LCSWMA

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April 8, 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: 4th Quarter 2019 Form 19, 50 and 52 Submittal
Frey Farm Landfill; BWM Permit #101389

Dear Ms. Kinkaid:

In accordance with the Municipal Waste Management Regulations, the Lancaster County Solid Waste Management Authority (LCSWMA) continues the above-referenced monitoring program.

LCSWMA provided the 4th Quarter 2019 data on January 9, 2020 to ARM Group and then ARM Group has provided an analysis for the groundwater, leachate, and contiguous landowners data. ARM Group's report is attached to this submittal.

Groundwater:

In accordance with the Municipal Waste Management Regulations, the Lancaster County Solid Waste Management Authority (LCSWMA) continues the above-referenced monitoring program.

Attached are the Forms 19, laboratory reports, and data export excel file for uploading the data into your LandLinks Access database.

Leachate:

In accordance with both the Pennsylvania Municipal Waste Management and the Federal Subtitle D Regulations, the Lancaster County Solid Waste Management Authority (LCSWMA) continues to complete the above referenced monitoring program. Enclosed is the Department's Form 50 - "Municipal Waste Landfill Leachate Analysis" for the quarterly monitoring period.

- LCSWMA continues to monitor the Form 50 parameters from location FFLEINFS. This location is the leachate collection system for the Frey Farm Landfill and represents "raw" leachate characteristics for the facility, as collected from the six (6) landfill cells.

- As indicated on the Form 50, the primary leachate collection and secondary detection systems encompass approximately 93 acres of drainage area.

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- At DEP's request, we have included analyses of the four (4) secondary individual detection zone discharges with an individual Form 50 for each.

- Included on the CD are files which contains the FFLEINFS data in a compatible format for your LandLinks software. The CD also contains a pdf file of the laboratory results and the Form 50.

In accordance with Section 273.255(d)(1)(2) and (3) of the Municipal Waste Management Regulations, the Lancaster County Solid Waste Management Authority (LCSWMA) is providing this secondary flow report.

The 4th Quarter Frey Farm Landfill (FFLF) secondary flow was noted at 1.81 gallons per day per acre (gpdpa); which is below the regulatory limit of 100 gpdpa. The 4th Quarter secondary flow was 0.80% of the primary flow, which is below the regulatory 10% (maximum). Table 1 indicates this quarter's weekly flow information for the six (6) operational cells at the FFLF, cells 2 and 4 continue to indicate no secondary flow present.

- Consistent with all previous monitoring events, LCSWMA remains well below the secondary leachate flow threshold (100-gpdpa)

Contiguous Landowners:

Attached are the Forms 52, laboratory reports, and a data export excel file for uploading the data into your LandLinks Access database.

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

Respectfully submitted,

Daniel A. Brown
Environmental Compliance Manager

Enclosures

Cc: LCSWMA: Environmental, John Ridinger, Aaron Rice
PA DEP: Ed Rawski, Randy Weiss

ARM Group LLC
Engineers and Scientists

April 7, 2020

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

Re: LCSWMA Frey Farm Landfill
Permit No. 101389
Manor Township
Lancaster County, Pennsylvania
Third Quarter 2019 Water Quality Data Review
ARM Project 190783

Dear Mr. Brown:

ARM Group LLC (ARM) has prepared this assessment at the request of the Lancaster County Solid Waste Management Authority (LCSWMA) to provide an evaluation of the Fourth Quarter 2019 water quality monitoring results for Frey Farm Landfill (FFLF). As part of this evaluation, ARM reviewed the historic and Fourth Quarter 2019 laboratory analytical results for the sampled upgradient and downgradient Form 19 groundwater monitoring wells, Form 50 leachate collection and detection zones, and Form 52 contiguous private wells.

The groundwater and leachate samples collected by LCSWMA during the Fourth Quarter 2019 were analyzed for quarterly Form 19, Form 50, and Form 52 parameters, as applicable. The following narrative provides a summary of noteworthy observations of the results for the Fourth Quarter of 2019, 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 groundwater 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, FFMP002W (MP-2), using laboratory analytical results provided by LCSWMA from the First Quarter 2009 through the most recent quarter (Fourth Quarter 2019).

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 Dixon's and Rosner's Tests 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-2. The Dixon's Test applies to populations of 3-25 values, and the Rosner's Test is valid for populations of more than 25 values. ARM identified 44 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 Fourth Quarter 2019 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-2 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 95% 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 Fourth Quarter 2019 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), chemical oxygen demand (COD), and total phenolics because of a historical lack of detections in MP-2. A background level could therefore not be accurately 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 these parameters in the downgradient wells due to their historical absence in the upgradient groundwater.

The attached **Table 1** summarizes the background exceedances in the downgradient Form 19 wells during the Fourth Quarter 2019. The attached **Table 2** summarizes the background exceedances in the downgradient Form 52 wells during the Fourth Quarter 2019. Background exceedances shown in **Tables 1 and 2** denote a statistically significant increase of concentrations relative to those observed historically in the upgradient well MP-2. 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 Form 19 Well Summary

- MP-2 – No parameters are above the statistical background level in this upgradient well for the Fourth Quarter 2019, indicating that groundwater quality appears relatively stable upgradient of the site. Alkalinity, ammonia-N, calcium, manganese, potassium, sodium, specific conductance (SpC), total dissolved solids (TDS), and total organic carbon (TOC) concentrations increased rapidly in 2012 to historical high levels. All these parameters have returned to apparently stable, long-term trends in line with historical average levels since 2014. pH has fluctuated over a range of approximately 0.5 unit over the past several years but appears to have a steady long-term trend. All other Form 19 analytical parameters appear to be stable and within historical concentration ranges.

- MP-5 – Parameters above background in this well include ammonia-N, calcium, chloride, magnesium, sodium, SpC, TDS, and total organic carbon (TOC). Concentrations of these parameters historically appeared stable until an increase in 2018. These concentrations have decreased over the past five quarters and now generally appear in line with the historical averages. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.6 unit higher, on average, while fluctuating over a slightly wider range.

- MP-15 – Magnesium is above background in this well and appears to be increasing in concentration since early 2018. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.7 unit higher, on average, while fluctuating over a slightly wider range.

- MP-16 – Chloride, magnesium, and sodium levels are above background in this well. Concentrations of these parameters appear to have a long-term stable trend with short-term fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.8 unit higher than background, on average.

- MP-17 – Parameters above background in this well include calcium, chloride, magnesium, manganese, sodium, SpC, TDS, and TOC. Concentrations of most of these parameters appear to be increasing over time. Two instances of apparent rapid increases in concentration occurred during 2012 and 2016. After both events, these parameter levels have generally appeared to stabilize. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.8 unit higher than background.

- MP-18 – Parameters above background in this well include chloride, magnesium, manganese, sodium, SpC, and TOC. Concentrations of these parameters appeared to spike during the First Quarter 2018 sampling event but have since returned to near historical average levels. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.5 unit higher, on average.

- MP-19 – Chloride is above background in this well and appears to be increasing slowly in concentration over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.6 units higher, on average.

- MP-25 – Chloride and magnesium levels are above background in this well. Concentrations of these parameters appear to be fluctuating rapidly and increasing slowly over time. pH appears to be increasing slowly since 2016 and is currently approximately 1.3 units higher than background.

- MP-28 – Parameters above background in this well include chloride, magnesium, sodium, TDS, and TOC. Chloride, sodium, and TDS concentrations appear to be elevated yet stable over time. Magnesium and TOC concentrations appear to be decreasing as a long-term trend with occasional fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.6 unit higher, on average, while fluctuating over a slightly wider range.

- MP-29 – Chloride levels are above background in this well and appear to fluctuate between 20-160 mg/L in a seasonal pattern, but there does not appear to be a long-term increasing or decreasing trend. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.5 unit higher, on average.

- MP-2DW – Parameters above background in this well include ammonia-N, calcium, chloride, iron, magnesium, manganese, sodium, SpC, TDS, and turbidity. These parameter concentrations appear to have increased between the Third Quarter 2017 and Fourth Quarter 2018 sampling events. They generally appear to be following a decreasing trend during subsequent quarters. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.2 units higher, on average.

- MP-2SW – Parameters above background in this well include chloride, iron, sodium, SpC, TDS, TOC, and turbidity. Chloride, sodium, SpC, TDS levels appear to be decreasing over time. Iron, TOC, and turbidity appear to be increasing over time with occasional fluctuations. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.8 unit higher, on average.

- MP-31 – Parameters above background in this well include iron, manganese, and turbidity. These parameter concentrations appear to be increasing slowly since the First Quarter 2018 sampling event. pH appears to mimic the trend observed in the upgradient well at levels approximately 2.1 units higher, on average, while fluctuating over a wider range.

- MP-32 – Parameters above background in this well include ammonia-N, iron, manganese, and turbidity. These parameter concentrations appear to be fluctuating rapidly but do not appear to show a long-term increasing or decreasing trend. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.8 units higher, on average, while fluctuating over a wider range.

- MP-33 – Parameters above background in this well include ammonia-N, chloride, iron, manganese, and turbidity. These parameter concentrations appear to be fluctuating but do not appear to show a long-term increasing or decreasing trend. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.9 unit higher, on average.

- MP-3A – Magnesium levels are above background in this well but appear to be steady long-term. pH appears to be increasing slowly over time and is currently approximately 0.8 units higher than background.

- MP-4A – Parameters above background in this well include alkalinity (bicarbonate and total), calcium, chloride, magnesium, sodium, SpC, and TDS. All these parameter concentrations appear to be either stable over time or decreasing. Calcium and TDS levels appear to be fluctuating rapidly within their long-term trends. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.9 units higher, on average, while fluctuating over a slightly wider range.

- MP-26R – Parameters above background in this well include chloride, magnesium, manganese, sodium, SpC, sulfate, TDS, and TOC. Most of these parameters appear to be increasing slowly since 2014. Sulfate and TOC appear to be fluctuating rapidly but not increasing long-term. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.4 unit higher, on average.

- MP-30R – Parameters above background in this well include chloride, iron, magnesium, manganese, sodium, SpC, TDS, TOC, and turbidity. These parameter concentrations appear to be fluctuating across a relatively wide range of values with no apparent long-term trends. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.6 unit higher, on average, while fluctuating over a wider range.

Parameters not noted above are either at or below background levels. Overall, the groundwater quality at FFLF appears to be stable. Most parameters noted as being elevated above background levels do not appear to be increasing over time. Several parameters appear to be fluctuating but do not show an apparent long-term increasing or decreasing trend. ARM will continue to closely assess the noted parameters with increasing trends to see if any changes to the trends occur over time.

Form 50 Leachate Zone Summary

ARM reviewed the historic and Fourth Quarter 2019 laboratory analytical results for sample location FFLEINFS (grab samples collected from the combined flow from FFLF's primary leachate collection lines) and four (4) manholes which represent the secondary leachate detection zones (FFMH01SS, FFMH03SS, FFMH05SS, and FFMH06SS).

Leachate flows in the primary and secondary zones appear to be generally stable over time apart from occasional fluctuations. Flows from the secondary zones appear to fluctuate seasonally, with the highest flows generally occurring in the first quarter and the lowest flows generally occurring in the third quarter.

Form 50 VOC Detections and Apparent Trends

2-butanone (MEK), 4-methyl-2-pentanone (MIK), acetone, methylene chloride, and toluene have historically been present in FFLEINFS, but none of these VOC concentrations appear to be increasing over time.

1,1-dichloroethane, 1,4-dichlorobenzene, acetone, benzene, cis-1,2-dichloroethene, ethylbenzene, and xylenes have historically been present at low levels in FFMH01SS. 1,4-dichlorobenzene levels appear to be very slowly increasing over time, and the other noted VOC concentrations appear to be stable or decreasing.

Acetone has historically been present at levels between approximately 10-30 µg/l in FFMH03SS and FFMH05SS, although concentrations do not appear to be increasing over time.

Other Form 50 Detections and Apparent Trends

Ammonia-N, barium, chloride, iron, pH, potassium, sodium, and TOC levels appear to be increasing long-term at FFLEINFS and FFMH01SS. COD, nitrate-N, SpC, sulfate, TDS, and TOC appear to be decreasing at FFMH05SS. Alkalinity, calcium, magnesium, and manganese concentrations fluctuate across a wide range of values in the historical leachate results, but no long-term trends are apparent for these parameters. ARM will continue to closely assess the noted parameters with increasing trends to see if any changes to the trends occur over time.

Form 50 MCL Exceedances and Form 19 Subtitle D Parameter Analysis

Form 19 groundwater monitoring wells are subject to additional analysis of Subtitle D parameters at the next annual sampling event if secondary leachate samples collected from an upgradient cell are found to exceed the primary maximum contaminant limit (MCL) of a regulated compound. For the Fourth Quarter 2019, the analysis for the secondary leachate sample collected from FFMH01SS resulted in MCL exceedances for barium and cadmium. FFMH03SS had MCL exceedances for cadmium and nitrate-N. FFMH06SS had an MCL exceedance for cadmium. All downgradient wells should therefore be sampled for Subtitle D Form 19 parameters at the next annual sampling event.

Form 52 Contiguous Private Wells Summary

ARM reviewed the historic and Fourth Quarter 2019 groundwater monitoring results for ten (10) contiguous privately-owned wells. Samples collected from these wells were analyzed for Form 52 parameters. The attached **Table 2** summarizes the background exceedances in the downgradient Form 52 wells during the Fourth Quarter 2019. Background exceedances shown in **Table 2** denote a statistically significant increase of concentrations relative to those observed historically in the upgradient well MP-2.

- 3044RIVERRD – Parameters above background in this well include total iron, total magnesium, methylene chloride, and dissolved potassium. Iron levels fluctuate in an apparently seasonal pattern and appear to generally trend toward an increase since 2017. Magnesium and potassium levels appear to be stable and not increasing over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.6 unit higher, on average, while fluctuating over a slightly wider range. Methylene chloride was detected at 1.2 µg/L in this well. This is the first detection according to the historical analytical data and represents potential laboratory contamination. ARM will closely assess future results to confirm if this is an anomalous result.

- 3052RIVERRD – Dissolved potassium is above background in this well but appears to be stable long-term. pH appears to be slowly increasing since 2017 and is currently approximately 0.6 unit higher than background.

- 3056RIVERRD – Parameters above background in this well include total and dissolved magnesium and dissolved potassium. Concentrations of both parameters appear to be stable and not increasing over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.1 unit higher, on average, while fluctuating over a slightly wider range.

- 3060RIVERRD – Dissolved potassium is above background in this well but appears to be stable long-term. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.1 unit lower, on average, while fluctuating over a slightly wider range.

- 3076RIVERRD – Parameters above background in this well include chloride, dissolved potassium, and total and dissolved sodium. Chloride and sodium levels appear to be stable and not increasing over time. Potassium levels appear to be trending toward an increase since the First Quarter 2019. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.2 unit higher, on average.

- 3079RIVERRD – Parameters above background in this well include chloride, total manganese, and dissolved potassium. Chloride levels fluctuate in an apparently seasonal manner but do not appear to be trending toward an increase over time. Manganese levels appear to be trending toward a long-term increase since approximately 2015. Potassium levels appear to be trending toward an increase since the First Quarter 2019. pH appears to be slowly increasing since 2017 and is currently approximately 1.2 units higher than background.

- 3088RIVERRD – Parameters above background in this well include chloride, dissolved potassium, total and dissolved sodium, SpC, and TDS. Chloride, SpC, and TDS levels appear to be steadily increasing over time since 2013. Potassium levels appear to be stable and not increasing over time. Sodium levels increased rapidly during 2013 and appear to still be increasing slowly over the subsequent years. There appears to be a seasonal fluctuation pattern in the chloride, sodium, and SpC levels, indicating that road salt application may be influencing these parameter concentration increases. pH appears to mimic the trend observed in the upgradient well at levels approximately 1.5 units higher, on average, while fluctuating over a slightly wider range.

- 3100RIVERRD – Parameters above background in this well include chloride and dissolved potassium. Concentrations of both parameters appear to be stable and not increasing over time. pH appears to mimic the trend observed in the upgradient well at levels approximately 0.4 unit higher, on average.

- 3106RIVERRD – Parameters above background in this well include dissolved calcium, chloride, total and dissolved magnesium, dissolved potassium, total and dissolved sodium, and SpC. Concentrations of all these parameters appear to be trending toward an increase since the First Quarter 2019. Since late 2015, pH appears to mimic the trend observed in the upgradient well at levels approximately 1.0 unit higher, on average.

- 3125RIVERRD – Parameters above background in this well include total and bicarbonate alkalinity, chloride, dissolved potassium, total and dissolved sodium, SpC, and TDS. Chloride levels fluctuate in an apparently seasonal manner but do not appear to be trending toward an increase over time. Sodium, SpC, and TDS levels appear to be decreasing since the Second Quarter 2018. Total and bicarbonate alkalinity and potassium levels increased during the Second, Third, and Fourth Quarters 2018 and remain elevated above background levels. pH also appears to be increasing since early 2018 and is currently approximately 2.2 units higher than background.

Form 52 parameters not noted above are either at or below background levels. ARM will continue to assess the noted apparent trends in the Form 52 results to see if any changes in the trends develop.

Closing

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

Sincerely,
ARM Group LLC

Ryan A. Brandon

Ryan Brandon
Project Hydrogeologist II

Scott A. Wendling

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

Enclosed: Tables 1-2
Attachments 1-2

TABLES

Table 1. LCSWMA Frey Farm Landfill Form 19 Groundwater Monitoring Well Background Standard Comparisons - 4th Quarter 2019

Parameter	Background Standard	Units	FFMP002W	FFMP005W	FFMP015W	FFMP016W	FFMP017W	FFMP018W	FFMP019W	FFMP025W	FFMP028W	FFMP029W	FFMP02DW	FFMP02SW	FFMP031W	FFMP032W	FFMP033W	FFMP03AW	FFMP04AW	FFMP26RW	FFMP30RW
1,1,1-TRICHLOROETHANE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHANE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-DICHLOROETHENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-DIBROMOETHANE (EDB) (ETHYLENE DIBROMIDE)	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-DICHLOROETHANE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
ALKALINITY	145.8	mg/L	< 5	55	19	35	53	30	80	37	34	14	138	19	81	90	55	20	243	50	42
AMMONIA-NITROGEN	0.313	mg/L	< 0.10	0.49	< 0.10	0.11	0.14	0.17	0.17	< 0.10	< 0.10	0.19	0.32	0.16	< 0.10	0.60	0.70	< 0.10	0.11	0.15	0.15
BENZENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BICARBONATE	143.2	mg/L	< 5	55	19	35	53	30	80	37	34	14	138	19	81	90	55	20	243	50	42
CALCIUM, TOTAL	73.74	mg/L	20.4	79.5	11.7	29	92.9	35.5	59	21.7	41.4	14.6	107	24.7	41.2	15.2	26.7	17.6	150	72	43.1
CHLORIDE	30.97	mg/L	21.1	187	13.4	68.5	348	99.2	81.1	51.8	89.4	61.9	264	133	23.5	21.2	39.2	24.7	296	195	229
cis 1,2-DICHLOROETHENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
COD (CHEMICAL OXYGEN DEMAND)	15*	mg/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
ETHYLBENZENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FLUORIDE	0.5	mg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.26	< 0.2	< 0.2	0.20	< 0.2	< 0.2	< 0.2
IRON, TOTAL	0.185	mg/L	< 0.06	< 0.06	< 0.06	< 0.06	0.09	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	0.66	1.7	3.8	7.8	6	< 0.06	< 0.06	< 0.06	0.27
MAGNESIUM, TOTAL	10.17	mg/L	8.2	19.3	12	14.6	41.6	16.2	5.8	11.9	17.5	10.1	17	9.6	4.1	5.1	9	12.7	25.1	19.9	16.9
MANGANESE, TOTAL	0.329	mg/L	0.26	0.090	0.030	0.010	0.45	0.35	< 0.0056	0.0066	0.0092	0.030	0.45	0.030	0.36	0.65	0.49	0.26	0.20	0.50	3.0
METHYLENE CHLORIDE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
NITRATE-NITROGEN	28.82	mg/L	20.0	3.1	14.9	10.1	2.3	5.5	0.32	8.0	18.6	3.9	10.3	14.8	< 0.20	< 0.20	11.6	20.0	0.30	2.1	5.9
POTASSIUM, TOTAL	10.69	mg/L	1.9	3.5	2.1	3.0	5.2	6.5	1.2	2.4	2.2	2.4	2.0	5.1	1.5	1.5	1.7	1.4	2.5	8.4	6.8
SODIUM, TOTAL	22.3	mg/L	15.0	47.8	18.9	27.8	79.2	35.8	10.5	19.5	28.0	21.2	102	88.5	10.4	13.8	14.1	12.2	83.9	64.0	112
SPEC. COND., LAB	582.1	µmho/cm	261	981	252	428	1,530	613	478	306	552	323	1,370	719	269	169	294	264	1,560	1,020	1,090
SULFATE	59.97	mg/L	23.3	52.9	36.5	26	56	39.9	16.4	23.9	26.7	6.8	29.9	29.9	45.7	< 2.0	7.4	3.1	46.4	65.5	32.9
TDS (TOTAL DISSOLVED SOLIDS)	338.6	mg/L	220	628	304	284	900	290	256	188	426	146	714	360	122	92	284	80	922	502	626
TETRACHLOROETHENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TOC (TOTAL ORGANIC CARBON)	1.06	mg/L	0.8	1.2	1.0	0.88	2.1	1.1	0.92	0.91	1.1	< 0.5	0.74	1.5	0.58	0.64	< 0.5	0.57	0.91	1.5	1.3
TOLUENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TOTAL PHENOLICS	0.005*	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans 1,2-DICHLOROETHENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TRICHLOROETHENE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TURBIDITY	1.792	NTU	< 0.10	< 0.10	< 0.10	0.18	0.48	< 0.10	< 0.10	0.11	< 0.10	0.18	6.51	62.7	14	150	5.81	< 0.10	0.34	0.70	3.07
VINYL CHLORIDE	1*	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
XYLENES (TOTAL)	3*	µg/L	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

Notes:
Gray text indicates a parameter non-detection.
Shaded text indicates a background standard exceedance.
* Reporting limit substituted for background standard due to lack of historical detections in the upgradient well.

Table 2. LCSWMA Frey Farm Landfill Form 52 Groundwater Monitoring Well Background Standard Comparisons - 4th Quarter 2019

Parameter	FFLF Background Standard	Units	3044 RIVER RD	3052 RIVER RD	3056 RIVER RD	3060 RIVER RD	3076 RIVER RD	3079 RIVER RD	3088 RIVER RD	3100 RIVER RD	3106 RIVER RD	3125 RIVER RD
ALKALINITY	**145.8**	mg/L	13	10	6	7	11	33	107	22	12	229
AMMONIA-NITROGEN	**0.311**	mg/L						0.21				
BICARBONATE ALKALINITY	**140.5**	mg/L	13	10	6	7	11	33	107	22	12	229
CALCIUM, DISSOLVED	**28.22**	mg/L	13.5	16.5	11.0	9.6	13.9	9.0	0.3	12.3	30.1	7.80
CALCIUM, TOTAL	**73.42**	mg/L	14.2	16.5	10.9	9.3	15.1	9.5	0.66	13.6	30.6	8.20
CHLORIDE	**30.9**	mg/L	20.5	20.6	23.9	17.2	46.4	31.8	237	38.2	155	73.6
IRON, TOTAL	**0.183**	mg/L	0.53								0.040	0.04
MAGNESIUM, DISSOLVED	**10.84**	mg/L	10.2	8.4	12.9	10.4	8.2	5.3	0.14	6.1	20.1	0.97
MAGNESIUM, TOTAL	**10.15**	mg/L	10.3	8.2	12.5	9.7	8.5	5.4	0.24	6.2	19.1	0.96
MANGANESE, DISSOLVED	**0.531**	mg/L	0.020	0.030	0.090	0.110	0.210	0.410		0.010	0.060	0.0079
MANGANESE, TOTAL	**0.33**	mg/L	0.020	0.030	0.080	0.090	0.190	0.360		0.010	0.050	0.0062
METHYLENE CHLORIDE	**1***	µg/L	1.2*									
NITRATE-NITROGEN	**28.76**	mg/L	17.7	17.5	18.7	14.3	10.0		6.1	3.3	14.2	5.6
pH-LAB	**NA**	S.U.	6.04	5.89	5.79	5.98	5.75	6.48	6.90	6.11	5.93	7.48
POTASSIUM, DISSOLVED	**1.685**	mg/L	2.0	2.1	2.4	2.5	4.5	3.0	4.1	2.4	3.1	5.6
POTASSIUM, TOTAL	**10.49**	mg/L	1.9	1.9	2.4	2.5	4.3	2.3	3.5	1.7	2.8	4.9
SODIUM, DISSOLVED	**21.81**	mg/L	9.0	8.1	8.2	9.2	24.3	14.2	207	17.5	57.1	138
SODIUM, TOTAL	**22.2**	mg/L	8.8	8.5	8.3	8.7	24.7	13.6	207	17.6	58.7	139
SPEC. COND., LAB	**575.3**	µmhos/cm	213	207	220	204	271	174	1,060	200	676	660
SULFATE	**59.53**	mg/L				8.8	12.3	15.6	2.6	10.8	5.4	9.8
TDS (TOT. DISSOLVED SOLIDS)	**337**	mg/L	180	166	188	162	198	120	508	144	226	404
TOC (TOTAL ORGANIC CARBON)	**1.065**	mg/L	0.62	0.57	0.52						0.51	
TURBIDITY	**1.747**	NTU		0.31							0.11	

Notes:
Blank cells indicate parameter not detected by laboratory.
Shaded text indicates exceedance of a FFLF statistical background standard.
*Methylene chloride has not been detected in any Form 52 results since 2Q 2013. This is a common laboratory contaminant. Future results will be closely monitored to confirm if this is an anomalous result.

ATTACHMENT 1

BACKGROUND UPPER PREDICTION LIMITS

LCSWMA Frey Farm Landfill 4th Quarter 2019 - Background Upper Prediction Limits (MP-2)			
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	145.8	mg/L
Ammonia-Nitrogen	Normal	0.311	mg/L
Benzene	NA	1*	µg/L
Bicarbonate Alkalinity	No Distribution	140.5	mg/L
Calcium, Dissolved	Normal	28.22	mg/L
Calcium, Total	No Distribution	73.42	mg/L
Chloride	Normal	30.90	mg/L
Cis 1,2-Dichloroethene	NA	1*	µg/L
Chemical Oxygen Demand	NA	15*	mg/L
Ethylbenzene	NA	1*	µg/L
Fluoride	No Distribution	0.50	mg/L
Iron, Dissolved	NA	0.066*	mg/L
Iron, Total	Lognormal	0.183	mg/L
Magnesium, Dissolved	Normal	10.84	mg/L
Magnesium, Total	Normal	10.15	mg/L
Manganese, Dissolved	Gamma	0.531	mg/L
Manganese, Total	Lognormal	0.330	mg/L
Methylene Chloride	NA	1*	µg/L
Nitrate-Nitrogen	No Distribution	28.76	mg/L
pH-Lab	NA	None**	S.U.
Potassium, Dissolved	Normal	1.685	mg/L
Potassium, Total	No Distribution	10.49	mg/L
Sodium, Dissolved	Normal	21.81	mg/L
Sodium, Total	Normal	22.2	mg/L
Spec. Cond., Lab	No Distribution	575.3	µmhos/cm
Sulfate	No Distribution	59.53	mg/L
Total Dissolved Solids	Normal	337	mg/L
Tetrachloroethene	NA	1*	µg/L
Total Organic Carbon	Normal	1.065	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	1.747	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-2 over course of historical data to develop tolerance limits.

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

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

ATTACHMENT 2

STATISTICAL CALCULATION SHEETS

1				Background Statistics for Data Sets with Non-Detects								
2		User Selected Options										
3		Date/Time of Computation		ProUCL 5.13/24/2020 9:24:28 PM								
4		From File		MP-2 ProUCL Entry.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	44			Number of Missing Observations	0				
15			Number of Distinct Observations	1								
16			Number of Detects	0			Number of Non-Detects	44				
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	44			Number of Missing Observations	0				
35			Number of Distinct Observations	1								
36			Number of Detects	0			Number of Non-Detects	44				
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												

	A	B	C	D	E	F	G	H	I	J	K	L
51	**1,1-DICHLOROETHENE (ug/L)**											
52												
53	**General Statistics**											
54	Total Number of Observations					44	Number of Missing Observations					0
55	Number of Distinct Observations					1						
56	Number of Detects					0	Number of Non-Detects					44
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					44	Number of Missing Observations					0
75	Number of Distinct Observations					1						
76	Number of Detects					0	Number of Non-Detects					44
77	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
78	Minimum Detect					N/A	Minimum Non-Detect					1
79	Maximum Detect					N/A	Maximum Non-Detect					1
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					44	Number of Missing Observations					0
95	Number of Distinct Observations					1						
96	Number of Detects					0	Number of Non-Detects					44
97	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
98	Minimum Detect					N/A	Minimum Non-Detect					1
99	Maximum Detect					N/A	Maximum Non-Detect					1
100	Variance Detected					N/A	Percent Non-Detects					100%

	Mean Detected	N/A
	Mean of Detected Logged Data	N/A
	SD Detected	N/A
	SD of Detected Logged Data	N/A

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

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

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

The data set for variable 1,2-DICHLOROETHANE was not processed!

ALKALINITY (mg/L)

General Statistics

Total Number of Observations	43	Number of Missing Observations	0
Number of Distinct Observations	14		
Number of Detects	20	Number of Non-Detects	23
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	5	Minimum Non-Detect	5
Maximum Detect	182	Maximum Non-Detect	5
Variance Detected	3029	Percent Non-Detects	53.49%
Mean Detected	42.2	SD Detected	55.03
Mean of Detected Logged Data	2.904	SD of Detected Logged Data	1.329

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.097	d2max (for USL)	2.897

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.725	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

KM Mean	22.3	KM SD	41.02
95% UTL95% Coverage	108.3	95% KM UPL (t)	92.09
90% KM Percentile (z)	74.87	95% KM Percentile (z)	89.77
99% KM Percentile (z)	117.7	95% KM USL	141.1

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	20.97	SD	42.09
95% UTL95% Coverage	109.2	95% UPL (t)	92.58
90% Percentile (z)	74.9	95% Percentile (z)	90.2
99% Percentile (z)	118.9	95% USL	142.9

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

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.479	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.782	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.263	**Kolmogorov-Smirnov GOF**

151	5% K-S Critical Value					0.202	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)					0.718	k star (bias corrected MLE)					0.644
156	Theta hat (MLE)					58.77	Theta star (bias corrected MLE)					65.56
157	nu hat (MLE)					28.72	nu star (bias corrected)					25.75
158	MLE Mean (bias corrected)					42.2						
159	MLE Sd (bias corrected)					52.6	95% Percentile of Chisquare (2kstar)					4.516
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.											
166	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
167	Minimum					0.01	Mean					19.63
168	Maximum					182	Median					0.01
169	SD					42.7	CV					2.175
170	k hat (MLE)					0.183	k star (bias corrected MLE)					0.185
171	Theta hat (MLE)					107.6	Theta star (bias corrected MLE)					106
172	nu hat (MLE)					15.7	nu star (bias corrected)					15.93
173	MLE Mean (bias corrected)					19.63	MLE Sd (bias corrected)					45.61
174	95% Percentile of Chisquare (2kstar)					1.947	90% Percentile					59.28
175	95% Percentile					103.1	99% Percentile					225.4
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	95% Approx. Gamma UTL with 95% Coverage			118.6	140		95% Approx. Gamma UPL				77.44	82.53
180	95% Gamma USL			241.6	341.8							
181												
182	**Estimates of Gamma Parameters using KM Estimates**											
183	Mean (KM)					22.3	SD (KM)					41.02
184	Variance (KM)					1682	SE of Mean (KM)					6.418
185	k hat (KM)					0.296	k star (KM)					0.291
186	nu hat (KM)					25.42	nu star (KM)					24.98
187	theta hat (KM)					75.44	theta star (KM)					76.77
188	80% gamma percentile (KM)					33.92	90% gamma percentile (KM)					66.02
189	95% gamma percentile (KM)					103.1	99% gamma percentile (KM)					199.8
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	95% Approx. Gamma UTL with 95% Coverage			94.75	93.35		95% Approx. Gamma UPL				70.24	67.31
195	95% KM Gamma Percentile			67.13	64.09		95% Gamma USL				160.4	168.3
196												
197	**Lognormal GOF Test on Detected Observations Only**											
198	Shapiro Wilk Test Statistic					0.844	**Shapiro Wilk GOF Test**					
199	5% Shapiro Wilk Critical Value					0.905	Data Not Lognormal at 5% Significance Level					
200	Lilliefors Test Statistic					0.225	**Lilliefors GOF Test**					

201	5% Lilliefors Critical Value					0.192	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					20.05	Mean in Log Scale					0.874
206	SD in Original Scale					42.51	SD in Log Scale					2.337
207	95% UTL95% Coverage					322	95% BCA UTL95% Coverage					175.1
208	95% Bootstrap (%) UTL95% Coverage					179.2	95% UPL (t)					127.7
209	90% Percentile (z)					47.88	95% Percentile (z)					111.9
210	99% Percentile (z)					550.1	95% USL					2087
211												
212	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
213	KM Mean of Logged Data					2.211	95% KM UTL (Lognormal)95% Coverage					90.55
214	KM SD of Logged Data					1.094	95% KM UPL (Lognormal)					58.73
215	95% KM Percentile Lognormal (z)					55.2	95% KM USL (Lognormal)					217.2
216												
217	**Background DL/2 Statistics Assuming Lognormal Distribution**											
218	Mean in Original Scale					20.97	Mean in Log Scale					1.841
219	SD in Original Scale					42.09	SD in Log Scale					1.343
220	95% UTL95% Coverage					105.4	95% UPL (t)					61.96
221	90% Percentile (z)					35.25	95% Percentile (z)					57.43
222	99% Percentile (z)					143.5	95% USL					308.8
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					43	95% UTL with95% Coverage					182
230	Approx, f used to compute achieved CC					2.263	Approximate Actual Confidence Coefficient achieved by UTL					0.89
231	Approximate Sample Size needed to achieve specified CC					59	95% UPL					145.8
232	95% USL					182	95% KM Chebyshev UPL					203.2
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					44	Number of Missing Observations					0
244	Number of Distinct Observations					7						
245	Number of Detects					7	Number of Non-Detects					37
246	Number of Distinct Detects					7	Number of Distinct Non-Detects					1
247	Minimum Detect					0.1	Minimum Non-Detect					0.1
248	Maximum Detect					0.63	Maximum Non-Detect					0.1
249	Variance Detected					0.0395	Percent Non-Detects					84.09%
250	Mean Detected					0.304	SD Detected					0.199

