage				340.6		341.4		95% Approx. Gamma UPL				331.7		332.3	
2447	95% Gamma USL				395.2		397.8									
2448																
2449	Estimates of Gamma Parameters using KM Estimates															
2450	Mean (KM)				274.1		SD (KM)				32.4					
2451	Variance (KM)				1050		SE of Mean (KM)				3.051					
2452	k hat (KM)				71.58		k star (KM)				69.73					
2453	nu hat (KM)				16607		nu star (KM)				16178					
2454	theta hat (KM)				3.83		theta star (KM)				3.931					
2455	80% gamma percentile (KM)				301.3		90% gamma percentile (KM)				317					
2456	95% gamma percentile (KM)				330.3		99% gamma percentile (KM)				356.2					
2457																
2458	The following statistics are computed using gamma distribution and KM estimates															
2459	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods															
2460					WH		HW						WH		HW	
2461	% Approx. Gamma UTL with 95% Coverage				341.3		342.2		95% Approx. Gamma UPL				332.3		332.9	
2462	95% KM Gamma Percentile				331.5		332.1		95% Gamma USL				396.7		399.5	
2463																
2464	Lognormal GOF Test on Detected Observations Only															
2465	Shapiro Wilk Approximate Test Statistic				0.937		Shapiro Wilk GOF Test									
2466	5% Shapiro Wilk P Value				2.9248E-5		Data Not Lognormal at 5% Significance Level									
2467	Lilliefors Test Statistic				0.0816		Lilliefors GOF Test									
2468	5% Lilliefors Critical Value				0.084		Detected Data appear Lognormal at 5% Significance Level									
2469	Detected Data appear Approximate Lognormal at 5% Significance Level															
2470																
2471	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects															
2472	Mean in Original Scale				274.2		Mean in Log Scale				5.607					
2473	SD in Original Scale				32.17		SD in Log Scale				0.123					
2474	95% UTL95% Coverage				344.2		95% BCA UTL95% Coverage				326.5					
2475	95% Bootstrap (%) UTL95% Coverage				330		95% UPL (t)				334.3					

	A	B	C	D	E	F	G	H	I	J	K	L
2476					90% Percentile (z)	318.8				95% Percentile (z)		333.5
2477					99% Percentile (z)	362.7				95% USL		406.9
2478												
2479	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2480					KM Mean of Logged Data	5.606				95% KM UTL (Lognormal)	95% Coverage	345
2481					KM SD of Logged Data	0.125				95% KM UPL (Lognormal)		335
2482					95% KM Percentile Lognormal (z)	334.2				95% KM USL (Lognormal)		408.8
2483												
2484	Background DL/2 Statistics Assuming Lognormal Distribution											
2485					Mean in Original Scale	270.4				Mean in Log Scale		5.586
2486					SD in Original Scale	41.23				SD in Log Scale		0.182
2487					95% UTL	376.7				95% UPL (t)		360.8
2488					90% Percentile (z)	336.5				95% Percentile (z)		359.5
2489					99% Percentile (z)	407				95% USL		482.2
2490	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2491												
2492	Nonparametric Distribution Free Background Statistics											
2493	Data appear to follow a Discernible Distribution at 5% Significance Level											
2494												
2495	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2496					Order of Statistic, r	113				95% UTL with 95% Coverage		329
2497					Approx, f used to compute achieved CC	1.487				Approximate Actual Confidence Coefficient achieved by UTL		0.837
2498					Approximate Sample Size needed to achieve specified CC	153				95% UPL		326.3
2499					95% USL	358				95% KM Chebyshev UPL		416
2500												
2501	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2502	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2503	and consists of observations collected from clean unimpacted locations.											
2504	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2505	represents a background data set and when many onsite observations need to be compared with the BTV.											
2506												
2507	SPEC. COND., LAB (umhos/cm)											
2508												
2509	General Statistics											
2510					Total Number of Observations	124				Number of Missing Observations		6
2511					Number of Distinct Observations	46						
2512					Number of Detects	121				Number of Non-Detects		3
2513					Number of Distinct Detects	46				Number of Distinct Non-Detects		2
2514					Minimum Detect	218				Minimum Non-Detect		260
2515					Maximum Detect	310				Maximum Non-Detect		270
2516					Variance Detected	302.6				Percent Non-Detects		2.419%
2517					Mean Detected	271.9				SD Detected		17.4
2518					Mean of Detected Logged Data	5.603				SD of Detected Logged Data		0.0654
2519												
2520	Critical Values for Background Threshold Values (BTVs)											
2521					Tolerance Factor K (For UTL)	1.892				d2max (for USL)		3.281
2522												
2523	Normal GOF Test on Detects Only											
2524					Shapiro Wilk Test Statistic	0.965				Normal GOF Test on Detected Observations Only		
2525					5% Shapiro Wilk P Value	0.0346				Data Not Normal at 5% Significance Level		
2526					Lilliefors Test Statistic	0.0991				Lilliefors GOF Test		
2527					5% Lilliefors Critical Value	0.0809				Data Not Normal at 5% Significance Level		
2528	Data Not Normal at 5% Significance Level											
2529												
2530	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
2531					KM Mean	271.4					KM SD	17.53
2532					95% UTL95% Coverage	304.6				95% KM UPL (t)		300.6
2533					90% KM Percentile (z)	293.9				95% KM Percentile (z)		300.3
2534					99% KM Percentile (z)	312.2				95% KM USL		329
2535												
2536	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2537					Mean	268.6					SD	27.43
2538					95% UTL95% Coverage	320.5				95% UPL (t)		314.2
2539					90% Percentile (z)	303.7				95% Percentile (z)		313.7
2540					99% Percentile (z)	332.4				95% USL		358.6
2541	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2542												
2543	Gamma GOF Tests on Detected Observations Only											
2544					A-D Test Statistic	1.25					Anderson-Darling GOF Test	
2545					5% A-D Critical Value	0.75					Data Not Gamma Distributed at 5% Significance Level	
2546					K-S Test Statistic	0.108					Kolmogorov-Smirnov GOF	
2547					5% K-S Critical Value	0.0838					Data Not Gamma Distributed at 5% Significance Level	
2548	Data Not Gamma Distributed at 5% Significance Level											
2549												
2550	Gamma Statistics on Detected Data Only											
2551					k hat (MLE)	239.8				k star (bias corrected MLE)		233.9
2552					Theta hat (MLE)	1.134				Theta star (bias corrected MLE)		1.163
2553					nu hat (MLE)	58033				nu star (bias corrected)		56596
2554					MLE Mean (bias corrected)	271.9						
2555					MLE Sd (bias corrected)	17.78				95% Percentile of Chisquare (2kstar)		519.2
2556												
2557	Gamma ROS Statistics using Imputed Non-Detects											
2558	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2559	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)											
2560	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2561	This is especially true when the sample size is small.											
2562	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2563					Minimum	218				Mean		271.5
2564					Maximum	310				Median		270
2565					SD	17.44				CV		0.0642
2566					k hat (MLE)	238.4				k star (bias corrected MLE)		232.6
2567					Theta hat (MLE)	1.139				Theta star (bias corrected MLE)		1.167
2568					nu hat (MLE)	59121				nu star (bias corrected)		57692
2569					MLE Mean (bias corrected)	271.5				MLE Sd (bias corrected)		17.8
2570					95% Percentile of Chisquare (2kstar)	516.5				90% Percentile		294.5
2571					95% Percentile	301.4				99% Percentile		314.6
2572	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2573	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2574						WH					WH	HW
2575	% Approx. Gamma UTL with 95% Coverage				305.9					95% Approx. Gamma UPL	301.5	301.7
2576	95% Gamma USL				333.2							
2577												
2578	Estimates of Gamma Parameters using KM Estimates											
2579					Mean (KM)	271.4				SD (KM)		17.53
2580					Variance (KM)	307.2				SE of Mean (KM)		1.591
2581					k hat (KM)	239.8				k star (KM)		234
2582					nu hat (KM)	59482				nu star (KM)		58044
2583					theta hat (KM)	1.132				theta star (KM)		1.16
2584					80% gamma percentile (KM)	286.3				90% gamma percentile (KM)		294.4
2585					95% gamma percentile (KM)	301.3				99% gamma percentile (KM)		314.4

	A	B	C	D	E	F	G	H	I	J	K	L
2586												
2587	The following statistics are computed using gamma distribution and KM estimates											
2588	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2589					WH	HW				WH	HW	
2590	% Approx. Gamma UTL with 95% Coverage				306	306.2			95% Approx. Gamma UPL		301.7	301.8
2591	95% KM Gamma Percentile				301.3	301.5			95% Gamma USL		333.6	334.2
2592												
2593	Lognormal GOF Test on Detected Observations Only											
2594					Shapiro Wilk Approximate Test Statistic	0.953			Shapiro Wilk GOF Test			
2595					5% Shapiro Wilk P Value	0.00135			Data Not Lognormal at 5% Significance Level			
2596					Lilliefors Test Statistic	0.113			Lilliefors GOF Test			
2597					5% Lilliefors Critical Value	0.0809			Data Not Lognormal at 5% Significance Level			
2598	Data Not Lognormal at 5% Significance Level											
2599												
2600	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2601					Mean in Original Scale	271.5			Mean in Log Scale		5.602	
2602					SD in Original Scale	17.44			SD in Log Scale		0.0655	
2603					95% UTL95% Coverage	306.7			95% BCA UTL95% Coverage		303	
2604					95% Bootstrap (%) UTL95% Coverage	306.4			95% UPL (t)		302.1	
2605					90% Percentile (z)	294.6			95% Percentile (z)		301.7	
2606					99% Percentile (z)	315.5			95% USL		335.9	
2607												
2608	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2609					KM Mean of Logged Data	5.602			95% KM UTL (Lognormal)95% Coverage		306.9	
2610					KM SD of Logged Data	0.066			95% KM UPL (Lognormal)		302.3	
2611					95% KM Percentile Lognormal (z)	301.9			95% KM USL (Lognormal)		336.3	
2612												
2613	Background DL/2 Statistics Assuming Lognormal Distribution											
2614					Mean in Original Scale	268.6			Mean in Log Scale		5.586	
2615					SD in Original Scale	27.43			SD in Log Scale		0.127	
2616					95% UTL95% Coverage	339.4			95% UPL (t)		329.7	
2617					90% Percentile (z)	314			95% Percentile (z)		328.9	
2618					99% Percentile (z)	358.7			95% USL		405	
2619	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2620												
2621	Nonparametric Distribution Free Background Statistics											
2622	Data do not follow a Discernible Distribution (0.05)											
2623												
2624	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2625					Order of Statistic, r	121			95% UTL with95% Coverage		307	
2626					Approx, f used to compute achieved CC	1.592			Approximate Actual Confidence Coefficient achieved by UTL		0.872	
2627					Approximate Sample Size needed to achieve specified CC	153			95% UPL		299.3	
2628					95% USL	310			95% KM Chebyshev UPL		348.1	
2629												
2630	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2631	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2632	and consists of observations collected from clean unimpacted locations.											
2633	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2634	represents a background data set and when many onsite observations need to be compared with the BTV.											
2635												
2636	SULFATE (mg/L)											
2637												
2638	General Statistics											
2639					Total Number of Observations	89			Number of Missing Observations		41	
2640					Number of Distinct Observations	17						

	A	B	C	D	E	F	G	H	I	J	K	L
2641					Number of Detects	29				Number of Non-Detects		60
2642					Number of Distinct Detects	16				Number of Distinct Non-Detects		2
2643					Minimum Detect	1.1				Minimum Non-Detect		2
2644					Maximum Detect	4.4				Maximum Non-Detect		5
2645					Variance Detected	0.434				Percent Non-Detects		67.42%
2646					Mean Detected	1.869				SD Detected		0.659
2647					Mean of Detected Logged Data	0.577				SD of Detected Logged Data		0.305
2648												
2649	Critical Values for Background Threshold Values (BTVs)											
2650					Tolerance Factor K (For UTL)	1.942				d2max (for USL)		3.169
2651												
2652	Normal GOF Test on Detects Only											
2653					Shapiro Wilk Test Statistic	0.815				Shapiro Wilk GOF Test		
2654					5% Shapiro Wilk Critical Value	0.926				Data Not Normal at 5% Significance Level		
2655					Lilliefors Test Statistic	0.141				Lilliefors GOF Test		
2656					5% Lilliefors Critical Value	0.161				Detected Data appear Normal at 5% Significance Level		
2657	Detected Data appear Approximate Normal at 5% Significance Level											
2658												
2659	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2660					KM Mean	1.767				KM SD		0.602
2661					95% UTL95% Coverage	2.936				95% KM UPL (t)		2.773
2662					90% KM Percentile (z)	2.538				95% KM Percentile (z)		2.757
2663					99% KM Percentile (z)	3.168				95% KM USL		3.675
2664												
2665	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2666					Mean	2.143				SD		0.608
2667					95% UTL95% Coverage	3.324				95% UPL (t)		3.16
2668					90% Percentile (z)	2.922				95% Percentile (z)		3.143
2669					99% Percentile (z)	3.558				95% USL		4.071
2670	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2671												
2672	Gamma GOF Tests on Detected Observations Only											
2673					A-D Test Statistic	0.776				Anderson-Darling GOF Test		
2674					5% A-D Critical Value	0.746				Data Not Gamma Distributed at 5% Significance Level		
2675					K-S Test Statistic	0.164				Kolmogorov-Smirnov GOF		
2676					5% K-S Critical Value	0.162				Data Not Gamma Distributed at 5% Significance Level		
2677	Data Not Gamma Distributed at 5% Significance Level											
2678												
2679	Gamma Statistics on Detected Data Only											
2680					k hat (MLE)	10.49				k star (bias corrected MLE)		9.424
2681					Theta hat (MLE)	0.178				Theta star (bias corrected MLE)		0.198
2682					nu hat (MLE)	608.2				nu star (bias corrected)		546.6
2683					MLE Mean (bias corrected)	1.869						
2684					MLE Sd (bias corrected)	0.609				95% Percentile of Chisquare (2kstar)		29.95
2685												
2686	Gamma ROS Statistics using Imputed Non-Detects											
2687	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2688	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)											
2689	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2690	This is especially true when the sample size is small.											
2691	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2692					Minimum	0.708				Mean		1.762
2693					Maximum	4.4				Median		1.647
2694					SD	0.593				CV		0.336
2695					k hat (MLE)	9.744				k star (bias corrected MLE)		9.423

