BRAC Program Management Office East
Philadelphia, Pennsylvania

Final
Technical Memorandum – September 2019 Groundwater Sampling

Site 12 – South Landfill Groundwater (Operable Unit 11)

Former Naval Air Station Joint Reserve Base Willow Grove
Horsham, Pennsylvania

July 2020

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FINAL
TECHNICAL MEMORANDUM - SEPTEMBER 2019 GROUNDWATER SAMPLING

SITE 12 – SOUTH LANDFILL GROUNDWATER (OPERABLE UNIT 11)

FORMER NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE
HORSHAM, PENNSYLVANIA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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Acronyms and Abbreviations

2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-P-dioxin
µg/L	Microgram per Liter
BRAC	Base Realignment and Closure
CASRN	Chemical Abstracts Service Registry Number
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Contaminant of Concern
CTO	Contract Task Order
DOD	United States Department of Defense
DOE	United States Department of Energy
DON	United States Department of the Navy
FS	Feasibility Study
HAGS	Horsham Air Guard Station
HHRA	Human Health Risk Assessment
JRB	Joint Reserve Base
MCL	Maximum Contaminant Level
MDC	Minimum Detectable Concentration
MDL	Method Detection Limit
mrem/yr	Millirem per Year
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
OU	Operable Unit
PAL	Project Action Limit
pCi/L	Picocuries per Liter

PMO	Program Management Office
PQL	Practical Quantitation Limit
PRAP	Proposed Remedial Action Plan
PRG	Proposed Remediation Goal
Ra-226	Radium-226
RB	Rinsate Blank
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
Sr-90	Strontium-90
TB	Trip Blank
TEQ	Toxic Equivalence
U-238	Uranium-238
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1.0 Introduction

The Technical Memorandum was prepared by Tetra Tech for the United States Department of the Navy (DON) Naval Facilities Engineering Command (NAVFAC) Base Realignment and Closure (BRAC) Program Management Office (PMO) East as part of Contract Task Order (CTO) WE04 under Comprehensive Long-Term Environmental Action Navy (CLEAN) contract number N6247016D9008. This report summarizes the methodology and analytical results of the September 2019 groundwater sampling event conducted at Site 12 – South Landfill at the former Naval Air Station (NAS) Joint Reserve Base (JRB) Willow Grove located in Horsham Township, Pennsylvania. Groundwater sampling was performed in accordance with the Final Groundwater Sampling and Analysis Plan (SAP) (Tetra Tech, 2019a).

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2.0 Background

The former NAS JRB Willow Grove is located in Horsham Township, Montgomery County in southeastern Pennsylvania, approximately 20 miles north of Philadelphia. The former NAS JRB Willow Grove (hereafter referred to as the Base) occupies approximately 900 acres. The Horsham Air Guard Station (HAGS) occupies approximately 200 acres of adjacent land to the northeast of the Base. Figure 2-1 shows the location of the Base and HAGS. The Base is composed of flat to slightly rolling terrain and is generally bounded by State Route 611 to the east, State Route 463 to the southwest, and Keith Valley Road to the north.

The primary mission of the Base was to provide support for operations involving aviation training activities and to train Navy reservists. The Base supported United States Department of Defense (DOD) tenants such as the Marine Reserve, Pennsylvania National Guard, and the Army Reserve; and shared facilities/services with the Air Force Reserve. The Base provided facilities, services, materials, and training in direct support of all assigned units. The Base was selected for closure by the BRAC Commission in recommendations that became law on November 9, 2005 and was officially disestablished on March 30, 2011. The Base continued to provide services and facilities, on a limited basis, until September 2011, at which time it was transferred to the BRAC PMO and entered caretaker status. The Base is an inactive facility and environmental investigations and remediation at the Base are funded under the BRAC program.

Site 12 occupies approximately 12 acres of an undeveloped area southwest of Runway 10/28 in the southern portion of the Base, immediately northeast of Site 2 – Antenna Field Landfill (Figure 2-2). Investigations completed at the site have identified approximately nine distinct waste/debris burial trenches comprising a 1.5 acre subset of the total area. A gravel road runs through the northeastern part of Site 12 and provided access to a fenced magazine area in the eastern part of the site. The southwest boundary of Site 12 is a drainage ditch, which separates Site 12 from Site 2. A storm sewer outfall empties into the stream approximately 100 feet north (upstream) of the confluence of the drainage ditch and stream. The storm sewer receives runoff from the taxiway immediately north of Site 12 (Taxiway Juliet), from the southeastern end of the Base runway. The drainage ditch is typically dry or non-flowing. The stream downgradient of the storm water outfall is typically wetter and tends to contain water for most of the year. The ground surface at Site 12 generally slopes southward. The central part of the site is relatively flat, the northern part slopes gently to the south at a

grade of approximately 2 percent, and the western part is hummocky and uneven. The entire site is covered by vegetation, including grass, brush, and trees.

Site 12 consists of what is believed to be the historical landfill that was previously investigated as Site 2. Between 1948 and 1960, the landfill was the principal disposal area for the solid waste generated by the Base. Landfill activities consisted of trench excavation with subsequent burning and burial of waste material disposed within the trenches. Wastes reportedly disposed in the landfill include general refuse, paint wastes, sewage and industrial pretreatment plant sludges, trichloroethene, and carbon tetrachloride. Site 12 is also known as Operable Unit (OU) 11 for soil and groundwater.

Site 12 was previously investigated as part of the Preliminary Assessment/Site Inspection, and Remedial Investigation (RI)/Feasibility Study (FS) processes. A Human Health Risk Assessment (HHRA) for Site 12 was performed to evaluate risks to current and future human receptors potentially exposed to groundwater, surface soil, total (surface and subsurface) soil, surface water, and sediment and was included in the Site 12 RI Report (Tetra Tech, 2014).

A radiological scoping survey was conducted in response to findings of a Historical Radiological Assessment for the Base. The final scoping survey report was submitted in March 2017 (Tetra Tech, 2017). Results of the FS, incorporating the results of the RI and the radiological scoping survey, were submitted in the Site 12 Final FS (Tetra Tech, 2019b).

A Proposed Remedial Action Plan (PRAP) for Site 12 detailing the preferred alternatives for the remedial actions for OU 11 soil and groundwater was developed and submitted as the Site 12 Draft Final Proposed Plan in November 2019 (NAVFAC, 2019). Proposed Remediation Goals (PRGs) for groundwater were developed using information from the HHRA and FS and included as part of the November 2019 PRAP submittal.

In January 2020, the United States Environmental Protection Agency (USEPA) informed NAVFAC that additional groundwater data is needed to support the preferred alternative for the groundwater remedial action, and that separate PRAPs for Site 12 soil and Site 12 groundwater would be needed. NAVFAC submitted a revised Site 12 Draft Final Proposed Plan in February 2020 (NAVFAC, 2020), which detailed the preferred alternatives for the remedial actions for OU 11 soils only. A PRAP for Site 12 groundwater will be developed and submitted at a later date.

Groundwater analytical results from the September 2019 sampling event are compared to the PRGs included in the November 2019 Draft Final Proposed Plan (NAVFAC,

2019) for evaluation purposes. An evaluation of groundwater analytical results and additional details of the November 2019 PRAP are provided in Section 5.

Detailed background information for Site 12, including a detailed site history and key submittals, a discussion of physical and hydrogeological characteristics and the conceptual site model can be found in the Site 12 RI Report (Tetra Tech, 2014) and Site 12 FS (Tetra Tech, 2019b).

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3.0 Groundwater Gauging and Sampling

September 2019 groundwater gauging and sampling activities were performed in accordance with the Final SAP (Tetra Tech, 2019a). Sample locations were chosen to take advantage of the broad spatial distribution of existing wells, and to ensure comparability of data with previous investigations. All groundwater gauging and sampling activities were performed by Tetra Tech staff. Site 12 well locations are presented on Figure 3-1.

Groundwater samples were collected from eight monitoring well locations on September 19 and September 23, 2019. One monitoring well location, 12MW03O, could not be sampled due to an insufficient water column within the well. Groundwater samples were collected using USEPA low-flow methodology. Groundwater sampling logs are included in Appendix A.

Groundwater quality field parameters including pH, specific conductance, temperature, dissolved oxygen, oxidation-reduction potential and turbidity were collected at monitoring well locations during purging to ensure sampling conditions were stable prior to collecting the sample and to provide additional groundwater characterization data. Groundwater quality parameters collected during the September 2019 sampling event are summarized in Table 3-1.

Samples were placed in laboratory-provided containers, preserved as required per analytical methods, stored on ice, and transported under chain-of-custody to ALS laboratory of Middletown, Pennsylvania. This laboratory is approved by the DOD Environmental Laboratory Accreditation Program and certified by the State of Pennsylvania. All samples were analyzed for the following parameters, as outlined in the SAP (Tetra Tech, 2019a):

- Volatile organic compounds (VOCs) via SW-846 8260C.
- Total metals via SW-846 6020/7470A.
- Radium-226 (Ra-226) via USEPA 903.1.
- Strontium-90 (Sr-90) via HASL 300 and United States Department of Energy (DOE) Sr-02.
- Uranium-238 (U-238) via HASL 300 and DOE U-02.

Following groundwater sampling activities, a synoptic round of groundwater gauging was performed on September 25, 2019. Depth to water measurements were collected

from each of the nine wells including in the SAP. Well construction details and groundwater gauging information from the September 2019 sampling event are summarized in Table 3-2. The gauging log sheet is included in Appendix A.

Groundwater flow directions beneath Site 12 were determined from the contouring of the static-water level elevations measured during September 2019 gauging activities. The groundwater elevation contour maps indicate that the groundwater flow direction beneath Site 12 differs between the overburden and the shallow bedrock groundwater zones.

A potentiometric surface map showing groundwater elevation conditions in the overburden is provided as Figure 3-2. This potentiometric surface map indicates multiple flow directions within the overburden, with a strong, generally southward component.

A potentiometric surface map showing groundwater elevation conditions in the shallow bedrock zone is provided as Figure 3-3. Groundwater in the shallow bedrock zone flows in a generally westward direction.

4.0 Quality Assurance/Quality Control Sampling

Field quality assurance/quality control samples collected during the September 2019 sampling event included blind duplicate samples, matrix spike/matrix spike duplicate (MS/MSD) samples, equipment rinsate blank (RB) samples and trip blank (TB) samples.

Blind duplicate samples were collected at a rate of one per 10 field samples. One blind duplicate sample was collected during the September 2019 event.

MS/MSD and RB samples were collected at a rate of one per 20 field samples. One MS/MSD and one RB sample were collected during the September 2019 event.

TB samples were collected at a rate of one per sample cooler containing samples collected for VOC analysis. Two TB samples were collected during the September 2019 event.

Blind duplicate, MS/MSD and RB samples were analyzed for the following parameters, as outlined in the SAP (Tetra Tech, 2019a):

- VOCs via SW-846 8260C
- Total metals via SW-846 6020/7470A
- Ra-226 via EPA 903.1
- Sr-90 via HASL 300 and DOE Sr-02
- U-238 via HASL 300 and DOE U-02

TB samples were analyzed only for VOCs via SW-846 8260C, as outlined in the SAP (Tetra Tech, 2019a).

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5.0 Data Evaluation

The groundwater analytical results of the Site 12 September 2019 groundwater sampling event are presented in the following sections. Historical results from previous groundwater sampling events conducted in 1991, 1997, 2009, 2012 and 2017 are referenced where appropriate. Laboratory analytical reports are provided as Appendix B. Data validation reports are provided as Appendix C.

5.1 Reference Limits

Groundwater analytical results presented in this report were compared to both the PRGs included in the November 2019 PRAP (NAVFAC, 2019) and the Project Action Limits (PALs) defined in the Final SAP (Tetra Tech, 2019a).

Groundwater PRGs, developed using data from the RI and HHRA, are the primary reference criteria for Site 12. The November 2019 Site 12 PRAP established that three total metals (aluminum, chromium and manganese) and dioxin [represented by the 2,3,7,8-tetrachlorodibenzo-P-dioxin (2,3,7,8-TCDD) Toxic Equivalence (TEQ) value] are the only contaminants of concern (COCs) within Site 12 groundwater (NAVFAC, 2019). PRGs included in the November 2019 PRAP are provided in Table 5-1, below.

Table 5-1: Groundwater Proposed Remediation Goals

Analyte	Proposed Remediation Goal (µg/L)
Aluminum	200
Chromium	100
Manganese	300
Dioxin[1]	30×10^{-6}

[1] – Dioxin is represented by the 2,3,7,8-TCDD TEQ value.
µg/L – Micrograms per liter.

Groundwater PALs are the secondary reference criteria for Site 12 and are used to monitor concentrations of additional analytes (VOCs, metals, radionuclides) that are not considered groundwater COCs in the PRAP to ensure that the proposed remedial action remains protective of human health and the environment. PALs are included in a summary table provided as Appendix D.

September 2019 groundwater analytical results compared to applicable PRGs and PALs are presented in Tables 5-2 and 5-3, respectively. Historical groundwater

analytical results compared to applicable PRGs and PALs are presented in Tables 5-4 and 5-5, respectively.

5.2 Total Metals Results Compared to PRGs

As shown in Table 5-1, PRGs have been proposed for three total metals COCs. This section discusses the results from the September 2019 sampling event in comparison to the PRGs proposed in the PRAP (Table 5-2). Groundwater concentrations of analytes in exceedances of PRGs are shown on Figure 5-1.

Concentrations of aluminum ranged from non-detected to 480 µg/L (12MW02O) and were detected above the laboratory method detection limit (MDL) in two of eight wells sampled. The only well location with concentrations of aluminum exceeding the PRG of 200 µg/L was 12MW02O (480 µg/L).

Concentrations of chromium ranged from non-detected to 60 µg/L (12MW02O) and were detected above the laboratory MDL in four of eight wells sampled. Concentrations of chromium did not exceed the PRG of 100 µg/L in any of the eight well locations sampled during the September 2019 groundwater sampling event. Historical data for chromium is provided for reference on Figure 5-2 and is summarized in Table 5-4.

Concentrations of manganese ranged from non-detected to 4,500 µg/L (12MW02O) and were detected above the laboratory MDL in seven of eight wells sampled. Concentrations of manganese exceeded the PRG of 300 µg/L at four well locations: 12MW01O (410 µg/L); 12MW02O (4,500 µg/L); 12MW02S (310 µg/L); and 12MW03S (1,000 µg/L).

5.3 Dioxin Results Compared to PRGs

As shown in Table 5-1, a PRG has been proposed for dioxin. Dioxin was not sampled during the September 2019 groundwater sampling event. Historical dioxin data collected in 2012 is provided for reference on Figure 5-3 and is summarized in Table 5-4.

5.4 Total Metals and VOCs Analytical Results Compared to PALs

As shown in Appendix D, PALs have been established for all sampled analytes as outlined in the SAP (Tetra Tech, 2019a), with the exception of one VOC (methyl cyclohexane) and two total metals (calcium and potassium). This section discusses the results from the September 2019 sampling event in comparison to the PALs established by the SAP (Table 5-3), for all analytes except the three total metals COCs with PRGs

noted above (Table 5-1) and the radionuclides (radionuclide results are discussed in Section 5.5). Groundwater concentrations of analytes in exceedance of PALs are shown on Figure 5-4.

5.4.1 Total Metals

Concentrations of four total metals, arsenic, cobalt, iron, and nickel were detected at concentrations exceeding their applicable PALs and are discussed below. As noted above, concentrations of total metals aluminum, chromium and manganese are evaluated using PRGs proposed in the PRAP (NAVFAC, 2019) and are not discussed in reference to their PALs.

Concentrations of arsenic ranged from non-detected to 2.2 J µg/L (12MW02O) and were detected above the laboratory MDL in one of eight wells sampled. Concentrations of arsenic exceeded the PAL of 0.052 µg/L at one well location: 12MW02O (2.2 J µg/L).

Concentrations of cobalt ranged from non-detected to 10 µg/L (12MW01O) and were detected above the laboratory MDL in three of eight wells sampled. Concentrations of cobalt exceeded the PAL of 0.6 µg/L at three well locations: 12MW01O (10 µg/L); 12MW02O (6.5 µg/L); and 12MW04O (2 J µg/L).

Concentrations of iron ranged from 28 J µg/L (02MW02) to 9,400 µg/L (12MW02S) and were detected above the laboratory MDL in eight of eight wells sampled. Concentrations of iron exceeded the PAL of 300 µg/L at five well locations: 12MW01O (800 µg/L); 12MW02O (4,800 µg/L); 12MW02S (9,400 µg/L); 12MW04O (380 µg/L); and 12MW04S (750 µg/L).

Concentrations of nickel ranged from non-detect to 58 µg/L (12MW02O) and were detected above the laboratory MDL in seven of eight wells sampled. Concentrations of nickel exceeded the PAL of 39 µg/L at one well location: 12MW02O (58 µg/L).

Total metals concentrations were evaluated in the Site 12 HHRA as reported in the Site 12 RI (Tetra Tech, 2014), which concluded that aluminum, chromium and manganese were the only significant contributors to risk from exposure to Site 12 groundwater. Total metals concentrations from September 2019 groundwater sampling activities are similar to historical results for remaining total metals, which are not considered significant contributors to risk.

5.4.2 Volatile Organic Compounds

No VOCs concentrations in samples collected during the September 2019 groundwater sampling event exceeded the PALs established in the SAP (Tetra Tech, 2019a).

5.5 Radionuclide Analytical Results Compared to PALs

The PALs for radionuclides were derived from the USEPA Preliminary Remediation Goal Calculator for Radionuclides and were calculated based on a 10^{-6} Target Risk Range. All PAL values were significantly less than the laboratory Minimum Detectable Concentration (MDC) as defined in the SAP. A comparison of these values is provided in Table 5-6.

Table 5-6: PAL and MDC Values for Radionuclides

Analyte	PAL (pCi/L)	MDC (pCi/L)
Radium-226	0.0004	1.0
Strontium-90	0.065	1.0
Uranium-238	0.00039	0.2

pCi/L – Picocuries per liter.

As summarized in Table 5-3, groundwater concentrations in four samples collected in September 2019 exceeded the PAL for U-238 only. Ra-226 and Sr-90 were not detected above laboratory MDLs in any of the samples collected in September 2019.

An alternate sample evaluation was performed comparing the sample results to the concentration limits listed in the Safe Drinking Water Act (SDWA) Radionuclide Rules (USEPA, 2000). The SDWA Maximum Contaminant Levels (MCLs) for Ra-226/228, Sr-90 (as a beta particle and photo emitter) and uranium are listed in Table 5-7.

Table 5-7: Safe Drinking Water Act MCLs

Analyte	MCL (pCi/L)[1]
Radium-226/228	5.0
Strontium-90 (as a beta particle and photo emitter)	4 mrem/yr
Uranium	30 µg/L

[1] – Unless otherwise noted.
mrem/yr – millirem per year.

The SDWA MCL for beta emitters is 4 mrem/yr. A table is provided on the USEPA website that provides concentrations in pCi/L for beta emitters that equate to a dose of 4 mrem/yr and is included as Appendix E. The value listed in Appendix E for Sr-90 is 8 pCi/L.

The SDWA MCL of 30 µg/L for uranium is in mass units. The USEPA Directive on the use of uranium Drinking Water Standards (USEPA, 2001) is included as Appendix F,

and provides the mass to activity conversion of uranium stating that the MCL of 30 µg/L is equivalent to 27 pCi/L.

The converted SDWA MCL values and the maximum detected groundwater concentrations for each analyte during the September 2019 sampling event are listed in Table 5-8 below.

Table 5-8: Converted Safe Drinking Water Act MCLs

Analyte	MCL (pCi/L)	Maximum Detected Concentration (pCi/L)
Radium-226/228	5.0	Not Detected
Strontium-90	8.0	Not Detected
Uranium-238	27.0	0.123 (12MW04S)

As summarized in Table 5-3, a majority of the radionuclide groundwater analytical results (including all concentrations of Ra-226 and Sr-90) were reported as non-detect values. None of the detected radionuclide groundwater concentrations of U-238 exceed the converted SDWA MCL of 27 pCi/L.

September 2019 results indicate that radionuclides concentrations do not exceed and are significantly below the MCLs contained in the SDWA. Additionally, background concentrations are not known. Therefore, sample results may overestimate the contaminant concentrations that are attributable to site activities.

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6.0 Conclusions

September 2019 groundwater total metals results indicate that aluminum and manganese are present in groundwater at concentrations exceeding PRGs proposed in the PRAP. While present at concentrations above the laboratory MDL, total chromium concentrations do not exceed the PRG proposed in the PRAP.

Dioxin was not included as an analyte in the September 2019 groundwater sampling event. Historical data from 2012 indicated that dioxin was not present in groundwater in concentrations exceeding the PRG proposed in the PRAP.

Four total metals (arsenic, cobalt, iron, and nickel) exceed PALs established in the SAP. However, these concentrations are similar to historical groundwater results and were not considered significant contributors to risk in the HHRA.

No VOCs were detected in groundwater above applicable PALs during the September 2019 groundwater sampling event.

September 2019 groundwater radionuclides results indicate that radionuclides concentrations do not exceed and are significantly below the MCLs contained in the SDWA. Additionally, background concentrations are not known. Therefore, sample results may overestimate the contaminant concentrations that are attributable to site activities.

The USEPA has determined that additional groundwater data is required to support a groundwater remedy for Site 12. Groundwater samples will be collected for total chromium, hexavalent chromium, and dioxin to evaluate the current concentrations of these analytes in groundwater within Site 12. A work plan detailing these activities will be prepared and submitted for regulatory review.

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7.0 References

NAVFAC (Naval Facilities), 2019. *Draft Final Proposed Plan for Site 12 – South Landfill, Former Naval Air Station Joint Reserve Base Willow Grove, Pennsylvania*. November.

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USEPA, 2017. *Regional Screening Levels for Chemical Contaminants at Superfund Sites*. November.

USEPA, 2018. *2018 Edition of the Drinking Water Standards and Health Advisories.* EPA 822-F-18-001. March.

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TABLES

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Table 3-1: Site 12 Groundwater Quality Parameters - September 201 9

Well ID	Sample Date	pH (s.u.)	Specific Conductance (mS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	ORP (mV)	Turbidity (NTU)
02MW02S	9/23/2019	5.80	0.121	17.01	0.05	17.5	0.55
12MW01O	9/19/2019	5.79	0.276	16.44	0.00	66	0.0
12MW01S	9/19/2019	6.04	0.262	14.96	0.00	20	0.58
12MW02O	9/19/2019	6.27	0.343	15.36	0.00	-10	1.9
12MW02S	9/19/2019	6.15	0.256	13.50	3.26	-4	7.41
12MW03O	--	Dry - Not Sampled					
12MW03S	9/19/2019	6.37	0.267	13.78	0.00	72	0.81
12MW04O	9/19/2019	5.96	0.124	14.65	0.00	44	1.29
12MW04S	9/19/2019	6.51	0.265	13.31	0.28	16	1.1

Notes:

s.u. = Standard pH units.

mS/cm = MilliSiemens per centimeter.

°C = Degrees Celsius.

mg/L = Milligrams per liter.

ORP = Oxidation-reduction potential.

mV = Millivolts.

NTU = Nephelometric Turbidity Units.

Table 3-2: Site 12 Well Construction and September 2019 Gauging Information

Well ID	Well Diameter (in)	Screened Interval (ft bgs)		Gauging Date	TOC Elevation (ft amsl)	Depth to Water (ft bTOC)	Groundwater Elevation (ft amsl)
		Top	Bottom				
02MW02S	2	4.5	14.5	9/25/2019	349.42	14.80	334.62
12MW01O	2	4.5	14.5	9/25/2019	345.92	12.25	333.67
12MW01S	2	25	35	9/25/2019	346.43	13.72	332.71
12MW02O	2	4	14	9/25/2019	346.17	14.13	332.04
12MW02S	2	22	35	9/25/2019	346.26	14.24	332.02
12MW03O	2	5	15	9/25/2019	348.26	DRY	--
12MW03S	2	22	32	9/25/2019	348.40	20.14	328.26
12MW04O	2	5	15	9/25/2019	348.83	11.00	337.83
12MW04S	2	25	35	9/25/2019	349.55	21.82	327.73

Notes:

in = Inches.

ft bgs = Feet below ground surface.

ft amsl = Feet above mean sea level (NAVD 88).

ft bTOC = Feet below top of inner casing.

NAVD 88 = North American Vertical Datum of 1988.

DRY = Well was gauged and found to be dry.

Table 5-2: Site 12 September 2019 Groundwater Results Compared to Proposed Remediation Goals

			Location	02MW02	12MW01O	12MW01S	12MW02O	12MW02S	12MW03S		12MW04O	12MW04S
			Sample ID	02MW02-20190923	12MW01O-20190919	12MW01S-20190919	12MW02O-20190919	12MW02S-20190919	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20190919	12MW04S-20190919
			Sample Date	9/23/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019
			Sample Code	N	N	N	N	N	N	FD	N	N
Analyte	**CASRN**	**PRG**	**Units**									
Metals (Total)												
Aluminum	7429-90-5	200	µg/L	59 U	59 U	59 U	**480**	59 U	59 U	59 U	59 U	**49 J**
Chromium	7440-47-3	100	µg/L	**1.2 J**	**1.5 J**	1.5 U	**60**	1.5 U	1.5 U	**0.8 J**	1.5 U	**3.3**
Manganese	7439-96-5	300	µg/L	3.3 U	**410**	**12**	**4500**	**310**	**1000**	**970**	**140**	**11**

Data Qualifiers:

J = Value is an estimated value between the MDL and the PQL for the analyte.
U = Value is a non-detected result as reported by the laboratory.

Notes:

Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PRG.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PRG = Proposed Remediation Goal.
µg/L = Micrograms per liter.
N = Normal sample.
FD = Field duplicate sample.

Table 5-3: Site 12 September 2019 Groundwater Results Compared to Project Action Limits

				Location	02MW02	12MW01O	12MW01S	12MW02O	12MW02S	12MW03S		12MW04O	12MW04S
				Sample ID	02MW02-20190923	12MW01O-20190919	12MW01S-20190919	12MW02O-20190919	12MW02S-20190919	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20190919	12MW04S-20190919
				Sample Date	9/23/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019
				Sample Code	N	N	N	N	N	N	FD	N	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Volatile Organic Compounds													
1,1,1-Trichloroethane	71-55-6	200	MCL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,1,2,2-Tetrachloroethane	79-34-5	0.076	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,1,2-Trichloroethane	79-00-5	0.041	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,1,2-Trichlorotrifluoroethane	76-13-1	1000	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,1-Dichloroethane	75-34-3	2.8	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,1-Dichloroethene	75-35-4	7	MCL	µg/L	0.75 UJ	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,2,3-Trichlorobenzene	87-61-6	0.7	Tap Water RSL	µg/L	0.75 UJ	0.75 UJ	0.75 UJ	0.75 U	0.75 U	0.75 UJ	0.75 UJ	0.75 UJ	0.75 U
1,2,4-Trichlorobenzene	120-82-1	0.4	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.00033	Tap Water RSL	µg/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane	106-93-4	0.0075	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,2-Dichlorobenzene	95-50-1	30	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,2-Dichloroethane	107-06-2	0.17	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,2-Dichloropropane	78-87-5	0.14	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,3-Dichlorobenzene[1]	541-73-1	0.48	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,4-Dichlorobenzene	106-46-7	0.48	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
1,4-Dioxane	123-91-1	0.46	Tap Water RSL	µg/L	62.5 UJ	62.5 UJ	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U	62.5 UJ	62.5 U
2-Butanone	78-93-3	560	Tap Water RSL	µg/L	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
2-Hexanone	591-78-6	3.8	Tap Water RSL	µg/L	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
4-Methyl-2-Pentanone	108-10-1	630	Tap Water RSL	µg/L	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
Acetone	67-64-1	1400	Tap Water RSL	µg/L	**6.8**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
Benzene	71-43-2	0.46	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Bromochloromethane	74-97-5	8.3	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Bromodichloromethane	75-27-4	0.13	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Bromoform	75-25-2	3.3	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Bromomethane	74-83-9	0.75	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 UJ	0.75 UJ	0.75 U	0.75 U	0.75 U	0.75 UJ
Carbon Disulfide	75-15-0	81	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Carbon Tetrachloride	56-23-5	0.46	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Chlorobenzene	108-90-7	7.8	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Chloroethane	75-00-3	2100	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Chloroform	67-66-3	0.22	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Chloromethane	74-87-3	19	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Cis-1,2-Dichloroethene	156-59-2	3.6	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Cis-1,3-Dichloropropene[2]	10061-01-5	0.47	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Cyclohexane	110-82-7	1300	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Dibromochloromethane	124-48-1	0.87	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Dichlorodifluoromethane	75-71-8	20	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Ethylbenzene	100-41-4	1.5	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Isopropylbenzene	98-82-8	45	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methyl Acetate	79-20-9	2000	Tap Water RSL	µg/L	0.75 UJ	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methyl Cyclohexane	108-87-2	--	--	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methyl Tert-Butyl Ether	1634-04-4	14	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Methylene Chloride	75-09-2	5	MCL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Styrene	100-42-5	100	MCL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Tetrachloroethene	127-18-4	4.1	MCL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Toluene	108-88-3	110	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Total Xylenes	1330-20-7	19	Tap Water RSL	µg/L	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Trans-1,2-Dichloroethene	156-60-5	36	Tap Water RSL	µg/L	0.75 UJ	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Trans-1,3-Dichloropropene[2]	10061-02-6	0.47	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Trichloroethene	79-01-6	0.28	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Trichlorofluoromethane	75-69-4	520	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
Vinyl Chloride	75-01-4	0.019	Tap Water RSL	µg/L	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U

Table 5-3: Site 12 September 2019 Groundwater Results Compared to Project Action Limits

				Location	02MW02	12MW01O	12MW01S	12MW02O	12MW02S	12MW03S		12MW04O	12MW04S
				Sample ID	02MW02-20190923	12MW01O-20190919	12MW01S-20190919	12MW02O-20190919	12MW02S-20190919	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20190919	12MW04S-20190919
				Sample Date	9/23/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019
				Sample Code	N	N	N	N	N	N	FD	N	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Metals (Total)													
Aluminum[3]	7429-90-5	200	MCL	µg/L	59 U	59 U	59 U	**480**	59 U	59 U	59 U	59 U	**49 J**
Antimony	7440-36-0	0.78	Tap Water RSL	µg/L	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Arsenic	7440-38-2	0.052	Tap Water RSL	µg/L	2 U	2 U	2 U	**2.2 J**	2 U	2 U	2 U	2 U	2 U
Barium	7440-39-3	380	Tap Water RSL	µg/L	**120**	**98**	**82**	**280**	**230**	**130**	**120**	**75**	**130**
Beryllium	7440-41-7	2.5	Tap Water RSL	µg/L	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Cadmium	7440-43-9	0.92	Tap Water RSL	µg/L	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Calcium	7440-70-2	--	--	µg/L	**13300**	**28100**	**36500**	**30700**	**29400**	**30500**	**29500**	**21100**	**33600**
Chromium	7440-47-3	100	MCL	µg/L	**1.2 J**	**1.5 J**	1.5 U	**60**	1.5 U	1.5 U	**0.8 J**	1.5 U	**3.3**
Cobalt	7440-48-4	0.6	Tap Water RSL	µg/L	3.7 U	**10**	3.7 U	**6.5**	3.7 U	3.7 U	3.7 U	**2 J**	3.7 U
Copper	7440-50-8	80	Tap Water RSL	µg/L	3.7 U	3.7 U	**2.2 J**	**4.7 J**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Iron[3]	7439-89-6	300	MCL	µg/L	**28 J**	**800**	**45 J**	**4800**	**9400**	**160**	**160**	**380**	**750**
Lead	7439-92-1	15	MCL	µg/L	1.5 U	1.5 U	1.5 U	**1.2 J**	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Magnesium	7439-95-4	--	--	µg/L	**4900**	**12200**	**13500**	**17600**	**10200**	**13700**	**12900**	**7000**	**16400**
Manganese	7439-96-5	43	Tap Water RSL	µg/L	3.3 U	**410**	**12**	**4500**	**310**	**1000**	**970**	**140**	**11**
Mercury	7439-97-6	0.063	Tap Water RSL	µg/L	0.33 U	0.33 U	--	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Nickel	7440-02-0	39	Tap Water RSL	µg/L	**3.9 J**	**2 J**	**2.3 J**	**58**	3.7 U	**5.2 J**	**5.6 J**	**2.7 J**	**2.5 J**
Potassium	7440-09-7	--	--	µg/L	**740**	**1600**	**1200**	**2600**	**1800**	**9600**	**9600**	**1200**	**8300**
Selenium	7782-49-2	10	Tap Water RSL	µg/L	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Silver	7440-22-4	9.4	Tap Water RSL	µg/L	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Sodium	7440-23-5	20000	Health Advisory	µg/L	**8100 J-**	**16500**	**10700**	**13400**	**7800**	**7200**	**6900**	**7000**	**7600**
Thallium	7440-28-0	0.02	Tap Water RSL	µg/L	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Vanadium	7440-62-2	8.6	Tap Water RSL	µg/L	1.5 U	1.5 U	1.5 U	**1.4 J**	1.5 U	1.5 U	**0.88 J**	1.5 U	1.5 U
Zinc	7440-66-6	600	Tap Water RSL	µg/L	**17**	4.5 U	4.6 U	**6**	3.7 U	3.7 U	5 U	3.7 U	3.7 U
Radionuclides													
Radium-226	13982-63-3	0.0004	--	pCi/L	0.07 U	0.16 U	0.08 U	-0.04 U	0.12 U	0.03 U	-0.03 U	0.1 U	0.1 U
Strontium-90	10098-97-2	0.065	Tap Water RSL	pCi/L	0 U	0.21 U	0.16 U	0.08 U	0.19 U	0.23 U	-0.08 U	0.18 U	0.27 U
Uranium-238	7440-61-1	0.00039	Tap Water RSL	pCi/L	0.006 U	0.018 U	**0.115**	**0.32**	0.035 U	0.049 U	**0.082**	-0.011 U	**0.123**

Data Qualifiers:
J = Value is an estimated value between the MDL and the PQL for the analyte.
J- = Value is an estimated value between the MDL and the PQL for the analyte and may have a potential negative bias
U = Value is a non-detected result as reported by the laboratory.
UJ = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is approximate

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PAL.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PAL = Project Action Limit.
Tap Water RSL = Tap Water Regional Screening Level (USEPA, 2017).
MCL = Maximum Contaminant Level (USEPA, 2012).
Health Advisory = Drinking Water Health Advisory Level (USEPA, 2018).
USEPA = United States Environmental Protection Agency.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not calculated.
1 = The value for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene.
2 = The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.
3 = Secondary MCLs are presented for aluminum and iron.

Table 5-4: Site 12 Historical Groundwater Results Compared to Proposed Remediation Goals

			Location	02MW02S	02MW02S	02MW02S	02MW02S	12MW01O	12MW01O	12MW01S	12MW01S
			Sample ID	02MW02	02MW02S	02MW02S-20090514	02MW02-20190923	12MW01O-20120307	12MW01O-20190919	12MW01S-20120307	12MW01S-20190919
			Sample Date	9/19/1991	7/11/1997	5/14/2009	9/23/2019	3/7/2012	9/19/2019	3/7/2012	9/19/2019
			Sample Code	N	N	N	N	N	N	N	N
Analyte	**CASRN**	**PRG**	**Units**								
Dioxins											
Total 2,3,7,8-TCDD TEQ	--	300	pg/L	--	--	--	--	**0.616 L**	--	**1.47**	--
Metals (Total)											
Aluminum	7429-90-5	200	µg/L	**295 B**	**86.5**	23.2 U	59 U	**26.3 B**	59 U	**48.5**	59 U
Chromium	7440-47-3	100	µg/L	7 U	5 U	**1.8 J**	**1.2 J**	**3.6 J**	**1.5 J**	**2.9 J**	1.5 U
Manganese	7439-96-5	300	µg/L	**12 B**	**66.2**	**2.1 E**	3.3 U	**21.2**	**410**	**630**	**12**

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PRG.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PRG = Proposed Remediation Goal.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not applicable.

Table 5-4: Site 12 Historical Groundwater Results Compared to Proposed Remediation Goals

			Location	12MW02O	12MW02O	12MW02S		12MW02S	12MW03O	12MW03S	
			Sample ID	12MW02O-20120306	12MW02O-20190919	12MW02S-20120306	12MW02S-20120306-D	12MW02S-20190919	12MW03O-20120306	12MW03S-20120306	12MW03S-20120306-D
			Sample Date	3/6/2012	9/19/2019	3/6/2012	3/6/2012	9/19/2019	3/6/2012	3/6/2012	3/6/2012
			Sample Code	N	N	N	FD	N	N	N	FD
Analyte	**CASRN**	**PRG**	**Units**								
Dioxins											
Total 2,3,7,8-TCDD TEQ	--	300	pg/L	**0.0452**	--	**0.391**	**0.965**	--	--	--	--
Metals (Total)											
Aluminum	7429-90-5	200	µg/L	**8570**	**480**	**59.6**	--	59 U	**1600**	**42.6**	**38.1 K**
Chromium	7440-47-3	100	µg/L	**14.7 J**	**60**	**3.4 J**	--	1.5 U	**24.6 J**	**4.6 J**	**2.6 J**
Manganese	7439-96-5	300	µg/L	**86.5**	**4500**	**662**	--	**310**	**896**	**1630**	**1680**

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PRG.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PRG = Proposed Remediation Goal.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not applicable.

Table 5-4: Site 12 Historical Groundwater Results Compared to Proposed Remediation Goals

			Location	12MW03S		12MW04O	12MW04O	12MW04S	12MW04S
			Sample ID	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20120307	12MW04O-20190919	12MW04S-20120306	12MW04S-20190919
			Sample Date	9/19/2019	9/19/2019	3/7/2012	9/19/2019	3/6/2012	9/19/2019
			Sample Code	N	FD	N	N	N	N
Analyte	**CASRN**	**PRG**	**Units**						
Dioxins									
Total 2,3,7,8-TCDD TEQ	--	300	pg/L	--	--	--	--	--	--
Metals (Total)									
Aluminum	7429-90-5	200	µg/L	59 U	59 U	**213**	59 U	**207**	**49 J**
Chromium	7440-47-3	100	µg/L	1.5 U	**0.8 J**	**7.5 J**	1.5 U	**4.8 J**	**3.3**
Manganese	7439-96-5	300	µg/L	**1000**	**970**	**128**	**140**	**165**	**11**

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PRG.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PRG = Proposed Remediation Goal.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not applicable.