251	Mean of Detected Logged Data					-1.389	SD of Detected Logged Data					0.699
252												
253	**Critical Values for Background Threshold Values (BTVs)**											
254	Tolerance Factor K (For UTL)					2.091	d2max (for USL)					2.906
255												
256	**Normal GOF Test on Detects Only**											
257	Shapiro Wilk Test Statistic					0.904	**Shapiro Wilk GOF Test**					
258	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Normal at 5% Significance Level					
259	Lilliefors Test Statistic					0.254	**Lilliefors GOF Test**					
260	5% Lilliefors Critical Value					0.304	Detected Data appear Normal at 5% Significance Level					
261	**Detected Data appear Normal at 5% Significance Level**											
262												
263	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
264	KM Mean					0.133	KM SD					0.105
265	95% UTL95% Coverage					0.351	95% KM UPL (t)					0.311
266	90% KM Percentile (z)					0.267	95% KM Percentile (z)					0.305
267	99% KM Percentile (z)					0.376	95% KM USL					0.437
268												
269	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
270	Mean					0.0905	SD					0.12
271	95% UTL95% Coverage					0.341	95% UPL (t)					0.294
272	90% Percentile (z)					0.244	95% Percentile (z)					0.288
273	99% Percentile (z)					0.369	95% USL					0.439
274	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
275												
276	**Gamma GOF Tests on Detected Observations Only**											
277	A-D Test Statistic					0.319	**Anderson-Darling GOF Test**					
278	5% A-D Critical Value					0.713	Detected data appear Gamma Distributed at 5% Significance Level					
279	K-S Test Statistic					0.212	**Kolmogorov-Smirnov GOF**					
280	5% K-S Critical Value					0.314	Detected data appear Gamma Distributed at 5% Significance Level					
281	**Detected data appear Gamma Distributed at 5% Significance Level**											
282												
283	**Gamma Statistics on Detected Data Only**											
284	k hat (MLE)					2.665	k star (bias corrected MLE)					1.618
285	Theta hat (MLE)					0.114	Theta star (bias corrected MLE)					0.188
286	nu hat (MLE)					37.3	nu star (bias corrected)					22.65
287	MLE Mean (bias corrected)					0.304						
288	MLE Sd (bias corrected)					0.239	95% Percentile of Chisquare (2kstar)					8.22
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					0.0568
297	Maximum					0.63	Median					0.01
298	SD					0.132	CV					2.319
299	k hat (MLE)					0.516	k star (bias corrected MLE)					0.496
300	Theta hat (MLE)					0.11	Theta star (bias corrected MLE)					0.115

301					nu hat (MLE)	45.39				nu star (bias corrected)		43.63
302					MLE Mean (bias corrected)	0.0568				MLE Sd (bias corrected)		0.0807
303					95% Percentile of Chisquare (2kstar)	3.82				90% Percentile		0.154
304					95% Percentile	0.219				99% Percentile		0.379
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					WH	HW
308				95% Approx. Gamma UTL with 95% Coverage	0.256	0.246				95% Approx. Gamma UPL	0.185	0.171
309				95% Gamma USL	0.46	0.475						
310												
311	**Estimates of Gamma Parameters using KM Estimates**											
312					Mean (KM)	0.133				SD (KM)		0.105
313					Variance (KM)	0.011				SE of Mean (KM)		0.0171
314					k hat (KM)	1.601				k star (KM)		1.507
315					nu hat (KM)	140.9				nu star (KM)		132.6
316					theta hat (KM)	0.0828				theta star (KM)		0.0879
317					80% gamma percentile (KM)	0.205				90% gamma percentile (KM)		0.276
318					95% gamma percentile (KM)	0.345				99% gamma percentile (KM)		0.5
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	HW					WH	HW
323				95% Approx. Gamma UTL with 95% Coverage	0.303	0.297				95% Approx. Gamma UPL	0.26	0.254
324				95% KM Gamma Percentile	0.255	0.249				95% Gamma USL	0.408	0.405
325												
326	**Lognormal GOF Test on Detected Observations Only**											
327					Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**					
328					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level					
329					Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**					
330					5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level					
331	**Detected Data appear Lognormal at 5% Significance Level**											
332												
333	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
334					Mean in Original Scale	0.0637				Mean in Log Scale		-4.267
335					SD in Original Scale	0.131				SD in Log Scale		1.863
336					95% UTL95% Coverage	0.69				95% BCA UTL95% Coverage		0.597
337					95% Bootstrap (%) UTL95% Coverage	0.605				95% UPL (t)		0.333
338					90% Percentile (z)	0.153				95% Percentile (z)		0.301
339					99% Percentile (z)	1.07				95% USL		3.154
340												
341	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
342					KM Mean of Logged Data	-2.157				95% KM UTL (Lognormal)95% Coverage		0.28
343					KM SD of Logged Data	0.422				95% KM UPL (Lognormal)		0.237
344					95% KM Percentile Lognormal (z)	0.232				95% KM USL (Lognormal)		0.394
345												
346	**Background DL/2 Statistics Assuming Lognormal Distribution**											
347					Mean in Original Scale	0.0905				Mean in Log Scale		-2.74
348					SD in Original Scale	0.12				SD in Log Scale		0.649
349					95% UTL95% Coverage	0.251				95% UPL (t)		0.195
350					90% Percentile (z)	0.148				95% Percentile (z)		0.188

351					99% Percentile (z)	0.292					95% USL	0.426
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 appear to follow a Discernible Distribution at 5% Significance Level**											
356												
357	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
358					Order of Statistic, r	44					95% UTL with95% Coverage	0.63
359					Approx, f used to compute achieved CC	2.316					Approximate Actual Confidence Coefficient achieved by UTL	0.895
360					Approximate Sample Size needed to achieve specified CC	59					95% UPL	0.448
361					95% USL	0.63					95% KM Chebyshev UPL	0.594
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	44					Number of Missing Observations	0
373					Number of Distinct Observations	1						
374					Number of Detects	0					Number of Non-Detects	44
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												
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	44					Number of Missing Observations	0
393					Number of Distinct Observations	14						
394					Number of Detects	20					Number of Non-Detects	24
395					Number of Distinct Detects	14					Number of Distinct Non-Detects	1
396					Minimum Detect	5					Minimum Non-Detect	5
397					Maximum Detect	182					Maximum Non-Detect	5
398					Variance Detected	2624					Percent Non-Detects	54.55%
399					Mean Detected	36.65					SD Detected	51.23
400					Mean of Detected Logged Data	2.823					SD of Detected Logged Data	1.241

401												
402	**Critical Values for Background Threshold Values (BTVs)**											
403					Tolerance Factor K (For UTL)	2.091			d2max (for USL)	2.906		
404												
405	**Normal GOF Test on Detects Only**											
406					Shapiro Wilk Test Statistic	0.673	**Shapiro Wilk GOF Test**					
407					5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level					
408					Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**					
409					5% Lilliefors Critical Value	0.192	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	19.39			KM SD	37.17		
414					95% UTL95% Coverage	97.11			95% KM UPL (t)	82.58		
415					90% KM Percentile (z)	67.02			95% KM Percentile (z)	80.52		
416					99% KM Percentile (z)	105.9			95% KM USL	127.4		
417												
418	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
419					Mean	18.02			SD	38.15		
420					95% UTL95% Coverage	97.79			95% UPL (t)	82.88		
421					90% Percentile (z)	66.91			95% Percentile (z)	80.77		
422					99% Percentile (z)	106.8			95% USL	128.9		
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	1.343	**Anderson-Darling GOF Test**					
427					5% A-D Critical Value	0.779	Data Not Gamma Distributed at 5% Significance Level					
428					K-S Test Statistic	0.251	**Kolmogorov-Smirnov GOF**					
429					5% K-S Critical Value	0.201	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)	0.767			k star (bias corrected MLE)	0.685		
434					Theta hat (MLE)	47.81			Theta star (bias corrected MLE)	53.51		
435					nu hat (MLE)	30.66			nu star (bias corrected)	27.4		
436					MLE Mean (bias corrected)	36.65						
437					MLE Sd (bias corrected)	44.28			95% Percentile of Chisquare (2kstar)	4.699		
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											
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	0.01			Mean	16.66		
446					Maximum	182			Median	0.01		
447					SD	38.73			CV	2.324		
448					k hat (MLE)	0.184			k star (bias corrected MLE)	0.187		
449					Theta hat (MLE)	90.39			Theta star (bias corrected MLE)	89.14		
450					nu hat (MLE)	16.22			nu star (bias corrected)	16.45		

451				MLE Mean (bias corrected)		16.66				MLE Sd (bias corrected)		38.54
452				95% Percentile of Chisquare (2kstar)		1.96				90% Percentile		50.34
453				95% Percentile		87.35				99% Percentile		190.4
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				95% Approx. Gamma UTL with 95% Coverage	99.14	116.5				95% Approx. Gamma UPL	65.08	69.18
458				95% Gamma USL	204.5	288.8						
459												
460	**Estimates of Gamma Parameters using KM Estimates**											
461				Mean (KM)		19.39				SD (KM)		37.17
462				Variance (KM)		1382				SE of Mean (KM)		5.749
463				k hat (KM)		0.272				k star (KM)		0.269
464				nu hat (KM)		23.94				nu star (KM)		23.64
465				theta hat (KM)		71.26				theta star (KM)		72.16
466				80% gamma percentile (KM)		28.84				90% gamma percentile (KM)		57.85
467				95% gamma percentile (KM)		91.82				99% gamma percentile (KM)		181.4
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				95% Approx. Gamma UTL with 95% Coverage	78.6	76.73				95% Approx. Gamma UPL	59.07	56.31
473				95% KM Gamma Percentile	56.61	53.8				95% Gamma USL	132.3	136.6
474												
475	**Lognormal GOF Test on Detected Observations Only**											
476				Shapiro Wilk Test Statistic		0.864				**Shapiro Wilk GOF Test**		
477				5% Shapiro Wilk Critical Value		0.905				Data Not Lognormal at 5% Significance Level		
478				Lilliefors Test Statistic		0.212				**Lilliefors GOF Test**		
479				5% Lilliefors Critical Value		0.192				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		17.11				Mean in Log Scale		0.847
484				SD in Original Scale		38.54				SD in Log Scale		2.226
485				95% UTL95% Coverage		244.9				95% BCA UTL95% Coverage		161.6
486				95% Bootstrap (%) UTL95% Coverage		177.8				95% UPL (t)		102.6
487				90% Percentile (z)		40.41				95% Percentile (z)		90.72
488				99% Percentile (z)		413.5				95% USL		1503
489												
490	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
491				KM Mean of Logged Data		2.161				95% KM UTL (Lognormal)95% Coverage		72.48
492				KM SD of Logged Data		1.015				95% KM UPL (Lognormal)		48.74
493				95% KM Percentile Lognormal (z)		46.08				95% KM USL (Lognormal)		165.8
494												
495	**Background DL/2 Statistics Assuming Lognormal Distribution**											
496				Mean in Original Scale		18.02				Mean in Log Scale		1.783
497				SD in Original Scale		38.15				SD in Log Scale		1.266
498				95% UTL95% Coverage		83.94				95% UPL (t)		51.17
499				90% Percentile (z)		30.12				95% Percentile (z)		47.72
500				99% Percentile (z)		113.1				95% USL		235.6

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	44			95% UTL with95% Coverage	182	
508						Approx, f used to compute achieved CC	2.316			Approximate Actual Confidence Coefficient achieved by UTL	0.895	
509						Approximate Sample Size needed to achieve specified CC	59			95% UPL	140.5	
510						95% USL	182			95% KM Chebyshev UPL	183.2	
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	10			Number of Distinct Observations	9	
522						Minimum	18.3			First Quartile	21.3	
523						Second Largest	26.1			Median	23.4	
524						Maximum	26.6			Third Quartile	24.48	
525						Mean	22.83			SD	2.803	
526						Coefficient of Variation	0.123			Skewness	-0.371	
527						Mean of logged Data	3.121			SD of logged Data	0.126	
528												
529	**Critical Values for Background Threshold Values (BTVs)**											
530						Tolerance Factor K (For UTL)	2.911			d2max (for USL)	2.176	
531												
532	**Normal GOF Test**											
533						Shapiro Wilk Test Statistic	0.945			**Shapiro Wilk GOF Test**		
534						5% Shapiro Wilk Critical Value	0.842			Data appear Normal at 5% Significance Level		
535						Lilliefors Test Statistic	0.167			**Lilliefors GOF Test**		
536						5% Lilliefors Critical Value	0.262			Data appear Normal at 5% Significance Level		
537	**Data appear Normal at 5% Significance Level**											
538												
539	**Background Statistics Assuming Normal Distribution**											
540						95% UTL with 95% Coverage	30.99			90% Percentile (z)	26.42	
541						95% UPL (t)	28.22			95% Percentile (z)	27.44	
542						95% USL	28.93			99% Percentile (z)	29.35	
543												
544	**Gamma GOF Test**											
545						A-D Test Statistic	0.323			**Anderson-Darling Gamma GOF Test**		
546						5% A-D Critical Value	0.724			Detected data appear Gamma Distributed at 5% Significance Level		
547						K-S Test Statistic	0.184			**Kolmogorov-Smirnov Gamma GOF Test**		
548						5% K-S Critical Value	0.266			Detected data appear Gamma Distributed at 5% Significance Level		
549	**Detected data appear Gamma Distributed at 5% Significance Level**											
550												

551	**Gamma Statistics**											
552					k hat (MLE)	71.14			k star (bias corrected MLE)			49.87
553					Theta hat (MLE)	0.321			Theta star (bias corrected MLE)			0.458
554					nu hat (MLE)	1423			nu star (bias corrected)			997.4
555					MLE Mean (bias corrected)	22.83			MLE Sd (bias corrected)			3.233
556												
557	**Background Statistics Assuming Gamma Distribution**											
558					95% Wilson Hilferty (WH) Approx. Gamma UPL	28.64			90% Percentile			27.06
559					95% Hawkins Wixley (HW) Approx. Gamma UPL	28.7			95% Percentile			28.39
560					95% WH Approx. Gamma UTL with 95% Coverage	32.05			99% Percentile			31.02
561					95% HW Approx. Gamma UTL with 95% Coverage	32.21						
562					95% WH USL	29.49			95% HW USL			29.58
563												
564	**Lognormal GOF Test**											
565					Shapiro Wilk Test Statistic	0.933			**Shapiro Wilk Lognormal GOF Test**			
566					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level			
567					Lilliefors Test Statistic	0.186			**Lilliefors Lognormal GOF Test**			
568					5% Lilliefors Critical Value	0.262			Data appear Lognormal at 5% Significance Level			
569	**Data appear Lognormal at 5% Significance Level**											
570												
571	**Background Statistics assuming Lognormal Distribution**											
572					95% UTL with 95% Coverage	32.75			90% Percentile (z)			26.65
573					95% UPL (t)	28.9			95% Percentile (z)			27.91
574					95% USL	29.84			99% Percentile (z)			30.42
575												
576	**Nonparametric Distribution Free Background Statistics**											
577	**Data appear Normal at 5% Significance Level**											
578												
579	**Nonparametric Upper Limits for Background Threshold Values**											
580					Order of Statistic, r	10			95% UTL with 95% Coverage			26.6
581					Approx, f used to compute achieved CC	0.526			Approximate Actual Confidence Coefficient achieved by UTL			0.401
582									Approximate Sample Size needed to achieve specified CC			59
583					95% Percentile Bootstrap UTL with 95% Coverage	26.6			95% BCA Bootstrap UTL with 95% Coverage			26.6
584					95% UPL	26.6			90% Percentile			26.15
585					90% Chebyshev UPL	31.65			95% Percentile			26.38
586					95% Chebyshev UPL	35.64			99% Percentile			26.56
587					95% USL	26.6						
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	43			Number of Distinct Observations			37
599					Minimum	18.9			First Quartile			21.25
600					Second Largest	74.7			Median			23.1

601					Maximum	93					Third Quartile	25.25
602					Mean	28.04					SD	15.39
603					Coefficient of Variation	0.549					Skewness	3.073
604					Mean of logged Data	3.25					SD of logged Data	0.36
605												
606					**Critical Values for Background Threshold Values (BTVs)**							
607					Tolerance Factor K (For UTL)	2.097					d2max (for USL)	2.897
608												
609					**Normal GOF Test**							
610					Shapiro Wilk Test Statistic	0.536	**Shapiro Wilk GOF Test**					
611					5% Shapiro Wilk Critical Value	0.943	Data Not Normal at 5% Significance Level					
612					Lilliefors Test Statistic	0.354	**Lilliefors GOF Test**					
613					5% Lilliefors Critical Value	0.134	Data Not Normal at 5% Significance Level					
614					**Data Not Normal at 5% Significance Level**							
615												
616					**Background Statistics Assuming Normal Distribution**							
617					95% UTL with 95% Coverage	60.31	90% Percentile (z)	47.76				
618					95% UPL (t)	54.22	95% Percentile (z)	53.35				
619					95% USL	72.61	99% Percentile (z)	63.83				
620												
621					**Gamma GOF Test**							
622					A-D Test Statistic	6.173	**Anderson-Darling Gamma GOF Test**					
623					5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level					
624					K-S Test Statistic	0.315	**Kolmogorov-Smirnov Gamma GOF Test**					
625					5% K-S Critical Value	0.135	Data Not Gamma Distributed at 5% Significance Level					
626					**Data Not Gamma Distributed at 5% Significance Level**							
627												
628					**Gamma Statistics**							
629					k hat (MLE)	6.164	k star (bias corrected MLE)	5.749				
630					Theta hat (MLE)	4.549	Theta star (bias corrected MLE)	4.877				
631					nu hat (MLE)	530.1	nu star (bias corrected)	494.4				
632					MLE Mean (bias corrected)	28.04	MLE Sd (bias corrected)	11.69				
633												
634					**Background Statistics Assuming Gamma Distribution**							
635					95% Wilson Hilferty (WH) Approx. Gamma UPL	49.67	90% Percentile	43.68				
636					95% Hawkins Wixley (HW) Approx. Gamma UPL	49.13	95% Percentile	49.62				
637					95% WH Approx. Gamma UTL with 95% Coverage	56.55	99% Percentile	62.11				
638					95% HW Approx. Gamma UTL with 95% Coverage	56.11						
639					95% WH USL	72.33	95% HW USL	72.45				
640												
641					**Lognormal GOF Test**							
642					Shapiro Wilk Test Statistic	0.676	**Shapiro Wilk Lognormal GOF Test**					
643					5% Shapiro Wilk Critical Value	0.943	Data Not Lognormal at 5% Significance Level					
644					Lilliefors Test Statistic	0.284	**Lilliefors Lognormal GOF Test**					
645					5% Lilliefors Critical Value	0.134	Data Not Lognormal at 5% Significance Level					
646					**Data Not Lognormal at 5% Significance Level**							
647												
648					**Background Statistics assuming Lognormal Distribution**							
649					95% UTL with 95% Coverage	54.85	90% Percentile (z)	40.91				
650					95% UPL (t)	47.57	95% Percentile (z)	46.62				

651					95% USL	73.14				99% Percentile (z)		59.57
652												
653	**Nonparametric Distribution Free Background Statistics**											
654	**Data do not follow a Discernible Distribution (0.05)**											
655												
656	**Nonparametric Upper Limits for Background Threshold Values**											
657					Order of Statistic, r	43				95% UTL with 95% Coverage		93
658					Approx, f used to compute achieved CC	2.263				Approximate Actual Confidence Coefficient achieved by UTL		0.89
659										Approximate Sample Size needed to achieve specified CC		59
660					95% Percentile Bootstrap UTL with 95% Coverage	90.53				95% BCA Bootstrap UTL with 95% Coverage		90.53
661					95% UPL	73.42				90% Percentile		34.72
662					90% Chebyshev UPL	74.73				95% Percentile		66.74
663					95% Chebyshev UPL	95.88				99% Percentile		85.31
664					95% USL	93						
665												
666	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
667	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
668	and consists of observations collected from clean unimpacted locations.											
669	The use of USL tends to provide a balance between false positives and false negatives provided the data											
670	represents a background data set and when many onsite observations need to be compared with the BTV.											
671												
672	**CHLORIDE (mg/L)**											
673												
674	**General Statistics**											
675					Total Number of Observations	44				Number of Distinct Observations		38
676					Minimum	19.6				First Quartile		22.3
677					Second Largest	34.3				Median		25.15
678					Maximum	34.5				Third Quartile		26.53
679					Mean	25.07				SD		3.431
680					Coefficient of Variation	0.137				Skewness		0.944
681					Mean of logged Data	3.213				SD of logged Data		0.132
682												
683	**Critical Values for Background Threshold Values (BTVs)**											
684					Tolerance Factor K (For UTL)	2.091				d2max (for USL)		2.906
685												
686	**Normal GOF Test**											
687					Shapiro Wilk Test Statistic	0.925				**Shapiro Wilk GOF Test**		
688					5% Shapiro Wilk Critical Value	0.944				Data Not Normal at 5% Significance Level		
689					Lilliefors Test Statistic	0.115				**Lilliefors GOF Test**		
690					5% Lilliefors Critical Value	0.132				Data appear Normal at 5% Significance Level		
691	**Data appear Approximate Normal at 5% Significance Level**											
692												
693	**Background Statistics Assuming Normal Distribution**											
694					95% UTL with 95% Coverage	32.24				90% Percentile (z)		29.46
695					95% UPL (t)	30.9				95% Percentile (z)		30.71
696					95% USL	35.04				99% Percentile (z)		33.05
697												
698	**Gamma GOF Test**											
699					A-D Test Statistic	0.537				**Anderson-Darling Gamma GOF Test**		
700					5% A-D Critical Value	0.747				Detected data appear Gamma Distributed at 5% Significance Level		

701	K-S Test Statistic					0.0968	**Kolmogorov-Smirnov Gamma GOF Test**					
702	5% K-S Critical Value					0.133	Detected data appear Gamma Distributed at 5% Significance Level					
703	**Detected data appear Gamma Distributed at 5% Significance Level**											
704												
705	**Gamma Statistics**											
706	k hat (MLE)					57.81	k star (bias corrected MLE)					53.88
707	Theta hat (MLE)					0.434	Theta star (bias corrected MLE)					0.465
708	nu hat (MLE)					5087	nu star (bias corrected)					4741
709	MLE Mean (bias corrected)					25.07	MLE Sd (bias corrected)					3.415
710												
711	**Background Statistics Assuming Gamma Distribution**											
712	95% Wilson Hilferty (WH) Approx. Gamma UPL					31.01	90% Percentile					29.53
713	95% Hawkins Wixley (HW) Approx. Gamma UPL					31.02	95% Percentile					30.93
714	95% WH Approx. Gamma UTL with 95% Coverage					32.53	99% Percentile					33.69
715	95% HW Approx. Gamma UTL with 95% Coverage					32.58						
716	95% WH USL					35.88	95% HW USL					36.01
717												
718	**Lognormal GOF Test**											
719	Shapiro Wilk Test Statistic					0.955	**Shapiro Wilk Lognormal GOF Test**					
720	5% Shapiro Wilk Critical Value					0.944	Data appear Lognormal at 5% Significance Level					
721	Lilliefors Test Statistic					0.0918	**Lilliefors Lognormal GOF Test**					
722	5% Lilliefors Critical Value					0.132	Data appear Lognormal at 5% Significance Level					
723	**Data appear Lognormal at 5% Significance Level**											
724												
725	**Background Statistics assuming Lognormal Distribution**											
726	95% UTL with 95% Coverage					32.73	90% Percentile (z)					29.42
727	95% UPL (t)					31.09	95% Percentile (z)					30.86
728	95% USL					36.44	99% Percentile (z)					33.76
729												
730	**Nonparametric Distribution Free Background Statistics**											
731	**Data appear Approximate Normal at 5% Significance Level**											
732												
733	**Nonparametric Upper Limits for Background Threshold Values**											
734	Order of Statistic, r					44	95% UTL with 95% Coverage					34.5
735	Approx, f used to compute achieved CC					2.316	Approximate Actual Confidence Coefficient achieved by UTL					0.895
736							Approximate Sample Size needed to achieve specified CC					59
737	95% Percentile Bootstrap UTL with 95% Coverage					34.47	95% BCA Bootstrap UTL with 95% Coverage					34.3
738	95% UPL					33.88	90% Percentile					28.51
739	90% Chebyshev UPL					35.48	95% Percentile					32.23
740	95% Chebyshev UPL					40.19	99% Percentile					34.41
741	95% USL					34.5						
742												
743	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
744	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
745	and consists of observations collected from clean unimpacted locations.											
746	The use of USL tends to provide a balance between false positives and false negatives provided the data											
747	represents a background data set and when many onsite observations need to be compared with the BTV.											
748												
749	**CIS 1,2-DICHLOROETHENE (ug/L)**											
750												

	A	B	C	D	E	F	G	H	I	J	K	L
751	**General Statistics**											
752					Total Number of Observations	44				Number of Missing Observations		0
753					Number of Distinct Observations	1						
754					Number of Detects	0				Number of Non-Detects		44
755					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
756					Minimum Detect	N/A				Minimum Non-Detect		1
757					Maximum Detect	N/A				Maximum Non-Detect		1
758					Variance Detected	N/A				Percent Non-Detects		100%
759					Mean Detected	N/A				SD Detected		N/A
760					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
761												
762	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
763	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
764	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
765												
766	**The data set for variable CIS 1,2-DICHLOROETHENE (ug/L) was not processed!**											
767												
768												
769	**Chemical Oxygen Demand (mg/L)**											
770												
771	**General Statistics**											
772					Total Number of Observations	43				Number of Missing Observations		0
773					Number of Distinct Observations	3						
774					Number of Detects	0				Number of Non-Detects		43
775					Number of Distinct Detects	0				Number of Distinct Non-Detects		3
776					Minimum Detect	N/A				Minimum Non-Detect		5
777					Maximum Detect	N/A				Maximum Non-Detect		15
778					Variance Detected	N/A				Percent Non-Detects		100%
779					Mean Detected	N/A				SD Detected		N/A
780					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
781												
782	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
783	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
784	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
785												
786	**The data set for variable Chemical Oxygen Demand (mg/L) was not processed!**											
787												
788												
789	**ETHYLBENZENE (mg/L)**											
790												
791	**General Statistics**											
792					Total Number of Observations	44				Number of Missing Observations		0
793					Number of Distinct Observations	1						
794					Number of Detects	0				Number of Non-Detects		44
795					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
796					Minimum Detect	N/A				Minimum Non-Detect		1
797					Maximum Detect	N/A				Maximum Non-Detect		1
798					Variance Detected	N/A				Percent Non-Detects		100%
799					Mean Detected	N/A				SD Detected		N/A
800					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A

801												
802	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
803	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
804	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
805												
806	**The data set for variable ETHYLBENZENE (mg/L) was not processed!**											
807												
808												
809	**FLUORIDE (mg/L)**											
810												
811	**General Statistics**											
812	Total Number of Observations			43			Number of Missing Observations			0		
813	Number of Distinct Observations			7								
814	Number of Detects			15			Number of Non-Detects			28		
815	Number of Distinct Detects			6			Number of Distinct Non-Detects			2		
816	Minimum Detect			0.12			Minimum Non-Detect			0.2		
817	Maximum Detect			0.24			Maximum Non-Detect			0.5		
818	Variance Detected			0.00157			Percent Non-Detects			65.12%		
819	Mean Detected			0.157			SD Detected			0.0396		
820	Mean of Detected Logged Data			-1.881			SD of Detected Logged Data			0.237		
821												
822	**Critical Values for Background Threshold Values (BTVs)**											
823	Tolerance Factor K (For UTL)			2.097			d2max (for USL)			2.897		
824												
825	**Normal GOF Test on Detects Only**											
826	Shapiro Wilk Test Statistic			0.807			**Shapiro Wilk GOF Test**					
827	5% Shapiro Wilk Critical Value			0.881			Data Not Normal at 5% Significance Level					
828	Lilliefors Test Statistic			0.263			**Lilliefors GOF Test**					
829	5% Lilliefors Critical Value			0.22			Data Not Normal at 5% Significance Level					
830	**Data Not Normal at 5% Significance Level**											
831												
832	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
833	KM Mean			0.143			KM SD			0.0303		
834	95% UTL95% Coverage			0.207			95% KM UPL (t)			0.195		
835	90% KM Percentile (z)			0.182			95% KM Percentile (z)			0.193		
836	99% KM Percentile (z)			0.214			95% KM USL			0.231		
837												
838	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
839	Mean			0.162			SD			0.0649		
840	95% UTL95% Coverage			0.298			95% UPL (t)			0.272		
841	90% Percentile (z)			0.245			95% Percentile (z)			0.268		
842	99% Percentile (z)			0.313			95% USL			0.35		
843	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
844												
845	**Gamma GOF Tests on Detected Observations Only**											
846	A-D Test Statistic			1.282			**Anderson-Darling GOF Test**					
847	5% A-D Critical Value			0.735			Data Not Gamma Distributed at 5% Significance Level					
848	K-S Test Statistic			0.254			**Kolmogorov-Smirnov GOF**					
849	5% K-S Critical Value			0.221			Data Not Gamma Distributed at 5% Significance Level					
850	**Data Not Gamma Distributed at 5% Significance Level**											

851												
852	**Gamma Statistics on Detected Data Only**											
853					k hat (MLE)	18.4			k star (bias corrected MLE)	14.76		
854					Theta hat (MLE)	0.00852			Theta star (bias corrected MLE)	0.0106		
855					nu hat (MLE)	551.9			nu star (bias corrected)	442.9		
856					MLE Mean (bias corrected)	0.157						
857					MLE Sd (bias corrected)	0.0408			95% Percentile of Chisquare (2kstar)	43.19		
858												
859	**Gamma ROS Statistics using Imputed Non-Detects**											
860	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
861	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)											
862	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
863	This is especially true when the sample size is small.											
864	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
865					Minimum	0.0924			Mean	0.145		
866					Maximum	0.24			Median	0.139		
867					SD	0.0322			CV	0.222		
868					k hat (MLE)	22.32			k star (bias corrected MLE)	20.77		
869					Theta hat (MLE)	0.00651			Theta star (bias corrected MLE)	0.00699		
870					nu hat (MLE)	1919			nu star (bias corrected)	1787		
871					MLE Mean (bias corrected)	0.145			MLE Sd (bias corrected)	0.0319		
872					95% Percentile of Chisquare (2kstar)	57.59			90% Percentile	0.187		
873					95% Percentile	0.201			99% Percentile	0.229		
874	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
875	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
876						WH	HW			WH	HW	
877					95% Approx. Gamma UTL with 95% Coverage	0.218	0.219		95% Approx. Gamma UPL	0.202	0.202	
878					95% Gamma USL	0.252	0.254					
879												
880	**Estimates of Gamma Parameters using KM Estimates**											
881					Mean (KM)	0.143			SD (KM)	0.0303		
882					Variance (KM)	9.1799E-4			SE of Mean (KM)	0.00599		
883					k hat (KM)	22.41			k star (KM)	20.86		
884					nu hat (KM)	1927			nu star (KM)	1794		
885					theta hat (KM)	0.0064			theta star (KM)	0.00688		
886					80% gamma percentile (KM)	0.169			90% gamma percentile (KM)	0.185		
887					95% gamma percentile (KM)	0.199			99% gamma percentile (KM)	0.226		
888												
889	**The following statistics are computed using gamma distribution and KM estimates**											
890	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
891						WH	HW			WH	HW	
892					95% Approx. Gamma UTL with 95% Coverage	0.207	0.207		95% Approx. Gamma UPL	0.193	0.193	
893					95% KM Gamma Percentile	0.191	0.191		95% Gamma USL	0.236	0.237	
894												
895	**Lognormal GOF Test on Detected Observations Only**											
896					Shapiro Wilk Test Statistic	0.828			**Shapiro Wilk GOF Test**			
897					5% Shapiro Wilk Critical Value	0.881			Data Not Lognormal at 5% Significance Level			
898					Lilliefors Test Statistic	0.24			**Lilliefors GOF Test**			
899					5% Lilliefors Critical Value	0.22			Data Not Lognormal at 5% Significance Level			
900	**Data Not Lognormal at 5% Significance Level**											

901												
902	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
903					Mean in Original Scale	0.145				Mean in Log Scale	-1.948	
904					SD in Original Scale	0.0307				SD in Log Scale	0.199	
905					95% UTL95% Coverage	0.216				95% BCA UTL95% Coverage	0.2	
906					95% Bootstrap (%) UTL95% Coverage	0.236				95% UPL (t)	0.2	
907					90% Percentile (z)	0.184				95% Percentile (z)	0.198	
908					99% Percentile (z)	0.226				95% USL	0.254	
909												
910	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
911					KM Mean of Logged Data	-1.961				95% KM UTL (Lognormal)95% Coverage	0.207	
912					KM SD of Logged Data	0.184				95% KM UPL (Lognormal)	0.193	
913					95% KM Percentile Lognormal (z)	0.191				95% KM USL (Lognormal)	0.24	
914												
915	**Background DL/2 Statistics Assuming Lognormal Distribution**											
916					Mean in Original Scale	0.162				Mean in Log Scale	-1.9	
917					SD in Original Scale	0.0649				SD in Log Scale	0.395	
918					95% UTL95% Coverage	0.343				95% UPL (t)	0.293	
919					90% Percentile (z)	0.248				95% Percentile (z)	0.286	
920					99% Percentile (z)	0.375				95% USL	0.47	
921	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
922												
923	**Nonparametric Distribution Free Background Statistics**											
924	**Data do not follow a Discernible Distribution (0.05)**											
925												
926	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
927					Order of Statistic, r	43				95% UTL with95% Coverage	0.5	
928					Approx, f used to compute achieved CC	2.263				Approximate Actual Confidence Coefficient achieved by UTL	0.89	
929					Approximate Sample Size needed to achieve specified CC	59				95% UPL	0.5	
930					95% USL	0.5				95% KM Chebyshev UPL	0.277	
931												
932	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
933	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
934	and consists of observations collected from clean unimpacted locations.											
935	The use of USL tends to provide a balance between false positives and false negatives provided the data											
936	represents a background data set and when many onsite observations need to be compared with the BTV.											
937												
938	**IRON, DISSOLVED (mg/L)**											
939												
940	**General Statistics**											
941					Total Number of Observations	11				Number of Missing Observations	0	
942					Number of Distinct Observations	2						
943					Number of Detects	0				Number of Non-Detects	11	
944					Number of Distinct Detects	0				Number of Distinct Non-Detects	2	
945					Minimum Detect	N/A				Minimum Non-Detect	0.05	
946					Maximum Detect	N/A				Maximum Non-Detect	0.06	
947					Variance Detected	N/A				Percent Non-Detects	100%	
948					Mean Detected	N/A				SD Detected	N/A	
949					Mean of Detected Logged Data	N/A				SD of Detected Logged Data	N/A	
950												

	A	B	C	D	E	F	G	H	I	J	K	L
951	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
952	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
953	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
954												
955	**The data set for variable IRON, DISSOLVED (mg/L) was not processed!**											
956												
957												
958	**IRON, TOTAL (mg/L)**											
959												
960	**General Statistics**											
961						Total Number of Observations	42			Number of Missing Observations	0	
962						Number of Distinct Observations	11					
963						Number of Detects	13			Number of Non-Detects	29	
964						Number of Distinct Detects	10			Number of Distinct Non-Detects	1	
965						Minimum Detect	0.07			Minimum Non-Detect	0.06	
966						Maximum Detect	0.37			Maximum Non-Detect	0.06	
967						Variance Detected	0.00866			Percent Non-Detects	69.05%	
968						Mean Detected	0.166			SD Detected	0.0931	
969						Mean of Detected Logged Data	-1.912			SD of Detected Logged Data	0.482	
970												
971	**Critical Values for Background Threshold Values (BTVs)**											
972						Tolerance Factor K (For UTL)	2.104			d2max (for USL)	2.887	
973												
974	**Normal GOF Test on Detects Only**											
975						Shapiro Wilk Test Statistic	0.783			**Shapiro Wilk GOF Test**		
976						5% Shapiro Wilk Critical Value	0.866			Data Not Normal at 5% Significance Level		
977						Lilliefors Test Statistic	0.303			**Lilliefors GOF Test**		
978						5% Lilliefors Critical Value	0.234			Data Not Normal at 5% Significance Level		
979	**Data Not Normal at 5% Significance Level**											
980												
981	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
982						KM Mean	0.0929			KM SD	0.0699	
983						95% UTL95% Coverage	0.24			95% KM UPL (t)	0.212	
984						90% KM Percentile (z)	0.182			95% KM Percentile (z)	0.208	
985						99% KM Percentile (z)	0.255			95% KM USL	0.295	
986												
987	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
988						Mean	0.0721			SD	0.0812	
989						95% UTL95% Coverage	0.243			95% UPL (t)	0.21	
990						90% Percentile (z)	0.176			95% Percentile (z)	0.206	
991						99% Percentile (z)	0.261			95% USL	0.307	
992	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
993												
994	**Gamma GOF Tests on Detected Observations Only**											
995						A-D Test Statistic	0.726			**Anderson-Darling GOF Test**		
996						5% A-D Critical Value	0.737			Detected data appear Gamma Distributed at 5% Significance Level		
997						K-S Test Statistic	0.267			**Kolmogorov-Smirnov GOF**		
998						5% K-S Critical Value	0.238			Data Not Gamma Distributed at 5% Significance Level		
999	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
1000												