	A	B	C	D	E	F	G	H	I	J	K	L
2696					Theta hat (MLE)	0.181				Theta star (bias corrected MLE)		0.187
2697					nu hat (MLE)	1734				nu star (bias corrected)		1677
2698					MLE Mean (bias corrected)	1.762				MLE Sd (bias corrected)		0.574
2699					95% Percentile of Chisquare (2kstar)	29.95				90% Percentile		2.526
2700					95% Percentile	2.8				99% Percentile		3.364
2701	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2702	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2703					WH	HW				WH	HW	
2704	% Approx. Gamma UTL with 95% Coverage				3.022	3.046			95% Approx. Gamma UPL		2.807	2.821
2705		95% Gamma USL			4.133	4.239						
2706												
2707	Estimates of Gamma Parameters using KM Estimates											
2708					Mean (KM)	1.767				SD (KM)		0.602
2709					Variance (KM)	0.363				SE of Mean (KM)		0.101
2710					k hat (KM)	8.608				k star (KM)		8.326
2711					nu hat (KM)	1532				nu star (KM)		1482
2712					theta hat (KM)	0.205				theta star (KM)		0.212
2713					80% gamma percentile (KM)	2.251				90% gamma percentile (KM)		2.583
2714					95% gamma percentile (KM)	2.879				99% gamma percentile (KM)		3.493
2715												
2716	The following statistics are computed using gamma distribution and KM estimates											
2717	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2718					WH	HW				WH	HW	
2719	% Approx. Gamma UTL with 95% Coverage				2.921	2.924			95% Approx. Gamma UPL		2.726	2.724
2720		95% KM Gamma Percentile			2.708	2.705			95% Gamma USL		3.92	3.972
2721												
2722	Lognormal GOF Test on Detected Observations Only											
2723					Shapiro Wilk Test Statistic	0.93				Shapiro Wilk GOF Test		
2724					5% Shapiro Wilk Critical Value	0.926				Detected Data appear Lognormal at 5% Significance Level		
2725					Lilliefors Test Statistic	0.164				Lilliefors GOF Test		
2726					5% Lilliefors Critical Value	0.161				Data Not Lognormal at 5% Significance Level		
2727	Detected Data appear Approximate Lognormal at 5% Significance Level											
2728												
2729	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2730					Mean in Original Scale	1.764				Mean in Log Scale		0.525
2731					SD in Original Scale	0.552				SD in Log Scale		0.288
2732					95% UTL95% Coverage	2.957				95% BCA UTL95% Coverage		2.996
2733					95% Bootstrap (%) UTL95% Coverage	2.896				95% UPL (t)		2.735
2734					90% Percentile (z)	2.445				95% Percentile (z)		2.714
2735					99% Percentile (z)	3.302				95% USL		4.208
2736												
2737	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2738					KM Mean of Logged Data	0.524				95% KM UTL (Lognormal)95% Coverage		2.943
2739					KM SD of Logged Data	0.286				95% KM UPL (Lognormal)		2.724
2740					95% KM Percentile Lognormal (z)	2.703				95% KM USL (Lognormal)		4.179
2741												
2742	Background DL/2 Statistics Assuming Lognormal Distribution											
2743					Mean in Original Scale	2.143				Mean in Log Scale		0.713
2744					SD in Original Scale	0.608				SD in Log Scale		0.334
2745					95% UTL95% Coverage	3.903				95% UPL (t)		3.566
2746					90% Percentile (z)	3.13				95% Percentile (z)		3.534
2747					99% Percentile (z)	4.438				95% USL		5.881
2748	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2749												
2750	Nonparametric Distribution Free Background Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
2751	Data appear to follow a Discernible Distribution at 5% Significance Level											
2752												
2753	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2754	Order of Statistic, r				87		95% UTL with 95% Coverage				5	
2755	Approx, f used to compute achieved CC				1.526		Approximate Actual Confidence Coefficient achieved by UTL				0.828	
2756	Approximate Sample Size needed to achieve specified CC				124		95% UPL				5	
2757	95% USL				5		95% KM Chebyshev UPL				4.406	
2758												
2759	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2760	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2761	and consists of observations collected from clean unimpacted locations.											
2762	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2763	represents a background data set and when many onsite observations need to be compared with the BTV.											
2764												
2765	Total Dissolved Solids (mg/L)											
2766												
2767	General Statistics											
2768	Total Number of Observations				102		Number of Distinct Observations				63	
2769							Number of Missing Observations				28	
2770	Minimum				127		First Quartile				180.3	
2771	Second Largest				286		Median				200	
2772	Maximum				294		Third Quartile				227.5	
2773	Mean				202.5		SD				33.69	
2774	Coefficient of Variation				0.166		Skewness				0.273	
2775	Mean of logged Data				5.297		SD of logged Data				0.168	
2776												
2777	Critical Values for Background Threshold Values (BTVs)											
2778	Tolerance Factor K (For UTL)				1.92		d2max (for USL)				3.216	
2779												
2780	Normal GOF Test											
2781	Shapiro Wilk Test Statistic				0.98		Normal GOF Test					
2782	5% Shapiro Wilk P Value				0.543		Data appear Normal at 5% Significance Level					
2783	Lilliefors Test Statistic				0.0839		Lilliefors GOF Test					
2784	5% Lilliefors Critical Value				0.088		Data appear Normal at 5% Significance Level					
2785	Data appear Normal at 5% Significance Level											
2786												
2787	Background Statistics Assuming Normal Distribution											
2788	95% UTL with 95% Coverage				267.2		90% Percentile (z)				245.6	
2789	95% UPL (t)				258.7		95% Percentile (z)				257.9	
2790	95% USL				310.8		99% Percentile (z)				280.8	
2791												
2792	Gamma GOF Test											
2793	A-D Test Statistic				0.249		Anderson-Darling Gamma GOF Test					
2794	5% A-D Critical Value				0.75		Detected data appear Gamma Distributed at 5% Significance Level					
2795	K-S Test Statistic				0.0618		Kolmogorov-Smirnov Gamma GOF Test					
2796	5% K-S Critical Value				0.0887		Detected data appear Gamma Distributed at 5% Significance Level					
2797	Detected data appear Gamma Distributed at 5% Significance Level											
2798												
2799	Gamma Statistics											
2800	k hat (MLE)				36.29		k star (bias corrected MLE)				35.23	
2801	Theta hat (MLE)				5.579		Theta star (bias corrected MLE)				5.747	
2802	nu hat (MLE)				7404		nu star (bias corrected)				7187	
2803	MLE Mean (bias corrected)				202.5		MLE Sd (bias corrected)				34.11	
2804												
2805	Background Statistics Assuming Gamma Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
2806			95% Wilson Hilferty (WH) Approx. Gamma UPL			262					90% Percentile	247.2
2807			95% Hawkins Wixley (HW) Approx. Gamma UPL			262.5					95% Percentile	261.6
2808			95% WH Approx. Gamma UTL with 95% Coverage			272.2					99% Percentile	290.1
2809			95% HW Approx. Gamma UTL with 95% Coverage			273						
2810			95% WH USL			329.1					95% HW USL	332.2
2811												
2812	Lognormal GOF Test											
2813			Shapiro Wilk Test Statistic			0.983		Shapiro Wilk Lognormal GOF Test				
2814			5% Shapiro Wilk P Value			0.658		Data appear Lognormal at 5% Significance Level				
2815			Lilliefors Test Statistic			0.0541		Lilliefors Lognormal GOF Test				
2816			5% Lilliefors Critical Value			0.088		Data appear Lognormal at 5% Significance Level				
2817	Data appear Lognormal at 5% Significance Level											
2818												
2819	Background Statistics assuming Lognormal Distribution											
2820			95% UTL with 95% Coverage			275.8					90% Percentile (z)	247.7
2821			95% UPL (t)			264.3					95% Percentile (z)	263.3
2822			95% USL			342.9					99% Percentile (z)	295.3
2823												
2824	Nonparametric Distribution Free Background Statistics											
2825	Data appear Normal at 5% Significance Level											
2826												
2827	Nonparametric Upper Limits for Background Threshold Values											
2828			Order of Statistic, r			100					95% UTL with 95% Coverage	272
2829			Approx, f used to compute achieved CC			1.754		Approximate Actual Confidence Coefficient achieved by UTL			0.89	
2830								Approximate Sample Size needed to achieve specified CC			124	
2831			95% Percentile Bootstrap UTL with 95% Coverage			271.9				95% BCA Bootstrap UTL with 95% Coverage	271.9	
2832			95% UPL			260.9					90% Percentile	246.6
2833			90% Chebyshev UPL			304					95% Percentile	259.9
2834			95% Chebyshev UPL			350					99% Percentile	285.9
2835			95% USL			294						
2836												
2837	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2838	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2839	and consists of observations collected from clean unimpacted locations.											
2840	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2841	represents a background data set and when many onsite observations need to be compared with the BTV.											
2842												
2843	TETRACHLOROETHENE (ug/L)											
2844												
2845	General Statistics											
2846			Total Number of Observations			130					Number of Missing Observations	0
2847			Number of Distinct Observations			1						
2848			Number of Detects			0					Number of Non-Detects	130
2849			Number of Distinct Detects			0					Number of Distinct Non-Detects	1
2850			Minimum Detect			N/A					Minimum Non-Detect	1
2851			Maximum Detect			N/A					Maximum Non-Detect	1
2852			Variance Detected			N/A					Percent Non-Detects	100%
2853			Mean Detected			N/A					SD Detected	N/A
2854			Mean of Detected Logged Data			N/A					SD of Detected Logged Data	N/A
2855												
2856	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
2857	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
2858	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
2859												
2860	The data set for variable TETRACHLOROETHENE (ug/L) was not processed!											

	A	B	C	D	E	F	G	H	I	J	K	L
2861												
2862												
2863	TOTAL ORGANIC CARBON (mg/L)											
2864												
2865	General Statistics											
2866	Total Number of Observations					125	Number of Missing Observations					5
2867	Number of Distinct Observations					16						
2868	Number of Detects					29	Number of Non-Detects					96
2869	Number of Distinct Detects					16	Number of Distinct Non-Detects					3
2870	Minimum Detect					0.5	Minimum Non-Detect					0.5
2871	Maximum Detect					1.6	Maximum Non-Detect					1.5
2872	Variance Detected					0.0885	Percent Non-Detects					76.8%
2873	Mean Detected					1.032	SD Detected					0.297
2874	Mean of Detected Logged Data					-0.0128	SD of Detected Logged Data					0.314
2875												
2876	Critical Values for Background Threshold Values (BTVs)											
2877	Tolerance Factor K (For UTL)					1.891	d2max (for USL)					3.284
2878												
2879	Normal GOF Test on Detects Only											
2880	Shapiro Wilk Test Statistic					0.962	Shapiro Wilk GOF Test					
2881	5% Shapiro Wilk Critical Value					0.926	Detected Data appear Normal at 5% Significance Level					
2882	Lilliefors Test Statistic					0.112	Lilliefors GOF Test					
2883	5% Lilliefors Critical Value					0.161	Detected Data appear Normal at 5% Significance Level					
2884	Detected Data appear Normal at 5% Significance Level											
2885												
2886	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2887	KM Mean					0.706	KM SD					0.257
2888	95% UTL95% Coverage					1.193	95% KM UPL (t)					1.134
2889	90% KM Percentile (z)					1.036	95% KM Percentile (z)					1.129
2890	99% KM Percentile (z)					1.305	95% KM USL					1.551
2891												
2892	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2893	Mean					0.614	SD					0.279
2894	95% UTL95% Coverage					1.141	95% UPL (t)					1.078
2895	90% Percentile (z)					0.971	95% Percentile (z)					1.072
2896	99% Percentile (z)					1.262	95% USL					1.53
2897	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2898												
2899	Gamma GOF Tests on Detected Observations Only											
2900	A-D Test Statistic					0.581	Anderson-Darling GOF Test					
2901	5% A-D Critical Value					0.745	Detected data appear Gamma Distributed at 5% Significance Level					
2902	K-S Test Statistic					0.152	Kolmogorov-Smirnov GOF					
2903	5% K-S Critical Value					0.162	Detected data appear Gamma Distributed at 5% Significance Level					
2904	Detected data appear Gamma Distributed at 5% Significance Level											
2905												
2906	Gamma Statistics on Detected Data Only											
2907	k hat (MLE)					11.36	k star (bias corrected MLE)					10.21
2908	Theta hat (MLE)					0.0909	Theta star (bias corrected MLE)					0.101
2909	nu hat (MLE)					658.8	nu star (bias corrected)					592
2910	MLE Mean (bias corrected)					1.032						
2911	MLE Sd (bias corrected)					0.323	95% Percentile of Chisquare (2kstar)					31.93
2912												
2913	Gamma ROS Statistics using Imputed Non-Detects											
2914	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2915	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)											

	A	B	C	D	E	F	G	H	I	J	K	L
2916	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2917	This is especially true when the sample size is small.											
2918	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2919		Minimum	0.01							Mean	0.644	
2920		Maximum	1.6							Median	0.603	
2921		SD	0.329							CV	0.51	
2922		k hat (MLE)	3.056							k star (bias corrected MLE)	2.988	
2923		Theta hat (MLE)	0.211							Theta star (bias corrected MLE)	0.216	
2924		nu hat (MLE)	764							nu star (bias corrected)	747	
2925		MLE Mean (bias corrected)	0.644							MLE Sd (bias corrected)	0.373	
2926		95% Percentile of Chisquare (2kstar)	12.56							90% Percentile	1.144	
2927		95% Percentile	1.354							99% Percentile	1.809	
2928	The following statistics are computed using Gamma ROS Statistics on Imputed Data											
2929	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2930			WH			HW					WH	HW
2931	% Approx. Gamma UTL with 95% Coverage		1.492			1.564			95% Approx. Gamma UPL		1.351	1.404
2932		95% Gamma USL	2.568			2.869						
2933												
2934	Estimates of Gamma Parameters using KM Estimates											
2935		Mean (KM)	0.706							SD (KM)	0.257	
2936		Variance (KM)	0.0662							SE of Mean (KM)	0.0348	
2937		k hat (KM)	7.527							k star (KM)	7.352	
2938		nu hat (KM)	1882							nu star (KM)	1838	
2939		theta hat (KM)	0.0938							theta star (KM)	0.096	
2940		80% gamma percentile (KM)	0.911							90% gamma percentile (KM)	1.053	
2941		95% gamma percentile (KM)	1.182							99% gamma percentile (KM)	1.448	
2942												
2943	The following statistics are computed using gamma distribution and KM estimates											
2944	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
2945			WH			HW					WH	HW
2946	% Approx. Gamma UTL with 95% Coverage		1.204			1.207			95% Approx. Gamma UPL		1.13	1.131
2947		95% KM Gamma Percentile	1.124			1.124			95% Gamma USL		1.727	1.762
2948												
2949	Lognormal GOF Test on Detected Observations Only											
2950		Shapiro Wilk Test Statistic	0.936							Shapiro Wilk GOF Test		
2951		5% Shapiro Wilk Critical Value	0.926							Detected Data appear Lognormal at 5% Significance Level		
2952		Lilliefors Test Statistic	0.171							Lilliefors GOF Test		
2953		5% Lilliefors Critical Value	0.161							Data Not Lognormal at 5% Significance Level		
2954	Detected Data appear Approximate Lognormal at 5% Significance Level											
2955												
2956	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
2957		Mean in Original Scale	0.677							Mean in Log Scale	-0.474	
2958		SD in Original Scale	0.287							SD in Log Scale	0.412	
2959		95% UTL95% Coverage	1.357							95% BCA UTL95% Coverage	1.2	
2960		95% Bootstrap (%) UTL95% Coverage	1.4							95% UPL (t)	1.235	
2961		90% Percentile (z)	1.055							95% Percentile (z)	1.226	
2962		99% Percentile (z)	1.623							95% USL	2.409	
2963												
2964	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
2965		KM Mean of Logged Data	-0.403							95% KM UTL (Lognormal)95% Coverage	1.218	
2966		KM SD of Logged Data	0.318							95% KM UPL (Lognormal)	1.133	
2967		95% KM Percentile Lognormal (z)	1.127							95% KM USL (Lognormal)	1.896	
2968												
2969	Background DL/2 Statistics Assuming Lognormal Distribution											
2970		Mean in Original Scale	0.614							Mean in Log Scale	-0.568	

	A	B	C	D	E	F	G	H	I	J	K	L
2971					SD in Original Scale	0.279				SD in Log Scale		0.38
2972					95% UTL95% Coverage	1.163				95% UPL (t)		1.067
2973					90% Percentile (z)	0.923				95% Percentile (z)		1.059
2974					99% Percentile (z)	1.372				95% USL		1.975
2975	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
2976												
2977	Nonparametric Distribution Free Background Statistics											
2978	Data appear to follow a Discernible Distribution at 5% Significance Level											
2979												
2980	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
2981					Order of Statistic, r	122				95% UTL with95% Coverage		1.5
2982					Approx, f used to compute achieved CC	1.605				Approximate Actual Confidence Coefficient achieved by UTL		0.876
2983					Approximate Sample Size needed to achieve specified CC	153				95% UPL		1.4
2984					95% USL	1.6				95% KM Chebyshev UPL		1.832
2985												
2986	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2987	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2988	and consists of observations collected from clean unimpacted locations.											
2989	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2990	represents a background data set and when many onsite observations need to be compared with the BTV.											
2991												
2992	TOLUENE (mg/)											
2993												
2994	General Statistics											
2995					Total Number of Observations	128				Number of Missing Observations		2
2996					Number of Distinct Observations	1						
2997					Number of Detects	0				Number of Non-Detects		128
2998					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
2999					Minimum Detect	N/A				Minimum Non-Detect		1
3000					Maximum Detect	N/A				Maximum Non-Detect		1
3001					Variance Detected	N/A				Percent Non-Detects		100%
3002					Mean Detected	N/A				SD Detected		N/A
3003					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
3004												
3005	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3006	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3007	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3008												
3009	The data set for variable TOLUENE (mg/) was not processed!											
3010												
3011												
3012	TOTAL PHENOLICS (mg/L)											
3013												
3014	General Statistics											
3015					Total Number of Observations	126				Number of Missing Observations		4
3016					Number of Distinct Observations	4						
3017					Number of Detects	2				Number of Non-Detects		124
3018					Number of Distinct Detects	2				Number of Distinct Non-Detects		3
3019					Minimum Detect	0.009				Minimum Non-Detect		0.005
3020					Maximum Detect	0.01				Maximum Non-Detect		0.03
3021					Variance Detected	5.0000E-7				Percent Non-Detects		98.41%
3022					Mean Detected	0.0095				SD Detected		7.0711E-4
3023					Mean of Detected Logged Data	-4.658				SD of Detected Logged Data		0.0745
3024												
3025	Warning: Data set has only 2 Detected Values.											