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	02MW02S	02MW02S	02MW02S	02MW02S	02MW02S	02MW02S	12MW01O	12MW01O	12MW01O
				Sample ID	02MW02	02MW02S	02MW02S-20090514	02MW02S-20120307	02MW02-20170828	02MW02-20190923	12MW01O-20120307	12MW01O-20170829	12MW01O-20170829-D
				Sample Date	9/19/1991	7/11/1997	5/14/2009	3/7/2012	8/28/2017	9/23/2019	3/7/2012	8/29/2017	8/29/2017
				Sample Code	N	N	N	N	N	N	N	N	FD
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Volatile Organic Compounds													
1,1,1-Trichloroethane	71-55-6	200	MCL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,1,2,2-Tetrachloroethane	79-34-5	0.076	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
1,1,2-Trichloroethane	79-00-5	0.041	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
1,1,2-Trichlorotrifluoroethane	76-13-1	1000	Tap Water RSL	µg/L	--	--	1 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	1.6 U
1,1-Dichloroethane	75-34-3	2.8	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
1,1-Dichloroethene	75-35-4	7	MCL	µg/L	5 U	10 U	1 U	0.5 U	0.8 U	0.75 UJ	0.5 U	0.8 U	0.8 U
1,2,3-Trichlorobenzene	87-61-6	0.7	Tap Water RSL	µg/L	--	--	1 U	0.5 UJ	0.8 U	0.75 UJ	0.5 UJ	0.8 U	0.8 U
1,2,4-Trichlorobenzene	120-82-1	0.4	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.00033	Tap Water RSL	µg/L	--	--	2 U	0.5 U	1.6 U	2.5 U	0.5 U	1.6 U	1.6 U
1,2-Dibromoethane	106-93-4	0.0075	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,2-Dichlorobenzene	95-50-1	30	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,2-Dichloroethane	107-06-2	0.17	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,2-Dichloropropane	78-87-5	0.14	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,3-Dichlorobenzene[1]	541-73-1	0.48	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,4-Dichlorobenzene	106-46-7	0.48	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
1,4-Dioxane	123-91-1	0.46	Tap Water RSL	µg/L	--	--	--	10 UR	--	62.5 UJ	10 UR	--	--
2-Butanone	78-93-3	560	Tap Water RSL	µg/L	10 U	10 U	5 U	2.5 U	4 U	3.8 U	2.5 U	4 U	4 U
2-Hexanone	591-78-6	3.8	Tap Water RSL	µg/L	10 U	10 U	5 U	2.5 U	4 U	3.8 U	2.5 U	4 U	4 U
4-Methyl-2-Pentanone	108-10-1	630	Tap Water RSL	µg/L	10 U	10 U	5 U	2.5 U	3.2 U	3.8 U	2.5 U	3.2 U	3.2 U
Acetone	67-64-1	1400	Tap Water RSL	µg/L	10 U	10 UJ	5 U	2.5 U	4.3 U	**6.8**	2.5 U	5.7 U	3.4 U
Benzene	71-43-2	0.46	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Bromochloromethane	74-97-5	8.3	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.2 U	0.75 U	0.5 U	0.2 U	0.2 U
Bromodichloromethane	75-27-4	0.13	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Bromoform	75-25-2	3.3	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Bromomethane	74-83-9	0.75	Tap Water RSL	µg/L	10 U	10 U	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Carbon Disulfide	75-15-0	81	Tap Water RSL	µg/L	5 U	10 UR	1 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	1.6 U
Carbon Tetrachloride	56-23-5	0.46	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Chlorobenzene	108-90-7	7.8	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Chloroethane	75-00-3	2100	Tap Water RSL	µg/L	10 U	10 U	1 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	1.6 U
Chloroform	67-66-3	0.22	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Chloromethane	74-87-3	19	Tap Water RSL	µg/L	10 U	10 U	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Cis-1,2-Dichloroethene	156-59-2	3.6	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Cis-1,3-Dichloropropene[2]	10061-01-5	0.47	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Cyclohexane	110-82-7	1300	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Dibromochloromethane	124-48-1	0.87	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Dichlorodifluoromethane	75-71-8	20	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Ethylbenzene	100-41-4	1.5	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Isopropylbenzene	98-82-8	45	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Methyl Acetate	79-20-9	2000	Tap Water RSL	µg/L	--	--	1 U	0.5 U	4 U	0.75 UJ	0.5 U	4 U	4 U
Methyl Cyclohexane	108-87-2	NC	None	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Methyl Tert-Butyl Ether	1634-04-4	14	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Methylene Chloride	75-09-2	5	MCL	µg/L	5 U	10 U	**4.5**	0.5 U	0.38 U	0.75 U	0.5 U	0.8 U	0.8 U
Styrene	100-42-5	100	MCL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Tetrachloroethene	127-18-4	4.1	MCL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Toluene	108-88-3	110	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Total Xylenes	1330-20-7	19	Tap Water RSL	µg/L	5 U	10 U	--	1.5 U	--	2.3 U	1.5 U	--	--
Trans-1,2-Dichloroethene	156-60-5	36	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.4 U	0.75 UJ	0.5 U	0.4 U	0.4 U
Cis-1,3-Dichloropropene[2]	10061-02-6	0.47	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Trichloroethene	79-01-6	0.28	Tap Water RSL	µg/L	5 U	10 U	1 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.4 U
Trichlorofluoromethane	75-69-4	520	Tap Water RSL	µg/L	--	--	1 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.8 U
Vinyl Chloride	75-01-4	0.019	Tap Water RSL	µg/L	10 U	10 U	1 U	0.5 U	0.2 U	0.75 U	0.5 U	0.2 U	0.2 U
Dioxins													
Total 2,3,7,8-TCDD TEQ	--	--	--	pg/L	--	--	--	--	--	--	**0.616 L**	--	--

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	02MW02S	02MW02S	02MW02S	02MW02S	02MW02S	02MW02S	12MW01O	12MW01O	12MW01O
				Sample ID	02MW02	02MW02S	02MW02S-20090514	02MW02S-20120307	02MW02-20170828	02MW02-20190923	12MW01O-20120307	12MW01O-20170829	12MW01O-20170829-D
				Sample Date	9/19/1991	7/11/1997	5/14/2009	3/7/2012	8/28/2017	9/23/2019	3/7/2012	8/29/2017	8/29/2017
				Sample Code	N	N	N	N	N	N	N	N	FD
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Metals (Total)													
Aluminum[3]	7429-90-5	200	MCL	µg/L	**295 B**	**86.5**	23.2 U	--	--	59 U	**26.3 B**	--	--
Antimony	7440-36-0	0.78	Tap Water RSL	µg/L	45 U	20 U	0.3 U	--	--	1.5 U	**0.16 B**	--	--
Arsenic	7440-38-2	0.052	Tap Water RSL	µg/L	2 U	**1.3**	1.1 U	--	--	2 U	0.5 U	--	--
Barium	7440-39-3	380	Tap Water RSL	µg/L	**102**	**105**	**94.8**	--	--	**120**	**64.9**	--	--
Beryllium	7440-41-7	2.5	Tap Water RSL	µg/L	**4 B**	1 U	0.033 U	--	--	0.7 U	0.5 U	--	--
Cadmium	7440-43-9	0.92	Tap Water RSL	µg/L	4 U	5 U	**0.15 J**	--	--	0.7 U	0.5 U	--	--
Calcium	7440-70-2	--	--	µg/L	**10600**	**10600**	**9000**	--	--	**13300**	**29000**	--	--
Chromium	7440-47-3	100	MCL	µg/L	7 U	5 U	**1.8 J**	--	--	**1.2 J**	**3.6 J**	--	--
Cobalt	7440-48-4	0.6	Tap Water RSL	µg/L	10 U	5 U	**0.21 J**	--	--	3.7 U	**0.088 B**	--	--
Copper	7440-50-8	80	Tap Water RSL	µg/L	**5 B**	10 U	**1.4 J**	--	--	3.7 U	**1.2 J**	--	--
Iron[3]	7439-89-6	300	MCL	µg/L	**558**	**3190**	**36.1 J**	--	--	**28 J**	**168 J**	--	--
Lead	7439-92-1	15	MCL	µg/L	**1**	**1.5**	**0.43 J**	--	--	1.5 U	**0.81 J**	--	--
Magnesium	7439-95-4	--	--	µg/L	**3320**	**3420**	**3090 N**	--	--	**4900**	**12100**	--	--
Manganese	7439-96-5	43	Tap Water RSL	µg/L	**12 B**	**66.2**	**2.1 E**	--	--	3.3 U	**21.2**	--	--
Mercury	7439-97-6	0.063	Tap Water RSL	µg/L	0.2 U	0.2 U	0.036 U	--	--	0.33 U	0.1 UL	--	--
Nickel	7440-02-0	39	Tap Water RSL	µg/L	**14 B**	20 U	**2.3**	--	--	**3.9 J**	**2.1 J**	--	--
Potassium	7440-09-7	--	--	µg/L	2140 U	1500 U	**722 J**	--	--	**740**	**1220**	--	--
Selenium	7782-49-2	10	Tap Water RSL	µg/L	4 U	5 U	1.1 U	--	--	3.7 U	2.5 U	--	--
Silver	7440-22-4	9.4	Tap Water RSL	µg/L	6 U	5 U	0.077 U	--	--	1.5 U	0.5 U	--	--
Sodium	7440-23-5	20000	Health Advisory	µg/L	**8920**	**8150**	**7380**	--	--	**8100 J-**	**17100 L**	--	--
Thallium	7440-28-0	0.02	Tap Water RSL	µg/L	2 U	1 U	0.3 U	--	--	0.7 U	**0.5 B**	--	--
Vanadium	7440-62-2	8.6	Tap Water RSL	µg/L	4 U	5 U	1.7 U	--	--	1.5 U	2.5 U	--	--
Zinc	7440-66-6	600	Tap Water RSL	µg/L	**7 B**	5 U	**10.2**	--	--	**17**	**11.1 J**	--	--
Radionuclides													
Radium-226	13982-63-3	0.0004	None	pCi/L	--	--	--	--	--	0.07 U	--	--	--
Strontium-90	10098-97-2	0.065	Tap Water RSL	pCi/L	--	--	--	--	--	0 U	--	--	--
Uranium-238	7440-61-1	0.00039	Tap Water RSL	pCi/L	--	--	--	--	--	0.006 U	--	--	--

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
J- = Value is an estimated value between the MDL and the PQL for the analyte and may have a potential negative bias
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.
UJ = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is approximate
UL = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is biased low.
UR = Value is a non-detected result as reported by the laboratory. QC indicates that data are not usable.
Resampling and re-analysis are necessary for verification.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PAL.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PAL = Project Action Limit.
Tap Water RSL = Tap Water Regional Screening Level (USEPA, 2017).
MCL = Maximum Contaminant Level (USEPA, 2012).
Health Advisory = Drinking Water Health Advisory Level (USEPA, 2018).
USEPA = United States Environmental Protection Agency.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not calculated.
1 = The value for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene.
2 = The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.
3 = Secondary MCLs are presented for aluminum and iron.

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW01O	12MW01S	12MW01S	12MW01S	12MW02O	12MW02O	12MW02O	12MW02S	
				Sample ID	12MW01O-20190919	12MW01S-20120307	12MW01S-20170829	12MW01S-20190919	12MW02O-20120306	12MW02O-20170828	12MW02O-20190919	12MW02S-20120306	12MW02S-20120306-D
				Sample Date	9/19/2019	3/7/2012	8/29/2017	9/19/2019	3/6/2012	8/28/2017	9/19/2019	3/6/2012	3/6/2012
				Sample Code	N	N	N	N	N	N	N	N	FD
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Volatile Organic Compounds													
1,1,1-Trichloroethane	71-55-6	200	MCL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	0.076	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
1,1,2-Trichloroethane	79-00-5	0.041	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
1,1,2-Trichlorotrifluoroethane	76-13-1	1000	Tap Water RSL	µg/L	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	0.5 U
1,1-Dichloroethane	75-34-3	2.8	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
1,1-Dichloroethene	75-35-4	7	MCL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	0.7	Tap Water RSL	µg/L	0.75 UJ	0.5 UJ	0.8 U	0.75 UJ	0.5 UJ	0.8 U	0.75 U	0.5 UJ	0.5 UJ
1,2,4-Trichlorobenzene	120-82-1	0.4	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.00033	Tap Water RSL	µg/L	2.5 U	0.5 U	1.6 U	2.5 U	0.5 U	1.6 U	2.5 U	0.5 U	0.5 U
1,2-Dibromoethane	106-93-4	0.0075	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,2-Dichlorobenzene	95-50-1	30	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,2-Dichloroethane	107-06-2	0.17	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,2-Dichloropropane	78-87-5	0.14	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,3-Dichlorobenzene[1]	541-73-1	0.48	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,4-Dichlorobenzene	106-46-7	0.48	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
1,4-Dioxane	123-91-1	0.46	Tap Water RSL	µg/L	62.5 UJ	10 UR	--	62.5 U	10 UR	--	62.5 U	10 UR	10 UR
2-Butanone	78-93-3	560	Tap Water RSL	µg/L	3.8 U	2.5 U	4 U	3.8 U	2.5 U	4 U	3.8 U	2.5 U	2.5 U
2-Hexanone	591-78-6	3.8	Tap Water RSL	µg/L	3.8 U	2.5 U	4 U	3.8 U	2.5 U	4 U	3.8 U	2.5 U	2.5 U
4-Methyl-2-Pentanone	108-10-1	630	Tap Water RSL	µg/L	3.8 U	2.5 U	3.2 U	3.8 U	2.5 U	3.2 U	3.8 U	2.5 U	2.5 U
Acetone	67-64-1	1400	Tap Water RSL	µg/L	3.8 U	2.5 U	2.2 U	3.8 U	2.5 U	5.6 U	3.8 U	2.5 U	2.5 U
Benzene	71-43-2	0.46	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Bromochloromethane	74-97-5	8.3	Tap Water RSL	µg/L	0.75 U	0.5 U	0.2 U	0.75 U	0.5 U	0.2 U	0.75 U	0.5 U	0.5 U
Bromodichloromethane	75-27-4	0.13	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Bromoform	75-25-2	3.3	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Bromomethane	74-83-9	0.75	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 UJ	0.5 U	0.5 U
Carbon Disulfide	75-15-0	81	Tap Water RSL	µg/L	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	0.5 U
Carbon Tetrachloride	56-23-5	0.46	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Chlorobenzene	108-90-7	7.8	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Chloroethane	75-00-3	2100	Tap Water RSL	µg/L	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U	0.5 U	0.5 U
Chloroform	67-66-3	0.22	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Chloromethane	74-87-3	19	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Cis-1,2-Dichloroethene	156-59-2	3.6	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Cis-1,3-Dichloropropene[2]	10061-01-5	0.47	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Cyclohexane	110-82-7	1300	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Dibromochloromethane	124-48-1	0.87	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Dichlorodifluoromethane	75-71-8	20	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Ethylbenzene	100-41-4	1.5	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Isopropylbenzene	98-82-8	45	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Methyl Acetate	79-20-9	2000	Tap Water RSL	µg/L	0.75 U	0.5 U	4 U	0.75 U	0.5 U	4 U	0.75 U	0.5 U	0.5 U
Methyl Cyclohexane	108-87-2	NC	None	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether	1634-04-4	14	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Methylene Chloride	75-09-2	5	MCL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Styrene	100-42-5	100	MCL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Tetrachloroethene	127-18-4	4.1	MCL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 UJ	0.5 UJ
Toluene	108-88-3	110	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Total Xylenes	1330-20-7	19	Tap Water RSL	µg/L	2.3 U	1.5 U	--	2.3 U	1.5 U	--	2.3 U	1.5 U	1.5 U
Trans-1,2-Dichloroethene	156-60-5	36	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Cis-1,3-Dichloropropene[2]	10061-02-6	0.47	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Trichloroethene	79-01-6	0.28	Tap Water RSL	µg/L	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U	0.5 U	0.5 U
Trichlorofluoromethane	75-69-4	520	Tap Water RSL	µg/L	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U	0.5 U	0.5 U
Vinyl Chloride	75-01-4	0.019	Tap Water RSL	µg/L	0.75 U	0.5 U	0.2 U	0.75 U	0.5 U	0.2 U	0.75 U	0.5 U	0.5 U
Dioxins													
Total 2,3,7,8-TCDD TEQ	--	--	--	pg/L	--	**1.47**	--	--	**0.0452**	--	--	**0.391**	**0.965**

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW01O	12MW01S	12MW01S	12MW01S	12MW02O	12MW02O	12MW02O	12MW02S	
				Sample ID	12MW01O-20190919	12MW01S-20120307	12MW01S-20170829	12MW01S-20190919	12MW02O-20120306	12MW02O-20170828	12MW02O-20190919	12MW02S-20120306	12MW02S-20120306-D
				Sample Date	9/19/2019	3/7/2012	8/29/2017	9/19/2019	3/6/2012	8/28/2017	9/19/2019	3/6/2012	3/6/2012
				Sample Code	N	N	N	N	N	N	N	N	FD
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Metals (Total)													
Aluminum[3]	7429-90-5	200	MCL	µg/L	59 U	**48.5**	--	59 U	**8570**	--	**480**	**59.6**	--
Antimony	7440-36-0	0.78	Tap Water RSL	µg/L	1.5 U	**0.21 B**	--	1.5 U	**0.26 B**	--	1.5 U	**0.25 B**	--
Arsenic	7440-38-2	0.052	Tap Water RSL	µg/L	2 U	0.5 U	--	2 U	**2.7**	--	**2.2 J**	**0.66 J**	--
Barium	7440-39-3	380	Tap Water RSL	µg/L	**98**	**111**	--	**82**	**29.7**	--	**280**	**310**	--
Beryllium	7440-41-7	2.5	Tap Water RSL	µg/L	0.7 U	0.5 U	--	0.7 U	**0.41 B**	--	0.7 U	0.5 U	--
Cadmium	7440-43-9	0.92	Tap Water RSL	µg/L	0.7 U	0.5 U	--	0.7 U	0.5 U	--	0.7 U	**0.14 J**	--
Calcium	7440-70-2	--	--	µg/L	**28100**	**47300**	--	**36500**	**199 J**	--	**30700**	**46200**	--
Chromium	7440-47-3	100	MCL	µg/L	**1.5 J**	**2.9 J**	--	1.5 U	**14.7 J**	--	**60**	**3.4 J**	--
Cobalt	7440-48-4	0.6	Tap Water RSL	µg/L	**10**	**2.5**	--	3.7 U	**3.6**	--	**6.5**	**1.5**	--
Copper	7440-50-8	80	Tap Water RSL	µg/L	3.7 U	**1.3 J**	--	**2.2 J**	**7.1**	--	**4.7 J**	**0.91 J**	--
Iron[3]	7439-89-6	300	MCL	µg/L	**800**	**377**	--	**45 J**	**12200**	--	**4800**	**477**	--
Lead	7439-92-1	15	MCL	µg/L	1.5 U	**0.23 B**	--	1.5 U	**5.1**	--	**1.2 J**	**0.19 B**	--
Magnesium	7439-95-4	--	--	µg/L	**12200**	**12300**	--	**13500**	**1550**	--	**17600**	**11100**	--
Manganese	7439-96-5	43	Tap Water RSL	µg/L	**410**	**630**	--	**12**	**86.5**	--	**4500**	**662**	--
Mercury	7439-97-6	0.063	Tap Water RSL	µg/L	0.33 U	0.1 UL	--	--	0.1 UL	--	0.33 U	0.1 UL	--
Nickel	7440-02-0	39	Tap Water RSL	µg/L	**2 J**	**5.5 J**	--	**2.3 J**	**7.7 J**	--	**58**	**3.8 J**	--
Potassium	7440-09-7	--	--	µg/L	**1600**	**1960**	--	**1200**	**301 J**	--	**2600**	**2760**	--
Selenium	7782-49-2	10	Tap Water RSL	µg/L	3.7 U	2.5 U	--	3.7 U	2.5 U	--	3.7 U	**0.96 J**	--
Silver	7440-22-4	9.4	Tap Water RSL	µg/L	1.5 U	0.5 U	--	1.5 U	0.5 U	--	1.5 U	0.5 U	--
Sodium	7440-23-5	20000	Health Advisory	µg/L	**16500**	**11900 L**	--	**10700**	**18.6 B**	--	**13400**	**8430 L**	--
Thallium	7440-28-0	0.02	Tap Water RSL	µg/L	0.7 U	**0.42 B**	--	0.7 U	**1.5 B**	--	0.7 U	**0.88 B**	--
Vanadium	7440-62-2	8.6	Tap Water RSL	µg/L	1.5 U	**0.32 J**	--	1.5 U	**19.2**	--	**1.4 J**	**0.81 J**	--
Zinc	7440-66-6	600	Tap Water RSL	µg/L	4.5 U	**19.6 J**	--	4.6 U	**20 J**	--	**6**	**14.2 J**	--
Radionuclides													
Radium-226	13982-63-3	0.0004	None	pCi/L	0.16 U	--	--	0.08 U	--	--	-0.04 U	--	--
Strontium-90	10098-97-2	0.065	Tap Water RSL	pCi/L	0.21 U	--	--	0.16 U	--	--	0.08 U	--	--
Uranium-238	7440-61-1	0.00039	Tap Water RSL	pCi/L	0.018 U	--	--	**0.115**	--	--	**0.32**	--	--

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
J- = Value is an estimated value between the MDL and the PQL for the analyte and may have a potential negative bias
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.
UJ = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is approximate
UL = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is biased low.
UR = Value is a non-detected result as reported by the laboratory. QC indicates that data are not usable.
Resampling and re-analysis are necessary for verification.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PAL.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PAL = Project Action Limit.
Tap Water RSL = Tap Water Regional Screening Level (USEPA, 2017).
MCL = Maximum Contaminant Level (USEPA, 2012).
Health Advisory = Drinking Water Health Advisory Level (USEPA, 2018).
USEPA = United States Environmental Protection Agency.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not calculated.
1 = The value for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene.
2 = The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.
3 = Secondary MCLs are presented for aluminum and iron.

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW02S	12MW02S	12MW03O	12MW03S		12MW03S	12MW03S		12MW04O
				Sample ID	12MW02S-20170828	12MW02S-20190919	12MW03O-20120306	12MW03S-20120306	12MW03S-20120306-D	12MW03S-20170828	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20120307
				Sample Date	8/28/2017	9/19/2019	3/6/2012	3/6/2012	3/6/2012	8/28/2017	9/19/2019	9/19/2019	3/7/2012
				Sample Code	N	N	N	N	FD	N	N	FD	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Volatile Organic Compounds													
1,1,1-Trichloroethane	71-55-6	200	MCL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	0.076	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
1,1,2-Trichloroethane	79-00-5	0.041	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
1,1,2-Trichlorotrifluoroethane	76-13-1	1000	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	0.5 U	0.5 U	1.6 U	0.75 U	0.75 U	0.5 U
1,1-Dichloroethane	75-34-3	2.8	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
1,1-Dichloroethene	75-35-4	7	MCL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
1,2,3-Trichlorobenzene	87-61-6	0.7	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 UJ	0.5 UJ	0.5 UJ	0.8 U	0.75 UJ	0.75 UJ	0.5 UJ
1,2,4-Trichlorobenzene	120-82-1	0.4	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.00033	Tap Water RSL	µg/L	1.6 U	2.5 U	0.5 U	0.5 U	0.5 U	1.6 U	2.5 U	2.5 U	0.5 U
1,2-Dibromoethane	106-93-4	0.0075	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,2-Dichlorobenzene	95-50-1	30	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,2-Dichloroethane	107-06-2	0.17	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,2-Dichloropropane	78-87-5	0.14	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,3-Dichlorobenzene[1]	541-73-1	0.48	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,4-Dichlorobenzene	106-46-7	0.48	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
1,4-Dioxane	123-91-1	0.46	Tap Water RSL	µg/L	--	62.5 U	10 UR	10 UR	10 UR	--	62.5 U	62.5 U	10 UR
2-Butanone	78-93-3	560	Tap Water RSL	µg/L	4 U	3.8 U	2.5 U	2.5 U	2.5 U	4 U	3.8 U	3.8 U	2.5 U
2-Hexanone	591-78-6	3.8	Tap Water RSL	µg/L	4 U	3.8 U	2.5 U	2.5 U	2.5 U	4 U	3.8 U	3.8 U	2.5 U
4-Methyl-2-Pentanone	108-10-1	630	Tap Water RSL	µg/L	3.2 U	3.8 U	2.5 U	2.5 U	2.5 U	3.2 U	3.8 U	3.8 U	2.5 U
Acetone	67-64-1	1400	Tap Water RSL	µg/L	5.6 U	3.8 U	2.5 U	2.5 U	2.5 U	6.3 U	3.8 U	3.8 U	2.5 U
Benzene	71-43-2	0.46	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Bromochloromethane	74-97-5	8.3	Tap Water RSL	µg/L	0.2 U	0.75 U	0.5 U	0.5 U	0.5 U	0.2 U	0.75 U	0.75 U	0.5 U
Bromodichloromethane	75-27-4	0.13	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Bromoform	75-25-2	3.3	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Bromomethane	74-83-9	0.75	Tap Water RSL	µg/L	0.8 U	0.75 UJ	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Carbon Disulfide	75-15-0	81	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	0.5 U	0.5 U	1.6 U	0.75 U	0.75 U	0.5 U
Carbon Tetrachloride	56-23-5	0.46	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Chlorobenzene	108-90-7	7.8	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Chloroethane	75-00-3	2100	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	0.5 U	0.5 U	1.6 U	0.75 U	0.75 U	0.5 U
Chloroform	67-66-3	0.22	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Chloromethane	74-87-3	19	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Cis-1,2-Dichloroethene	156-59-2	3.6	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Cis-1,3-Dichloropropene[2]	10061-01-5	0.47	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Cyclohexane	110-82-7	1300	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Dibromochloromethane	124-48-1	0.87	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Dichlorodifluoromethane	75-71-8	20	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Ethylbenzene	100-41-4	1.5	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Isopropylbenzene	98-82-8	45	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Methyl Acetate	79-20-9	2000	Tap Water RSL	µg/L	4 U	0.75 U	0.5 U	0.5 U	0.5 U	4 U	0.75 U	0.75 U	0.5 U
Methyl Cyclohexane	108-87-2	NC	None	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Methyl Tert-Butyl Ether	1634-04-4	14	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Methylene Chloride	75-09-2	5	MCL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Styrene	100-42-5	100	MCL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Tetrachloroethene	127-18-4	4.1	MCL	µg/L	0.4 U	0.75 U	0.5 UJ	0.5 UJ	0.5 UJ	0.4 U	0.75 U	0.75 U	0.5 UJ
Toluene	108-88-3	110	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Total Xylenes	1330-20-7	19	Tap Water RSL	µg/L	--	2.3 U	1.5 U	1.5 U	1.5 U	--	2.3 U	2.3 U	1.5 U
Trans-1,2-Dichloroethene	156-60-5	36	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Cis-1,3-Dichloropropene[2]	10061-02-6	0.47	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Trichloroethene	79-01-6	0.28	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.5 U	0.5 U	0.4 U	0.75 U	0.75 U	0.5 U
Trichlorofluoromethane	75-69-4	520	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.5 U	0.5 U	0.8 U	0.75 U	0.75 U	0.5 U
Vinyl Chloride	75-01-4	0.019	Tap Water RSL	µg/L	0.2 U	0.75 U	0.5 U	0.5 U	0.5 U	0.2 U	0.75 U	0.75 U	0.5 U
Dioxins													
Total 2,3,7,8-TCDD TEQ	--	--	--	pg/L	--	--	--	--	--	--	--	--	--

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW02S	12MW02S	12MW03O	12MW03S	12MW03S	12MW03S	12MW03S	12MW03S	12MW04O
				Sample ID	12MW02S-20170828	12MW02S-20190919	12MW03O-20120306	12MW03S-20120306	12MW03S-20120306-D	12MW03S-20170828	12MW03S-20190919	12MW03S-20190919-D	12MW04O-20120307
				Sample Date	8/28/2017	9/19/2019	3/6/2012	3/6/2012	3/6/2012	8/28/2017	9/19/2019	9/19/2019	3/7/2012
				Sample Code	N	N	N	N	FD	N	N	FD	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**									
Metals (Total)													
Aluminum[3]	7429-90-5	200	MCL	µg/L	--	59 U	**1600**	**42.6**	**38.1 K**	--	59 U	59 U	**213**
Antimony	7440-36-0	0.78	Tap Water RSL	µg/L	--	1.5 U	**0.26 B**	**0.59 B**	**0.19 B**	--	1.5 U	1.5 U	**0.46 B**
Arsenic	7440-38-2	0.052	Tap Water RSL	µg/L	--	2 U	0.5 U	**0.29 J**	**0.23 J**	--	2 U	2 U	0.5 U
Barium	7440-39-3	380	Tap Water RSL	µg/L	--	**230**	**117**	**156**	**157**	--	**130**	**120**	**75.5**
Beryllium	7440-41-7	2.5	Tap Water RSL	µg/L	--	0.7 U	**0.2 B**	0.5 U	0.5 U	--	0.7 U	0.7 U	0.5 U
Cadmium	7440-43-9	0.92	Tap Water RSL	µg/L	--	0.7 U	**0.15 J**	**0.21 J**	0.5 U	--	0.7 U	0.7 U	**0.17 J**
Calcium	7440-70-2	--	--	µg/L	--	**29400**	**40100**	**41300**	**41700**	--	**30500**	**29500**	**25300**
Chromium	7440-47-3	100	MCL	µg/L	--	1.5 U	**24.6 J**	**4.6 J**	**2.6 J**	--	1.5 U	**0.8 J**	**7.5 J**
Cobalt	7440-48-4	0.6	Tap Water RSL	µg/L	--	3.7 U	**2.6**	**0.56 J**	**0.51 J**	--	3.7 U	3.7 U	**0.85 J**
Copper	7440-50-8	80	Tap Water RSL	µg/L	--	3.7 U	**2.9**	2	**2**	--	3.7 U	3.7 U	**1.6 J**
Iron[3]	7439-89-6	300	MCL	µg/L	--	**9400**	**1970**	**311**	**271**	--	**160**	**160**	**438**
Lead	7439-92-1	15	MCL	µg/L	--	1.5 U	**0.87 J**	**0.39 B**	**0.16 B**	--	1.5 U	1.5 U	**0.86 J**
Magnesium	7439-95-4	--	--	µg/L	--	**10200**	**22200**	**16900**	**17300**	--	**13700**	**12900**	**8090**
Manganese	7439-96-5	43	Tap Water RSL	µg/L	--	**310**	**896**	**1630**	**1680**	--	**1000**	**970**	**128**
Mercury	7439-97-6	0.063	Tap Water RSL	µg/L	--	0.33 U	0.1 UL	0.1 UL	0.1 UL	--	0.33 U	0.33 U	0.1 UL
Nickel	7440-02-0	39	Tap Water RSL	µg/L	--	3.7 U	**20.3 J**	**7.7 J**	**5.3 J**	--	**5.2 J**	**5.6 J**	**18.6 J**
Potassium	7440-09-7	--	--	µg/L	--	**1800**	**43300**	**13100**	**13300**	--	**9600**	**9600**	**1960**
Selenium	7782-49-2	10	Tap Water RSL	µg/L	--	3.7 U	2.5 U	2.5 U	2.5 U	--	3.7 U	3.7 U	**0.78 J**
Silver	7440-22-4	9.4	Tap Water RSL	µg/L	--	1.5 U	0.5 U	**0.032 B**	0.5 U	--	1.5 U	1.5 U	0.5 U
Sodium	7440-23-5	20000	Health Advisory	µg/L	--	**7800**	**5960 L**	**6620 L**	**6670 L**	--	**7200**	**6900**	**6990 L**
Thallium	7440-28-0	0.02	Tap Water RSL	µg/L	--	0.7 U	**0.53 B**	**0.65 B**	**0.19 B**	--	0.7 U	0.7 U	**0.33 B**
Vanadium	7440-62-2	8.6	Tap Water RSL	µg/L	--	1.5 U	**2.7 J**	2.5 U	2.5 U	--	1.5 U	**0.88 J**	2.5 U
Zinc	7440-66-6	600	Tap Water RSL	µg/L	--	3.7 U	**16 J**	**20.7 J**	**7.3 J**	--	3.7 U	5 U	**51.1 J**
Radionuclides													
Radium-226	13982-63-3	0.0004	None	pCi/L	--	0.12 U	--	--	--	--	0.03 U	-0.03 U	--
Strontium-90	10098-97-2	0.065	Tap Water RSL	pCi/L	--	0.19 U	--	--	--	--	0.23 U	-0.08 U	--
Uranium-238	7440-61-1	0.00039	Tap Water RSL	pCi/L	--	0.035 U	--	--	--	--	0.049 U	**0.082**	--

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
J- = Value is an estimated value between the MDL and the PQL for the analyte and may have a potential negative bias
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.
UJ = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is approximate
UL = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is biased low.
UR = Value is a non-detected result as reported by the laboratory. QC indicates that data are not usable.
Resampling and re-analysis are necessary for verification.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PAL.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PAL = Project Action Limit.
Tap Water RSL = Tap Water Regional Screening Level (USEPA, 2017).
MCL = Maximum Contaminant Level (USEPA, 2012).
Health Advisory = Drinking Water Health Advisory Level (USEPA, 2018).
USEPA = United States Environmental Protection Agency.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not calculated.
1 = The value for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene.
2 = The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.
3 = Secondary MCLs are presented for aluminum and iron.