1001	**Gamma Statistics on Detected Data Only**											
1002					k hat (MLE)	4.431			k star (bias corrected MLE)			3.46
1003					Theta hat (MLE)	0.0375			Theta star (bias corrected MLE)			0.048
1004					nu hat (MLE)	115.2			nu star (bias corrected)			89.95
1005					MLE Mean (bias corrected)	0.166						
1006					MLE Sd (bias corrected)	0.0893			95% Percentile of Chisquare (2kstar)			13.95
1007												
1008	**Gamma ROS Statistics using Imputed Non-Detects**											
1009	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1010	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)											
1011	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1012	This is especially true when the sample size is small.											
1013	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1014					Minimum	0.01			Mean			0.0601
1015					Maximum	0.37			Median			0.01
1016					SD	0.088			CV			1.463
1017					k hat (MLE)	0.698			k star (bias corrected MLE)			0.664
1018					Theta hat (MLE)	0.0862			Theta star (bias corrected MLE)			0.0906
1019					nu hat (MLE)	58.6			nu star (bias corrected)			55.75
1020					MLE Mean (bias corrected)	0.0601			MLE Sd (bias corrected)			0.0738
1021					95% Percentile of Chisquare (2kstar)	4.606			90% Percentile			0.153
1022					95% Percentile	0.209			99% Percentile			0.342
1023	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
1024	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1025				WH	HW					WH	HW	
1026			95% Approx. Gamma UTL with 95% Coverage	0.272	0.285			95% Approx. Gamma UPL		0.201	0.203	
1027			95% Gamma USL	0.455	0.513							
1028												
1029	**Estimates of Gamma Parameters using KM Estimates**											
1030					Mean (KM)	0.0929			SD (KM)			0.0699
1031					Variance (KM)	0.00488			SE of Mean (KM)			0.0112
1032					k hat (KM)	1.766			k star (KM)			1.656
1033					nu hat (KM)	148.3			nu star (KM)			139.1
1034					theta hat (KM)	0.0526			theta star (KM)			0.0561
1035					80% gamma percentile (KM)	0.142			90% gamma percentile (KM)			0.189
1036					95% gamma percentile (KM)	0.234			99% gamma percentile (KM)			0.335
1037												
1038	**The following statistics are computed using gamma distribution and KM estimates**											
1039	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
1040				WH	HW					WH	HW	
1041			95% Approx. Gamma UTL with 95% Coverage	0.226	0.225			95% Approx. Gamma UPL		0.191	0.189	
1042			95% KM Gamma Percentile	0.186	0.184			95% Gamma USL		0.305	0.309	
1043												
1044	**Lognormal GOF Test on Detected Observations Only**											
1045					Shapiro Wilk Test Statistic	0.921			**Shapiro Wilk GOF Test**			
1046					5% Shapiro Wilk Critical Value	0.866			Detected Data appear Lognormal at 5% Significance Level			
1047					Lilliefors Test Statistic	0.237			**Lilliefors GOF Test**			
1048					5% Lilliefors Critical Value	0.234			Data Not Lognormal at 5% Significance Level			
1049	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
1050												

1051	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
1052					Mean in Original Scale	0.0743				Mean in Log Scale	-3.08	
1053					SD in Original Scale	0.0816				SD in Log Scale	1.008	
1054					95% UTL95% Coverage	0.383				95% BCA UTL95% Coverage	0.361	
1055					95% Bootstrap (%) UTL95% Coverage	0.369				95% UPL (t)	0.256	
1056					90% Percentile (z)	0.167				95% Percentile (z)	0.241	
1057					99% Percentile (z)	0.479				95% USL	0.844	
1058												
1059	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1060					KM Mean of Logged Data	-2.534				95% KM UTL (Lognormal)95% Coverage	0.222	
1061					KM SD of Logged Data	0.49				95% KM UPL (Lognormal)	0.183	
1062					95% KM Percentile Lognormal (z)	0.178				95% KM USL (Lognormal)	0.326	
1063												
1064	**Background DL/2 Statistics Assuming Lognormal Distribution**											
1065					Mean in Original Scale	0.0721				Mean in Log Scale	-3.013	
1066					SD in Original Scale	0.0812				SD in Log Scale	0.79	
1067					95% UTL95% Coverage	0.259				95% UPL (t)	0.189	
1068					90% Percentile (z)	0.135				95% Percentile (z)	0.18	
1069					99% Percentile (z)	0.309				95% USL	0.482	
1070	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
1071												
1072	**Nonparametric Distribution Free Background Statistics**											
1073	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1074												
1075	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
1076					Order of Statistic, r	42				95% UTL with95% Coverage	0.37	
1077					Approx, f used to compute achieved CC	2.211				Approximate Actual Confidence Coefficient achieved by UTL	0.884	
1078					Approximate Sample Size needed to achieve specified CC	59				95% UPL	0.328	
1079					95% USL	0.37				95% KM Chebyshev UPL	0.401	
1080												
1081	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1082	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1083	and consists of observations collected from clean unimpacted locations.											
1084	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1085	represents a background data set and when many onsite observations need to be compared with the BTV.											
1086												
1087	**MAGNESIUM, DISSOLVED (mg/L)**											
1088												
1089	**General Statistics**											
1090					Total Number of Observations	11				Number of Distinct Observations	9	
1091					Minimum	7.4				First Quartile	8.8	
1092					Second Largest	9.8				Median	9.3	
1093					Maximum	10.7				Third Quartile	9.6	
1094					Mean	9.191				SD	0.869	
1095					Coefficient of Variation	0.0945				Skewness	-0.521	
1096					Mean of logged Data	2.214				SD of logged Data	0.0975	
1097												
1098	**Critical Values for Background Threshold Values (BTVs)**											
1099					Tolerance Factor K (For UTL)	2.815				d2max (for USL)	2.234	
1100												

	A	B	C	D	E	F	G	H	I	J	K	L
1101	**Normal GOF Test**											
1102					Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**					
1103					5% Shapiro Wilk Critical Value	0.85	Data appear Normal at 5% Significance Level					
1104					Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**					
1105					5% Lilliefors Critical Value	0.251	Data appear Normal at 5% Significance Level					
1106	**Data appear Normal at 5% Significance Level**											
1107												
1108	**Background Statistics Assuming Normal Distribution**											
1109				95% UTL with	95% Coverage	11.64				90% Percentile (z)		10.3
1110					95% UPL (t)	10.84				95% Percentile (z)		10.62
1111					95% USL	11.13				99% Percentile (z)		11.21
1112												
1113	**Gamma GOF Test**											
1114					A-D Test Statistic	0.371	**Anderson-Darling Gamma GOF Test**					
1115					5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level					
1116					K-S Test Statistic	0.153	**Kolmogorov-Smirnov Gamma GOF Test**					
1117					5% K-S Critical Value	0.254	Detected data appear Gamma Distributed at 5% Significance Level					
1118	**Detected data appear Gamma Distributed at 5% Significance Level**											
1119												
1120	**Gamma Statistics**											
1121					k hat (MLE)	118.4				k star (bias corrected MLE)		86.19
1122					Theta hat (MLE)	0.0776				Theta star (bias corrected MLE)		0.107
1123					nu hat (MLE)	2605				nu star (bias corrected)		1896
1124					MLE Mean (bias corrected)	9.191				MLE Sd (bias corrected)		0.99
1125												
1126	**Background Statistics Assuming Gamma Distribution**											
1127					95% Wilson Hilferty (WH) Approx. Gamma UPL	10.94				90% Percentile		10.48
1128					95% Hawkins Wixley (HW) Approx. Gamma UPL	10.96				95% Percentile		10.88
1129				95% WH Approx. Gamma UTL with	95% Coverage	11.89				99% Percentile		11.65
1130				95% HW Approx. Gamma UTL with	95% Coverage	11.92						
1131					95% WH USL	11.29				95% HW USL		11.31
1132												
1133	**Lognormal GOF Test**											
1134					Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk Lognormal GOF Test**					
1135					5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level					
1136					Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**					
1137					5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level					
1138	**Data appear Lognormal at 5% Significance Level**											
1139												
1140	**Background Statistics assuming Lognormal Distribution**											
1141				95% UTL with	95% Coverage	12.04				90% Percentile (z)		10.37
1142					95% UPL (t)	11.01				95% Percentile (z)		10.74
1143					95% USL	11.38				99% Percentile (z)		11.48
1144												
1145	**Nonparametric Distribution Free Background Statistics**											
1146	**Data appear Normal at 5% Significance Level**											
1147												
1148	**Nonparametric Upper Limits for Background Threshold Values**											
1149					Order of Statistic, r	11				95% UTL with	95% Coverage	10.7
1150					Approx, f used to compute achieved CC	0.579				Approximate Actual Confidence Coefficient achieved by UTL		0.431

1151							Approximate Sample Size needed to achieve specified CC					59
1152	95% Percentile Bootstrap UTL with 95% Coverage					10.7	95% BCA Bootstrap UTL with 95% Coverage					10.7
1153	95% UPL					10.7	90% Percentile					9.8
1154	90% Chebyshev UPL					11.91	95% Percentile					10.25
1155	95% Chebyshev UPL					13.15	99% Percentile					10.61
1156	95% USL					10.7						
1157												
1158	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1159	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1160	and consists of observations collected from clean unimpacted locations.											
1161	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1162	represents a background data set and when many onsite observations need to be compared with the BTV.											
1163												
1164	**MAGNESIUM, TOTAL (mg/L)**											
1165												
1166	**General Statistics**											
1167	Total Number of Observations					41	Number of Distinct Observations					21
1168	Minimum					7.6	First Quartile					8.5
1169	Second Largest					10.4	Median					9
1170	Maximum					10.6	Third Quartile					9.5
1171	Mean					8.998	SD					0.678
1172	Coefficient of Variation					0.0754	Skewness					0.163
1173	Mean of logged Data					2.194	SD of logged Data					0.0754
1174												
1175	**Critical Values for Background Threshold Values (BTVs)**											
1176	Tolerance Factor K (For UTL)					2.11	d2max (for USL)					2.878
1177												
1178	**Normal GOF Test**											
1179	Shapiro Wilk Test Statistic					0.981	**Shapiro Wilk GOF Test**					
1180	5% Shapiro Wilk Critical Value					0.941	Data appear Normal at 5% Significance Level					
1181	Lilliefors Test Statistic					0.0854	**Lilliefors GOF Test**					
1182	5% Lilliefors Critical Value					0.137	Data appear Normal at 5% Significance Level					
1183	**Data appear Normal at 5% Significance Level**											
1184												
1185	**Background Statistics Assuming Normal Distribution**											
1186	95% UTL with 95% Coverage					10.43	90% Percentile (z)					9.867
1187	95% UPL (t)					10.15	95% Percentile (z)					10.11
1188	95% USL					10.95	99% Percentile (z)					10.58
1189												
1190	**Gamma GOF Test**											
1191	A-D Test Statistic					0.243	**Anderson-Darling Gamma GOF Test**					
1192	5% A-D Critical Value					0.747	Detected data appear Gamma Distributed at 5% Significance Level					
1193	K-S Test Statistic					0.0851	**Kolmogorov-Smirnov Gamma GOF Test**					
1194	5% K-S Critical Value					0.137	Detected data appear Gamma Distributed at 5% Significance Level					
1195	**Detected data appear Gamma Distributed at 5% Significance Level**											
1196												
1197	**Gamma Statistics**											
1198	k hat (MLE)					180.5	k star (bias corrected MLE)					167.3
1199	Theta hat (MLE)					0.0498	Theta star (bias corrected MLE)					0.0538
1200	nu hat (MLE)					14802	nu star (bias corrected)					13720

1201					MLE Mean (bias corrected)	8.998				MLE Sd (bias corrected)		0.696
1202												
1203	**Background Statistics Assuming Gamma Distribution**											
1204				95% Wilson Hilferty (WH) Approx. Gamma UPL		10.19				90% Percentile		9.9
1205				95% Hawkins Wixley (HW) Approx. Gamma UPL		10.19				95% Percentile		10.17
1206				95% WH Approx. Gamma UTL with 95% Coverage		10.49				99% Percentile		10.69
1207				95% HW Approx. Gamma UTL with 95% Coverage		10.5						
1208					95% WH USL	11.07				95% HW USL		11.09
1209												
1210	**Lognormal GOF Test**											
1211					Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk Lognormal GOF Test**					
1212					5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level					
1213					Lilliefors Test Statistic	0.0805	**Lilliefors Lognormal GOF Test**					
1214					5% Lilliefors Critical Value	0.137	Data appear Lognormal at 5% Significance Level					
1215	**Data appear Lognormal at 5% Significance Level**											
1216												
1217	**Background Statistics assuming Lognormal Distribution**											
1218					95% UTL with 95% Coverage	10.52				90% Percentile (z)		9.883
1219					95% UPL (t)	10.2				95% Percentile (z)		10.16
1220					95% USL	11.15				99% Percentile (z)		10.69
1221												
1222	**Nonparametric Distribution Free Background Statistics**											
1223	**Data appear Normal at 5% Significance Level**											
1224												
1225	**Nonparametric Upper Limits for Background Threshold Values**											
1226					Order of Statistic, r	41				95% UTL with 95% Coverage		10.6
1227					Approx, f used to compute achieved CC	2.158				Approximate Actual Confidence Coefficient achieved by UTL		0.878
1228										Approximate Sample Size needed to achieve specified CC		59
1229				95% Percentile Bootstrap UTL with 95% Coverage		10.6				95% BCA Bootstrap UTL with 95% Coverage		10.4
1230					95% UPL	10.36				90% Percentile		9.7
1231					90% Chebyshev UPL	11.06				95% Percentile		10
1232					95% Chebyshev UPL	11.99				99% Percentile		10.52
1233					95% USL	10.6						
1234												
1235	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1236	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1237	and consists of observations collected from clean unimpacted locations.											
1238	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1239	represents a background data set and when many onsite observations need to be compared with the BTV.											
1240												
1241	**MANGANESE, DISSOLVED (mg/L)**											
1242												
1243	**General Statistics**											
1244					Total Number of Observations	11				Number of Distinct Observations		8
1245					Minimum	0.11				First Quartile		0.245
1246					Second Largest	0.32				Median		0.26
1247					Maximum	0.57				Third Quartile		0.31
1248					Mean	0.287				SD		0.111
1249					Coefficient of Variation	0.386				Skewness		1.494
1250					Mean of logged Data	-1.313				SD of logged Data		0.388

	A	B	C	D	E	F	G	H	I	J	K	L
1251												
1252	**Critical Values for Background Threshold Values (BTVs)**											
1253					Tolerance Factor K (For UTL)	2.815				d2max (for USL)		2.234
1254												
1255	**Normal GOF Test**											
1256					Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**					
1257					5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level					
1258					Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**					
1259					5% Lilliefors Critical Value	0.251	Data Not Normal at 5% Significance Level					
1260	**Data Not Normal at 5% Significance Level**											
1261												
1262	**Background Statistics Assuming Normal Distribution**											
1263				95% UTL with	95% Coverage	0.599				90% Percentile (z)		0.429
1264					95% UPL (t)	0.497				95% Percentile (z)		0.47
1265					95% USL	0.535				99% Percentile (z)		0.545
1266												
1267	**Gamma GOF Test**											
1268					A-D Test Statistic	0.786	**Anderson-Darling Gamma GOF Test**					
1269					5% A-D Critical Value	0.73	Data Not Gamma Distributed at 5% Significance Level					
1270					K-S Test Statistic	0.244	**Kolmogorov-Smirnov Gamma GOF Test**					
1271					5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level					
1272	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
1273												
1274	**Gamma Statistics**											
1275					k hat (MLE)	7.82				k star (bias corrected MLE)		5.748
1276					Theta hat (MLE)	0.0367				Theta star (bias corrected MLE)		0.05
1277					nu hat (MLE)	172				nu star (bias corrected)		126.5
1278					MLE Mean (bias corrected)	0.287				MLE Sd (bias corrected)		0.12
1279												
1280	**Background Statistics Assuming Gamma Distribution**											
1281					95% Wilson Hilferty (WH) Approx. Gamma UPL	0.524				90% Percentile		0.448
1282					95% Hawkins Wixley (HW) Approx. Gamma UPL	0.531				95% Percentile		0.508
1283				95% WH Approx. Gamma UTL with	95% Coverage	0.686				99% Percentile		0.636
1284				95% HW Approx. Gamma UTL with	95% Coverage	0.708						
1285					95% WH USL	0.581				95% HW USL		0.592
1286												
1287	**Lognormal GOF Test**											
1288					Shapiro Wilk Test Statistic	0.856	**Shapiro Wilk Lognormal GOF Test**					
1289					5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level					
1290					Lilliefors Test Statistic	0.252	**Lilliefors Lognormal GOF Test**					
1291					5% Lilliefors Critical Value	0.251	Data Not Lognormal at 5% Significance Level					
1292	**Data appear Approximate Lognormal at 5% Significance Level**											
1293												
1294	**Background Statistics assuming Lognormal Distribution**											
1295				95% UTL with	95% Coverage	0.802				90% Percentile (z)		0.442
1296					95% UPL (t)	0.561				95% Percentile (z)		0.509
1297					95% USL	0.64				99% Percentile (z)		0.663
1298												
1299	**Nonparametric Distribution Free Background Statistics**											
1300	**Data appear Approximate Gamma Distribution at 5% Significance Level**											

1301												
1302	**Nonparametric Upper Limits for Background Threshold Values**											
1303					Order of Statistic, r	11				95% UTL with 95% Coverage	0.57	
1304					Approx, f used to compute achieved CC	0.579				Approximate Actual Confidence Coefficient achieved by UTL	0.431	
1305										Approximate Sample Size needed to achieve specified CC	59	
1306					95% Percentile Bootstrap UTL with 95% Coverage	0.57				95% BCA Bootstrap UTL with 95% Coverage	0.57	
1307					95% UPL	0.57				90% Percentile	0.32	
1308					90% Chebyshev UPL	0.635				95% Percentile	0.445	
1309					95% Chebyshev UPL	0.792				99% Percentile	0.545	
1310					95% USL	0.57						
1311												
1312	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1313	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1314	and consists of observations collected from clean unimpacted locations.											
1315	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1316	represents a background data set and when many onsite observations need to be compared with the BTV.											
1317												
1318	**MANGANESE, TOTAL (mg/L)**											
1319												
1320	**General Statistics**											
1321					Total Number of Observations	35				Number of Distinct Observations	11	
1322					Minimum	0.23				First Quartile	0.26	
1323					Second Largest	0.33				Median	0.27	
1324					Maximum	0.34				Third Quartile	0.29	
1325					Mean	0.278				SD	0.0294	
1326					Coefficient of Variation	0.106				Skewness	0.599	
1327					Mean of logged Data	-1.285				SD of logged Data	0.104	
1328												
1329	**Critical Values for Background Threshold Values (BTVs)**											
1330					Tolerance Factor K (For UTL)	2.157				d2max (for USL)	2.812	
1331												
1332	**Normal GOF Test**											
1333					Shapiro Wilk Test Statistic	0.922				**Shapiro Wilk GOF Test**		
1334					5% Shapiro Wilk Critical Value	0.934				Data Not Normal at 5% Significance Level		
1335					Lilliefors Test Statistic	0.158				**Lilliefors GOF Test**		
1336					5% Lilliefors Critical Value	0.148				Data Not Normal at 5% Significance Level		
1337	**Data Not Normal at 5% Significance Level**											
1338												
1339	**Background Statistics Assuming Normal Distribution**											
1340					95% UTL with 95% Coverage	0.341				90% Percentile (z)	0.316	
1341					95% UPL (t)	0.328				95% Percentile (z)	0.326	
1342					95% USL	0.361				99% Percentile (z)	0.346	
1343												
1344	**Gamma GOF Test**											
1345					A-D Test Statistic	0.877				**Anderson-Darling Gamma GOF Test**		
1346					5% A-D Critical Value	0.746				Data Not Gamma Distributed at 5% Significance Level		
1347					K-S Test Statistic	0.158				**Kolmogorov-Smirnov Gamma GOF Test**		
1348					5% K-S Critical Value	0.148				Data Not Gamma Distributed at 5% Significance Level		
1349	**Data Not Gamma Distributed at 5% Significance Level**											
1350												

1351	**Gamma Statistics**										
1352					k hat (MLE)	94.86			k star (bias corrected MLE)		86.75
1353					Theta hat (MLE)	0.00293			Theta star (bias corrected MLE)		0.0032
1354					nu hat (MLE)	6640			nu star (bias corrected)		6072
1355					MLE Mean (bias corrected)	0.278			MLE Sd (bias corrected)		0.0298
1356											
1357	**Background Statistics Assuming Gamma Distribution**										
1358					95% Wilson Hilferty (WH) Approx. Gamma UPL	0.33			90% Percentile		0.317
1359					95% Hawkins Wixley (HW) Approx. Gamma UPL	0.33			95% Percentile		0.329
1360					95% WH Approx. Gamma UTL with 95% Coverage	0.344			99% Percentile		0.352
1361					95% HW Approx. Gamma UTL with 95% Coverage	0.345					
1362					95% WH USL	0.366			95% HW USL		0.367
1363											
1364	**Lognormal GOF Test**										
1365					Shapiro Wilk Test Statistic	0.937			**Shapiro Wilk Lognormal GOF Test**		
1366					5% Shapiro Wilk Critical Value	0.934			Data appear Lognormal at 5% Significance Level		
1367					Lilliefors Test Statistic	0.153			**Lilliefors Lognormal GOF Test**		
1368					5% Lilliefors Critical Value	0.148			Data Not Lognormal at 5% Significance Level		
1369	**Data appear Approximate Lognormal at 5% Significance Level**										
1370											
1371	**Background Statistics assuming Lognormal Distribution**										
1372					95% UTL with 95% Coverage	0.346			90% Percentile (z)		0.316
1373					95% UPL (t)	0.33			95% Percentile (z)		0.328
1374					95% USL	0.37			99% Percentile (z)		0.352
1375											
1376	**Nonparametric Distribution Free Background Statistics**										
1377	**Data appear Approximate Lognormal at 5% Significance Level**										
1378											
1379	**Nonparametric Upper Limits for Background Threshold Values**										
1380					Order of Statistic, r	35			95% UTL with 95% Coverage		0.34
1381					Approx, f used to compute achieved CC	1.842			Approximate Actual Confidence Coefficient achieved by UTL		0.834
1382									Approximate Sample Size needed to achieve specified CC		59
1383					95% Percentile Bootstrap UTL with 95% Coverage	0.34			95% BCA Bootstrap UTL with 95% Coverage		0.33
1384					95% UPL	0.332			90% Percentile		0.33
1385					90% Chebyshev UPL	0.367			95% Percentile		0.33
1386					95% Chebyshev UPL	0.408			99% Percentile		0.337
1387					95% USL	0.34					
1388											
1389	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.										
1390	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers										
1391	and consists of observations collected from clean unimpacted locations.										
1392	The use of USL tends to provide a balance between false positives and false negatives provided the data										
1393	represents a background data set and when many onsite observations need to be compared with the BTV.										
1394											
1395	**METHYLENE CHLORIDE (ug/L)**										
1396											
1397	**General Statistics**										
1398					Total Number of Observations	44			Number of Missing Observations		0
1399					Number of Distinct Observations	1					
1400					Number of Detects	0			Number of Non-Detects		44

1401					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
1402					Minimum Detect	N/A				Minimum Non-Detect		1
1403					Maximum Detect	N/A				Maximum Non-Detect		1
1404					Variance Detected	N/A				Percent Non-Detects		100%
1405					Mean Detected	N/A				SD Detected		N/A
1406					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
1407												
1408	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
1409	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
1410	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1411												
1412	**The data set for variable METHYLENE CHLORIDE (ug/L) was not processed!**											
1413												
1414												
1415	**NITRATE-NITROGEN (mg/L)**											
1416												
1417	**General Statistics**											
1418					Total Number of Observations	43				Number of Distinct Observations		35
1419					Minimum	4.9				First Quartile		19.6
1420					Second Largest	29				Median		22.5
1421					Maximum	31.7				Third Quartile		25.9
1422					Mean	21.09				SD		6.478
1423					Coefficient of Variation	0.307				Skewness		-0.993
1424					Mean of logged Data	2.98				SD of logged Data		0.42
1425												
1426	**Critical Values for Background Threshold Values (BTVs)**											
1427					Tolerance Factor K (For UTL)	2.097				d2max (for USL)		2.897
1428												
1429	**Normal GOF Test**											
1430					Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**					
1431					5% Shapiro Wilk Critical Value	0.943	Data Not Normal at 5% Significance Level					
1432					Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**					
1433					5% Lilliefors Critical Value	0.134	Data Not Normal at 5% Significance Level					
1434	**Data Not Normal at 5% Significance Level**											
1435												
1436	**Background Statistics Assuming Normal Distribution**											
1437					95% UTL with 95% Coverage	34.68				90% Percentile (z)		29.39
1438					95% UPL (t)	32.11				95% Percentile (z)		31.75
1439					95% USL	39.86				99% Percentile (z)		36.16
1440												
1441	**Gamma GOF Test**											
1442					A-D Test Statistic	2.953	**Anderson-Darling Gamma GOF Test**					
1443					5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level					
1444					K-S Test Statistic	0.236	**Kolmogorov-Smirnov Gamma GOF Test**					
1445					5% K-S Critical Value	0.135	Data Not Gamma Distributed at 5% Significance Level					
1446	**Data Not Gamma Distributed at 5% Significance Level**											
1447												
1448	**Gamma Statistics**											
1449					k hat (MLE)	7.433				k star (bias corrected MLE)		6.93
1450					Theta hat (MLE)	2.838				Theta star (bias corrected MLE)		3.044

	A	B	C	D	E	F	G	H	I	J	K	L
1451					nu hat (MLE)	639.2				nu star (bias corrected)		596
1452					MLE Mean (bias corrected)	21.09				MLE Sd (bias corrected)		8.013
1453												
1454	**Background Statistics Assuming Gamma Distribution**											
1455					95% Wilson Hilferty (WH) Approx. Gamma UPL	36.06				90% Percentile		31.79
1456					95% Hawkins Wixley (HW) Approx. Gamma UPL	36.89				95% Percentile		35.76
1457					95% WH Approx. Gamma UTL with 95% Coverage	40.66				99% Percentile		44.04
1458					95% HW Approx. Gamma UTL with 95% Coverage	41.96						
1459					95% WH USL	51.1				95% HW USL		53.81
1460												
1461	**Lognormal GOF Test**											
1462					Shapiro Wilk Test Statistic	0.783	**Shapiro Wilk Lognormal GOF Test**					
1463					5% Shapiro Wilk Critical Value	0.943	Data Not Lognormal at 5% Significance Level					
1464					Lilliefors Test Statistic	0.259	**Lilliefors Lognormal GOF Test**					
1465					5% Lilliefors Critical Value	0.134	Data Not Lognormal at 5% Significance Level					
1466	**Data Not Lognormal at 5% Significance Level**											
1467												
1468	**Background Statistics assuming Lognormal Distribution**											
1469					95% UTL with 95% Coverage	47.54				90% Percentile (z)		33.74
1470					95% UPL (t)	40.25				95% Percentile (z)		39.31
1471					95% USL	66.53				99% Percentile (z)		52.35
1472												
1473	**Nonparametric Distribution Free Background Statistics**											
1474	**Data do not follow a Discernible Distribution (0.05)**											
1475												
1476	**Nonparametric Upper Limits for Background Threshold Values**											
1477					Order of Statistic, r	43				95% UTL with 95% Coverage		31.7
1478					Approx, f used to compute achieved CC	2.263	Approximate Actual Confidence Coefficient achieved by UTL					0.89
1479							Approximate Sample Size needed to achieve specified CC					59
1480					95% Percentile Bootstrap UTL with 95% Coverage	31.43				95% BCA Bootstrap UTL with 95% Coverage		31.31
1481					95% UPL	28.76				90% Percentile		26.7
1482					90% Chebyshev UPL	40.75				95% Percentile		27.73
1483					95% Chebyshev UPL	49.66				99% Percentile		30.57
1484					95% USL	31.7						
1485												
1486	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1487	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1488	and consists of observations collected from clean unimpacted locations.											
1489	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1490	represents a background data set and when many onsite observations need to be compared with the BTV.											
1491												
1492	**pH-FIELD (SU)**											
1493												
1494	**General Statistics**											
1495					Total Number of Observations	42				Number of Distinct Observations		36
1496					Minimum	3.91				First Quartile		4.553
1497					Second Largest	6.38				Median		4.7
1498					Maximum	6.55				Third Quartile		5.143
1499					Mean	4.938				SD		0.568
1500					Coefficient of Variation	0.115				Skewness		1.14

1501					Mean of logged Data	1.591					SD of logged Data	0.11
1502												
1503	**Critical Values for Background Threshold Values (BTVs)**											
1504					Tolerance Factor K (For UTL)	2.104					d2max (for USL)	2.887
1505												
1506	**Normal GOF Test**											
1507					Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**					
1508					5% Shapiro Wilk Critical Value	0.942	Data Not Normal at 5% Significance Level					
1509					Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**					
1510					5% Lilliefors Critical Value	0.135	Data Not Normal at 5% Significance Level					
1511	**Data Not Normal at 5% Significance Level**											
1512												
1513	**Background Statistics Assuming Normal Distribution**											
1514					95% UTL with 95% Coverage	6.134					90% Percentile (z)	5.666
1515					95% UPL (t)	5.906					95% Percentile (z)	5.873
1516					95% USL	6.579					99% Percentile (z)	6.26
1517												
1518	**Gamma GOF Test**											
1519					A-D Test Statistic	1.752	**Anderson-Darling Gamma GOF Test**					
1520					5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level					
1521					K-S Test Statistic	0.186	**Kolmogorov-Smirnov Gamma GOF Test**					
1522					5% K-S Critical Value	0.136	Data Not Gamma Distributed at 5% Significance Level					
1523	**Data Not Gamma Distributed at 5% Significance Level**											
1524												
1525	**Gamma Statistics**											
1526					k hat (MLE)	82.67					k star (bias corrected MLE)	76.78
1527					Theta hat (MLE)	0.0597					Theta star (bias corrected MLE)	0.0643
1528					nu hat (MLE)	6944					nu star (bias corrected)	6449
1529					MLE Mean (bias corrected)	4.938					MLE Sd (bias corrected)	0.564
1530												
1531	**Background Statistics Assuming Gamma Distribution**											
1532					95% Wilson Hilferty (WH) Approx. Gamma UPL	5.912					90% Percentile	5.673
1533					95% Hawkins Wixley (HW) Approx. Gamma UPL	5.913					95% Percentile	5.9
1534					95% WH Approx. Gamma UTL with 95% Coverage	6.164					99% Percentile	6.343
1535					95% HW Approx. Gamma UTL with 95% Coverage	6.168						
1536					95% WH USL	6.677					95% HW USL	6.691
1537												
1538	**Lognormal GOF Test**											
1539					Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk Lognormal GOF Test**					
1540					5% Shapiro Wilk Critical Value	0.942	Data Not Lognormal at 5% Significance Level					
1541					Lilliefors Test Statistic	0.182	**Lilliefors Lognormal GOF Test**					
1542					5% Lilliefors Critical Value	0.135	Data Not Lognormal at 5% Significance Level					
1543	**Data Not Lognormal at 5% Significance Level**											
1544												
1545	**Background Statistics assuming Lognormal Distribution**											
1546					95% UTL with 95% Coverage	6.183					90% Percentile (z)	5.65
1547					95% UPL (t)	5.917					95% Percentile (z)	5.879
1548					95% USL	6.739					99% Percentile (z)	6.336
1549												
1550	**Nonparametric Distribution Free Background Statistics**											

1551	**Data do not follow a Discernible Distribution (0.05)**										
1552											
1553	**Nonparametric Upper Limits for Background Threshold Values**										
1554					Order of Statistic, r	42			95% UTL with 95% Coverage		6.55
1555					Approx, f used to compute achieved CC	2.211			Approximate Actual Confidence Coefficient achieved by UTL		0.884
1556									Approximate Sample Size needed to achieve specified CC		59
1557					95% Percentile Bootstrap UTL with 95% Coverage	6.542			95% BCA Bootstrap UTL with 95% Coverage		6.513
1558					95% UPL	6.316			90% Percentile		5.781
1559					90% Chebyshev UPL	6.663			95% Percentile		5.943
1560					95% Chebyshev UPL	7.445			99% Percentile		6.48
1561					95% USL	6.55					
1562											
1563	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.										
1564	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers										
1565	and consists of observations collected from clean unimpacted locations.										
1566	The use of USL tends to provide a balance between false positives and false negatives provided the data										
1567	represents a background data set and when many onsite observations need to be compared with the BTV.										
1568											
1569	**pH-LAB (SU)**										
1570											
1571	**General Statistics**										
1572					Total Number of Observations	41			Number of Distinct Observations		36
1573					Minimum	4.84			First Quartile		5.41
1574					Second Largest	7.24			Median		5.57
1575					Maximum	7.81			Third Quartile		5.74
1576					Mean	5.696			SD		0.604
1577					Coefficient of Variation	0.106			Skewness		1.804
1578					Mean of logged Data	1.735			SD of logged Data		0.0987
1579											
1580	**Critical Values for Background Threshold Values (BTVs)**										
1581					Tolerance Factor K (For UTL)	2.11			d2max (for USL)		2.878
1582											
1583	**Normal GOF Test**										
1584					Shapiro Wilk Test Statistic	0.811			**Shapiro Wilk GOF Test**		
1585					5% Shapiro Wilk Critical Value	0.941			Data Not Normal at 5% Significance Level		
1586					Lilliefors Test Statistic	0.232			**Lilliefors GOF Test**		
1587					5% Lilliefors Critical Value	0.137			Data Not Normal at 5% Significance Level		
1588	**Data Not Normal at 5% Significance Level**										
1589											
1590	**Background Statistics Assuming Normal Distribution**										
1591					95% UTL with 95% Coverage	6.97			90% Percentile (z)		6.47
1592					95% UPL (t)	6.725			95% Percentile (z)		6.689
1593					95% USL	7.433			99% Percentile (z)		7.1
1594											
1595	**Gamma GOF Test**										
1596					A-D Test Statistic	2.495			**Anderson-Darling Gamma GOF Test**		
1597					5% A-D Critical Value	0.747			Data Not Gamma Distributed at 5% Significance Level		
1598					K-S Test Statistic	0.219			**Kolmogorov-Smirnov Gamma GOF Test**		
1599					5% K-S Critical Value	0.137			Data Not Gamma Distributed at 5% Significance Level		
1600	**Data Not Gamma Distributed at 5% Significance Level**										