	A	B	C	D	E	F	G	H	I	J	K	L
3026	This is not enough to compute meaningful or reliable statistics and estimates.											
3027												
3028												
3029	Critical Values for Background Threshold Values (BTVs)											
3030	Tolerance Factor K (For UTL)					1.89	d2max (for USL)					3.287
3031												
3032	Normal GOF Test on Detects Only											
3033	Not Enough Data to Perform GOF Test											
3034												
3035	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
3036	KM Mean				0.00532	KM SD				0.00113		
3037	95% UTL95% Coverage				0.00747	95% KM UPL (t)				0.00721		
3038	90% KM Percentile (z)				0.00678	95% KM Percentile (z)				0.00719		
3039	99% KM Percentile (z)				0.00796	95% KM USL				0.00905		
3040												
3041	DL/2 Substitution Background Statistics Assuming Normal Distribution											
3042	Mean				0.0109	SD				0.00531		
3043	95% UTL95% Coverage				0.021	95% UPL (t)				0.0198		
3044	90% Percentile (z)				0.0177	95% Percentile (z)				0.0197		
3045	99% Percentile (z)				0.0233	95% USL				0.0284		
3046	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
3047												
3048	Gamma GOF Tests on Detected Observations Only											
3049	Not Enough Data to Perform GOF Test											
3050												
3051	Gamma Statistics on Detected Data Only											
3052	k hat (MLE)			360.7	k star (bias corrected MLE)			N/A				
3053	Theta hat (MLE)			2.6340E-5	Theta star (bias corrected MLE)			N/A				
3054	nu hat (MLE)			1443	nu star (bias corrected)			N/A				
3055	MLE Mean (bias corrected)			N/A								
3056	MLE Sd (bias corrected)			N/A	95% Percentile of Chisquare (2kstar)			N/A				
3057												
3058	Estimates of Gamma Parameters using KM Estimates											
3059	Mean (KM)			0.00532	SD (KM)			0.00113				
3060	Variance (KM)			1.2877E-6	SE of Mean (KM)			3.2990E-4				
3061	k hat (KM)			21.99	k star (KM)			21.48				
3062	nu hat (KM)			5542	nu star (KM)			5412				
3063	theta hat (KM)			2.4196E-4	theta star (KM)			2.4780E-4				
3064	80% gamma percentile (KM)			0.00626	90% gamma percentile (KM)			0.00684				
3065	95% gamma percentile (KM)			0.00734	99% gamma percentile (KM)			0.00835				
3066												
3067	The following statistics are computed using gamma distribution and KM estimates											
3068	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods											
3069		WH			HW			WH	HW			
3070	% Approx. Gamma UTL with 95% Coverage	0.00724			0.00722			95% Approx. Gamma UPL	0.00698	0.00696		
3071	95% KM Gamma Percentile	0.00696			0.00693			95% Gamma USL	0.00899	0.00898		
3072												
3073	Lognormal GOF Test on Detected Observations Only											
3074	Not Enough Data to Perform GOF Test											
3075												
3076	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects											
3077	Mean in Original Scale			0.00695	Mean in Log Scale			-4.981				
3078	SD in Original Scale			0.00107	SD in Log Scale			0.153				
3079	95% UTL95% Coverage			0.00918	95% BCA UTL95% Coverage			0.00912				
3080	95% Bootstrap (%) UTL95% Coverage			0.00916	95% UPL (t)			0.00886				

	A	B	C	D	E	F	G	H	I	J	K	L
3081					90% Percentile (z)	0.00836				95% Percentile (z)		0.00884
3082					99% Percentile (z)	0.00981				95% USL		0.0114
3083												
3084	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
3085					KM Mean of Logged Data	-5.252				95% KM UTL (Lognormal)	95% Coverage	0.00713
3086					KM SD of Logged Data	0.163				95% KM UPL (Lognormal)		0.00687
3087					95% KM Percentile Lognormal (z)	0.00685				95% KM USL (Lognormal)		0.00896
3088												
3089	Background DL/2 Statistics Assuming Lognormal Distribution											
3090					Mean in Original Scale	0.0109				Mean in Log Scale		-4.702
3091					SD in Original Scale	0.00531				SD in Log Scale		0.683
3092					95% UTL	95% Coverage	0.033			95% UPL (t)		0.0283
3093					90% Percentile (z)	0.0218				95% Percentile (z)		0.0279
3094					99% Percentile (z)	0.0445				95% USL		0.0856
3095	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
3096												
3097	Nonparametric Distribution Free Background Statistics											
3098	Data do not follow a Discernible Distribution (0.05)											
3099												
3100	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
3101					Order of Statistic, r	123				95% UTL with	95% Coverage	0.03
3102					Approx, f used to compute achieved CC	1.618				Approximate Actual Confidence Coefficient achieved by UTL		0.88
3103					Approximate Sample Size needed to achieve specified CC	153				95% UPL		0.03
3104					95% USL	0.03				95% KM Chebyshev UPL		0.0103
3105												
3106	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
3107	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
3108	and consists of observations collected from clean unimpacted locations.											
3109	The use of USL tends to provide a balance between false positives and false negatives provided the data											
3110	represents a background data set and when many onsite observations need to be compared with the BTV.											
3111												
3112	TRANS 1,2-DICHLOROETHENE (ug/L)											
3113												
3114	General Statistics											
3115					Total Number of Observations	130				Number of Missing Observations		0
3116					Number of Distinct Observations	1						
3117					Number of Detects	0				Number of Non-Detects		130
3118					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
3119					Minimum Detect	N/A				Minimum Non-Detect		1
3120					Maximum Detect	N/A				Maximum Non-Detect		1
3121					Variance Detected	N/A				Percent Non-Detects		100%
3122					Mean Detected	N/A				SD Detected		N/A
3123					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
3124												
3125	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3126	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3127	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3128												
3129	The data set for variable TRANS 1,2-DICHLOROETHENE (ug/L) was not processed!											
3130												
3131												
3132	TRICHLOROETHENE (ug/L)											
3133												
3134	General Statistics											
3135					Total Number of Observations	130				Number of Missing Observations		0

	A	B	C	D	E	F	G	H	I	J	K	L
3136	Number of Distinct Observations					1						
3137	Number of Detects					0	Number of Non-Detects					130
3138	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
3139	Minimum Detect					N/A	Minimum Non-Detect					1
3140	Maximum Detect					N/A	Maximum Non-Detect					1
3141	Variance Detected					N/A	Percent Non-Detects					100%
3142	Mean Detected					N/A	SD Detected					N/A
3143	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3144												
3145	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3146	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3147	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3148												
3149	The data set for variable TRICHLOROETHENE (ug/L) was not processed!											
3150												
3151												
3152	TURBIDITY (NTU)											
3153												
3154	General Statistics											
3155	Total Number of Observations					108	Number of Missing Observations					22
3156	Number of Distinct Observations					104						
3157	Number of Detects					105	Number of Non-Detects					3
3158	Number of Distinct Detects					101	Number of Distinct Non-Detects					3
3159	Minimum Detect					1.23	Minimum Non-Detect					2.5
3160	Maximum Detect					169	Maximum Non-Detect					3.6
3161	Variance Detected					1703	Percent Non-Detects					2.778%
3162	Mean Detected					39.32	SD Detected					41.27
3163	Mean of Detected Logged Data					2.984	SD of Detected Logged Data					1.327
3164												
3165	Critical Values for Background Threshold Values (BTVs)											
3166	Tolerance Factor K (For UTL)					1.912	d2max (for USL)					3.236
3167												
3168	Normal GOF Test on Detects Only											
3169	Shapiro Wilk Test Statistic					0.817	Normal GOF Test on Detected Observations Only					
3170	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
3171	Lilliefors Test Statistic					0.185	Lilliefors GOF Test					
3172	5% Lilliefors Critical Value					0.0867	Data Not Normal at 5% Significance Level					
3173	Data Not Normal at 5% Significance Level											
3174												
3175	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
3176	KM Mean					38.28	KM SD					40.96
3177	95% UTL95% Coverage					116.6	95% KM UPL (t)					106.6
3178	90% KM Percentile (z)					90.77	95% KM Percentile (z)					105.7
3179	99% KM Percentile (z)					133.6	95% KM USL					170.8
3180												
3181	DL/2 Substitution Background Statistics Assuming Normal Distribution											
3182	Mean					38.27	SD					41.16
3183	95% UTL95% Coverage					117	95% UPL (t)					106.9
3184	90% Percentile (z)					91.02	95% Percentile (z)					106
3185	99% Percentile (z)					134	95% USL					171.4
3186	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
3187												
3188	Gamma GOF Tests on Detected Observations Only											
3189	A-D Test Statistic					0.868	Anderson-Darling GOF Test					
3190	5% A-D Critical Value					0.79	Data Not Gamma Distributed at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
3191	K-S Test Statistic					0.0794	Kolmogorov-Smirnov GOF						
3192	5% K-S Critical Value					0.0913	Detected data appear Gamma Distributed at 5% Significance Level						
3193	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
3194													
3195	Gamma Statistics on Detected Data Only												
3196	k hat (MLE)					0.855	k star (bias corrected MLE)					0.837	
3197	Theta hat (MLE)					45.96	Theta star (bias corrected MLE)					46.95	
3198	nu hat (MLE)					179.7	nu star (bias corrected)					175.9	
3199	MLE Mean (bias corrected)					39.32							
3200	MLE Sd (bias corrected)					42.97	95% Percentile of Chisquare (2kstar)					5.345	
3201													
3202	Gamma ROS Statistics using Imputed Non-Detects												
3203	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
3204	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)												
3205	For such situations, GROS method may yield incorrect values of UCLs and BTVs												
3206	This is especially true when the sample size is small.												
3207	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
3208	Minimum					0.0456	Mean					38.24	
3209	Maximum					169	Median					23.25	
3210	SD					41.19	CV					1.077	
3211	k hat (MLE)					0.763	k star (bias corrected MLE)					0.748	
3212	Theta hat (MLE)					50.1	Theta star (bias corrected MLE)					51.1	
3213	nu hat (MLE)					164.9	nu star (bias corrected)					161.6	
3214	MLE Mean (bias corrected)					38.24	MLE Sd (bias corrected)					44.2	
3215	95% Percentile of Chisquare (2kstar)					4.973	90% Percentile					94.48	
3216	95% Percentile					127.1	99% Percentile					204.4	
3217	The following statistics are computed using Gamma ROS Statistics on Imputed Data												
3218	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
3219	WH					HW	WH					HW	
3220	% Approx. Gamma UTL with 95% Coverage					148	95% Approx. Gamma UPL					123.8	132.6
3221	95% Gamma USL					335.2							
3222													
3223	Estimates of Gamma Parameters using KM Estimates												
3224	Mean (KM)					38.28	SD (KM)					40.96	
3225	Variance (KM)					1678	SE of Mean (KM)					3.96	
3226	k hat (KM)					0.873	k star (KM)					0.855	
3227	nu hat (KM)					188.6	nu star (KM)					184.7	
3228	theta hat (KM)					43.83	theta star (KM)					44.76	
3229	80% gamma percentile (KM)					62.31	90% gamma percentile (KM)					91.58	
3230	95% gamma percentile (KM)					121.2	99% gamma percentile (KM)					190.9	
3231													
3232	The following statistics are computed using gamma distribution and KM estimates												
3233	Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods												
3234	WH					HW	WH					HW	
3235	% Approx. Gamma UTL with 95% Coverage					144.5	95% Approx. Gamma UPL					121.1	128.1
3236	95% KM Gamma Percentile					119.2	95% Gamma USL					323.3	398.7
3237													
3238	Lognormal GOF Test on Detected Observations Only												
3239	Shapiro Wilk Approximate Test Statistic					0.939	Shapiro Wilk GOF Test						
3240	5% Shapiro Wilk P Value					1.1593E-4	Data Not Lognormal at 5% Significance Level						
3241	Lilliefors Test Statistic					0.0771	Lilliefors GOF Test						
3242	5% Lilliefors Critical Value					0.0867	Detected Data appear Lognormal at 5% Significance Level						
3243	Detected Data appear Approximate Lognormal at 5% Significance Level												
3244													
3245	Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects												

	A	B	C	D	E	F	G	H	I	J	K	L
3246					Mean in Original Scale	38.29				Mean in Log Scale		2.924
3247					SD in Original Scale	41.14				SD in Log Scale		1.356
3248					95% UTL95% Coverage	248.8				95% BCA UTL95% Coverage		138.8
3249					95% Bootstrap (%) UTL95% Coverage	141.9				95% UPL (t)		178.5
3250					90% Percentile (z)	105.8				95% Percentile (z)		173.2
3251					99% Percentile (z)	436.5				95% USL		1498
3252												
3253	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
3254					KM Mean of Logged Data	2.917				95% KM UTL (Lognormal)95% Coverage		250
3255					KM SD of Logged Data	1.362				95% KM UPL (Lognormal)		179.1
3256					95% KM Percentile Lognormal (z)	173.8				95% KM USL (Lognormal)		1518
3257												
3258	Background DL/2 Statistics Assuming Lognormal Distribution											
3259					Mean in Original Scale	38.27				Mean in Log Scale		2.912
3260					SD in Original Scale	41.16				SD in Log Scale		1.377
3261					95% UTL95% Coverage	255.8				95% UPL (t)		182.6
3262					90% Percentile (z)	107.4				95% Percentile (z)		177.1
3263					99% Percentile (z)	452.7				95% USL		1583
3264	DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.											
3265												
3266	Nonparametric Distribution Free Background Statistics											
3267	Data appear to follow a Discernible Distribution at 5% Significance Level											
3268												
3269	Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)											
3270					Order of Statistic, r	106				95% UTL with95% Coverage		144
3271					Approx, f used to compute achieved CC	1.86				Approximate Actual Confidence Coefficient achieved by UTL		0.911
3272					Approximate Sample Size needed to achieve specified CC	124				95% UPL		127.2
3273					95% USL	169				95% KM Chebyshev UPL		217.6
3274												
3275	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
3276	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
3277	and consists of observations collected from clean unimpacted locations.											
3278	The use of USL tends to provide a balance between false positives and false negatives provided the data											
3279	represents a background data set and when many onsite observations need to be compared with the BTV.											
3280												
3281	VINYL CHLORIDE (ug/L)											
3282												
3283	General Statistics											
3284					Total Number of Observations	125				Number of Missing Observations		5
3285					Number of Distinct Observations	1						
3286					Number of Detects	0				Number of Non-Detects		125
3287					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
3288					Minimum Detect	N/A				Minimum Non-Detect		1
3289					Maximum Detect	N/A				Maximum Non-Detect		1
3290					Variance Detected	N/A				Percent Non-Detects		100%
3291					Mean Detected	N/A				SD Detected		N/A
3292					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
3293												
3294	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3295	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3296	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3297												
3298	The data set for variable VINYL CHLORIDE (ug/L) was not processed!											
3299												
3300												

	A	B	C	D	E	F	G	H	I	J	K	L
3301	TOTAL XYLENES (ug/L)											
3302												
3303	General Statistics											
3304	Total Number of Observations					127	Number of Missing Observations					3
3305	Number of Distinct Observations					4						
3306	Number of Detects					0	Number of Non-Detects					127
3307	Number of Distinct Detects					0	Number of Distinct Non-Detects					4
3308	Minimum Detect					N/A	Minimum Non-Detect					1
3309	Maximum Detect					N/A	Maximum Non-Detect					5
3310	Variance Detected					N/A	Percent Non-Detects					100%
3311	Mean Detected					N/A	SD Detected					N/A
3312	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
3313												
3314	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
3315	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
3316	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
3317												
3318	The data set for variable TOTAL XYLENES (ug/L) was not processed!											
3319												
3320												