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW04O	12MW04O	12MW04S	12MW04S	12MW04S
				Sample ID	12MW04O-20170828	12MW04O-20190919	12MW04S-20120306	12MW04S-20170828	12MW04S-20190919
				Sample Date	8/28/2017	9/19/2019	3/6/2012	8/28/2017	9/19/2019
				Sample Code	N	N	N	N	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**					
Volatile Organic Compounds									
1,1,1-Trichloroethane	71-55-6	200	MCL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,1,2,2-Tetrachloroethane	79-34-5	0.076	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
1,1,2-Trichloroethane	79-00-5	0.041	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
1,1,2-Trichlorotrifluoroethane	76-13-1	1000	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U
1,1-Dichloroethane	75-34-3	2.8	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
1,1-Dichloroethene	75-35-4	7	MCL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
1,2,3-Trichlorobenzene	87-61-6	0.7	Tap Water RSL	µg/L	0.8 U	0.75 UJ	0.5 UJ	0.8 U	0.75 U
1,2,4-Trichlorobenzene	120-82-1	0.4	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.00033	Tap Water RSL	µg/L	1.6 U	2.5 U	0.5 U	1.6 U	2.5 U
1,2-Dibromoethane	106-93-4	0.0075	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,2-Dichlorobenzene	95-50-1	30	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,2-Dichloroethane	107-06-2	0.17	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,2-Dichloropropane	78-87-5	0.14	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,3-Dichlorobenzene[1]	541-73-1	0.48	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,4-Dichlorobenzene	106-46-7	0.48	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
1,4-Dioxane	123-91-1	0.46	Tap Water RSL	µg/L	--	62.5 UJ	10 UR	--	62.5 U
2-Butanone	78-93-3	560	Tap Water RSL	µg/L	4 U	3.8 U	2.5 U	4 U	3.8 U
2-Hexanone	591-78-6	3.8	Tap Water RSL	µg/L	4 U	3.8 U	2.5 U	4 U	3.8 U
4-Methyl-2-Pentanone	108-10-1	630	Tap Water RSL	µg/L	3.2 U	3.8 U	2.5 U	3.2 U	3.8 U
Acetone	67-64-1	1400	Tap Water RSL	µg/L	7.4 U	3.8 U	2.5 U	5.8 U	3.8 U
Benzene	71-43-2	0.46	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Bromochloromethane	74-97-5	8.3	Tap Water RSL	µg/L	0.2 U	0.75 U	0.5 U	0.2 U	0.75 U
Bromodichloromethane	75-27-4	0.13	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Bromoform	75-25-2	3.3	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Bromomethane	74-83-9	0.75	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 UJ
Carbon Disulfide	75-15-0	81	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U
Carbon Tetrachloride	56-23-5	0.46	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Chlorobenzene	108-90-7	7.8	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Chloroethane	75-00-3	2100	Tap Water RSL	µg/L	1.6 U	0.75 U	0.5 U	1.6 U	0.75 U
Chloroform	67-66-3	0.22	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Chloromethane	74-87-3	19	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Cis-1,2-Dichloroethene	156-59-2	3.6	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Cis-1,3-Dichloropropene[2]	10061-01-5	0.47	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Cyclohexane	110-82-7	1300	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Dibromochloromethane	124-48-1	0.87	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Dichlorodifluoromethane	75-71-8	20	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Ethylbenzene	100-41-4	1.5	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Isopropylbenzene	98-82-8	45	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Methyl Acetate	79-20-9	2000	Tap Water RSL	µg/L	4 U	0.75 U	0.5 U	4 U	0.75 U
Methyl Cyclohexane	108-87-2	NC	None	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Methyl Tert-Butyl Ether	1634-04-4	14	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Methylene Chloride	75-09-2	5	MCL	µg/L	0.32 U	0.75 U	0.5 U	0.8 U	0.75 U
Styrene	100-42-5	100	MCL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Tetrachloroethene	127-18-4	4.1	MCL	µg/L	0.4 U	0.75 U	0.5 UJ	0.4 U	0.75 U
Toluene	108-88-3	110	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Total Xylenes	1330-20-7	19	Tap Water RSL	µg/L	--	2.3 U	1.5 U	--	2.3 U
Trans-1,2-Dichloroethene	156-60-5	36	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Cis-1,3-Dichloropropene[2]	10061-02-6	0.47	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Trichloroethene	79-01-6	0.28	Tap Water RSL	µg/L	0.4 U	0.75 U	0.5 U	0.4 U	0.75 U
Trichlorofluoromethane	75-69-4	520	Tap Water RSL	µg/L	0.8 U	0.75 U	0.5 U	0.8 U	0.75 U
Vinyl Chloride	75-01-4	0.019	Tap Water RSL	µg/L	0.2 U	0.75 U	0.5 U	0.2 U	0.75 U
Dioxins									
Total 2,3,7,8-TCDD TEQ	--	--	--	pg/L	--	--	--	--	--

Table 5-5: Site 12 Historical Groundwater Results Compared to Project Action Limits

				Location	12MW04O	12MW04O	12MW04S	12MW04S	12MW04S
				Sample ID	12MW04O-20170828	12MW04O-20190919	12MW04S-20120306	12MW04S-20170828	12MW04S-20190919
				Sample Date	8/28/2017	9/19/2019	3/6/2012	8/28/2017	9/19/2019
				Sample Code	N	N	N	N	N
Analyte	**CASRN**	**PAL**	**PAL Reference**	**Units**					
Metals (Total)									
Aluminum[3]	7429-90-5	200	MCL	µg/L	--	59 U	**207**	--	**49 J**
Antimony	7440-36-0	0.78	Tap Water RSL	µg/L	--	1.5 U	**0.22 B**	--	1.5 U
Arsenic	7440-38-2	0.052	Tap Water RSL	µg/L	--	2 U	0.5 U	--	2 U
Barium	7440-39-3	380	Tap Water RSL	µg/L	--	**75**	**179**	--	**130**
Beryllium	7440-41-7	2.5	Tap Water RSL	µg/L	--	0.7 U	0.5 U	--	0.7 U
Cadmium	7440-43-9	0.92	Tap Water RSL	µg/L	--	0.7 U	0.5 U	--	0.7 U
Calcium	7440-70-2	--	--	µg/L	--	**21100**	**36900**	--	**33600**
Chromium	7440-47-3	100	MCL	µg/L	--	1.5 U	**4.8 J**	--	**3.3**
Cobalt	7440-48-4	0.6	Tap Water RSL	µg/L	--	**2 J**	**0.56 J**	--	3.7 U
Copper	7440-50-8	80	Tap Water RSL	µg/L	--	3.7 U	**2 J**	--	3.7 U
Iron[3]	7439-89-6	300	MCL	µg/L	--	**380**	**1040**	--	**750**
Lead	7439-92-1	15	MCL	µg/L	--	1.5 U	**0.33 B**	--	1.5 U
Magnesium	7439-95-4	--	--	µg/L	--	**7000**	**16900**	--	**16400**
Manganese	7439-96-5	43	Tap Water RSL	µg/L	--	**140**	**165**	--	**11**
Mercury	7439-97-6	0.063	Tap Water RSL	µg/L	--	0.33 U	0.1 UL	--	0.33 U
Nickel	7440-02-0	39	Tap Water RSL	µg/L	--	**2.7 J**	**7.9 J**	--	**2.5 J**
Potassium	7440-09-7	--	--	µg/L	--	**1200**	**10000**	--	**8300**
Selenium	7782-49-2	10	Tap Water RSL	µg/L	--	3.7 U	2.5 U	--	3.7 U
Silver	7440-22-4	9.4	Tap Water RSL	µg/L	--	1.5 U	0.5 U	--	1.5 U
Sodium	7440-23-5	20000	Health Advisory	µg/L	--	**7000**	**7100 L**	--	**7600**
Thallium	7440-28-0	0.02	Tap Water RSL	µg/L	--	0.7 U	**0.25 B**	--	0.7 U
Vanadium	7440-62-2	8.6	Tap Water RSL	µg/L	--	1.5 U	2.5 U	--	1.5 U
Zinc	7440-66-6	600	Tap Water RSL	µg/L	--	3.7 U	**14 J**	--	3.7 U
Radionuclides									
Radium-226	13982-63-3	0.0004	None	pCi/L	--	0.1 U	--	--	0.1 U
Strontium-90	10098-97-2	0.065	Tap Water RSL	pCi/L	--	0.18 U	--	--	0.27 U
Uranium-238	7440-61-1	0.00039	Tap Water RSL	pCi/L	--	-0.011 U	--	--	**0.123**

Data Qualifiers:
B = Analyte found in the associated blank.
E = Value is estimated due to the presence of interference.
J = Value is an estimated value between the MDL and the PQL for the analyte.
J- = Value is an estimated value between the MDL and the PQL for the analyte and may have a potential negative bias
K = Value is reported with an unknown bias.
L = Value is biased low.
U = Value is a non-detected result as reported by the laboratory.
UJ = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is approximate
UL = Value is a non-detected result as reported by the laboratory. The reported quantitation limit is biased low.
UR = Value is a non-detected result as reported by the laboratory. QC indicates that data are not usable.
Resampling and re-analysis are necessary for verification.

Notes:
Concentrations detected above the MDL are shown with bold face.
Gray-shaded results indicate concentrations detected above the indicated PAL.
MDL = Method detection limit.
PQL = Practical quantitation limit.
CASRN = Chemical Abstracts Service Registry Number.
PAL = Project Action Limit.
Tap Water RSL = Tap Water Regional Screening Level (USEPA, 2017).
MCL = Maximum Contaminant Level (USEPA, 2012).
Health Advisory = Drinking Water Health Advisory Level (USEPA, 2018).
USEPA = United States Environmental Protection Agency.
TEQ = Toxic Equivalent.
pg/L = Picograms per liter.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
N = Normal sample.
FD = Field duplicate sample.
-- = Not analyzed/not calculated.
1 = The value for 1,4-dichlorobenzene was used for 1,3-dichlorobenzene.
2 = The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.
3 = Secondary MCLs are presented for aluminum and iron.

FIGURES

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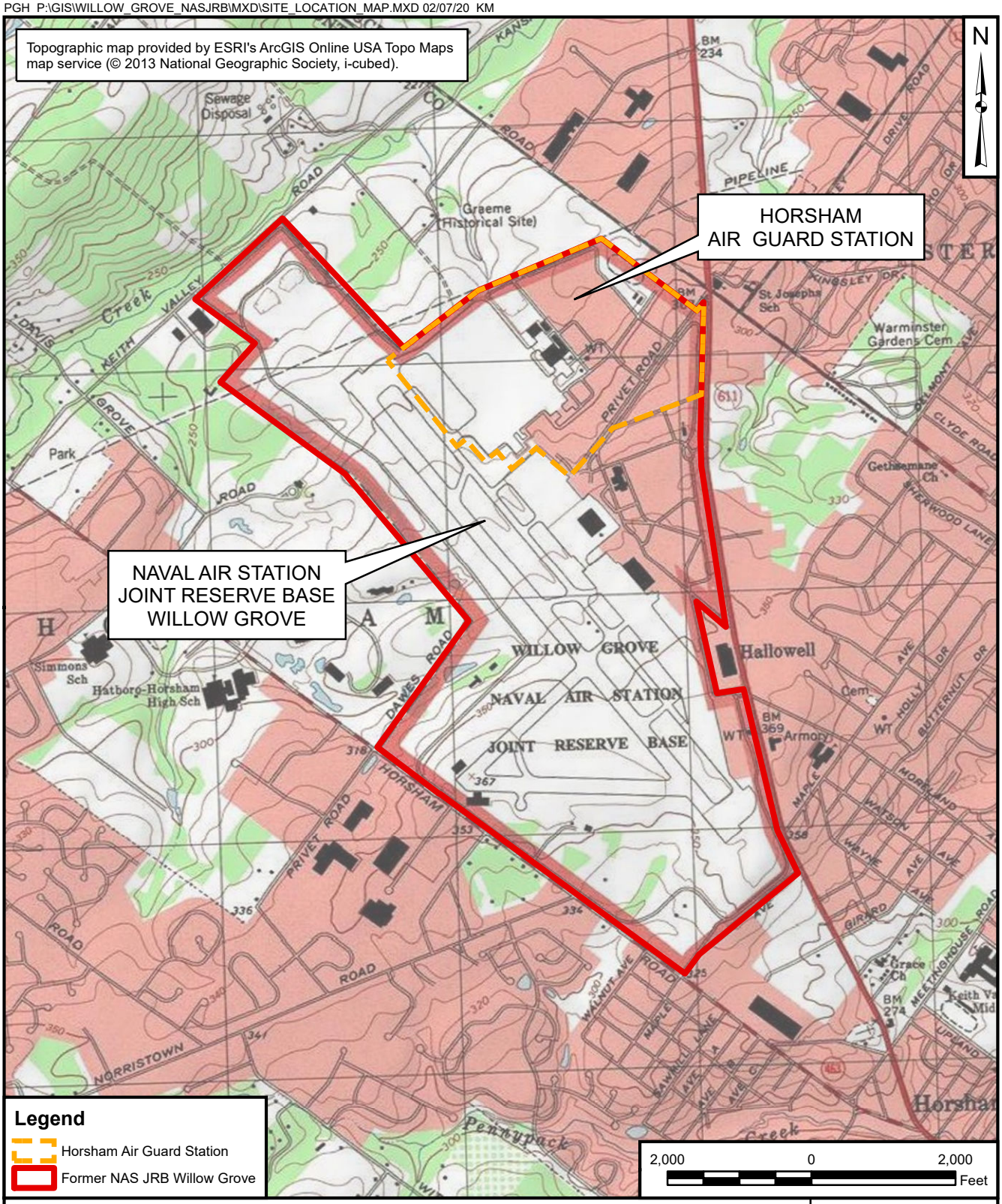

NAVFAC

BASE LOCATION MAP
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO WE04	
DRAWN BY K. MOORE	DATE 01/20/20
CHECKED BY D. LIPIK	DATE 02/07/20
FIGURE NUMBER 2-1	

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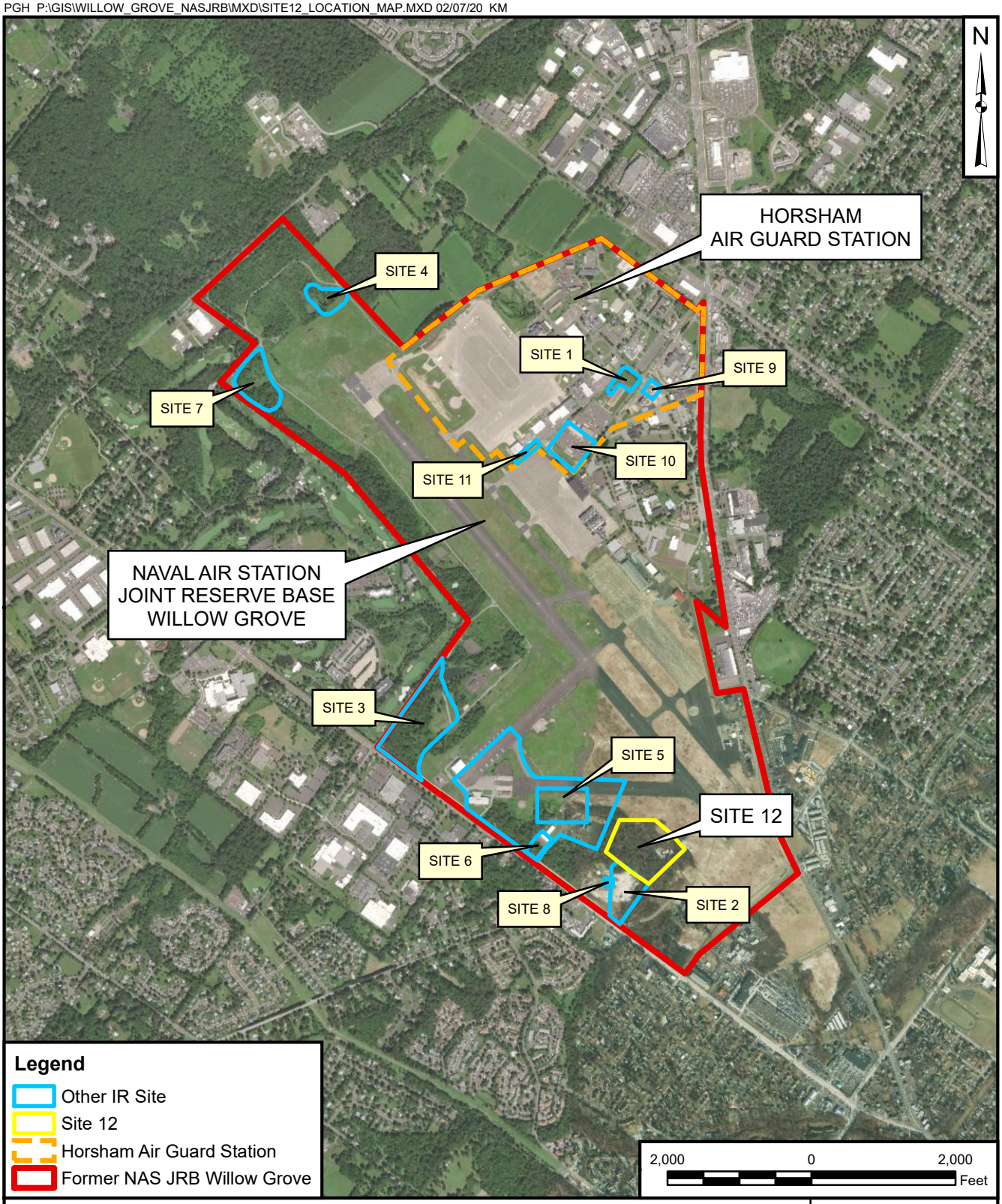
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_LOCATION_MAP.MXD 02/07/20 KM



NAVFAC

SITE 12 LOCATION MAP
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/20/20
CHECKED BY	DATE
D. LIPIK	02/07/20
FIGURE NUMBER	
2-2	

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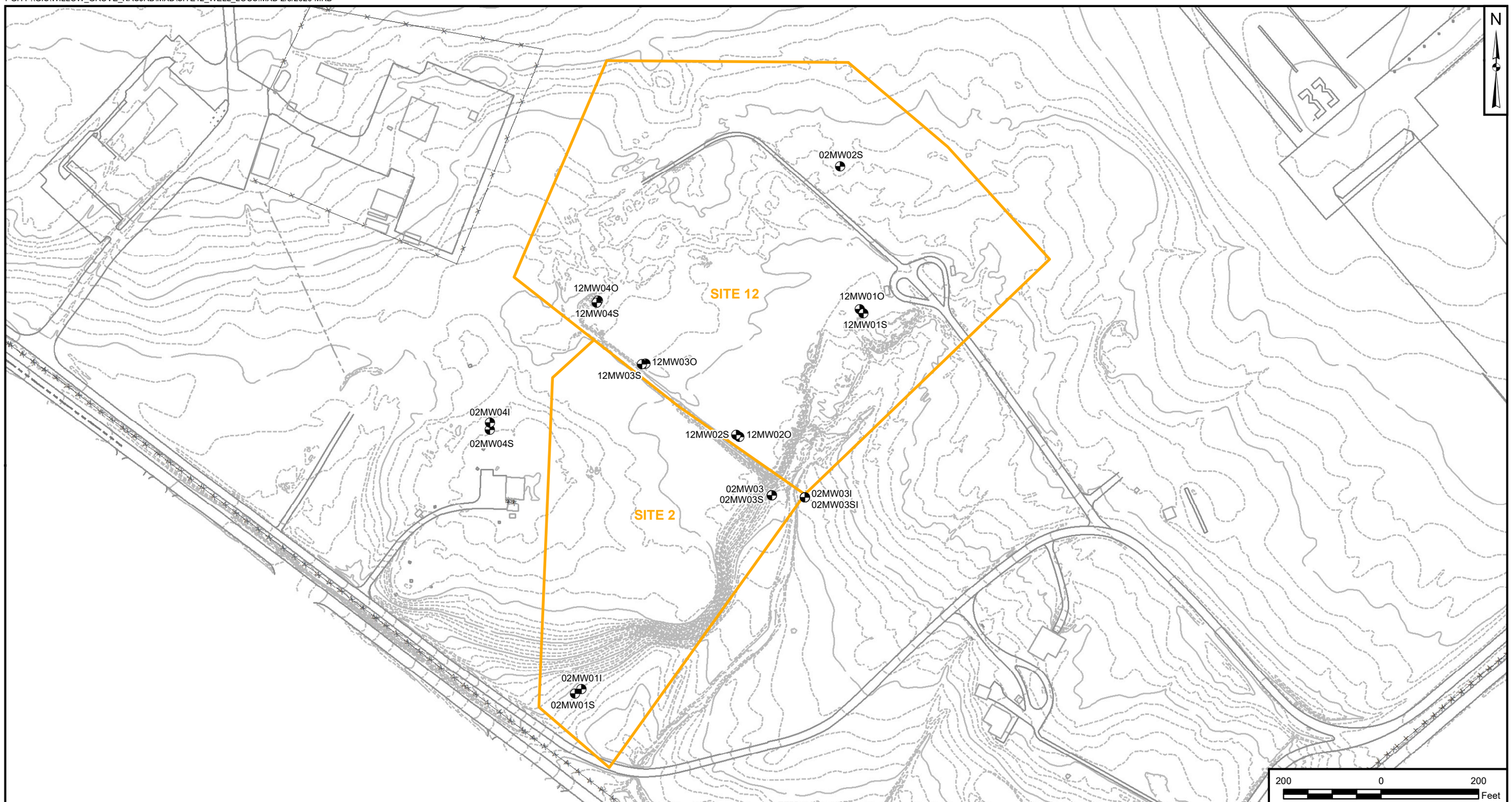
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_WELL_LOCS.MXD 2/5/2020 MKB



Legend

- Monitoring Well Location
- Site Boundary

SITE 12 WELL LOCATIONS
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/24/20
CHECKED BY	DATE
D. LIPIK	02/04/20
FIGURE NUMBER	
3-1	

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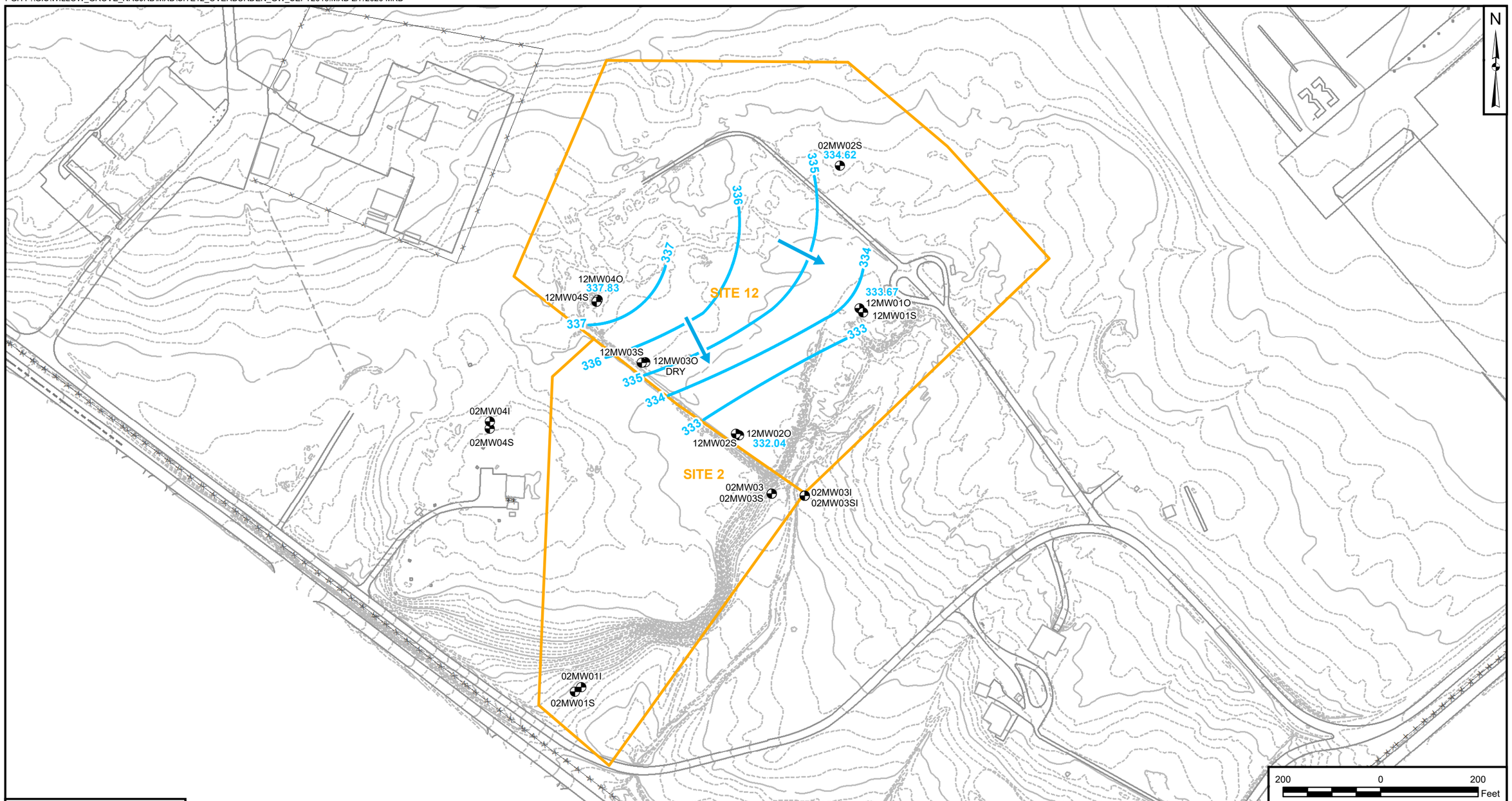
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_OVERBURDEN_GW_SEPT2019.MXD 2/7/2020 MKB



Legend

- Monitoring Well Location
- 332.02 Groundwater Elevation (ft amsl)
- Groundwater Flow Direction
- Potentiometric Contour
- Site Boundary

Notes:
Groundwater elevation data presented from gauging activities conducted on 9/25/2019.
Contour interval of 1 foot.
ft amsl = Feet above mean sea level (NAVD 88).
DRY = Well was gauged and found to be dry.

NAVFAC

OVERBURDEN GROUNDWATER
POTENTIOMETRIC SURFACE MAP
SEPTEMBER 2019
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/17/20
CHECKED BY	DATE
D. LIPIK	02/07/20
FIGURE NUMBER	
3-2	

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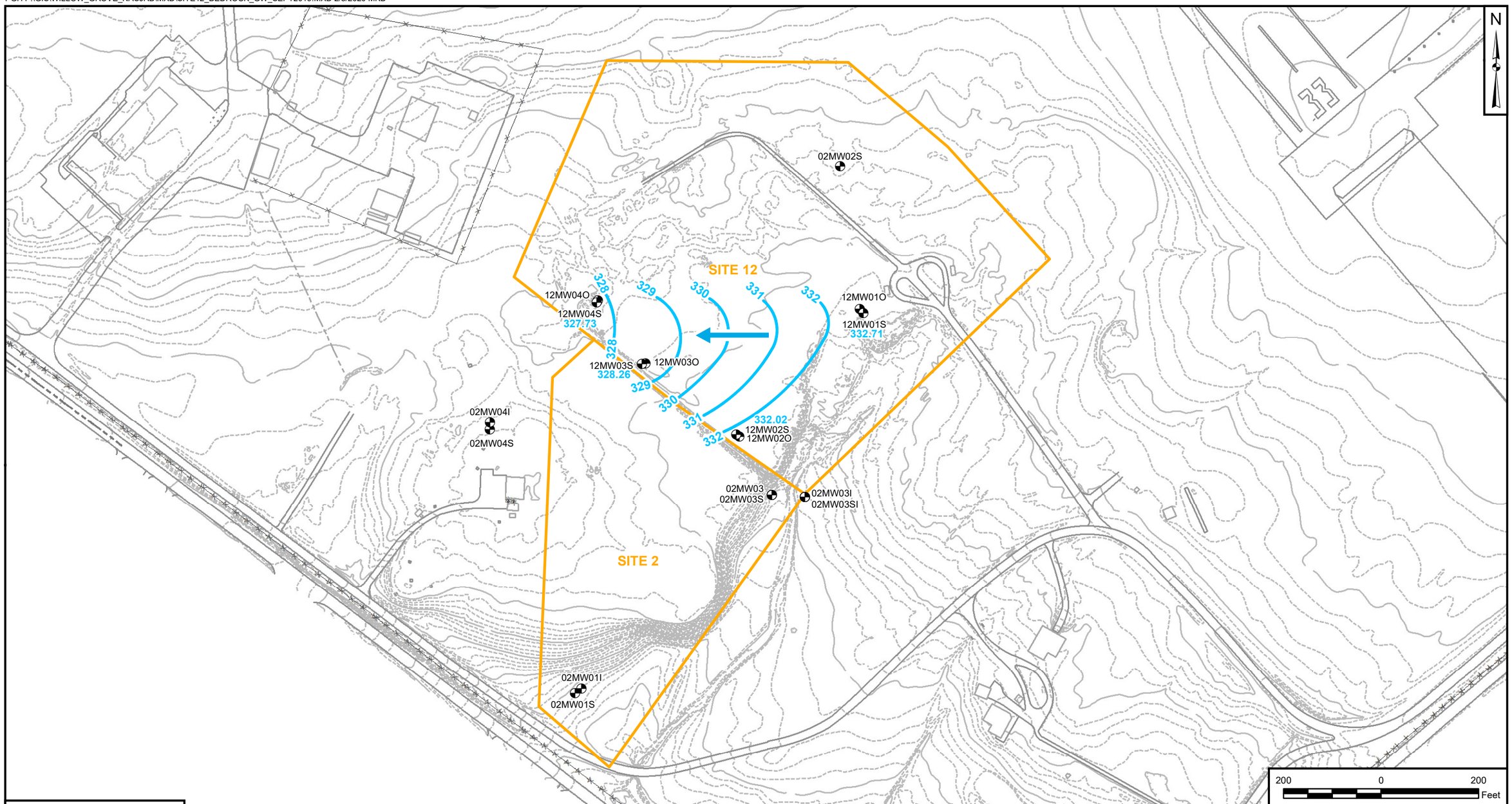
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_BEDROCK_GW_SEPT2019.MXD 2/5/2020 MKB



Legend

- Monitoring Well Location
- 332.04 Groundwater Elevation (ft amsl)
- Groundwater Flow Direction
- Potentiometric Contour
- Site Boundary

Notes:
Groundwater elevation data presented from gauging activities conducted on 9/25/2019.
Contour interval of 1 foot.
ft amsl = Feet above mean sea level (NAVD 88).

NAVFAC

SHALLOW BEDROCK GROUNDWATER
POTENTIOMETRIC SURFACE MAP
SEPTEMBER 2019
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/17/20
CHECKED BY	DATE
D. LIPIK	02/04/20
FIGURE NUMBER	
3-3	

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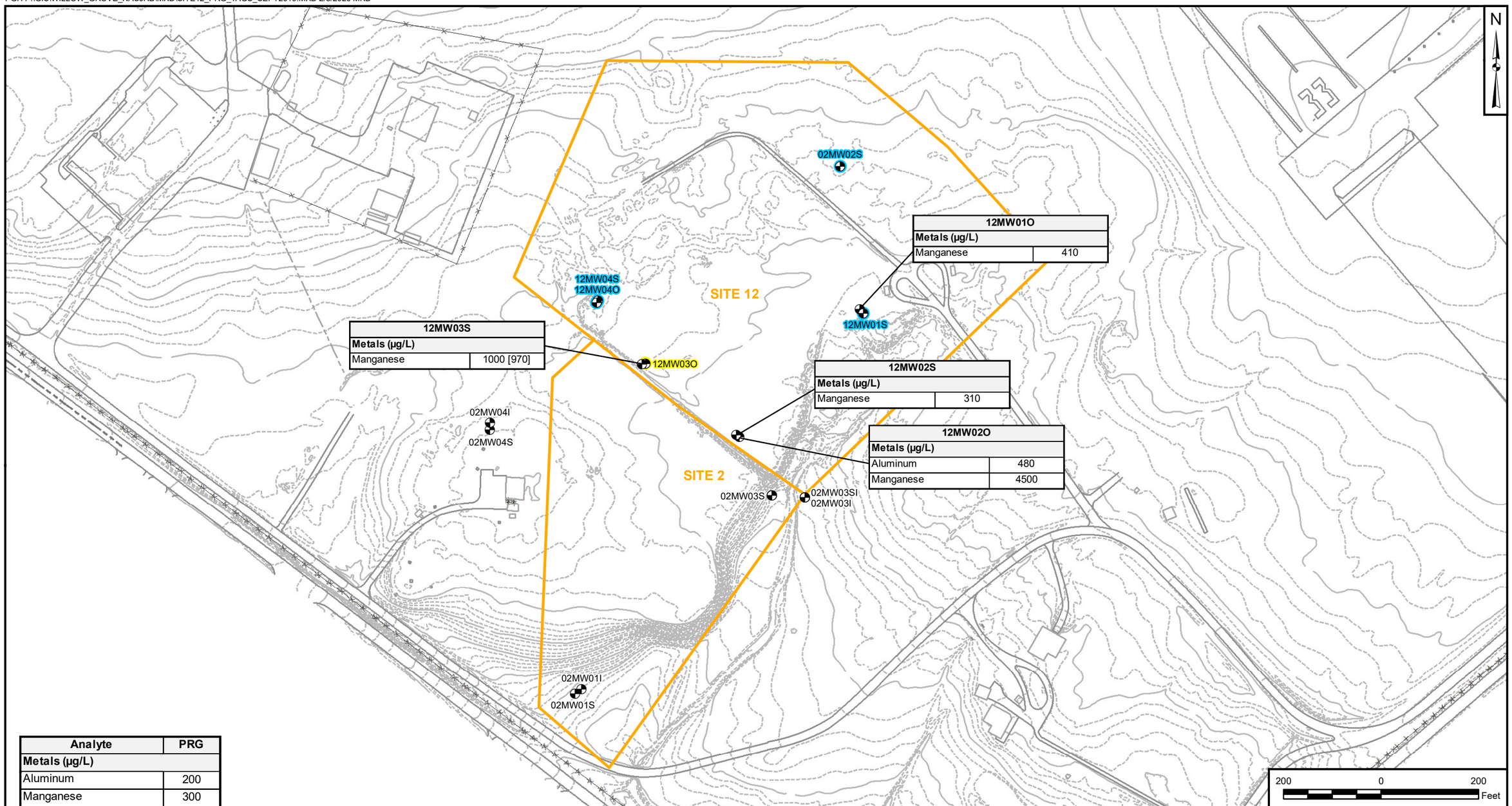
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_PRG_TAGS_SEPT2019.MXD 2/5/2020 MKB



Analyte	PRG
Metals (µg/L)	
Aluminum	200
Manganese	300

Legend

- Monitoring Well Location
- Dry Well (No Sample Collected)
- Groundwater Sample Location (No Exceedances)
- Site Boundary

Notes:
Well locations presented without data boxes or shading were not included in the September 2019 event.
Results in brackets represent duplicate results.
PRG = Proposed Remediation Goal.
µg/L = Micrograms per liter.

NAVFAC

GROUNDWATER CONCENTRATIONS ABOVE PROPOSED REMEDIATION GOALS
SEPTEMBER 2019 GROUNDWATER MONITORING
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/15/20
CHECKED BY	DATE
D. LIPIK	02/04/20
FIGURE NUMBER	
5-1	

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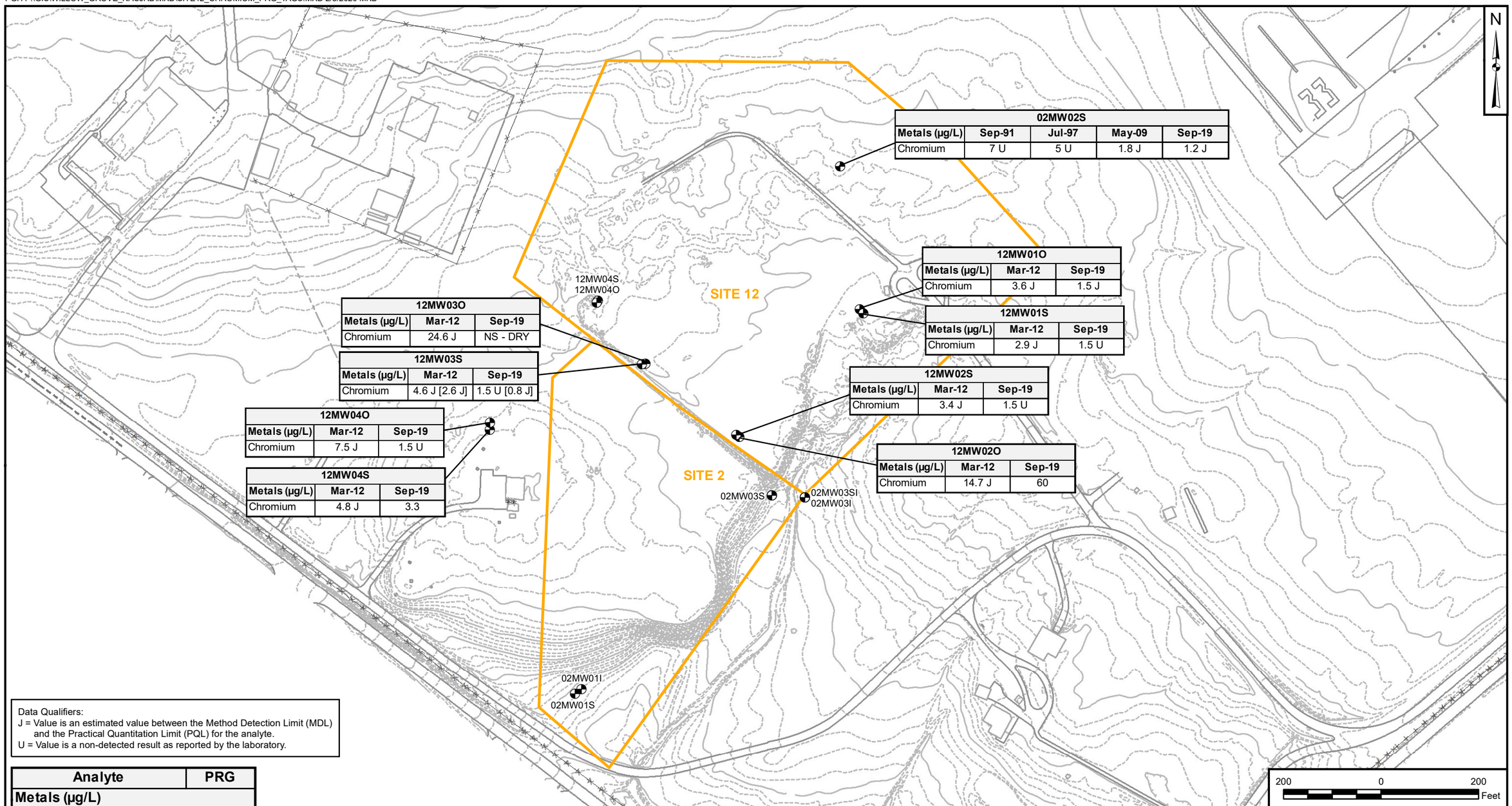
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_CHROMIUM_PRG_TAGS.MXD 2/5/2020 MKB



02MW02S				
Metals (µg/L)	Sep-91	Jul-97	May-09	Sep-19
Chromium	7 U	5 U	1.8 J	1.2 J

12MW01O		
Metals (µg/L)	Mar-12	Sep-19
Chromium	3.6 J	1.5 J

12MW01S		
Metals (µg/L)	Mar-12	Sep-19
Chromium	2.9 J	1.5 U

12MW02S		
Metals (µg/L)	Mar-12	Sep-19
Chromium	3.4 J	1.5 U

12MW02O		
Metals (µg/L)	Mar-12	Sep-19
Chromium	14.7 J	60

12MW03O		
Metals (µg/L)	Mar-12	Sep-19
Chromium	24.6 J	NS - DRY

12MW03S		
Metals (µg/L)	Mar-12	Sep-19
Chromium	4.6 J [2.6 J]	1.5 U [0.8 J]

12MW04O		
Metals (µg/L)	Mar-12	Sep-19
Chromium	7.5 J	1.5 U

12MW04S		
Metals (µg/L)	Mar-12	Sep-19
Chromium	4.8 J	3.3

Data Qualifiers:
J = Value is an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte.
U = Value is a non-detected result as reported by the laboratory.

Analyte	PRG
Metals (µg/L)	
Chromium	200

Legend

- Monitoring Well Location
- Site Boundary

Notes:
Results in brackets represent duplicate results.
PRG = Proposed Remediation Goal.
µg/L = Micrograms per liter.
NS = Not sampled.
L = Value is biased low.