	A	B	C	D	E	F	G	H	I	J	K	L
1601												
1602	**Gamma Statistics**											
1603					k hat (MLE)	100.8				k star (bias corrected MLE)		93.4
1604					Theta hat (MLE)	0.0565				Theta star (bias corrected MLE)		0.061
1605					nu hat (MLE)	8262				nu star (bias corrected)		7658
1606					MLE Mean (bias corrected)	5.696				MLE Sd (bias corrected)		0.589
1607												
1608	**Background Statistics Assuming Gamma Distribution**											
1609					95% Wilson Hilferty (WH) Approx. Gamma UPL	6.711				90% Percentile		6.463
1610					95% Hawkins Wixley (HW) Approx. Gamma UPL	6.709				95% Percentile		6.699
1611					95% WH Approx. Gamma UTL with 95% Coverage	6.974				99% Percentile		7.156
1612					95% HW Approx. Gamma UTL with 95% Coverage	6.975						
1613					95% WH USL	7.491				95% HW USL		7.5
1614												
1615	**Lognormal GOF Test**											
1616					Shapiro Wilk Test Statistic	0.854				**Shapiro Wilk Lognormal GOF Test**		
1617					5% Shapiro Wilk Critical Value	0.941				Data Not Lognormal at 5% Significance Level		
1618					Lilliefors Test Statistic	0.213				**Lilliefors Lognormal GOF Test**		
1619					5% Lilliefors Critical Value	0.137				Data Not Lognormal at 5% Significance Level		
1620	**Data Not Lognormal at 5% Significance Level**											
1621												
1622	**Background Statistics assuming Lognormal Distribution**											
1623					95% UTL with 95% Coverage	6.979				90% Percentile (z)		6.431
1624					95% UPL (t)	6.705				95% Percentile (z)		6.666
1625					95% USL	7.528				99% Percentile (z)		7.13
1626												
1627	**Nonparametric Distribution Free Background Statistics**											
1628	**Data do not follow a Discernible Distribution (0.05)**											
1629												
1630	**Nonparametric Upper Limits for Background Threshold Values**											
1631					Order of Statistic, r	41				95% UTL with 95% Coverage		7.81
1632					Approx, f used to compute achieved CC	2.158				Approximate Actual Confidence Coefficient achieved by UTL		0.878
1633										Approximate Sample Size needed to achieve specified CC		59
1634					95% Percentile Bootstrap UTL with 95% Coverage	7.81				95% BCA Bootstrap UTL with 95% Coverage		7.24
1635					95% UPL	7.231				90% Percentile		6.44
1636					90% Chebyshev UPL	7.529				95% Percentile		7.15
1637					95% Chebyshev UPL	8.36				99% Percentile		7.582
1638					95% USL	7.81						
1639												
1640	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1641	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1642	and consists of observations collected from clean unimpacted locations.											
1643	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1644	represents a background data set and when many onsite observations need to be compared with the BTV.											
1645												
1646	**POTASSIUM, DISSOLVED (mg/L)**											
1647												
1648	**General Statistics**											
1649					Total Number of Observations	10				Number of Distinct Observations		7
1650					Minimum	0.95				First Quartile		1.1

	A	B	C	D	E	F	G	H	I	J	K	L
1651					Second Largest	1.6					Median	1.2
1652					Maximum	1.6					Third Quartile	1.375
1653					Mean	1.245					SD	0.229
1654					Coefficient of Variation	0.184					Skewness	0.54
1655					Mean of logged Data	0.204					SD of logged Data	0.181
1656												
1657	**Critical Values for Background Threshold Values (BTVs)**											
1658					Tolerance Factor K (For UTL)	2.911					d2max (for USL)	2.176
1659												
1660	**Normal GOF Test**											
1661					Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**					
1662					5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level					
1663					Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**					
1664					5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level					
1665	**Data appear Normal at 5% Significance Level**											
1666												
1667	**Background Statistics Assuming Normal Distribution**											
1668				95% UTL with	95% Coverage	1.912					90% Percentile (z)	1.539
1669					95% UPL (t)	1.685					95% Percentile (z)	1.622
1670					95% USL	1.743					99% Percentile (z)	1.778
1671												
1672	**Gamma GOF Test**											
1673					A-D Test Statistic	0.306	**Anderson-Darling Gamma GOF Test**					
1674					5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level					
1675					K-S Test Statistic	0.162	**Kolmogorov-Smirnov Gamma GOF Test**					
1676					5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level					
1677	**Detected data appear Gamma Distributed at 5% Significance Level**											
1678												
1679	**Gamma Statistics**											
1680					k hat (MLE)	33.83					k star (bias corrected MLE)	23.75
1681					Theta hat (MLE)	0.0368					Theta star (bias corrected MLE)	0.0524
1682					nu hat (MLE)	676.5					nu star (bias corrected)	474.9
1683					MLE Mean (bias corrected)	1.245					MLE Sd (bias corrected)	0.255
1684												
1685	**Background Statistics Assuming Gamma Distribution**											
1686					95% Wilson Hilferty (WH) Approx. Gamma UPL	1.716					90% Percentile	1.582
1687					95% Hawkins Wixley (HW) Approx. Gamma UPL	1.721					95% Percentile	1.693
1688					95% WH Approx. Gamma UTL with 95% Coverage	2.007					99% Percentile	1.915
1689					95% HW Approx. Gamma UTL with 95% Coverage	2.023						
1690					95% WH USL	1.788					95% HW USL	1.795
1691												
1692	**Lognormal GOF Test**											
1693					Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**					
1694					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
1695					Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**					
1696					5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level					
1697	**Data appear Lognormal at 5% Significance Level**											
1698												
1699	**Background Statistics assuming Lognormal Distribution**											
1700				95% UTL with	95% Coverage	2.076					90% Percentile (z)	1.546

1701					95% UPL (t)	1.736				95% Percentile (z)		1.651
1702					95% USL	1.818				99% Percentile (z)		1.868
1703												
1704	**Nonparametric Distribution Free Background Statistics**											
1705	**Data appear Normal at 5% Significance Level**											
1706												
1707	**Nonparametric Upper Limits for Background Threshold Values**											
1708					Order of Statistic, r	10				95% UTL with 95% Coverage		1.6
1709					Approx, f used to compute achieved CC	0.526				Approximate Actual Confidence Coefficient achieved by UTL		0.401
1710										Approximate Sample Size needed to achieve specified CC		59
1711					95% Percentile Bootstrap UTL with 95% Coverage	1.6				95% BCA Bootstrap UTL with 95% Coverage		1.6
1712					95% UPL	1.6				90% Percentile		1.6
1713					90% Chebyshev UPL	1.966				95% Percentile		1.6
1714					95% Chebyshev UPL	2.292				99% Percentile		1.6
1715					95% USL	1.6						
1716												
1717	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1718	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1719	and consists of observations collected from clean unimpacted locations.											
1720	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1721	represents a background data set and when many onsite observations need to be compared with the BTV.											
1722												
1723	**POTASSIUM, TOTAL (mg/L)**											
1724												
1725	**General Statistics**											
1726					Total Number of Observations	42				Number of Distinct Observations		17
1727					Minimum	0				First Quartile		1.2
1728					Second Largest	11.1				Median		1.25
1729					Maximum	14.4				Third Quartile		1.9
1730					Mean	2.201				SD		2.716
1731					Coefficient of Variation	1.234				Skewness		3.401
1732												
1733	**Critical Values for Background Threshold Values (BTVs)**											
1734					Tolerance Factor K (For UTL)	2.104				d2max (for USL)		2.887
1735												
1736	**Normal GOF Test**											
1737					Shapiro Wilk Test Statistic	0.499				**Shapiro Wilk GOF Test**		
1738					5% Shapiro Wilk Critical Value	0.942				Data Not Normal at 5% Significance Level		
1739					Lilliefors Test Statistic	0.354				**Lilliefors GOF Test**		
1740					5% Lilliefors Critical Value	0.135				Data Not Normal at 5% Significance Level		
1741	**Data Not Normal at 5% Significance Level**											
1742												
1743	**Background Statistics Assuming Normal Distribution**											
1744					95% UTL with 95% Coverage	7.914				90% Percentile (z)		5.682
1745					95% UPL (t)	6.826				95% Percentile (z)		6.669
1746					95% USL	10.04				99% Percentile (z)		8.519
1747												
1748	**Gamma Statistics**											
1749	**Gamma Statistics Not Available**											
1750												

1751	**Cannot Compute Gamma Statistics!**											
1752												
1753	**Cannot Compute Log Statistics**											
1754												
1755	**Nonparametric Distribution Free Background Statistics**											
1756	**Data do not follow a Discernible Distribution (0.05)**											
1757												
1758	**Nonparametric Upper Limits for Background Threshold Values**											
1759					Order of Statistic, r	42			95% UTL with 95% Coverage			14.4
1760					Approx, f used to compute achieved CC	2.211			Approximate Actual Confidence Coefficient achieved by UTL			0.884
1761									Approximate Sample Size needed to achieve specified CC			59
1762					95% Percentile Bootstrap UTL with 95% Coverage	14.03			95% BCA Bootstrap UTL with 95% Coverage			14.03
1763					95% UPL	10.49			90% Percentile			3.06
1764					90% Chebyshev UPL	10.45			95% Percentile			6.965
1765					95% Chebyshev UPL	14.18			99% Percentile			13.05
1766					95% USL	14.4						
1767												
1768	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1769	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1770	and consists of observations collected from clean unimpacted locations.											
1771	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1772	represents a background data set and when many onsite observations need to be compared with the BTV.											
1773												
1774	**SODIUM, DISSOLVED (mg/L)**											
1775												
1776	**General Statistics**											
1777					Total Number of Observations	11			Number of Distinct Observations			9
1778					Minimum	13.7			First Quartile			14.2
1779					Second Largest	20.6			Median			16.2
1780					Maximum	20.9			Third Quartile			18.75
1781					Mean	16.76			SD			2.667
1782					Coefficient of Variation	0.159			Skewness			0.437
1783					Mean of logged Data	2.808			SD of logged Data			0.157
1784												
1785	**Critical Values for Background Threshold Values (BTVs)**											
1786					Tolerance Factor K (For UTL)	2.815			d2max (for USL)			2.234
1787												
1788	**Normal GOF Test**											
1789					Shapiro Wilk Test Statistic	0.895			**Shapiro Wilk GOF Test**			
1790					5% Shapiro Wilk Critical Value	0.85			Data appear Normal at 5% Significance Level			
1791					Lilliefors Test Statistic	0.186			**Lilliefors GOF Test**			
1792					5% Lilliefors Critical Value	0.251			Data appear Normal at 5% Significance Level			
1793	**Data appear Normal at 5% Significance Level**											
1794												
1795	**Background Statistics Assuming Normal Distribution**											
1796					95% UTL with 95% Coverage	24.27			90% Percentile (z)			20.18
1797					95% UPL (t)	21.81			95% Percentile (z)			21.15
1798					95% USL	22.72			99% Percentile (z)			22.97
1799												
1800	**Gamma GOF Test**											

1801					A-D Test Statistic	0.469	**Anderson-Darling Gamma GOF Test**					
1802					5% A-D Critical Value	0.728	Detected data appear Gamma Distributed at 5% Significance Level					
1803					K-S Test Statistic	0.201	**Kolmogorov-Smirnov Gamma GOF Test**					
1804					5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level					
1805	**Detected data appear Gamma Distributed at 5% Significance Level**											
1806												
1807	**Gamma Statistics**											
1808					k hat (MLE)	44.49	k star (bias corrected MLE)	32.41				
1809					Theta hat (MLE)	0.377	Theta star (bias corrected MLE)	0.517				
1810					nu hat (MLE)	978.7	nu star (bias corrected)	713.1				
1811					MLE Mean (bias corrected)	16.76	MLE Sd (bias corrected)	2.944				
1812												
1813	**Background Statistics Assuming Gamma Distribution**											
1814				95% Wilson Hilferty (WH) Approx. Gamma UPL		22.11	90% Percentile	20.63				
1815				95% Hawkins Wixley (HW) Approx. Gamma UPL		22.16	95% Percentile	21.88				
1816				95% WH Approx. Gamma UTL with	95% Coverage	25.17	99% Percentile	24.36				
1817				95% HW Approx. Gamma UTL with	95% Coverage	25.31						
1818					95% WH USL	23.21	95% HW USL	23.29				
1819												
1820	**Lognormal GOF Test**											
1821					Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk Lognormal GOF Test**					
1822					5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level					
1823					Lilliefors Test Statistic	0.19	**Lilliefors Lognormal GOF Test**					
1824					5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level					
1825	**Data appear Lognormal at 5% Significance Level**											
1826												
1827	**Background Statistics assuming Lognormal Distribution**											
1828					95% UTL with	95% Coverage	25.77	90% Percentile (z)	20.26			
1829						95% UPL (t)	22.3	95% Percentile (z)	21.45			
1830						95% USL	23.53	99% Percentile (z)	23.87			
1831												
1832	**Nonparametric Distribution Free Background Statistics**											
1833	**Data appear Normal at 5% Significance Level**											
1834												
1835	**Nonparametric Upper Limits for Background Threshold Values**											
1836					Order of Statistic, r	11	95% UTL with	95% Coverage	20.9			
1837					Approx, f used to compute achieved CC	0.579	Approximate Actual Confidence Coefficient achieved by UTL		0.431			
1838							Approximate Sample Size needed to achieve specified CC		59			
1839				95% Percentile Bootstrap UTL with	95% Coverage	20.9	95% BCA Bootstrap UTL with	95% Coverage	20.9			
1840					95% UPL	20.9	90% Percentile	20.6				
1841					90% Chebyshev UPL	25.12	95% Percentile	20.75				
1842					95% Chebyshev UPL	28.91	99% Percentile	20.87				
1843					95% USL	20.9						
1844												
1845	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1846	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1847	and consists of observations collected from clean unimpacted locations.											
1848	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1849	represents a background data set and when many onsite observations need to be compared with the BTV.											
1850												

	A	B	C	D	E	F	G	H	I	J	K	L
1851	**SODIUM, TOTAL (mg/L)**											
1852												
1853	**General Statistics**											
1854					Total Number of Observations	40			Number of Distinct Observations	30		
1855					Minimum	13.7			First Quartile	14.48		
1856					Second Largest	22.3			Median	15.7		
1857					Maximum	24			Third Quartile	18.35		
1858					Mean	16.6			SD	2.507		
1859					Coefficient of Variation	0.151			Skewness	1.08		
1860					Mean of logged Data	2.799			SD of logged Data	0.143		
1861												
1862					**Critical Values for Background Threshold Values (BTVs)**							
1863					Tolerance Factor K (For UTL)	2.117			d2max (for USL)	2.868		
1864												
1865					**Normal GOF Test**							
1866					Shapiro Wilk Test Statistic	0.876			**Shapiro Wilk GOF Test**			
1867					5% Shapiro Wilk Critical Value	0.94			Data Not Normal at 5% Significance Level			
1868					Lilliefors Test Statistic	0.169			**Lilliefors GOF Test**			
1869					5% Lilliefors Critical Value	0.139			Data Not Normal at 5% Significance Level			
1870					**Data Not Normal at 5% Significance Level**							
1871												
1872					**Background Statistics Assuming Normal Distribution**							
1873					95% UTL with 95% Coverage	21.9			90% Percentile (z)	19.81		
1874					95% UPL (t)	20.87			95% Percentile (z)	20.72		
1875					95% USL	23.78			99% Percentile (z)	22.43		
1876												
1877					**Gamma GOF Test**							
1878					A-D Test Statistic	1.476			**Anderson-Darling Gamma GOF Test**			
1879					5% A-D Critical Value	0.746			Data Not Gamma Distributed at 5% Significance Level			
1880					K-S Test Statistic	0.164			**Kolmogorov-Smirnov Gamma GOF Test**			
1881					5% K-S Critical Value	0.139			Data Not Gamma Distributed at 5% Significance Level			
1882					**Data Not Gamma Distributed at 5% Significance Level**							
1883												
1884					**Gamma Statistics**							
1885					k hat (MLE)	48.65			k star (bias corrected MLE)	45.02		
1886					Theta hat (MLE)	0.341			Theta star (bias corrected MLE)	0.369		
1887					nu hat (MLE)	3892			nu star (bias corrected)	3601		
1888					MLE Mean (bias corrected)	16.6			MLE Sd (bias corrected)	2.473		
1889												
1890					**Background Statistics Assuming Gamma Distribution**							
1891					95% Wilson Hilferty (WH) Approx. Gamma UPL	20.92			90% Percentile	19.83		
1892					95% Hawkins Wixley (HW) Approx. Gamma UPL	20.93			95% Percentile	20.86		
1893					95% WH Approx. Gamma UTL with 95% Coverage	22.1			99% Percentile	22.88		
1894					95% HW Approx. Gamma UTL with 95% Coverage	22.13						
1895					95% WH USL	24.36			95% HW USL	24.45		
1896												
1897					**Lognormal GOF Test**							
1898					Shapiro Wilk Test Statistic	0.898			**Shapiro Wilk Lognormal GOF Test**			
1899					5% Shapiro Wilk Critical Value	0.94			Data Not Lognormal at 5% Significance Level			
1900					Lilliefors Test Statistic	0.157			**Lilliefors Lognormal GOF Test**			

1901				5% Lilliefors Critical Value		0.139		Data Not Lognormal at 5% Significance Level				
1902	**Data Not Lognormal at 5% Significance Level**											
1903												
1904	**Background Statistics assuming Lognormal Distribution**											
1905				95% UTL with 95% Coverage		22.23				90% Percentile (z)		19.72
1906				95% UPL (t)		20.96				95% Percentile (z)		20.78
1907				95% USL		24.74				99% Percentile (z)		22.9
1908												
1909	**Nonparametric Distribution Free Background Statistics**											
1910	**Data do not follow a Discernible Distribution (0.05)**											
1911												
1912	**Nonparametric Upper Limits for Background Threshold Values**											
1913				Order of Statistic, r		40				95% UTL with 95% Coverage		24
1914				Approx, f used to compute achieved CC		2.105				Approximate Actual Confidence Coefficient achieved by UTL		0.871
1915										Approximate Sample Size needed to achieve specified CC		59
1916				95% Percentile Bootstrap UTL with 95% Coverage		24				95% BCA Bootstrap UTL with 95% Coverage		24
1917				95% UPL		22.2				90% Percentile		20
1918				90% Chebyshev UPL		24.21				95% Percentile		20.4
1919				95% Chebyshev UPL		27.66				99% Percentile		23.34
1920				95% USL		24						
1921												
1922	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
1923	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
1924	and consists of observations collected from clean unimpacted locations.											
1925	The use of USL tends to provide a balance between false positives and false negatives provided the data											
1926	represents a background data set and when many onsite observations need to be compared with the BTV.											
1927												
1928	**SPEC. COND., FIELD (umhos/cm)**											
1929												
1930	**General Statistics**											
1931				Total Number of Observations		41				Number of Distinct Observations		32
1932				Minimum		215				First Quartile		309
1933				Second Largest		590				Median		331
1934				Maximum		661				Third Quartile		350
1935				Mean		338.3				SD		80.14
1936				Coefficient of Variation		0.237				Skewness		2.31
1937				Mean of logged Data		5.802				SD of logged Data		0.207
1938												
1939	**Critical Values for Background Threshold Values (BTVs)**											
1940				Tolerance Factor K (For UTL)		2.11				d2max (for USL)		2.878
1941												
1942	**Normal GOF Test**											
1943				Shapiro Wilk Test Statistic		0.749		**Shapiro Wilk GOF Test**				
1944				5% Shapiro Wilk Critical Value		0.941		Data Not Normal at 5% Significance Level				
1945				Lilliefors Test Statistic		0.272		**Lilliefors GOF Test**				
1946				5% Lilliefors Critical Value		0.137		Data Not Normal at 5% Significance Level				
1947	**Data Not Normal at 5% Significance Level**											
1948												
1949	**Background Statistics Assuming Normal Distribution**											
1950				95% UTL with 95% Coverage		507.5				90% Percentile (z)		441

1951					95% UPL (t)	474.9				95% Percentile (z)		470.2
1952					95% USL	569				99% Percentile (z)		524.8
1953												
1954	**Gamma GOF Test**											
1955					A-D Test Statistic	2.577	**Anderson-Darling Gamma GOF Test**					
1956					5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level					
1957					K-S Test Statistic	0.235	**Kolmogorov-Smirnov Gamma GOF Test**					
1958					5% K-S Critical Value	0.138	Data Not Gamma Distributed at 5% Significance Level					
1959	**Data Not Gamma Distributed at 5% Significance Level**											
1960												
1961	**Gamma Statistics**											
1962					k hat (MLE)	22.42				k star (bias corrected MLE)		20.79
1963					Theta hat (MLE)	15.09				Theta star (bias corrected MLE)		16.27
1964					nu hat (MLE)	1838				nu star (bias corrected)		1705
1965					MLE Mean (bias corrected)	338.3				MLE Sd (bias corrected)		74.2
1966												
1967	**Background Statistics Assuming Gamma Distribution**											
1968				95% Wilson Hilferty (WH) Approx. Gamma UPL		470.5				90% Percentile		436.2
1969				95% Hawkins Wixley (HW) Approx. Gamma UPL		470.4				95% Percentile		468.9
1970				95% WH Approx. Gamma UTL with	95% Coverage	508				99% Percentile		534.4
1971				95% HW Approx. Gamma UTL with	95% Coverage	508.7						
1972					95% WH USL	584.2				95% HW USL		587.5
1973												
1974	**Lognormal GOF Test**											
1975					Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk Lognormal GOF Test**					
1976					5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level					
1977					Lilliefors Test Statistic	0.22	**Lilliefors Lognormal GOF Test**					
1978					5% Lilliefors Critical Value	0.137	Data Not Lognormal at 5% Significance Level					
1979	**Data Not Lognormal at 5% Significance Level**											
1980												
1981	**Background Statistics assuming Lognormal Distribution**											
1982				95% UTL with	95% Coverage	511.9				90% Percentile (z)		431.3
1983					95% UPL (t)	470.7				95% Percentile (z)		464.9
1984					95% USL	600				99% Percentile (z)		535.3
1985												
1986	**Nonparametric Distribution Free Background Statistics**											
1987	**Data do not follow a Discernible Distribution (0.05)**											
1988												
1989	**Nonparametric Upper Limits for Background Threshold Values**											
1990					Order of Statistic, r	41				95% UTL with	95% Coverage	661
1991					Approx, f used to compute achieved CC	2.158				Approximate Actual Confidence Coefficient achieved by UTL		0.878
1992										Approximate Sample Size needed to achieve specified CC		59
1993				95% Percentile Bootstrap UTL with	95% Coverage	661				95% BCA Bootstrap UTL with	95% Coverage	590
1994					95% UPL	577.6				90% Percentile		371
1995					90% Chebyshev UPL	581.7				95% Percentile		466
1996					95% Chebyshev UPL	691.9				99% Percentile		632.6
1997					95% USL	661						
1998												
1999	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2000	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											

	A	B	C	D	E	F	G	H	I	J	K	L
2001	and consists of observations collected from clean unimpacted locations.											
2002	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2003	represents a background data set and when many onsite observations need to be compared with the BTV.											
2004												
2005	**SPEC. COND., LAB (umhos/cm)**											
2006												
2007	**General Statistics**											
2008						Total Number of Observations	41			Number of Distinct Observations	34	
2009						Minimum	242			First Quartile	282	
2010						Second Largest	589			Median	302	
2011						Maximum	656			Third Quartile	336	
2012						Mean	323.5			SD	81.42	
2013						Coefficient of Variation	0.252			Skewness	2.698	
2014						Mean of logged Data	5.756			SD of logged Data	0.205	
2015												
2016	**Critical Values for Background Threshold Values (BTVs)**											
2017						Tolerance Factor K (For UTL)	2.11			d2max (for USL)	2.878	
2018												
2019	**Normal GOF Test**											
2020						Shapiro Wilk Test Statistic	0.714		**Shapiro Wilk GOF Test**			
2021						5% Shapiro Wilk Critical Value	0.941		Data Not Normal at 5% Significance Level			
2022						Lilliefors Test Statistic	0.21		**Lilliefors GOF Test**			
2023						5% Lilliefors Critical Value	0.137		Data Not Normal at 5% Significance Level			
2024	**Data Not Normal at 5% Significance Level**											
2025												
2026	**Background Statistics Assuming Normal Distribution**											
2027						95% UTL with 95% Coverage	495.3			90% Percentile (z)	427.9	
2028						95% UPL (t)	462.3			95% Percentile (z)	457.4	
2029						95% USL	557.8			99% Percentile (z)	512.9	
2030												
2031	**Gamma GOF Test**											
2032						A-D Test Statistic	2.245		**Anderson-Darling Gamma GOF Test**			
2033						5% A-D Critical Value	0.747		Data Not Gamma Distributed at 5% Significance Level			
2034						K-S Test Statistic	0.171		**Kolmogorov-Smirnov Gamma GOF Test**			
2035						5% K-S Critical Value	0.138		Data Not Gamma Distributed at 5% Significance Level			
2036	**Data Not Gamma Distributed at 5% Significance Level**											
2037												
2038	**Gamma Statistics**											
2039						k hat (MLE)	21.61			k star (bias corrected MLE)	20.05	
2040						Theta hat (MLE)	14.97			Theta star (bias corrected MLE)	16.14	
2041						nu hat (MLE)	1772			nu star (bias corrected)	1644	
2042						MLE Mean (bias corrected)	323.5			MLE Sd (bias corrected)	72.25	
2043												
2044	**Background Statistics Assuming Gamma Distribution**											
2045						95% Wilson Hilferty (WH) Approx. Gamma UPL	452.2			90% Percentile	418.9	
2046						95% Hawkins Wixley (HW) Approx. Gamma UPL	451.2			95% Percentile	450.8	
2047						95% WH Approx. Gamma UTL with 95% Coverage	488.9			99% Percentile	514.9	
2048						95% HW Approx. Gamma UTL with 95% Coverage	488.4					
2049						95% WH USL	563.5			95% HW USL	564.9	
2050												

2051	**Lognormal GOF Test**											
2052					Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk Lognormal GOF Test**					
2053					5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level					
2054					Lilliefors Test Statistic	0.152	**Lilliefors Lognormal GOF Test**					
2055					5% Lilliefors Critical Value	0.137	Data Not Lognormal at 5% Significance Level					
2056	**Data Not Lognormal at 5% Significance Level**											
2057												
2058	**Background Statistics assuming Lognormal Distribution**											
2059					95% UTL with 95% Coverage	487.2			90% Percentile (z)	411.1		
2060					95% UPL (t)	448.3			95% Percentile (z)	442.8		
2061					95% USL	570.2			99% Percentile (z)	509.3		
2062												
2063	**Nonparametric Distribution Free Background Statistics**											
2064	**Data do not follow a Discernible Distribution (0.05)**											
2065												
2066	**Nonparametric Upper Limits for Background Threshold Values**											
2067					Order of Statistic, r	41			95% UTL with 95% Coverage	656		
2068					Approx, f used to compute achieved CC	2.158	Approximate Actual Confidence Coefficient achieved by UTL			0.878		
2069							Approximate Sample Size needed to achieve specified CC			59		
2070					95% Percentile Bootstrap UTL with 95% Coverage	656			95% BCA Bootstrap UTL with 95% Coverage	589		
2071					95% UPL	575.3			90% Percentile	381		
2072					90% Chebyshev UPL	570.7			95% Percentile	452		
2073					95% Chebyshev UPL	682.7			99% Percentile	629.2		
2074					95% USL	656						
2075												
2076	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2077	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2078	and consists of observations collected from clean unimpacted locations.											
2079	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2080	represents a background data set and when many onsite observations need to be compared with the BTV.											
2081												
2082	**SULFATE (mg/L)**											
2083												
2084	**General Statistics**											
2085					Total Number of Observations	41			Number of Distinct Observations	38		
2086					Minimum	6.9			First Quartile	9.8		
2087					Second Largest	60.4			Median	12.3		
2088					Maximum	74			Third Quartile	23.3		
2089					Mean	20.28			SD	15.97		
2090					Coefficient of Variation	0.787			Skewness	1.75		
2091					Mean of logged Data	2.78			SD of logged Data	0.647		
2092												
2093	**Critical Values for Background Threshold Values (BTVs)**											
2094					Tolerance Factor K (For UTL)	2.11			d2max (for USL)	2.878		
2095												
2096	**Normal GOF Test**											
2097					Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**					
2098					5% Shapiro Wilk Critical Value	0.941	Data Not Normal at 5% Significance Level					
2099					Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**					
2100					5% Lilliefors Critical Value	0.137	Data Not Normal at 5% Significance Level					

2101	**Data Not Normal at 5% Significance Level**										
2102											
2103	**Background Statistics Assuming Normal Distribution**										
2104				95% UTL with	95% Coverage	53.98			90% Percentile (z)	40.75	
2105					95% UPL (t)	47.5			95% Percentile (z)	46.55	
2106					95% USL	66.23			99% Percentile (z)	57.43	
2107											
2108	**Gamma GOF Test**										
2109					A-D Test Statistic	1.996	**Anderson-Darling Gamma GOF Test**				
2110					5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level				
2111					K-S Test Statistic	0.226	**Kolmogorov-Smirnov Gamma GOF Test**				
2112					5% K-S Critical Value	0.139	Data Not Gamma Distributed at 5% Significance Level				
2113	**Data Not Gamma Distributed at 5% Significance Level**										
2114											
2115	**Gamma Statistics**										
2116					k hat (MLE)	2.328			k star (bias corrected MLE)	2.174	
2117					Theta hat (MLE)	8.711			Theta star (bias corrected MLE)	9.329	
2118					nu hat (MLE)	190.9			nu star (bias corrected)	178.3	
2119					MLE Mean (bias corrected)	20.28			MLE Sd (bias corrected)	13.76	
2120											
2121	**Background Statistics Assuming Gamma Distribution**										
2122				95% Wilson Hilferty (WH) Approx. Gamma UPL		47.2			90% Percentile	38.69	
2123				95% Hawkins Wixley (HW) Approx. Gamma UPL		47.41			95% Percentile	46.87	
2124				95% WH Approx. Gamma UTL with	95% Coverage	57.45			99% Percentile	64.92	
2125				95% HW Approx. Gamma UTL with	95% Coverage	58.48					
2126					95% WH USL	80.69			95% HW USL	84.59	
2127											
2128	**Lognormal GOF Test**										
2129					Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**				
2130					5% Shapiro Wilk Critical Value	0.941	Data Not Lognormal at 5% Significance Level				
2131					Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**				
2132					5% Lilliefors Critical Value	0.137	Data Not Lognormal at 5% Significance Level				
2133	**Data Not Lognormal at 5% Significance Level**										
2134											
2135	**Background Statistics assuming Lognormal Distribution**										
2136				95% UTL with	95% Coverage	63.2			90% Percentile (z)	36.96	
2137					95% UPL (t)	48.59			95% Percentile (z)	46.76	
2138					95% USL	103.9			99% Percentile (z)	72.69	
2139											
2140	**Nonparametric Distribution Free Background Statistics**										
2141	**Data do not follow a Discernible Distribution (0.05)**										
2142											
2143	**Nonparametric Upper Limits for Background Threshold Values**										
2144					Order of Statistic, r	41			95% UTL with	95% Coverage	74
2145					Approx, f used to compute achieved CC	2.158			Approximate Actual Confidence Coefficient achieved by UTL		0.878
2146									Approximate Sample Size needed to achieve specified CC		59
2147				95% Percentile Bootstrap UTL with	95% Coverage	74			95% BCA Bootstrap UTL with	95% Coverage	60.4
2148					95% UPL	59.53			90% Percentile		42.2
2149					90% Chebyshev UPL	68.77			95% Percentile		51.7
2150					95% Chebyshev UPL	90.73			99% Percentile		68.56

2151					95% USL	74						
2152												
2153	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2154	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2155	and consists of observations collected from clean unimpacted locations.											
2156	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2157	represents a background data set and when many onsite observations need to be compared with the BTV.											
2158												
2159	**Total Dissolved Solids (mg/L)**											
2160												
2161	**General Statistics**											
2162					Total Number of Observations	41			Number of Distinct Observations	39		
2163					Minimum	135			First Quartile	199		
2164					Second Largest	381			Median	238		
2165					Maximum	433			Third Quartile	262		
2166					Mean	236.4			SD	58.98		
2167					Coefficient of Variation	0.249			Skewness	1.087		
2168					Mean of logged Data	5.437			SD of logged Data	0.24		
2169												
2170	**Critical Values for Background Threshold Values (BTVs)**											
2171					Tolerance Factor K (For UTL)	2.11			d2max (for USL)	2.878		
2172												
2173	**Normal GOF Test**											
2174					Shapiro Wilk Test Statistic	0.926			**Shapiro Wilk GOF Test**			
2175					5% Shapiro Wilk Critical Value	0.941			Data Not Normal at 5% Significance Level			
2176					Lilliefors Test Statistic	0.123			**Lilliefors GOF Test**			
2177					5% Lilliefors Critical Value	0.137			Data appear Normal at 5% Significance Level			
2178	**Data appear Approximate Normal at 5% Significance Level**											
2179												
2180	**Background Statistics Assuming Normal Distribution**											
2181					95% UTL with 95% Coverage	360.9			90% Percentile (z)	312		
2182					95% UPL (t)	337			95% Percentile (z)	333.5		
2183					95% USL	406.2			99% Percentile (z)	373.6		
2184												
2185	**Gamma GOF Test**											
2186					A-D Test Statistic	0.576			**Anderson-Darling Gamma GOF Test**			
2187					5% A-D Critical Value	0.747			Detected data appear Gamma Distributed at 5% Significance Level			
2188					K-S Test Statistic	0.0985			**Kolmogorov-Smirnov Gamma GOF Test**			
2189					5% K-S Critical Value	0.138			Detected data appear Gamma Distributed at 5% Significance Level			
2190	**Detected data appear Gamma Distributed at 5% Significance Level**											
2191												
2192	**Gamma Statistics**											
2193					k hat (MLE)	17.72			k star (bias corrected MLE)	16.44		
2194					Theta hat (MLE)	13.34			Theta star (bias corrected MLE)	14.38		
2195					nu hat (MLE)	1453			nu star (bias corrected)	1348		
2196					MLE Mean (bias corrected)	236.4			MLE Sd (bias corrected)	58.32		
2197												
2198	**Background Statistics Assuming Gamma Distribution**											
2199					95% Wilson Hilferty (WH) Approx. Gamma UPL	341.4			90% Percentile	313.6		
2200					95% Hawkins Wixley (HW) Approx. Gamma UPL	342.3			95% Percentile	339.8		

2201	95% WH Approx. Gamma UTL with 95% Coverage					371.7					99% Percentile	392.8
2202	95% HW Approx. Gamma UTL with 95% Coverage					373.8						
2203					95% WH USL	433.9					95% HW USL	439.1
2204												
2205	**Lognormal GOF Test**											
2206					Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**					
2207					5% Shapiro Wilk Critical Value	0.941	Data appear Lognormal at 5% Significance Level					
2208					Lilliefors Test Statistic	0.113	**Lilliefors Lognormal GOF Test**					
2209					5% Lilliefors Critical Value	0.137	Data appear Lognormal at 5% Significance Level					
2210	**Data appear Lognormal at 5% Significance Level**											
2211												
2212	**Background Statistics assuming Lognormal Distribution**											
2213					95% UTL with 95% Coverage	381.3					90% Percentile (z)	312.5
2214					95% UPL (t)	345.9					95% Percentile (z)	341
2215					95% USL	458.4					99% Percentile (z)	401.6
2216												
2217	**Nonparametric Distribution Free Background Statistics**											
2218	**Data appear Approximate Normal at 5% Significance Level**											
2219												
2220	**Nonparametric Upper Limits for Background Threshold Values**											
2221					Order of Statistic, r	41					95% UTL with 95% Coverage	433
2222					Approx, f used to compute achieved CC	2.158	Approximate Actual Confidence Coefficient achieved by UTL					0.878
2223							Approximate Sample Size needed to achieve specified CC					59
2224	95% Percentile Bootstrap UTL with 95% Coverage					433					95% BCA Bootstrap UTL with 95% Coverage	381
2225					95% UPL	376					90% Percentile	293
2226					90% Chebyshev UPL	415.5					95% Percentile	331
2227					95% Chebyshev UPL	496.6					99% Percentile	412.2
2228					95% USL	433						
2229												
2230	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2231	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2232	and consists of observations collected from clean unimpacted locations.											
2233	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2234	represents a background data set and when many onsite observations need to be compared with the BTV.											
2235												
2236	**TETRACHLOROETHENE (ug/L)**											
2237												
2238	**General Statistics**											
2239					Total Number of Observations	44					Number of Missing Observations	0
2240					Number of Distinct Observations	1						
2241					Number of Detects	0					Number of Non-Detects	44
2242					Number of Distinct Detects	0					Number of Distinct Non-Detects	1
2243					Minimum Detect	N/A					Minimum Non-Detect	1
2244					Maximum Detect	N/A					Maximum Non-Detect	1
2245					Variance Detected	N/A					Percent Non-Detects	100%
2246					Mean Detected	N/A					SD Detected	N/A
2247					Mean of Detected Logged Data	N/A					SD of Detected Logged Data	N/A
2248												
2249	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2250	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											