ATTACHMENT 3

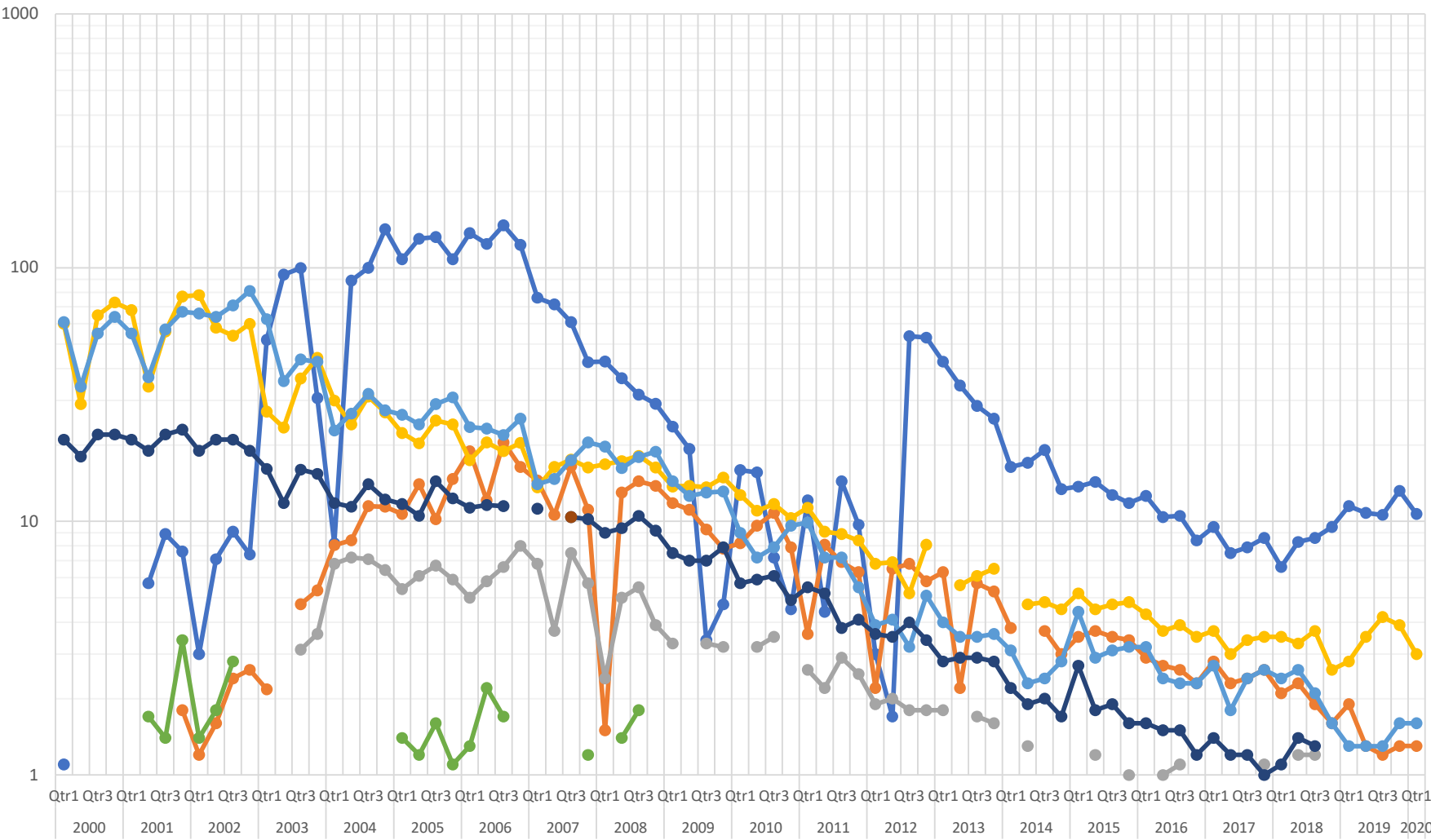
VOC TREND PLOTS



Parameter Flag

Max of Result

1,1-DICHLOROETHANE



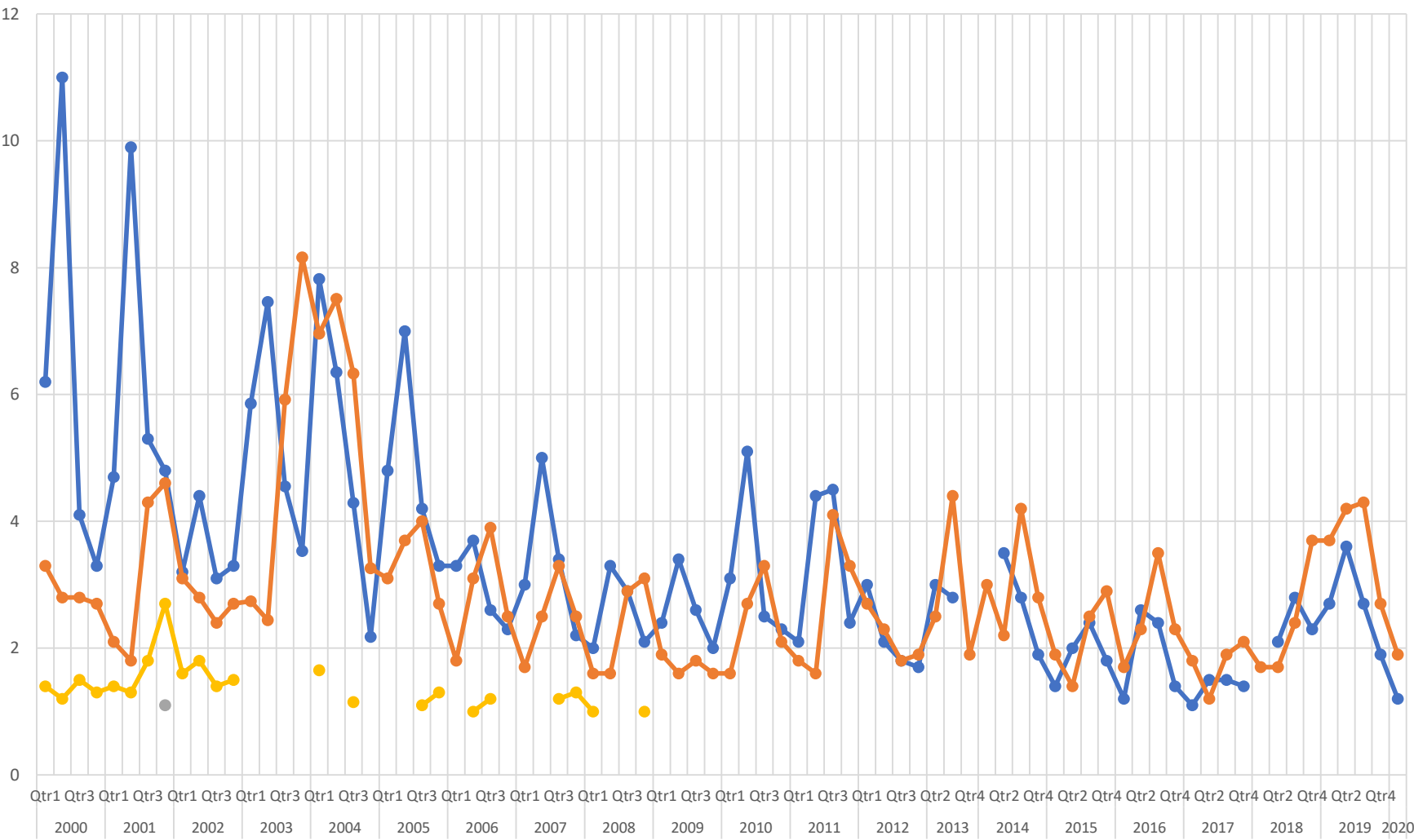
- Location
- CWMP002W
 - CWMP003W
 - CWMP004W
 - CWMP008W
 - CWMP009W
 - CWMP010W
 - CWMP012W
 - CWMP017S

Years Sample Date

Parameter Flag

Max of Result

BENZENE



Location

- CWMP008W
- CWMP009W
- CWMP010W
- CWMP012W

Years Sample Date



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
02/25/2020

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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: CWMP007W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor Township

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

Depth to Water Level: 5.68 ft Measured from: Land Surface TOC

Casing Stickup: 1.50 ft Elevation of Water Level: 447.72 ft./MSL

Sampling Depth: 33 ft Volume of Water Column: 45.26 gal

Total Well Depth: 36.5 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 2.4

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/20/2020 Sample Collection Time: 10:55

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3081690001 Final Lab Analysis Completion Date: 1/28/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP007W

Sample Date 1/20/2020

FORM 19
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES
ANALYTES

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

ANALYTE	VALUE ^T	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	14	SM18-2321
CALCIUM, TOTAL	17.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	61.1	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	8.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9.3	EPA 300.0
pH-FIELD (SU)	5.2	FIELD
pH-LAB (SU)	7.18	EPA 150.1
POTASSIUM, TOTAL	2.1	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	31.3	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	372	FIELD
SPEC. COND., LAB (umhos/cm)	375	EPA 120.1
SULFATE	21.7	EPA 300.0
ALKALINITY	14	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	212	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.67	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP007W

Sample Date 1/20/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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

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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 Township

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

Depth to Water Level: 28.84 ft Measured from: Land Surface TOC

Casing Stickup: 1.23 ft Elevation of Water Level: 486.29 ft./MSL

Sampling Depth: 57 ft Volume of Water Column: 55.02 gal

Total Well Depth: 66.3 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 2.0

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/20/2020 Sample Collection Time: 12:14

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3081690002 Final Lab Analysis Completion Date: 1/28/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP001W

Sample Date 1/20/2020

FORM 19
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES
ANALYTES

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

ANALYTE	VALUE ^T	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	5 ND	SM18-2321
CALCIUM, TOTAL	14.9	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	27.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	1200	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	10.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	55	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	19.5	EPA 300.0
pH-FIELD (SU)	5.14	FIELD
pH-LAB (SU)	7.08	EPA 150.1
POTASSIUM, TOTAL	2.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	12.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	275	FIELD
SPEC. COND., LAB (umhos/cm)	278	EPA 120.1
SULFATE	2.4	EPA 300.0
ALKALINITY	5 ND	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	188	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.65	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	18.4	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP001W

Sample Date 1/20/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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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 Township

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

Depth to Water Level: 63 ft Measured from: Land Surface TOC

Casing Stickup: -1.19 ft Elevation of Water Level: 462.81 ft./MSL

Sampling Depth: 85 ft Volume of Water Column: 54.34 gal

Total Well Depth: 100 ft Sampling Method: Pumped Bailed Grab

Well 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): 1/21/2020 Sample Collection Time: 12:29

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3081807001 Final Lab Analysis Completion Date: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP002W

Sample Date 1/21/2020

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	0.137	EPA 350.3
BICARBONATE	77	SM18-2321
CALCIUM, TOTAL	51.8	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	17	EPA 410.4
CHLORIDE	102	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	16.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	1100	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	3.4	EPA 300.0
pH-FIELD (SU)	5.65	FIELD
pH-LAB (SU)	5.99	EPA 150.1
POTASSIUM, TOTAL	2.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	27.5	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	607	FIELD
SPEC. COND., LAB (umhos/cm)	558	EPA 120.1
SULFATE	16.7	EPA 300.0
ALKALINITY	77	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	386	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.4	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. CWMP002W

Sample Date 1/21/2020

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

T Please indicate detection limit if analyte is not detected.



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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 Township

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

Depth to Water Level: 9.82 ft Measured from: Land Surface TOC

Casing Stickup: 2.53 ft Elevation of Water Level: 302.15 ft./MSL

Sampling Depth: 71 ft Volume of Water Column: _____ gal

Total Well Depth: 78.03 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 2.7

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

Spring Flow Rate: _____ gpm

Sample Date (mm/dd/yy): 1/22/2020 Sample Collection Time: 12:07

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082088001 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP016W

Sample Date 1/22/2020

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	0.103	EPA 350.3
BICARBONATE	12	SM18-2321
CALCIUM, TOTAL	5.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	2.9	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	350	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	1.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	8.8	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.6	EPA 300.0
pH-FIELD (SU)	5.36	FIELD
pH-LAB (SU)	6.64	EPA 150.1
POTASSIUM, TOTAL	0.56 ND	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	3.2	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	66	FIELD
SPEC. COND., LAB (umhos/cm)	57	EPA 120.1
SULFATE	11.6	EPA 300.0
ALKALINITY	12	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	22	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.76	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 1/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
02/25/2020

DEP USE ONLY

Date Received

FORM 19
MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

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 Township

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

Depth to Water Level: 8.51 ft Measured from: Land Surface TOC

Casing Stickup: 2.10 ft Elevation of Water Level: 352.39 ft./MSL

Sampling Depth: 17 ft Volume of Water Column: 7.24 gal

Total Well Depth: 19.6 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 1.8

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/22/2020 Sample Collection Time: 12:36

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082088002 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP010W

Sample Date 1/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****ANALYTES****1-Q. Inorganics (Enter all data in mg/l except as noted)**

ANALYTE	VALUE^T	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	187	SM18-2321
CALCIUM, TOTAL	45.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	242	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	300	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	40	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	110	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	10.2	EPA 300.0
pH-FIELD (SU)	6.24	FIELD
pH-LAB (SU)	6.94	EPA 150.1
POTASSIUM, TOTAL	6.7	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	151	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	1601	FIELD
SPEC. COND., LAB (umhos/cm)	1260	EPA 120.1
SULFATE	31.2	EPA 300.0
ALKALINITY	187	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	638	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	3.4	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.85	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP010W

Sample Date 1/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



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^o MM' SS.S")

Monitoring Point Number: CWMP009W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County

Municipality: Manor Township

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

Depth to Water Level: 8.98 ft Measured from: Land Surface TOC

Casing Stickup: 2.70 ft Elevation of Water Level: 395.22 ft./MSL

Sampling Depth: 16 ft Volume of Water Column: 7.00 gal

Total Well Depth: 19.7 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 5.2

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/22/2020 Sample Collection Time: 13:06

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082088003 Final Lab Analysis CompletionDate: 1/30/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP009W

Sample Date 1/22/2020

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	25.6	EPA 350.3
BICARBONATE	518	SM18-2321
CALCIUM, TOTAL	162	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	106	EPA 410.4
CHLORIDE	493	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	36000	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	76.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	12500	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.11	FIELD
pH-LAB (SU)	6.43	EPA 150.1
POTASSIUM, TOTAL	33.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	162	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2582	FIELD
SPEC. COND., LAB (umhos/cm)	2410	EPA 120.1
SULFATE	5.9	EPA 300.0
ALKALINITY	518	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1210	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	34.4	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	34.2	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

Remaining quarterly samples only require total metals analysis.

I.D. No 100008

Monitoring Point No. CWMP009W

Sample Date 1/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

ANALYTE	VALUE^T	ANALYSIS METHOD NUMBER
BENZENE	1.9	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	1.6	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.



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: CWMP008W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County

Municipality: Manor Township

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

Depth to Water Level: 2.35 ft Measured from: Land Surface TOC

Casing Stickup: 2.80 ft Elevation of Water Level: 419.95 ft./MSL

Sampling Depth: 19 ft Volume of Water Column: 3.34 gal

Total Well Depth: 22.8 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 5.9

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/22/2020 Sample Collection Time: 13:38

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082088004 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP008W

Sample Date 1/22/2020

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	6.37	EPA 350.3
BICARBONATE	350	SM18-2321
CALCIUM, TOTAL	65.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	23	EPA 410.4
CHLORIDE	33.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	25300	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	29.5	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	16200	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	0.2 ND	EPA 300.0
pH-FIELD (SU)	6.07	FIELD
pH-LAB (SU)	6.47	EPA 150.1
POTASSIUM, TOTAL	9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	35.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	840	FIELD
SPEC. COND., LAB (umhos/cm)	775	EPA 120.1
SULFATE	7.3	EPA 300.0
ALKALINITY	350	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	402	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	9.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	15.2	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP008W

Sample Date 1/22/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

ANALYTE	VALUE^T	ANALYSIS METHOD NUMBER
BENZENE	1.2	SW846 8260B
1,2-DIBROMOETHANE (EDB) (ETHYLENE D	1 ND	SW846 8260B
1,1-DICHLOROETHANE	3	SW846 8260B
1,1-DICHLOROETHENE	1 ND	SW846 8260B
1,2-DICHLOROETHANE	1 ND	SW846 8260B
cis 1,2-DICHLOROETHENE	1 ND	SW846 8260B
trans 1,2-DICHLOROETHENE	1 ND	SW846 8260B
ETHYLBENZENE	1 ND	SW846 8260B
METHYLENE CHLORIDE	1 ND	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

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: CWMP012W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County

Municipality: Manor Township

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

Depth to Water Level: 48.82 ft Measured from: Land Surface TOC

Casing Stickup: 1.90 ft Elevation of Water Level: 333.88 ft./MSL

Sampling Depth: 0 ft Volume of Water Column: 77.96 gal

Total Well Depth: 101.9 ft Sampling Method: Pumped Bailed Grab

Well 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): 1/23/2020 Sample Collection Time: 9:30

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377001 Final Lab Analysis Completion Date: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP012W

Sample Date 1/23/2020

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	66	SM18-2321
CALCIUM, TOTAL	32.2	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	33.3	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	25400	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	9.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	170	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	9	EPA 300.0
pH-FIELD (SU)	5.38	FIELD
pH-LAB (SU)	6.8	EPA 150.1
POTASSIUM, TOTAL	1.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	13.5	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	312	FIELD
SPEC. COND., LAB (umhos/cm)	310	EPA 120.1
SULFATE	5.2	EPA 300.0
ALKALINITY	66	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	190	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	1.3	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	258	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP012W

Sample Date 1/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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FORM 19
MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

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 Township

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

Depth to Water Level: 43.07 ft Measured from: Land Surface TOC

Casing Stickup: -0.37 ft Elevation of Water Level: 470.36 ft./MSL

Sampling Depth: 130 ft Volume of Water Column: 142.36 gal

Total Well Depth: 140 ft Sampling Method: Pumped Bailed Grab

Well Purged: Yes No Well Volumes Purged: 2.2

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

Spring Flow Rate: gpm

Sample Date (mm/dd/yy): 1/23/2020 Sample Collection Time: 10:26

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377002 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP005W

Sample Date 1/23/2020

FORM 19
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES
ANALYTES

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

ANALYTE	VALUE ^T	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	EPA 350.3
BICARBONATE	18	SM18-2321
CALCIUM, TOTAL	14.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	57.4	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	8	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	53	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	8.6	EPA 300.0
pH-FIELD (SU)	5.2	FIELD
pH-LAB (SU)	6.26	EPA 150.1
POTASSIUM, TOTAL	2.4	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	27.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	318	FIELD
SPEC. COND., LAB (umhos/cm)	299	EPA 120.1
SULFATE	4.7	EPA 300.0
ALKALINITY	18	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	166	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.75	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.38	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP005W

Sample Date 1/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised 02/25/2020
DEP USE ONLY
Date Received

FORM 19
MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana
Site Name: Creswell Landfill
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: Manor

Sampling 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 gal

Total Well Depth: _____ ft Sampling Method: Pumped Bailed Grab

Well 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): 1/23/2020 Sample Collection Time: 11:00

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377003 Final Lab Analysis CompletionDate: 1/31/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP018S

Sample Date 1/23/2020

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	0.292	EPA 350.3
BICARBONATE	409	SM18-2321
CALCIUM, TOTAL	78.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	18	EPA 410.4
CHLORIDE	490	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	180	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	81.2	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	180	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	19.7	EPA 300.0
pH-FIELD (SU)	7.53	FIELD
pH-LAB (SU)	8.5	EPA 150.1
POTASSIUM, TOTAL	18.2	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	296	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	2536	FIELD
SPEC. COND., LAB (umhos/cm)	2320	EPA 120.1
SULFATE	30.7	EPA 300.0
ALKALINITY	409	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	1270	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	7.2	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	1.02	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

Remaining quarterly samples only require total metals analysis.

I.D. No 100008

Monitoring Point No. CWMP018S

Sample Date 1/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
02/25/2020

DEP USE ONLY

Date Received

FORM 19
MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Creswell Landfill

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 Township

Sampling 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 gal

Total Well Depth: _____ ft Sampling Method: Pumped Bailed Grab

Well 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): 1/23/2020 Sample Collection Time: 11:23

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377004 Final Lab Analysis CompletionDate: 1/31/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP017S

Sample Date 1/23/2020

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	674	SM18-2321
CALCIUM, TOTAL	96.5	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	826	EPA 300.0
FLUORIDE	0.5 ND	EPA 300.0
IRON, TOTAL (ug/l)	1100	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	132	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	110	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	27.7	EPA 300.0
pH-FIELD (SU)	7.99	FIELD
pH-LAB (SU)	8.4	EPA 150.1
POTASSIUM, TOTAL	23.5	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	496	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	3858	FIELD
SPEC. COND., LAB (umhos/cm)	3640	EPA 120.1
SULFATE	25.4	EPA 300.0
ALKALINITY	674	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	2020	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	4.7	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	2.26	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

Remaining quarterly samples only require total metals analysis.

I.D. No 100008

Monitoring Point No. CWMP017S

Sample Date 1/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised 02/25/2020
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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: CWMP003W Well Spring Stream Other
 Upgradient/Upstream Downgradient/Downstream

Location (County): Lancaster County Municipality: Manor Township

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

Depth to Water Level: 99.77 ft Measured from: Land Surface TOC

Casing Stickup: -1.29 ft Elevation of Water Level: 424.44 ft./MSL

Sampling Depth: 100 ft Volume of Water Column: -36.38 gal

Total Well Depth: 75 ft Sampling Method: Pumped Bailed Grab

Well 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): 1/23/2020 Sample Collection Time: 12:25

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377005 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP003W

Sample Date 1/23/2020

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	24.6	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	67	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	9.1	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.6	EPA 300.0
pH-FIELD (SU)	5.39	FIELD
pH-LAB (SU)	6.68	EPA 150.1
POTASSIUM, TOTAL	1.9	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	23.4	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	365	FIELD
SPEC. COND., LAB (umhos/cm)	340	EPA 120.1
SULFATE	5.3	EPA 300.0
ALKALINITY	22	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	200	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.78	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.

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Remaining quarterly samples only require total metals analysis.