NAVFAC

CHROMIUM GROUNDWATER CONCENTRATIONS
COMPARED TO PROPOSED REMEDIATION GOALS
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/15/20
CHECKED BY	DATE
D. LIPIK	02/04/20
FIGURE NUMBER	
5-2	

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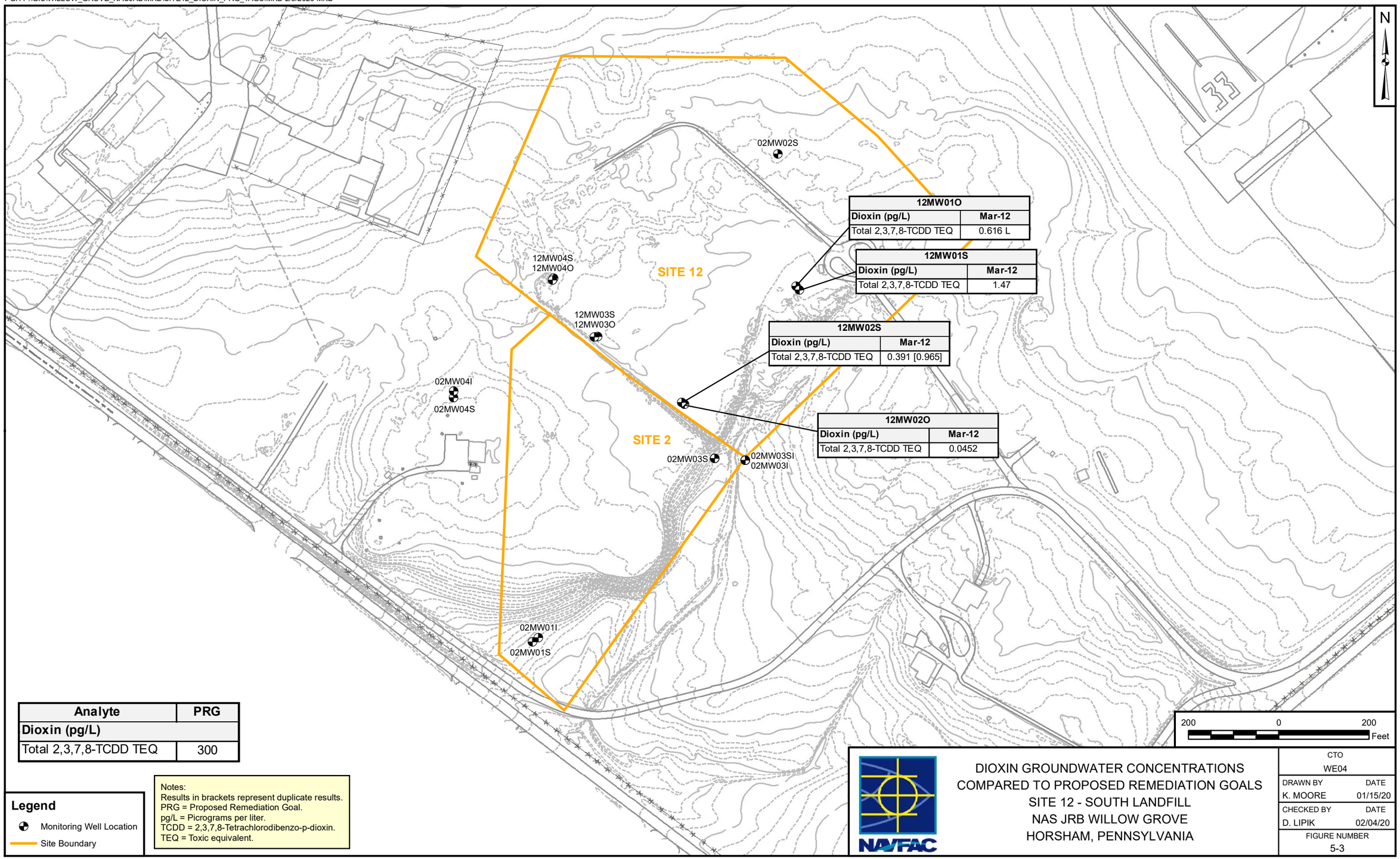
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_DIOXIN_PRG_TAGS.MXD 2/5/2020 MKB



12MW01O	
Dioxin (pg/L)	Mar-12
Total 2,3,7,8-TCDD TEQ	0.616 L

12MW01S	
Dioxin (pg/L)	Mar-12
Total 2,3,7,8-TCDD TEQ	1.47

12MW02S	
Dioxin (pg/L)	Mar-12
Total 2,3,7,8-TCDD TEQ	0.391 [0.965]

12MW02O	
Dioxin (pg/L)	Mar-12
Total 2,3,7,8-TCDD TEQ	0.0452

Analyte	PRG
Dioxin (pg/L)	
Total 2,3,7,8-TCDD TEQ	300

Legend

- Monitoring Well Location
- Site Boundary

Notes:
Results in brackets represent duplicate results.
PRG = Proposed Remediation Goal.
pg/L = Picrograms per liter.
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin.
TEQ = Toxic equivalent.

NAVFAC

DIOXIN GROUNDWATER CONCENTRATIONS
COMPARED TO PROPOSED REMEDIATION GOALS
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/15/20
CHECKED BY	DATE
D. LIPIK	02/04/20
FIGURE NUMBER	
5-3	

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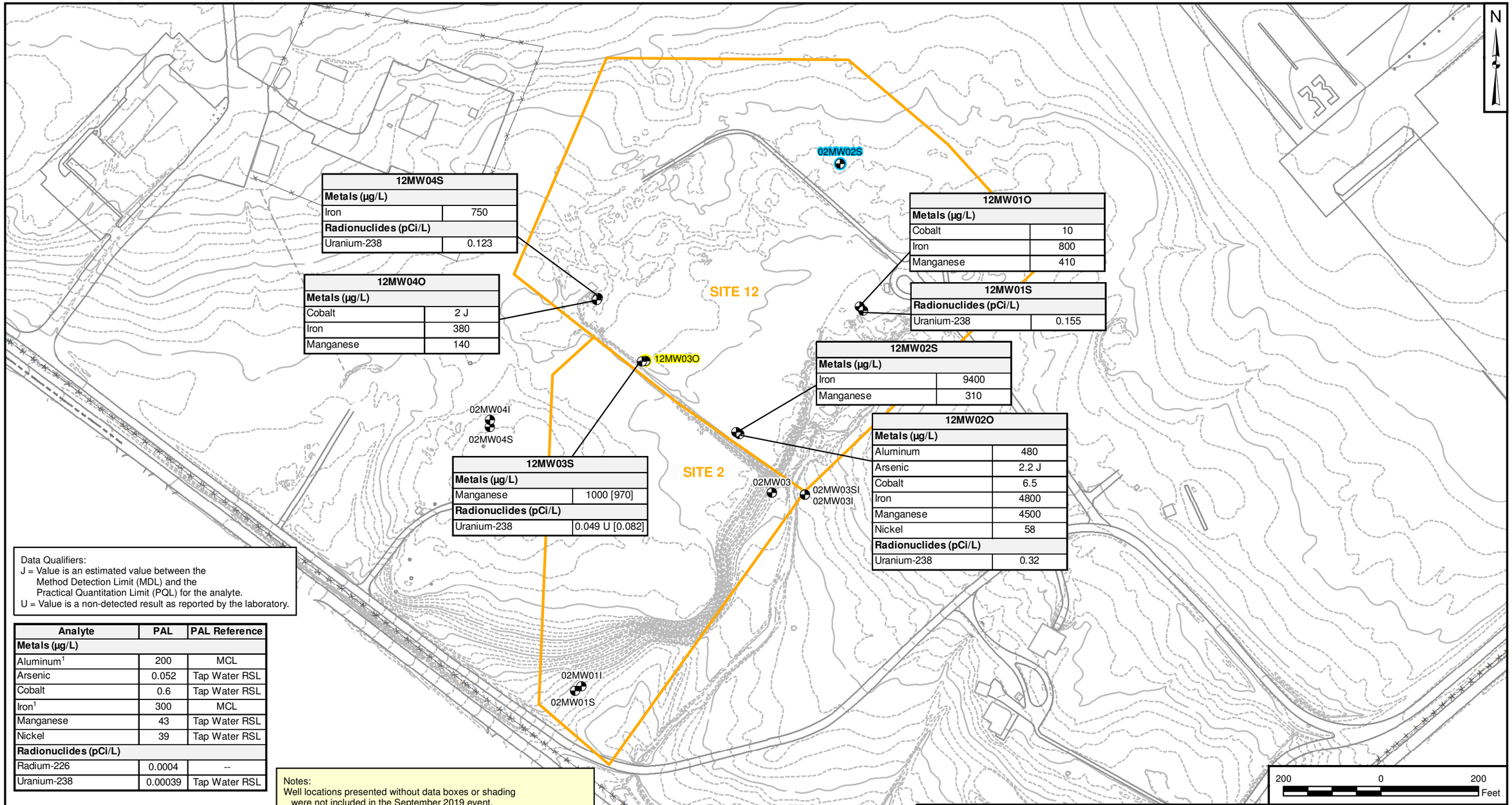
PGH P:\GIS\WILLOW_GROVE_NASJRB\MXD\SITE12_PAL_TAGS_SEPT2019.MXD 2/7/2020 KM



12MW04S	
Metals (µg/L)	
Iron	750
Radionuclides (pCi/L)	
Uranium-238	0.123

12MW04O	
Metals (µg/L)	
Cobalt	2 J
Iron	380
Manganese	140

12MW01O	
Metals (µg/L)	
Cobalt	10
Iron	800
Manganese	410

12MW01S	
Radionuclides (pCi/L)	
Uranium-238	0.155

12MW02S	
Metals (µg/L)	
Iron	9400
Manganese	310

12MW02O	
Metals (µg/L)	
Aluminum	480
Arsenic	2.2 J
Cobalt	6.5
Iron	4800
Manganese	4500
Nickel	58
Radionuclides (pCi/L)	
Uranium-238	0.32

12MW03S	
Metals (µg/L)	
Manganese	1000 [970]
Radionuclides (pCi/L)	
Uranium-238	0.049 U [0.082]

Data Qualifiers:
J = Value is an estimated value between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) for the analyte.
U = Value is a non-detected result as reported by the laboratory.

Analyte	PAL	PAL Reference
Metals (µg/L)		
Aluminum[1]	200	MCL
Arsenic	0.052	Tap Water RSL
Cobalt	0.6	Tap Water RSL
Iron[1]	300	MCL
Manganese	43	Tap Water RSL
Nickel	39	Tap Water RSL
Radionuclides (pCi/L)		
Radium-226	0.0004	--
Uranium-238	0.00039	Tap Water RSL

Notes:
Well locations presented without data boxes or shading were not included in the September 2019 event.
Results in brackets represent duplicate results.
PAL = Project Action Limit.
µg/L = Micrograms per liter.
pCi/L = Picocuries per liter.
-- = Not calculated.
Tap Water RSL = USEPA Regional Screening Level for Tapwater (2017).
MCL = USEPA Maximum Contaminant Level (2012).
USEPA = United States Environmental Protection Agency.
1 = Secondary MCLs are presented for aluminum and iron.

Legend

- Monitoring Well Location
- Dry Well (No Sample Collected)
- Groundwater Sample Location (No Exceedances)
- Site Boundary

NAVFAC

GROUNDWATER CONCENTRATIONS ABOVE PROJECT ACTION LIMITS
SEPTEMBER 2019 GROUNDWATER MONITORING
SITE 12 - SOUTH LANDFILL
NAS JRB WILLOW GROVE
HORSHAM, PENNSYLVANIA

CTO	
WE04	
DRAWN BY	DATE
K. MOORE	01/15/20
CHECKED BY	DATE
D. LIPIK	02/07/20
FIGURE NUMBER	
5-4	

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APPENDIX A
FIELD LOGS

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Name: Willow Grove Site 12 | Project No.: 112G0

Location: Willow Grove, PA | Personnel:

Weather Conditions: | Measuring Device: Solinst W L Indicator

Tidally Influenced: Yes ____ No __X__ | Remarks:

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
12MW01O	9/25/19	1300		15.00	12.25			
12MW01S	9/25/19	1305		34.00	13.72			
12MW02O	9/25/19	1315			14.13			
12MW02S	9/25/19	1313			14.24			
12MW-03O	9/25/19	1325		18.69	18.41	18.69		
12MW-03S	9/25/19	1327			20.14			
12MW-04O	9/25/19	1321			11.00			
12MW-04S	9/25/19	1320			21.82			
02MW02S	9/25/19	1246			14.80			

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 02MW02
Sample Location: 02MW02
Sampled By: DW
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. ^{0}C	Turbidity NTU	DO mg/l	ORP mV	TBD
Date: 9-23-19								
Time: 1145								
Method: Rediflo2	clear	5.80	0.121	17.01	0.55	0.05	175	

PURGE DATA:

Date: 9-23-19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: Rediflo2								
Monitor Reading(ppm):								
Well Casing Diameter & Material Type: 4" PVC		**(See Low Flow Purge Data Sheet)**						
Total Well Depth (TD):								
Static Water Level (WL): 14.78								
One Casing Volume(gal/L):								
Start Purge (hrs): 1040								
End Purge (hrs): 1140								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	6
Total Metals & Mercury	HNO3	125 ml Poly	3
Dissolved Metal & Mercury	HNO3	125 ml Poly	—
Strontium 90	HNO3	1 Liter Poly	3
Uranium 238	HNO3	1 Liter Poly	3
Radium 226	HNO3	1 Liter Poly	3

OBSERVATIONS / NOTES:

Water was clear with no odor

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12
PROJECT NUMBER: 112G08005-WE04

WELL ID.: 02MW02
DATE: 9-23-19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1040	14.78	390	5.71	0.185	–	6.73	14.44	218	<1cm
1045	14.79	390	5.55	0.141	1.03	1.74	14.72	200	
1050	14.83	390	5.59	0.141	0.85	1.66	14.83	194	
1055	14.83	390	5.63	0.134	0.74	1.00	15.11	191	
1100	14.83	390	5.65	0.133	0.67	0.76	15.34	189	
1105	14.83	390	5.72	0.131	0.65	0.48	15.45	186	
1110	14.83	390	5.74	0.131	0.64	0.36	15.50	183	
1115	14.83	390	5.77	0.130	0.53	0.27	15.56	181	
1120	14.83	390	5.79	0.126	0.46	0.27	15.77	180	
1125	14.83	390	5.79	0.125	0.50	0.19	15.89	178	
1130	14.83	390	5.79	0.123	0.56	0.09	16.64	177	
1135	14.83	390	5.81	0.122	0.53	0.07	16.94	176	
1140	14.83	390	5.80	0.121	0.55	0.05	17.01	175	

SIGNATURE(S): [signature] **PAGE** ___ **OF**

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW01S-20190915
Sample Location: 12MW01S
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Date: 9/19/19	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Time: 1545								
Method: Low Flow	clear	6.04	0.262	14.96	0.58	0.00	20	—

PURGE DATA:

Date: 9/19/19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: Low Flow								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" pvc		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 13.58								
One Casing Volume(gal/L):								
Start Purge (hrs): 1445								
End Purge (hrs): 1545								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	2
Total Metals & Mercury	HNO3	125 ml Poly	1
Dissolved Metal & Mercury	HNO3	125 ml Poly	N/A
Strontium 90	HNO3	1 Liter Poly	1
Uranium 238	HNO3	1 Liter Poly	1
Radium 226	HNO3	1 Liter Poly	1

OBSERVATIONS / NOTES:

Water clear with no odor

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW01S-20190919

DATE: 9/19/19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1445	13.58	200	6.24	0.251	9.43	1.76	16.29	15	
1450	14.18	200	6.20	0.253	5.11	1.00	15.84	39	
1455	14.09	200	6.17	0.256	3.97	0.43	15.47	61	
1500	14.02	200	6.16	0.258	2.05	0.10	15.21	79	
1505	14.00	200	6.14	0.260	1.17	0.00	15.47	84	
1510	14.00	200	6.13	0.260	0.94	0.00	15.56	83	
1515	13.98	200	6.12	0.260	0.89	0.00	15.57	72	
1520	13.97	200	6.11	0.259	0.84	0.00	15.57	67	
1525	13.97	200	6.08	0.261	0.82	0.00	15.30	49	
1530	13.97	200	6.07	0.261	0.75	0.00	15.28	27	
1535	13.97	200	6.06	0.262	0.66	0.00	15.10	22	
1540	13.97	200	6.04	0.262	0.61	0.00	15.02	22	
1545	13.97	200	6.04	0.262	0.58	0.00	14.96	20	

SIGNATURE(S): [illegible]

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW010-20190919
Sample Location: 12MW010
Sampled By: VAS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Date: 9-19-19	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Time: 1540								
Method: Low Flow	clear	5.79	0.276	16.44	0.0	0.0	66	–

PURGE DATA:

Date: 9-19-19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: Redi-Flo pump								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2 inch PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 11.98								
One Casing Volume(gal/L):								
Start Purge (hrs): 1445								
End Purge (hrs): 1540								
Total Purge Time (min): 55								
Total Vol. Purged (~~gal/L~~ L): 4.75								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	yes
Total Metals & Mercury	HNO3	125 ml Poly	yes
Dissolved Metal & Mercury	HNO3	125 ml Poly	No
Strontium 90	HNO3	1 Liter Poly	yes
Uranium 238	HNO3	1 Liter Poly	yes
Radium 226	HNO3	1 Liter Poly	yes

OBSERVATIONS / NOTES:

No stains or odors observed during purge.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	–

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW010-20190919

DATE: 9-19-19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1445	12.02	350	6.26	0.266	19.8	4.13	16.48	162	clear
1450	12.17	300	6.12	0.266	11.5	2.62	16.32	126	clear
1455	12.22	275	6.05	0.267	5.7	1.70	16.36	94	clear
1500	12.24	275	5.98	0.271	2.2	1.04	16.38	75	clear
1505	12.24	275	5.92	0.274	1.4	0.78	16.38	72	clear
1510	12.24	275	5.87	0.274	0.5	0.51	16.34	70	clear
1515	12.24	275	5.84	0.275	0.1	0.37	16.33	69	clear
1520	12.24	275	5.81	0.275	0.0	0.24	16.34	68	clear
1525	12.24	275	5.79	0.276	0.0	0.09	16.35	67	clear
1530	12.24	275	5.79	0.276	0.0	0.04	16.37	67	clear
1535	12.24	275	5.79	0.276	0.0	0.0	16.41	66	clear
1540	12.24	275	5.79	0.276	0.0	0.0	16.44	66	clear-collect sample

SIGNATURE(S): [signature]

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW02S-20190919
Sample Location: 12MW02S-20190919
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/19/19	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1030	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Low Flow	clear	6.15	0.256	13.50	7.41	3.26	-4	—

PURGE DATA:

Date: 9/19/19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: Low Flow								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 12.09								
One Casing Volume(gal/L):								
Start Purge (hrs): 0920								
End Purge (hrs): 1030								
Total Purge Time (min): 70								
Total Vol. Purged(gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	2
Total Metals & Mercury	HNO3	125 ml Poly	1
Dissolved Metal & Mercury	HNO3	125 ml Poly	N/A
Strontium 90	HNO3	1 Liter Poly	1
Uranium 238	HNO3	1 Liter Poly	1
Radium 226	HNO3	1 Liter Poly	1

OBSERVATIONS / NOTES:

Water clear with no odor

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW02S - 20190919

DATE: 9/19/19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
0920	14.07	200	5.92	0.261	516	9.14	11.90	69	Orange Brown
0925	14.10	200	5.98	0.265	365	8.12	12.08	56	Orange Brown
0930	14.10	200	6.03	0.272	214	7.27	12.67	34	Orange Brown
0935	14.11	200	6.07	0.278	155	6.63	12.90	21	
0940	14.11	200	6.05	0.274	68.9	5.83	13.03	13	
0945	14.11	200	6.04	0.269	35.0	4.98	13.12	9	
0950	14.11	200	6.03	0.266	22.4	4.46	13.18	9	
0955	14.11	200	6.04	0.265	19.3	4.12	13.23	8	
1000	14.11	200	6.03	0.264	17.1	3.74	13.27	8	
1005	14.11	200	6.05	0.263	15.8	3.54	13.30	7	
1010	14.11	200	6.08	0.261	11.9	3.29	13.33	4	
1015	14.11	200	6.10	0.260	10.1	3.23	13.34	2	
1020	14.11	200	6.12	0.258	8.43	3.16	13.47	-1	
1025	14.11	200	6.13	0.258	6.97	3.34	13.49	-2	
1030	14.11	200	6.15	0.256	7.41	3.26	13.50	-4	

SIGNATURE(S): [signature]

PAGE 1 **OF** 1

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW020-20190919
Sample Location: 12MW020
Sampled By: VAS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Date: 9-19-19	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Time: 1015								
Method: Low Flow	clear	6.27	0.343	15.36	1.9	0.0	-10	—

PURGE DATA:

Date: 9-19-19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: RediFlo pump								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2 inch PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 13.59								
One Casing Volume(gal/L):								
Start Purge (hrs): 0915								
End Purge (hrs): 1015								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	yes
Total Metals & Mercury	HNO3	125 ml Poly	yes
Dissolved Metal & Mercury	HNO3	125 ml Poly	No
Strontium 90	HNO3	1 Liter Poly	yes
Uranium 238	HNO3	1 Liter Poly	yes
Radium 226	HNO3	1 Liter Poly	yes

OBSERVATIONS / NOTES:

No stains or odors observed during purge

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

MW020

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW020-20190919

DATE: 9-19-19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
0915	13.85	450	6.21	0.699	984	4.60	13.51	22	cloudy - Blk/Gry
0920	13.97	300	6.31	0.632	513	3.25	13.95	9	Gry Tint
0925	13.99	275	6.29	0.498	122	2.13	14.21	7	slight Gry Tint
0930	13.96	275	6.25	0.397	67.2	1.28	14.75	5	" " "
0935	13.95	275	6.25	0.381	15.4	1.09	15.08	3	clear
0940	13.94	275	6.25	0.373	7.7	0.85	15.09	1	clear
0945	13.94	275	6.25	0.348	4.2	0.51	15.13	-1	clear
0950	13.94	275	6.25	0.349	3.4	0.37	15.17	-3	clear
0955	13.94	275	6.26	0.348	2.8	0.21	15.20	-5	clear
1000	13.94	275	6.26	0.343	2.7	0.11	15.24	-7	clear
1005	13.94	275	6.26	0.344	2.3	0.06	15.29	-8	clear
1010	13.94	275	6.26	0.343	2.1	0.0	15.32	-9	clear
1015	13.94	275	6.27	0.343	1.9	0.0	15.36	-10	clear - collect sample

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Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW03S-20190919
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. ^{0}C	Turbidity NTU	DO mg/l	ORP mV	TBD
Date: 9/19/19								
Time: 1425								
Method: Low Flow	clear	6.37	0.267	13.78	0.81	0.00	72	—

PURGE DATA:

Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: Low Flow								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 19.81								
One Casing Volume(gal/L):								
Start Purge (hrs): 1325								
End Purge (hrs): 1425								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	4
Total Metals & Mercury	HNO3	125 ml Poly	2
Dissolved Metal & Mercury	HNO3	125 ml Poly	N/A
Strontium 90	HNO3	1 Liter Poly	2
Uranium 238	HNO3	1 Liter Poly	2
Radium 226	HNO3	1 Liter Poly	2

OBSERVATIONS / NOTES:

water clear no odor

Circle if Applicable:

MS/MSD

Duplicate ID No.: 12DUP01-20190919
Assigned time 1200

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW03S - 20190919

DATE: 9/19/19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1325	19.81	200	6.55	0.258		1.30	13.85	12	
1330	20.01	200	6.52	0.259	0.77	0.52	13.96	38	
1335	20.01	200	6.47	0.259	0.36	0.07	14.01	58	
1340	20.01	200	6.46	0.261	0.09	0.00	13.89	67	
1345	20.01	200	6.43	0.262	0.55	0.00	13.84	70	
1350	20.01	200	6.40	0.262	0.69	0.00	13.78	71	
1355	20.01	200	6.37	0.263	0.83	0.00	13.81	69	
1400	20.01	200	6.38	0.265	0.89	0.00	13.79	68	
1405	20.01	200	6.38	0.266	0.95	0.00	13.77	68	
1410	20.01	200	6.38	0.266	0.97	0.00	13.79	69	
1415	20.01	200	6.38	0.266	0.85	0.00	13.78	71	
1420	20.01	200	6.37	0.267	0.81	0.00	13.78	72	

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PAGE 1 **OF** 1

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW04S-20190919
Sample Location: 12MW04S
Sampled By: VAS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9-19-19	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TBD
Time: 1230	Visual	Standard	mS/cm	^{0}C	NTU	mg/l	mV	
Method: Low Flow	clear	6.51	0.265	13.31	1.1	0.28	16	—

PURGE DATA:

Date: 9-19-19	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Method: RediFlo pump								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2 inch PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 21.49								
One Casing Volume(gal/L):								
Start Purge (hrs): 1130								
End Purge (hrs): 1230								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	yes
Total Metals & Mercury	HNO3	125 ml Poly	yes
Dissolved Metal & Mercury	HNO3	125 ml Poly	No
Strontium 90	HNO3	1 Liter Poly	yes
Uranium 238	HNO3	1 Liter Poly	yes
Radium 226	HNO3	1 Liter Poly	yes

OBSERVATIONS / NOTES:

No stains or odors observed during purge.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW04S-20190919

DATE: 9-19-19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1130	21.53	400	6.61	0.306	201	2.57	13.22	-17	orange Tint
1135	21.54	325	6.61	0.298	89.2	1.24	12.46	22	Tan Tint
1140	21.55	300	6.55	0.294	16.7	1.18	12.53	50	clear
1145	21.55	300	6.53	0.293	5.3	0.84	12.77	42	clear
1150	21.55	300	6.50	0.291	5.7	0.62	12.92	35	clear
1155	21.55	300	6.50	0.288	3.0	0.69	13.01	26	clear
1200	21.55	300	6.50	0.288	2.2	0.61	13.07	21	clear
1205	21.55	300	6.50	0.288	1.4	0.49	13.12	18	clear
1210	21.55	300	6.52	0.285	1.1	0.41	13.17	19	clear
1215	21.55	300	6.52	0.274	1.3	0.34	13.21	17	clear
1220	21.55	300	6.51	0.266	1.2	0.33	13.25	17	clear
1225	21.55	300	6.51	0.265	1.1	0.27	13.28	16	clear
1230	21.55	300	6.51	0.265	1.1	0.28	13.31	16	clear - collect sample

SIGNATURE(S): [illegible]

Tetra Tech, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Willow Grove Site 12
Project No.: 112G08005-WE04

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 12MW04Q-20190119
Sample Location: 12MW04Q
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. ^{0}C	Turbidity NTU	DO mg/l	ORP mV	TBD
Date: 9/19/19								
Time: 1250								
Method: Low Flow	clear	5.96	0.174	14.65	1.29	0.00	44	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	TBD
Date: 9/19/19								
Method: Low Flow								
Monitor Reading(ppm): 0.0								
Well Casing Diameter & Material								
Type: 2" PVC		(See Low Flow Purge Data Sheet)						
Total Well Depth (TD):								
Static Water Level (WL): 10.76								
One Casing Volume(gal/L):								
Start Purge (hrs): 1135								
End Purge (hrs): 1245								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 5.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40ml VOA Vial	2
Total Metals & Mercury	HNO3	125 ml Poly	1
Dissolved Metal & Mercury	HNO3	125 ml Poly	N/A
Strontium 90	HNO3	1 Liter Poly	1
Uranium 238	HNO3	1 Liter Poly	1
Radium 226	HNO3	1 Liter Poly	1

OBSERVATIONS / NOTES:

Water clear no odor

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

TBD: To Be Determined

Tetra Tech

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Willow Grove Site 12

PROJECT NUMBER: 112G08005-WE04

WELL ID.: 12MW04Ø-20190919

DATE: 9/19/19

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Other Comments
1135	10.76	200	6.16	0.187	209	5.86	15.01	60	Lt Brown
1140	10.90	200	6.12	0.186	177	2.65	15.60	60	Lt Brown
1145	10.93	200	6.10	0.187	164	1.40	16.25	59	Lt Brown Tint
1150	10.94	200	6.11	0.184	94.7	0.44	15.15	56	Lt Brown Tint
1155	10.95	200	6.07	0.183	51.5	0.24	15.15	65	Clear
1200	10.95	200	6.01	0.181	49.8	0.08	16.06	72	Clear
1205	10.95	200	6.02	0.182	31.6	0.00	16.56	74	Clear
1210	10.95	200	6.02	0.182	24.2	0.00	16.00	72	Clear
1215	10.96	200	6.02	0.181	11.7	0.00	15.15	76	Clear
1220	10.96	200	6.03	0.181	8.78	0.00	14.47	78	Clear
1225	10.96	200	6.00	0.180	3.25	0.00	14.49	84	Clear
1230	10.96	200	5.98	0.179	1.77	0.00	14.53	91	Clear
1235	10.96	200	5.98	0.179	1.53	0.00	14.64	92	Clear
1240	10.96	200	5.96	0.179	1.41	0.00	14.69	94	Clear
1245	10.96	200	5.96	0.179	1.29	0.00	14.65	94	

SIGNATURE(S): [signature]

PAGE 1 **OF** 1

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APPENDIX B

LABORATORY ANALYTICAL REPORTS (INCLUDED ON CD ONLY)

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ALS Environmental

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

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

October 31, 2019

Ms. Tricia Moore
Tetra Tech Inc

Certificate of Analysis

Project Name:	**Form Naval Air Station JRB/Willow Grove**	Workorder:	**3059461**
Purchase Order:		Workorder ID:	**EPR032|Willow Grove Sites 3 an**

Dear Ms. Moore:

Enclosed are the analytical results for samples received by the laboratory on Friday, September 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 Mrs. Vanessa N Badman (Project Coordinator) at (717) 944-5541.

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

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

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

CC: Ms. Amy Thompson , Mr. Rick Carr , Ms. Megan Ritchie

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

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

ALS Environmental

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

SAMPLE SUMMARY

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3059461001	12TB01-20190919	Water	9/19/2019 07:00	9/20/2019 21:45	Collected by Client
3059461002	12MW020-20190919	Water	9/19/2019 10:15	9/20/2019 21:45	Collected by Client
3059461003	12MW02S-20190919	Water	9/19/2019 10:30	9/20/2019 21:45	Collected by Client
3059461004	12MW04S-20190919	Water	9/19/2019 12:30	9/20/2019 21:45	Collected by Client
3059461005	12MW040-20190919	Water	9/19/2019 12:50	9/20/2019 21:45	Collected by Client
3059461006	12MW03S-20190919	Water	9/19/2019 14:25	9/20/2019 21:45	Collected by Client
3059461007	12MW010-20190919	Water	9/19/2019 15:40	9/20/2019 21:45	Collected by Client
3059461008	12MW01S-20190919	Water	9/19/2019 15:45	9/20/2019 21:45	Collected by Client
3059461009	12DUP01-20190919	Water	9/19/2019 12:00	9/20/2019 21:45	Collected by Client

ALS Environmental

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

SAMPLE SUMMARY

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Notes

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

Standard Acronyms/Flags

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

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

PROJECT SUMMARY

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Workorder Comments

Please see attached subcontracting from ALS Ft. Collins. VNB 9/24/19

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461001** Date Collected: 9/19/2019 07:00 Matrix: Water

Sample ID: **12TB01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1-Dichloroethene	0.75U	U,3	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 05:25	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461001** Date Collected: 9/19/2019 07:00 Matrix: Water

Sample ID: **12TB01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C		9/27/19 05:25	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C		9/27/19 05:25	PDK	A
4-Bromofluorobenzene (S)	115	2	%	85 - 114	SW846 8260C		9/27/19 05:25	PDK	A
Dibromofluoromethane (S)	99.4		%	80 - 119	SW846 8260C		9/27/19 05:25	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C		9/27/19 05:25	PDK	A

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,1-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 07:18	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 07:18	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 07:18	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C			9/27/19 07:18	PDK	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 07:18	PDK	A
Dibromofluoromethane (S)	99.4		%	80 - 119	SW846 8260C			9/27/19 07:18	PDK	A
Toluene-d8 (S)	100		%	89 - 112	SW846 8260C			9/27/19 07:18	PDK	A

METALS

Aluminum, Total	0.48		mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Arsenic, Total	0.0022J	J	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Barium, Total	0.28		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Calcium, Total	30.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Chromium, Total	0.060		mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Cobalt, Total	0.0065		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Copper, Total	0.0047J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Iron, Total	4.8		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Lead, Total	0.0012J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Magnesium, Total	17.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Manganese, Total	4.5		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 14:14	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:52	AHI	C
Nickel, Total	0.058		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	2.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Sodium, Total	13.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Vanadium, Total	0.0014J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Zinc, Total	0.0060		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 10:15	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,1-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 07:41	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 07:41	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 07:41	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118	SW846 8260C			9/27/19 07:41	PDK	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 07:41	PDK	A
Dibromofluoromethane (S)	101		%	80 - 119	SW846 8260C			9/27/19 07:41	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 07:41	PDK	A

METALS

Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Barium, Total	0.23		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Calcium, Total	29.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Iron, Total	9.4		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Magnesium, Total	10.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Manganese, Total	0.31		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:54	AHI	C
Nickel, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.8		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Sodium, Total	7.8		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Zinc, Total	0.0030J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 10:30	SUB	D

Vanessa N. Badman

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Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,1-Dichloroethene	0.75U	U,3	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 08:03	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 08:03	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 08:03	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C			9/27/19 08:03	PDK	A
4-Bromofluorobenzene (S)	115	2	%	85 - 114	SW846 8260C			9/27/19 08:03	PDK	A
Dibromofluoromethane (S)	99.7		%	80 - 119	SW846 8260C			9/27/19 08:03	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 08:03	PDK	A

METALS

Aluminum, Total	0.049J	J	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Barium, Total	0.13		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Calcium, Total	33.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Chromium, Total	0.0033		mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Iron, Total	0.75		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Magnesium, Total	16.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Manganese, Total	0.011		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:55	AHI	C
Nickel, Total	0.0025J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	8.3		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Sodium, Total	7.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Zinc, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:30	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,1-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 18:45	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 18:45	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 18:45	TMP	A
1,2,3-Trichlorobenzene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118	SW846 8260C			9/27/19 18:45	TMP	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 18:45	TMP	A
Dibromofluoromethane (S)	99.2		%	80 - 119	SW846 8260C			9/27/19 18:45	TMP	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 18:45	TMP	A

METALS

Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Barium, Total	0.075		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Calcium, Total	21.1		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Cobalt, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Iron, Total	0.38		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Magnesium, Total	7.0		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Manganese, Total	0.14		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:56	AHI	C
Nickel, Total	0.0027J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Sodium, Total	7.0		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Zinc, Total	0.0032J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:50	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:02	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:02	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:02	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118			SW846 8260C			10/2/19 17:02	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:02	TMP	B
Dibromofluoromethane (S)	95.4		%	80 - 119			SW846 8260C			10/2/19 17:02	TMP	B
Toluene-d8 (S)	96		%	89 - 112			SW846 8260C			10/2/19 17:02	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Barium, Total	0.13		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Calcium, Total	30.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Iron, Total	0.16		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Magnesium, Total	13.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Manganese, Total	1.0		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:57	AHI	C
Nickel, Total	0.0052J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	9.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Sodium, Total	7.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Zinc, Total	0.0023J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 14:25	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,1-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 19:30	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 19:30	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 19:30	TMP	A
1,2,3-Trichlorobenzene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118			SW846 8260C			9/27/19 19:30	TMP	A
4-Bromofluorobenzene (S)	113		%	85 - 114			SW846 8260C			9/27/19 19:30	TMP	A
Dibromofluoromethane (S)	101		%	80 - 119			SW846 8260C			9/27/19 19:30	TMP	A
Toluene-d8 (S)	98.9		%	89 - 112			SW846 8260C			9/27/19 19:30	TMP	A
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Barium, Total	0.098		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Calcium, Total	28.1		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Chromium, Total	0.0015J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Cobalt, Total	0.010		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Iron, Total	0.80		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Magnesium, Total	12.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Manganese, Total	0.41		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:58	AHI	C
Nickel, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Sodium, Total	16.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Zinc, Total	0.0045J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 15:40	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:25	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:25	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:25	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118			SW846 8260C			10/2/19 17:25	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:25	TMP	B
Dibromofluoromethane (S)	96		%	80 - 119			SW846 8260C			10/2/19 17:25	TMP	B
Toluene-d8 (S)	96.2		%	89 - 112			SW846 8260C			10/2/19 17:25	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Barium, Total	0.082		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Calcium, Total	36.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Copper, Total	0.0022J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Iron, Total	0.045J	J	mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Magnesium, Total	13.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Manganese, Total	0.012		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:00	AHI	C
Nickel, Total	0.0023J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Sodium, Total	10.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Zinc, Total	0.0046J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 15:45	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:48	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:48	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:48	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118			SW846 8260C			10/2/19 17:48	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:48	TMP	B
Dibromofluoromethane (S)	97.7		%	80 - 119			SW846 8260C			10/2/19 17:48	TMP	B
Toluene-d8 (S)	96.2		%	89 - 112			SW846 8260C			10/2/19 17:48	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Barium, Total	0.12		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Calcium, Total	29.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Chromium, Total	0.00080J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Iron, Total	0.16		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Magnesium, Total	12.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Manganese, Total	0.97		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:13	AHI	C
Nickel, Total	0.0056J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	9.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Sodium, Total	6.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Vanadium, Total	0.00088J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Zinc, Total	0.0050J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:00	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3059461001	1	12TB01-20190919	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 181 and the control limits were 59 to 139.				
3059461001	2	12TB01-20190919	SW846 8260C	4-Bromofluorobenzene
The surrogate 4-Bromofluorobenzene for method SW846 8260C was outside of control limits. The % Recovery was reported as 115 and the control limits were 85 to 114. This result was reported at a dilution of 1.				
3059461001	3	12TB01-20190919	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 135 and the control limits were 71 to 131.				
3059461002	1	12MW020-20190919	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 181 and the control limits were 59 to 139.				
3059461002	2	12MW020-20190919	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 135 and the control limits were 71 to 131.				
3059461003	1	12MW02S-20190919	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 181 and the control limits were 59 to 139.				
3059461003	2	12MW02S-20190919	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 135 and the control limits were 71 to 131.				
3059461004	1	12MW04S-20190919	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 181 and the control limits were 59 to 139.				
3059461004	2	12MW04S-20190919	SW846 8260C	4-Bromofluorobenzene
The surrogate 4-Bromofluorobenzene for method SW846 8260C was outside of control limits. The % Recovery was reported as 115 and the control limits were 85 to 114. This result was reported at a dilution of 1.				
3059461004	3	12MW04S-20190919	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 135 and the control limits were 71 to 131.				
3059461005	1	12MW040-20190919	SW846 8260C	1,4-Dioxane
The Method Blank for method SW846 8260C reported a value greater than the reporting level for the analyte 1,4-Dioxane.				
3059461005	2	12MW040-20190919	SW846 8260C	1,2,3-Trichlorobenzene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,2,3-Trichlorobenzene. The % Recovery was reported as 64.8 and the control limits were 69 to 129.				
3059461006	4	12MW03S-20190919	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.				
3059461006	5	12MW03S-20190919	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.				
3059461007	1	12MW010-20190919	SW846 8260C	1,4-Dioxane
The Method Blank for method SW846 8260C reported a value greater than the reporting level for the analyte 1,4-Dioxane.				