2251	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
2252												
2253	The data set for variable TETRACHLOROETHENE (ug/L) was not processed!											
2254												
2255												
2256	TOTAL ORGANIC CARBON (mg/L)											
2257												
2258	General Statistics											
2259						Total Number of Observations	41			Number of Missing Observations	0	
2260						Number of Distinct Observations	13					
2261						Number of Detects	12			Number of Non-Detects	29	
2262						Number of Distinct Detects	11			Number of Distinct Non-Detects	2	
2263						Minimum Detect	0.6			Minimum Non-Detect	0.5	
2264						Maximum Detect	1.4			Maximum Non-Detect	1	
2265						Variance Detected	0.0659			Percent Non-Detects	70.73%	
2266						Mean Detected	0.887			SD Detected	0.257	
2267						Mean of Detected Logged Data	-0.157			SD of Detected Logged Data	0.278	
2268												
2269	Critical Values for Background Threshold Values (BTVs)											
2270						Tolerance Factor K (For UTL)	2.11			d2max (for USL)	2.878	
2271												
2272	Normal GOF Test on Detects Only											
2273						Shapiro Wilk Test Statistic	0.912			Shapiro Wilk GOF Test		
2274						5% Shapiro Wilk Critical Value	0.859			Detected Data appear Normal at 5% Significance Level		
2275						Lilliefors Test Statistic	0.177			Lilliefors GOF Test		
2276						5% Lilliefors Critical Value	0.243			Detected Data appear Normal at 5% Significance Level		
2277	Detected Data appear Normal at 5% Significance Level											
2278												
2279	Kaplan Meier (KM) Background Statistics Assuming Normal Distribution											
2280						KM Mean	0.707			KM SD	0.21	
2281						95% UTL95% Coverage	1.15			95% KM UPL (t)	1.065	
2282						90% KM Percentile (z)	0.976			95% KM Percentile (z)	1.052	
2283						99% KM Percentile (z)	1.195			95% KM USL	1.311	
2284												
2285	DL/2 Substitution Background Statistics Assuming Normal Distribution											
2286						Mean	0.589			SD	0.247	
2287						95% UTL95% Coverage	1.111			95% UPL (t)	1.01	
2288						90% Percentile (z)	0.906			95% Percentile (z)	0.996	
2289						99% Percentile (z)	1.164			95% USL	1.3	
2290	DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons											
2291												
2292	Gamma GOF Tests on Detected Observations Only											
2293						A-D Test Statistic	0.365			Anderson-Darling GOF Test		
2294						5% A-D Critical Value	0.731			Detected data appear Gamma Distributed at 5% Significance Level		
2295						K-S Test Statistic	0.155			Kolmogorov-Smirnov GOF		
2296						5% K-S Critical Value	0.245			Detected data appear Gamma Distributed at 5% Significance Level		
2297	Detected data appear Gamma Distributed at 5% Significance Level											
2298												
2299	Gamma Statistics on Detected Data Only											
2300						k hat (MLE)	13.9			k star (bias corrected MLE)	10.48	

2301					Theta hat (MLE)	0.0638				Theta star (bias corrected MLE)		0.0846
2302					nu hat (MLE)	333.7				nu star (bias corrected)		251.6
2303					MLE Mean (bias corrected)	0.887						
2304					MLE Sd (bias corrected)	0.274				95% Percentile of Chisquare (2kstar)		32.63
2305												
2306	**Gamma ROS Statistics using Imputed Non-Detects**											
2307	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2308	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)											
2309	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2310	This is especially true when the sample size is small.											
2311	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2312					Minimum	0.231				Mean		0.674
2313					Maximum	1.4				Median		0.66
2314					SD	0.261				CV		0.387
2315					k hat (MLE)	6.665				k star (bias corrected MLE)		6.194
2316					Theta hat (MLE)	0.101				Theta star (bias corrected MLE)		0.109
2317					nu hat (MLE)	546.6				nu star (bias corrected)		507.9
2318					MLE Mean (bias corrected)	0.674				MLE Sd (bias corrected)		0.271
2319					95% Percentile of Chisquare (2kstar)	21.55				90% Percentile		1.035
2320					95% Percentile	1.172				99% Percentile		1.457
2321	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2322	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2323					WH	HW					WH	HW
2324	95% Approx. Gamma UTL with 95% Coverage				1.345	1.371	95% Approx. Gamma UPL				1.182	1.196
2325	95% Gamma USL				1.693	1.754						
2326												
2327	**Estimates of Gamma Parameters using KM Estimates**											
2328					Mean (KM)	0.707				SD (KM)		0.21
2329					Variance (KM)	0.0441				SE of Mean (KM)		0.0456
2330					k hat (KM)	11.32				k star (KM)		10.51
2331					nu hat (KM)	928.3				nu star (KM)		861.7
2332					theta hat (KM)	0.0624				theta star (KM)		0.0672
2333					80% gamma percentile (KM)	0.881				90% gamma percentile (KM)		0.996
2334					95% gamma percentile (KM)	1.099				99% gamma percentile (KM)		1.31
2335												
2336	**The following statistics are computed using gamma distribution and KM estimates**											
2337	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2338					WH	HW					WH	HW
2339	95% Approx. Gamma UTL with 95% Coverage				1.178	1.184	95% Approx. Gamma UPL				1.07	1.072
2340	95% KM Gamma Percentile				1.055	1.056	95% Gamma USL				1.402	1.419
2341												
2342	**Lognormal GOF Test on Detected Observations Only**											
2343					Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**					
2344					5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level					
2345					Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**					
2346					5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level					
2347	**Detected Data appear Lognormal at 5% Significance Level**											
2348												
2349	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2350					Mean in Original Scale	0.695				Mean in Log Scale		-0.415

2351					SD in Original Scale	0.232				SD in Log Scale		0.322
2352					95% UTL95% Coverage	1.303				95% BCA UTL95% Coverage		1.1
2353					95% Bootstrap (%) UTL95% Coverage	1.4				95% UPL (t)		1.143
2354					90% Percentile (z)	0.998				95% Percentile (z)		1.122
2355					99% Percentile (z)	1.397				95% USL		1.669
2356												
2357	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2358					KM Mean of Logged Data	-0.386				95% KM UTL (Lognormal)95% Coverage		1.204
2359					KM SD of Logged Data	0.271				95% KM UPL (Lognormal)		1.079
2360					95% KM Percentile Lognormal (z)	1.062				95% KM USL (Lognormal)		1.483
2361												
2362	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2363					Mean in Original Scale	0.589				Mean in Log Scale		-0.604
2364					SD in Original Scale	0.247				SD in Log Scale		0.384
2365					95% UTL95% Coverage	1.23				95% UPL (t)		1.052
2366					90% Percentile (z)	0.894				95% Percentile (z)		1.028
2367					99% Percentile (z)	1.336				95% USL		1.651
2368	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2369												
2370	**Nonparametric Distribution Free Background Statistics**											
2371	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2372												
2373	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2374					Order of Statistic, r	41				95% UTL with95% Coverage		1.4
2375					Approx, f used to compute achieved CC	2.158				Approximate Actual Confidence Coefficient achieved by UTL		0.878
2376					Approximate Sample Size needed to achieve specified CC	59				95% UPL		1.19
2377					95% USL	1.4				95% KM Chebyshev UPL		1.633
2378												
2379	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2380	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2381	and consists of observations collected from clean unimpacted locations.											
2382	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2383	represents a background data set and when many onsite observations need to be compared with the BTV.											
2384												
2385	**TOLUENE (mg/)**											
2386												
2387	**General Statistics**											
2388					Total Number of Observations	43				Number of Missing Observations		0
2389					Number of Distinct Observations	1						
2390					Number of Detects	0				Number of Non-Detects		43
2391					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
2392					Minimum Detect	N/A				Minimum Non-Detect		1
2393					Maximum Detect	N/A				Maximum Non-Detect		1
2394					Variance Detected	N/A				Percent Non-Detects		100%
2395					Mean Detected	N/A				SD Detected		N/A
2396					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
2397												
2398	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2399	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2400	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											

	A	B	C	D	E	F	G	H	I	J	K	L
2401												
2402	**The data set for variable TOLUENE (mg/) was not processed!**											
2403												
2404												
2405	**TOTAL PHENOLICS (mg/L)**											
2406												
2407	**General Statistics**											
2408	Total Number of Observations					44	Number of Missing Observations					0
2409	Number of Distinct Observations					2						
2410	Number of Detects					2	Number of Non-Detects					42
2411	Number of Distinct Detects					1	Number of Distinct Non-Detects					2
2412	Minimum Detect					0.01	Minimum Non-Detect					0.005
2413	Maximum Detect					0.01	Maximum Non-Detect					0.01
2414	Variance Detected					0	Percent Non-Detects					95.45%
2415	Mean Detected					0.01	SD Detected					0
2416	Mean of Detected Logged Data					-4.605	SD of Detected Logged Data					0
2417												
2418	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
2419	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
2420												
2421	**The data set for variable TOTAL PHENOLICS (mg/L) was not processed!**											
2422												
2423												
2424	**TRANS 1,2-DICHLOROETHENE (ug/L)**											
2425												
2426	**General Statistics**											
2427	Total Number of Observations					44	Number of Missing Observations					0
2428	Number of Distinct Observations					1						
2429	Number of Detects					0	Number of Non-Detects					44
2430	Number of Distinct Detects					0	Number of Distinct Non-Detects					1
2431	Minimum Detect					N/A	Minimum Non-Detect					1
2432	Maximum Detect					N/A	Maximum Non-Detect					1
2433	Variance Detected					N/A	Percent Non-Detects					100%
2434	Mean Detected					N/A	SD Detected					N/A
2435	Mean of Detected Logged Data					N/A	SD of Detected Logged Data					N/A
2436												
2437	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2438	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2439	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2440												
2441	**The data set for variable TRANS 1,2-DICHLOROETHENE (ug/L) was not processed!**											
2442												
2443												
2444	**TRICHLOROETHENE (ug/L)**											
2445												
2446	**General Statistics**											
2447	Total Number of Observations					44	Number of Missing Observations					0
2448	Number of Distinct Observations					1						
2449	Number of Detects					0	Number of Non-Detects					44
2450	Number of Distinct Detects					0	Number of Distinct Non-Detects					1

2451					Minimum Detect	N/A				Minimum Non-Detect		1
2452					Maximum Detect	N/A				Maximum Non-Detect		1
2453					Variance Detected	N/A				Percent Non-Detects		100%
2454					Mean Detected	N/A				SD Detected		N/A
2455					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
2456												
2457	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2458	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2459	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2460												
2461	**The data set for variable TRICHLOROETHENE (ug/L) was not processed!**											
2462												
2463												
2464	**TURBIDITY (NTU)**											
2465												
2466	**General Statistics**											
2467					Total Number of Observations	44				Number of Missing Observations		0
2468					Number of Distinct Observations	29						
2469					Number of Detects	37				Number of Non-Detects		7
2470					Number of Distinct Detects	28				Number of Distinct Non-Detects		1
2471					Minimum Detect	0.11				Minimum Non-Detect		0.1
2472					Maximum Detect	10.1				Maximum Non-Detect		0.1
2473					Variance Detected	3.434				Percent Non-Detects		15.91%
2474					Mean Detected	0.826				SD Detected		1.853
2475					Mean of Detected Logged Data	-1.038				SD of Detected Logged Data		1.05
2476												
2477	**Critical Values for Background Threshold Values (BTVs)**											
2478					Tolerance Factor K (For UTL)	2.091				d2max (for USL)		2.906
2479												
2480	**Normal GOF Test on Detects Only**											
2481					Shapiro Wilk Test Statistic	0.405				**Shapiro Wilk GOF Test**		
2482					5% Shapiro Wilk Critical Value	0.936				Data Not Normal at 5% Significance Level		
2483					Lilliefors Test Statistic	0.401				**Lilliefors GOF Test**		
2484					5% Lilliefors Critical Value	0.144				Data Not Normal at 5% Significance Level		
2485	**Data Not Normal at 5% Significance Level**											
2486												
2487	**Kaplan Meier (KM) Background Statistics Assuming Normal Distribution**											
2488					KM Mean	0.71				KM SD		1.697
2489					95% UTL95% Coverage	4.259				95% KM UPL (t)		3.596
2490					90% KM Percentile (z)	2.886				95% KM Percentile (z)		3.502
2491					99% KM Percentile (z)	4.659				95% KM USL		5.643
2492												
2493	**DL/2 Substitution Background Statistics Assuming Normal Distribution**											
2494					Mean	0.703				SD		1.72
2495					95% UTL95% Coverage	4.299				95% UPL (t)		3.626
2496					90% Percentile (z)	2.907				95% Percentile (z)		3.531
2497					99% Percentile (z)	4.703				95% USL		5.701
2498	**DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons**											
2499												
2500	**Gamma GOF Tests on Detected Observations Only**											

2501					A-D Test Statistic	4.196	**Anderson-Darling GOF Test**					
2502					5% A-D Critical Value	0.792	Data Not Gamma Distributed at 5% Significance Level					
2503					K-S Test Statistic	0.277	**Kolmogorov-Smirnov GOF**					
2504					5% K-S Critical Value	0.151	Data Not Gamma Distributed at 5% Significance Level					
2505	**Data Not Gamma Distributed at 5% Significance Level**											
2506												
2507	**Gamma Statistics on Detected Data Only**											
2508					k hat (MLE)	0.712	k star (bias corrected MLE)					0.673
2509					Theta hat (MLE)	1.16	Theta star (bias corrected MLE)					1.228
2510					nu hat (MLE)	52.71	nu star (bias corrected)					49.77
2511					MLE Mean (bias corrected)	0.826						
2512					MLE Sd (bias corrected)	1.007	95% Percentile of Chisquare (2kstar)					4.645
2513												
2514	**Gamma ROS Statistics using Imputed Non-Detects**											
2515	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2516	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)											
2517	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2518	This is especially true when the sample size is small.											
2519	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2520					Minimum	0.01	Mean					0.696
2521					Maximum	10.1	Median					0.235
2522					SD	1.722	CV					2.474
2523					k hat (MLE)	0.51	k star (bias corrected MLE)					0.49
2524					Theta hat (MLE)	1.366	Theta star (bias corrected MLE)					1.421
2525					nu hat (MLE)	44.84	nu star (bias corrected)					43.11
2526					MLE Mean (bias corrected)	0.696	MLE Sd (bias corrected)					0.995
2527					95% Percentile of Chisquare (2kstar)	3.792	90% Percentile					1.891
2528					95% Percentile	2.694	99% Percentile					4.67
2529	**The following statistics are computed using Gamma ROS Statistics on Imputed Data**											
2530	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2531						WH	HW				WH	HW
2532					95% Approx. Gamma UTL with 95% Coverage	3.191	3.303	95% Approx. Gamma UPL			2.315	2.3
2533					95% Gamma USL	5.676	6.413					
2534												
2535	**Estimates of Gamma Parameters using KM Estimates**											
2536					Mean (KM)	0.71	SD (KM)					1.697
2537					Variance (KM)	2.88	SE of Mean (KM)					0.259
2538					k hat (KM)	0.175	k star (KM)					0.178
2539					nu hat (KM)	15.42	nu star (KM)					15.7
2540					theta hat (KM)	4.054	theta star (KM)					3.982
2541					80% gamma percentile (KM)	0.877	90% gamma percentile (KM)					2.142
2542					95% gamma percentile (KM)	3.766	99% gamma percentile (KM)					8.327
2543												
2544	**The following statistics are computed using gamma distribution and KM estimates**											
2545	**Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods**											
2546						WH	HW				WH	HW
2547					95% Approx. Gamma UTL with 95% Coverage	2.87	2.759	95% Approx. Gamma UPL			2.14	2.009
2548					95% KM Gamma Percentile	2.048	1.917	95% Gamma USL			4.89	4.977
2549												
2550	**Lognormal GOF Test on Detected Observations Only**											

2551					Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**					
2552					5% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 5% Significance Level					
2553					Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**					
2554					5% Lilliefors Critical Value	0.144	Detected Data appear Lognormal at 5% Significance Level					
2555	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
2556												
2557	**Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects**											
2558					Mean in Original Scale	0.7	Mean in Log Scale	-1.409				
2559					SD in Original Scale	1.721	SD in Log Scale	1.303				
2560					95% UTL95% Coverage	3.729	95% BCA UTL95% Coverage	9.076				
2561					95% Bootstrap (%) UTL95% Coverage	9.407	95% UPL (t)	2.241				
2562					90% Percentile (z)	1.299	95% Percentile (z)	2.085				
2563					99% Percentile (z)	5.068	95% USL	10.79				
2564												
2565	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2566					KM Mean of Logged Data	-1.239	95% KM UTL (Lognormal)95% Coverage	2.641				
2567					KM SD of Logged Data	1.057	95% KM UPL (Lognormal)	1.747				
2568					95% KM Percentile Lognormal (z)	1.648	95% KM USL (Lognormal)	6.251				
2569												
2570	**Background DL/2 Statistics Assuming Lognormal Distribution**											
2571					Mean in Original Scale	0.703	Mean in Log Scale	-1.349				
2572					SD in Original Scale	1.72	SD in Log Scale	1.204				
2573					95% UTL95% Coverage	3.215	95% UPL (t)	2.008				
2574					90% Percentile (z)	1.213	95% Percentile (z)	1.879				
2575					99% Percentile (z)	4.267	95% USL	8.576				
2576	**DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.**											
2577												
2578	**Nonparametric Distribution Free Background Statistics**											
2579	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2580												
2581	**Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)**											
2582					Order of Statistic, r	44	95% UTL with95% Coverage	10.1				
2583					Approx, f used to compute achieved CC	2.316	Approximate Actual Confidence Coefficient achieved by UTL	0.895				
2584					Approximate Sample Size needed to achieve specified CC	59	95% UPL	4.928				
2585					95% USL	10.1	95% KM Chebyshev UPL	8.192				
2586												
2587	Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20.											
2588	Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers											
2589	and consists of observations collected from clean unimpacted locations.											
2590	The use of USL tends to provide a balance between false positives and false negatives provided the data											
2591	represents a background data set and when many onsite observations need to be compared with the BTV.											
2592												
2593	**VINYL CHLORIDE (ug/L)**											
2594												
2595	**General Statistics**											
2596					Total Number of Observations	44	Number of Missing Observations	0				
2597					Number of Distinct Observations	1						
2598					Number of Detects	0	Number of Non-Detects	44				
2599					Number of Distinct Detects	0	Number of Distinct Non-Detects	1				
2600					Minimum Detect	N/A	Minimum Non-Detect	1				

	A	B	C	D	E	F	G	H	I	J	K	L
2601					Maximum Detect	N/A				Maximum Non-Detect		1
2602					Variance Detected	N/A				Percent Non-Detects		100%
2603					Mean Detected	N/A				SD Detected		N/A
2604					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
2605												
2606	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2607	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2608	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2609												
2610	**The data set for variable VINYL CHLORIDE (ug/L) was not processed!**											
2611												
2612												
2613	**TOTAL XYLENES (ug/L)**											
2614												
2615	**General Statistics**											
2616					Total Number of Observations	44				Number of Missing Observations		0
2617					Number of Distinct Observations	1						
2618					Number of Detects	0				Number of Non-Detects		44
2619					Number of Distinct Detects	0				Number of Distinct Non-Detects		1
2620					Minimum Detect	N/A				Minimum Non-Detect		3
2621					Maximum Detect	N/A				Maximum Non-Detect		3
2622					Variance Detected	N/A				Percent Non-Detects		100%
2623					Mean Detected	N/A				SD Detected		N/A
2624					Mean of Detected Logged Data	N/A				SD of Detected Logged Data		N/A
2625												
2626	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2627	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2628	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2629												
2630	**The data set for variable TOTAL XYLENES (ug/L) was not processed!**											
2631												
2632												

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP015W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 36.43 " — Longitude: 76 ° 27 ' 10.82 "

Depth to Water Level: 59.81 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.90 ft — Elevation of Water Level: 516.59 ft./MSL

Sampling Depth: 135 ft — Volume of Water Column: 130.84 gal

Total Well Depth: 148.9 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 1.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/18/2019 — Sample Collection Time: 10:40

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070614001 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP015W
Sample Date	11/18/2019

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	D6919-09
BICARBONATE ALKALINITY	19	SM20-2320B
CALCIUM, TOTAL	11.7	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	13.4	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	12	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	30	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	14.9	EPA 300
pH-FIELD (SU)	5.31	FIELD
pH-LAB (SU)	5.92	SM20-4500HB
POTASSIUM, TOTAL	2.1	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	18.9	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	293	FIELD
SPEC. COND., LAB (umhos/cm)	252	SW846 9050A
SULFATE	36.5	EPA 300
ALKALINITY	19	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	304	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1	SW846 9060A
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	101389
Monitoring Point No.	FFMP015W
Sample Date	11/18/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP028W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 37 ° 57 ' 21.62 " — Longitude: 76 ° 27 ' 0.1 "

Depth to Water Level: 12.31 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.50 ft — Elevation of Water Level: 452.69 ft./MSL

Sampling Depth: 50 ft — Volume of Water Column: ___ gal

Total Well Depth: 60 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/18/2019 — Sample Collection Time: 13:45

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070614002 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP028W
Sample Date	11/18/2019

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	D6919-09
BICARBONATE ALKALINITY	34	SM20-2320B
CALCIUM, TOTAL	41.4	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	89.4	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	17.5	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	9.2	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	18.6	EPA 300
pH-FIELD (SU)	5.44	FIELD
pH-LAB (SU)	6.01	SM20-4500HB
POTASSIUM, TOTAL	2.2	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	28	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	573	FIELD
SPEC. COND., LAB (umhos/cm)	552	SW846 9050A
SULFATE	26.7	EPA 300
ALKALINITY	34	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	426	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.1	SW846 9060A
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	101389
Monitoring Point No.	FFMP028W
Sample Date	11/18/2019

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	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	1.1	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP033W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: MANOR TOWNSHIP

Sampling Point: Latitude: 39 ° 57 ' 31.09 " — Longitude: 76 ° 27 ' 4.98 "

Depth to Water Level: 18.11 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 0.49 ft — Elevation of Water Level: 498.41 ft./MSL

Sampling Depth: 79 ft — Volume of Water Column: 114.39 gal

Total Well Depth: 96 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 1.0

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/18/2019 — Sample Collection Time: 15:03

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070614003 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP033W
Sample Date	11/18/2019

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	0.702	D6919-09
BICARBONATE ALKALINITY	55	SM20-2320B
CALCIUM, TOTAL	26.7	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	39.2	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	6000	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	9	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	490	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	11.6	EPA 300
pH-FIELD (SU)	5.82	FIELD
pH-LAB (SU)	6.46	SM20-4500HB
POTASSIUM, TOTAL	1.7	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	14.1	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	351	FIELD
SPEC. COND., LAB (umhos/cm)	294	SW846 9050A
SULFATE	7.4	EPA 300
ALKALINITY	55	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	284	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	5.81	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	101389
Monitoring Point No.	FFMP033W
Sample Date	11/18/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP30RW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 15.52 " — Longitude: 76 ° 27 ' 26.8 "

Depth to Water Level: 36.45 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.20 ft — Elevation of Water Level: 525.85 ft./MSL

Sampling Depth: 85 ft — Volume of Water Column: 78.65 gal

Total Well Depth: 90 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/19/2019 — Sample Collection Time: 10:59

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070806001 — Final Lab Analysis CompletionDate: 11/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP30RW
Sample Date	11/19/2019

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	0.159	D6919-09
BICARBONATE ALKALINITY	42	SM20-2320B
CALCIUM, TOTAL	43.1	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	229	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	270	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	16.9	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	3000	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	5.9	EPA 300
pH-FIELD (SU)	5.39	FIELD
pH-LAB (SU)	6.17	SM20-4500HB
POTASSIUM, TOTAL	6.8	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	112	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	1008	FIELD
SPEC. COND., LAB (umhos/cm)	1090	SW846 9050A
SULFATE	32.9	EPA 300
ALKALINITY	42	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	626	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.3	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	3.07	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	101389
Monitoring Point No.	FFMP30RW
Sample Date	11/19/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP04AW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 15.4 " — Longitude: 76 ° 27 ' 26.58 "

Depth to Water Level: 36.52 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.52 ft — Elevation of Water Level: 524.2 ft./MSL

Sampling Depth: 146 ft — Volume of Water Column: 389.19 gal

Total Well Depth: 301.52 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.7

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/19/2019 — Sample Collection Time: 12:06

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 X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070806002 — Final Lab Analysis CompletionDate: 11/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP04AW
Sample Date	11/19/2019

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	0.111	D6919-09
BICARBONATE ALKALINITY	243	SM20-2320B
CALCIUM, TOTAL	150	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	296	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	25.1	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	200	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	0.3	EPA 300
pH-FIELD (SU)	6.91	FIELD
pH-LAB (SU)	7.57	SM20-4500HB
POTASSIUM, TOTAL	2.5	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	83.9	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	1459	FIELD
SPEC. COND., LAB (umhos/cm)	1560	SW846 9050A
SULFATE	46.4	EPA 300
ALKALINITY	243	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	922	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.91	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.34	SM 2130B

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

I.D. No	101389
Monitoring Point No.	FFMP04AW
Sample Date	11/19/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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Date Received

FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP017W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 8.5 " — Longitude: 76 ° 27 ' 6.17 "

Depth to Water Level: 42.25 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.00 ft — Elevation of Water Level: 438.45 ft./MSL

Sampling Depth: 135 ft — Volume of Water Column: 158.98 gal

Total Well Depth: 150.5 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.9

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/19/2019 — Sample Collection Time: 13:50

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070806003 — Final Lab Analysis CompletionDate: 11/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP017W
Sample Date	11/19/2019

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	0.146	D6919-09
BICARBONATE ALKALINITY	53	SM20-2320B
CALCIUM, TOTAL	92.9	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	348	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	41.6	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	450	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	2.3	EPA 300
pH-FIELD (SU)	5.67	FIELD
pH-LAB (SU)	6.4	SM20-4500HB
POTASSIUM, TOTAL	5.2	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	79.2	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	1419	FIELD
SPEC. COND., LAB (umhos/cm)	1530	SW846 9050A
SULFATE	56	EPA 300
ALKALINITY	53	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	900	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	2.1	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.48	SM 2130B

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

I.D. No	101389
Monitoring Point No.	FFMP017W
Sample Date	11/19/2019

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	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	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
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FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP005W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 10.67 " — Longitude: 76 ° 27 ' 21.3 "

Depth to Water Level: 70.98 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.70 ft — Elevation of Water Level: 466.42 ft./MSL

Sampling Depth: 135 ft — Volume of Water Column: 116.05 gal

Total Well Depth: 150 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/19/2019 — Sample Collection Time: 15:10

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3070806004 — Final Lab Analysis CompletionDate: 11/26/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP005W
Sample Date	11/19/2019

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	0.499	D6919-09
BICARBONATE ALKALINITY	55	SM20-2320B
CALCIUM, TOTAL	79.5	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	187	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	19.3	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	96	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	3.1	EPA 300
pH-FIELD (SU)	5.55	FIELD
pH-LAB (SU)	6.32	SM20-4500HB
POTASSIUM, TOTAL	3.5	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	47.8	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	906	FIELD
SPEC. COND., LAB (umhos/cm)	981	SW846 9050A
SULFATE	52.9	EPA 300
ALKALINITY	55	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	628	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.2	SW846 9060A
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	101389
Monitoring Point No.	FFMP005W
Sample Date	11/19/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP26RW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 11.03 " — Longitude: 76 ° 27 ' 20.3 "

Depth to Water Level: 80.96 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 3.30 ft — Elevation of Water Level: 466.44 ft./MSL

Sampling Depth: 105 ft — Volume of Water Column: 48.52 gal

Total Well Depth: 114 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 10:14

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088001 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP26RW
Sample Date	11/20/2019

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	0.154	D6919-09
BICARBONATE ALKALINITY	50	SM20-2320B
CALCIUM, TOTAL	72	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	195	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	19.9	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	500	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	2.1	EPA 300
pH-FIELD (SU)	5.23	FIELD
pH-LAB (SU)	5.96	SM20-4500HB
POTASSIUM, TOTAL	8.4	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	64	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	956	FIELD
SPEC. COND., LAB (umhos/cm)	1020	SW846 9050A
SULFATE	65.5	EPA 300
ALKALINITY	50	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	502	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.5	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.7	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	101389
Monitoring Point No.	FFMP26RW
Sample Date	11/20/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP018W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 11.62 " — Longitude: 76 ° 27 ' 5.68 "

Depth to Water Level: 28.06 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.46 ft — Elevation of Water Level: 444.14 ft./MSL

Sampling Depth: 40 ft — Volume of Water Column: 15.25 gal

Total Well Depth: 51.43 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 3.1

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 10:40

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088002 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP018W
Sample Date	11/20/2019

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	0.174	D6919-09
BICARBONATE ALKALINITY	30	SM20-2320B
CALCIUM, TOTAL	35.5	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	99.2	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	16.2	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	350	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	5.5	EPA 300
pH-FIELD (SU)	5.51	FIELD
pH-LAB (SU)	6.15	SM20-4500HB
POTASSIUM, TOTAL	6.5	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	35.8	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	572	FIELD
SPEC. COND., LAB (umhos/cm)	613	SW846 9050A
SULFATE	39.9	EPA 300
ALKALINITY	30	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	290	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.1	SW846 9060A
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	101389
Monitoring Point No.	FFMP018W
Sample Date	11/20/2019

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	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	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP019W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 11.58 " — Longitude: 76 ° 27 ' 5.75 "

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

Casing Stickup: 1.79 ft — Elevation of Water Level: 443.11 ft./MSL

Sampling Depth: 49 ft — Volume of Water Column: 67.85 gal

Total Well Depth: 132.79 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 2.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 11:27

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088003 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP019W
Sample Date	11/20/2019

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	0.175	D6919-09
BICARBONATE ALKALINITY	80	SM20-2320B
CALCIUM, TOTAL	59	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	81.1	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	5.8	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	5.6 ND	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	0.32	EPA 300
pH-FIELD (SU)	6.53	FIELD
pH-LAB (SU)	7.28	SM20-4500HB
POTASSIUM, TOTAL	1.2	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	10.5	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	454	FIELD
SPEC. COND., LAB (umhos/cm)	478	SW846 9050A
SULFATE	16.4	EPA 300
ALKALINITY	80	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	256	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.92	SW846 9060A
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	101389
Monitoring Point No.	FFMP019W
Sample Date	11/20/2019

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	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	1.5	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP029W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 12.93 " — Longitude: 76 ° 27 ' 0.67 "

Depth to Water Level: 39.43 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.00 ft — Elevation of Water Level: 437.87 ft./MSL

Sampling Depth: 55 ft — Volume of Water Column: 28.01 gal

Total Well Depth: 58.5 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 3.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 12:32

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088004 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP029W
Sample Date	11/20/2019

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	0.196	D6919-09
BICARBONATE ALKALINITY	14	SM20-2320B
CALCIUM, TOTAL	14.6	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	61.9	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	10.1	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	32	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	3.9	EPA 300
pH-FIELD (SU)	5.04	FIELD
pH-LAB (SU)	6	SM20-4500HB
POTASSIUM, TOTAL	2.4	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	21.2	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	307	FIELD
SPEC. COND., LAB (umhos/cm)	323	SW846 9050A
SULFATE	6.8	EPA 300
ALKALINITY	14	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	146	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.5 ND	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.18	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	101389
Monitoring Point No.	FFMP029W
Sample Date	11/20/2019

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	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	1.9	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP02DW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: MANOR TOWNSHIP

Sampling Point: Latitude: 39 ° 57 ' 27.74 " — Longitude: 76 ° 27 ' 1.49 "

Depth to Water Level: 20.59 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: ___ ft — Elevation of Water Level: 489.01 ft./MSL

Sampling Depth: 120 ft — Volume of Water Column: ___ gal

Total Well Depth: 152 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.4

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 13:52

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088005 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP02DW
Sample Date	11/20/2019

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	0.322	D6919-09
BICARBONATE ALKALINITY	138	SM20-2320B
CALCIUM, TOTAL	107	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	264	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	660	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	17	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	450	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	10.3	EPA 300
pH-FIELD (SU)	7.23	FIELD
pH-LAB (SU)	7.77	SM20-4500HB
POTASSIUM, TOTAL	2	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	102	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	1286	FIELD
SPEC. COND., LAB (umhos/cm)	1370	SW846 9050A
SULFATE	29.9	EPA 300
ALKALINITY	138	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	714	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.74	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	6.51	SM 2130B

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

I.D. No	101389
Monitoring Point No.	FFMP02DW
Sample Date	11/20/2019

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	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	1.4	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
DEP USE ONLY
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FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP02SW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: MANOR TOWNSHIP

Sampling Point: Latitude: 39 ° 57 ' 27.9 " — Longitude: 76 ° 27 ' 1.58 "

Depth to Water Level: 15.96 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: ___ ft — Elevation of Water Level: 493.94 ft./MSL

Sampling Depth: 18 ft — Volume of Water Column: ___ gal

Total Well Depth: 25 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.7

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/20/2019 — Sample Collection Time: 14:17

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071088006 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP02SW
Sample Date	11/20/2019

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	0.16	D6919-09
BICARBONATE ALKALINITY	19	SM20-2320B
CALCIUM, TOTAL	24.7	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	133	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	1700	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	9.6	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	38	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	14.8	EPA 300
pH-FIELD (SU)	5.46	FIELD
pH-LAB (SU)	6.1	SM20-4500HB
POTASSIUM, TOTAL	5.1	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	88.5	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	395	FIELD
SPEC. COND., LAB (umhos/cm)	719	SW846 9050A
SULFATE	29.9	EPA 300
ALKALINITY	19	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	360	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	1.5	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	62.7	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	101389
Monitoring Point No.	FFMP02SW
Sample Date	11/20/2019

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	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	1.4	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP03AW — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 24.05 " — Longitude: 76 ° 27 ' 30.58 "

Depth to Water Level: 52.71 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.20 ft — Elevation of Water Level: 538.19 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 138.77 gal

Total Well Depth: 147.2 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.8

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/21/2019 — Sample Collection Time: 10:20

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071453001 — Final Lab Analysis CompletionDate: 11/29/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP03AW
Sample Date	11/21/2019

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	D6919-09
BICARBONATE ALKALINITY	20	SM20-2320B
CALCIUM, TOTAL	17.6	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	24.7	EPA 300
FLUORIDE	0.2	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	12.7	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	260	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	20	EPA 300
pH-FIELD (SU)	4.96	FIELD
pH-LAB (SU)	6.17	SM20-4500HB
POTASSIUM, TOTAL	1.4	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	12.2	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	304	FIELD
SPEC. COND., LAB (umhos/cm)	264	SW846 9050A
SULFATE	3.1	EPA 300
ALKALINITY	20	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	80	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.57	SW846 9060A
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	101389
Monitoring Point No.	FFMP03AW
Sample Date	11/21/2019

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	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
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP031W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

Location (County): Lancaster County — Municipality: MANOR TOWNSHIP

Sampling Point: Latitude: 39 ° 57 ' 31.2 " — Longitude: 76 ° 27 ' 23.53 "

Depth to Water Level: 68.41 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.38 ft — Elevation of Water Level: 544.25 ft./MSL

Sampling Depth: 130 ft — Volume of Water Column: 105.14 gal

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

Well Purged: X Yes ___ No — Well Volumes Purged: 1.3

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/21/2019 — Sample Collection Time: 12:04

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071453002 — Final Lab Analysis CompletionDate: 12/4/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP031W
Sample Date	11/21/2019

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	D6919-09
BICARBONATE ALKALINITY	81	SM20-2320B
CALCIUM, TOTAL	41.2	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	23.5	EPA 300
FLUORIDE	0.26	EPA 300
IRON, TOTAL (ug/l)	3800	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	4.1	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	360	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	0.2 ND	EPA 300
pH-FIELD (SU)	7.5	FIELD
pH-LAB (SU)	7.97	SM20-4500HB
POTASSIUM, TOTAL	1.5	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	10.4	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	318	FIELD
SPEC. COND., LAB (umhos/cm)	269	SW846 9050A
SULFATE	45.7	EPA 300
ALKALINITY	81	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	122	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.58	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	14	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	101389
Monitoring Point No.	FFMP031W
Sample Date	11/21/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
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FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP002W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 32.25 " — Longitude: 76 ° 27 ' 24.03 "

Depth to Water Level: 69.74 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.60 ft — Elevation of Water Level: 543.46 ft./MSL

Sampling Depth: 85 ft — Volume of Water Column: 146.66 gal

Total Well Depth: 169.6 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/21/2019 — Sample Collection Time: 12:43

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071453003 — Final Lab Analysis CompletionDate: 12/4/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP002W
Sample Date	11/21/2019

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	D6919-09
BICARBONATE ALKALINITY	5 ND	SM20-2320B
CALCIUM, TOTAL	20.4	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	21.1	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	8.2	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	260	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	20	EPA 300
pH-FIELD (SU)	4.61	FIELD
pH-LAB (SU)	5.31	SM20-4500HB
POTASSIUM, TOTAL	1.9	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	15	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	308	FIELD
SPEC. COND., LAB (umhos/cm)	261	SW846 9050A
SULFATE	23.3	EPA 300
ALKALINITY	5 ND	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	220	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.8	SW846 9060A
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	101389
Monitoring Point No.	FFMP002W
Sample Date	11/21/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP032W — X Well ___ Spring ___ Stream ___ Other

X Upgradient/Upstream ___ Downgradient/Downstream

Location (County): Lancaster County — Municipality: MANOR TOWNSHIP

Sampling Point: Latitude: 39 ° 57 ' 33.45 " — Longitude: 76 ° 27 ' 17.71 "

Depth to Water Level: 49.29 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 2.06 ft — Elevation of Water Level: 544.80 ft./MSL

Sampling Depth: 62 ft — Volume of Water Column: 37.76 gal

Total Well Depth: 75 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 0.7

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/21/2019 — Sample Collection Time: 13:50

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071453004 — Final Lab Analysis CompletionDate: 12/4/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP032W
Sample Date	11/21/2019

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	0.606	D6919-09
BICARBONATE ALKALINITY	90	SM20-2320B
CALCIUM, TOTAL	15.2	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	21.2	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	7800	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	5.1	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	650	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	0.2 ND	EPA 300
pH-FIELD (SU)	6.96	FIELD
pH-LAB (SU)	7.65	SM20-4500HB
POTASSIUM, TOTAL	1.5	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	13.8	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	214	FIELD
SPEC. COND., LAB (umhos/cm)	169	SW846 9050A
SULFATE	2 ND	EPA 300
ALKALINITY	90	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	92	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.64	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	150	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	101389
Monitoring Point No.	FFMP032W
Sample Date	11/21/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
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: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP025W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 19.07 " — Longitude: 76 ° 27 ' 1.12 "

Depth to Water Level: 24.85 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.50 ft — Elevation of Water Level: 451.95 ft./MSL

Sampling Depth: 39 ft — Volume of Water Column: 22.25 gal

Total Well Depth: 40 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

Well Purged: X Yes ___ No — Well Volumes Purged: 3.6

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/21/2019 — Sample Collection Time: 14:34

Sample Collector's Name: Mr. Brian G Shade

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071453005 — Final Lab Analysis CompletionDate: 12/4/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP025W
Sample Date	11/21/2019

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	D6919-09
BICARBONATE ALKALINITY	37	SM20-2320B
CALCIUM, TOTAL	21.7	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	51.8	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	11.9	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	6.6	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	8	EPA 300
pH-FIELD (SU)	4.78	FIELD
pH-LAB (SU)	6.63	SM20-4500HB
POTASSIUM, TOTAL	2.4	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	19.5	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	345	FIELD
SPEC. COND., LAB (umhos/cm)	306	SW846 9050A
SULFATE	23.9	EPA 300
ALKALINITY	37	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	188	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.91	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.11	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	101389
Monitoring Point No.	FFMP025W
Sample Date	11/21/2019

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

T Please indicate detection limit if analyte is not detected.