I.D. No 100008

Monitoring Point No. CWMP003W

Sample Date 1/23/2020

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

T Please indicate detection limit if analyte is not detected.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

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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 Township

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

Depth to Water Level: 102.31 ft Measured from: Land Surface TOC

Casing Stickup: -1.37 ft Elevation of Water Level: 427.22 ft./MSL

Sampling Depth: 130 ft Volume of Water Column: 55.35 gal

Total Well Depth: 140 ft Sampling Method: Pumped Bailed Grab

Well 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): 1/23/2020 Sample Collection Time: 12:37

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3082377006 Final Lab Analysis CompletionDate: 1/29/2020

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

Comments: _____

I.D. No 100008

Monitoring Point No. CWMP004W

Sample Date 1/23/2020

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	24	SM18-2321
CALCIUM, TOTAL	21.1	SW846 6010B
CALCIUM, DISSOLVED		SW 8466010B
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	47.6	EPA 300.0
FLUORIDE	0.2 ND	EPA 300.0
IRON, TOTAL (ug/l)	67 ND	SW846 6010B
IRON, DISSOLVED (ug/l)		SW846 6010B
MAGNESIUM, TOTAL	7.4	SW846 6010B
MAGNESIUM, DISSOLVED		SW846 6010B
MANGANESE, TOTAL (ug/l)	10	SW846 6010B
MANGANESE, DISSOLVED (ug/l)		SW846 6010B
NITRATE-NITROGEN	7.1	EPA 300.0
pH-FIELD (SU)	5.61	FIELD
pH-LAB (SU)	6.48	EPA 150.1
POTASSIUM, TOTAL	1.6	SW846 6010B
POTASSIUM, DISSOLVED		SW846 6010B
SODIUM, TOTAL	16.7	SW846 6010B
SODIUM, DISSOLVED		SW846 6010B
SPEC. COND., FIELD (umhos/cm)	292	FIELD
SPEC. COND., LAB (umhos/cm)	273	EPA 120.1
SULFATE	6	EPA 300.0
ALKALINITY	24	SM18-2320B
TDS (TOTAL DISSOLVED SOLIDS)	140	SM18-2540C
TOC (TOTAL ORGANIC CARBON)	0.9	SM18-5310B
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.1 ND	SM 2130B

* Indicator Analyte - For comparison with detection zone analytes.

T Please indicate detection limit if analyte is not detected.

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

I.D. No 100008

Monitoring Point No. CWMP004W

Sample Date 1/23/2020

FORM 19**QUARTERLY AND ANNUAL WATER QUALITY ANALYSES****2-Q. Organics (Enter all data in ug/l)**

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

T Please indicate detection limit if analyte is not detected.

January 29, 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:	3081690
Purchase Order:	PO1000127	Workorder ID:	1st QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

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

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

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

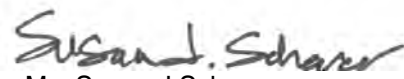
Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications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

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

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

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


Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3081690001	CWMP007W	Ground Water	1/20/2020 10:55	1/20/2020 16:40	Mr. Brian G Shade
3081690002	CWMP001W	Ground Water	1/20/2020 12:14	1/20/2020 16:40	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3081690 1st 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 performed 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: 3081690 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3081690001** Date Collected: 1/20/2020 10:55 Matrix: Ground Water
 Sample ID: **CWMP007W** Date Received: 1/20/2020 16:40

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/23/20 05:27	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 05:27	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>
1,2-Dichloroethane-d4 (S)	117		%	62 - 133	SW846 8260B			1/23/20 05:27	PDK	G
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			1/23/20 05:27	PDK	G
Dibromofluoromethane (S)	111		%	78 - 116	SW846 8260B			1/23/20 05:27	PDK	G
Toluene-d8 (S)	109		%	76 - 127	SW846 8260B			1/23/20 05:27	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	14		mg/L	5	SM2320B-2011			1/24/20 16:45	DXC	B
Alkalinity, Total	14	2	mg/L	5	SM2320B-2011			1/24/20 16:45	DXC	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/26/20 16:55	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/28/20 11:35	AK	A
Chloride	61.1		mg/L	2.0	EPA 300.0			1/21/20 03:23	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/21/20 03:23	MBW	B
Nitrate-N	9.3		mg/L	0.20	EPA 300.0			1/21/20 03:23	MBW	B
pH	7.18	1	pH_Units		S4500HB-11			1/24/20 16:45	DXC	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/21/20 11:20	VXF	1/21/20 10:30	VXF	F
Specific Conductance	375		umhos/cm	1	SW846 9050A			1/24/20 16:45	DXC	B
Sulfate	21.7		mg/L	2.0	EPA 300.0			1/21/20 03:23	MBW	B
Total Dissolved Solids	212		mg/L	5	S2540C-11			1/24/20 14:39	D1C	B
Total Organic Carbon (TOC)	0.67		mg/L	0.50	SW846 9060A			1/21/20 23:45	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			1/21/20 01:05	MBW	B

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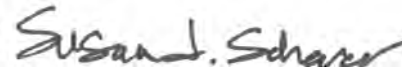
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ANALYTICAL RESULTS

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3081690001** Date Collected: 1/20/2020 10:55 Matrix: Ground Water
 Sample ID: **CWMP007W** Date Received: 1/20/2020 16:40

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	17.2		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
Magnesium, Total	8.5		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
Potassium, Total	2.1		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
Sodium, Total	31.3		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:12	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	5.68		Feet		Field			1/20/20 10:55	BGS	C
Elev Top MW Casing above MSL	453.40		Feet		Field			1/20/20 10:55	BGS	C
Flow Rate	1.58		gal/min		Field			1/20/20 10:55	BGS	C
Ground Water Elevation	447.72		ft/MSL		Field			1/20/20 10:55	BGS	C
pH, Field (SM4500B)	5.20		pH_Units		Field			1/20/20 10:55	BGS	C
Sample Depth	33.00		Feet		Field			1/20/20 10:55	BGS	C
Specific Conductance, Field	372		umhos/cm	1	Field			1/20/20 10:55	BGS	C
Temperature	10.24		Deg. C		Field			1/20/20 10:55	BGS	C
Total Well Depth	36.50		Feet		Field			1/20/20 10:55	BGS	C
Volume in Water Column	45.31		Gallons		Field			1/20/20 10:55	BGS	C
Water Level After Purge	5.86		Feet		Field			1/20/20 10:55	BGS	C
Well Volumes Purged	2.44		Vol		Field			1/20/20 10:55	BGS	C



Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3081690002** Date Collected: 1/20/2020 12:14 Matrix: Ground Water
 Sample ID: **CWMP001W** Date Received: 1/20/2020 16:40

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/23/20 05:50	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 05:50	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>
1,2-Dichloroethane-d4 (S)	116		%	62 - 133	SW846 8260B			1/23/20 05:50	PDK	G
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			1/23/20 05:50	PDK	G
Dibromofluoromethane (S)	108		%	78 - 116	SW846 8260B			1/23/20 05:50	PDK	G
Toluene-d8 (S)	107		%	76 - 127	SW846 8260B			1/23/20 05:50	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	5	SM2320B-2011			1/24/20 16:45	DXC	B
Alkalinity, Total	ND	2	mg/L	5	SM2320B-2011			1/24/20 16:45	DXC	I
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/26/20 17:23	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/28/20 11:35	AK	A
Chloride	27.4		mg/L	2.0	EPA 300.0			1/21/20 03:54	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/21/20 03:54	MBW	B
Nitrate-N	19.5		mg/L	0.20	EPA 300.0			1/21/20 03:54	MBW	B
pH	7.08	1	pH_Units		S4500HB-11			1/24/20 16:45	DXC	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/21/20 11:20	VXF	1/21/20 10:30	VXF	F
Specific Conductance	278		umhos/cm	1	SW846 9050A			1/24/20 16:45	DXC	B
Sulfate	2.4		mg/L	2.0	EPA 300.0			1/21/20 03:54	MBW	B
Total Dissolved Solids	188		mg/L	5	S2540C-11			1/24/20 14:39	D1C	B
Total Organic Carbon (TOC)	0.65		mg/L	0.50	SW846 9060A			1/21/20 23:45	PAG	D
Turbidity	18.4		NTU	0.10	SM2130B-2011			1/21/20 01:05	MBW	B

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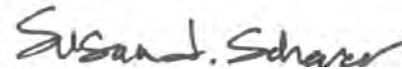
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ANALYTICAL RESULTS

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3081690002** Date Collected: 1/20/2020 12:14 Matrix: Ground Water
 Sample ID: **CWMP001W** Date Received: 1/20/2020 16:40

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	14.9		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
Iron, Total	1.2		mg/L	0.067	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
Magnesium, Total	10.2		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
Manganese, Total	0.055		mg/L	0.0056	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
Potassium, Total	2.2		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
Sodium, Total	12.7		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:23	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	28.84		Feet		Field			1/20/20 12:14	BGS	C
Elev Top MW Casing above MSL	515.13		Feet		Field			1/20/20 12:14	BGS	C
Flow Rate	1.83		gal/min		Field			1/20/20 12:14	BGS	C
Ground Water Elevation	486.29		ft/MSL		Field			1/20/20 12:14	BGS	C
pH, Field (SM4500B)	5.14		pH_Units		Field			1/20/20 12:14	BGS	C
Sample Depth	57.00		Feet		Field			1/20/20 12:14	BGS	C
Specific Conductance, Field	275		umhos/cm	1	Field			1/20/20 12:14	BGS	C
Temperature	10.43		Deg. C		Field			1/20/20 12:14	BGS	C
Total Well Depth	66.30		Feet		Field			1/20/20 12:14	BGS	C
Volume in Water Column	55.07		Gallons		Field			1/20/20 12:14	BGS	C
Water Level After Purge	50.85		Feet		Field			1/20/20 12:14	BGS	C
Well Volumes Purged	2.00		Vol		Field			1/20/20 12:14	BGS	C



 Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3081690001	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.				
3081690001	2	CWMP007W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3081690002	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.				
3081690002	2	CWMP001W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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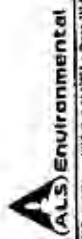
ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3081690 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3081690001	CWMP007W	ASTM D6919-09	
3081690001	CWMP007W	EPA 300.0	
3081690001	CWMP007W	EPA 410.4	
3081690001	CWMP007W	Field	
3081690001	CWMP007W	S2540C-11	
3081690001	CWMP007W	S4500HB-11	
3081690001	CWMP007W	SM2130B-2011	
3081690001	CWMP007W	SM2320B-2011	
3081690001	CWMP007W	SW846 6010C	SW846 3015
3081690001	CWMP007W	SW846 8260B	
3081690001	CWMP007W	SW846 9050A	
3081690001	CWMP007W	SW846 9060A	
3081690001	CWMP007W	SW846 9066	420.4/9066
3081690002	CWMP001W	ASTM D6919-09	
3081690002	CWMP001W	EPA 300.0	
3081690002	CWMP001W	EPA 410.4	
3081690002	CWMP001W	Field	
3081690002	CWMP001W	S2540C-11	
3081690002	CWMP001W	S4500HB-11	
3081690002	CWMP001W	SM2130B-2011	
3081690002	CWMP001W	SM2320B-2011	
3081690002	CWMP001W	SW846 6010C	SW846 3015
3081690002	CWMP001W	SW846 8260B	
3081690002	CWMP001W	SW846 9050A	
3081690002	CWMP001W	SW846 9060A	
3081690002	CWMP001W	SW846 9066	420.4/9066

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34 Dogwood Lane • Middletown, PA 17057 • Phone: 717.944.5511 • Fax: 717.944.1430
 Client Name: Lancaster County Solid Waste MA
 Address: 1299 Harrisburg Pike, P.O. Box 4424
 Lancaster, PA 17604

**CHAIN OF CUSTODY/
 REQUEST FOR ANALYSIS**
**ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT/
 SAMPLER. INSTRUCTIONS ON THE BACK.**

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1 of 1

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

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	Matrix	TOC	O-H	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Total Metals: Ca, Fe, Mn, Mg, K, Na	TDS	Alkalinity, HCO3
1. CWMP007W	01/20/20	1055	G GW	2	1	2	X	X	1	1	1	1
2. CWMP001W	01/20/20	1214	G GW	2	1	2	X	X	1	1	1	1
3												
4												
5												
6												
7												
8												
9												
10												

Enter Number of Containers Per Sample or Field Results Below.

ALS Field Services: Pickup Labor
 Composite_Sampling Rental_Equipment
 Other.

Cooler Temp: 4°C Therm ID: 525
 No. of Coolers: Y N Initial

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

Courier/Tracking #: _____ Sample/COC Comments

LOGGED BY (signature): _____
 REVIEWED BY (signature): _____

Relinquished By: _____ Company Name: _____
 Date: 1-20-20 Time: 10:55
 Received By / Company Name: COM Date: 1/20/20 Time: 16:47

Standard OLP-like USACE
 Special Processing: USACE Navy
 State Samples Collected In: NY NJ PA NC

Reportable to PADEP? Yes No
 Sample Disposal: Lab Special
 PWSID #: _____ 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





301 Fulling Mill Road
Middletown, PA 17057

P: (717) 944-5541

F: (717) 944-1430

Condition of Sample Receipt Form

Client: Lancaster County SWMA Work Order #: 3081690 Initials: GOM Date: 1/20/2020

1. Were airbills / tracking numbers present and recorded?..... NONE YES NO
Tracking number: _____
2. Are Custody Seals on shipping containers intact?..... NONE YES NO
3. Are Custody Seals on sample containers intact?..... NONE YES NO
4. Is there a COC (Chain-of-Custody) present?..... YES 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?..... Client 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? N/A YES 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?..... Permit of hold YES NO GOM
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)..... YES YES NO 1/20
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?..... N/A YES YES NO
11. Were the samples received on ice?..... YES 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..... YES NO
 - 13a. Are the samples required for SDWA compliance reporting?..... N/A YES YES NO
 - 13b. Did the client provide a SDWA PWS ID#?..... N/A YES YES NO
 - 13c. Are all aqueous unpreserved SDWA samples pH 5-9?..... N/A YES YES NO
 - 13d. Did the client provide the SDWA sample location ID/Description?..... N/A YES YES NO
 - 13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?..... N/A YES YES NO

Cooler #: _____

Temperature (°C): 4

Thermometer ID: 525

Radiological (µCi): _____

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

Rev. 4/29/2019

January 30, 2020

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

Certificate of Analysis

Project Name: CRESWELL	Workorder: 3081807
Purchase Order: PO1000127	Workorder ID: 1st QTR 2020 CWMP-FORM 19Q

Dear Ms. Gallagher:

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

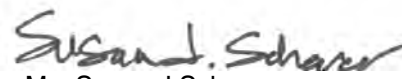
Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications 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 , Mr. Nicholas Rogers , Mr. Daniel Brown , Mr. Jeff Musser

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



Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3081807 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3081807001	CWMP002W	Ground Water	1/21/2020 12:29	1/21/2020 15:05	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3081807 1st 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 performed 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: 3081807 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3081807001** Date Collected: 1/21/2020 12:29 Matrix: Ground Water
 Sample ID: **CWMP002W** Date Received: 1/21/2020 15:05

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Bromoform	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Bromomethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Chloroethane	31.3		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Chloroform	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Chloromethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,1-Dichloroethane	10.7		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			1/23/20 03:45	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Styrene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			1/23/20 03:45	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	G
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			1/23/20 03:45	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/23/20 03:45	VLM	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: 3081807 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3081807001** Date Collected: 1/21/2020 12:29 Matrix: Ground Water
Sample ID: **CWMP002W** Date Received: 1/21/2020 15:05

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	92.8		%	62 - 133	SW846 8260B			1/23/20 03:45	VLM	G
4-Bromofluorobenzene (S)	106		%	79 - 114	SW846 8260B			1/23/20 03:45	VLM	G
Dibromofluoromethane (S)	91.5		%	78 - 116	SW846 8260B			1/23/20 03:45	VLM	G
Toluene-d8 (S)	95.7		%	76 - 127	SW846 8260B			1/23/20 03:45	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	77		mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Alkalinity, Total	77	2	mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Ammonia-N	0.137		mg/L	0.100	ASTM D6919-09			1/26/20 19:17	JWB	A
Chemical Oxygen Demand (COD)	17		mg/L	15	EPA 410.4			1/29/20 09:22	AK	A
Chloride	102		mg/L	2.0	EPA 300.0			1/22/20 03:06	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/22/20 03:06	MBW	B
Nitrate-N	3.4		mg/L	0.20	EPA 300.0			1/22/20 03:06	MBW	B
pH	5.99	1	pH_Units		S4500HB-11			1/28/20 15:32	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/26/20 18:30	VXF	1/27/20 15:36	C_D	F
Specific Conductance	558		umhos/cm	1	SW846 9050A			1/28/20 15:32	MBW	B
Sulfate	16.7		mg/L	2.0	EPA 300.0			1/22/20 03:06	MBW	B
Total Dissolved Solids	386		mg/L	5	S2540C-11			1/24/20 16:11	D1C	B
Total Organic Carbon (TOC)	4.4		mg/L	0.50	SW846 9060A			1/22/20 22:18	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			1/22/20 05:20	MBW	B
METALS										
Calcium, Total	51.8		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
Magnesium, Total	16.1		mg/L	0.11	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
Manganese, Total	1.1		mg/L	0.0056	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
Potassium, Total	2.9		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
Sodium, Total	27.5		mg/L	0.56	SW846 6010C	1/22/20 12:15	AHI	1/22/20 16:30	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	63.00		Feet		Field			1/21/20 12:29	BGS	C
Elev Top MW Casing above MSL	525.81		Feet		Field			1/21/20 12:29	BGS	C
Ground Water Elevation	462.81		ft/MSL		Field			1/21/20 12:29	BGS	C
pH, Field (SM4500B)	5.65		pH_Units		Field			1/21/20 12:29	BGS	C
Sample Depth	85.00		Feet		Field			1/21/20 12:29	BGS	C
Specific Conductance, Field	607		umhos/cm	1	Field			1/21/20 12:29	BGS	C
Temperature	10.46		Deg. C		Field			1/21/20 12:29	BGS	C
Total Well Depth	100.00		Feet		Field			1/21/20 12:29	BGS	C