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

3059461007	2	12MW010-20190919	SW846 8260C	1,2,3-Trichlorobenzene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,2,3-Trichlorobenzene. The % Recovery was reported as 64.8 and the control limits were 69 to 129.

3059461008	4	12MW01S-20190919	SW846 8260C	1,1-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.

3059461008	5	12MW01S-20190919	SW846 8260C	trans-1,2-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.

3059461009	4	12DUP01-20190919	SW846 8260C	1,1-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.

3059461009	5	12DUP01-20190919	SW846 8260C	trans-1,2-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Analysis Method	Prep Method
3059461001	12TB01-20190919	SW846 8260C	
3059461002	12MW020-20190919	SW846 6020A	SW846 3015
3059461002	12MW020-20190919	SW846 7470A	SW846 7470A
3059461002	12MW020-20190919	SW846 8260C	
3059461002	12MW020-20190919	Subcontract	
3059461003	12MW02S-20190919	SW846 6020A	SW846 3015
3059461003	12MW02S-20190919	SW846 7470A	SW846 7470A
3059461003	12MW02S-20190919	SW846 8260C	
3059461003	12MW02S-20190919	Subcontract	
3059461004	12MW04S-20190919	SW846 6020A	SW846 3015
3059461004	12MW04S-20190919	SW846 7470A	SW846 7470A
3059461004	12MW04S-20190919	SW846 8260C	
3059461004	12MW04S-20190919	Subcontract	
3059461005	12MW040-20190919	SW846 6020A	SW846 3015
3059461005	12MW040-20190919	SW846 7470A	SW846 7470A
3059461005	12MW040-20190919	SW846 8260C	
3059461005	12MW040-20190919	Subcontract	
3059461006	12MW03S-20190919	SW846 6020A	SW846 3015
3059461006	12MW03S-20190919	SW846 7470A	SW846 7470A
3059461006	12MW03S-20190919	SW846 8260C	
3059461006	12MW03S-20190919	Subcontract	
3059461007	12MW010-20190919	SW846 6020A	SW846 3015
3059461007	12MW010-20190919	SW846 7470A	SW846 7470A
3059461007	12MW010-20190919	SW846 8260C	
3059461007	12MW010-20190919	Subcontract	
3059461008	12MW01S-20190919	SW846 6020A	SW846 3015
3059461008	12MW01S-20190919	SW846 7470A	SW846 7470A
3059461008	12MW01S-20190919	SW846 8260C	
3059461008	12MW01S-20190919	Subcontract	
3059461009	12DUP01-20190919	SW846 6020A	SW846 3015
3059461009	12DUP01-20190919	SW846 7470A	SW846 7470A
3059461009	12DUP01-20190919	SW846 8260C	
3059461009	12DUP01-20190919	Subcontract	

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QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QC Batch: MDIG/80119 **Analysis Method:** SW846 7470A

QC Batch Method: SW846 7470A

Associated Lab Samples: 3059461002, 3059461003, 3059461004, 3059461005, 3059461006, 3059461007, 3059461008, 3059461009

METHOD BLANK: 3018753

Parameter	Blank Result	Units	Reporting Limit
Mercury, Total	0.00033U	mg/L	0.00050

LABORATORY CONTROL SAMPLE: 3018754

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Mercury, Total	96.5	mg/L	.002	0.0019	82 - 119

MATRIX SPIKE: 3018756 DUPLICATE: 3018757 ORIGINAL: 3059732003

****NOTE - The Original Result shown below is a raw result and is only used for the purpose of calculating Matrix Spike percent recoveries. This result is not a final value and cannot be used as such.

Parameter	Original Result	Units	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD
Mercury, Total	.00001	mg/L	.005	.00475	.00502	94.7	100	82 - 119	5.53	20

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QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QC Batch: MDIG/80150 **Analysis Method:** SW846 6020A

QC Batch Method: SW846 3015

Associated Lab Samples: 3059461002, 3059461003, 3059461004, 3059461005, 3059461006, 3059461007, 3059461008, 3059461009

METHOD BLANK: 3019442

Parameter	Blank Result	Units	Reporting Limit
Aluminum, Total	0.059U	mg/L	0.089
Antimony, Total	0.0015U	mg/L	0.0022
Arsenic, Total	0.0020U	mg/L	0.0030
Barium, Total	0.0037U	mg/L	0.0056
Beryllium, Total	0.00070U	mg/L	0.0010
Cadmium, Total	0.00070U	mg/L	0.0011
Calcium, Total	0.073U	mg/L	0.11
Chromium, Total	0.0015U	mg/L	0.0022
Cobalt, Total	0.0037U	mg/L	0.0056
Copper, Total	0.0037U	mg/L	0.0056
Iron, Total	0.019J	mg/L	0.056
Lead, Total	0.0015U	mg/L	0.0022
Magnesium, Total	0.073U	mg/L	0.11
Manganese, Total	0.0037U	mg/L	0.0056
Nickel, Total	0.0037U	mg/L	0.0056
Potassium, Total	0.073U	mg/L	0.11
Selenium, Total	0.0037U	mg/L	0.0056
Silver, Total	0.0015U	mg/L	0.0022
Sodium, Total	0.073U	mg/L	0.11
Thallium, Total	0.00070U	mg/L	0.0010
Vanadium, Total	0.0015U	mg/L	0.0022
Zinc, Total	0.0022J	mg/L	0.0056

LABORATORY CONTROL SAMPLE: 3019443

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Aluminum, Total	100	mg/L	2.2	2.2	84 - 117
Antimony, Total	98.3	mg/L	.22	0.22	85 - 117
Arsenic, Total	99.3	mg/L	.22	0.22	84 - 116
Barium, Total	89.9	mg/L	2.2	2.0	86 - 114
Beryllium, Total	96.3	mg/L	.22	0.21	83 - 121
Cadmium, Total	96	mg/L	.22	0.21	87 - 115
Calcium, Total	103	mg/L	2.2	2.3	87 - 118
Chromium, Total	98.9	mg/L	.22	0.22	85 - 116
Cobalt, Total	97.9	mg/L	.22	0.22	86 - 115

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Copper, Total	101	mg/L	.22	0.22	85 - 118
Iron, Total	103	mg/L	2.2	2.3	87 - 118
Lead, Total	97.3	mg/L	.22	0.22	88 - 115
Magnesium, Total	96.5	mg/L	2.2	2.1	83 - 118
Manganese, Total	101	mg/L	.22	0.22	87 - 115
Nickel, Total	99.7	mg/L	.22	0.22	85 - 117
Potassium, Total	99.7	mg/L	2.2	2.2	87 - 115
Selenium, Total	105	mg/L	.22	0.23	80 - 120
Silver, Total	93	mg/L	.11	0.10	85 - 116
Sodium, Total	107	mg/L	2.2	2.4	85 - 117
Thallium, Total	96.3	mg/L	.22	0.21	82 - 116
Vanadium, Total	99.2	mg/L	.22	0.22	86 - 115
Zinc, Total	98.5	mg/L	.22	0.22	83 - 119

LABORATORY CONTROL SAMPLE: 3019444

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Aluminum, Total	98	mg/L	2.2	2.2	84 - 117
Antimony, Total	101	mg/L	.22	0.22	85 - 117
Arsenic, Total	107	mg/L	.22	0.24	84 - 116
Barium, Total	94.6	mg/L	2.2	2.1	86 - 114
Beryllium, Total	93.9	mg/L	.22	0.21	83 - 121
Cadmium, Total	97.7	mg/L	.22	0.22	87 - 115
Calcium, Total	107	mg/L	2.2	2.4	87 - 118
Chromium, Total	95.8	mg/L	.22	0.21	85 - 116
Cobalt, Total	94.4	mg/L	.22	0.21	86 - 115
Copper, Total	96.6	mg/L	.22	0.21	85 - 118
Iron, Total	89.5	mg/L	2.2	2.0	87 - 118
Lead, Total	99.4	mg/L	.22	0.22	88 - 115
Magnesium, Total	86.5	mg/L	2.2	1.9	83 - 118
Manganese, Total	97.1	mg/L	.22	0.22	87 - 115
Nickel, Total	96.6	mg/L	.22	0.21	85 - 117
Potassium, Total	101	mg/L	2.2	2.2	87 - 115
Selenium, Total	108	mg/L	.22	0.24	80 - 120
Silver, Total	94.5	mg/L	.11	0.11	85 - 116
Sodium, Total	86.3	mg/L	2.2	1.9	85 - 117
Thallium, Total	98.3	mg/L	.22	0.22	82 - 116
Vanadium, Total	95.9	mg/L	.22	0.21	86 - 115
Zinc, Total	101	mg/L	.22	0.22	83 - 119

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

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QC Batch: VOMS/52445 **Analysis Method:** SW846 8260C

QC Batch Method: SW846 8260C

Associated Lab Samples: 3059461001, 3059461002, 3059461003, 3059461004

METHOD BLANK: 3017575

Parameter	Blank Result	Units	Reporting Limit
Acetone	3.8U	ug/L	5.0
Benzene	0.75U	ug/L	1.0
Bromochloromethane	0.75U	ug/L	1.0
Bromodichloromethane	0.75U	ug/L	1.0
Bromoform	0.75U	ug/L	1.0
Bromomethane	0.75U	ug/L	1.0
2-Butanone	3.8U	ug/L	5.0
Carbon Disulfide	0.75U	ug/L	1.0
Carbon Tetrachloride	0.75U	ug/L	1.0
Chlorobenzene	0.75U	ug/L	1.0
Chlorodibromomethane	0.75U	ug/L	1.0
Chloroethane	0.75U	ug/L	1.0
Chloroform	0.75U	ug/L	1.0
Chloromethane	0.75U	ug/L	1.0
Cyclohexane	0.75U	ug/L	1.0
1,2-Dibromo-3-chloropropane	2.5U	ug/L	5.0
1,2-Dibromoethane	0.75U	ug/L	1.0
1,2-Dichlorobenzene	0.75U	ug/L	1.0
1,3-Dichlorobenzene	0.75U	ug/L	1.0
1,4-Dichlorobenzene	0.75U	ug/L	1.0
Dichlorodifluoromethane	0.75U	ug/L	1.0
1,1-Dichloroethane	0.75U	ug/L	1.0
1,2-Dichloroethane	0.75U	ug/L	1.0
1,1-Dichloroethene	0.75U	ug/L	1.0
cis-1,2-Dichloroethene	0.75U	ug/L	1.0
trans-1,2-Dichloroethene	0.75U	ug/L	1.0
1,2-Dichloropropane	0.75U	ug/L	1.0
cis-1,3-Dichloropropene	0.75U	ug/L	1.0
trans-1,3-Dichloropropene	0.75U	ug/L	1.0
1,4-Dioxane	62.5U	ug/L	125
Ethylbenzene	0.75U	ug/L	1.0
Freon 113	0.75U	ug/L	1.0
2-Hexanone	3.8U	ug/L	5.0
Isopropylbenzene	0.75U	ug/L	1.0
Methyl acetate	0.75U	ug/L	1.0
Methyl cyclohexane	0.75U	ug/L	1.0
Methyl t-Butyl Ether	0.75U	ug/L	1.0

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

4-Methyl-2-Pentanone(MIBK)	3.8U	ug/L	5.0
Methylene Chloride	0.75U	ug/L	1.0
Styrene	0.75U	ug/L	1.0
1,1,2,2-Tetrachloroethane	0.75U	ug/L	1.0
Tetrachloroethene	0.75U	ug/L	1.0
Toluene	0.75U	ug/L	1.0
Total Xylenes	2.3U	ug/L	3.0
1,2,3-Trichlorobenzene	0.75U	ug/L	1.0
1,2,4-Trichlorobenzene	0.75U	ug/L	1.0
1,1,1-Trichloroethane	0.75U	ug/L	1.0
1,1,2-Trichloroethane	0.75U	ug/L	1.0
Trichloroethene	0.75U	ug/L	1.0
Trichlorofluoromethane	0.75U	ug/L	1.0
Vinyl Chloride	0.75U	ug/L	1.0
1,2-Dichloroethane-d4 (S)	103	%	81 - 118
4-Bromofluorobenzene (S)	112	%	85 - 114
Dibromofluoromethane (S)	99.3	%	80 - 119
Toluene-d8 (S)	99.9	%	89 - 112

LABORATORY CONTROL SAMPLE: 3017576

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Acetone	115	ug/L	100	115	39 - 160
Benzene	108	ug/L	20	21.5	79 - 120
Bromochloromethane	102	ug/L	20	20.5	78 - 123
Bromodichloromethane	107	ug/L	20	21.4	79 - 125
Bromoform	109	ug/L	20	21.8	66 - 130
Bromomethane	72.6	ug/L	20	14.5	53 - 141
2-Butanone	122	ug/L	100	122	56 - 143
Carbon Disulfide	104	ug/L	20	20.7	64 - 133
Carbon Tetrachloride	114	ug/L	20	22.9	72 - 136
Chlorobenzene	100	ug/L	20	20.1	82 - 118
Chlorodibromomethane	105	ug/L	20	20.9	74 - 126
Chloroethane	89	ug/L	20	17.8	60 - 138
Chloroform	103	ug/L	20	20.5	79 - 124
Chloromethane	95.9	ug/L	20	19.2	50 - 139
Cyclohexane	115	ug/L	20	23.0	71 - 130
1,2-Dibromo-3-chloropropane	98.8	ug/L	20	19.8	62 - 128
1,2-Dibromoethane	101	ug/L	20	20.3	77 - 121
1,2-Dichlorobenzene	102	ug/L	20	20.4	80 - 119
1,3-Dichlorobenzene	101	ug/L	20	20.3	80 - 119
1,4-Dichlorobenzene	97.6	ug/L	20	19.5	79 - 118
Dichlorodifluoromethane	90.1	ug/L	20	18.0	32 - 152

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

1,1-Dichloroethane	117	ug/L	20	23.4	77 - 125
1,2-Dichloroethane	104	ug/L	20	20.7	73 - 128
1,1-Dichloroethene	135*	ug/L	20	27.0	71 - 131
cis-1,2-Dichloroethene	105	ug/L	20	21.0	78 - 123
trans-1,2-Dichloroethene	122	ug/L	20	24.4	75 - 124
1,2-Dichloropropane	107	ug/L	20	21.5	78 - 122
cis-1,3-Dichloropropene	105	ug/L	20	21.0	75 - 124
trans-1,3-Dichloropropene	106	ug/L	20	21.1	73 - 127
1,4-Dioxane	181*	ug/L	500	903	59 - 139
Ethylbenzene	103	ug/L	20	20.7	79 - 121
Freon 113	105	ug/L	20	20.9	70 - 136
2-Hexanone	95	ug/L	100	95.0	57 - 139
Isopropylbenzene	114	ug/L	20	22.7	72 - 131
Methyl acetate	127	ug/L	20	25.4	56 - 136
Methyl cyclohexane	114	ug/L	20	22.7	72 - 132
Methyl t-Butyl Ether	109	ug/L	20	21.8	71 - 124
4-Methyl-2-Pentanone(MIBK)	97.1	ug/L	100	97.1	67 - 130
Methylene Chloride	110	ug/L	20	22.0	74 - 124
Styrene	108	ug/L	20	21.6	78 - 123
1,1,2,2-Tetrachloroethane	105	ug/L	20	21.0	71 - 121
Tetrachloroethene	106	ug/L	20	21.2	74 - 129
Toluene	104	ug/L	20	20.9	80 - 121
Total Xylenes	107	ug/L	60	64.0	79 - 121
1,2,3-Trichlorobenzene	89.7	ug/L	20	17.9	69 - 129
1,2,4-Trichlorobenzene	94	ug/L	20	18.8	69 - 130
1,1,1-Trichloroethane	116	ug/L	20	23.2	74 - 131
1,1,2-Trichloroethane	102	ug/L	20	20.4	80 - 119
Trichloroethene	101	ug/L	20	20.2	79 - 123
Trichlorofluoromethane	99.5	ug/L	20	19.9	65 - 141
Vinyl Chloride	97.6	ug/L	20	19.5	58 - 137
1,2-Dichloroethane-d4 (S)	98.2	%			81 - 118
4-Bromofluorobenzene (S)	108	%			85 - 114
Dibromofluoromethane (S)	99.3	%			80 - 119
Toluene-d8 (S)	97.7	%			89 - 112

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QC Batch: VOMS/52473 **Analysis Method:** SW846 8260C

QC Batch Method: SW846 8260C

Associated Lab Samples: 3059461005, 3059461006, 3059461007, 3059461008, 3059461009

METHOD BLANK: 3018649

Parameter	Blank Result	Units	Reporting Limit
Acetone	3.8U	ug/L	5.0
Benzene	0.75U	ug/L	1.0
Bromochloromethane	0.75U	ug/L	1.0
Bromodichloromethane	0.75U	ug/L	1.0
Bromoform	0.75U	ug/L	1.0
Bromomethane	0.75U	ug/L	1.0
2-Butanone	3.8U	ug/L	5.0
Carbon Disulfide	0.75U	ug/L	1.0
Carbon Tetrachloride	0.75U	ug/L	1.0
Chlorobenzene	0.75U	ug/L	1.0
Chlorodibromomethane	0.75U	ug/L	1.0
Chloroethane	0.75U	ug/L	1.0
Chloroform	0.75U	ug/L	1.0
Chloromethane	0.75U	ug/L	1.0
Cyclohexane	0.75U	ug/L	1.0
1,2-Dibromo-3-chloropropane	2.5U	ug/L	5.0
1,2-Dibromoethane	0.75U	ug/L	1.0
1,2-Dichlorobenzene	0.75U	ug/L	1.0
1,3-Dichlorobenzene	0.75U	ug/L	1.0
1,4-Dichlorobenzene	0.75U	ug/L	1.0
Dichlorodifluoromethane	0.75U	ug/L	1.0
1,1-Dichloroethane	0.75U	ug/L	1.0
1,2-Dichloroethane	0.75U	ug/L	1.0
1,1-Dichloroethene	0.75U	ug/L	1.0
cis-1,2-Dichloroethene	0.75U	ug/L	1.0
trans-1,2-Dichloroethene	0.75U	ug/L	1.0
1,2-Dichloropropane	0.75U	ug/L	1.0
cis-1,3-Dichloropropene	0.75U	ug/L	1.0
trans-1,3-Dichloropropene	0.75U	ug/L	1.0
1,4-Dioxane	73.7J	ug/L	125
Ethylbenzene	0.75U	ug/L	1.0
Freon 113	0.75U	ug/L	1.0
2-Hexanone	3.8U	ug/L	5.0
Isopropylbenzene	0.75U	ug/L	1.0
Methyl acetate	0.75U	ug/L	1.0
Methyl cyclohexane	0.75U	ug/L	1.0
Methyl t-Butyl Ether	0.75U	ug/L	1.0

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

4-Methyl-2-Pentanone(MIBK)	3.8U	ug/L	5.0
Methylene Chloride	0.75U	ug/L	1.0
Styrene	0.75U	ug/L	1.0
1,1,2,2-Tetrachloroethane	0.75U	ug/L	1.0
Tetrachloroethene	0.75U	ug/L	1.0
Toluene	0.75U	ug/L	1.0
Total Xylenes	2.3U	ug/L	3.0
1,2,3-Trichlorobenzene	0.75U	ug/L	1.0
1,2,4-Trichlorobenzene	0.75U	ug/L	1.0
1,1,1-Trichloroethane	0.75U	ug/L	1.0
1,1,2-Trichloroethane	0.75U	ug/L	1.0
Trichloroethene	0.75U	ug/L	1.0
Trichlorofluoromethane	0.75U	ug/L	1.0
Vinyl Chloride	0.75U	ug/L	1.0
1,2-Dichloroethane-d4 (S)	104	%	81 - 118
4-Bromofluorobenzene (S)	111	%	85 - 114
Dibromofluoromethane (S)	100	%	80 - 119
Toluene-d8 (S)	100	%	89 - 112

LABORATORY CONTROL SAMPLE: 3018650

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Acetone	105	ug/L	100	105	39 - 160
Benzene	105	ug/L	20	20.9	79 - 120
Bromochloromethane	105	ug/L	20	21.0	78 - 123
Bromodichloromethane	107	ug/L	20	21.4	79 - 125
Bromoform	101	ug/L	20	20.3	66 - 130
Bromomethane	86.6	ug/L	20	17.3	53 - 141
2-Butanone	89.2	ug/L	100	89.2	56 - 143
Carbon Disulfide	104	ug/L	20	20.9	64 - 133
Carbon Tetrachloride	110	ug/L	20	22.0	72 - 136
Chlorobenzene	98.4	ug/L	20	19.7	82 - 118
Chlorodibromomethane	103	ug/L	20	20.5	74 - 126
Chloroethane	101	ug/L	20	20.2	60 - 138
Chloroform	102	ug/L	20	20.4	79 - 124
Chloromethane	97.6	ug/L	20	19.5	50 - 139
Cyclohexane	110	ug/L	20	21.9	71 - 130
1,2-Dibromo-3-chloropropane	85.5	ug/L	20	17.1	62 - 128
1,2-Dibromoethane	101	ug/L	20	20.2	77 - 121
1,2-Dichlorobenzene	99.4	ug/L	20	19.9	80 - 119
1,3-Dichlorobenzene	99.6	ug/L	20	19.9	80 - 119
1,4-Dichlorobenzene	96.9	ug/L	20	19.4	79 - 118
Dichlorodifluoromethane	93.5	ug/L	20	18.7	32 - 152

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

1,1-Dichloroethane	113	ug/L	20	22.7	77 - 125
1,2-Dichloroethane	104	ug/L	20	20.8	73 - 128
1,1-Dichloroethene	129	ug/L	20	25.9	71 - 131
cis-1,2-Dichloroethene	103	ug/L	20	20.6	78 - 123
trans-1,2-Dichloroethene	119	ug/L	20	23.7	75 - 124
1,2-Dichloropropane	105	ug/L	20	20.9	78 - 122
cis-1,3-Dichloropropene	104	ug/L	20	20.8	75 - 124
trans-1,3-Dichloropropene	105	ug/L	20	21.0	73 - 127
1,4-Dioxane	318*	ug/L	500	1590	59 - 139
Ethylbenzene	98	ug/L	20	19.6	79 - 121
Freon 113	98.7	ug/L	20	19.7	70 - 136
2-Hexanone	86	ug/L	100	86.0	57 - 139
Isopropylbenzene	108	ug/L	20	21.6	72 - 131
Methyl acetate	108	ug/L	20	21.5	56 - 136
Methyl cyclohexane	107	ug/L	20	21.3	72 - 132
Methyl t-Butyl Ether	106	ug/L	20	21.1	71 - 124
4-Methyl-2-Pentanone(MIBK)	81.8	ug/L	100	81.8	67 - 130
Methylene Chloride	111	ug/L	20	22.2	74 - 124
Styrene	105	ug/L	20	21.0	78 - 123
1,1,2,2-Tetrachloroethane	96.6	ug/L	20	19.3	71 - 121
Tetrachloroethene	103	ug/L	20	20.5	74 - 129
Toluene	101	ug/L	20	20.3	80 - 121
Total Xylenes	103	ug/L	60	61.8	79 - 121
1,2,3-Trichlorobenzene	64.8*	ug/L	20	13.0	69 - 129
1,2,4-Trichlorobenzene	78.3	ug/L	20	15.7	69 - 130
1,1,1-Trichloroethane	111	ug/L	20	22.3	74 - 131
1,1,2-Trichloroethane	98.3	ug/L	20	19.7	80 - 119
Trichloroethene	98.1	ug/L	20	19.6	79 - 123
Trichlorofluoromethane	103	ug/L	20	20.5	65 - 141
Vinyl Chloride	101	ug/L	20	20.3	58 - 137
1,2-Dichloroethane-d4 (S)	104	%			81 - 118
4-Bromofluorobenzene (S)	109	%			85 - 114
Dibromofluoromethane (S)	98.9	%			80 - 119
Toluene-d8 (S)	98	%			89 - 112

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QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QC Batch: VOMS/52501 **Analysis Method:** SW846 8260C

QC Batch Method: SW846 8260C

Associated Lab Samples: 3059461006, 3059461008, 3059461009

METHOD BLANK: 3019576

Parameter	Blank Result	Units	Reporting Limit
Acetone	3.8U	ug/L	5.0
Benzene	0.75U	ug/L	1.0
Bromochloromethane	0.75U	ug/L	1.0
Bromodichloromethane	0.75U	ug/L	1.0
Bromoform	0.75U	ug/L	1.0
Bromomethane	0.75U	ug/L	1.0
2-Butanone	3.8U	ug/L	5.0
Carbon Disulfide	0.75U	ug/L	1.0
Carbon Tetrachloride	0.75U	ug/L	1.0
Chlorobenzene	0.75U	ug/L	1.0
Chlorodibromomethane	0.75U	ug/L	1.0
Chloroethane	0.75U	ug/L	1.0
Chloroform	0.75U	ug/L	1.0
Chloromethane	0.75U	ug/L	1.0
Cyclohexane	0.75U	ug/L	1.0
1,2-Dibromo-3-chloropropane	2.5U	ug/L	5.0
1,2-Dibromoethane	0.75U	ug/L	1.0
1,2-Dichlorobenzene	0.75U	ug/L	1.0
1,3-Dichlorobenzene	0.75U	ug/L	1.0
1,4-Dichlorobenzene	0.75U	ug/L	1.0
Dichlorodifluoromethane	0.75U	ug/L	1.0
1,1-Dichloroethane	0.75U	ug/L	1.0
1,2-Dichloroethane	0.75U	ug/L	1.0
1,1-Dichloroethene	0.75U	ug/L	1.0
cis-1,2-Dichloroethene	0.75U	ug/L	1.0
trans-1,2-Dichloroethene	0.75U	ug/L	1.0
1,2-Dichloropropane	0.75U	ug/L	1.0
cis-1,3-Dichloropropene	0.75U	ug/L	1.0
trans-1,3-Dichloropropene	0.75U	ug/L	1.0
1,4-Dioxane	62.5U	ug/L	125
Ethylbenzene	0.75U	ug/L	1.0
Freon 113	0.75U	ug/L	1.0
2-Hexanone	3.8U	ug/L	5.0
Isopropylbenzene	0.75U	ug/L	1.0
Methyl acetate	0.75U	ug/L	1.0
Methyl cyclohexane	0.75U	ug/L	1.0
Methyl t-Butyl Ether	0.75U	ug/L	1.0

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

4-Methyl-2-Pentanone(MIBK)	3.8U	ug/L	5.0
Methylene Chloride	0.75U	ug/L	1.0
Styrene	0.75U	ug/L	1.0
1,1,2,2-Tetrachloroethane	0.75U	ug/L	1.0
Tetrachloroethene	0.75U	ug/L	1.0
Toluene	0.75U	ug/L	1.0
Total Xylenes	2.3U	ug/L	3.0
1,2,3-Trichlorobenzene	0.75U	ug/L	1.0
1,2,4-Trichlorobenzene	0.75U	ug/L	1.0
1,1,1-Trichloroethane	0.75U	ug/L	1.0
1,1,2-Trichloroethane	0.75U	ug/L	1.0
Trichloroethene	0.75U	ug/L	1.0
Trichlorofluoromethane	0.75U	ug/L	1.0
Vinyl Chloride	0.75U	ug/L	1.0
1,2-Dichloroethane-d4 (S)	103	%	81 - 118
4-Bromofluorobenzene (S)	102	%	85 - 114
Dibromofluoromethane (S)	95.2	%	80 - 119
Toluene-d8 (S)	96	%	89 - 112

LABORATORY CONTROL SAMPLE: 3019577

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Acetone	93.2	ug/L	100	93.2	39 - 160
Benzene	112	ug/L	20	22.4	79 - 120
Bromochloromethane	110	ug/L	20	22.0	78 - 123
Bromodichloromethane	109	ug/L	20	21.8	79 - 125
Bromoform	99.6	ug/L	20	19.9	66 - 130
Bromomethane	100	ug/L	20	20.0	53 - 141
2-Butanone	104	ug/L	100	104	56 - 143
Carbon Disulfide	111	ug/L	20	22.2	64 - 133
Carbon Tetrachloride	117	ug/L	20	23.5	72 - 136
Chlorobenzene	104	ug/L	20	20.8	82 - 118
Chlorodibromomethane	109	ug/L	20	21.9	74 - 126
Chloroethane	102	ug/L	20	20.3	60 - 138
Chloroform	106	ug/L	20	21.3	79 - 124
Chloromethane	96.4	ug/L	20	19.3	50 - 139
Cyclohexane	119	ug/L	20	23.7	71 - 130
1,2-Dibromo-3-chloropropane	84.9	ug/L	20	17.0	62 - 128
1,2-Dibromoethane	107	ug/L	20	21.5	77 - 121
1,2-Dichlorobenzene	106	ug/L	20	21.2	80 - 119
1,3-Dichlorobenzene	103	ug/L	20	20.5	80 - 119
1,4-Dichlorobenzene	101	ug/L	20	20.2	79 - 118
Dichlorodifluoromethane	102	ug/L	20	20.4	32 - 152

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

1,1-Dichloroethane	120	ug/L	20	23.9	77 - 125
1,2-Dichloroethane	108	ug/L	20	21.6	73 - 128
1,1-Dichloroethene	133*	ug/L	20	26.7	71 - 131
cis-1,2-Dichloroethene	109	ug/L	20	21.8	78 - 123
trans-1,2-Dichloroethene	127*	ug/L	20	25.4	75 - 124
1,2-Dichloropropane	109	ug/L	20	21.8	78 - 122
cis-1,3-Dichloropropene	109	ug/L	20	21.8	75 - 124
trans-1,3-Dichloropropene	112	ug/L	20	22.4	73 - 127
1,4-Dioxane	131	ug/L	500	654	59 - 139
Ethylbenzene	107	ug/L	20	21.4	79 - 121
Freon 113	108	ug/L	20	21.5	70 - 136
2-Hexanone	93.5	ug/L	100	93.5	57 - 139
Isopropylbenzene	114	ug/L	20	22.7	72 - 131
Methyl acetate	121	ug/L	20	24.3	56 - 136
Methyl cyclohexane	96.4	ug/L	20	19.3	72 - 132
Methyl t-Butyl Ether	111	ug/L	20	22.2	71 - 124
4-Methyl-2-Pentanone(MIBK)	94.3	ug/L	100	94.3	67 - 130
Methylene Chloride	105	ug/L	20	21.0	74 - 124
Styrene	113	ug/L	20	22.5	78 - 123
1,1,2,2-Tetrachloroethane	106	ug/L	20	21.1	71 - 121
Tetrachloroethene	106	ug/L	20	21.2	74 - 129
Toluene	110	ug/L	20	22.1	80 - 121
Total Xylenes	110	ug/L	60	66.3	79 - 121
1,2,3-Trichlorobenzene	77	ug/L	20	15.4	69 - 129
1,2,4-Trichlorobenzene	83.9	ug/L	20	16.8	69 - 130
1,1,1-Trichloroethane	118	ug/L	20	23.6	74 - 131
1,1,2-Trichloroethane	106	ug/L	20	21.1	80 - 119
Trichloroethene	105	ug/L	20	21.1	79 - 123
Trichlorofluoromethane	115	ug/L	20	23.0	65 - 141
Vinyl Chloride	95.7	ug/L	20	19.1	58 - 137
1,2-Dichloroethane-d4 (S)	99	%			81 - 118
4-Bromofluorobenzene (S)	98.3	%			85 - 114
Dibromofluoromethane (S)	95.9	%			80 - 119
Toluene-d8 (S)	94.8	%			89 - 112

MATRIX SPIKE: 3021417 DUPLICATE: 3021418 ORIGINAL: 3059732003

****NOTE - The Original Result shown below is a raw result and is only used for the purpose of calculating Matrix Spike percent recoveries. This result is not a final value and cannot be used as such.

Parameter	Original Result	Units	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD
Acetone	6.78091	ug/L	100	77.3734	96.9778	70.6	90.2	39 - 160	22.5	30
Benzene	0	ug/L	20	23.0257	23.3729	115	117	79 - 120	1.5	30
Bromochloromethane	0	ug/L	20	22.4019	22.4061	112	112	78 - 123	.02	30
Bromodichloromethane	0	ug/L	20	21.758	22.1649	109	111	79 - 125	1.85	30

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Bromoform	0	ug/L	20	19.1656	19.1509	95.8	95.8	66 - 130	.08	30
Bromomethane	0	ug/L	20	14.106	13.6144	70.5	68.1	53 - 141	3.55	30
2-Butanone	0	ug/L	100	97.0821	101.091	97.1	101	56 - 143	4.05	30
Carbon Disulfide	0	ug/L	20	20.1791	23.3627	101	117	64 - 133	14.6	30
Carbon Tetrachloride	0	ug/L	20	24.3061	25.0379	122	125	72 - 136	2.97	30
Chlorobenzene	0	ug/L	20	21.0009	21.385	105	107	82 - 118	1.81	30
Chlorodibromomethane	0	ug/L	20	21.0716	21.689	105	108	74 - 126	2.89	30
Chloroethane	0	ug/L	20	21.7575	20.942	109	105	60 - 138	3.82	30
Chloroform	0	ug/L	20	21.128	22.0378	106	110	79 - 124	4.22	30
Chloromethane	0	ug/L	20	18.4146	20.3188	92.1	102	50 - 139	9.83	30
Cyclohexane	0	ug/L	20	25.49	25.8901	127	129	71 - 130	1.56	30
1,2-Dibromo-3-chloropropane	0	ug/L	20	15.4662	15.8921	77.3	79.5	62 - 128	2.72	30
1,2-Dibromoethane	0	ug/L	20	20.6183	21.1177	103	106	77 - 121	2.39	30
1,2-Dichlorobenzene	0	ug/L	20	21.2189	21.3694	106	107	80 - 119	.71	30
1,3-Dichlorobenzene	0	ug/L	20	20.9274	21.0204	105	105	80 - 119	.44	30
1,4-Dichlorobenzene	0	ug/L	20	20.3064	20.5656	102	103	79 - 118	1.27	30
Dichlorodifluoromethane	0	ug/L	20	20.3264	21.794	102	109	32 - 152	6.97	30
1,1-Dichloroethane	0	ug/L	20	21.6608	25.0952	108	125	77 - 125	14.7	30
1,2-Dichloroethane	0	ug/L	20	21.6242	21.9602	108	110	73 - 128	1.54	30
1,1-Dichloroethene	0	ug/L	20	24.3506	28.7066	122	144*	71 - 131	16.4	30
cis-1,2-Dichloroethene	0	ug/L	20	21.9021	22.6341	110	113	78 - 123	3.29	30
trans-1,2-Dichloroethene	0	ug/L	20	22.8504	27.1323	114	136*	75 - 124	17.1	30
1,2-Dichloropropane	0	ug/L	20	21.9139	22.3996	110	112	78 - 122	2.19	30
cis-1,3-Dichloropropene	0	ug/L	20	21.2202	21.8181	106	109	75 - 124	2.78	30
trans-1,3-Dichloropropene	0	ug/L	20	21.0313	21.9763	105	110	73 - 127	4.39	30
1,4-Dioxane	0	ug/L	500	411.513	709.425	82.3	142*	59 - 139	53.2	30
Ethylbenzene	0	ug/L	20	22.0618	22.3385	110	112	79 - 121	1.25	30
Freon 113	0	ug/L	20	20.7374	24.2014	104	121	70 - 136	15.4	30
2-Hexanone	0	ug/L	100	75.3079	76.1207	75.3	76.1	57 - 139	1.07	30
Isopropylbenzene	0	ug/L	20	23.3969	23.8285	117	119	72 - 131	1.83	30
Methyl acetate	0	ug/L	20	14.9428	17.3464	74.7	86.7	56 - 136	14.9	30
Methyl cyclohexane	0	ug/L	20	20.6309	20.8426	103	104	72 - 132	1.02	30
Methyl t-Butyl Ether	0	ug/L	20	18.4872	21.5488	92.4	108	71 - 124	15.3	30
4-Methyl-2-Pentanone(MIBK)	0	ug/L	100	87.0536	88.4863	87.1	88.5	67 - 130	1.63	30
Methylene Chloride	0	ug/L	20	18.597	21.5139	93	108	74 - 124	14.5	30
Styrene	0	ug/L	20	22.6856	22.9646	113	115	78 - 123	1.22	30
1,1,2,2-Tetrachloroethane	0	ug/L	20	20.6495	20.7382	103	104	71 - 121	.43	30
Tetrachloroethene	0	ug/L	20	19.5692	20.1502	97.8	101	74 - 129	2.93	30
Toluene	0	ug/L	20	22.3168	22.9743	112	115	80 - 121	2.9	30
Total Xylenes	0	ug/L	60	67.3108	68.5247	112	114	79 - 121	1.79	30
1,2,3-Trichlorobenzene	0	ug/L	20	13.5537	14.2395	67.8*	71.2	69 - 129	4.94	30
1,2,4-Trichlorobenzene	0	ug/L	20	15.1617	15.8784	75.8	79.4	69 - 130	4.62	30
1,1,1-Trichloroethane	0	ug/L	20	24.5524	24.9552	123	125	74 - 131	1.63	30
1,1,2-Trichloroethane	0	ug/L	20	20.8058	21.1006	104	106	80 - 119	1.41	30
Trichloroethene	0	ug/L	20	21.9576	22.0262	110	110	79 - 123	.31	30
Trichlorofluoromethane	0	ug/L	20	25.7036	25.5581	129	128	65 - 141	.57	30

QUALITY CONTROL DATA

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Vinyl Chloride	0	ug/L	20	19.267	20.3253	96.3	102	58 - 137	5.35	30
1,2-Dichloroethane-d4 (S)	99.1	%				99.1	100	81 - 118		
4-Bromofluorobenzene (S)	97.6	%				97.6	98.2	85 - 114		
Dibromofluoromethane (S)	96.1	%				96.1	96.4	80 - 119		
Toluene-d8 (S)	94.8	%				94.8	95.2	89 - 112		

QUALITY CONTROL DATA QUALIFIERS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

QUALITY CONTROL PARAMETER QUALIFIERS

Lab ID	#	Sample Type	Analytical Method	Analyte
3017576	1	Lab Control Standard	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 181 and the control limits were 59 to 139.				
3017576	2	Lab Control Standard	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 135 and the control limits were 71 to 131.				
3018649	3	Method Blank	SW846 8260C	1,4-Dioxane
The Method Blank for method SW846 8260C reported a value greater than the reporting level for the analyte 1,4-Dioxane.				
3018650	4	Lab Control Standard	SW846 8260C	1,4-Dioxane
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 318 and the control limits were 59 to 139.				
3018650	5	Lab Control Standard	SW846 8260C	1,2,3-Trichlorobenzene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,2,3-Trichlorobenzene. The % Recovery was reported as 64.8 and the control limits were 69 to 129.				
3019577	6	Lab Control Standard	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.				
3019577	7	Lab Control Standard	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.				