2540-FM-BWM0041 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
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FORM 19

MUNICIPAL WASTE LANDFILL
QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

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

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Mana

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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: FFMP016W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

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

Sampling Point: Latitude: 39 ° 57 ' 19.15 " — Longitude: 76 ° 27 ' 0.88 "

Depth to Water Level: 22.67 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: 1.97 ft — Elevation of Water Level: 451.93 ft./MSL

Sampling Depth: 135 ft — Volume of Water Column: 186.71 gal

Total Well Depth: 149.8 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/22/2019 — Sample Collection Time: 14:00

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 X No If yes, please explain in comments field.

Lab Accreditation Number(s): 22-293

Lab Sample Number(s): 3071832001 — Final Lab Analysis CompletionDate: 12/4/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP016W
Sample Date	11/22/2019

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	0.115	D6919-09
BICARBONATE ALKALINITY	35	SM20-2320B
CALCIUM, TOTAL	29	SW846 6010C
CALCIUM, DISSOLVED		SW846 6010C
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	68.5	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL (ug/l)	67 ND	SW846 6010C
IRON, DISSOLVED (ug/l)		SW846 6010C
MAGNESIUM, TOTAL	14.6	SW846 6010C
MAGNESIUM, DISSOLVED		SW846 6010C
MANGANESE, TOTAL (ug/l)	18	SW846 6010C
MANGANESE, DISSOLVED (ug/l)		SW846 6010C
NITRATE-NITROGEN	10.1	EPA 300
pH-FIELD (SU)	5.18	FIELD
pH-LAB (SU)	6.37	SM20-4500HB
POTASSIUM, TOTAL	3	SW846 6010C
POTASSIUM, DISSOLVED		SW846 6010C
SODIUM, TOTAL	27.8	SW846 6010C
SODIUM, DISSOLVED		SW846 6010C
SPEC. COND., FIELD (umhos/cm)	468	FIELD
SPEC. COND., LAB (umhos/cm)	428	SW846 9050A
SULFATE	26	EPA 300
ALKALINITY	35	SM20-2320B
TDS (TOT. DISSOLVED SOLIDS)	284	SM20-2540C
TOC (TOTAL ORGANIC CARBON)	0.88	SW846 9060A
TOTAL PHENOLICS (ug/l)	5 ND	SW846 9066
TURBIDITY (N.T.U.)	0.18	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	101389
Monitoring Point No.	FFMP016W
Sample Date	11/22/2019

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	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	1.1	SW846 8260B
TETRACHLOROETHENE	1 ND	SW846 8260B
TOLUENE	1 ND	SW846 8260B
1,1,1-TRICHLOROETHANE	1 ND	SW846 8260B
TRICHLOROETHENE	1 ND	SW846 8260B
VINYL CHLORIDE	1 ND	SW846 8260B
XYLENES (TOTAL)	3 ND	SW846 8260B

T Please indicate detection limit if analyte is not detected.

ALS Environmental

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

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

December 5, 2019

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

Certificate of Analysis

Project Name:	**FREY FARM**	Workorder:	**3071453**
Purchase Order:	**PO1000126**	Workorder ID:	**4TH QTR 2019 GWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Thursday, November 21, 2019.

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: 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3071453001	FFMP03AW	Ground Water	11/21/2019 10:20	11/21/2019 15:51	Mr. Brian G Shade
3071453002	FFMP031W	Ground Water	11/21/2019 12:04	11/21/2019 15:51	Mr. Brian G Shade
3071453003	FFMP002W	Ground Water	11/21/2019 12:43	11/21/2019 15:51	Mr. Brian G Shade
3071453004	FFMP032W	Ground Water	11/21/2019 13:50	11/21/2019 15:51	Mr. Brian G Shade
3071453005	FFMP025W	Ground Water	11/21/2019 14:34	11/21/2019 15:51	Mr. Brian G Shade
3071453006	FIELD BLANK	Water	11/21/2019 14:50	11/21/2019 15:51	Mr. Brian G Shade
3071453007	TRIP BLANK	Water	11/21/2019 15:51	11/21/2019 15:51	Mr. Brian G Shade

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

ALS Environmental

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

ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453001** Date Collected: 11/21/2019 10:20 Matrix: Ground Water

Sample ID: **FFMP03AW** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/19 05:28	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 05:28	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	110		%	62 - 133	SW846 8260B			11/23/19 05:28	VLM	G
4-Bromofluorobenzene (S)	91.6		%	79 - 114	SW846 8260B			11/23/19 05:28	VLM	G
Dibromofluoromethane (S)	88.2		%	78 - 116	SW846 8260B			11/23/19 05:28	VLM	G
Toluene-d8 (S)	90.5		%	76 - 127	SW846 8260B			11/23/19 05:28	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	20	2	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	20	3,4	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/29/19 16:56	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:55	AK	A
Chloride	24.7		mg/L	2.0	EPA 300.0			11/22/19 10:20	CHW	B
Fluoride	0.20		mg/L	0.20	EPA 300.0			11/22/19 10:20	CHW	B
Nitrate-N	20.0	5	mg/L	0.50	EPA 300.0			11/23/19 12:40	CHW	B
pH	6.17	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:16	C_D	11/26/19 11:19	C_D	F
Specific Conductance	264		umhos/cm	1	SW846 9050A			11/28/19 09:11	MBW	B
Sulfate	3.1		mg/L	2.0	EPA 300.0			11/22/19 10:20	CHW	B
Total Dissolved Solids	80		mg/L	5	S2540C-11			11/24/19 21:35	VXF	B
Total Organic Carbon (TOC)	0.57		mg/L	0.50	SW846 9060A			11/26/19 16:42	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453001** Date Collected: 11/21/2019 10:20 Matrix: Ground Water

Sample ID: **FFMP03AW** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	17.6		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
Magnesium, Total	12.7		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
Manganese, Total	0.26		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
Potassium, Total	1.4		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
Sodium, Total	12.2		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:44	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	52.71		Feet		Field			11/21/19 10:20	BGS	C
Elev Top MW Casing above MSL	590.90		Feet		Field			11/21/19 10:20	BGS	C
Flow Rate	1.69		gal/min		Field			11/21/19 10:20	BGS	C
Ground Water Elevation	538.19		ft/MSL		Field			11/21/19 10:20	BGS	C
pH, Field (SM4500B)	4.96		pH_Units		Field			11/21/19 10:20	BGS	C
Sample Depth	130.00		Feet		Field			11/21/19 10:20	BGS	C
Specific Conductance, Field	304		umhos/cm	1	Field			11/21/19 10:20	BGS	C
Temperature	10.85		Deg. C		Field			11/21/19 10:20	BGS	C
Total Well Depth	148.40		Feet		Field			11/21/19 10:20	BGS	C
Volume in Water Column	140.66		Gallons		Field			11/21/19 10:20	BGS	C
Water Level After Purge	84.81		Feet		Field			11/21/19 10:20	BGS	C
Well Volumes Purged	0.84		Vol		Field			11/21/19 10:20	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453002** Date Collected: 11/21/2019 12:04 Matrix: Ground Water
Sample ID: **FFMP031W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/19 05:50	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 05:50	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	111		%	62 - 133	SW846 8260B			11/23/19 05:50	VLM	G
4-Bromofluorobenzene (S)	91.6		%	79 - 114	SW846 8260B			11/23/19 05:50	VLM	G
Dibromofluoromethane (S)	89.9		%	78 - 116	SW846 8260B			11/23/19 05:50	VLM	G
Toluene-d8 (S)	91		%	76 - 127	SW846 8260B			11/23/19 05:50	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	81	2	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	81	5,6	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/29/19 17:09	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:55	AK	A
Chloride	23.5		mg/L	2.0	EPA 300.0			11/22/19 10:36	CHW	B
Fluoride	0.26		mg/L	0.20	EPA 300.0			11/22/19 10:36	CHW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			11/22/19 10:36	CHW	B
pH	7.97	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND	3,4	mg/L	0.005	SW846 9066	12/2/19 14:11	C_D	12/4/19 07:20	C_D	F
Specific Conductance	269		umhos/cm	1	SW846 9050A			11/28/19 09:13	MBW	B
Sulfate	45.7		mg/L	2.0	EPA 300.0			11/22/19 10:36	CHW	B
Total Dissolved Solids	122		mg/L	5	S2540C-11			11/24/19 21:35	VXF	B
Total Organic Carbon (TOC)	0.58		mg/L	0.50	SW846 9060A			11/26/19 16:42	PAG	D
Turbidity	14.0		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453002** Date Collected: 11/21/2019 12:04 Matrix: Ground Water

Sample ID: **FFMP031W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	41.2		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
Iron, Total	3.8		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
Magnesium, Total	4.1		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
Manganese, Total	0.36		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
Potassium, Total	1.5		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
Sodium, Total	10.4		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:48	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	68.41		Feet		Field			11/21/19 12:04	BGS	C
Elev Top MW Casing above MSL	612.66		Feet		Field			11/21/19 12:04	BGS	C
Flow Rate	1.61		gal/min		Field			11/21/19 12:04	BGS	C
Ground Water Elevation	544.25		ft/MSL		Field			11/21/19 12:04	BGS	C
pH, Field (SM4500B)	7.50		pH_Units		Field			11/21/19 12:04	BGS	C
Sample Depth	130.00		Feet		Field			11/21/19 12:04	BGS	C
Specific Conductance, Field	318		umhos/cm	1	Field			11/21/19 12:04	BGS	C
Temperature	13.53		Deg. C		Field			11/21/19 12:04	BGS	C
Total Well Depth	142.70		Feet		Field			11/21/19 12:04	BGS	C
Volume in Water Column	109.21		Gallons		Field			11/21/19 12:04	BGS	C
Water Level After Purge	107.68		Feet		Field			11/21/19 12:04	BGS	C
Well Volumes Purged	1.33		Vol		Field			11/21/19 12:04	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453003** Date Collected: 11/21/2019 12:43 Matrix: Ground Water
Sample ID: **FFMP002W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Toluene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/26/19 00:20	VLM	H
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/26/19 00:20	VLM	H
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	62 - 133	SW846 8260B			11/26/19 00:20	VLM	H
4-Bromofluorobenzene (S)	91.6		%	79 - 114	SW846 8260B			11/26/19 00:20	VLM	H
Dibromofluoromethane (S)	91.9		%	78 - 116	SW846 8260B			11/26/19 00:20	VLM	H
Toluene-d8 (S)	91.6		%	76 - 127	SW846 8260B			11/26/19 00:20	VLM	H
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND	2	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	ND	3,4	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/29/19 17:22	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:55	AK	A
Chloride	21.1		mg/L	2.0	EPA 300.0			11/22/19 10:51	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/22/19 10:51	CHW	B
Nitrate-N	20.0	5	mg/L	0.50	EPA 300.0			11/23/19 12:53	CHW	B
pH	5.31	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/2/19 14:11	C_D	12/4/19 07:20	C_D	F
Specific Conductance	261		umhos/cm	1	SW846 9050A			11/28/19 09:14	MBW	B
Sulfate	23.3		mg/L	2.0	EPA 300.0			11/22/19 10:51	CHW	B
Total Dissolved Solids	220		mg/L	5	S2540C-11			11/25/19 17:53	D1C	B
Total Organic Carbon (TOC)	0.80		mg/L	0.50	SW846 9060A			11/26/19 16:42	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453003** Date Collected: 11/21/2019 12:43 Matrix: Ground Water

Sample ID: **FFMP002W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	20.4		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
Magnesium, Total	8.2		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
Manganese, Total	0.26		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
Potassium, Total	1.9		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
Sodium, Total	15.0		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 10:51	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	69.74		Feet		Field			11/21/19 12:42	BGS	C
Elev Top MW Casing above MSL	613.20		Feet		Field			11/21/19 12:42	BGS	C
Flow Rate	0.95		gal/min		Field			11/21/19 12:42	BGS	C
Ground Water Elevation	543.46		ft/MSL		Field			11/21/19 12:42	BGS	C
pH, Field (SM4500B)	4.61		pH_Units		Field			11/21/19 12:42	BGS	C
Sample Depth	85.00		Feet		Field			11/21/19 12:42	BGS	C
Specific Conductance, Field	308		umhos/cm	1	Field			11/21/19 12:42	BGS	C
Temperature	11.48		Deg. C		Field			11/21/19 12:42	BGS	C
Total Well Depth	90.02		Feet		Field			11/21/19 12:42	BGS	C
Volume in Water Column	29.81		Gallons		Field			11/21/19 12:42	BGS	C
Water Level After Purge	81.41		Feet		Field			11/21/19 12:42	BGS	C
Well Volumes Purged	0.61		Vol		Field			11/21/19 12:42	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453004** Date Collected: 11/21/2019 13:50 Matrix: Ground Water
Sample ID: **FFMP032W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/19 06:35	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 06:35	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	112		%	62 - 133	SW846 8260B			11/23/19 06:35	VLM	G
4-Bromofluorobenzene (S)	89.7		%	79 - 114	SW846 8260B			11/23/19 06:35	VLM	G
Dibromofluoromethane (S)	88.7		%	78 - 116	SW846 8260B			11/23/19 06:35	VLM	G
Toluene-d8 (S)	90.5		%	76 - 127	SW846 8260B			11/23/19 06:35	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	90	2	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	90	3,4	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	0.606		mg/L	0.100	D6919-09			11/29/19 17:34	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	21.2		mg/L	2.0	EPA 300.0			11/22/19 12:39	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/22/19 12:39	CHW	B
Nitrate-N	ND		mg/L	0.20	EPA 300.0			11/22/19 12:39	CHW	B
pH	7.65	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/2/19 14:11	C_D	12/4/19 07:20	C_D	F
Specific Conductance	169		umhos/cm	1	SW846 9050A			11/28/19 09:15	MBW	B
Sulfate	ND		mg/L	2.0	EPA 300.0			11/22/19 12:39	CHW	B
Total Dissolved Solids	92		mg/L	5	S2540C-11			11/25/19 17:53	D1C	B
Total Organic Carbon (TOC)	0.64		mg/L	0.50	SW846 9060A			11/26/19 21:50	PAG	D
Turbidity	150		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453004** Date Collected: 11/21/2019 13:50 Matrix: Ground Water
Sample ID: **FFMP032W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	15.2		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
Iron, Total	7.8		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
Magnesium, Total	5.1		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
Manganese, Total	0.65		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
Potassium, Total	1.5		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
Sodium, Total	13.8		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:13	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	49.29		Feet		Field			11/21/19 13:50	BGS	C
Elev Top MW Casing above MSL	594.09		Feet		Field			11/21/19 13:50	BGS	C
Flow Rate	0.61		gal/min		Field			11/21/19 13:50	BGS	C
Ground Water Elevation	544.80		ft/MSL		Field			11/21/19 13:50	BGS	C
pH, Field (SM4500B)	6.96		pH_Units		Field			11/21/19 13:50	BGS	C
Sample Depth	62.00		Feet		Field			11/21/19 13:50	BGS	C
Specific Conductance, Field	214		umhos/cm	1	Field			11/21/19 13:50	BGS	C
Temperature	12.34		Deg. C		Field			11/21/19 13:50	BGS	C
Total Well Depth	77.60		Feet		Field			11/21/19 13:50	BGS	C
Volume in Water Column	41.62		Gallons		Field			11/21/19 13:50	BGS	C
Water Level After Purge	55.87		Feet		Field			11/21/19 13:50	BGS	C
Well Volumes Purged	0.73		Vol		Field			11/21/19 13:50	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453005** Date Collected: 11/21/2019 14:34 Matrix: Ground Water
Sample ID: **FFMP025W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Toluene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/26/19 00:43	VLM	H
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/26/19 00:43	VLM	H
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	62 - 133	SW846 8260B			11/26/19 00:43	VLM	H
4-Bromofluorobenzene (S)	91.3		%	79 - 114	SW846 8260B			11/26/19 00:43	VLM	H
Dibromofluoromethane (S)	94.1		%	78 - 116	SW846 8260B			11/26/19 00:43	VLM	H
Toluene-d8 (S)	90.6		%	76 - 127	SW846 8260B			11/26/19 00:43	VLM	H
WET CHEMISTRY										
Alkalinity, Bicarbonate	37	2	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	37	3,4	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/29/19 17:47	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	51.8		mg/L	2.0	EPA 300.0			11/22/19 12:55	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/22/19 12:55	CHW	B
Nitrate-N	8.0		mg/L	0.20	EPA 300.0			11/22/19 12:55	CHW	B
pH	6.63	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/2/19 14:11	C_D	12/4/19 07:20	C_D	F
Specific Conductance	306		umhos/cm	1	SW846 9050A			11/28/19 09:17	MBW	B
Sulfate	23.9		mg/L	2.0	EPA 300.0			11/22/19 12:55	CHW	B
Total Dissolved Solids	188		mg/L	5	S2540C-11			11/25/19 17:53	D1C	B
Total Organic Carbon (TOC)	0.91		mg/L	0.50	SW846 9060A			11/26/19 21:50	PAG	D
Turbidity	0.11		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453005** Date Collected: 11/21/2019 14:34 Matrix: Ground Water

Sample ID: **FFMP025W** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	21.7		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
Magnesium, Total	11.9		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
Manganese, Total	0.0066		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
Potassium, Total	2.4		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
Sodium, Total	19.5		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:17	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	24.85		Feet		Field			11/21/19 14:34	BGS	C
Elev Top MW Casing above MSL	476.80		Feet		Field			11/21/19 14:34	BGS	C
Flow Rate	2.97		gal/min		Field			11/21/19 14:34	BGS	C
Ground Water Elevation	451.95		ft/MSL		Field			11/21/19 14:34	BGS	C
pH, Field (SM4500B)	4.78		pH_Units		Field			11/21/19 14:34	BGS	C
Sample Depth	39.00		Feet		Field			11/21/19 14:34	BGS	C
Specific Conductance, Field	345		umhos/cm	1	Field			11/21/19 14:34	BGS	C
Temperature	10.44		Deg. C		Field			11/21/19 14:34	BGS	C
Total Well Depth	41.50		Feet		Field			11/21/19 14:34	BGS	C
Volume in Water Column	24.48		Gallons		Field			11/21/19 14:34	BGS	C
Water Level After Purge	24.94		Feet		Field			11/21/19 14:34	BGS	C
Well Volumes Purged	3.64		Vol		Field			11/21/19 14:34	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453006** Date Collected: 11/21/2019 14:50 Matrix: Water

Sample ID: **FIELD BLANK** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Methylene Chloride	3.4		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/19 01:21	VLM	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 01:21	VLM	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	99		%	62 - 133	SW846 8260B			11/23/19 01:21	VLM	G
4-Bromofluorobenzene (S)	94		%	79 - 114	SW846 8260B			11/23/19 01:21	VLM	G
Dibromofluoromethane (S)	88.4		%	78 - 116	SW846 8260B			11/23/19 01:21	VLM	G
Toluene-d8 (S)	94		%	76 - 127	SW846 8260B			11/23/19 01:21	VLM	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	ND	3	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	B
Alkalinity, Total	ND	45	mg/L	5	SM2320B-2011			11/27/19 13:55	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/29/19 18:25	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:55	AK	A
Chloride	ND		mg/L	1.0	EPA 300.0			11/22/19 13:10	CHW	B
Fluoride	ND		mg/L	0.10	EPA 300.0			11/22/19 13:10	CHW	B
Nitrate-N	ND		mg/L	0.10	EPA 300.0			11/22/19 13:10	CHW	B
pH	6.38	1	pH_Units		S4500HB-11			11/27/19 13:55	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/2/19 14:11	C_D	12/4/19 07:20	C_D	F
Specific Conductance	ND		umhos/cm	1	SW846 9050A			11/28/19 09:18	MBW	B
Sulfate	ND		mg/L	1.0	EPA 300.0			11/22/19 13:10	CHW	B
Total Dissolved Solids	8	2	mg/L	5	S2540C-11			11/25/19 17:53	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			11/26/19 21:50	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/22/19 07:25	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453006** Date Collected: 11/21/2019 14:50 Matrix: Water

Sample ID: **FIELD BLANK** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	ND		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1
Magnesium, Total	ND		mg/L	0.11	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1
Potassium, Total	ND		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1
Sodium, Total	ND		mg/L	0.56	SW846 6010C	11/26/19 14:55	SXC	11/27/19 11:21	SRT	J1

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ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071453007** Date Collected: 11/21/2019 15:51 Matrix: Water

Sample ID: **TRIP BLANK** Date Received: 11/21/2019 15:51

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Toluene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/23/19 00:58	VLM	A
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/23/19 00:58	VLM	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	95		%	62 - 133	SW846 8260B			11/23/19 00:58	VLM	A
4-Bromofluorobenzene (S)	94.6		%	79 - 114	SW846 8260B			11/23/19 00:58	VLM	A
Dibromofluoromethane (S)	89.7		%	78 - 116	SW846 8260B			11/23/19 00:58	VLM	A
Toluene-d8 (S)	93.5		%	76 - 127	SW846 8260B			11/23/19 00:58	VLM	A

Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3071453001	1	FFMP03AW	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.				
3071453001	2	FFMP03AW	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453001	3	FFMP03AW	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453001	4	FFMP03AW	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453001	5	FFMP03AW	EPA 300.0	Nitrate-N
The sample was originally run within hold time, but required further analysis that exceeded hold time.				
3071453002	1	FFMP031W	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.				
3071453002	2	FFMP031W	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453002	3	FFMP031W	SW846 9066	Phenolics
The QC sample type MS for method 420.4/9066 was outside the control limits for the analyte Phenolics. The % Recovery was reported as 18.7 and the control limits were 90 to 110.				
3071453002	4	FFMP031W	SW846 9066	Phenolics
The QC sample type MSD for method 420.4/9066 was outside the control limits for the analyte Phenolics. The % Recovery was reported as 18.8 and the control limits were 90 to 110.				
3071453002	5	FFMP031W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453002	6	FFMP031W	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453003	1	FFMP002W	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.				
3071453003	2	FFMP002W	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453003	3	FFMP002W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453003	4	FFMP002W	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453003	5	FFMP002W	EPA 300.0	Nitrate-N
The sample was originally run within hold time, but required further analysis that exceeded hold time.				

ANALYTICAL RESULTS

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

3071453004	1	FFMP032W	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.				
3071453004	2	FFMP032W	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453004	3	FFMP032W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453004	4	FFMP032W	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453005	1	FFMP025W	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.				
3071453005	2	FFMP025W	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453005	3	FFMP025W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453005	4	FFMP025W	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453006	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.				
3071453006	2	FIELD BLANK	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.				
3071453006	3	FIELD BLANK	SM2320B-2011	Alkalinity, Bicarbonate
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				
3071453006	4	FIELD BLANK	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071453006	5	FIELD BLANK	SM2320B-2011	Alkalinity, Total
The Method Blank for method SM2320B-2011 reported a value greater than the reporting level for the analyte Alkalinity, Total. The concentration was 6 mg/L.				

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3071453001	FFMP03AW	D6919-09	
3071453001	FFMP03AW	EPA 300.0	
3071453001	FFMP03AW	EPA 410.4	
3071453001	FFMP03AW	Field	
3071453001	FFMP03AW	S2540C-11	
3071453001	FFMP03AW	S4500HB-11	
3071453001	FFMP03AW	SM2130B-2011	
3071453001	FFMP03AW	SM2320B-2011	
3071453001	FFMP03AW	SW846 6010C	SW846 3015
3071453001	FFMP03AW	SW846 8260B	
3071453001	FFMP03AW	SW846 9050A	
3071453001	FFMP03AW	SW846 9060A	
3071453001	FFMP03AW	SW846 9066	420.4/9066
3071453002	FFMP031W	D6919-09	
3071453002	FFMP031W	EPA 300.0	
3071453002	FFMP031W	EPA 410.4	
3071453002	FFMP031W	Field	
3071453002	FFMP031W	S2540C-11	
3071453002	FFMP031W	S4500HB-11	
3071453002	FFMP031W	SM2130B-2011	
3071453002	FFMP031W	SM2320B-2011	
3071453002	FFMP031W	SW846 6010C	SW846 3015
3071453002	FFMP031W	SW846 8260B	
3071453002	FFMP031W	SW846 9050A	
3071453002	FFMP031W	SW846 9060A	
3071453002	FFMP031W	SW846 9066	420.4/9066
3071453003	FFMP002W	D6919-09	
3071453003	FFMP002W	EPA 300.0	
3071453003	FFMP002W	EPA 410.4	
3071453003	FFMP002W	Field	
3071453003	FFMP002W	S2540C-11	
3071453003	FFMP002W	S4500HB-11	
3071453003	FFMP002W	SM2130B-2011	
3071453003	FFMP002W	SM2320B-2011	
3071453003	FFMP002W	SW846 6010C	SW846 3015
3071453003	FFMP002W	SW846 8260B	
3071453003	FFMP002W	SW846 9050A	
3071453003	FFMP002W	SW846 9060A	
3071453003	FFMP002W	SW846 9066	420.4/9066
3071453004	FFMP032W	D6919-09	
3071453004	FFMP032W	EPA 300.0	
3071453004	FFMP032W	EPA 410.4	
3071453004	FFMP032W	Field	
3071453004	FFMP032W	S2540C-11	
3071453004	FFMP032W	S4500HB-11	
3071453004	FFMP032W	SM2130B-2011	

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3071453 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3071453004	FFMP032W	SM2320B-2011	
3071453004	FFMP032W	SW846 6010C	SW846 3015
3071453004	FFMP032W	SW846 8260B	
3071453004	FFMP032W	SW846 9050A	
3071453004	FFMP032W	SW846 9060A	
3071453004	FFMP032W	SW846 9066	420.4/9066
3071453005	FFMP025W	D6919-09	
3071453005	FFMP025W	EPA 300.0	
3071453005	FFMP025W	EPA 410.4	
3071453005	FFMP025W	Field	
3071453005	FFMP025W	S2540C-11	
3071453005	FFMP025W	S4500HB-11	
3071453005	FFMP025W	SM2130B-2011	
3071453005	FFMP025W	SM2320B-2011	
3071453005	FFMP025W	SW846 6010C	SW846 3015
3071453005	FFMP025W	SW846 8260B	
3071453005	FFMP025W	SW846 9050A	
3071453005	FFMP025W	SW846 9060A	
3071453005	FFMP025W	SW846 9066	420.4/9066
3071453006	FIELD BLANK	D6919-09	
3071453006	FIELD BLANK	EPA 300.0	
3071453006	FIELD BLANK	EPA 410.4	
3071453006	FIELD BLANK	S2540C-11	
3071453006	FIELD BLANK	S4500HB-11	
3071453006	FIELD BLANK	SM2130B-2011	
3071453006	FIELD BLANK	SM2320B-2011	
3071453006	FIELD BLANK	SW846 6010C	SW846 3015
3071453006	FIELD BLANK	SW846 8260B	
3071453006	FIELD BLANK	SW846 9050A	
3071453006	FIELD BLANK	SW846 9060A	
3071453006	FIELD BLANK	SW846 9066	420.4/9066
3071453007	TRIP BLANK	SW846 8260B	

Thursday, December 05, 2019 11:20:45 PM
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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

1 of 1

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

* 3 0 7 1 4 5 3 *

Client Name: Lancaster County Solid Waste MA
Address: 1299 Harrisburg Pike, P.O. Box 4424
Lancaster, PA 17604
Contact: Dan Brown
Phone#: (717) 735-0193
Project Name/#: Frey Farm Quarterly (GWMP)
Bill To: Lancaster County Solid Waste MA

TAT [X] Normal-Standard TAT is 10-12 business days. [ ] Rush-Subject to ALS approval and surcharges.
Date Required: _____ Approved By: _____
Email? [X] -Y mreider@LCSWMA.com
Fax? [X] -Y No.: (717) 397-9973

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

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	# TOC	# O-OH	VOC - Form 190*	Field Measurements*	Sample Depth for AUX Data	NH3-N, COD	Metals: Fe, Mn, Na, Ca, K, Mg	pH, Cl, SpC, F, SO4, TDS, NO3, Turb.*	Alkalinity Bicarbonate	
					Enter Number of Containers Per Sample or Field Results Below. *									
1. FFMP03AW	11/21/19	1020	G	GW	2	1	2	X	X	1	1	1	1	
2. FFMP031W	11/21/19	1204	G	GW	2	1	2	X	X	1	1	1	1	
3. FFMP002W	11/21/19	1243	G	GW	2	1	2	X	X	1	1	1	1	
4. FFMP032W	11/21/19	1350	G	GW	2	1	2	X	X	1	1	1	1	
5. FFMP025W	11/21/19	1434	G	GW	2	1	2	X	X	1	1	1	1	
6. Field Blank	11/21/19	1450	G	GW	2	1	2			1	1	1	1	
7. Trip Blank	11/21/19	1450	G	GW			2							
8														
9														
10														

(Receiving Lab)
Cooler Temp: 2 Therm ID: S25
No. of Coolers: _____

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

Courier/Tracking #:

Sample/COC Comments

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

Project Comments:

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

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Rob Moeller ALS	11-21-19	1650	2	11/21/19	1557
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE ☐ Navy ☐ ☐

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

Reportable to PADEP? Yes ☐ PWSID # _____

Sample Disposal: Lab [X] Special ☐

EDDS: Format Type- _____

* G=Grab; C=Composite **Matrix - Al=Air; DW=Drinking Water; GW=Groundwater; Ol=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 | Work Order #: 3071453 | Initials: CJ | Date: 11/21/19

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?		(YES)	NO
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below.		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	(N/A)	YES	NO
13b. Did the client provide a SDWA PWS ID#?	(N/A)	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	(N/A)	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	(N/A)	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	(N/A)	YES	NO

Cooler #:								
Temperature (°C):	2							
Thermometer ID:	525							
Radiological (µCi):								

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

Rev. 4/29/2019

ALS Environmental

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

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

December 2, 2019

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

Certificate of Analysis

Project Name:	**FREY FARM**	Workorder:	**3071088**
Purchase Order:	**PO1000126**	Workorder ID:	**4TH QTR 2019 GWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Wednesday, November 20, 2019.