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ANALYTICAL RESULTS

Workorder: 3081807 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3081807001** Date Collected: 1/21/2020 12:29 Matrix: Ground Water
Sample ID: **CWMP002W** Date Received: 1/21/2020 15:05

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

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ANALYTICAL RESULTS

Workorder: 3081807 1st QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3081807001	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.				
3081807001	2	CWMP002W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3081807 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3081807001	CWMP002W	ASTM D6919-09	
3081807001	CWMP002W	EPA 300.0	
3081807001	CWMP002W	EPA 410.4	
3081807001	CWMP002W	Field	
3081807001	CWMP002W	S2540C-11	
3081807001	CWMP002W	S4500HB-11	
3081807001	CWMP002W	SM2130B-2011	
3081807001	CWMP002W	SM2320B-2011	
3081807001	CWMP002W	SW846 6010C	SW846 3015
3081807001	CWMP002W	SW846 8260B	
3081807001	CWMP002W	SW846 9050A	
3081807001	CWMP002W	SW846 9060A	
3081807001	CWMP002W	SW846 9066	420.4/9066

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COC
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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/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 N mreider@LCSWMA.com
 Fax? Y N No.: (717) 397-9973

34 Dogwood Lane • Middletown, PA 17057 • Phone: 717-944-5511 • Fax: 717-944-1430

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

Field Measurements	Sample Depth for AUX Data	Total Metals: Ca, Fe, Mn, Mg, K, Na	PH, NO3, Cl, F, SPC, SO4, Turb.	Alkalinity, HCO3
8260 VOCs - Form 19Q	NH3-N, COD			

Enter Number of Containers Per Sample or Field Results Below.	TOC	O-OH	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	Total Metals: Ca, Fe, Mn, Mg, K, Na	PH, NO3, Cl, F, SPC, SO4, Turb.	Alkalinity, HCO3
2	1	2	1	1	1	1	1	1

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time
1. CWMP002W	01/21/20	1229
2		
3		
4		
5		
6		
7		
8		
9		
10		

Project Comments:
 Relinquished By / Company Name: *ALS*
 Date: 6-21-20 1405
 Received By / Company Name: *ALS*
 Date: 11/21/20 1505

LOGGED BY (signature): _____
 REVIEWED BY (signature): _____

ALS Field Services: Pickup Labor
 Composite_Sampling Rental_Equipment
 Other:

Standard CLP-like USACE State Samples Collected In NY NJ PA NC

Special Processing: USACE Navy Sample Disposal: Lab Special

Reportable to PADEP? Yes No PWSID # _____ EDDS: Format Type: _____

Courier/Tracking #: _____
 Sampler/COC Comments: _____

Cooler Temp: 5 Therm ID: 525
 No. of Coolers: Y N Initial

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

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: Lancaster County Solid Waste north west Work Order #: _____ Initials: [Signature] Date: 1/21/2020

1. Were airbills / tracking numbers present and recorded?..... NONE YES NO
 Tracking number: _____
2. Are Custody Seals on shipping containers intact?..... NONE YES NO
3. Are Custody Seals on sample containers intact?..... NONE YES NO
4. Is there a COC (Chain-of-Custody) present?..... YES NO
5. Are the COC and bottle labels complete, legible and in agreement?..... YES NO
 - 5a. Does the COC contain sample locations?..... YES NO
 - 5b. Does the COC contain date and time of sample collection for all samples?..... YES NO
 - 5c. Does the COC contain sample collectors name?..... YES NO
 - 5d. Does the COC note the type(s) of preservation for all bottles?..... YES NO
 - 5e. Does the COC note the number of bottles submitted for each sample?..... YES NO
 - 5f. Does the COC note the type of sample, composite or grab?..... YES NO
 - 5g. Does the COC note the matrix of the sample(s)?..... YES NO
6. Are all aqueous samples requiring preservation preserved correctly?..... N/A YES NO
7. Were all samples placed in the proper containers for the requested analyses, with sufficient volume?..... YES NO
8. Are all samples within holding times for the requested analyses?..... ph 15 covered YES NO
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)..... YES NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?..... N/A YES NO
11. Were the samples received on ice?..... YES NO
12. Were sample temperatures measured at 0.0-6.0°C..... YES NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below..... YES NO
 - 13a. Are the samples required for SDWA compliance reporting?..... N/A YES NO
 - 13b. Did the client provide a SDWA PWS ID#?..... N/A YES NO
 - 13c. Are all aqueous unpreserved SDWA samples pH 5-9?..... N/A YES NO
 - 13d. Did the client provide the SDWA sample location ID/Description?..... N/A YES NO
 - 13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?..... N/A YES NO

Cooler #: _____
 Temperature (°C): 5 _____
 Thermometer ID: S25 _____
 Radiological (µCi): _____

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

January 31, 2020

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

Certificate of Analysis

Project Name:	CRESWELL	Workorder:	3082088
Purchase Order:	PO1000127	Workorder ID:	1st QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

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

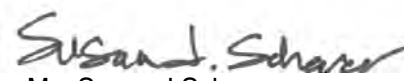
Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications 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: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3082088001	CWMP016W	Ground Water	1/22/2020 12:07	1/22/2020 16:00	Mr. Brian G Shade
3082088002	CWMP010W	Ground Water	1/22/2020 12:36	1/22/2020 16:00	Mr. Brian G Shade
3082088003	CWMP009W	Ground Water	1/22/2020 13:06	1/22/2020 16:00	Mr. Brian G Shade
3082088004	CWMP008W	Ground Water	1/22/2020 13:38	1/22/2020 16:00	Mr. Brian G Shade
3082088005	Field Blank	Water	1/22/2020 15:00	1/22/2020 16:00	Mr. Brian G Shade
3082088006	Trip Blank	Water	1/22/2020 16:00	1/22/2020 16:00	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3082088 1st 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 performed 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: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088001** Date Collected: 1/22/2020 12:07 Matrix: Ground Water
Sample ID: **CWMP016W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 02:55	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:55	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>
1,2-Dichloroethane-d4 (S)	116		%	62 - 133	SW846 8260B			1/24/20 02:55	PDK	G
4-Bromofluorobenzene (S)	111		%	79 - 114	SW846 8260B			1/24/20 02:55	PDK	G
Dibromofluoromethane (S)	110		%	78 - 116	SW846 8260B			1/24/20 02:55	PDK	G
Toluene-d8 (S)	107		%	76 - 127	SW846 8260B			1/24/20 02:55	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	12		mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Alkalinity, Total	12	3	mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Ammonia-N	0.103		mg/L	0.100	ASTM D6919-09			1/27/20 20:52	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	2.9		mg/L	2.0	EPA 300.0			1/23/20 07:40	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/23/20 07:40	MBW	B
Nitrate-N	0.60		mg/L	0.20	EPA 300.0			1/23/20 07:40	MBW	B
pH	6.64	1	pH_Units		S4500HB-11			1/28/20 15:32	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	57		umhos/cm	1	SW846 9050A			1/28/20 15:32	MBW	B
Sulfate	11.6		mg/L	2.0	EPA 300.0			1/23/20 07:40	MBW	B
Total Dissolved Solids	22	2	mg/L	5	S2540C-11			1/27/20 14:00	D1C	B
Total Organic Carbon (TOC)	0.76		mg/L	0.50	SW846 9060A			1/23/20 18:47	PAG	D
Turbidity	3.70		NTU	0.10	SM2130B-2011			1/23/20 04:30	MBW	B

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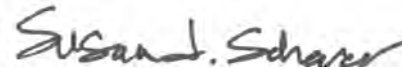
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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088001** Date Collected: 1/22/2020 12:07 Matrix: Ground Water
 Sample ID: **CWMP016W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	5.1		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 12:56	SRT	J1
Iron, Total	0.35		mg/L	0.067	SW846 6010C	1/23/20 17:50	AHI	1/24/20 12:56	SRT	J1
Magnesium, Total	1.2		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 12:56	SRT	J1
Manganese, Total	0.0088		mg/L	0.0056	SW846 6010C	1/23/20 17:50	AHI	1/27/20 09:39	SRT	J1
Potassium, Total	ND		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 12:56	SRT	J1
Sodium, Total	3.2		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 12:56	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	9.82		Feet		Field			1/22/20 12:07	BGS	C
Elev Top MW Casing above MSL	311.97		Feet		Field			1/22/20 12:07	BGS	C
Flow Rate	3.61		gal/min		Field			1/22/20 12:07	BGS	C
Ground Water Elevation	302.15		ft/MSL		Field			1/22/20 12:07	BGS	C
pH, Field (SM4500B)	5.36		pH_Units		Field			1/22/20 12:07	BGS	C
Sample Depth	71.00		Feet		Field			1/22/20 12:07	BGS	C
Specific Conductance, Field	66		umhos/cm	1	Field			1/22/20 12:07	BGS	C
Temperature	9.73		Deg. C		Field			1/22/20 12:07	BGS	C
Total Well Depth	73.52		Feet		Field			1/22/20 12:07	BGS	C
Volume in Water Column	93.64		Gallons		Field			1/22/20 12:07	BGS	C
Water Level After Purge	26.40		Feet		Field			1/22/20 12:07	BGS	C
Well Volumes Purged	2.70		Vol		Field			1/22/20 12:07	BGS	C



Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082088002** Date Collected: 1/22/2020 12:36 Matrix: Ground Water
 Sample ID: **CWMP010W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
trans-1,2-Dichloroethene	ND	2	ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 03:17	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 03:17	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>
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			1/24/20 03:17	PDK	G
4-Bromofluorobenzene (S)	112		%	79 - 114	SW846 8260B			1/24/20 03:17	PDK	G
Dibromofluoromethane (S)	112		%	78 - 116	SW846 8260B			1/24/20 03:17	PDK	G
Toluene-d8 (S)	108		%	76 - 127	SW846 8260B			1/24/20 03:17	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	187		mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Alkalinity, Total	187	3	mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 05:25	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	242		mg/L	5.0	EPA 300.0			1/24/20 04:49	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/23/20 07:56	MBW	B
Nitrate-N	10.2		mg/L	0.20	EPA 300.0			1/23/20 07:56	MBW	B
pH	6.94	1	pH_Units		S4500HB-11			1/28/20 15:32	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	1260		umhos/cm	1	SW846 9050A			1/28/20 15:32	MBW	B
Sulfate	31.2		mg/L	2.0	EPA 300.0			1/23/20 07:56	MBW	B
Total Dissolved Solids	638		mg/L	5	S2540C-11			1/27/20 14:00	D1C	B
Total Organic Carbon (TOC)	3.4		mg/L	0.50	SW846 9060A			1/23/20 18:47	PAG	D
Turbidity	1.85		NTU	0.10	SM2130B-2011			1/23/20 04:30	MBW	B

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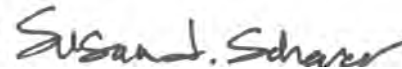
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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088002** Date Collected: 1/22/2020 12:36 Matrix: Ground Water
 Sample ID: **CWMP010W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	45.5		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:00	SRT	J1
Iron, Total	0.30		mg/L	0.067	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:00	SRT	J1
Magnesium, Total	40.0		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:00	SRT	J1
Manganese, Total	0.11		mg/L	0.0056	SW846 6010C	1/23/20 17:50	AHI	1/27/20 09:42	SRT	J1
Potassium, Total	6.7		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:00	SRT	J1
Sodium, Total	151		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:00	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	8.51		Feet		Field			1/22/20 12:36	BGS	C
Elev Top MW Casing above MSL	360.90		Feet		Field			1/22/20 12:36	BGS	C
Flow Rate	0.92		gal/min		Field			1/22/20 12:36	BGS	C
Ground Water Elevation	352.39		ft/MSL		Field			1/22/20 12:36	BGS	C
pH, Field (SM4500B)	6.24		pH_Units		Field			1/22/20 12:36	BGS	C
Sample Depth	17.00		Feet		Field			1/22/20 12:36	BGS	C
Specific Conductance, Field	1601		umhos/cm	1	Field			1/22/20 12:36	BGS	C
Temperature	7.78		Deg. C		Field			1/22/20 12:36	BGS	C
Total Well Depth	19.60		Feet		Field			1/22/20 12:36	BGS	C
Volume in Water Column	7.21		Gallons		Field			1/22/20 12:36	BGS	C
Water Level After Purge	16.54		Feet		Field			1/22/20 12:36	BGS	C
Well Volumes Purged	1.79		Vol		Field			1/22/20 12:36	BGS	C



Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082088003** Date Collected: 1/22/2020 13:06 Matrix: Ground Water
 Sample ID: **CWMP009W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.9		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
1,1-Dichloroethane	1.6		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 02:10	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:10	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>
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			1/24/20 02:10	PDK	G
4-Bromofluorobenzene (S)	113		%	79 - 114	SW846 8260B			1/24/20 02:10	PDK	G
Dibromofluoromethane (S)	113		%	78 - 116	SW846 8260B			1/24/20 02:10	PDK	G
Toluene-d8 (S)	107		%	76 - 127	SW846 8260B			1/24/20 02:10	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	518		mg/L	50	SM2320B-2011			1/30/20 18:09	MBW	B
Alkalinity, Total	518	2	mg/L	50	SM2320B-2011			1/30/20 18:09	MBW	B
Ammonia-N	25.6		mg/L	0.100	ASTM D6919-09			1/27/20 22:46	JWB	A
Chemical Oxygen Demand (COD)	106		mg/L	15	EPA 410.4			1/30/20 17:22	AK	A
Chloride	493		mg/L	10.0	EPA 300.0			1/24/20 05:04	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/23/20 08:11	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			1/23/20 08:11	MBW	B
pH	6.43	1	pH_Units		S4500HB-11			1/28/20 15:32	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	2410		umhos/cm	1	SW846 9050A			1/28/20 15:32	MBW	B
Sulfate	5.9		mg/L	2.0	EPA 300.0			1/23/20 08:11	MBW	B
Total Dissolved Solids	1210		mg/L	5	S2540C-11			1/27/20 14:00	D1C	B
Total Organic Carbon (TOC)	34.4		mg/L	2.5	SW846 9060A			1/23/20 18:47	PAG	D
Turbidity	34.2		NTU	0.10	SM2130B-2011			1/23/20 04:30	MBW	B

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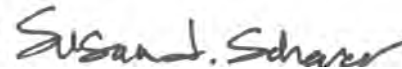
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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088003** Date Collected: 1/22/2020 13:06 Matrix: Ground Water
 Sample ID: **CWMP009W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	162		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:03	SRT	J1
Iron, Total	36.0		mg/L	0.067	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:03	SRT	J1
Magnesium, Total	76.1		mg/L	0.11	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:03	SRT	J1
Manganese, Total	12.5		mg/L	0.0056	SW846 6010C	1/23/20 17:50	AHI	1/27/20 09:46	SRT	J1
Potassium, Total	33.9		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:03	SRT	J1
Sodium, Total	162		mg/L	0.56	SW846 6010C	1/23/20 17:50	AHI	1/24/20 13:03	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	8.98		Feet		Field			1/22/20 13:06	BGS	C
Elev Top MW Casing above MSL	404.20		Feet		Field			1/22/20 13:06	BGS	C
Flow Rate	1.82		gal/min		Field			1/22/20 13:06	BGS	C
Ground Water Elevation	395.22		ft/MSL		Field			1/22/20 13:06	BGS	C
pH, Field (SM4500B)	6.11		pH_Units		Field			1/22/20 13:06	BGS	C
Sample Depth	16.00		Feet		Field			1/22/20 13:06	BGS	C
Specific Conductance, Field	2582		umhos/cm	1	Field			1/22/20 13:06	BGS	C
Temperature	8.59		Deg. C		Field			1/22/20 13:06	BGS	C
Total Well Depth	19.70		Feet		Field			1/22/20 13:06	BGS	C
Volume in Water Column	6.97		Gallons		Field			1/22/20 13:06	BGS	C
Water Level After Purge	12.34		Feet		Field			1/22/20 13:06	BGS	C
Well Volumes Purged	5.22		Vol		Field			1/22/20 13:06	BGS	C



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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088004** Date Collected: 1/22/2020 13:38 Matrix: Ground Water
Sample ID: **CWMP008W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	1.2		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
1,1-Dichloroethane	3.0		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 02:32	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 02:32	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>
1,2-Dichloroethane-d4 (S)	119		%	62 - 133	SW846 8260B			1/24/20 02:32	PDK	G
4-Bromofluorobenzene (S)	111		%	79 - 114	SW846 8260B			1/24/20 02:32	PDK	G
Dibromofluoromethane (S)	113		%	78 - 116	SW846 8260B			1/24/20 02:32	PDK	G
Toluene-d8 (S)	109		%	76 - 127	SW846 8260B			1/24/20 02:32	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	350		mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Alkalinity, Total	350	2	mg/L	5	SM2320B-2011			1/28/20 15:32	MBW	B
Ammonia-N	6.37		mg/L	0.100	ASTM D6919-09			1/27/20 21:06	JWB	A
Chemical Oxygen Demand (COD)	23		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	33.4		mg/L	2.0	EPA 300.0			1/23/20 08:27	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/23/20 08:27	MBW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			1/23/20 08:27	MBW	B
pH	6.47	1	pH_Units		S4500HB-11			1/28/20 15:32	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	775		umhos/cm	1	SW846 9050A			1/28/20 15:32	MBW	B
Sulfate	7.3		mg/L	2.0	EPA 300.0			1/23/20 08:27	MBW	B
Total Dissolved Solids	402		mg/L	5	S2540C-11			1/27/20 14:00	D1C	B
Total Organic Carbon (TOC)	9.2		mg/L	2.5	SW846 9060A			1/23/20 18:47	PAG	D
Turbidity	15.2		NTU	0.10	SM2130B-2011			1/23/20 04:30	MBW	B