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
3059461001	12TB01-20190919			SW846 8260C	VOMS/52445
3059461002	12MW020-20190919			SW846 8260C	VOMS/52445
3059461003	12MW02S-20190919			SW846 8260C	VOMS/52445
3059461004	12MW04S-20190919			SW846 8260C	VOMS/52445
3059461005	12MW040-20190919			SW846 8260C	VOMS/52473
3059461007	12MW010-20190919			SW846 8260C	VOMS/52473
3059461002	12MW020-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461003	12MW02S-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461004	12MW04S-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461005	12MW040-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461006	12MW03S-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461007	12MW010-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461008	12MW01S-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461009	12DUP01-20190919	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059461002	12MW020-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461003	12MW02S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461004	12MW04S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461005	12MW040-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461006	12MW03S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461007	12MW010-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461008	12MW01S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461009	12DUP01-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059461002	12MW020-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461003	12MW02S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461004	12MW04S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461005	12MW040-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461006	12MW03S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461007	12MW010-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461008	12MW01S-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
3059461009	12DUP01-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059461002	12MW020-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70203
3059461009	12DUP01-20190919	SW846 3015	MDIG/80150	SW846 6020A	META/70203
3059461006	12MW03S-20190919			SW846 8260C	VOMS/52501
3059461008	12MW01S-20190919			SW846 8260C	VOMS/52501
3059461009	12DUP01-20190919			SW846 8260C	VOMS/52501

301 Fulling Mill Road
Middletown, PA 17057
P. 717-944-5541
F. 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #: 3

ALS Quote #:

* 3 0 5 9 4 6 1 *

Client Name: Tetra Tech

Address: 234 Mall Boulevard Suite 260 King of Prussia, PA 19406.

Contact: Tricia Moore

Phone#: 610 382 1171

Project Name/#: Willow Grove Sites 3 and 12

Bill To: Tetra Tech Foster Plaza 7

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

Date Required: Approved?

Email? ☐ -Y

Fax? ☐ -Y No.:

W.O. Temp: 4°C Therm ID: 402

Analyst Initials: JAS

Courier/Tracking #:

Purchase Order #:

Project Comments:

ALS Field Services: ☐ Pickup ☐ Labor ☐ Composite Sampling ☐ Rental Equipment

Other:

	Sample Description/Location (as it will appear on the lab report)	Date Collected mm/dd/yy	Time hh:mm	*G or C	**Matrix	40ml VOA Vial VOC's	125ml Poly Metals & Hg	1 Liter Poly Strontium-90	1 Liter Poly Uranium 235	1 Liter Poly Radium 226						Sample/COC Comments
						Container Type	VOA Vial	Poly	Poly	Poly	Poly					
						Container Size	40ml	125ml	1Liter	1Liter	1Liter					
						Preservative	HCl	HNO_3	HNO_3	HNO_3	HNO_3					
						ANALYSES/METHOD REQUESTED										
						Enter Number of Containers Per Sample or Field Results Below.										
1	TQ-TB01-20190919	9/19/19	0700	G	Aq	2										Laboratory Supplied
2	12MW02D-20190919	9/19/19	1015	G	GW	2	1	1	1	1						
3	12MW02S-20190919	9/19/19	1030	G	GW	2	1	1	1	1						
4	12MW04S-20190919	9/19/19	1230	G	GW	2	1	1	1	1						
5	12MW04D-20190919	9/19/19	1250	G	GW	2	1	1	1	1						
6	12MW03S-20190919	9/19/19	1425	G	GW	2	1	1	1	1						
7	12MW01D-20190919	9/19/19	1540	G	GW	2	1	1	1	1						
8	12MW01S-20190919	9/19/19	1545	G	GW	2	1	1	1	1						
9	12DUP01-20190919	9/19/19	1200	G	GW	2	1	1	1	1						
10																

SAMPLED BY (Please Print): Charles Meyer

Sampler Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Charles Meyer Tetra Tech	9/19/19	1350	2 [illegible]	9/20/19	1350
3 [illegible]	9/20/19	1800	4 COMMON COURIER / ALS COURIER		
5 COMMON COURIER / ALS COURIER			6 [illegible]	9/20/19	2145
7			8		
9			10		

Data Deliverables: ☑ Standard ☐ CLP-like ☐ USACE/DOD

Special Processing: USACE ☐

State Samples Collected In: ☐ NY ☐ NJ ☑ PA ☐ ☐ other

Reportable to PADEP? Yes ☐ No ☑

PWSID #

Sample Disposal: Lab ☑ Special ☐

EDDS: Format Type-

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

ALS SHIPPING ADDRESS: 301 Fulling Mill Road, Middletown, PA 17057

Rev 04/19

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

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
Tetra Tech	3059461	LW	9/23/19

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):	4							
Thermometer ID:	462							

Radiological (µCi): _____

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

Rev. 4/29/2019

Wednesday, October 30, 2019

Vanessa Badman
ALS Environmental
301 Fulling Mill Rd
Middletown, PA 17057

Re: ALS Workorder: 1909522
Project Name:
Project Number: 3059461

Dear Ms. Badman:

Eight water samples were received from ALS Environmental, on 9/25/2019. The samples were scheduled for the following analyses:

Isotopic Uranium
Radium-226
Strontium-90

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Jeff R. Kujawa
Project Manager

ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522
ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

Environmental www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1909522

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

Strontium-90:
The samples were analyzed for the presence of ^{90}Sr according to the current revision of SOP 724.

All acceptance criteria were met.

Isotopic Uranium:
The samples were analyzed for the presence of isotopic uranium according to the current revision of SOP 714.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1909522
Client Name: ALS Environmental
Client Project Name:
Client Project Number: 3059461
Client PO Number: 3059461

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
3059461002	1909522-1		WATER	19-Sep-19	10:15
3059461003	1909522-2		WATER	19-Sep-19	10:30
3059461004	1909522-3		WATER	19-Sep-19	12:30
3059461005	1909522-4		WATER	19-Sep-19	12:50
3059461006	1909522-5		WATER	19-Sep-19	14:25
3059461007	1909522-6		WATER	19-Sep-19	15:40
3059461008	1909522-7		WATER	19-Sep-19	15:45
3059461009	1909522-8		WATER	19-Sep-19	12:00

Analytical Laboratory Services, Inc.
Environmental • Industrial Hygiene • Field Services
34 Dogwood Lane • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #: 1909522 — 1 of 1
ALSI Quote #:

Client Name: ALS Environmental
Address: 34 Dogwood Lane, Middletown, PA 17057
Contact: Vanessa Badman
Phone#: (717) 944-5541
Project Name/#: E3280: 3059461
Bill To: ALS Environmental
TAT: [ ] Normal-Standard TAT is 10-12 business days. [X] Rush-Subject to ALSI approval and surcharges.
Date Required: 10/1/2019 Approved By:
Email? [x] -Y ALMDTSUBCONTRACT@ALSGloba
Fax? [ ] -Y No.:

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	Radium 226	Isotopic Ur-238	Strontium-90								Sample/COC Comments
Container Type					P	P	P								
Container Size					1 L	1L	1L								
Preservative					HNO3	HNO3	HNO3								
1 3059461 002	9/19/19	1015	G	WT	1	1	1								
2 3059461 003	9/19/19	1030	G	WT	1	1	1								
3 3059461 004	9/19/19	1230	G	WT	1	1	1								Subcontract: ALS Fort Collins
4 3059461 005	9/19/19	1250	G	WT	1	1	1								
5 3059461 006	9/19/19	1425	G	WT	1	1	1								
6 3059461 007	9/19/19	1540	G	WT	1	1	1								
7 3059461 008	9/19/19	1545	G	WT	1	1	1								
8 3059461 009	9/19/19	1200	G	WT	1	1	1								
9															
10															

Enter Number of Containers Per Sample or Field Results Below.

Receipt Information (completed by Receiving Lab)
Cooler Temp: ____ Therm. ID: ____
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 #:

ALSI 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			2		
3	09-24-19	1505	4 Emily Ryan	09-25-19	0955
5			6		
7			8		
9			10		

Data Deliverables: [ ] Standard [X] CLP-like [X] DOD [X] Internal COC
Special Processing: USACE [ ] Navy [ ] DOD [X]
State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC [ ] other
Reportable to PADEP? Yes [ ]
PWSID #
Sample Disposal: Lab [X] Special [ ]
EDDs: Format Type- CUSTOM EDD, See e-mail.

* 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

Copies: WHITE - ORIGINAL CANARY - CUSTOMER MAILING PINK - FILE GOLDENROD - CUSTOMER COPY Rev 5/05

ALS

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS_PA Workorder No: 1909522

Project Manager: JRK Initials: EM Date: 09.25.19

1. Are airbills / shipping documents present and/or removable?		DROP OFF	YES	NO
2. Are custody seals on **shipping** containers intact?		NONE	YES	NO *
3. Are custody seals on **sample** containers intact?		NONE	YES	NO *
4. Is there a COC (chain-of-custody) present?			YES	NO *
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)			YES	NO *
6. Are short-hold samples present?			YES	NO
7. Are all samples within holding times for the requested analyses?			YES	NO *
8. Were all sample containers received intact? (not broken or leaking)			YES	NO *
9. Is there sufficient sample for the requested analyses?			YES	NO *
10. Are all samples in the proper containers for the requested analyses?			YES	NO *
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)		N/A	YES	NO *
12. Are all aqueous non-preserved samples pH 4-9?		N/A	YES	NO *
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)		N/A	YES	NO
14. Were the samples shipped on ice?			YES	NO
15. Were cooler temperatures measured at 0.1-6.0°C?	IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	Amb.							
No. of custody seals on cooler:	Ø							
DOT Survey/ Acceptance Information — External µR/hr reading:	12							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

*** Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

All client bottle ID's vs ALS lab ID's double-checked by: NJ

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 9-27-19

Form 201r27.xls
(02/11/2019)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

After printing this label:
CONSIGNEE COPY - PLEASE PLACE IN FRONT OF POUCH
1. Fold the printed page along the horizontal line.
2. Place label in shipping pouch and affix it to your shipment.

ORIGIN ID:MDTA (717) 944-5541
NEIL BROCIOUS
ALS GLOBAL
301 FULLING MILL ROAD
SUITE A
MIDDLETOWN, PA 17057
UNITED STATES US

SHIP DATE: 24SEP19
ACTWGT: 15.00 LB MAN
CAD: 0218589/CAFE3310

BILL THIRD PARTY

TO ATTN:SAMPLE RECEIVING
ALS FORT COLLINS
225 COMMERCE DR

FORT COLLINS CO 80524
(970) 490-1511 REF:
INV:
PO: DEPT:

12-0
Amb

FedEx Express

565C1/9D04/05A2

WED - 25 SEP 3:00P
STANDARD OVERNIGHT

TRK# 0201 4798 9481 6126

NA FTCA

80524
CO-US DEN

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461002	**Lab ID:**	1909522-1
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 10:15	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*75.9*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	0.32 (+/- 0.12)		0.06	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.33)	U	0.67	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*97.4*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.34)	U	0.78	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*72*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461003	**Lab ID:**	1909522-2
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 10:30	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*94.9*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	ND (+/- 0.043)	U	0.072	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.3)	U	0.54	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*96.2*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.3)	U	0.67	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*92.9*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461004	**Lab ID:**	1909522-3
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 12:30	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*70.5*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	0.123 (+/- 0.076)		0.077	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.17)	U	0.25	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*99.4*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.28)	U	0.6	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*94.2*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461005	**Lab ID:**	1909522-4
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 12:50	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*66.7*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	ND (+/- 0.039)	U	0.098	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.17)	U	0.25	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*99.3*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.27)	U	0.59	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*94.3*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461006	**Lab ID:**	1909522-5
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 14:25	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*73.7*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	ND (+/- 0.049)	U	0.067	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.17)	U	0.32	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*97.7*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.38)	U	0.85	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*72*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461007	**Lab ID:**	1909522-6
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 15:40	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	68.5		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	ND (+/- 0.038)	U	0.081	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.2)	U	0.3	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*97*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.3)	U	0.65	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*91.2*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461008	**Lab ID:**	1909522-7
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 15:45	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*72.6*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	0.115 (+/- 0.072)		0.066	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.25)	U	0.48	pCi/l	NA	10/23/2019 11:39
Carr: BARIUM	*95.5*		*40-110*	*%REC*	DL = NA	10/23/2019 11:39
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.28)	U	0.61	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*91.9*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461009	**Lab ID:**	1909522-8
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 12:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*78.2*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	0.082 (+/- 0.056)		0.025	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.24)	U	0.49	pCi/l	NA	10/23/2019 11:57
Carr: BARIUM	*98.3*		*40-110*	*%REC*	DL = NA	10/23/2019 11:57
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/14/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.32)	U	0.76	pCi/l	NA	10/18/2019 10:13
Carr: STRONTIUM	*74.1*		*40-110*	*%REC*	DL = NA	10/18/2019 10:13

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059461	**Work Order:**	1909522
Sample ID:	3059461009	**Lab ID:**	1909522-8
Legal Location:		**Matrix:**	WATER
Collection Date:	9/19/2019 12:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110 %. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15 % of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: RE191016-1-2 Instrument ID Alpha Scin Method: Radium-226 by Radon Emanation

LCS Sample ID: RE191016-1 Units: pCi/l Analysis Date: 10/23/2019 12:16

Client ID: Run ID: RE191016-1A Prep Date: 10/16/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	33 (+/-8.4)	0.3	46.47		70.9	67-120					P
Carr: BARIUM	17510		17810		98.3	40-110					

MB Sample ID: RE191016-1 Units: pCi/l Analysis Date: 10/23/2019 12:16

Client ID: Run ID: RE191016-1A Prep Date: 10/16/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.5									U
Carr: BARIUM	16850		17800		94.6	40-110					

The following samples were analyzed in this batch:

1909522-1	1909522-2	1909522-3
1909522-4	1909522-5	1909522-6
1909522-7	1909522-8	

Client: ALS Environmental
Work Order: 1909522
Project: 3059461

QC BATCH REPORT

Batch ID: AS191017-1-6 Instrument ID AlphaSpec2 Method: Isotopic Uranium by Alpha Spec

LCS Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/25/2019 14:27
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-234	4.44 (+/-0.73)	0.02	4.22		105	82-122					P
U-238	4.41 (+/-0.73)	0.03	4.382		101	78-126					P
Tracer: U-232	3.6	0.04	4.565		78.9	30-110					

LCSD Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/25/2019 14:27
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-234	4.2 (+/-0.69)	0.03	4.22		99.5	82-122		4.44	0.2	2.1	P
U-238	4.43 (+/-0.73)	0.03	4.382		101	78-126		4.41	0.03	2.1	P
Tracer: U-232	3.69	0.03	4.565		80.9	30-110		3.6			

MB Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/28/2019 13:33
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-238	ND	0.016									U
Tracer: U-232	3.56	0.03	4.564		78	30-110					

The following samples were analyzed in this batch:

1909522-1	1909522-2	1909522-3
1909522-4	1909522-5	1909522-6
1909522-7	1909522-8	

Client: ALS Environmental
Work Order: 1909522
Project: 3059461

QC BATCH REPORT

Batch ID: SR191014-1-1 Instrument ID LB4100-C Method: Strontium-90 by GFPC

LCS Sample ID: SR191014-1 Units: pCi/l Analysis Date: 10/18/2019 11:58
Client ID: Run ID: SR191014-1A Prep Date: 10/14/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	11.9 (+/-3.1)	1.1	11.54		103	75-125					P,M3
Carr: STRONTIUM	987.3		1052		93.9	40-110					

LCSD Sample ID: SR191014-1 Units: pCi/l Analysis Date: 10/18/2019 11:58
Client ID: Run ID: SR191014-1A Prep Date: 10/14/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	12.9 (+/-3.3)	1.2	11.54		112	75-125		11.9	0.2	2.1	P,M3
Carr: STRONTIUM	937.8		1052		89.2	40-110		987.3			

MB Sample ID: SR191014-1 Units: pCi/l Analysis Date: 10/18/2019 10:13
Client ID: Run ID: SR191014-1A Prep Date: 10/14/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	ND	0.68									U
Carr: STRONTIUM	924.7		1052		87.9	40-110					

The following samples were analyzed in this batch:

1909522-1	1909522-2	1909522-3
1909522-4	1909522-5	1909522-6
1909522-7	1909522-8	

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

October 31, 2019

Ms. Tricia Moore
Tetra Tech Inc

Certificate of Analysis

Project Name:	**Form Naval Air Station JRB/Willow Grove**	Workorder:	**3059732**
Purchase Order:		Workorder ID:	**EPR033|Willow Grove Sites 3 a**

Dear Ms. Moore:

Enclosed are the analytical results for samples received by the laboratory on Tuesday, September 24, 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 Mrs. Vanessa N Badman (Project Coordinator) at (717) 944-5541.

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

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

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

CC: Ms. Amy Thompson , Mr. Rick Carr , Ms. Megan Ritchie

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

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

ALS Environmental

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SAMPLE SUMMARY

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3059732001	TB05-20190920	Water	9/20/2019 18:00	9/24/2019 21:22	Collected by Client
3059732002	RB02-20190920	Water	9/20/2019 18:10	9/24/2019 21:22	Collected by Client
3059732003	03MW02-20190923	Water	9/23/2019 11:45	9/24/2019 21:22	Collected by Client

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SAMPLE SUMMARY

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

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

PROJECT SUMMARY

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Workorder Comments

Please see attached subcontracting from ALS Ft. Collins. VNB 9/25/19

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732001** Date Collected: 9/20/2019 18:00 Matrix: Water

Sample ID: **TB05-20190920** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:17	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Bromomethane	0.40J	J	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:17	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 16:17	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,1-Dichloroethene	0.75U	U,1	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
trans-1,2-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 16:17	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:17	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732001** Date Collected: 9/20/2019 18:00 Matrix: Water

Sample ID: **TB05-20190920** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:17	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C		10/2/19 16:17	TMP	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:17	TMP	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118	SW846 8260C		10/2/19 16:17	TMP	A
4-Bromofluorobenzene (S)	105		%	85 - 114	SW846 8260C		10/2/19 16:17	TMP	A
Dibromofluoromethane (S)	95.7		%	80 - 119	SW846 8260C		10/2/19 16:17	TMP	A
Toluene-d8 (S)	97		%	89 - 112	SW846 8260C		10/2/19 16:17	TMP	A

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732002** Date Collected: 9/20/2019 18:10 Matrix: Water

Sample ID: **RB02-20190920** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:39	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:39	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 16:39	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,1-Dichloroethene	0.75U	U,1	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
trans-1,2-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 16:39	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 16:39	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 16:39	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732002** Date Collected: 9/20/2019 18:10 Matrix: Water

Sample ID: **RB02-20190920** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 16:39	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 16:39	TMP	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 16:39	TMP	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	104		%	81 - 118			SW846 8260C			10/2/19 16:39	TMP	A
4-Bromofluorobenzene (S)	106		%	85 - 114			SW846 8260C			10/2/19 16:39	TMP	A
Dibromofluoromethane (S)	95.7		%	80 - 119			SW846 8260C			10/2/19 16:39	TMP	A
Toluene-d8 (S)	96.7		%	89 - 112			SW846 8260C			10/2/19 16:39	TMP	A
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 15:36	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 15:36	LXC	C1
Barium, Total	0.032		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Calcium, Total	30.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Iron, Total	0.021J	J	mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Magnesium, Total	7.3		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Manganese, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:14	AHI	C
Nickel, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732002** Date Collected: 9/20/2019 18:10 Matrix: Water

Sample ID: **RB02-20190920** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	2.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Sodium, Total	17.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 15:36	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:24	LXC	C1
Zinc, Total	0.13		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 10:11	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/20/19 18:10	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732003** Date Collected: 9/23/2019 11:45 Matrix: Water

Sample ID: **03MW02-20190923** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	6.8		ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 18:10	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 18:10	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 18:10	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,1-Dichloroethene	0.75U	U,1,2	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
trans-1,2-Dichloroethene	0.75U	U,3,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
1,4-Dioxane	62.5U	U,6,7	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 18:10	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 18:10	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 18:10	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732003** Date Collected: 9/23/2019 11:45 Matrix: Water

Sample ID: **03MW02-20190923** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 18:10	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 18:10	TMP	A
1,2,3-Trichlorobenzene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 18:10	TMP	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118			SW846 8260C			10/2/19 18:10	TMP	A
4-Bromofluorobenzene (S)	102		%	85 - 114			SW846 8260C			10/2/19 18:10	TMP	A
Dibromofluoromethane (S)	95.7		%	80 - 119			SW846 8260C			10/2/19 18:10	TMP	A
Toluene-d8 (S)	96.7		%	89 - 112			SW846 8260C			10/2/19 18:10	TMP	A
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	10/4/19	AHI	10/9/19 17:21	MO	G1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Barium, Total	0.12		mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Calcium, Total	13.3		mg/L	0.11	0.073	0.037	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Chromium, Total	0.0012J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Iron, Total	0.028J	J	mg/L	0.056	0.037	0.019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Magnesium, Total	4.9		mg/L	0.11	0.073	0.037	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Manganese, Total	0.0033J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 17:21	MO	G1

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID: **3059732003** Date Collected: 9/23/2019 11:45 Matrix: Water

Sample ID: **03MW02-20190923** Date Received: 9/24/2019 21:22

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:15	AHI	G
Nickel, Total	0.0039J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Potassium, Total	0.74		mg/L	0.11	0.073	0.037	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Sodium, Total	8.1	8	mg/L	0.11	0.073	0.037	SW846 6020A	10/4/19	AHI	10/9/19 17:21	MO	G1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
Zinc, Total	0.017		mg/L	0.0056	0.0037	0.0019	SW846 6020A	10/4/19	AHI	10/9/19 13:27	MO	G1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/23/19 11:45	SUB	J

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

PARAMETER QUALIFIERS

Lab ID	#	Sample ID	Analytical Method	Analyte
3059732001	1	TB05-20190920	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.				
3059732001	2	TB05-20190920	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.				
3059732002	1	RB02-20190920	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.				
3059732002	2	RB02-20190920	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.				
3059732003	1	03MW02-20190923	SW846 8260C	1,1-Dichloroethene
The QC sample type MSD for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 144 and the control limits were 71 to 131.				
3059732003	2	03MW02-20190923	SW846 8260C	1,1-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.				
3059732003	3	03MW02-20190923	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type MSD for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 136 and the control limits were 75 to 124.				
3059732003	4	03MW02-20190923	SW846 8260C	trans-1,2-Dichloroethene
The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.				
3059732003	5	03MW02-20190923	SW846 8260C	1,2,3-Trichlorobenzene
The QC sample type MS for method SW846 8260C was outside the control limits for the analyte 1,2,3-Trichlorobenzene. The % Recovery was reported as 67.8 and the control limits were 69 to 129.				
3059732003	6	03MW02-20190923	SW846 8260C	1,4-Dioxane
The QC sample type MSD for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The RPD was reported as 53.2 and the upper control limit is 30.				
3059732003	7	03MW02-20190923	SW846 8260C	1,4-Dioxane
The QC sample type MSD for method SW846 8260C was outside the control limits for the analyte 1,4-Dioxane. The % Recovery was reported as 142 and the control limits were 59 to 139.				
3059732003	8	03MW02-20190923	SW846 6020A	Sodium, Total
One of the two matrix spike analyses performed on this sample failed to meet acceptable recovery limits. The other matrix spike was within acceptable recovery limits. Matrix interferences are the possible cause for the failure.				

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ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID	Sample ID	Analysis Method	Prep Method
3059732001	TB05-20190920	SW846 8260C	
3059732002	RB02-20190920	SW846 6020A	SW846 3015
3059732002	RB02-20190920	SW846 7470A	SW846 7470A
3059732002	RB02-20190920	SW846 8260C	
3059732002	RB02-20190920	Subcontract	
3059732003	03MW02-20190923	SW846 6020A	SW846 3015
3059732003	03MW02-20190923	SW846 7470A	SW846 7470A
3059732003	03MW02-20190923	SW846 8260C	
3059732003	03MW02-20190923	Subcontract	

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QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

QC Batch: MDIG/80119 **Analysis Method:** SW846 7470A

QC Batch Method: SW846 7470A

Associated Lab Samples: 3059732002, 3059732003

METHOD BLANK: 3018753

Parameter	Blank Result	Units	Reporting Limit
Mercury, Total	0.00033U	mg/L	0.00050

LABORATORY CONTROL SAMPLE: 3018754

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Mercury, Total	96.5	mg/L	.002	0.0019	82 - 119

MATRIX SPIKE: 3018756 DUPLICATE: 3018757 ORIGINAL: 3059732003

****NOTE - The Original Result shown below is a raw result and is only used for the purpose of calculating Matrix Spike percent recoveries. This result is not a final value and cannot be used as such.

Parameter	Original Result	Units	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD
Mercury, Total	.00001	mg/L	.005	.00475	.00502	94.7	100	82 - 119	5.53	20

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QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

QC Batch: MDIG/80150 **Analysis Method:** SW846 6020A

QC Batch Method: SW846 3015

Associated Lab Samples: 3059732002

METHOD BLANK: 3019442

Parameter	Blank Result	Units	Reporting Limit
Aluminum, Total	0.059U	mg/L	0.089
Antimony, Total	0.0015U	mg/L	0.0022
Arsenic, Total	0.0020U	mg/L	0.0030
Barium, Total	0.0037U	mg/L	0.0056
Beryllium, Total	0.00070U	mg/L	0.0010
Cadmium, Total	0.00070U	mg/L	0.0011
Calcium, Total	0.073U	mg/L	0.11
Chromium, Total	0.0015U	mg/L	0.0022
Cobalt, Total	0.0037U	mg/L	0.0056
Copper, Total	0.0037U	mg/L	0.0056
Iron, Total	0.019J	mg/L	0.056
Lead, Total	0.0015U	mg/L	0.0022
Magnesium, Total	0.073U	mg/L	0.11
Manganese, Total	0.0037U	mg/L	0.0056
Nickel, Total	0.0037U	mg/L	0.0056
Potassium, Total	0.073U	mg/L	0.11
Selenium, Total	0.0037U	mg/L	0.0056
Silver, Total	0.0015U	mg/L	0.0022
Sodium, Total	0.073U	mg/L	0.11
Thallium, Total	0.00070U	mg/L	0.0010
Vanadium, Total	0.0015U	mg/L	0.0022
Zinc, Total	0.0022J	mg/L	0.0056

LABORATORY CONTROL SAMPLE: 3019443

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Aluminum, Total	100	mg/L	2.2	2.2	84 - 117
Antimony, Total	98.3	mg/L	.22	0.22	85 - 117
Arsenic, Total	99.3	mg/L	.22	0.22	84 - 116
Barium, Total	89.9	mg/L	2.2	2.0	86 - 114
Beryllium, Total	96.3	mg/L	.22	0.21	83 - 121
Cadmium, Total	96	mg/L	.22	0.21	87 - 115
Calcium, Total	103	mg/L	2.2	2.3	87 - 118
Chromium, Total	98.9	mg/L	.22	0.22	85 - 116
Cobalt, Total	97.9	mg/L	.22	0.22	86 - 115

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Copper, Total	101	mg/L	.22	0.22	85 - 118
Iron, Total	103	mg/L	2.2	2.3	87 - 118
Lead, Total	97.3	mg/L	.22	0.22	88 - 115
Magnesium, Total	96.5	mg/L	2.2	2.1	83 - 118
Manganese, Total	101	mg/L	.22	0.22	87 - 115
Nickel, Total	99.7	mg/L	.22	0.22	85 - 117
Potassium, Total	99.7	mg/L	2.2	2.2	87 - 115
Selenium, Total	105	mg/L	.22	0.23	80 - 120
Silver, Total	93	mg/L	.11	0.10	85 - 116
Sodium, Total	107	mg/L	2.2	2.4	85 - 117
Thallium, Total	96.3	mg/L	.22	0.21	82 - 116
Vanadium, Total	99.2	mg/L	.22	0.22	86 - 115
Zinc, Total	98.5	mg/L	.22	0.22	83 - 119

LABORATORY CONTROL SAMPLE: 3019444

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Aluminum, Total	98	mg/L	2.2	2.2	84 - 117
Antimony, Total	101	mg/L	.22	0.22	85 - 117
Arsenic, Total	107	mg/L	.22	0.24	84 - 116
Barium, Total	94.6	mg/L	2.2	2.1	86 - 114
Beryllium, Total	93.9	mg/L	.22	0.21	83 - 121
Cadmium, Total	97.7	mg/L	.22	0.22	87 - 115
Calcium, Total	107	mg/L	2.2	2.4	87 - 118
Chromium, Total	95.8	mg/L	.22	0.21	85 - 116
Cobalt, Total	94.4	mg/L	.22	0.21	86 - 115
Copper, Total	96.6	mg/L	.22	0.21	85 - 118
Iron, Total	89.5	mg/L	2.2	2.0	87 - 118
Lead, Total	99.4	mg/L	.22	0.22	88 - 115
Magnesium, Total	86.5	mg/L	2.2	1.9	83 - 118
Manganese, Total	97.1	mg/L	.22	0.22	87 - 115
Nickel, Total	96.6	mg/L	.22	0.21	85 - 117
Potassium, Total	101	mg/L	2.2	2.2	87 - 115
Selenium, Total	108	mg/L	.22	0.24	80 - 120
Silver, Total	94.5	mg/L	.11	0.11	85 - 116
Sodium, Total	86.3	mg/L	2.2	1.9	85 - 117
Thallium, Total	98.3	mg/L	.22	0.22	82 - 116
Vanadium, Total	95.9	mg/L	.22	0.21	86 - 115
Zinc, Total	101	mg/L	.22	0.22	83 - 119

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QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

QC Batch: MDIG/80256 **Analysis Method:** SW846 6020A

QC Batch Method: SW846 3015

Associated Lab Samples: 3059732003

METHOD BLANK: 3023073

Parameter	Blank Result	Units	Reporting Limit
Aluminum, Total	0.059U	mg/L	0.089
Antimony, Total	0.0015U	mg/L	0.0022
Arsenic, Total	0.0020U	mg/L	0.0030
Barium, Total	0.0037U	mg/L	0.0056
Beryllium, Total	0.00070U	mg/L	0.0010
Cadmium, Total	0.00070U	mg/L	0.0011
Calcium, Total	0.073U	mg/L	0.11
Chromium, Total	0.0015U	mg/L	0.0022
Cobalt, Total	0.0037U	mg/L	0.0056
Copper, Total	0.0037U	mg/L	0.0056
Iron, Total	0.037U	mg/L	0.056
Lead, Total	0.0015U	mg/L	0.0022
Magnesium, Total	0.073U	mg/L	0.11
Manganese, Total	0.0020J	mg/L	0.0056
Nickel, Total	0.0037U	mg/L	0.0056
Potassium, Total	0.073U	mg/L	0.11
Selenium, Total	0.0037U	mg/L	0.0056
Silver, Total	0.0015U	mg/L	0.0022
Sodium, Total	0.073U	mg/L	0.11
Thallium, Total	0.00070U	mg/L	0.0010
Vanadium, Total	0.0015U	mg/L	0.0022
Zinc, Total	0.0021J	mg/L	0.0056

LABORATORY CONTROL SAMPLE: 3023074

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Aluminum, Total	92.4	mg/L	2.2	2.1	84 - 117
Antimony, Total	103	mg/L	.22	0.23	85 - 117
Arsenic, Total	98.9	mg/L	.22	0.22	84 - 116
Barium, Total	103	mg/L	2.2	2.3	86 - 114
Beryllium, Total	92	mg/L	.22	0.20	83 - 121
Cadmium, Total	95.2	mg/L	.22	0.21	87 - 115
Calcium, Total	92.4	mg/L	2.2	2.1	87 - 118
Chromium, Total	86.9	mg/L	.22	0.19	85 - 116
Cobalt, Total	100	mg/L	.22	0.22	86 - 115

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Copper, Total	91.8	mg/L	.22	0.20	85 - 118
Iron, Total	98.1	mg/L	2.2	2.2	87 - 118
Lead, Total	96.2	mg/L	.22	0.21	88 - 115
Magnesium, Total	96.7	mg/L	2.2	2.1	83 - 118
Manganese, Total	94.2	mg/L	.22	0.21	87 - 115
Nickel, Total	91.6	mg/L	.22	0.20	85 - 117
Potassium, Total	93.6	mg/L	2.2	2.1	87 - 115
Selenium, Total	95.8	mg/L	.22	0.21	80 - 120
Silver, Total	90.7	mg/L	.11	0.10	85 - 116
Sodium, Total	95	mg/L	2.2	2.1	85 - 117
Thallium, Total	94.5	mg/L	.22	0.21	82 - 116
Vanadium, Total	92.6	mg/L	.22	0.21	86 - 115
Zinc, Total	93.6	mg/L	.22	0.21	83 - 119

MATRIX SPIKE: 3023084 DUPLICATE: 3023085 ORIGINAL: 3059732003

****NOTE - The Original Result shown below is a raw result and is only used for the purpose of calculating Matrix Spike percent recoveries. This result is not a final value and cannot be used as such.