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: 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3071088001	FFMP26RW	Ground Water	11/20/2019 10:14	11/20/2019 15:35	Mr. Brian G Shade
3071088002	FFMP018W	Ground Water	11/20/2019 10:40	11/20/2019 15:35	Mr. Brian G Shade
3071088003	FFMP019W	Ground Water	11/20/2019 11:27	11/20/2019 15:35	Mr. Brian G Shade
3071088004	FFMP029W	Ground Water	11/20/2019 12:32	11/20/2019 15:35	Mr. Brian G Shade
3071088005	FFMP02DW	Ground Water	11/20/2019 13:52	11/20/2019 15:35	Mr. Brian G Shade
3071088006	FFMP02SW	Ground Water	11/20/2019 14:17	11/20/2019 15:35	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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

ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088001** Date Collected: 11/20/2019 10:14 Matrix: Ground Water
Sample ID: **FFMP26RW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 18:56	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 18:56	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	109		%	62 - 133	SW846 8260B			11/22/19 18:56	TMP	G
4-Bromofluorobenzene (S)	91.9		%	79 - 114	SW846 8260B			11/22/19 18:56	TMP	G
Dibromofluoromethane (S)	99.7		%	78 - 116	SW846 8260B			11/22/19 18:56	TMP	G
Toluene-d8 (S)	91.1		%	76 - 127	SW846 8260B			11/22/19 18:56	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	50		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	50	3	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.154		mg/L	0.100	D6919-09			11/27/19 12:14	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	195		mg/L	5.0	EPA 300.0			11/23/19 13:58	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 11:17	CHW	B
Nitrate-N	2.1		mg/L	0.20	EPA 300.0			11/21/19 11:17	CHW	B
pH	5.96	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	1020	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	65.5		mg/L	2.0	EPA 300.0			11/21/19 11:17	CHW	B
Total Dissolved Solids	502		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	1.5		mg/L	0.50	SW846 9060A			11/22/19 04:15	PAG	D
Turbidity	0.70		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088001** Date Collected: 11/20/2019 10:14 Matrix: Ground Water
Sample ID: **FFMP26RW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	72.0		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
Magnesium, Total	19.9		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
Manganese, Total	0.50		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
Potassium, Total	8.4		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
Sodium, Total	64.0		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:00	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	80.96		Feet		Field			11/20/19 10:14	BGS	C
Elev Top MW Casing above MSL	547.40		Feet		Field			11/20/19 10:14	BGS	C
Flow Rate	2.07		gal/min		Field			11/20/19 10:14	BGS	C
Ground Water Elevation	466.44		ft/MSL		Field			11/20/19 10:14	BGS	C
pH, Field (SM4500B)	5.23		pH_Units		Field			11/20/19 10:14	BGS	C
Sample Depth	105.00		Feet		Field			11/20/19 10:14	BGS	C
Specific Conductance, Field	956		umhos/cm	1	Field			11/20/19 10:14	BGS	C
Temperature	11.34		Deg. C		Field			11/20/19 10:14	BGS	C
Total Well Depth	118.30		Feet		Field			11/20/19 10:14	BGS	C
Volume in Water Column	54.89		Gallons		Field			11/20/19 10:14	BGS	C
Water Level After Purge	98.97		Feet		Field			11/20/19 10:14	BGS	C
Well Volumes Purged	1.51		Vol		Field			11/20/19 10:14	BGS	C

Susan J. Scherer
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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088002** Date Collected: 11/20/2019 10:40 Matrix: Ground Water
Sample ID: **FFMP018W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Methylene Chloride	1.0		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 19:18	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 19:18	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	112		%	62 - 133	SW846 8260B			11/22/19 19:18	TMP	G
4-Bromofluorobenzene (S)	91.6		%	79 - 114	SW846 8260B			11/22/19 19:18	TMP	G
Dibromofluoromethane (S)	95.2		%	78 - 116	SW846 8260B			11/22/19 19:18	TMP	G
Toluene-d8 (S)	90.6		%	76 - 127	SW846 8260B			11/22/19 19:18	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	30		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	30	4	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.174		mg/L	0.100	D6919-09			11/27/19 12:27	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	99.2		mg/L	2.0	EPA 300.0			11/21/19 11:33	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 11:33	CHW	B
Nitrate-N	5.5		mg/L	0.20	EPA 300.0			11/21/19 11:33	CHW	B
pH	6.15	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND	3	mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	613	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	39.9		mg/L	2.0	EPA 300.0			11/21/19 11:33	CHW	B
Total Dissolved Solids	290		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	1.1		mg/L	0.50	SW846 9060A			11/22/19 04:15	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088002** Date Collected: 11/20/2019 10:40 Matrix: Ground Water

Sample ID: **FFMP018W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	35.5		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
Magnesium, Total	16.2		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
Manganese, Total	0.35		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
Potassium, Total	6.5		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
Sodium, Total	35.8		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:04	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	28.06		Feet		Field			11/20/19 10:40	BGS	C
Elev Top MW Casing above MSL	472.20		Feet		Field			11/20/19 10:40	BGS	C
Flow Rate	3.95		gal/min		Field			11/20/19 10:40	BGS	C
Ground Water Elevation	444.14		ft/MSL		Field			11/20/19 10:40	BGS	C
pH, Field (SM4500B)	5.51		pH_Units		Field			11/20/19 10:40	BGS	C
Sample Depth	40.00		Feet		Field			11/20/19 10:40	BGS	C
Specific Conductance, Field	572		umhos/cm	1	Field			11/20/19 10:40	BGS	C
Temperature	12.18		Deg. C		Field			11/20/19 10:40	BGS	C
Total Well Depth	51.46		Feet		Field			11/20/19 10:40	BGS	C
Volume in Water Column	15.21		Gallons		Field			11/20/19 10:40	BGS	C
Well Volumes Purged	3.12		Vol		Field			11/20/19 10:40	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088003** Date Collected: 11/20/2019 11:27 Matrix: Ground Water
Sample ID: **FFMP019W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
1,1-Dichloroethene	ND	3,4	ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
trans-1,2-Dichloroethene	ND	5,6	ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Methylene Chloride	1.5		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 19:40	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 19:40	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	113		%	62 - 133	SW846 8260B			11/22/19 19:40	TMP	G
4-Bromofluorobenzene (S)	91.7		%	79 - 114	SW846 8260B			11/22/19 19:40	TMP	G
Dibromofluoromethane (S)	95.7		%	78 - 116	SW846 8260B			11/22/19 19:40	TMP	G
Toluene-d8 (S)	92.2		%	76 - 127	SW846 8260B			11/22/19 19:40	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	80		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	80	7	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.175		mg/L	0.100	D6919-09			11/27/19 12:40	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	81.1		mg/L	2.0	EPA 300.0			11/21/19 13:21	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 13:21	CHW	B
Nitrate-N	0.32		mg/L	0.20	EPA 300.0			11/21/19 13:21	CHW	B
pH	7.28	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	478	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	16.4		mg/L	2.0	EPA 300.0			11/21/19 13:21	CHW	B
Total Dissolved Solids	256		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	0.92		mg/L	0.50	SW846 9060A			11/25/19 20:58	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088003** Date Collected: 11/20/2019 11:27 Matrix: Ground Water
Sample ID: **FFMP019W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	59.0		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
Magnesium, Total	5.8		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
Manganese, Total	ND		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
Potassium, Total	1.2		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
Sodium, Total	10.5		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:08	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	28.84		Feet		Field			11/20/19 11:27	BGS	C
Elev Top MW Casing above MSL	471.95		Feet		Field			11/20/19 11:27	BGS	C
Flow Rate	3.95		gal/min		Field			11/20/19 11:27	BGS	C
Ground Water Elevation	443.11		ft/MSL		Field			11/20/19 11:27	BGS	C
pH, Field (SM4500B)	6.53		pH_Units		Field			11/20/19 11:27	BGS	C
Sample Depth	49.00		Feet		Field			11/20/19 11:27	BGS	C
Specific Conductance, Field	454		umhos/cm	1	Field			11/20/19 11:27	BGS	C
Temperature	11.13		Deg. C		Field			11/20/19 11:27	BGS	C
Total Well Depth	132.79		Feet		Field			11/20/19 11:27	BGS	C
Volume in Water Column	67.57		Gallons		Field			11/20/19 11:27	BGS	C
Water Level After Purge	34.35		Feet		Field			11/20/19 11:27	BGS	C
Well Volumes Purged	2.34		Vol		Field			11/20/19 11:27	BGS	C

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088004** Date Collected: 11/20/2019 12:32 Matrix: Ground Water
Sample ID: **FFMP029W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Methylene Chloride	1.9		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 17:01	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 17:01	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97		%	62 - 133	SW846 8260B			11/22/19 17:01	TMP	G
4-Bromofluorobenzene (S)	95		%	79 - 114	SW846 8260B			11/22/19 17:01	TMP	G
Dibromofluoromethane (S)	91.9		%	78 - 116	SW846 8260B			11/22/19 17:01	TMP	G
Toluene-d8 (S)	91.7		%	76 - 127	SW846 8260B			11/22/19 17:01	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	14		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	14	3	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.196		mg/L	0.100	D6919-09			11/27/19 12:52	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	61.9		mg/L	2.0	EPA 300.0			11/21/19 13:36	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 13:36	CHW	B
Nitrate-N	3.9		mg/L	0.20	EPA 300.0			11/21/19 13:36	CHW	B
pH	6.00	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	323	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	6.8		mg/L	2.0	EPA 300.0			11/21/19 13:36	CHW	B
Total Dissolved Solids	146		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			11/25/19 20:58	PAG	D
Turbidity	0.18		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088004** Date Collected: 11/20/2019 12:32 Matrix: Ground Water

Sample ID: **FFMP029W** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	14.6		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
Magnesium, Total	10.1		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
Manganese, Total	0.032		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
Potassium, Total	2.4		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
Sodium, Total	21.2		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:12	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	39.43		Feet		Field			11/20/19 12:32	BGS	C
Elev Top MW Casing above MSL	477.30		Feet		Field			11/20/19 12:32	BGS	C
Flow Rate	2.05		gal/min		Field			11/20/19 12:32	BGS	C
Ground Water Elevation	437.87		ft/MSL		Field			11/20/19 12:32	BGS	C
pH, Field (SM4500B)	5.04		pH_Units		Field			11/20/19 12:32	BGS	C
Sample Depth	55.00		Feet		Field			11/20/19 12:32	BGS	C
Specific Conductance, Field	307		umhos/cm	1	Field			11/20/19 12:32	BGS	C
Temperature	11.55		Deg. C		Field			11/20/19 12:32	BGS	C
Total Well Depth	60.50		Feet		Field			11/20/19 12:32	BGS	C
Volume in Water Column	30.97		Gallons		Field			11/20/19 12:32	BGS	C
Water Level After Purge	45.31		Feet		Field			11/20/19 12:32	BGS	C
Well Volumes Purged	3.31		Vol		Field			11/20/19 12:32	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088005** Date Collected: 11/20/2019 13:52 Matrix: Ground Water
Sample ID: **FFMP02DW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Methylene Chloride	1.4		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 17:23	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 17:23	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	97.7		%	62 - 133	SW846 8260B			11/22/19 17:23	TMP	G
4-Bromofluorobenzene (S)	93		%	79 - 114	SW846 8260B			11/22/19 17:23	TMP	G
Dibromofluoromethane (S)	90.9		%	78 - 116	SW846 8260B			11/22/19 17:23	TMP	G
Toluene-d8 (S)	92		%	76 - 127	SW846 8260B			11/22/19 17:23	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	138		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	138	3	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.322		mg/L	0.100	D6919-09			11/27/19 13:05	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/26/19 16:48	AK	A
Chloride	264		mg/L	5.0	EPA 300.0			11/23/19 14:13	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 13:51	CHW	B
Nitrate-N	10.3		mg/L	0.20	EPA 300.0			11/21/19 13:51	CHW	B
pH	7.77	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	1370	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	29.9		mg/L	2.0	EPA 300.0			11/21/19 13:51	CHW	B
Total Dissolved Solids	714		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	0.74		mg/L	0.50	SW846 9060A			11/25/19 20:58	PAG	D
Turbidity	6.51		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088005** Date Collected: 11/20/2019 13:52 Matrix: Ground Water

Sample ID: **FFMP02DW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	107		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
Iron, Total	0.66		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
Magnesium, Total	17.0		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
Manganese, Total	0.45		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
Potassium, Total	2.0		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
Sodium, Total	102		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:15	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	20.59		Feet		Field			11/20/19 13:52	BGS	C
Elev Top MW Casing above MSL	509.60		Feet		Field			11/20/19 13:52	BGS	C
Flow Rate	1.35		gal/min		Field			11/20/19 13:52	BGS	C
Ground Water Elevation	489.01		ft/MSL		Field			11/20/19 13:52	BGS	C
pH, Field (SM4500B)	7.23		pH_Units		Field			11/20/19 13:52	BGS	C
Sample Depth	120.00		Feet		Field			11/20/19 13:52	BGS	C
Specific Conductance, Field	1286		umhos/cm	1	Field			11/20/19 13:52	BGS	C
Temperature	9.90		Deg. C		Field			11/20/19 13:52	BGS	C
Total Well Depth	153.00		Feet		Field			11/20/19 13:52	BGS	C
Volume in Water Column	194.64		Gallons		Field			11/20/19 13:52	BGS	C
Water Level After Purge	48.63		Feet		Field			11/20/19 13:52	BGS	C
Well Volumes Purged	0.42		Vol		Field			11/20/19 13:52	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088006** Date Collected: 11/20/2019 14:17 Matrix: Ground Water
Sample ID: **FFMP02SW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Methylene Chloride	1.4		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/22/19 17:46	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/22/19 17:46	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	96.5		%	62 - 133	SW846 8260B			11/22/19 17:46	TMP	G
4-Bromofluorobenzene (S)	93		%	79 - 114	SW846 8260B			11/22/19 17:46	TMP	G
Dibromofluoromethane (S)	91.4		%	78 - 116	SW846 8260B			11/22/19 17:46	TMP	G
Toluene-d8 (S)	90.1		%	76 - 127	SW846 8260B			11/22/19 17:46	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	19		mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	B
Alkalinity, Total	19	3	mg/L	5	SM2320B-2011			11/26/19 06:07	MXO	I
Ammonia-N	0.160		mg/L	0.100	D6919-09			11/27/19 13:18	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/27/19 16:56	AK	A
Chloride	133		mg/L	2.0	EPA 300.0			11/21/19 14:07	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/21/19 14:07	CHW	B
Nitrate-N	14.8		mg/L	0.20	EPA 300.0			11/21/19 14:07	CHW	B
pH	6.10	1	pH_Units		S4500HB-11			11/26/19 06:07	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/26/19 09:15	C_D	11/26/19 11:19	C_D	F
Specific Conductance	719	2	umhos/cm	1	SW846 9050A			11/26/19 06:07	MXO	B
Sulfate	29.9		mg/L	2.0	EPA 300.0			11/21/19 14:07	CHW	B
Total Dissolved Solids	360		mg/L	5	S2540C-11			11/22/19 14:50	D1C	B
Total Organic Carbon (TOC)	1.5		mg/L	0.50	SW846 9060A			11/25/19 20:58	PAG	D
Turbidity	62.7		NTU	0.10	SM2130B-2011			11/21/19 07:39	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071088006** Date Collected: 11/20/2019 14:17 Matrix: Ground Water

Sample ID: **FFMP02SW** Date Received: 11/20/2019 15:35

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	24.7		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
Iron, Total	1.7		mg/L	0.067	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
Magnesium, Total	9.6		mg/L	0.11	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
Manganese, Total	0.038		mg/L	0.0056	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
Potassium, Total	5.1		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
Sodium, Total	88.5		mg/L	0.56	SW846 6010C	11/21/19 17:10	SXC	11/22/19 10:19	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	15.96		Feet		Field			11/20/19 14:17	BGS	C
Elev Top MW Casing above MSL	509.90		Feet		Field			11/20/19 14:17	BGS	C
Flow Rate	0.30		gal/min		Field			11/20/19 14:17	BGS	C
Ground Water Elevation	493.94		ft/MSL		Field			11/20/19 14:17	BGS	C
pH, Field (SM4500B)	5.46		pH_Units		Field			11/20/19 14:17	BGS	C
Sample Depth	18.00		Feet		Field			11/20/19 14:17	BGS	C
Specific Conductance, Field	395		umhos/cm	1	Field			11/20/19 14:17	BGS	C
Temperature	12.15		Deg. C		Field			11/20/19 14:17	BGS	C
Total Well Depth	22.70		Feet		Field			11/20/19 14:17	BGS	C
Volume in Water Column	4.38		Gallons		Field			11/20/19 14:17	BGS	C
Water Level After Purge	18.51		Feet		Field			11/20/19 14:17	BGS	C
Well Volumes Purged	0.69		Vol		Field			11/20/19 14:17	BGS	C

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ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3071088001	1	FFMP26RW	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.				
3071088001	2	FFMP26RW	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088001	3	FFMP26RW	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071088002	1	FFMP018W	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.				
3071088002	2	FFMP018W	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088002	3	FFMP018W	SW846 9066	Phenolics
The QC sample type MS for method 420.4/9066 was outside the control limits for the analyte Phenolics. The % Recovery was reported as 88.5 and the control limits were 90 to 110.				
3071088002	4	FFMP018W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071088003	1	FFMP019W	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.				
3071088003	2	FFMP019W	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088003	3	FFMP019W	SW846 8260B	1,1-Dichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 151 and the control limits were 63 to 128.				
3071088003	4	FFMP019W	SW846 8260B	1,1-Dichloroethene
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 138 and the control limits were 63 to 128.				
3071088003	5	FFMP019W	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 139 and the control limits were 71 to 122.				
3071088003	6	FFMP019W	SW846 8260B	trans-1,2-Dichloroethene
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 126 and the control limits were 71 to 122.				
3071088003	7	FFMP019W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071088004	1	FFMP029W	S4500HB-11	pH
The pH analysis is an "analyze immediately" analysis. Parameters identified as "analyze immediately" require analysis within 15 minutes of collection, and are therefore analyzed outside of the method holding time when analyzed in the laboratory.				

ANALYTICAL RESULTS

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

3071088004	2	FFMP029W	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088004	3	FFMP029W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071088005	1	FFMP02DW	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.				
3071088005	2	FFMP02DW	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088005	3	FFMP02DW	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3071088006	1	FFMP02SW	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.				
3071088006	2	FFMP02SW	SW846 9050A	Specific Conductance
The QC sample type CCV1 for method SM2510B-2011 was outside the control limits for the analyte Specific Conductance. The % Recovery was reported as 114 and the control limits were 90 to 110.				
3071088006	3	FFMP02SW	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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State Certifications: FL E871113 , WA C999 , MD 128 , VA 460157 , WV DW 9961-C , WV 343

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3071088001	FFMP26RW	D6919-09	
3071088001	FFMP26RW	EPA 300.0	
3071088001	FFMP26RW	EPA 410.4	
3071088001	FFMP26RW	Field	
3071088001	FFMP26RW	S2540C-11	
3071088001	FFMP26RW	S4500HB-11	
3071088001	FFMP26RW	SM2130B-2011	
3071088001	FFMP26RW	SM2320B-2011	
3071088001	FFMP26RW	SW846 6010C	SW846 3015
3071088001	FFMP26RW	SW846 8260B	
3071088001	FFMP26RW	SW846 9050A	
3071088001	FFMP26RW	SW846 9060A	
3071088001	FFMP26RW	SW846 9066	420.4/9066
3071088002	FFMP018W	D6919-09	
3071088002	FFMP018W	EPA 300.0	
3071088002	FFMP018W	EPA 410.4	
3071088002	FFMP018W	Field	
3071088002	FFMP018W	S2540C-11	
3071088002	FFMP018W	S4500HB-11	
3071088002	FFMP018W	SM2130B-2011	
3071088002	FFMP018W	SM2320B-2011	
3071088002	FFMP018W	SW846 6010C	SW846 3015
3071088002	FFMP018W	SW846 8260B	
3071088002	FFMP018W	SW846 9050A	
3071088002	FFMP018W	SW846 9060A	
3071088002	FFMP018W	SW846 9066	420.4/9066
3071088003	FFMP019W	D6919-09	
3071088003	FFMP019W	EPA 300.0	
3071088003	FFMP019W	EPA 410.4	
3071088003	FFMP019W	Field	
3071088003	FFMP019W	S2540C-11	
3071088003	FFMP019W	S4500HB-11	
3071088003	FFMP019W	SM2130B-2011	
3071088003	FFMP019W	SM2320B-2011	
3071088003	FFMP019W	SW846 6010C	SW846 3015
3071088003	FFMP019W	SW846 8260B	
3071088003	FFMP019W	SW846 9050A	
3071088003	FFMP019W	SW846 9060A	
3071088003	FFMP019W	SW846 9066	420.4/9066
3071088004	FFMP029W	D6919-09	
3071088004	FFMP029W	EPA 300.0	
3071088004	FFMP029W	EPA 410.4	
3071088004	FFMP029W	Field	
3071088004	FFMP029W	S2540C-11	
3071088004	FFMP029W	S4500HB-11	
3071088004	FFMP029W	SM2130B-2011	

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3071088 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3071088004	FFMP029W	SM2320B-2011	
3071088004	FFMP029W	SW846 6010C	SW846 3015
3071088004	FFMP029W	SW846 8260B	
3071088004	FFMP029W	SW846 9050A	
3071088004	FFMP029W	SW846 9060A	
3071088004	FFMP029W	SW846 9066	420.4/9066
3071088005	FFMP02DW	D6919-09	
3071088005	FFMP02DW	EPA 300.0	
3071088005	FFMP02DW	EPA 410.4	
3071088005	FFMP02DW	Field	
3071088005	FFMP02DW	S2540C-11	
3071088005	FFMP02DW	S4500HB-11	
3071088005	FFMP02DW	SM2130B-2011	
3071088005	FFMP02DW	SM2320B-2011	
3071088005	FFMP02DW	SW846 6010C	SW846 3015
3071088005	FFMP02DW	SW846 8260B	
3071088005	FFMP02DW	SW846 9050A	
3071088005	FFMP02DW	SW846 9060A	
3071088005	FFMP02DW	SW846 9066	420.4/9066
3071088006	FFMP02SW	D6919-09	
3071088006	FFMP02SW	EPA 300.0	
3071088006	FFMP02SW	EPA 410.4	
3071088006	FFMP02SW	Field	
3071088006	FFMP02SW	S2540C-11	
3071088006	FFMP02SW	S4500HB-11	
3071088006	FFMP02SW	SM2130B-2011	
3071088006	FFMP02SW	SM2320B-2011	
3071088006	FFMP02SW	SW846 6010C	SW846 3015
3071088006	FFMP02SW	SW846 8260B	
3071088006	FFMP02SW	SW846 9050A	
3071088006	FFMP02SW	SW846 9060A	
3071088006	FFMP02SW	SW846 9066	420.4/9066

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December 2, 2019

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

Certificate of Analysis

Project Name:	**FREY FARM**	Workorder:	**3070806**
Purchase Order:	**PO1000126**	Workorder ID:	**4th QTR 2019 GWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, November 19, 2019.

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: 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3070806 4th QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3070806001	FFMP30RW	Ground Water	11/19/2019 10:59	11/19/2019 16:23	Mr. Brian G Shade
3070806002	FFMP04AW	Ground Water	11/19/2019 12:06	11/19/2019 16:23	Mr. Brian G Shade
3070806003	FFMP017W	Ground Water	11/19/2019 13:50	11/19/2019 16:23	Mr. Brian G Shade
3070806004	FFMP005W	Ground Water	11/19/2019 15:10	11/19/2019 16:23	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3070806 4th QTR 2019 GWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3070806 4th QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3070806001	FFMP30RW	D6919-09	
3070806001	FFMP30RW	EPA 300.0	
3070806001	FFMP30RW	EPA 410.4	
3070806001	FFMP30RW	Field	
3070806001	FFMP30RW	S2540C-11	
3070806001	FFMP30RW	S4500HB-11	
3070806001	FFMP30RW	SM2130B-2011	
3070806001	FFMP30RW	SM2320B-2011	
3070806001	FFMP30RW	SW846 6010C	SW846 3015
3070806001	FFMP30RW	SW846 8260B	
3070806001	FFMP30RW	SW846 9050A	
3070806001	FFMP30RW	SW846 9060A	
3070806001	FFMP30RW	SW846 9066	420.4/9066
3070806002	FFMP04AW	D6919-09	
3070806002	FFMP04AW	EPA 300.0	
3070806002	FFMP04AW	EPA 410.4	
3070806002	FFMP04AW	Field	
3070806002	FFMP04AW	S2540C-11	
3070806002	FFMP04AW	S4500HB-11	
3070806002	FFMP04AW	SM2130B-2011	
3070806002	FFMP04AW	SM2320B-2011	
3070806002	FFMP04AW	SW846 6010C	SW846 3015
3070806002	FFMP04AW	SW846 8260B	
3070806002	FFMP04AW	SW846 9050A	
3070806002	FFMP04AW	SW846 9060A	
3070806002	FFMP04AW	SW846 9066	420.4/9066
3070806003	FFMP017W	D6919-09	
3070806003	FFMP017W	EPA 300.0	
3070806003	FFMP017W	EPA 410.4	
3070806003	FFMP017W	Field	
3070806003	FFMP017W	S2540C-11	
3070806003	FFMP017W	S4500HB-11	
3070806003	FFMP017W	SM2130B-2011	
3070806003	FFMP017W	SM2320B-2011	
3070806003	FFMP017W	SW846 6010C	SW846 3015
3070806003	FFMP017W	SW846 8260B	
3070806003	FFMP017W	SW846 9050A	
3070806003	FFMP017W	SW846 9060A	
3070806003	FFMP017W	SW846 9066	420.4/9066
3070806004	FFMP005W	D6919-09	
3070806004	FFMP005W	EPA 300.0	
3070806004	FFMP005W	EPA 410.4	
3070806004	FFMP005W	Field	
3070806004	FFMP005W	S2540C-11	
3070806004	FFMP005W	S4500HB-11	
3070806004	FFMP005W	SM2130B-2011	

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3070806 4th QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3070806004	FFMP005W	SM2320B-2011	
3070806004	FFMP005W	SW846 6010C	SW846 3015
3070806004	FFMP005W	SW846 8260B	
3070806004	FFMP005W	SW846 9050A	
3070806004	FFMP005W	SW846 9060A	
3070806004	FFMP005W	SW846 9066	420.4/9066

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December 2, 2019

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

Certificate of Analysis

Project Name:	**FREY FARM**	Workorder:	**3070614**
Purchase Order:	**PO1000126**	Workorder ID:	**4th QTR 2019 GWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, November 18, 2019.

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

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Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3070614001	FFMP015W	Ground Water	11/18/2019 10:40	11/18/2019 16:23	Mr. Brian G Shade
3070614002	FFMP028W	Ground Water	11/18/2019 13:45	11/18/2019 16:23	Mr. Brian G Shade
3070614003	FFMP033W	Ground Water	11/18/2019 15:03	11/18/2019 16:23	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Notes

-- Samples collected by ALS personnel are done so in accordance with the procedures set forth in the ALS Field Sampling Plan (20 - Field Services Sampling Plan).
-- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
-- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
-- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
-- The Chain of Custody document is included as part of this report.
-- All Library Search analytes should be regarded as tentative identifications based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.
-- Parameters identified as "analyze immediately" require analysis within 15 minutes of collection. Any "analyze immediately" parameters not listed under the header "Field Parameters" are preformed in the laboratory and are therefore analyzed out of hold time.
-- Method references listed on this report beginning with the prefix “S” followed by a method number (such as S2310B-97) refer to methods from “Standard Methods for the Examination of Water and Wastewater”.
-- For microbiological analyses, the "Prepared" value is the date/time into the incubator and the "Analyzed" value is the date/time out the incubator.
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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: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614001** Date Collected: 11/18/2019 10:40 Matrix: Ground Water
Sample ID: **FFMP015W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/21/19 02:29	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:29	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	116		%	62 - 133	SW846 8260B			11/21/19 02:29	PDK	G
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			11/21/19 02:29	PDK	G
Dibromofluoromethane (S)	99.1		%	78 - 116	SW846 8260B			11/21/19 02:29	PDK	G
Toluene-d8 (S)	109		%	76 - 127	SW846 8260B			11/21/19 02:29	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	19		mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	B
Alkalinity, Total	19	3	mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/26/19 13:07	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/25/19 16:51	AK	A
Chloride	13.4		mg/L	2.0	EPA 300.0			11/19/19 14:34	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/19/19 14:34	CHW	B
Nitrate-N	14.9		mg/L	0.20	EPA 300.0			11/19/19 14:34	CHW	B
pH	5.92	1	pH_Units		S4500HB-11			11/24/19 02:51	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/19/19 14:45	C_D	11/20/19 06:11	C_D	F
Specific Conductance	252		umhos/cm	1	SW846 9050A			11/27/19 03:26	MBW	B
Sulfate	36.5		mg/L	2.0	EPA 300.0			11/19/19 14:34	CHW	B
Total Dissolved Solids	304	2	mg/L	5	S2540C-11			11/20/19 14:36	D1C	B
Total Organic Carbon (TOC)	1.0		mg/L	0.50	SW846 9060A			11/21/19 09:06	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/19/19 09:15	R2B	B

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ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614001** Date Collected: 11/18/2019 10:40 Matrix: Ground Water

Sample ID: **FFMP015W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	11.7		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
Magnesium, Total	12.0		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
Manganese, Total	0.030		mg/L	0.0056	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
Potassium, Total	2.1		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
Sodium, Total	18.9		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:49	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	59.81		Feet		Field			11/18/19 10:40	BGS	C
Elev Top MW Casing above MSL	576.40		Feet		Field			11/18/19 10:40	BGS	C
Flow Rate	2.15		gal/min		Field			11/18/19 10:40	BGS	C
Ground Water Elevation	516.59		ft/MSL		Field			11/18/19 10:40	BGS	C
pH, Field (SM4500B)	5.31		pH_Units		Field			11/18/19 10:40	BGS	C
Sample Depth	135.00		Feet		Field			11/18/19 10:40	BGS	C
Specific Conductance, Field	293		umhos/cm	1	Field			11/18/19 10:40	BGS	C
Temperature	10.85		Deg. C		Field			11/18/19 10:40	BGS	C
Total Well Depth	149.90		Feet		Field			11/18/19 10:40	BGS	C
Volume in Water Column	132.43		Gallons		Field			11/18/19 10:40	BGS	C
Water Level After Purge	103.60		Feet		Field			11/18/19 10:40	BGS	C
Well Volumes Purged	1.30		Vol		Field			11/18/19 10:40	BGS	C

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ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614002** Date Collected: 11/18/2019 13:45 Matrix: Ground Water
Sample ID: **FFMP028W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Methylene Chloride	1.1		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/21/19 02:52	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:52	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	117		%	62 - 133	SW846 8260B			11/21/19 02:52	PDK	G
4-Bromofluorobenzene (S)	111		%	79 - 114	SW846 8260B			11/21/19 02:52	PDK	G
Dibromofluoromethane (S)	99.6		%	78 - 116	SW846 8260B			11/21/19 02:52	PDK	G
Toluene-d8 (S)	110		%	76 - 127	SW846 8260B			11/21/19 02:52	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	34		mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	B
Alkalinity, Total	34	3	mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	I
Ammonia-N	ND		mg/L	0.100	D6919-09			11/26/19 13:19	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/26/19 16:48	AK	A
Chloride	89.4		mg/L	2.0	EPA 300.0			11/19/19 16:06	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/19/19 16:06	CHW	B
Nitrate-N	18.6		mg/L	0.20	EPA 300.0			11/19/19 16:06	CHW	B
pH	6.01	1	pH_Units		S4500HB-11			11/24/19 02:51	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/19/19 14:45	C_D	11/20/19 06:11	C_D	F
Specific Conductance	552		umhos/cm	1	SW846 9050A			11/27/19 03:35	MBW	B
Sulfate	26.7		mg/L	2.0	EPA 300.0			11/19/19 16:06	CHW	B
Total Dissolved Solids	426	2	mg/L	5	S2540C-11			11/20/19 14:36	D1C	B
Total Organic Carbon (TOC)	1.1		mg/L	0.50	SW846 9060A			11/21/19 09:06	PAG	D
Turbidity	ND		NTU	0.10	SM2130B-2011			11/19/19 09:15	R2B	B

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ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614002** Date Collected: 11/18/2019 13:45 Matrix: Ground Water

Sample ID: **FFMP028W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	41.4		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
Magnesium, Total	17.5		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
Manganese, Total	0.0092		mg/L	0.0056	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
Potassium, Total	2.2		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
Sodium, Total	28.0		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:52	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	12.31		Feet		Field			11/18/19 13:45	BGS	C
Elev Top MW Casing above MSL	465.00		Feet		Field			11/18/19 13:45	BGS	C
Flow Rate	2.73		gal/min		Field			11/18/19 13:45	BGS	C
Ground Water Elevation	452.69		ft/MSL		Field			11/18/19 13:45	BGS	C
pH, Field (SM4500B)	5.44		pH_Units		Field			11/18/19 13:45	BGS	C
Sample Depth	50.00		Feet		Field			11/18/19 13:45	BGS	C
Specific Conductance, Field	573		umhos/cm	1	Field			11/18/19 13:45	BGS	C
Temperature	10.27		Deg. C		Field			11/18/19 13:45	BGS	C
Total Well Depth	60.00		Feet		Field			11/18/19 13:45	BGS	C
Volume in Water Column	70.10		Gallons		Field			11/18/19 13:45	BGS	C
Water Level After Purge	37.28		Feet		Field			11/18/19 13:45	BGS	C
Well Volumes Purged	2.34		Vol		Field			11/18/19 13:45	BGS	C

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ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614003** Date Collected: 11/18/2019 15:03 Matrix: Ground Water
Sample ID: **FFMP033W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
1,1-Dichloroethene	ND	4,5	ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
trans-1,2-Dichloroethene	ND	6	ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/21/19 03:14	PDK	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 03:14	PDK	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	119		%	62 - 133	SW846 8260B			11/21/19 03:14	PDK	G
4-Bromofluorobenzene (S)	110		%	79 - 114	SW846 8260B			11/21/19 03:14	PDK	G
Dibromofluoromethane (S)	102		%	78 - 116	SW846 8260B			11/21/19 03:14	PDK	G
Toluene-d8 (S)	108		%	76 - 127	SW846 8260B			11/21/19 03:14	PDK	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	55		mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	B
Alkalinity, Total	55	7	mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	I
Ammonia-N	0.702		mg/L	0.100	D6919-09			11/26/19 13:32	NJA	A
Chemical Oxygen Demand (COD)	ND	1	mg/L	15	EPA 410.4			11/25/19 16:51	AK	A
Chloride	39.2		mg/L	2.0	EPA 300.0			11/19/19 16:22	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/19/19 16:22	CHW	B
Nitrate-N	11.6		mg/L	0.20	EPA 300.0			11/19/19 16:22	CHW	B
pH	6.46	2	pH_Units		S4500HB-11			11/24/19 02:51	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/19/19 14:45	C_D	11/20/19 06:11	C_D	F
Specific Conductance	294		umhos/cm	1	SW846 9050A			11/27/19 03:45	MBW	B
Sulfate	7.4		mg/L	2.0	EPA 300.0			11/19/19 16:22	CHW	B
Total Dissolved Solids	284	3	mg/L	5	S2540C-11			11/20/19 16:10	D1C	B
Total Organic Carbon (TOC)	ND		mg/L	0.50	SW846 9060A			11/21/19 09:06	PAG	D
Turbidity	5.81		NTU	0.10	SM2130B-2011			11/19/19 09:15	R2B	B

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ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID: **3070614003** Date Collected: 11/18/2019 15:03 Matrix: Ground Water
Sample ID: **FFMP033W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	26.7		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
Iron, Total	6.0		mg/L	0.067	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
Magnesium, Total	9.0		mg/L	0.11	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
Manganese, Total	0.49		mg/L	0.0056	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
Potassium, Total	1.7		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
Sodium, Total	14.1		mg/L	0.56	SW846 6010C	11/21/19 17:40	SXC	11/22/19 11:56	SRT	J1
FIELD PARAMETERS										
Depth to Water Level	18.11		Feet		Field			11/18/19 15:03	BGS	C
Elev Top MW Casing above MSL	516.52		Feet		Field			11/18/19 15:03	BGS	C
Flow Rate	1.95		gal/min		Field			11/18/19 15:03	BGS	C
Ground Water Elevation	498.41		ft/MSL		Field			11/18/19 15:03	BGS	C
pH, Field (SM4500B)	5.82		pH_Units		Field			11/18/19 15:03	BGS	C
Sample Depth	79.00		Feet		Field			11/18/19 15:03	BGS	C
Specific Conductance, Field	351		umhos/cm	1	Field			11/18/19 15:03	BGS	C
Temperature	11.84		Deg. C		Field			11/18/19 15:03	BGS	C
Total Well Depth	100.00		Feet		Field			11/18/19 15:03	BGS	C
Volume in Water Column	120.38		Gallons		Field			11/18/19 15:03	BGS	C
Water Level After Purge	28.32		Feet		Field			11/18/19 15:03	BGS	C
Well Volumes Purged	0.97		Vol		Field			11/18/19 15:03	BGS	C

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Project Coordinator

ANALYTICAL RESULTS

Workorder: 3070614 4th QTR 2019 GWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3070614001	1	FFMP015W	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.				
3070614001	2	FFMP015W	S2540C-11	Total Dissolved Solids
The Method Blank for method S2540C-11 reported a value equal to/greater than the reporting level for the analyte Total Dissolved Solids. The concentration was 25 mg/L.				
3070614001	3	FFMP015W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3070614002	1	FFMP028W	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.				
3070614002	2	FFMP028W	S2540C-11	Total Dissolved Solids
The Method Blank for method S2540C-11 reported a value equal to/greater than the reporting level for the analyte Total Dissolved Solids. The concentration was 25 mg/L.				
3070614002	3	FFMP028W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3070614003	1	FFMP033W	EPA 410.4	Chemical Oxygen Demand (COD)
The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits.				
3070614003	2	FFMP033W	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.				
3070614003	3	FFMP033W	S2540C-11	Total Dissolved Solids
The Method Blank for method S2540C-11 reported a value equal to/greater than the reporting level for the analyte Total Dissolved Solids. The concentration was 25 mg/L.				
3070614003	4	FFMP033W	SW846 8260B	1,1-Dichloroethene
The QC sample type MS for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 142 and the control limits were 63 to 128.				
3070614003	5	FFMP033W	SW846 8260B	1,1-Dichloroethene
The QC sample type MSD for method SW846 8260B was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 130 and the control limits were 63 to 128.				
3070614003	6	FFMP033W	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 132 and the control limits were 71 to 122.				
3070614003	7	FFMP033W	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: 3070614 4th QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3070614001	FFMP015W	D6919-09	
3070614001	FFMP015W	EPA 300.0	
3070614001	FFMP015W	EPA 410.4	
3070614001	FFMP015W	Field	
3070614001	FFMP015W	S2540C-11	
3070614001	FFMP015W	S4500HB-11	
3070614001	FFMP015W	SM2130B-2011	
3070614001	FFMP015W	SM2320B-2011	
3070614001	FFMP015W	SW846 6010C	SW846 3015
3070614001	FFMP015W	SW846 8260B	
3070614001	FFMP015W	SW846 9050A	
3070614001	FFMP015W	SW846 9060A	
3070614001	FFMP015W	SW846 9066	420.4/9066
3070614002	FFMP028W	D6919-09	
3070614002	FFMP028W	EPA 300.0	
3070614002	FFMP028W	EPA 410.4	
3070614002	FFMP028W	Field	
3070614002	FFMP028W	S2540C-11	
3070614002	FFMP028W	S4500HB-11	
3070614002	FFMP028W	SM2130B-2011	
3070614002	FFMP028W	SM2320B-2011	
3070614002	FFMP028W	SW846 6010C	SW846 3015
3070614002	FFMP028W	SW846 8260B	
3070614002	FFMP028W	SW846 9050A	
3070614002	FFMP028W	SW846 9060A	
3070614002	FFMP028W	SW846 9066	420.4/9066
3070614003	FFMP033W	D6919-09	
3070614003	FFMP033W	EPA 300.0	
3070614003	FFMP033W	EPA 410.4	
3070614003	FFMP033W	Field	
3070614003	FFMP033W	S2540C-11	
3070614003	FFMP033W	S4500HB-11	
3070614003	FFMP033W	SM2130B-2011	
3070614003	FFMP033W	SM2320B-2011	
3070614003	FFMP033W	SW846 6010C	SW846 3015
3070614003	FFMP033W	SW846 8260B	
3070614003	FFMP033W	SW846 9050A	
3070614003	FFMP033W	SW846 9060A	
3070614003	FFMP033W	SW846 9066	420.4/9066

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December 5, 2019

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

Certificate of Analysis

Project Name:	**FREY FARM**	Workorder:	**3071832**
Purchase Order:	**PO1000126**	Workorder ID:	**4TH QTR 2019 GWMP-FORM 19Q**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Friday, November 22, 2019.