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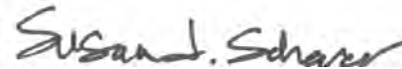
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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082088004** Date Collected: 1/22/2020 13:38 Matrix: Ground Water
Sample ID: **CWMP008W** Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	65.5		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
Iron, Total	25.3		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
Magnesium, Total	29.5		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
Manganese, Total	16.2		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
Potassium, Total	9.0		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
Sodium, Total	35.7		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 10:47	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	2.35		Feet		Field			1/22/20 13:38	BGS	C
Elev Top MW Casing above MSL	422.30		Feet		Field			1/22/20 13:38	BGS	C
Flow Rate	0.96		gal/min		Field			1/22/20 13:38	BGS	C
Ground Water Elevation	419.95		ft/MSL		Field			1/22/20 13:38	BGS	C
pH, Field (SM4500B)	6.07		pH_Units		Field			1/22/20 13:38	BGS	C
Sample Depth	19.00		Feet		Field			1/22/20 13:38	BGS	C
Specific Conductance, Field	840		umhos/cm	1	Field			1/22/20 13:38	BGS	C
Temperature	10.60		Deg. C		Field			1/22/20 13:38	BGS	C
Total Well Depth	22.80		Feet		Field			1/22/20 13:38	BGS	C
Volume in Water Column	3.27		Gallons		Field			1/22/20 13:38	BGS	C
Water Level After Purge	4.51		Feet		Field			1/22/20 13:38	BGS	C
Well Volumes Purged	5.88		Vol		Field			1/22/20 13:38	BGS	C



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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082088005**

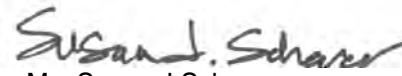
Date Collected: 1/22/2020 15:00

Matrix: Water

 Sample ID: **Field Blank**

Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 01:24	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 01:24	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>	<i>Cntr</i>
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			1/24/20 01:24	PDK	A
4-Bromofluorobenzene (S)	111		%	79 - 114	SW846 8260B			1/24/20 01:24	PDK	A
Dibromofluoromethane (S)	113		%	78 - 116	SW846 8260B			1/24/20 01:24	PDK	A
Toluene-d8 (S)	107		%	76 - 127	SW846 8260B			1/24/20 01:24	PDK	A



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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082088006**

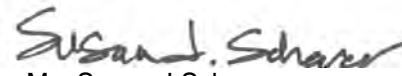
Date Collected: 1/22/2020 16:00

Matrix: Water

 Sample ID: **Trip Blank**

Date Received: 1/22/2020 16:00

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Toluene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/24/20 00:39	PDK	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	PDK	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/24/20 00:39	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>	<i>Cntr</i>
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			1/24/20 00:39	PDK	A
4-Bromofluorobenzene (S)	114		%	79 - 114	SW846 8260B			1/24/20 00:39	PDK	A
Dibromofluoromethane (S)	115		%	78 - 116	SW846 8260B			1/24/20 00:39	PDK	A
Toluene-d8 (S)	108		%	76 - 127	SW846 8260B			1/24/20 00:39	PDK	A



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ANALYTICAL RESULTS

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3082088001	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.				
3082088001	2	CWMP016W	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.				
3082088001	3	CWMP016W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082088002	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.				
3082088002	2	CWMP010W	SW846 8260B	trans-1,2-Dichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 125 and the control limits were 71 to 122.				
3082088002	3	CWMP010W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082088003	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.				
3082088003	2	CWMP009W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082088004	1	CWMP008W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3082088004	2	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: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3082088001	CWMP016W	ASTM D6919-09	
3082088001	CWMP016W	EPA 300.0	
3082088001	CWMP016W	EPA 410.4	
3082088001	CWMP016W	Field	
3082088001	CWMP016W	S2540C-11	
3082088001	CWMP016W	S4500HB-11	
3082088001	CWMP016W	SM2130B-2011	
3082088001	CWMP016W	SM2320B-2011	
3082088001	CWMP016W	SW846 6010C	SW846 3015
3082088001	CWMP016W	SW846 8260B	
3082088001	CWMP016W	SW846 9050A	
3082088001	CWMP016W	SW846 9060A	
3082088001	CWMP016W	SW846 9066	420.4/9066
3082088002	CWMP010W	ASTM D6919-09	
3082088002	CWMP010W	EPA 300.0	
3082088002	CWMP010W	EPA 410.4	
3082088002	CWMP010W	Field	
3082088002	CWMP010W	S2540C-11	
3082088002	CWMP010W	S4500HB-11	
3082088002	CWMP010W	SM2130B-2011	
3082088002	CWMP010W	SM2320B-2011	
3082088002	CWMP010W	SW846 6010C	SW846 3015
3082088002	CWMP010W	SW846 8260B	
3082088002	CWMP010W	SW846 9050A	
3082088002	CWMP010W	SW846 9060A	
3082088002	CWMP010W	SW846 9066	420.4/9066
3082088003	CWMP009W	ASTM D6919-09	
3082088003	CWMP009W	EPA 300.0	
3082088003	CWMP009W	EPA 410.4	
3082088003	CWMP009W	Field	
3082088003	CWMP009W	S2540C-11	
3082088003	CWMP009W	S4500HB-11	
3082088003	CWMP009W	SM2130B-2011	
3082088003	CWMP009W	SM2320B-2011	
3082088003	CWMP009W	SW846 6010C	SW846 3015
3082088003	CWMP009W	SW846 8260B	
3082088003	CWMP009W	SW846 9050A	
3082088003	CWMP009W	SW846 9060A	
3082088003	CWMP009W	SW846 9066	420.4/9066
3082088004	CWMP008W	ASTM D6919-09	
3082088004	CWMP008W	EPA 300.0	
3082088004	CWMP008W	EPA 410.4	
3082088004	CWMP008W	Field	
3082088004	CWMP008W	S2540C-11	
3082088004	CWMP008W	S4500HB-11	
3082088004	CWMP008W	SM2130B-2011	

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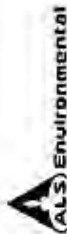
ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3082088 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3082088004	CWMP008W	SM2320B-2011	
3082088004	CWMP008W	SW846 6010C	SW846 3015
3082088004	CWMP008W	SW846 8260B	
3082088004	CWMP008W	SW846 9050A	
3082088004	CWMP008W	SW846 9060A	
3082088004	CWMP008W	SW846 9066	420.4/9066
3082088005	Field Blank	SW846 8260B	
3082088006	Trip Blank	SW846 8260B	

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34 Dogwood Lane • Middletown, PA 17057 • Tel: 717-944-5511 • Fax: 717-944-1430
 In Lancaster & Middletown, PA 17057 • Phone: 717-944-5511 • Fax: 717-944-1430 • www.als.com

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: Y N **Approved By:** _____
Email? Y N **Approved By:** mreider@LCSWMA.com
Fax? Y N **No.:** (717) 397-9973

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time
1. CWMF016W	01/22/20	1207
2. CWMF010W	01/22/20	1236
3. CWMF009W	01/22/20	1306
4. CWMF008W	01/22/20	1338
5. Field Blank	01/22/20	1500
6. Trip Blank	01/22/20	1600
7		
8		
9		
10		

Project Comments:
 Relinquished By / Company Name: ALS
 Date: 1-22-20 Time: 1600
 Received By / Company Name: COM
 Date: 1/22/20 Time: 1600

**CHAIN OF CUSTODY/
 REQUEST FOR ANALYSIS**
**ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT/
 SAMPLER. INSTRUCTIONS ON THE BACK.**

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

Field Measurements	Sample Depth for AUX Data	Total Metals: Ca, Fe, Mn, Mg, K, Na	PH	TDS	Alkalinity, HCO3
8260 VOCs - Form 19Q	NH3-N, COD				

Matrix	TOC	O-H	8260 VOCs - Form 19Q	Field Measurements	Sample Depth for AUX Data	Total Metals: Ca, Fe, Mn, Mg, K, Na	PH	TDS	Alkalinity, HCO3
G	2	1	2	X	X	1	1	1	1
GW	2	1	2	X	X	1	1	1	1
G	2	1	2	X	X	1	1	1	1
GW	2	1	2	X	X	1	1	1	1
G	2	1	2	X	X	1	1	1	1
GW	2	1	2	X	X	1	1	1	1
G	2	1	2	X	X	1	1	1	1
GW	2	1	2	X	X	1	1	1	1
G	2	1	2	X	X	1	1	1	1
GW	2	1	2	X	X	1	1	1	1

LOGGED BY (signature):	REVIEWED BY (signature):	Date	Time
		1-22-20	1600

COC
ALS
 1 of 1
 3 0 8 2 0 8 8 *

Cooler Temp: 6 Therm ID: 318
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?

Counter/Tracking #:
Sample/COC Comments:

ALS Field Services: Pickup Labor
 Composite_Sampling Rental_Equipment
 Other:
Special Processing: USACE
 Navy
State Samples Collected In: NY
 NJ
 PA
 NC
Sample Disposal: Lab
 Special
Reportable to PADEP? Yes
PWSID #
EDDS: Format Type-





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

Condition of Sample Receipt Form

Client: Lancaster County SWMA Work Order #: 3082088 Initials: GM Date: 1/22/2020

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

Cooler #: _____
 Temperature (°C): 6°C
 Thermometer ID: 318
 Radiological (µCi): _____

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

Rev. 4/29/2019





January 31, 2020

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

Certificate of Analysis

Project Name:	CRESWELL	Workorder:	3082377
Purchase Order:	PO1000127	Workorder ID:	1st QTR 2020 CWMP-FORM 19Q

Dear Mr. Brown:

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

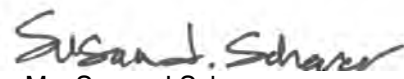
Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable. For a specific list of accredited analytes, refer to the certifications 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: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3082377001	CWMP012W	Ground Water	1/23/2020 09:30	1/23/2020 15:27	Mr. Brian G Shade
3082377002	CWMP005W	Ground Water	1/23/2020 10:26	1/23/2020 15:27	Mr. Brian G Shade
3082377003	CWMP018S	Ground Water	1/23/2020 11:00	1/23/2020 15:27	Mr. Brian G Shade
3082377004	CWMP017S	Ground Water	1/23/2020 11:23	1/23/2020 15:27	Mr. Brian G Shade
3082377005	CWMP003W	Ground Water	1/23/2020 12:25	1/23/2020 15:27	Mr. Brian G Shade
3082377006	CWMP004W	Ground Water	1/23/2020 12:37	1/23/2020 15:27	Mr. Brian G Shade
3082377007	Field Blank	Water	1/23/2020 13:26	1/23/2020 15:27	Mr. Brian G Shade
3082377008	Trip Blank	Water	1/23/2020 15:27	1/23/2020 15:27	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3082377 1st 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 performed 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: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377001** Date Collected: 1/23/2020 09:30 Matrix: Ground Water
 Sample ID: **CWMP012W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 03:32	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 03:32	VLM	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>
1,2-Dichloroethane-d4 (S)	116		%	62 - 133	SW846 8260B			1/25/20 03:32	VLM	G
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			1/25/20 03:32	VLM	G
Dibromofluoromethane (S)	109		%	78 - 116	SW846 8260B			1/25/20 03:32	VLM	G
Toluene-d8 (S)	105		%	76 - 127	SW846 8260B			1/25/20 03:32	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	66		mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Alkalinity, Total	66	2	mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 13:14	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	33.3		mg/L	2.0	EPA 300.0			1/24/20 05:57	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/24/20 05:57	MBW	B
Nitrate-N	9.0		mg/L	0.20	EPA 300.0			1/24/20 05:57	MBW	B
pH	6.80	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	310		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	5.2		mg/L	2.0	EPA 300.0			1/24/20 05:57	MBW	B
Total Dissolved Solids	190		mg/L	5	S2540C-11			1/27/20 16:04	D1C	B
Total Organic Carbon (TOC)	1.3		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	258		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377001** Date Collected: 1/23/2020 09:30 Matrix: Ground Water
 Sample ID: **CWMP012W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	32.2		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
Iron, Total	25.4		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
Magnesium, Total	9.1		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
Manganese, Total	0.17		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
Potassium, Total	1.6		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
Sodium, Total	13.5		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:26	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	48.82		Feet		Field			1/23/20 09:30	BGS	C
pH, Field (SM4500B)	5.38		pH_Units		Field			1/23/20 09:30	BGS	C
Specific Conductance, Field	312		umhos/cm	1	Field			1/23/20 09:30	BGS	C
Temperature	12.90		Deg. C		Field			1/23/20 09:30	BGS	C

Susan J. Scherer
 Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377002** Date Collected: 1/23/2020 10:26 Matrix: Ground Water
 Sample ID: **CWMP005W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 03:55	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 03:55	VLM	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>
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			1/25/20 03:55	VLM	G
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			1/25/20 03:55	VLM	G
Dibromofluoromethane (S)	111		%	78 - 116	SW846 8260B			1/25/20 03:55	VLM	G
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			1/25/20 03:55	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	18		mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Alkalinity, Total	18	2	mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 12:17	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	57.4		mg/L	2.0	EPA 300.0			1/24/20 06:22	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/24/20 06:22	MBW	B
Nitrate-N	8.6		mg/L	0.20	EPA 300.0			1/24/20 06:22	MBW	B
pH	6.26	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	299		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	4.7		mg/L	2.0	EPA 300.0			1/24/20 06:22	MBW	B
Total Dissolved Solids	166		mg/L	5	S2540C-11			1/27/20 16:04	D1C	B
Total Organic Carbon (TOC)	0.75		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	1.38		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B

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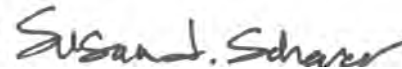
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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: 3082377002	Date Collected: 1/23/2020 10:26	Matrix: Ground Water
Sample ID: CWMP005W	Date Received: 1/23/2020 15:27	

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	14.5		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
Magnesium, Total	8.0		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
Manganese, Total	0.053		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
Potassium, Total	2.4		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
Sodium, Total	27.7		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:30	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	43.07		Feet		Field			1/23/20 10:26	BGS	C
Elev Top MW Casing above MSL	513.43		Feet		Field			1/23/20 10:26	BGS	C
Flow Rate	3.95		gal/min		Field			1/23/20 10:26	BGS	C
Ground Water Elevation	470.36		ft/MSL		Field			1/23/20 10:26	BGS	C
pH, Field (SM4500B)	5.20		pH_Units		Field			1/23/20 10:26	BGS	C
Sample Depth	130.00		Feet		Field			1/23/20 10:26	BGS	C
Specific Conductance, Field	318		umhos/cm	1	Field			1/23/20 10:26	BGS	C
Temperature	10.17		Deg. C		Field			1/23/20 10:26	BGS	C
Total Well Depth	138.92		Feet		Field			1/23/20 10:26	BGS	C
Volume in Water Column	140.90		Gallons		Field			1/23/20 10:26	BGS	C
Water Level After Purge	44.41		Feet		Field			1/23/20 10:26	BGS	C
Well Volumes Purged	2.24		Vol		Field			1/23/20 10:26	BGS	C



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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377003** Date Collected: 1/23/2020 11:00 Matrix: Ground Water
 Sample ID: **CWMP018S** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 04:17	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 04:17	VLM	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>
1,2-Dichloroethane-d4 (S)	118		%	62 - 133	SW846 8260B			1/25/20 04:17	VLM	G
4-Bromofluorobenzene (S)	109		%	79 - 114	SW846 8260B			1/25/20 04:17	VLM	G
Dibromofluoromethane (S)	110		%	78 - 116	SW846 8260B			1/25/20 04:17	VLM	G
Toluene-d8 (S)	107		%	76 - 127	SW846 8260B			1/25/20 04:17	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	409		mg/L	5	SM2320B-2011			1/31/20 02:53	MBW	B
Alkalinity, Total	409	2	mg/L	5	SM2320B-2011			1/31/20 02:53	MBW	B
Ammonia-N	0.292		mg/L	0.100	ASTM D6919-09			1/28/20 11:49	JWB	A
Chemical Oxygen Demand (COD)	18		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	490		mg/L	10.0	EPA 300.0			1/28/20 05:04	MBW	B
Fluoride	ND		mg/L	0.50	EPA 300.0			1/24/20 06:40	MBW	B
Nitrate-N	19.7		mg/L	0.50	EPA 300.0			1/24/20 06:40	MBW	B
pH	8.50	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	2320		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	30.7		mg/L	5.0	EPA 300.0			1/24/20 06:40	MBW	B
Total Dissolved Solids	1270		mg/L	5	S2540C-11			1/27/20 16:04	D1C	B
Total Organic Carbon (TOC)	7.2		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	1.02		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B

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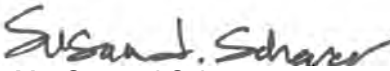
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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377003** Date Collected: 1/23/2020 11:00 Matrix: Ground Water
 Sample ID: **CWMP018S** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	78.5		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
Iron, Total	0.18		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
Magnesium, Total	81.2		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
Manganese, Total	0.18		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
Potassium, Total	18.2		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
Sodium, Total	296		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:33	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	18.73		mg/L	0.01	Field			1/23/20 11:00	BGS	C
pH, Field (SM4500B)	7.53		pH_Units		Field			1/23/20 11:00	BGS	C
Specific Conductance, Field	2536		umhos/cm	1	Field			1/23/20 11:00	BGS	C
Temperature	0.06		Deg. C		Field			1/23/20 11:00	BGS	C