Parameter	Original Result	Units	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD
Aluminum, Total	.0062	mg/L	2.2	2.08143	2.04838	93.4	91.9	84 - 117	1.6	20
Antimony, Total	.00037	mg/L	.22	.23228	.235	104	106	85 - 117	1.16	20
Arsenic, Total	.00065	mg/L	.22	.22527	.22972	101	103	84 - 116	1.96	20
Barium, Total	.11913	mg/L	2.2	2.47093	2.50282	106	107	86 - 114	1.28	20
Beryllium, Total	.00017	mg/L	.22	.2125	.21217	95.5	95.4	83 - 121	.15	20
Cadmium, Total	.0002	mg/L	.22	.21315	.21869	95.8	98.3	87 - 115	2.56	20
Calcium, Total	13.27397	mg/L	2.2	15.54359	15.28387	NC	NC	87 - 118	1.68	20
Chromium, Total	.00117	mg/L	.22	.20168	.21468	90.2	96.1	85 - 116	6.25	20
Cobalt, Total	.00023	mg/L	.22	.23333	.21868	105	98.3	86 - 115	6.48	20
Copper, Total	.0006	mg/L	.22	.21543	.20744	96.7	93.1	85 - 118	3.78	20
Iron, Total	.02822	mg/L	2.2	2.17832	2.21107	96.8	98.2	87 - 118	1.49	20
Lead, Total	.00066	mg/L	.22	.21739	.22312	97.5	100	88 - 115	2.6	20
Magnesium, Total	4.89885	mg/L	2.2	7.05877	7.02009	97.2	95.5	83 - 115	.55	20
Manganese, Total	.00333	mg/L	.22	.21364	.21704	94.6	96.2	87 - 115	1.58	20
Nickel, Total	.00388	mg/L	.22	.21764	.20993	96.2	92.7	85 - 117	3.61	20
Potassium, Total	.73933	mg/L	2.2	2.76181	2.78457	91	92	87 - 115	.82	20
Selenium, Total	.00099	mg/L	.22	.21863	.22876	97.9	102	80 - 120	4.53	20
Silver, Total	.0001	mg/L	.11	.1027	.10443	92.3	93.9	85 - 116	1.67	20
Sodium, Total	8.0652	mg/L	2.2	9.95891	9.47577	85.2	63.5*	85 - 117	4.97	20
Thallium, Total	.00022	mg/L	.22	.21359	.22112	96	99.4	82 - 116	3.46	20
Vanadium, Total	.00028	mg/L	.22	.21263	.21514	95.6	96.7	86 - 115	1.17	20
Zinc, Total	.01692	mg/L	.22	.21886	.20851	90.9	86.2	83 - 119	4.84	20

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

QC Batch: VOMS/52501 **Analysis Method:** SW846 8260C

QC Batch Method: SW846 8260C

Associated Lab Samples: 3059732001, 3059732002, 3059732003

METHOD BLANK: 3019576

Parameter	Blank Result	Units	Reporting Limit
Acetone	3.8U	ug/L	5.0
Benzene	0.75U	ug/L	1.0
Bromochloromethane	0.75U	ug/L	1.0
Bromodichloromethane	0.75U	ug/L	1.0
Bromoform	0.75U	ug/L	1.0
Bromomethane	0.75U	ug/L	1.0
2-Butanone	3.8U	ug/L	5.0
Carbon Disulfide	0.75U	ug/L	1.0
Carbon Tetrachloride	0.75U	ug/L	1.0
Chlorobenzene	0.75U	ug/L	1.0
Chlorodibromomethane	0.75U	ug/L	1.0
Chloroethane	0.75U	ug/L	1.0
Chloroform	0.75U	ug/L	1.0
Chloromethane	0.75U	ug/L	1.0
Cyclohexane	0.75U	ug/L	1.0
1,2-Dibromo-3-chloropropane	2.5U	ug/L	5.0
1,2-Dibromoethane	0.75U	ug/L	1.0
1,2-Dichlorobenzene	0.75U	ug/L	1.0
1,3-Dichlorobenzene	0.75U	ug/L	1.0
1,4-Dichlorobenzene	0.75U	ug/L	1.0
Dichlorodifluoromethane	0.75U	ug/L	1.0
1,1-Dichloroethane	0.75U	ug/L	1.0
1,2-Dichloroethane	0.75U	ug/L	1.0
1,1-Dichloroethene	0.75U	ug/L	1.0
cis-1,2-Dichloroethene	0.75U	ug/L	1.0
trans-1,2-Dichloroethene	0.75U	ug/L	1.0
1,2-Dichloropropane	0.75U	ug/L	1.0
cis-1,3-Dichloropropene	0.75U	ug/L	1.0
trans-1,3-Dichloropropene	0.75U	ug/L	1.0
1,4-Dioxane	62.5U	ug/L	125
Ethylbenzene	0.75U	ug/L	1.0
Freon 113	0.75U	ug/L	1.0
2-Hexanone	3.8U	ug/L	5.0
Isopropylbenzene	0.75U	ug/L	1.0
Methyl acetate	0.75U	ug/L	1.0
Methyl cyclohexane	0.75U	ug/L	1.0
Methyl t-Butyl Ether	0.75U	ug/L	1.0

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

4-Methyl-2-Pentanone(MIBK)	3.8U	ug/L	5.0
Methylene Chloride	0.75U	ug/L	1.0
Styrene	0.75U	ug/L	1.0
1,1,2,2-Tetrachloroethane	0.75U	ug/L	1.0
Tetrachloroethene	0.75U	ug/L	1.0
Toluene	0.75U	ug/L	1.0
Total Xylenes	2.3U	ug/L	3.0
1,2,3-Trichlorobenzene	0.75U	ug/L	1.0
1,2,4-Trichlorobenzene	0.75U	ug/L	1.0
1,1,1-Trichloroethane	0.75U	ug/L	1.0
1,1,2-Trichloroethane	0.75U	ug/L	1.0
Trichloroethene	0.75U	ug/L	1.0
Trichlorofluoromethane	0.75U	ug/L	1.0
Vinyl Chloride	0.75U	ug/L	1.0
1,2-Dichloroethane-d4 (S)	103	%	81 - 118
4-Bromofluorobenzene (S)	102	%	85 - 114
Dibromofluoromethane (S)	95.2	%	80 - 119
Toluene-d8 (S)	96	%	89 - 112

LABORATORY CONTROL SAMPLE: 3019577

Parameter	LCS % Rec	Units	Spike Conc.	LCS Result	% Rec Limit
Acetone	93.2	ug/L	100	93.2	39 - 160
Benzene	112	ug/L	20	22.4	79 - 120
Bromochloromethane	110	ug/L	20	22.0	78 - 123
Bromodichloromethane	109	ug/L	20	21.8	79 - 125
Bromoform	99.6	ug/L	20	19.9	66 - 130
Bromomethane	100	ug/L	20	20.0	53 - 141
2-Butanone	104	ug/L	100	104	56 - 143
Carbon Disulfide	111	ug/L	20	22.2	64 - 133
Carbon Tetrachloride	117	ug/L	20	23.5	72 - 136
Chlorobenzene	104	ug/L	20	20.8	82 - 118
Chlorodibromomethane	109	ug/L	20	21.9	74 - 126
Chloroethane	102	ug/L	20	20.3	60 - 138
Chloroform	106	ug/L	20	21.3	79 - 124
Chloromethane	96.4	ug/L	20	19.3	50 - 139
Cyclohexane	119	ug/L	20	23.7	71 - 130
1,2-Dibromo-3-chloropropane	84.9	ug/L	20	17.0	62 - 128
1,2-Dibromoethane	107	ug/L	20	21.5	77 - 121
1,2-Dichlorobenzene	106	ug/L	20	21.2	80 - 119
1,3-Dichlorobenzene	103	ug/L	20	20.5	80 - 119
1,4-Dichlorobenzene	101	ug/L	20	20.2	79 - 118
Dichlorodifluoromethane	102	ug/L	20	20.4	32 - 152

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

1,1-Dichloroethane	120	ug/L	20	23.9	77 - 125
1,2-Dichloroethane	108	ug/L	20	21.6	73 - 128
1,1-Dichloroethene	133*	ug/L	20	26.7	71 - 131
cis-1,2-Dichloroethene	109	ug/L	20	21.8	78 - 123
trans-1,2-Dichloroethene	127*	ug/L	20	25.4	75 - 124
1,2-Dichloropropane	109	ug/L	20	21.8	78 - 122
cis-1,3-Dichloropropene	109	ug/L	20	21.8	75 - 124
trans-1,3-Dichloropropene	112	ug/L	20	22.4	73 - 127
1,4-Dioxane	131	ug/L	500	654	59 - 139
Ethylbenzene	107	ug/L	20	21.4	79 - 121
Freon 113	108	ug/L	20	21.5	70 - 136
2-Hexanone	93.5	ug/L	100	93.5	57 - 139
Isopropylbenzene	114	ug/L	20	22.7	72 - 131
Methyl acetate	121	ug/L	20	24.3	56 - 136
Methyl cyclohexane	96.4	ug/L	20	19.3	72 - 132
Methyl t-Butyl Ether	111	ug/L	20	22.2	71 - 124
4-Methyl-2-Pentanone(MIBK)	94.3	ug/L	100	94.3	67 - 130
Methylene Chloride	105	ug/L	20	21.0	74 - 124
Styrene	113	ug/L	20	22.5	78 - 123
1,1,2,2-Tetrachloroethane	106	ug/L	20	21.1	71 - 121
Tetrachloroethene	106	ug/L	20	21.2	74 - 129
Toluene	110	ug/L	20	22.1	80 - 121
Total Xylenes	110	ug/L	60	66.3	79 - 121
1,2,3-Trichlorobenzene	77	ug/L	20	15.4	69 - 129
1,2,4-Trichlorobenzene	83.9	ug/L	20	16.8	69 - 130
1,1,1-Trichloroethane	118	ug/L	20	23.6	74 - 131
1,1,2-Trichloroethane	106	ug/L	20	21.1	80 - 119
Trichloroethene	105	ug/L	20	21.1	79 - 123
Trichlorofluoromethane	115	ug/L	20	23.0	65 - 141
Vinyl Chloride	95.7	ug/L	20	19.1	58 - 137
1,2-Dichloroethane-d4 (S)	99	%			81 - 118
4-Bromofluorobenzene (S)	98.3	%			85 - 114
Dibromofluoromethane (S)	95.9	%			80 - 119
Toluene-d8 (S)	94.8	%			89 - 112

MATRIX SPIKE: 3021417 DUPLICATE: 3021418 ORIGINAL: 3059732003

****NOTE - The Original Result shown below is a raw result and is only used for the purpose of calculating Matrix Spike percent recoveries. This result is not a final value and cannot be used as such.

Parameter	Original Result	Units	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD
Acetone	6.78091	ug/L	100	77.3734	96.9778	70.6	90.2	39 - 160	22.5	30
Benzene	0	ug/L	20	23.0257	23.3729	115	117	79 - 120	1.5	30
Bromochloromethane	0	ug/L	20	22.4019	22.4061	112	112	78 - 123	.02	30
Bromodichloromethane	0	ug/L	20	21.758	22.1649	109	111	79 - 125	1.85	30

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Bromoform	0	ug/L	20	19.1656	19.1509	95.8	95.8	66 - 130	.08	30
Bromomethane	0	ug/L	20	14.106	13.6144	70.5	68.1	53 - 141	3.55	30
2-Butanone	0	ug/L	100	97.0821	101.091	97.1	101	56 - 143	4.05	30
Carbon Disulfide	0	ug/L	20	20.1791	23.3627	101	117	64 - 133	14.6	30
Carbon Tetrachloride	0	ug/L	20	24.3061	25.0379	122	125	72 - 136	2.97	30
Chlorobenzene	0	ug/L	20	21.0009	21.385	105	107	82 - 118	1.81	30
Chlorodibromomethane	0	ug/L	20	21.0716	21.689	105	108	74 - 126	2.89	30
Chloroethane	0	ug/L	20	21.7575	20.942	109	105	60 - 138	3.82	30
Chloroform	0	ug/L	20	21.128	22.0378	106	110	79 - 124	4.22	30
Chloromethane	0	ug/L	20	18.4146	20.3188	92.1	102	50 - 139	9.83	30
Cyclohexane	0	ug/L	20	25.49	25.8901	127	129	71 - 130	1.56	30
1,2-Dibromo-3-chloropropane	0	ug/L	20	15.4662	15.8921	77.3	79.5	62 - 128	2.72	30
1,2-Dibromoethane	0	ug/L	20	20.6183	21.1177	103	106	77 - 121	2.39	30
1,2-Dichlorobenzene	0	ug/L	20	21.2189	21.3694	106	107	80 - 119	.71	30
1,3-Dichlorobenzene	0	ug/L	20	20.9274	21.0204	105	105	80 - 119	.44	30
1,4-Dichlorobenzene	0	ug/L	20	20.3064	20.5656	102	103	79 - 118	1.27	30
Dichlorodifluoromethane	0	ug/L	20	20.3264	21.794	102	109	32 - 152	6.97	30
1,1-Dichloroethane	0	ug/L	20	21.6608	25.0952	108	125	77 - 125	14.7	30
1,2-Dichloroethane	0	ug/L	20	21.6242	21.9602	108	110	73 - 128	1.54	30
1,1-Dichloroethene	0	ug/L	20	24.3506	28.7066	122	144*	71 - 131	16.4	30
cis-1,2-Dichloroethene	0	ug/L	20	21.9021	22.6341	110	113	78 - 123	3.29	30
trans-1,2-Dichloroethene	0	ug/L	20	22.8504	27.1323	114	136*	75 - 124	17.1	30
1,2-Dichloropropane	0	ug/L	20	21.9139	22.3996	110	112	78 - 122	2.19	30
cis-1,3-Dichloropropene	0	ug/L	20	21.2202	21.8181	106	109	75 - 124	2.78	30
trans-1,3-Dichloropropene	0	ug/L	20	21.0313	21.9763	105	110	73 - 127	4.39	30
1,4-Dioxane	0	ug/L	500	411.513	709.425	82.3	142*	59 - 139	53.2	30
Ethylbenzene	0	ug/L	20	22.0618	22.3385	110	112	79 - 121	1.25	30
Freon 113	0	ug/L	20	20.7374	24.2014	104	121	70 - 136	15.4	30
2-Hexanone	0	ug/L	100	75.3079	76.1207	75.3	76.1	57 - 139	1.07	30
Isopropylbenzene	0	ug/L	20	23.3969	23.8285	117	119	72 - 131	1.83	30
Methyl acetate	0	ug/L	20	14.9428	17.3464	74.7	86.7	56 - 136	14.9	30
Methyl cyclohexane	0	ug/L	20	20.6309	20.8426	103	104	72 - 132	1.02	30
Methyl t-Butyl Ether	0	ug/L	20	18.4872	21.5488	92.4	108	71 - 124	15.3	30
4-Methyl-2-Pentanone(MIBK)	0	ug/L	100	87.0536	88.4863	87.1	88.5	67 - 130	1.63	30
Methylene Chloride	0	ug/L	20	18.597	21.5139	93	108	74 - 124	14.5	30
Styrene	0	ug/L	20	22.6856	22.9646	113	115	78 - 123	1.22	30
1,1,2,2-Tetrachloroethane	0	ug/L	20	20.6495	20.7382	103	104	71 - 121	.43	30
Tetrachloroethene	0	ug/L	20	19.5692	20.1502	97.8	101	74 - 129	2.93	30
Toluene	0	ug/L	20	22.3168	22.9743	112	115	80 - 121	2.9	30
Total Xylenes	0	ug/L	60	67.3108	68.5247	112	114	79 - 121	1.79	30
1,2,3-Trichlorobenzene	0	ug/L	20	13.5537	14.2395	67.8*	71.2	69 - 129	4.94	30
1,2,4-Trichlorobenzene	0	ug/L	20	15.1617	15.8784	75.8	79.4	69 - 130	4.62	30
1,1,1-Trichloroethane	0	ug/L	20	24.5524	24.9552	123	125	74 - 131	1.63	30
1,1,2-Trichloroethane	0	ug/L	20	20.8058	21.1006	104	106	80 - 119	1.41	30
Trichloroethene	0	ug/L	20	21.9576	22.0262	110	110	79 - 123	.31	30
Trichlorofluoromethane	0	ug/L	20	25.7036	25.5581	129	128	65 - 141	.57	30

QUALITY CONTROL DATA

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Vinyl Chloride	0	ug/L	20	19.267	20.3253	96.3	102	58 - 137	5.35	30
1,2-Dichloroethane-d4 (S)	99.1	%				99.1	100	81 - 118		
4-Bromofluorobenzene (S)	97.6	%				97.6	98.2	85 - 114		
Dibromofluoromethane (S)	96.1	%				96.1	96.4	80 - 119		
Toluene-d8 (S)	94.8	%				94.8	95.2	89 - 112		

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

QUALITY CONTROL DATA QUALIFIERS

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

QUALITY CONTROL PARAMETER QUALIFIERS

Lab ID	#	Sample Type	Analytical Method	Analyte
3019577	1	Lab Control Standard	SW846 8260C	1,1-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte 1,1-Dichloroethene. The % Recovery was reported as 133 and the control limits were 71 to 131.

3019577	2	Lab Control Standard	SW846 8260C	trans-1,2-Dichloroethene

The QC sample type LCS for method SW846 8260C was outside the control limits for the analyte trans-1,2-Dichloroethene. The % Recovery was reported as 127 and the control limits were 75 to 124.

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
3059732002	RB02-20190920	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059732003	03MW02-20190923	SW846 7470A	MDIG/80119	SW846 7470A	META/70119
3059732002	RB02-20190920	SW846 3015	MDIG/80150	SW846 6020A	META/70180
3059732002	RB02-20190920	SW846 3015	MDIG/80150	SW846 6020A	META/70191
3059732002	RB02-20190920	SW846 3015	MDIG/80150	SW846 6020A	META/70203
3059732001	TB05-20190920			SW846 8260C	VOMS/52501
3059732002	RB02-20190920			SW846 8260C	VOMS/52501
3059732003	03MW02-20190923			SW846 8260C	VOMS/52501
3059732003	03MW02-20190923	SW846 3015	MDIG/80256	SW846 6020A	META/70321
3059732003	03MW02-20190923	SW846 3015	MDIG/80256	SW846 6020A	META/70355

301 Fulling Mill Road
Middletown, PA 17057
P. 717-944-5541
F. 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #:
ALS Que

3059732

Client Name: Tetra Tech
Address: 234 Mall Boulevard Suite 260 King of Prussia, PA 19406
Contact: Tricia Moore
Phone#: 610 382 1171
Project Name/#: Willow Grove Sites 3 and 12
Bill To: Tetra Tech Foster Plaza 7

TAT: [x] Normal-Standard TAT is 10-12 business days. [ ] Rush-Subject to ALS approval and surcharges.
Date Required: Approved?
Email? [ ] -Y
Fax? [ ] -Y No.:

W.O. Temp: 6 Therm ID: 402
Analyst Initials:
Courier/Tracking #:
Purchase Order #:
Project Comments:

ALS Field Services: ☐ Pickup ☐ Labor ☐ Composite Sampling ☐ Rental Equipment
Other:

ANALYSES/METHOD REQUESTED

	Sample Description/Location (as it will appear on the lab report)	Date Collected mm/dd/yy	Time hh:mm	*G or C	**Matrix	40 ml VOA Vial VOC's	125 ml Poly	1 Liter Poly Strontium 90	1 Liter Poly Uranium 238	1 Liter Poly Radium 226						Sample/COC Comments
						Enter Number of Containers Per Sample or Field Results Below.										
1	TB05-20190920	9/20/19	1800	G	Ag	2										Laboratory Supplied
2	RB02-20190920	9/20/19	1810	G	Ag	2	1	1	1	1						Laboratory Supplied water
3	02MW02-20190923	9/23/19	1145	G	GW	6	3	3	3	3						Do MS/MSD
4																
5																
6																
7																
8																
9																
10																

SAMPLED BY (Please Print): Charles Meyer

Sampler Comments:

	Relinquished By / Company Name	Date	Time		Received By / Company Name	Date	Time
1	Charles Meyer Tetra Tech	9/24/19	1605	2	Chris Fdenick	92419	1605
3	Chris Fdenick	92419	1800	4	COMMON COURIER / ALS COURIER		
5	COMMON COURIER / ALS COURIER			6	[signature]	9/24/19	2:22
7				8			
9				10			

Data Deliverables: [x] Standard [ ] CLP-like [ ] USACE/DOD [ ]

Special Processing: USACE [ ] [ ] [ ]

State Samples Collected In: [ ] NY [ ] NJ [x] PA [ ] [ ] other

Reportable to PADEP? Yes [ ] No [x]
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 SHIPPING ADDRESS: 301 Fulling Mill Road, Middletown, PA 17057

Rev 04/19

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

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
Tetra Tech	3059732	LW	9-25-19

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):	6							
Thermometer ID:	4C2							
Radiological (µCi):								

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

Rev. 4/29/2019

Wednesday, October 30, 2019

Vanessa Badman
ALS Environmental
301 Fulling Mill Rd
Middletown, PA 17057

Re: ALS Workorder: 1909554
Project Name:
Project Number: 3059732

Dear Ms. Badman:

Two water samples were received from ALS Environmental, on 9/26/2019. The samples were scheduled for the following analyses:

Isotopic Uranium
Radium-226
Strontium-90

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Jeff R. Kujawa
Project Manager

ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522
ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

Environmental www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Louisiana (LA)	05057
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1909554

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

Strontium-90:
The samples were analyzed for the presence of ^{90}Sr according to the current revision of SOP 724.

All acceptance criteria were met.

Isotopic Uranium:
The samples were analyzed for the presence of isotopic uranium according to the current revision of SOP 714. Sample 1909554-2DUP was sent for a clean-up procedure as described on QASS 458131 due to poor spectral quality in the initial analysis of this sample. The results for this sample are reported from the analysis after the clean-up procedure.

All remaining acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1909554
Client Name: ALS Environmental
Client Project Name:
Client Project Number: 3059732
Client PO Number: 3059732

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
3059732002	1909554-1		WATER	20-Sep-19	18:10
3059732003	1909554-2		WATER	23-Sep-19	11:45

Analytical Laboratory Services, Inc.
Environmental • Industrial Hygiene • Field Services
34 Dogwood Lane • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #: A09554 — 1 of 1
ALSI Quote #:

Client Name: ALS Environmental
Address: 34 Dogwood Lane, Middletown, PA 17057
Contact: Vanessa Badman
Phone#: (717) 944-5541
Project Name/#: E3280: 3059732
Bill To: ALS Environmental
TAT: [ ] Normal-Standard TAT is 10-12 business days. [X] Rush-Subject to ALSI approval and surcharges.
Date Required: 10/3/2019 Approved By:
Email? [X] -Y ALMDTSUBCONTRACT@ALSGloba
Fax? [ ] -Y No.:

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Time	*G or C	**Matrix	Radium 226	Isotopic Ur-238	Strontium-90
Container Type					P	P	P
Container Size					1L	1L	1L
Preservative					HNO3	HNO3	HNO3
1 3059732 002	9/20/19	1810	G	WT	1	1	1
2 3059732 003 (MS/MSD)	9/23/19	1145	G	WT	3	3	3
3							
4							
5							
6							
7							
8							
9							
10							

Enter Number of Containers Per Sample or Field Results Below.

Receipt Information (completed by Receiving Lab)
Cooler Temp: ____ Therm. ID: ____
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
Subcontract: ALS Fort Collins

ALSI 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			2		
3 CR	09-25-19	1512	4 Emily E ALS CO	9/26/19	0910
5			6		
7			8		
9			10		

Data Deliverables: [ ] Standard [X] CLP-like [X] DOD [X] Internal COC
Special Processing: USACE [ ] Navy [ ] DOD [X]
State Samples Collected In: [ ] NY [ ] NJ [X] PA [ ] NC [ ] other
Reportable to PADEP? Yes [ ]
PWSID #
Sample Disposal: Lab [X] Special [ ]
EDDs: Format Type- CUSTOM EDD, See e-mail.

* 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

Copies: WHITE - ORIGINAL CANARY - CUSTOMER MAILING PINK - FILE GOLDENROD - CUSTOMER COPY Rev 5/05

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Middletown Workorder No: 1909554

Project Manager: JRK Initials: EE Date: 9/26/19

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO *
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO *
4.	Is there a COC (chain-of-custody) present?		YES	NO *
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO *
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO *
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO *
9.	Is there sufficient sample for the requested analyses?		YES	NO *
10.	Are all samples in the proper containers for the requested analyses?		YES	NO *
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO *
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO *
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	AMB							
No. of custody seals on cooler:	0							
DOT Survey Acceptance Information — External µR/hr reading:	12							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

*** Please provide details here for NO responses to gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

8) sample 1 bottle 1 was received on its side with the cap off
9) see 8

All client bottle ID's vs ALS lab ID's double-checked by: EE

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: [signature] 9-27-19

Form 201r27.xls
(02/11/2019)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1909554

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ALS GLOBAL
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MIDDLETOWN, PA 17057
UNITED STATES US

SHIP DATE: 25SEP19
ACTWGT: 25.00 LB MAN
CAD: 0218589/CAFE3310

BILL THIRD PARTY

TO ATTN:SAMPLE RECEIVING
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225 COMMERCE DR

12-0

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TRK# 0201 4798 9481 6218

NA FTCA

80524
CO-US DEN

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059732	**Work Order:**	1909554
Sample ID:	3059732002	**Lab ID:**	1909554-1
Legal Location:		**Matrix:**	WATER
Collection Date:	9/20/2019 18:10	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/21/2019**	PrepBy: **SDW**
Tracer: U-232	*73.2*		*30-110*	*%REC*	DL = NA	10/28/2019 13:37
U-238	ND (+/- 0.12)	U,M	0.21	pCi/l	NA	10/28/2019 13:37
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.2)	U	0.47	pCi/l	NA	10/23/2019 11:57
Carr: BARIUM	*95.9*		*40-110*	*%REC*	DL = NA	10/23/2019 11:57
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/17/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.34)	U	0.81	pCi/l	NA	10/22/2019 07:54
Carr: STRONTIUM	*89*		*40-110*	*%REC*	DL = NA	10/22/2019 07:54

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059732	**Work Order:**	1909554
Sample ID:	3059732003	**Lab ID:**	1909554-2
Legal Location:		**Matrix:**	WATER
Collection Date:	9/23/2019 11:45	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Isotopic Uranium by Alpha Spectroscopy		**SOP 714**			Prep Date: **10/17/2019**	PrepBy: **AHJ**
Tracer: U-232	*69.3*		*30-110*	*%REC*	DL = NA	10/21/2019 13:28
U-238	ND (+/- 0.038)	U	0.057	pCi/l	NA	10/21/2019 13:28
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **10/16/2019**	PrepBy: **JXH**
Ra-226	ND (+/- 0.26)	U	0.49	pCi/l	NA	10/23/2019 11:57
Carr: BARIUM	*90.9*		*40-110*	*%REC*	DL = NA	10/23/2019 11:57
Strontium-90 by GFPC		**SOP 724**			Prep Date: **10/17/2019**	PrepBy: **JXH**
Sr-90	ND (+/- 0.29)	U	0.69	pCi/l	NA	10/22/2019 07:54
Carr: STRONTIUM	*93.3*		*40-110*	*%REC*	DL = NA	10/22/2019 07:54

Client:	ALS Environmental	**Date:**	*30-Oct-19*
Project:	3059732	**Work Order:**	1909554
Sample ID:	3059732003	**Lab ID:**	1909554-2
Legal Location:		**Matrix:**	WATER
Collection Date:	9/23/2019 11:45	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110 %. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15 % of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

ALS -- Fort Collins

Client: ALS Environmental
Work Order: 1909554
Project: 3059732

Date: *10/30/2019 10:0*

QC BATCH REPORT

Batch ID: RE191016-1-2 Instrument ID Alpha Scin Method: Radium-226 by Radon Emanation

DUP Sample ID: 1909554-2 Units: pCi/l Analysis Date: 10/23/2019 11:57
Client ID: 3059732003 Run ID: RE191016-1A Prep Date: 10/16/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.29						0.07	0.3	2.1	U
Carr: BARIUM	16250		17950		90.5	40-110		16320			

LCS Sample ID: RE191016-1 Units: pCi/l Analysis Date: 10/23/2019 12:16
Client ID: Run ID: RE191016-1A Prep Date: 10/16/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	33 (+/-8.4)	0.3	46.47		70.9	67-120					P
Carr: BARIUM	17510		17810		98.3	40-110					

MB Sample ID: RE191016-1 Units: pCi/l Analysis Date: 10/23/2019 12:16
Client ID: Run ID: RE191016-1A Prep Date: 10/16/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.5									U
Carr: BARIUM	16850		17800		94.6	40-110					

The following samples were analyzed in this batch: 1909554-1 1909554-2

Client: ALS Environmental
Work Order: 1909554
Project: 3059732

QC BATCH REPORT

Batch ID: AS191017-1-6 Instrument ID AlphaSpec2 Method: Isotopic Uranium by Alpha Spec

DUP Sample ID: 1909554-2 Units: pCi/l Analysis Date: 10/24/2019 07:28
Client ID: 3059732003 Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-238	0.045 (+/-0.056)	0.041						0.006	0.6	2.1	
Tracer: U-232	4.56	0.11	9.129		49.9	30-110		6.3			

LCS Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/25/2019 14:27
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-234	4.44 (+/-0.73)	0.02	4.22		105	82-122					P
U-238	4.41 (+/-0.73)	0.03	4.382		101	78-126					P
Tracer: U-232	3.6	0.04	4.565		78.9	30-110					

LCSD Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/25/2019 14:27
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-234	4.2 (+/-0.69)	0.03	4.22		99.5	82-122		4.44	0.2	2.1	P
U-238	4.43 (+/-0.73)	0.03	4.382		101	78-126		4.41	0.03	2.1	P
Tracer: U-232	3.69	0.03	4.565		80.9	30-110		3.6			

MB Sample ID: AS191017-1 Units: pCi/l Analysis Date: 10/28/2019 13:33
Client ID: Run ID: AS191017-1UDD Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-238	ND	0.016									U
Tracer: U-232	3.56	0.03	4.564		78	30-110					

The following samples were analyzed in this batch: 1909554-2

Client: ALS Environmental
Work Order: 1909554
Project: 3059732

QC BATCH REPORT

Batch ID: AS191021-3-5 Instrument ID AlphaSpec2 Method: Isotopic Uranium by Alpha Spec

LCS Sample ID: AS191021-3 Units: pCi/l Analysis Date: 10/25/2019 08:04

Client ID: Run ID: AS191021-3U Prep Date: 10/21/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-234	5.02 (+/-0.91)	0.05	4.22		119	82-122					P
U-238	5.33 (+/-0.96)	0.05	4.382		122	78-126					P
Tracer: U-232	2.94	0.06	4.574		64.4	30-110					

MB Sample ID: AS191021-3 Units: pCi/l Analysis Date: 10/28/2019 13:35

Client ID: Run ID: AS191021-3U Prep Date: 10/21/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
U-238	ND	0.024									U
Tracer: U-232	3.09	0.03	4.573		67.6	30-110					

The following samples were analyzed in this batch: 1909554-1 1910133-2

Client: ALS Environmental
Work Order: 1909554
Project: 3059732

QC BATCH REPORT

Batch ID: SR191017-1-2 Instrument ID LB4100-C Method: Strontium-90 by GFPC

DUP Sample ID: 1909554-2 Units: pCi/l Analysis Date: 10/22/2019 07:54
Client ID: 3059732003 Run ID: SR191017-1A Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	ND	0.76						0	0.2	2.1	U
Carr: STRONTIUM	1017		1088		93.5	40-110		1029			

LCS Sample ID: SR191017-1 Units: pCi/l Analysis Date: 10/22/2019 08:50
Client ID: Run ID: SR191017-1A Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	12 (+/-3)	0.8	11.54		104	75-125					P
Carr: STRONTIUM	905.2		1040		87	40-110					

MB Sample ID: SR191017-1 Units: pCi/l Analysis Date: 10/22/2019 07:43
Client ID: Run ID: SR191017-1A Prep Date: 10/17/2019 DF: NA

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Sr-90	ND	0.37									U
Carr: STRONTIUM	930.8		1040		89.5	40-110					

The following samples were analyzed in this batch: 1909554-1 1909554-2

ALS

QUALITY ASSURANCE SUMMARY SHEET

ALS W.O. # / BATCH Iso V Cleanup w/o Column
TEST Iso U
METHOD α spec
SOP/REV (PREP) 778
SOP/REV (ANAL) 714

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics. JP 2/25/19

The following clean-up procedure (without column) is performed for U-ISO analysis when there is poor spectral quality but no other suspected radioactive analyte interference:

1. The sample filter and tape is peeled from the planchet with forceps and placed into a 100mL hotblock cup.
2. 15mL conc HNO_3 is added to the cup to completely submerge the filter.
3. A Teflon white stir stick is placed into the cup and onto the filter to keep the filter submerged in the acid.
4. The hotblock cup is placed on the hotblock for 1 hour. It is important not to exceed this hour, as the acid will evaporate and the filter will no longer be submerged.
5. After 1 hour, the contents of the cup (excluding the filter) are transferred to another hotblock cup using minimal DI water. The old cup (with filter) can be disposed of appropriately.
6. The sample in the new cup is taken to dryness. Do not let the sample sit overnight and bake onto the cup.
7. Once the cup is dry, remove it from a warm hotblock, and add 1mL conc HCl in preparation of microprecipitation. Microprecipitation proceeds per SOP 778 with the exception that only **0.5mL La carrier** is added to the cup instead of the normal 1.5mL.

JP 2/25/19

TECHNICIAN/ANALYST [signature] DATE 2-25-19

DEPARTMENT MANAGER [signature] DATE 2/25/19

FORM 302r6.doc (4/22/04)

458131

APPENDIX C
DATA VALIDATION REPORTS (INCLUDED ON CD ONLY)

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TETRA TECH **INTERNAL CORRESPONDENCE**

TO: **T. MOORE** **DATE:** **DECEMBER 18, 2019**

FROM: **TERRI L. SOLOMON** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC / INORGANIC DATA VALIDATION –VOCs, TAL METALS**
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) EPR-032

SAMPLES: 8/Aqueous
VOCs, TAL Metals

12DUP01-20190919	12MW010-20190919
12MW01S-20190919	12MW020-20190919
12MW02S-20190919	12MW03S-20190919
12MW040-20190919	12MW04S-20190919

1/Trip Blank
VOCs

12TB01-20190919

Overview

The sample set for NAS JRB Willow Grove, SDG EPR-032, consisted of eight (8) aqueous samples and one (1) trip blank. The samples were analyzed for volatile organic compounds (VOCs) and target analyte list (TAL) metals. One (1) field duplicate pair,12MW03S-20190919 /12DUP01-20190919, was included in this SDG.

The samples were collected by Tetra Tech on September 19, 2019 and analyzed by Katahdin Analytical Services. All sample analyses were conducted in accordance with SW-846 Methods 8260C, 6020A and 7470A modified analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, GC/MS tuning, initial/continuing calibrations, laboratory method/preparation/trip blanks, Interference Check Sample (ICS), surrogate spike recoveries, laboratory control sample results, internal standard areas and recoveries, ICP serial dilution results, field duplicate results, chromatographic resolution, analyte identification, analyte quantitation, and detection limits. Areas of concern are listed below.

Major

No issues.

Minor

The closing continuing calibration performed on instrument ms07.i on 09/27/19 @ 22:08 had a percent recovery for 1,4-dioxane which was below the 50% quality control limit. Samples 12MW010-20190919 and 12MW040-20190919 were affected. The nondetected results reported for 1,4-dioxane in the affected samples were qualified as estimated (UJ).

The laboratory control sample (LCS) percent recovery for preparation batch 544174 for bromomethane was below the quality control limits. The LCS percent recoveries for 2-butanone, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane and methyl acetate were greater than the quality control limits. Samples 12MW020-20190919, 12MW02S-20190919, 12MW04S-20190919 and 12TB01-20190919 were affected.

The nondetected results reported for bromomethane in the affected samples were qualified as estimated (UJ). No validation actions were required for 2-butanone, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane and methyl acetate as all associated sample results were nondetected.

The LCS percent recovery for preparation batch 544596 for 1,2,3-trichlorobenzene was below the quality control limits. The LCS percent recovery for 1,4-dioxane was greater than the quality control limit. Samples 12MW010-20190919 and 12MW040-20190919 were affected. The nondetected results reported for 1,2,3-trichlorobenzene in the affected samples were qualified as estimated (UJ). No validation actions were required for 1,4-dioxane as all associated sample results were nondetected.

The LCS percent recovery for preparation batch 54305 for 1,2,3-trichlorobenzene was below the quality control limits. The LCS percent recoveries for 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane and methyl acetate were greater than the quality control limit. Samples 12DUP01-20190919, 12MW01S-20190919 and 12MW03S-20190919 were affected. The nondetected results reported for 1,2,3-trichlorobenzene in the affected samples were qualified as estimated (UJ). No validation actions were required for 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane and methyl acetate as all associated sample results were nondetected.

The following contaminants were detected in the laboratory instrument / method blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Limit of Quantitation (LOQ) > or <
1,4-Dioxane(1)	73.7 ug/L	> LOQ
Thallium(2)	0.0005 mg/L	< LOQ
Zinc(3)	0.00221 mg/L	< LOQ

(1) Maximum concentration detected in a method blank (preparation batch 544596) affecting samples 12MW010-20190919 and 12MW040-20190919.
(2) Maximum concentration present in an instrument blank affecting all samples.
(3) Maximum concentration present in a method blank affecting all samples.

The detected results reported below the LOQ were qualified as non-detected, (U) and raised to the limit of detection (LOD) if required.

Detected results reported below the LOQ limit but above the detection limit (DL) were qualified as estimated, (J).

Notes

Non-detected results were reported to the LOD.

It was noted that the laboratory uses the LCS as the second source initial calibration verification for the VOC analyses.

The surrogate recoveries for 4-bromofluorobenzene were greater than the quality control limits for samples 12TB01-20190919 and 12MW04S-20190919. No validation actions were required as all results reported for the affected samples were nondetects.

The internal standard recovery for scandium-45 was above the quality control limits for sample 12MW02S-20190919. The analytes arsenic, beryllium, cadmium, chromium, cobalt, copper, nickel, silver, selenium and vanadium were affected. No validation actions were required as all affected sample results were nondetects.

Executive Summary

Laboratory Performance: One closing calibration percent recovery were noncompliant for the VOC fraction. Several LCS percent recoveries were outside the quality control limits. Several contaminants were present in the instrument / method blanks.

Other Factors Affecting Data Quality: Results below the LOQ were estimated.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Superfund Methods Review" (January 2017) and the "National Functional Guidelines for Inorganic Superfund Methods Data Review" (January 2017). The text of this report has been formulated to address only those areas affecting data quality.