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: 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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

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

SAMPLE SUMMARY

Workorder: 3071832 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3071832001	FFMP016W	Ground Water	11/22/2019 14:00	11/22/2019 17:24	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3071832 4TH QTR 2019 GWMP-FORM 19Q

Notes

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

Standard Acronyms/Flags

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

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ANALYTICAL RESULTS

Workorder: 3071832 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071832001** Date Collected: 11/22/2019 14:00 Matrix: Ground Water
Sample ID: **FFMP016W** Date Received: 11/22/2019 17:24

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
VOLATILE ORGANICS										
Benzene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Methylene Chloride	1.1		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Toluene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/27/19 14:55	TMP	G
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/27/19 14:55	TMP	G
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			11/27/19 14:55	TMP	G
4-Bromofluorobenzene (S)	92.2		%	79 - 114	SW846 8260B			11/27/19 14:55	TMP	G
Dibromofluoromethane (S)	92.6		%	78 - 116	SW846 8260B			11/27/19 14:55	TMP	G
Toluene-d8 (S)	89.2		%	76 - 127	SW846 8260B			11/27/19 14:55	TMP	G
WET CHEMISTRY										
Alkalinity, Bicarbonate	35		mg/L	5	SM2320B-2011			11/28/19 12:09	MXO	B
Alkalinity, Total	35	2	mg/L	5	SM2320B-2011			11/28/19 12:09	MXO	J
Ammonia-N	0.115		mg/L	0.100	D6919-09			12/3/19 23:50	NJA	A
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			12/2/19 15:55	AK	A
Chloride	68.5		mg/L	2.0	EPA 300.0			11/23/19 06:47	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/23/19 06:47	CHW	B
Nitrate-N	10.1		mg/L	0.20	EPA 300.0			11/23/19 06:47	CHW	B
pH	6.37	1	pH_Units		S4500HB-11			11/28/19 12:09	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	12/2/19 20:00	VXF	12/4/19 07:20	C_D	F
Specific Conductance	428		umhos/cm	1	SW846 9050A			12/3/19 09:39	MBW	B
Sulfate	26.0		mg/L	2.0	EPA 300.0			11/23/19 06:47	CHW	B
Total Dissolved Solids	284		mg/L	5	S2540C-11			11/26/19 15:35	D1C	B
Total Organic Carbon (TOC)	0.88		mg/L	0.50	SW846 9060A			12/2/19 19:28	PAG	D
Turbidity	0.18		NTU	0.10	SM2130B-2011			11/23/19 05:44	R2B	B

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ANALYTICAL RESULTS

Workorder: 3071832 4TH QTR 2019 GWMP-FORM 19Q

Lab ID: **3071832001** Date Collected: 11/22/2019 14:00 Matrix: Ground Water
Sample ID: **FFMP016W** Date Received: 11/22/2019 17:24

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Calcium, Total	29.0		mg/L	0.11	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
Iron, Total	ND		mg/L	0.067	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
Magnesium, Total	14.6		mg/L	0.11	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
Manganese, Total	0.018		mg/L	0.0056	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
Potassium, Total	3.0		mg/L	0.56	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
Sodium, Total	27.8		mg/L	0.56	SW846 6010C	11/26/19 18:55	SXC	11/27/19 14:04	SRT	K1
FIELD PARAMETERS										
Depth to Water Level	22.67		Feet		Field			11/22/19 14:27	BGS	C
Elev Top MW Casing above MSL	474.60		Feet		Field			11/22/19 14:27	BGS	C
Ground Water Elevation	451.93		ft/MSL		Field			11/22/19 14:27	BGS	C
pH, Field (SM4500B)	5.18		pH_Units		Field			11/22/19 14:27	BGS	C
Sample Depth	135.00		Feet		Field			11/22/19 14:27	BGS	C
Specific Conductance, Field	468		umhos/cm	1	Field			11/22/19 14:27	BGS	C
Temperature	9.57		Deg. C		Field			11/22/19 14:27	BGS	C
Total Well Depth	149.80		Feet		Field			11/22/19 14:27	BGS	C
Volume in Water Column	331.81		Gallons		Field			11/22/19 14:27	BGS	C

Ms. Susan J Scherer
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3071832 4TH QTR 2019 GWMP-FORM 19Q

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3071832001	1	FFMP016W	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.				
3071832001	2	FFMP016W	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: 3071832 4TH QTR 2019 GWMP-FORM 19Q

Lab ID	Sample ID	Analysis Method	Prep Method
3071832001	FFMP016W	D6919-09	
3071832001	FFMP016W	EPA 300.0	
3071832001	FFMP016W	EPA 410.4	
3071832001	FFMP016W	Field	
3071832001	FFMP016W	S2540C-11	
3071832001	FFMP016W	S4500HB-11	
3071832001	FFMP016W	SM2130B-2011	
3071832001	FFMP016W	SM2320B-2011	
3071832001	FFMP016W	SW846 6010C	SW846 3015
3071832001	FFMP016W	SW846 8260B	
3071832001	FFMP016W	SW846 9050A	
3071832001	FFMP016W	SW846 9060A	
3071832001	FFMP016W	SW846 9066	420.4/9066

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

COC ALS

1 of 1

3071832

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/#: Frey Farm Quarterly (GWMP)

Bill To: Lancaster County Solid Waste MA

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

Date Required: _____ Approved By: _____

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

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

Container Type					AG	AN	CG	—	—	PL	PL	PL	PL	
Container Size					40 ml	125 ml	40 ml	—	—	250 ml	125 ml	500 ml	500 ml	
Preservative					HCl	H2SO4	HCl	—	—	H2SO4	HNO3	None	None	
Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	VOC - Form 19Q	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Metals: Fe, Mn, Na, Ca, K, Mg	pH, Cl, SpC, F, SO4, TDS, NO3, Turb.	Alkalinity Bicarbonate	
1. FFMP016W	11/22/19	1400	G	GW	2	1	~~2~~	x	x	1	1	1	1	
2							3	11/23/19						
3														
4														
5														
6														
7														
8														
9														
10														

ANALYSES/METHOD REQUESTED

Enter Number of Containers Per Sample or Field Results Below.

Cooler Temp: 0 Therm ID: 52R

No. of Coolers: _____ Initial 75

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

Courier/Tracking #:

Sample/COC Comments

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

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	11-22-19	1724	2 Taylor [signature]	11/22/19	1729
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE [ ] Navy [ ] [ ]

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

Reportable to PADEP? Yes [ ]

PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type- _____

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

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

Rev 8/04

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

Condition of Sample Receipt Form

Client: LCSWMA | Work Order #: 3071832 | Initials: TS | Date: 11-22-19

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?		(YES)	NO
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	N/A	YES	NO
13b. Did the client provide a SDWA PWS ID#?	N/A	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	N/A	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	N/A	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	N/A	YES	NO

Cooler #:	1							
Temperature (°C):	0							
Thermometer ID:	52							

Radiological (µCi): _____

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

Rev. 4/29/2019

2540-PM-LRWM0178 Rev. 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF LAND RECYCLING AND WASTE MANAGEMENT

Date Prepared/Revised
01/09/2020
DEP USE ONLY
Date Received

FORM 8

MUNICIPAL WASTE LANDFILLS
BASELINE GROUND WATER 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 8, 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.

An application for a municipal waste landfill shall contain a description of the chemical characteristics of each aqyufer in the proposed permit area and adjacent area, based on at least two quarters of monitoring data, one of which shall include the season of the highest local groundwater levels. Submit separate forms for each sample analysis.

SECTION A. APPLICANT IDENTIFIER

Applicant/permittee: Lancaster County Solid Waste Management Authority

Site Name: Frey Farm Landfill

Facitlity ID (as issued by DEP): 101389

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 (DD° MM' SS.S")

Monitoring Point Number: FFMP034W — X Well ___ Spring ___ Stream ___ Other

___ Upgradient/Upstream X Downgradient/Downstream

Location (County): Lancaster County — Municipality: ___

Sampling Point: Latitude: ___ o ___ ' ___ " — Longitude: ___ o ___ ' ___ "

Depth to Water Level: 10.63 ft — Measured from: ___ Land Surface X TOC

Casing Stickup: ___ ft — Elevation of Water Level: 462.25 ft./MSL

Sampling Depth: 25.85 ft — Volume of Water Column: ___ gal

Total Well Depth: 121 ft — Sampling Method: X Pumped ___ Bailed ___ Grab

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

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

Spring Flow Rate: ___ gpm

Sample Date (mm/dd/yy): 11/18/2019 — Sample Collection Time: 12:33

Sample Collector's Name: Mr. Brian G Sh

Sample Collector's Affiliation: ALS

Laboratory(ies) Performing Analysis: ALS Environmental

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

Lab Certification Number(s): 22-293

Lab Sample Number(s): 3070615001 — Final Lab Analysis CompletionDate: 11/27/2019

Name/Affiliation of Person who Filled Out Form: Nick R. Rogers

Comments:

I.D. No	101389
Monitoring Point No.	FFMP034W
Sample Date	11/18/2019

FORM 8

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

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
AMMONIA-NITROGEN	0.1 ND	ASTM D6919-03
BICARBONATE ALKALINITY	37	SM20 2321
CALCIUM, TOTAL	43.3	EPA 200.7
CALCIUM, DISSOLVED	46.3	EPA 200.7
COD (CHEMICAL OXYGEN DEMAND)	15 ND	EPA 410.4
CHLORIDE	124	EPA 300
FLUORIDE	0.2 ND	EPA 300
IRON, TOTAL	1500	EPA 200.7
IRON, DISSOLVED	1000	EPA 200.7
MAGNESIUM, TOTAL	17.6	EPA 200.7
MAGNESIUM, DISSOLVED	18.5	EPA 200.7
MANGANESE, TOTAL	86	EPA 200.7
MANGANESE, DISSOLVED	96	EPA 200.7
NITRATE-NITROGEN	9.5	EPA 300
pH-FIELD	5.65	FIELD
pH-LAB	6.09	EPA 150.1
POTASSIUM, TOTAL	2.3	EPA 200.7
POTASSIUM, DISSOLVED	2.3	EPA 200.7
SODIUM, TOTAL	33.3	EPA 200.7
SODIUM, DISSOLVED	33.7	EPA 200.7
SPEC. COND., FIELD	633	FIELD
SPEC. COND., LAB	607	EPA 120.1
SULFATE	32.7	EPA 300
ALKALINITY	37	SM20 2320B
TDS (TOT. DISSOLVED SOLIDS)	482	SM20 2540C
TOC (TOTAL ORGANIC CARBON)	0.93	SM20 5310B
TOTAL PHENOLICS	5 ND	SW846 9066
TURBIDITY	4.6	SM 2130B

T Please indicate detection limit if analyte is not detected.

I.D. No	101389
Monitoring Point No.	FFMP034W
Sample Date	11/18/2019

FORM 8

2. Metals (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
ARSENIC, TOTAL	3.3 ND	EPA 200.8
ARSENIC, DISSOLVED	3 ND	EPA 200.8
BARIUM, TOTAL	39	EPA 200.8
BARIUM, DISSOLVED	40	EPA 200.8
CADMIUM, TOTAL	1.1 ND	EPA 200.8
CADMIUM, DISSOLVED	1.1 ND	EPA 200.8
CHROMIUM, TOTAL	2.2 ND	EPA 200.8
CHROMIUM, DISSOLVED	2.2 ND	EPA 200.8
COPPER, TOTAL	5.6 ND	EPA 200.8
COPPER, DISSOLVED	5.6 ND	EPA 200.8
LEAD-FLAMELESS, TOTAL	2.2 ND	EPA 200.8
LEAD, DISSOLVED	2.2 ND	EPA 200.8
MERCURY, TOTAL	0.5 ND	EPA 200.8
MERCURY, DISSOLVED	0.5 ND	EPA 200.8
SELENIUM, TOTAL	5.6 ND	EPA 200.8
SELENIUM, DISSOLVED	5.6 ND	EPA 200.8
SILVER, TOTAL	2.2 ND	EPA 200.8
SILVER, DISSOLVED	2.2 ND	EPA 200.8
ZINC, TOTAL	5.6 ND	EPA 200.8
ZINC, DISSOLVED	5.6 ND	EPA 200.8

T Please indicate detection limit if analyte is not detected.

I.D. No	101389
Monitoring Point No.	FFMP034W
Sample Date	11/18/2019

FORM 8

3. Organics (Enter all data in ug/l)

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
BENZENE	1 ND	EPA 524.2
BROMOFORM	1 ND	EPA 524.2
CARBON TETRACHLORIDE	1 ND	EPA 524.2
CHLOROBENZENE	1 ND	EPA 524.2
CHLOROETHANE	1 ND	EPA 524.2
3-CHLORO-1-PROPENE	1 ND	EPA 524.2
DIBROMOCHLOROMETHANE	1 ND	EPA 524.2
1,2-DIBROMOETHANE	1 ND	EPA 524.2
1,2-DICHLOROBENZENE	1 ND	EPA 524.2
1,3-DICHLOROBENZENE	1 ND	EPA 524.2
1,4-DICHLOROBENZENE	1 ND	EPA 524.2
DICHLORODIFLUOROMETHANE	1 ND	EPA 524.2
1,1-DICHLOROETHANE	1 ND	EPA 524.2
1,1-DICHLOROETHENE	1 ND	EPA 524.2
1,2-DICHLOROETHANE	1 ND	EPA 524.2
CIS 1,2-DICHLOROETHENE	1 ND	EPA 524.2
TRANS 1,2-DICHLOROETHENE	1 ND	EPA 524.2
1,2-DICHLOROPROPANE	1 ND	EPA 524.2
CIS 1,3-DICHLOROPROPENE	1 ND	EPA 524.2
TRANS 1,3-DICHLOROPROPENE	1 ND	EPA 524.2
ETHYLBENZENE	1 ND	EPA 524.2
BROMOMETHANE	1 ND	EPA 524.2
CHLOROMETHANE	1 ND	EPA 524.2
METHYLENE CHLORIDE	1 ND	EPA 524.2
2-BUTANONE (MEK)	10 ND	EPA 524.2
1,1,1,2-TETRACHLOROETHANE	1 ND	EPA 524.2
TETRACHLOROETHENE	1 ND	EPA 524.2
1,1,2,2-TETRACHLOROETHANE	1 ND	EPA 524.2
TOLUENE	1 ND	EPA 524.2
1,1,1-TRICHLOROETHANE	1 ND	EPA 524.2
1,1,2-TRICHLOROETHANE	1 ND	EPA 524.2
TRICHLOROETHENE	1 ND	EPA 524.2
TRICHLOROFLUOROMETHANE	1 ND	EPA 524.2
1,2,3-TRICHLOROPROPANE	2 ND	EPA 524.2
VINYL CHLORIDE	1 ND	EPA 524.2
XYLENES (TOTAL)	3 ND	EPA 524.2
4-METHYL-2-PENTANONE	5 ND	EPA 524.2

T Please indicate detection limit if analyte is not detected.

I.D. No	101389
Monitoring Point No.	FFMP034W
Sample Date	11/18/2019

FORM 8

QUARTERLY AND ANNUAL WATER QUALITY ANALYSES

SUBTITLE D - Add-On List - For Detection Zone Analytes (mg/l). When the MCLs (where established) of any analyte is exceeded in the detection zone (e.g. established cells) Form 50 monitoring, the following analytes must be monitored during the baseline groundwater analyses .

ORGANICS AND METALS

ANALYTE	VALUE[T]	ANALYSIS METHOD NUMBER
ACETONE	10 ND	EPA 524.2
ACRYLONITRILE	5 ND	EPA 524.2
BROMOCHLOROMETHANE (CHLOROBRO	1 ND	EPA 524.2
BROMODICHLOROMETHANE	1 ND	EPA 524.2
CARBON DISULFIDE	1 ND	EPA 524.2
CHLOROFORM	1 ND	EPA 524.2
1,2-DIBROMO-3-CHLOROPROPANE	7 ND	EPA 524.2
TRANS 1,4-DICHLORO-2-BUTENE	3 ND	EPA 524.2
2-HEXANONE	5 ND	EPA 524.2
DIBROMOMETHANE	1 ND	EPA 524.2
IODOMETHANE	1 ND	EPA 524.2
STYRENE	1 ND	EPA 524.2
VINYL ACETATE	5 ND	EPA 524.2
ANTIMONY	2.2 ND	EPA 200.8
BERYLLIUM	1.1 ND	EPA 200.8
COBALT	5.6 ND	SW846 6010B
NICKEL	5.6 ND	SW846 6010B
THALLIUM	1.1 ND	EPA 200.8
VANADIUM	2.2 ND	SW846 6010B

T Please indicate detection limit if analyte is not detected.

I.D. No	101389
Monitoring Point No.	FFMP034W
Sample Date	11/18/2019

FORM 8

Qualitatively Identified Organic Compounds

List at least ten volatile organic compounds not otherwise identified in this section. Their identification should be based upon those compounds showing the greatest apparent concentration from the peaks of a mass spectrum of each sample. These ten compounds shall be identified but the concentration of each is not required.

Constituent	CAS Number

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December 3, 2019

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

Certificate of Analysis

Revised Report - 12/3/2019 4:56:26 PM - See workorder comment section for explanation

Project Name:	**FREY FARM**	Workorder:	**3070615**
Purchase Order:	**PO1000126**	Workorder ID:	**4th QTR 2019 GWMP-FORM 8**

Dear Mr. Brown:

Enclosed are the analytical results for samples received by the laboratory on Monday, November 18, 2019.

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: 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.

Susan J. Scherer

Ms. Susan J Scherer
Project Coordinator

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SAMPLE SUMMARY

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3070615001	FFMP034W	Ground Water	11/18/2019 12:33	11/18/2019 16:23	Mr. Brian G Shade

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SAMPLE SUMMARY

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Notes

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

Standard Acronyms/Flags

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

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PROJECT SUMMARY

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Workorder Comments

This certificate of analysis was modified to include the analytical results and chain of custody attachment. SJS 12/03/19

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ANALYTICAL RESULTS

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID: **3070615001** Date Collected: 11/18/2019 12:33 Matrix: Ground Water
Sample ID: **FFMP034W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
VOLATILE ORGANICS										
Acetone	ND		ug/L	10.0	SW846 8260B			11/21/19 02:07	PDK	J
Acrylonitrile	ND		ug/L	5.0	SW846 8260B			11/21/19 02:07	PDK	J
Benzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Bromochloromethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Bromodichloromethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Bromoform	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Bromomethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
2-Butanone	ND		ug/L	10.0	SW846 8260B			11/21/19 02:07	PDK	J
Carbon Disulfide	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Carbon Tetrachloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Chlorobenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Chlorodibromomethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Chloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Chloroform	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Chloromethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
3-Chloro-1-propene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2-Dibromo-3-chloropropane	ND		ug/L	7.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2-Dibromoethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Dibromomethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
trans-1,4-Dichloro-2-butene	ND		ug/L	3.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,3-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,4-Dichlorobenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Dichlorodifluoromethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2-Dichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
cis-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
trans-1,2-Dichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2-Dichloropropane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
cis-1,3-Dichloropropene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
trans-1,3-Dichloropropene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Ethylbenzene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
2-Hexanone	ND		ug/L	5.0	SW846 8260B			11/21/19 02:07	PDK	J
Iodomethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
4-Methyl-2-Pentanone(MIBK)	ND		ug/L	5.0	SW846 8260B			11/21/19 02:07	PDK	J

ANALYTICAL RESULTS

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID: **3070615001** Date Collected: 11/18/2019 12:33 Matrix: Ground Water
Sample ID: **FFMP034W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	Cntr
Methylene Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Styrene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1,1,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Tetrachloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Toluene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Total Xylenes	ND		ug/L	3.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1,1-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,1,2-Trichloroethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Trichloroethene	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Trichlorofluoromethane	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
1,2,3-Trichloropropane	ND		ug/L	2.0	SW846 8260B			11/21/19 02:07	PDK	J
Vinyl Acetate	ND		ug/L	5.0	SW846 8260B			11/21/19 02:07	PDK	J
Vinyl Chloride	ND		ug/L	1.0	SW846 8260B			11/21/19 02:07	PDK	J
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	115		%	62 - 133	SW846 8260B			11/21/19 02:07	PDK	J
4-Bromofluorobenzene (S)	112		%	79 - 114	SW846 8260B			11/21/19 02:07	PDK	J
Dibromofluoromethane (S)	99.3		%	78 - 116	SW846 8260B			11/21/19 02:07	PDK	J
Toluene-d8 (S)	110		%	76 - 127	SW846 8260B			11/21/19 02:07	PDK	J
LIBRARY SEARCH - VOLATILES										
No TIC's Detected	.				Lib Search VOC			11/21/19 02:07	CPK	J
WET CHEMISTRY										
Alkalinity, Bicarbonate	37		mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	B
Alkalinity, Total	37	1	mg/L	5	SM2320B-2011			11/24/19 02:51	MXO	A
Ammonia-N	ND		mg/L	0.100	D6919-09			11/26/19 14:10	NJA	C
Chemical Oxygen Demand (COD)	ND		mg/L	15	EPA 410.4			11/26/19 16:48	AK	C
Chloride	124		mg/L	2.0	EPA 300.0			11/19/19 16:37	CHW	B
Fluoride	ND		mg/L	0.20	EPA 300.0			11/19/19 16:37	CHW	B
Nitrate-N	9.5		mg/L	0.20	EPA 300.0			11/19/19 16:37	CHW	B
pH	6.09	2	pH_Units		S4500HB-11			11/24/19 02:51	MXO	B
Phenolics	ND		mg/L	0.005	SW846 9066	11/19/19 14:45	C_D	11/20/19 06:11	C_D	I
Specific Conductance	607		umhos/cm	1	SM2510B-2011			11/27/19 03:54	MBW	B
Sulfate	32.7		mg/L	2.0	EPA 300.0			11/19/19 16:37	CHW	B
Total Dissolved Solids	482	3	mg/L	25	S2540C-11			11/20/19 16:10	D1C	B
Total Organic Carbon (TOC)	0.93		mg/L	0.50	SM5310B-2011			11/21/19 09:06	PAG	G
Turbidity	4.60		NTU	0.10	SM2130B-2011			11/19/19 09:15	R2B	B

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ANALYTICAL RESULTS

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID: **3070615001** Date Collected: 11/18/2019 12:33 Matrix: Ground Water
Sample ID: **FFMP034W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
METALS										
Antimony, Total	ND		mg/L	0.0022	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Arsenic, Total	ND		mg/L	0.0033	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Arsenic, Dissolved	ND		mg/L	0.0030	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Barium, Total	0.039		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Barium, Dissolved	0.040		mg/L	0.0056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Beryllium, Total	ND		mg/L	0.0011	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Cadmium, Total	ND		mg/L	0.0011	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Cadmium, Dissolved	ND		mg/L	0.0011	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Calcium, Total	43.3		mg/L	0.11	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Calcium, Dissolved	46.3		mg/L	0.11	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Chromium, Total	ND		mg/L	0.0022	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Chromium, Dissolved	ND		mg/L	0.0022	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Cobalt, Total	ND		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Copper, Total	ND		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Copper, Dissolved	ND		mg/L	0.0056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Iron, Total	1.5		mg/L	0.056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Iron, Dissolved	1.0		mg/L	0.056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Lead, Total	ND		mg/L	0.0022	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Lead, Dissolved	ND		mg/L	0.0022	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Magnesium, Total	17.6		mg/L	0.11	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Magnesium, Dissolved	18.5		mg/L	0.11	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Manganese, Total	0.086		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Manganese, Dissolved	0.096		mg/L	0.0056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Mercury, Total	ND		mg/L	0.00050	SW846 7470A	11/21/19 11:50	AHI	11/21/19 16:33	AHI	E
Mercury, Dissolved	ND		mg/L	0.00050	SW846 7470A	11/26/19 10:15	AHI	11/26/19 16:15	AHI	D
Nickel, Total	ND		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Potassium, Total	2.3		mg/L	0.11	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Potassium, Dissolved	2.3		mg/L	0.11	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Selenium, Total	ND		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Selenium, Dissolved	ND		mg/L	0.0056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Silver, Total	ND		mg/L	0.0022	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Silver, Dissolved	ND		mg/L	0.0022	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Sodium, Total	33.3	4,5	mg/L	0.11	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Sodium, Dissolved	33.7		mg/L	0.11	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
Thallium, Total	ND		mg/L	0.0011	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Vanadium, Total	ND		mg/L	0.0022	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1
Zinc, Total	ND		mg/L	0.0056	SW846 6020A	11/21/19 21:05	SXC	11/26/19 07:48	MSA	E1

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

ANALYTICAL RESULTS

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID: **3070615001** Date Collected: 11/18/2019 12:33 Matrix: Ground Water
Sample ID: **FFMP034W** Date Received: 11/18/2019 16:23

Parameters	Results	Flag	Units	RDL	Method	Prepared	By	Analyzed	By	*Cntr*
Zinc, Dissolved	ND		mg/L	0.0056	SW846 6020A	11/21/19 20:00	SXC	11/26/19 16:56	MO	D1
FIELD PARAMETERS										
Depth to Water Level	10.63		Feet		Field			11/18/19 12:33	BGS	F
Elev Top MW Casing above MSL	472.88		Feet		Field			11/18/19 12:33	BGS	F
Flow Rate	1.88		gal/min		Field			11/18/19 12:33	BGS	F
Ground Water Elevation	462.25		ft/MSL		Field			11/18/19 12:33	BGS	F
pH, Field (SM4500B)	5.65		pH_Units		Field			11/18/19 12:33	BGS	F
Sample Depth	25.85		Feet		Field			11/18/19 12:33	BGS	F
Specific Conductance, Field	633		umhos/cm	1	Field			11/18/19 12:33	BGS	F
Temperature	11.28		Deg. C		Field			11/18/19 12:33	BGS	F
Total Well Depth	121.00		Feet		Field			11/18/19 12:33	BGS	F
Volume in Water Column	162.24		Gallons		Field			11/18/19 12:33	BGS	F
Water Level After Purge	11.54		Feet		Field			11/18/19 12:33	BGS	F
Well Volumes Purged	1.00		Vol		Field			11/18/19 12:33	BGS	F

Susan J. Scherer
Ms. Susan J Scherer
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3070615001	1	FFMP034W	SM2320B-2011	Alkalinity, Total
The Total Alkalinity is titrated to a pH of 4.5 and reported as mg CaCO3/L.				
3070615001	2	FFMP034W	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.				
3070615001	3	FFMP034W	S2540C-11	Total Dissolved Solids
The Method Blank for method S2540C-11 reported a value equal to/greater than the reporting level for the analyte Total Dissolved Solids. The concentration was 25 mg/L.				
3070615001	4	FFMP034W	SW846 6020A	Sodium, Total
One of the bracketing Low Level CCVs associated with this sample was recovered outside the required range for sodium, biased high. The concentration of sodium in the sample was greater than the concentration of the CCV. The sample was reported with a comment. MO 11-26-19				
3070615001	5	FFMP034W	SW846 6020A	Sodium, Total
One of the bracketing calibration blanks associated with this sample was positive for sodium. The sample sodium concentration was ten times greater than the concentration in the blank. For this reason, the sample was reported with a comment. MO 11-26-19				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3070615 4th QTR 2019 GWMP-FORM 8

Lab ID	Sample ID	Analysis Method	Prep Method
3070615001	FFMP034W	D6919-09	
3070615001	FFMP034W	EPA 300.0	
3070615001	FFMP034W	EPA 410.4	
3070615001	FFMP034W	Field	
3070615001	FFMP034W	Lib Search VOC	
3070615001	FFMP034W	S2540C-11	
3070615001	FFMP034W	S4500HB-11	
3070615001	FFMP034W	SM2130B-2011	
3070615001	FFMP034W	SM2320B-2011	
3070615001	FFMP034W	SM2510B-2011	
3070615001	FFMP034W	SM5310B-2011	
3070615001	FFMP034W	SW846 6020A	SW846 3015
3070615001	FFMP034W	SW846 7470A	SW846 7470A
3070615001	FFMP034W	SW846 8260B	
3070615001	FFMP034W	SW846 9066	420.4/9066

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CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

Generated by ALS

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

CO... AL...

1 of 1

3070615

Client Name: Lancaster County Solid Waste MA

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

Contact: Dan Brown

Phone#: (717) 735-0193

Project Name/#: FORM 8/FFMP034W

Bill To: Lancaster County Solid Waste MA

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

Date Required: _____ Approved By: _____

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

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

Container Type	AG	AN	CG	—	—	PL	PL	PL	PL	P...	...ceiving Lab)				
Container Size	40 ml	125 ml	40 ml	—	—	250 ml	125 ml	125 ml	500 ml	500 ml	Cooler Temp: 4	Therm ID: 318			
Preservative	HCl	H2SO4	HCl	—	—	H2SO4	HNO3	HNO3	None	None	No. of Coolers: _____	Y	N	Initial	
ANALYSES/METHOD REQUESTED															
	TOC	O-OH	8260 - Form 8 with Subtitle D	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Dissolved Metals Form 8 (Field Filtered)	Total Metals, with Subtitle D	pH, Cl, SpC, F, SO4, TDS, NO3, Turb.	Alkalinity-Bicarbonate	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 #:				

Enter Number of Containers Per Sample or Field Results Below.

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	TOC	O-OH	8260 - Form 8 with Subtitle D	Field Measurements	Sample Depth for AUX Data	NH3-N, COD	Dissolved Metals Form 8 (Field Filtered)	Total Metals, with Subtitle D	pH, Cl, SpC, F, SO4, TDS, NO3, Turb.	Alkalinity-Bicarbonate	Sample/COC Comments
1. FFMP034W	11/18/19	1233	G	GW	2	1	2	x	x	1	1	1	1	1	
2															
3															
4															
5															
6															
7															
8															
9															
10															

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

Project Comments:

LOGGED BY(signature): DATE TIME

REVIEWED BY(signature): DATE TIME

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature] ALS	11-18-19	1623	2 [signature]	11/18/19	1623
3			4		
5			6		
7			8		
9			10		

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

Special Processing: USACE [ ] Navy [ ] [ ]

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

Reportable to PADEP? Yes [ ]

PWSID # _____

Sample Disposal: Lab [X] Special [ ]

EDDS: Format Type- _____

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

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

Rev 8/04

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

Condition of Sample Receipt Form

Client: Lancaster County SWMA Work Order #: 3070615 Initials: CD Date: 11/18/19

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 is out of Hold		YES	(NO)
9. Were all sample containers received intact and headspace free when required? (not broken, leaking, frozen, etc.)		(YES)	NO
10. Did we receive trip blanks (applies only for methods EPA 504, EPA 524.2 and 1631E (LL Hg)?	(N/A)	YES	NO
11. Were the samples received on ice?		(YES)	NO
12. Were sample temperatures measured at 0.0-6.0°C		(YES)	NO
13. Are the samples DW matrix ? If YES, fill out Reportable Drinking Water questions below		YES	(NO)
13a. Are the samples required for SDWA compliance reporting?	N/A	YES	NO
13b. Did the client provide a SDWA PWS ID#?	N/A	YES	NO
13c. Are all aqueous unpreserved SDWA samples pH 5-9?	N/A	YES	NO
13d. Did the client provide the SDWA sample location ID/Description?	N/A	YES	NO
13e. Did the client provide the SDWA sample type (D, E, R, C, P, S)?	N/A	YES	NO

Cooler #: _____

Temperature (°C): 4

Thermometer ID: 318

Radiological (µCi): _____

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

Rev. 4/29/2019