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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377004** Date Collected: 1/23/2020 11:23 Matrix: Ground Water
Sample ID: **CWMP017S** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 04:40	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 04:40	VLM	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>
1,2-Dichloroethane-d4 (S)	120		%	62 - 133	SW846 8260B			1/25/20 04:40	VLM	G
4-Bromofluorobenzene (S)	109		%	79 - 114	SW846 8260B			1/25/20 04:40	VLM	G
Dibromofluoromethane (S)	112		%	78 - 116	SW846 8260B			1/25/20 04:40	VLM	G
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			1/25/20 04:40	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	674		mg/L	5	SM2320B-2011			1/31/20 02:53	MBW	B
Alkalinity, Total	674	2	mg/L	5	SM2320B-2011			1/31/20 02:53	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 11:35	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	826		mg/L	10.0	EPA 300.0			1/28/20 05:22	MBW	B
Fluoride	ND		mg/L	0.50	EPA 300.0			1/24/20 06:57	MBW	B
Nitrate-N	27.7		mg/L	0.50	EPA 300.0			1/24/20 06:57	MBW	B
pH	8.40	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	3640		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	25.4		mg/L	5.0	EPA 300.0			1/24/20 06:57	MBW	B
Total Dissolved Solids	2020		mg/L	5	S2540C-11			1/27/20 16:04	D1C	B
Total Organic Carbon (TOC)	4.7		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	2.26		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377004** Date Collected: 1/23/2020 11:23 Matrix: Ground Water
 Sample ID: **CWMP017S** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	96.5		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
Iron, Total	1.1		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
Magnesium, Total	132		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
Manganese, Total	0.11		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
Potassium, Total	23.5		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
Sodium, Total	496		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:45	SRT	J1
FIELD PARAMETERS										
Dissolved Oxygen	13.17		mg/L	0.01	Field			1/23/20 11:33	BGS	C
pH, Field (SM4500B)	7.99		pH_Units		Field			1/23/20 11:33	BGS	C
Specific Conductance, Field	3858		umhos/cm	1	Field			1/23/20 11:33	BGS	C
Temperature	10.00		Deg. C		Field			1/23/20 11:33	BGS	C

Susan J. Scherer
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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377005** Date Collected: 1/23/2020 12:25 Matrix: Ground Water
Sample ID: **CWMP003W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Bromoform	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Bromomethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Chloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Chloroform	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Chloromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,1-Dichloroethane	1.3		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			1/25/20 05:02	VLM	D
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Styrene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			1/25/20 05:02	VLM	D
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			1/25/20 05:02	VLM	D
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:02	VLM	D
<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: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377005** Date Collected: 1/23/2020 12:25 Matrix: Ground Water
Sample ID: **CWMP003W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	119		%	62 - 133	SW846 8260B			1/25/20 05:02	VLM	D
4-Bromofluorobenzene (S)	107		%	79 - 114	SW846 8260B			1/25/20 05:02	VLM	D
Dibromofluoromethane (S)	111		%	78 - 116	SW846 8260B			1/25/20 05:02	VLM	D
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			1/25/20 05:02	VLM	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	22		mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Alkalinity, Total	22	2	mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 08:58	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	67.0		mg/L	2.0	EPA 300.0			1/24/20 08:42	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/24/20 08:42	MBW	B
Nitrate-N	7.6		mg/L	0.20	EPA 300.0			1/24/20 08:42	MBW	B
pH	6.68	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	340		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	5.3		mg/L	2.0	EPA 300.0			1/24/20 08:42	MBW	B
Total Dissolved Solids	200		mg/L	5	S2540C-11			1/28/20 14:49	D1C	B
Total Organic Carbon (TOC)	0.78		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B
METALS										
Calcium, Total	24.6		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
Magnesium, Total	9.1		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
Potassium, Total	1.9		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
Sodium, Total	23.4		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:49	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	99.77		Feet		Field			1/23/20 12:25	BGS	C
Elev Top MW Casing above MSL	524.21		Feet		Field			1/23/20 12:25	BGS	C
Ground Water Elevation	424.44		ft/MSL		Field			1/23/20 12:25	BGS	C
pH, Field (SM4500B)	5.39		pH_Units		Field			1/23/20 12:25	BGS	C
Sample Depth	100.00		Feet		Field			1/23/20 12:25	BGS	C
Specific Conductance, Field	365		umhos/cm	1	Field			1/23/20 12:25	BGS	C
Temperature	11.29		Deg. C		Field			1/23/20 12:25	BGS	C
Total Well Depth	140.00		Feet		Field			1/23/20 12:25	BGS	C

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377005** Date Collected: 1/23/2020 12:25 Matrix: Ground Water
Sample ID: **CWMP003W** Date Received: 1/23/2020 15:27

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

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377006** Date Collected: 1/23/2020 12:37 Matrix: Ground Water
 Sample ID: **CWMP004W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Bromoform	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Bromomethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Chloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Chloroform	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Chloromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,3-Dichloropropene, Total	ND		ug/L	2.0	SW846 8260B			1/25/20 05:25	VLM	D
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Styrene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2,4-Trichlorobenzene	ND		ug/L	2.0	SW846 8260B			1/25/20 05:25	VLM	D
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			1/25/20 05:25	VLM	D
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 05:25	VLM	D
<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: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377006** Date Collected: 1/23/2020 12:37 Matrix: Ground Water
 Sample ID: **CWMP004W** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
1,2-Dichloroethane-d4 (S)	120		%	62 - 133	SW846 8260B			1/25/20 05:25	VLM	D
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			1/25/20 05:25	VLM	D
Dibromofluoromethane (S)	111		%	78 - 116	SW846 8260B			1/25/20 05:25	VLM	D
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			1/25/20 05:25	VLM	D
WET CHEMISTRY										
Alkalinity, Bicarbonate	24		mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Alkalinity, Total	24	2	mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 10:24	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	47.6		mg/L	2.0	EPA 300.0			1/24/20 08:59	MBW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			1/24/20 08:59	MBW	B
Nitrate-N	7.1		mg/L	0.20	EPA 300.0			1/24/20 08:59	MBW	B
pH	6.48	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	273		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	6.0		mg/L	2.0	EPA 300.0			1/24/20 08:59	MBW	B
Total Dissolved Solids	140		mg/L	5	S2540C-11			1/28/20 14:49	D1C	B
Total Organic Carbon (TOC)	0.90		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B
METALS										
Calcium, Total	21.1		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
Magnesium, Total	7.4		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
Manganese, Total	0.010		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
Potassium, Total	1.6		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
Sodium, Total	16.7		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:52	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	102.31		Feet		Field			1/23/20 12:37	BGS	C
Elev Top MW Casing above MSL	529.53		Feet		Field			1/23/20 12:37	BGS	C
Ground Water Elevation	427.22		ft/MSL		Field			1/23/20 12:37	BGS	C
pH, Field (SM4500B)	5.61		pH_Units		Field			1/23/20 12:37	BGS	C
Sample Depth	130.00		Feet		Field			1/23/20 12:37	BGS	C
Specific Conductance, Field	292		umhos/cm	1	Field			1/23/20 12:37	BGS	C
Temperature	11.01		Deg. C		Field			1/23/20 12:37	BGS	C
Total Well Depth	140.00		Feet		Field			1/23/20 12:37	BGS	C

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377006**
Sample ID: **CWMP004W**

Date Collected: 1/23/2020 12:37 Matrix: Ground Water
Date Received: 1/23/2020 15:27

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

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377007** Date Collected: 1/23/2020 13:26 Matrix: Water
 Sample ID: **Field Blank** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 02:02	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 02:02	VLM	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>
1,2-Dichloroethane-d4 (S)	119		%	62 - 133	SW846 8260B			1/25/20 02:02	VLM	G
4-Bromofluorobenzene (S)	111		%	79 - 114	SW846 8260B			1/25/20 02:02	VLM	G
Dibromofluoromethane (S)	113		%	78 - 116	SW846 8260B			1/25/20 02:02	VLM	G
Toluene-d8 (S)	106		%	76 - 127	SW846 8260B			1/25/20 02:02	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND		mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Alkalinity, Total	ND	2	mg/L	5	SM2320B-2011			1/29/20 22:25	MBW	B
Ammonia-N	ND		mg/L	0.100	ASTM D6919-09			1/28/20 11:21	JWB	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			1/29/20 13:39	AK	A
Chloride	ND		mg/L	1.0	EPA 300.0			1/24/20 09:16	MBW	B
Fluoride	ND		mg/L	0.10	EPA 300.0			1/24/20 09:16	MBW	B
Nitrate-N	ND		mg/L	0.10	EPA 300.0			1/24/20 09:16	MBW	B
pH	4.49	1	pH_Units		S4500HB-11			1/29/20 22:25	MBW	B
Phenolics	ND		mg/L	0.005	SW846 9066	1/28/20 14:23	C_D	1/29/20 10:21	C_D	F
Specific Conductance	2		umhos/cm	1	SW846 9050A			1/29/20 22:25	MBW	B
Sulfate	ND		mg/L	1.0	EPA 300.0			1/24/20 09:16	MBW	B
Total Dissolved Solids	ND		mg/L	5	S2540C-11			1/28/20 14:49	D1C	B
Total Organic Carbon (TOC)	0.61		mg/L	0.50	SW846 9060A			1/28/20 05:02	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			1/24/20 05:05	MBW	B

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID: **3082377007** Date Collected: 1/23/2020 13:26 Matrix: Water
 Sample ID: **Field Blank** Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
METALS										
Calcium, Total	ND		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1
Magnesium, Total	ND		mg/L	0.11	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1
Potassium, Total	ND		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1
Sodium, Total	ND		mg/L	0.56	SW846 6010C	1/29/20 08:45	SRT	1/29/20 11:56	SRT	J1


 Ms. Susan J Scherer
 Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

 Lab ID: **3082377008**

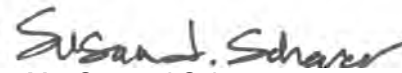
Date Collected: 1/23/2020 15:27

Matrix: Water

 Sample ID: **Trip Blank**

Date Received: 1/23/2020 15:27

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Toluene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			1/25/20 01:39	VLM	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			1/25/20 01:39	VLM	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>	<i>Cntr</i>
1,2-Dichloroethane-d4 (S)	119		%	62 - 133	SW846 8260B			1/25/20 01:39	VLM	A
4-Bromofluorobenzene (S)	108		%	79 - 114	SW846 8260B			1/25/20 01:39	VLM	A
Dibromofluoromethane (S)	109		%	78 - 116	SW846 8260B			1/25/20 01:39	VLM	A
Toluene-d8 (S)	105		%	76 - 127	SW846 8260B			1/25/20 01:39	VLM	A



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ANALYTICAL RESULTS

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3082377001	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.				
3082377001	2	CWMP012W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377002	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.				
3082377002	2	CWMP005W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377003	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.				
3082377003	2	CWMP018S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377004	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.				
3082377004	2	CWMP017S	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377005	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.				
3082377005	2	CWMP003W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377006	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.				
3082377006	2	CWMP004W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3082377007	1	Field Blank	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				
3082377007	2	Field Blank	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3082377001	CWMP012W	ASTM D6919-09	
3082377001	CWMP012W	EPA 300.0	
3082377001	CWMP012W	EPA 410.4	
3082377001	CWMP012W	Field	
3082377001	CWMP012W	S2540C-11	
3082377001	CWMP012W	S4500HB-11	
3082377001	CWMP012W	SM2130B-2011	
3082377001	CWMP012W	SM2320B-2011	
3082377001	CWMP012W	SW846 6010C	SW846 3015
3082377001	CWMP012W	SW846 8260B	
3082377001	CWMP012W	SW846 9050A	
3082377001	CWMP012W	SW846 9060A	
3082377001	CWMP012W	SW846 9066	420.4/9066
3082377002	CWMP005W	ASTM D6919-09	
3082377002	CWMP005W	EPA 300.0	
3082377002	CWMP005W	EPA 410.4	
3082377002	CWMP005W	Field	
3082377002	CWMP005W	S2540C-11	
3082377002	CWMP005W	S4500HB-11	
3082377002	CWMP005W	SM2130B-2011	
3082377002	CWMP005W	SM2320B-2011	
3082377002	CWMP005W	SW846 6010C	SW846 3015
3082377002	CWMP005W	SW846 8260B	
3082377002	CWMP005W	SW846 9050A	
3082377002	CWMP005W	SW846 9060A	
3082377002	CWMP005W	SW846 9066	420.4/9066
3082377003	CWMP018S	ASTM D6919-09	
3082377003	CWMP018S	EPA 300.0	
3082377003	CWMP018S	EPA 410.4	
3082377003	CWMP018S	Field	
3082377003	CWMP018S	S2540C-11	
3082377003	CWMP018S	S4500HB-11	
3082377003	CWMP018S	SM2130B-2011	
3082377003	CWMP018S	SM2320B-2011	
3082377003	CWMP018S	SW846 6010C	SW846 3015
3082377003	CWMP018S	SW846 8260B	
3082377003	CWMP018S	SW846 9050A	
3082377003	CWMP018S	SW846 9060A	
3082377003	CWMP018S	SW846 9066	420.4/9066
3082377004	CWMP017S	ASTM D6919-09	
3082377004	CWMP017S	EPA 300.0	
3082377004	CWMP017S	EPA 410.4	
3082377004	CWMP017S	Field	
3082377004	CWMP017S	S2540C-11	
3082377004	CWMP017S	S4500HB-11	
3082377004	CWMP017S	SM2130B-2011	

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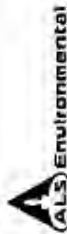
ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3082377 1st QTR 2020 CWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3082377004	CWMP017S	SM2320B-2011	
3082377004	CWMP017S	SW846 6010C	SW846 3015
3082377004	CWMP017S	SW846 8260B	
3082377004	CWMP017S	SW846 9050A	
3082377004	CWMP017S	SW846 9060A	
3082377004	CWMP017S	SW846 9066	420.4/9066
3082377005	CWMP003W	ASTM D6919-09	
3082377005	CWMP003W	EPA 300.0	
3082377005	CWMP003W	EPA 410.4	
3082377005	CWMP003W	Field	
3082377005	CWMP003W	S2540C-11	
3082377005	CWMP003W	S4500HB-11	
3082377005	CWMP003W	SM2130B-2011	
3082377005	CWMP003W	SM2320B-2011	
3082377005	CWMP003W	SW846 6010C	SW846 3015
3082377005	CWMP003W	SW846 8260B	
3082377005	CWMP003W	SW846 9050A	
3082377005	CWMP003W	SW846 9060A	
3082377005	CWMP003W	SW846 9066	420.4/9066
3082377006	CWMP004W	ASTM D6919-09	
3082377006	CWMP004W	EPA 300.0	
3082377006	CWMP004W	EPA 410.4	
3082377006	CWMP004W	Field	
3082377006	CWMP004W	S2540C-11	
3082377006	CWMP004W	S4500HB-11	
3082377006	CWMP004W	SM2130B-2011	
3082377006	CWMP004W	SM2320B-2011	
3082377006	CWMP004W	SW846 6010C	SW846 3015
3082377006	CWMP004W	SW846 8260B	
3082377006	CWMP004W	SW846 9050A	
3082377006	CWMP004W	SW846 9060A	
3082377006	CWMP004W	SW846 9066	420.4/9066
3082377007	Field Blank	ASTM D6919-09	
3082377007	Field Blank	EPA 300.0	
3082377007	Field Blank	EPA 410.4	
3082377007	Field Blank	S2540C-11	
3082377007	Field Blank	S4500HB-11	
3082377007	Field Blank	SM2130B-2011	
3082377007	Field Blank	SM2320B-2011	
3082377007	Field Blank	SW846 6010C	SW846 3015
3082377007	Field Blank	SW846 8260B	
3082377007	Field Blank	SW846 9050A	
3082377007	Field Blank	SW846 9060A	
3082377007	Field Blank	SW846 9066	420.4/9066
3082377008	Trip Blank	SW846 8260B	

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34 Dogwood Lane • Middletown, PA 17057 • Fax: 717.944.5541 • www.alsenv.com

**CHAIN OF CUSTODY/
REQUEST FOR ANALYSIS**
ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT/
SAMPLER. INSTRUCTIONS ON THE BACK.

Generated by ALS

COC #: 1
ALS QU: 1



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Client Name: Lancaster County Solid Waste MA

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

Lancaster, PA 17604

Contact: Matt Reider Dave Brock

Phone#: (717) 335-0193

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? X -Y mreider@LCSWMA.com

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

Sample Description/Location

(as it will appear on the lab report)

Sample Date

Time

1. CWM012W

01/23/20

0930

2. CWM005W

01/23/20

1026

3. CWM018S

01/23/20

1100

4. CWM017S

01/23/20

1123

5. CWM003W

01/23/20

1225

6. CWM004W

01/23/20

1237

7. Field Blank

01/23/20

1326

8. Trip Blank

01/23/20

9

10

Project Comments:

LOGGED BY (signature):

REVIEWED BY (signature):

Date

Time

1-23-20 10:27

2

4

6

8

10

Relinquished By / Company Name

Date

Time

1/23/20 15:27

2

4

6

8

10

Received By / Company Name

Date

Time

1/23/20 15:27

2

4

6

8

10

Deliverables

Standard

CLP-like

USACE

Reportable to PADEP?

Yes

PWSID #

EDDS: Formal Type-

Special Processing

USACE

Navy

Sample Disposal

Lab

Special

State Samples Collected In

NY

NJ

PA

NC

Cooler Temp: 4 Therm ID: 535

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:



301 Fulling Mill Road
Middletown, PA 17057

P: (717) 944-5541

F: (717) 944-1430

Condition of Sample Receipt Form

Client: LCSWMA Work Order #: 3082377 Initials: CS Date: 1/23/2020

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

Cooler #: _____
 Temperature (°C): 4
 Thermometer ID: 525
 Radiological (µCi): _____

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

Rev. 4/29/2019