Terri L. Solomon

Tetra Tech, Inc.
Terri L. Solomon
Chemist/Data Validator

Joseph A. Samchuck

Tetra Tech, Inc.
Joseph A. Samchuck
Data Validation Manager

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted detection limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
NJ	The analyte has been “tentatively identified” or “presumptively” as present and the associated numerical value is the estimated concentration in the sample.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Appendix A

Qualified Analytical Results

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's r < 0.995
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate
Z4 = Sample activity is less than the at uncertainty at 3 standard deviations and greater than the MDC
Z5 = Sample activity is less than the at uncertainty at 3 standard deviations and less than the MDC

PROJ_NO: 08005-WE04	NSAMPLE	12DUP01-20190919			12MW010-20190919			12MW01S-20190919			12MW020-20190919		
SDG: EPR-032	LAB_ID	3059461009			3059461007			3059461008			3059461002		
FRACTION: OV	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	12MW03S-20190919											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2,2-TETRACHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2,3-TRICHLOROBENZENE		0.75	UJ	E	0.75	UJ	E	0.75	UJ	E	0.75	U	
1,2,4-TRICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DIBROMO-3-CHLOROPROPANE		2.5	U		2.5	U		2.5	U		2.5	U	
1,2-DIBROMOETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROPROPANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,3-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,4-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,4-DIOXANE		62.5	U		62.5	UJ	C	62.5	U		62.5	U	
2-BUTANONE		3.8	U		3.8	U		3.8	U		3.8	U	
2-HEXANONE		3.8	U		3.8	U		3.8	U		3.8	U	
4-METHYL-2-PENTANONE		3.8	U		3.8	U		3.8	U		3.8	U	
ACETONE		3.8	U		3.8	U		3.8	U		3.8	U	
BENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOCHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMODICHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOFORM		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOMETHANE		0.75	U		0.75	U		0.75	U		0.75	UJ	E
CARBON DISULFIDE		0.75	U		0.75	U		0.75	U		0.75	U	
CARBON TETRACHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLORODIBROMOMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROFORM		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CIS-1,2-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
CIS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U		0.75	U	
CYCLOHEXANE		0.75	U		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12MW02S-20190919			12MW03S-20190919			12MW040-20190919			12MW04S-20190919		
SDG: EPR-032	LAB_ID	3059461003			3059461006			3059461005			3059461004		
FRACTION: OV	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2,2-TETRACHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2,3-TRICHLOROBENZENE		0.75	U		0.75	UJ	E	0.75	UJ	E	0.75	U	
1,2,4-TRICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DIBROMO-3-CHLOROPROPANE		2.5	U		2.5	U		2.5	U		2.5	U	
1,2-DIBROMOETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROPROPANE		0.75	U		0.75	U		0.75	U		0.75	U	
1,3-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,4-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
1,4-DIOXANE		62.5	U		62.5	U		62.5	UJ	C	62.5	U	
2-BUTANONE		3.8	U		3.8	U		3.8	U		3.8	U	
2-HEXANONE		3.8	U		3.8	U		3.8	U		3.8	U	
4-METHYL-2-PENTANONE		3.8	U		3.8	U		3.8	U		3.8	U	
ACETONE		3.8	U		3.8	U		3.8	U		3.8	U	
BENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOCHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMODICHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOFORM		0.75	U		0.75	U		0.75	U		0.75	U	
BROMOMETHANE		0.75	UJ	E	0.75	U		0.75	U		0.75	UJ	E
CARBON DISULFIDE		0.75	U		0.75	U		0.75	U		0.75	U	
CARBON TETRACHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLORODIBROMOMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROFORM		0.75	U		0.75	U		0.75	U		0.75	U	
CHLOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
CIS-1,2-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
CIS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U		0.75	U	
CYCLOHEXANE		0.75	U		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12TB01-20190919		
SDG: EPR-032	LAB_ID	3059461001		
FRACTION: OV	SAMP_DATE	9/19/2019		
MEDIA: WATER	QC_TYPE	NM		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.75	U	
1,1,2,2-TETRACHLOROETHANE		0.75	U	
1,1,2-TRICHLOROETHANE		0.75	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.75	U	
1,1-DICHLOROETHANE		0.75	U	
1,1-DICHLOROETHENE		0.75	U	
1,2,3-TRICHLOROBENZENE		0.75	U	
1,2,4-TRICHLOROBENZENE		0.75	U	
1,2-DIBROMO-3-CHLOROPROPANE		2.5	U	
1,2-DIBROMOETHANE		0.75	U	
1,2-DICHLOROBENZENE		0.75	U	
1,2-DICHLOROETHANE		0.75	U	
1,2-DICHLOROPROPANE		0.75	U	
1,3-DICHLOROBENZENE		0.75	U	
1,4-DICHLOROBENZENE		0.75	U	
1,4-DIOXANE		62.5	U	
2-BUTANONE		3.8	U	
2-HEXANONE		3.8	U	
4-METHYL-2-PENTANONE		3.8	U	
ACETONE		3.8	U	
BENZENE		0.75	U	
BROMOCHLOROMETHANE		0.75	U	
BROMODICHLOROMETHANE		0.75	U	
BROMOFORM		0.75	U	
BROMOMETHANE		0.75	UJ	E
CARBON DISULFIDE		0.75	U	
CARBON TETRACHLORIDE		0.75	U	
CHLOROBENZENE		0.75	U	
CHLORODIBROMOMETHANE		0.75	U	
CHLOROETHANE		0.75	U	
CHLOROFORM		0.75	U	
CHLOROMETHANE		0.75	U	
CIS-1,2-DICHLOROETHENE		0.75	U	
CIS-1,3-DICHLOROPROPENE		0.75	U	
CYCLOHEXANE		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12DUP01-20190919			12MW010-20190919			12MW01S-20190919			12MW020-20190919		
SDG: EPR-032	LAB_ID	3059461009			3059461007			3059461008			3059461002		
FRACTION: OV	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	12MW03S-20190919											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DICHLORODIFLUOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
ETHYLBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
ISOPROPYLBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL ACETATE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL CYCLOHEXANE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL TERT-BUTYL ETHER		0.75	U		0.75	U		0.75	U		0.75	U	
METHYLENE CHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	
STYRENE		0.75	U		0.75	U		0.75	U		0.75	U	
TETRACHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TOLUENE		0.75	U		0.75	U		0.75	U		0.75	U	
TOTAL XYLENES		2.3	U		2.3	U		2.3	U		2.3	U	
TRANS-1,2-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRANS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRICHLOROFLUOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
VINYL CHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12MW02S-20190919			12MW03S-20190919			12MW040-20190919			12MW04S-20190919		
SDG: EPR-032	LAB_ID	3059461003			3059461006			3059461005			3059461004		
FRACTION: OV	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DICHLORODIFLUOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
ETHYLBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
ISOPROPYLBENZENE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL ACETATE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL CYCLOHEXANE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL TERT-BUTYL ETHER		0.75	U		0.75	U		0.75	U		0.75	U	
METHYLENE CHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	
STYRENE		0.75	U		0.75	U		0.75	U		0.75	U	
TETRACHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TOLUENE		0.75	U		0.75	U		0.75	U		0.75	U	
TOTAL XYLENES		2.3	U		2.3	U		2.3	U		2.3	U	
TRANS-1,2-DICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRANS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRICHLOROETHENE		0.75	U		0.75	U		0.75	U		0.75	U	
TRICHLOROFLUOROMETHANE		0.75	U		0.75	U		0.75	U		0.75	U	
VINYL CHLORIDE		0.75	U		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12TB01-20190919		
SDG: EPR-032	LAB_ID	3059461001		
FRACTION: OV	SAMP_DATE	9/19/2019		
MEDIA: WATER	QC_TYPE	NM		
	UNITS	UG/L		
	PCT_SOLIDS	0.0		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
DICHLORODIFLUOROMETHANE		0.75	U	
ETHYLBENZENE		0.75	U	
ISOPROPYLBENZENE		0.75	U	
METHYL ACETATE		0.75	U	
METHYL CYCLOHEXANE		0.75	U	
METHYL TERT-BUTYL ETHER		0.75	U	
METHYLENE CHLORIDE		0.75	U	
STYRENE		0.75	U	
TETRACHLOROETHENE		0.75	U	
TOLUENE		0.75	U	
TOTAL XYLENES		2.3	U	
TRANS-1,2-DICHLOROETHENE		0.75	U	
TRANS-1,3-DICHLOROPROPENE		0.75	U	
TRICHLOROETHENE		0.75	U	
TRICHLOROFLUOROMETHANE		0.75	U	
VINYL CHLORIDE		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	12DUP01-20190919			12DUP01-20190919-RE			12DUP01-20190919-RE1			12MW010-20190919		
SDG: EPR-032	LAB_ID	3059461009			3059461009			3059461009			3059461007		
FRACTION: M	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF	12MW03S-20190919			12MW03S-20190919			12MW03S-20190919					
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM								0.059	U				
ANTIMONY		0.0015	U								0.0015	U	
ARSENIC								0.002	U		0.002	U	
BARIUM					0.12								
BERYLLIUM		0.0007	U								0.0007	U	
CADMIUM		0.0007	U								0.0007	U	
CALCIUM					29.5								
CHROMIUM		0.0008	J	P							0.0015	J	P
COBALT		0.0037	U								0.01		
COPPER		0.0037	U								0.0037	U	
IRON					0.16						0.8		
LEAD		0.0015	U								0.0015	U	
MAGNESIUM					12.9						12.2		
MANGANESE					0.97								
MERCURY		0.00033	U								0.00033	U	
NICKEL		0.0056	J	P							0.002	J	P
POTASSIUM					9.6								
SELENIUM					0.0037	U					0.0037	U	
SILVER		0.0015	U								0.0015	U	
SODIUM								6.9			16.5		
THALLIUM		0.0007	U								0.0007	U	
VANADIUM		0.00088	J	P							0.0015	U	
ZINC					0.005	U	A						

PROJ_NO: 08005-WE04	NSAMPLE	12MW010-20190919-RE			12MW01S-20190919			12MW01S-20190919-RE			12MW020-20190919		
SDG: EPR-032	LAB_ID	3059461007			3059461008			3059461008			3059461002		
FRACTION: M	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		0.059	U		0.059	U							
ANTIMONY								0.0015	U		0.0015	U	
ARSENIC								0.002	U		0.0022	J	P
BARIUM		0.098			0.082								
BERYLLIUM								0.0007	U		0.0007	U	
CADMIUM								0.0007	U		0.0007	U	
CALCIUM		28.1			36.5								
CHROMIUM								0.0015	U		0.06		
COBALT								0.0037	U		0.0065		
COPPER								0.0022	J	P	0.0047	J	P
IRON								0.045	J	P	4.8		
LEAD								0.0015	U		0.0012	J	P
MAGNESIUM								13.5			17.6		
MANGANESE		0.41						0.012					
MERCURY											0.00033	U	
NICKEL								0.0023	J	P	0.058		
POTASSIUM		1.6			1.2								
SELENIUM								0.0037	U		0.0037	U	
SILVER								0.0015	U		0.0015	U	
SODIUM								10.7			13.4		
THALLIUM								0.0007	U		0.0007	U	
VANADIUM								0.0015	U		0.0014	J	P
ZINC		0.0045	U	A	0.0046	U	A						

PROJ_NO: 08005-WE04	NSAMPLE	12MW020-20190919-DL			12MW020-20190919-RE			12MW02S-20190919			12MW02S-20190919-RE		
SDG: EPR-032	LAB_ID	3059461002			3059461002			3059461003			3059461003		
FRACTION: M	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM					0.48						0.059	U	
ANTIMONY								0.0015	U				
ARSENIC								0.002	U				
BARIUM					0.28						0.23		
BERYLLIUM								0.0007	U				
CADMIUM								0.0007	U				
CALCIUM					30.7						29.4		
CHROMIUM								0.0015	U				
COBALT								0.0037	U				
COPPER								0.0037	U				
IRON											9.4		
LEAD								0.0015	U				
MAGNESIUM											10.2		
MANGANESE		4.5									0.31		
MERCURY								0.00033	U				
NICKEL								0.0037	U				
POTASSIUM					2.6						1.8		
SELENIUM								0.0037	U				
SILVER								0.0015	U				
SODIUM											7.8		
THALLIUM								0.0007	U				
VANADIUM								0.0015	U				
ZINC					0.006						0.0037	U	A

PROJ_NO: 08005-WE04	NSAMPLE	12MW03S-20190919			12MW03S-20190919-RE			12MW040-20190919			12MW040-20190919-RE		
SDG: EPR-032	LAB_ID	3059461006			3059461006			3059461005			3059461005		
FRACTION: M	SAMP_DATE	9/19/2019			9/19/2019			9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/L			MG/L			MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM					0.059	U					0.059	U	
ANTIMONY		0.0015	U					0.0015	U				
ARSENIC		0.002	U					0.002	U				
BARIUM					0.13						0.075		
BERYLLIUM		0.0007	U					0.0007	U				
CADMIUM		0.0007	U					0.0007	U				
CALCIUM					30.5						21.1		
CHROMIUM		0.0015	U					0.0015	U				
COBALT		0.0037	U					0.002	J	P			
COPPER		0.0037	U					0.0037	U				
IRON		0.16						0.38					
LEAD		0.0015	U					0.0015	U				
MAGNESIUM		13.7						7					
MANGANESE					1			0.14					
MERCURY		0.00033	U					0.00033	U				
NICKEL		0.0052	J	P				0.0027	J	P			
POTASSIUM					9.6						1.2		
SELENIUM		0.0037	U					0.0037	U				
SILVER		0.0015	U					0.0015	U				
SODIUM		7.2						7					
THALLIUM		0.0007	U					0.0007	U				
VANADIUM		0.0015	U					0.0015	U				
ZINC					0.0037	U	A				0.0037	U	A

PROJ_NO: 08005-WE04	NSAMPLE	12MW04S-20190919			12MW04S-20190919-RE		
SDG: EPR-032	LAB_ID	3059461004			3059461004		
FRACTION: M	SAMP_DATE	9/19/2019			9/19/2019		
MEDIA: WATER	QC_TYPE	NM			NM		
	UNITS	MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM					0.049	J	P
ANTIMONY		0.0015	U				
ARSENIC		0.002	U				
BARIUM					0.13		
BERYLLIUM		0.0007	U				
CADMIUM		0.0007	U				
CALCIUM					33.6		
CHROMIUM		0.0033					
COBALT		0.0037	U				
COPPER		0.0037	U				
IRON		0.75					
LEAD		0.0015	U				
MAGNESIUM		16.4					
MANGANESE		0.011					
MERCURY		0.00033	U				
NICKEL		0.0025	J	P			
POTASSIUM					8.3		
SELENIUM		0.0037	U				
SILVER		0.0015	U				
SODIUM		7.6					
THALLIUM		0.0007	U				
VANADIUM		0.0015	U				
ZINC					0.0037	U	A

Appendix B

Results as Reported by the Laboratory

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461001** Date Collected: 9/19/2019 07:00 Matrix: Water

Sample ID: **12TB01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1-Dichloroethene	0.75U	U,3	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 05:25	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461001** Date Collected: 9/19/2019 07:00 Matrix: Water

Sample ID: **12TB01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 05:25	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C		9/27/19 05:25	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 05:25	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C		9/27/19 05:25	PDK	A
4-Bromofluorobenzene (S)	115	2	%	85 - 114	SW846 8260C		9/27/19 05:25	PDK	A
Dibromofluoromethane (S)	99.4		%	80 - 119	SW846 8260C		9/27/19 05:25	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C		9/27/19 05:25	PDK	A

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,1-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 07:18	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:18	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:18	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 07:18	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 07:18	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:18	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C			9/27/19 07:18	PDK	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 07:18	PDK	A
Dibromofluoromethane (S)	99.4		%	80 - 119	SW846 8260C			9/27/19 07:18	PDK	A
Toluene-d8 (S)	100		%	89 - 112	SW846 8260C			9/27/19 07:18	PDK	A

METALS

Aluminum, Total	0.48		mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Arsenic, Total	0.0022J	J	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Barium, Total	0.28		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Calcium, Total	30.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Chromium, Total	0.060		mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Cobalt, Total	0.0065		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Copper, Total	0.0047J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Iron, Total	4.8		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Lead, Total	0.0012J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Magnesium, Total	17.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Manganese, Total	4.5		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 14:14	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:52	AHI	C
Nickel, Total	0.058		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461002** Date Collected: 9/19/2019 10:15 Matrix: Water

Sample ID: **12MW020-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	2.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Sodium, Total	13.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Vanadium, Total	0.0014J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:33	LXC	C1
Zinc, Total	0.0060		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:27	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 10:15	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,1-Dichloroethene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 07:41	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 07:41	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 07:41	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 07:41	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 07:41	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 07:41	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118	SW846 8260C			9/27/19 07:41	PDK	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 07:41	PDK	A
Dibromofluoromethane (S)	101		%	80 - 119	SW846 8260C			9/27/19 07:41	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 07:41	PDK	A

METALS

Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Barium, Total	0.23		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Calcium, Total	29.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Iron, Total	9.4		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Magnesium, Total	10.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Manganese, Total	0.31		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:54	AHI	C
Nickel, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461003** Date Collected: 9/19/2019 10:30 Matrix: Water

Sample ID: **12MW02S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.8		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Sodium, Total	7.8		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:36	LXC	C1
Zinc, Total	0.0030J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:30	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 10:30	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,1-Dichloroethene	0.75U	U,3	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 08:03	PDK	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 08:03	PDK	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 08:03	PDK	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 08:03	PDK	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 08:03	PDK	A
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 08:03	PDK	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118	SW846 8260C			9/27/19 08:03	PDK	A
4-Bromofluorobenzene (S)	115	2	%	85 - 114	SW846 8260C			9/27/19 08:03	PDK	A
Dibromofluoromethane (S)	99.7		%	80 - 119	SW846 8260C			9/27/19 08:03	PDK	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 08:03	PDK	A

METALS

Aluminum, Total	0.049J	J	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Barium, Total	0.13		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Calcium, Total	33.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Chromium, Total	0.0033		mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Iron, Total	0.75		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Magnesium, Total	16.4		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Manganese, Total	0.011		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:55	AHI	C
Nickel, Total	0.0025J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461004** Date Collected: 9/19/2019 12:30 Matrix: Water

Sample ID: **12MW04S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	8.3		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Sodium, Total	7.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:39	LXC	C1
Zinc, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:33	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:30	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,1-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 18:45	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 18:45	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 18:45	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 18:45	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 18:45	TMP	A
1,2,3-Trichlorobenzene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 18:45	TMP	A

Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*	*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118	SW846 8260C			9/27/19 18:45	TMP	A
4-Bromofluorobenzene (S)	114		%	85 - 114	SW846 8260C			9/27/19 18:45	TMP	A
Dibromofluoromethane (S)	99.2		%	80 - 119	SW846 8260C			9/27/19 18:45	TMP	A
Toluene-d8 (S)	101		%	89 - 112	SW846 8260C			9/27/19 18:45	TMP	A

METALS

Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Barium, Total	0.075		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Calcium, Total	21.1		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Cobalt, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Iron, Total	0.38		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Magnesium, Total	7.0		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Manganese, Total	0.14		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:56	AHI	C
Nickel, Total	0.0027J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461005** Date Collected: 9/19/2019 12:50 Matrix: Water

Sample ID: **12MW040-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Sodium, Total	7.0		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:42	LXC	C1
Zinc, Total	0.0032J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:37	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:50	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:02	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:02	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:02	TMP	B

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:02	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:02	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:02	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118			SW846 8260C			10/2/19 17:02	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:02	TMP	B
Dibromofluoromethane (S)	95.4		%	80 - 119			SW846 8260C			10/2/19 17:02	TMP	B
Toluene-d8 (S)	96		%	89 - 112			SW846 8260C			10/2/19 17:02	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Barium, Total	0.13		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Calcium, Total	30.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Iron, Total	0.16		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Magnesium, Total	13.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Manganese, Total	1.0		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:57	AHI	C
Nickel, Total	0.0052J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461006** Date Collected: 9/19/2019 14:25 Matrix: Water

Sample ID: **12MW03S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	9.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Sodium, Total	7.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:46	LXC	C1
Zinc, Total	0.0023J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:40	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 14:25	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,1-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
trans-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
1,4-Dioxane	62.5U	U,1	ug/L	125	62.5	41.6	SW846 8260C		9/27/19 19:30	TMP	A
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		9/27/19 19:30	TMP	A
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		9/27/19 19:30	TMP	A

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			9/27/19 19:30	TMP	A
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			9/27/19 19:30	TMP	A
1,2,3-Trichlorobenzene	0.75U	U,2	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			9/27/19 19:30	TMP	A
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	105		%	81 - 118			SW846 8260C			9/27/19 19:30	TMP	A
4-Bromofluorobenzene (S)	113		%	85 - 114			SW846 8260C			9/27/19 19:30	TMP	A
Dibromofluoromethane (S)	101		%	80 - 119			SW846 8260C			9/27/19 19:30	TMP	A
Toluene-d8 (S)	98.9		%	89 - 112			SW846 8260C			9/27/19 19:30	TMP	A
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Barium, Total	0.098		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Calcium, Total	28.1		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Chromium, Total	0.0015J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Cobalt, Total	0.010		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Iron, Total	0.80		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Magnesium, Total	12.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Manganese, Total	0.41		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 17:58	AHI	C
Nickel, Total	0.0020J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461007** Date Collected: 9/19/2019 15:40 Matrix: Water

Sample ID: **12MW010-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Sodium, Total	16.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:49	LXC	C1
Zinc, Total	0.0045J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:43	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 15:40	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:25	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:25	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:25	TMP	B

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:25	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:25	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:25	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	102		%	81 - 118			SW846 8260C			10/2/19 17:25	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:25	TMP	B
Dibromofluoromethane (S)	96		%	80 - 119			SW846 8260C			10/2/19 17:25	TMP	B
Toluene-d8 (S)	96.2		%	89 - 112			SW846 8260C			10/2/19 17:25	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Barium, Total	0.082		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Calcium, Total	36.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Chromium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Copper, Total	0.0022J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Iron, Total	0.045J	J	mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Magnesium, Total	13.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Manganese, Total	0.012		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:00	AHI	C
Nickel, Total	0.0023J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461008** Date Collected: 9/19/2019 15:45 Matrix: Water

Sample ID: **12MW01S-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	1.2		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Sodium, Total	10.7		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Vanadium, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 01:52	LXC	C1
Zinc, Total	0.0046J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:47	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 15:45	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

ALS Environmental

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ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared By	Analyzed	By	*Cntr*
VOLATILE ORGANICS											
Acetone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Benzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromochloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromodichloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromoform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Bromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
2-Butanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Carbon Disulfide	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Carbon Tetrachloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chlorodibromomethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloroform	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Chloromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dibromo-3-chloropropane	2.5U	U	ug/L	5.0	2.5	1.6	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dibromoethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,3-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,4-Dichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Dichlorodifluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,1-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,1-Dichloroethene	0.75U	U,4	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
cis-1,2-Dichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
trans-1,2-Dichloroethene	0.75U	U,5	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,2-Dichloropropane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
cis-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
trans-1,3-Dichloropropene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
1,4-Dioxane	62.5U	U	ug/L	125	62.5	41.6	SW846 8260C		10/2/19 17:48	TMP	B
Ethylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Freon 113	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
2-Hexanone	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C		10/2/19 17:48	TMP	B
Isopropylbenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Methyl acetate	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B
Methyl cyclohexane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C		10/2/19 17:48	TMP	B

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	Cntr
Methyl t-Butyl Ether	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
4-Methyl-2-Pentanone(MIBK)	3.8U	U	ug/L	5.0	3.8	1.6	SW846 8260C			10/2/19 17:48	TMP	B
Methylene Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Styrene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,2,2-Tetrachloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Tetrachloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Toluene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Total Xylenes	2.3U	U	ug/L	3.0	2.3	1.0	SW846 8260C			10/2/19 17:48	TMP	B
1,2,3-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,2,4-Trichlorobenzene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,1-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
1,1,2-Trichloroethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Trichloroethene	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Trichlorofluoromethane	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Vinyl Chloride	0.75U	U	ug/L	1.0	0.75	0.33	SW846 8260C			10/2/19 17:48	TMP	B
Surrogate Recoveries	*Results*	*Flag*	*Units*	*Limits*			*Method*	*Prepared*	*By*	*Analyzed*	*By*	*Cntr*
1,2-Dichloroethane-d4 (S)	103		%	81 - 118			SW846 8260C			10/2/19 17:48	TMP	B
4-Bromofluorobenzene (S)	104		%	85 - 114			SW846 8260C			10/2/19 17:48	TMP	B
Dibromofluoromethane (S)	97.7		%	80 - 119			SW846 8260C			10/2/19 17:48	TMP	B
Toluene-d8 (S)	96.2		%	89 - 112			SW846 8260C			10/2/19 17:48	TMP	B
METALS												
Aluminum, Total	0.059U	U	mg/L	0.089	0.059	0.030	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Antimony, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Arsenic, Total	0.0020U	U	mg/L	0.0030	0.0020	0.0010	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Barium, Total	0.12		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Beryllium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Cadmium, Total	0.00070U	U	mg/L	0.0011	0.00070	0.00037	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Calcium, Total	29.5		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Chromium, Total	0.00080J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Cobalt, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Copper, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Iron, Total	0.16		mg/L	0.056	0.037	0.019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Lead, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Magnesium, Total	12.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Manganese, Total	0.97		mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Mercury, Total	0.00033U	U	mg/L	0.00050	0.00033	0.00016	SW846 7470A	9/27/19	AHI	9/27/19 18:13	AHI	C
Nickel, Total	0.0056J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1

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

ANALYTICAL RESULTS

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID: **3059461009** Date Collected: 9/19/2019 12:00 Matrix: Water

Sample ID: **12DUP01-20190919** Date Received: 9/20/2019 21:45

Parameters	Results	Flag	Units	LOQ	LOD	DL	Method	Prepared	By	Analyzed	By	*Cntr*
Potassium, Total	9.6		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Selenium, Total	0.0037U	U	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
Silver, Total	0.0015U	U	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Sodium, Total	6.9		mg/L	0.11	0.073	0.037	SW846 6020A	9/29/19	SXC	10/1/19 14:10	LXC	C1
Thallium, Total	0.00070U	U	mg/L	0.0010	0.00070	0.00030	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Vanadium, Total	0.00088J	J	mg/L	0.0022	0.0015	0.00074	SW846 6020A	9/29/19	SXC	10/1/19 02:21	LXC	C1
Zinc, Total	0.0050J	J	mg/L	0.0056	0.0037	0.0019	SW846 6020A	9/29/19	SXC	10/1/19 09:56	LXC	C1
SUBCONTRACTED ANALYSIS												
Subcontracted Analysis	See attached.						Subcontract			9/19/19 12:00	SUB	D

Vanessa N. Badman

Mrs. Vanessa N Badman
Project Coordinator

Appendix C

Support Documentation

ANALYTE	ORIGINAL 12MW03S-20190919	DUPLICATE 12DUP01-20190919	RL	RPD	RPD > 30% Aqueous	ORIGINAL SAMPLE CONC >2xRL	DUPLICATE SAMPLE CONC >2xRL	DIFFERENCE >2XRL
IRON	0.16	0.16	0.056	0.00	FALSE	TRUE	TRUE	FALSE
MAGNESIUM	13.7	12.9	0.11	6.02	FALSE	TRUE	TRUE	TRUE
NICKEL	0.0052	0.0056	0.005	7.41	FALSE	FALSE	FALSE	FALSE
SODIUM	7.2	6.9	0.11	4.26	FALSE	TRUE	TRUE	TRUE
BARIUM	0.13	0.12	0.005	8.00	FALSE	TRUE	TRUE	FALSE
CALCIUM	30.5	29.5	0.11	3.33	FALSE	TRUE	TRUE	TRUE
MANGANESE	1	0.97	0.005	3.05	FALSE	TRUE	TRUE	TRUE
POTASSIUM	9.6	9.6	0.11	0.00	FALSE	TRUE	TRUE	FALSE
ZINC	0.0023	0.005	0.005	73.97	TRUE	FALSE	FALSE	FALSE
CHROMIUM	0.0015	0.0008	0.002	60.87	TRUE	FALSE	FALSE	FALSE
VANADIUM	0.0015	0.00088	0.002	52.10	TRUE	FALSE	FALSE	FALSE

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F. 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #: 3

ALS Quote #:

* 3 0 5 9 4 6 1 *

Client Name: Tetra Tech

Address: 234 Mall Boulevard Suite 260 King of Prussia, PA 19406.

Contact: Tricia Moore

Phone#: 610 382 1171

Project Name/#: Willow Grove Sites 3 and 12

Bill To: Tetra Tech Foster Plaza 7

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

Date Required: Approved?

Email? ☐ -Y

Fax? ☐ -Y No.:

W.O. Temp: 4°C Therm ID: 402

Analyst Initials: JAS

Courier/Tracking #:

Purchase Order #:

Project Comments:

ALS Field Services: ☐ Pickup ☐ Labor ☐ Composite Sampling ☐ Rental Equipment

Other:

	Sample Description/Location (as it will appear on the lab report)	Date Collected mm/dd/yy	Time hh:mm	*G or C	**Matrix	40ml VOA Vial VOC's	125ml Poly Metals & Hg	1 Liter Poly Strontium-90	1 Liter Poly Uranium 235	1 Liter Poly Radium 226						Sample/COC Comments
Container Type						VOA Vial	Poly	Poly	Poly	Poly						
Container Size						40ml	125ml	1Liter	1Liter	1Liter						
Preservative						HCl	HNO_3	HNO_3	HNO_3	HNO_3						
						Enter Number of Containers Per Sample or Field Results Below.										
1	TQ-TB01-20190919	9/19/19	0700	G	Aq	2										Laboratory Supplied
2	12MW02Q-20190919	9/19/19	1015	G	GW	2	1	1	1	1						
3	12MW02S-20190919	9/19/19	1030	G	GW	2	1	1	1	1						
4	12MW04S-20190919	9/19/19	1230	G	GW	2	1	1	1	1						
5	12MW04Q-20190919	9/19/19	1250	G	GW	2	1	1	1	1						
6	12MW03S-20190919	9/19/19	1425	G	GW	2	1	1	1	1						
7	12MW01Q-20190919	9/19/19	1540	G	GW	2	1	1	1	1						
8	12MW01S-20190919	9/19/19	1545	G	GW	2	1	1	1	1						
9	12DUP01-20190919	9/19/19	1200	G	GW	2	1	1	1	1						
10																

SAMPLED BY (Please Print): Charles Meyer

Sampler Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Charles Meyer Tetra Tech	9/19/19	1350	2 [signature]	9/20/19	1350
3 [signature]	9/20/19	1800	4 COMMON COURIER / ALS COURIER		
5 COMMON COURIER / ALS COURIER			6 [signature]	9/20/19	2145
7			8		
9			10		

Data Deliverables: ☑ Standard ☐ CLP-like ☐ USACE/DOD

Special Processing: USACE ☐

State Samples Collected In: ☐ NY ☐ NJ ☑ PA ☐ ☐ other

Reportable to PADEP? Yes ☐ No ☑

PWSID #

Sample Disposal: Lab ☑ Special ☐

EDDS: Format Type-

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

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SAMPLE SUMMARY

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3059461001	12TB01-20190919	Water	9/19/2019 07:00	9/20/2019 21:45	Collected by Client
3059461002	12MW020-20190919	Water	9/19/2019 10:15	9/20/2019 21:45	Collected by Client
3059461003	12MW02S-20190919	Water	9/19/2019 10:30	9/20/2019 21:45	Collected by Client
3059461004	12MW04S-20190919	Water	9/19/2019 12:30	9/20/2019 21:45	Collected by Client
3059461005	12MW040-20190919	Water	9/19/2019 12:50	9/20/2019 21:45	Collected by Client
3059461006	12MW03S-20190919	Water	9/19/2019 14:25	9/20/2019 21:45	Collected by Client
3059461007	12MW010-20190919	Water	9/19/2019 15:40	9/20/2019 21:45	Collected by Client
3059461008	12MW01S-20190919	Water	9/19/2019 15:45	9/20/2019 21:45	Collected by Client
3059461009	12DUP01-20190919	Water	9/19/2019 12:00	9/20/2019 21:45	Collected by Client

Tetra Tech

ALS-Middletown
Case Narrative
EPR-032 (3059461)

Sample Management

This report contains the results of the analysis of nine (9) water samples collected on September 19 2019. Analytical results and quality control information are summarized in this data package.

Qualifier Symbol Definitions:

U = Qualifier indicates that the analyte was not detected above the LOD.
J = Qualifier indicates that the analyte value is between the DL and the LOQ.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds the calibration range.
P = Qualifier indicates that the RPD between the two analytical columns is >40%.
NSC = Qualifier indicates that spike recoveries were not calculated based on the spiking concentration.

Result Symbol Definitions:

DL = The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence.
LOD = The smallest analyte concentration that must be present in a sample in order to be detected at a high level of confidence.
LOQ = The lowest concentration that produces a quantitative result within specified limits of precision or bias.

Manual Integration Symbol Definitions

I = Peak was not integrated properly by chromatographic software. This may be due to baseline irregularities resulting from sample matrix, elevated baseline, or incorrect integration by software on a sample. Integration was adjusted by operator to ensure proper quantitation.
H = The incorrect peak was identified or the chromatographic software did not identify an analyte peak. Operator manually identified the correct peak as the appropriate target analyte. This flag is automatically assigned by the Target software.
SP = Peak was erroneously split. The operator manually integrated the peak to include all the area of the analyte peak to ensure proper quantitation.
MP = Two peaks were erroneously merged. This may include two discrete peaks separated by a distinguishable valley or a larger peak with a clearly identifiable shoulder. Operator manually split peaks.
AB = Integration of group of adjacent peaks did not follow baseline. Operator manually assigned integration to follow baseline.
NP = Negative spike in the baseline resulted in overstating area of analyte peaks. Analyte peaks were re-assigned.
AC = Integration of aggregate or multi-component analyte to include area off all components of the analyte (i.e., toxaphene).

Sample Receipt

Samples arrived at ALS via courier on September 20, 2019. Upon receipt, the samples were inspected and compared to the Chain of Custody. Sample temperature was documented on the enclosed Chain of Custody. Samples were received intact and properly preserved, unless noted on the enclosed Certificate of Analysis and/or Chain of Custody.

Subcontracted Data

Eight (8) water samples were submitted to ALS Fort Collins, Colorado for the analysis of isotopic uranium, radium-226, and strontium-90. The data has been included at the end of this data package.

Manual Integrations

If manual integrations were performed they are indicated on the raw data quantification files for each method.

Volatile Organics by SW-846 Method 8260

Sample Handling. Nine (9) ground water samples were analyzed by SW-846 Method 8260 for volatile organic compounds. All analyses were performed within holding time.

Initial Calibrations. Initial calibrations were properly analyzed and met method criteria for all target analytes. **Note:** The batch LCS also serves as a second source (ICV).

- In 30177576 LCS, several analytes were recovered outside control limits.

Continuing Calibration Verification. Continuing Calibrations were properly analyzed and met method criteria for all target analytes, except as follows:

- In file 1801-09271922:08, 1,4-Dioxane was recovered outside control limits.

Blanks. Target analytes were not detected in the method blanks, except as follows:

- In 3018649 MB, 1,4-Dioxane was detected at 73.7 µg/L.

Surrogates. Recoveries were within control limits, except as follows:

- In 3059461001 and 3059461004, BFB was recovered above control limits.

Laboratory control samples. Target analytes were within control limits, except as follows:

- In 3018650 LCS, 1,4-Dioxane and 1,2,3-Trichlorobenzene were recovered outside control limits.
- In 3019577 LCS, 1,1-Dichloroethene, trans-1,2-Dichloroethene, 1,4-Dioxane, Methyl acetate and 1,2,3-Trichlorobenzene were recovered outside control limits.

Internal Standards. Internal standard results met method criteria.

Total Metals by SW-846 Method 6020A

Sample handling. Eight (8) water samples were digested by SW-846 Method 3015 and analyzed for total metals on the Agilent 7700x ICP-MS, using SW-846 Method 6020A. The samples were digested and analyzed within the six-month holding time established for the method.

Calibration. All criteria associated with the calibration and calibration verification standards were within control limits

Blanks. Metals were not detected above the reporting limit in the blanks.

Laboratory Control Samples. Recoveries were within the control limits.

Spikes. A matrix spike and matrix spike duplicate analysis was not performed on a sample in this data deliverable.

Dilution Test. A dilution test was not performed on a sample in this data deliverable.

Total Mercury in Water by EPA Method 7470A

Sample handling. Eight (8) water samples were analyzed for total mercury using EPA method 7470A. The samples were digested and analyzed within the 28-day holding time established for the method.

Calibration. All criteria associated with the calibration and check standards were within control limits.

Blanks. Metals were not detected above the reporting limit in the blanks.

Laboratory Control Sample. The laboratory control sample was recovered within the control limits.

Spikes. A matrix spike/matrix spike duplicate was not performed on samples in this deliverable group.

I _Jennifer M. Stanhope Lamoreux_, as the designated Quality Assurance Officer, hereby attest that all electronic deliverables have been thoroughly reviewed and are in agreement with the associated PDF data. The enclosed electronic files have been reviewed for accuracy (including significant figures), completeness and format. The laboratory will be responsible for any labor time necessary to correct enclosed electronic deliverables that have been found to be in error. I can be reached at _717-944-5541_ if there are any questions or problems with the enclosed electronic deliverables.

Signature:_____ Title:_Reporting Manager_ Date:_11/8/2019_

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

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3059461 EPR032|Willow Grove Sites 3 an

Lab ID	Sample ID	Analysis Method	Prep Method
3059461001	12TB01-20190919	SW846 8260C	
3059461002	12MW020-20190919	SW846 6020A	SW846 3015
3059461002	12MW020-20190919	SW846 7470A	SW846 7470A
3059461002	12MW020-20190919	SW846 8260C	
3059461002	12MW020-20190919	Subcontract	
3059461003	12MW02S-20190919	SW846 6020A	SW846 3015
3059461003	12MW02S-20190919	SW846 7470A	SW846 7470A
3059461003	12MW02S-20190919	SW846 8260C	
3059461003	12MW02S-20190919	Subcontract	
3059461004	12MW04S-20190919	SW846 6020A	SW846 3015
3059461004	12MW04S-20190919	SW846 7470A	SW846 7470A
3059461004	12MW04S-20190919	SW846 8260C	
3059461004	12MW04S-20190919	Subcontract	
3059461005	12MW040-20190919	SW846 6020A	SW846 3015
3059461005	12MW040-20190919	SW846 7470A	SW846 7470A
3059461005	12MW040-20190919	SW846 8260C	
3059461005	12MW040-20190919	Subcontract	
3059461006	12MW03S-20190919	SW846 6020A	SW846 3015
3059461006	12MW03S-20190919	SW846 7470A	SW846 7470A
3059461006	12MW03S-20190919	SW846 8260C	
3059461006	12MW03S-20190919	Subcontract	
3059461007	12MW010-20190919	SW846 6020A	SW846 3015
3059461007	12MW010-20190919	SW846 7470A	SW846 7470A
3059461007	12MW010-20190919	SW846 8260C	
3059461007	12MW010-20190919	Subcontract	
3059461008	12MW01S-20190919	SW846 6020A	SW846 3015
3059461008	12MW01S-20190919	SW846 7470A	SW846 7470A
3059461008	12MW01S-20190919	SW846 8260C	
3059461008	12MW01S-20190919	Subcontract	
3059461009	12DUP01-20190919	SW846 6020A	SW846 3015
3059461009	12DUP01-20190919	SW846 7470A	SW846 7470A
3059461009	12DUP01-20190919	SW846 8260C	
3059461009	12DUP01-20190919	Subcontract	

2A

WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA CASE No.: SAS No.: SDG NO.: EPR-032

	Sample NO.	SMC1 (BFB) #	SMC2 (DBFM)	SMC3 (DCE) #	SMC4 (TOL) #	TOT OUT
01	3017576(LCS)	108	99.3	98.2	97.7	0
02	3017575(MB)	112	99.3	103	99.9	0
03	12TB01-20190919	115 *	99.4	103	101	1
04	12MW020-20190919	114	99.4	103	100	0
05	12MW02S-20190919	114	101	105	101	0
06	12MW04S-20190919	115 *	99.7	103	101	1

	QC LIMITS
SMC1 (BFB) = 4-Bromofluorobenzene	(76-119)
SMC2 (DBFM) = Dibromofluoromethane	(85-115)
SMC3 (DCE) = 1,2-Dichloroethane-d4	(72-119)
SMC4 (TOL) = Toluene-d8	(81-120)

Column to be used to flag recovery values
* Values outside of contract required QC Limits
D Surrogate Diluted Out

2A

WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA CASE No.: SAS No.: SDG NO.: EPR-032

	Sample NO.	SMC1 (BFB) #	SMC2 (DBFM)	SMC3 (DCE) #	SMC4 (TOL) #	TOT OUT
07	3018650(LCS)	109	98.9	104	98.0	0
08	3018649(MB)	111	100	104	100	0
09	12MW040-20190919	114	99.2	105	101	0
10	12MW010-20190919	113	101	105	98.9	0

	QC LIMITS
SMC1 (BFB) = 4-Bromofluorobenzene	(85-114)
SMC2 (DBFM) = Dibromofluoromethane	(80-119)
SMC3 (DCE) = 1,2-Dichloroethane-d4	(81-118)
SMC4 (TOL) = Toluene-d8	(89-112)

Column to be used to flag recovery values
* Values outside of contract required QC Limits
D Surrogate Diluted Out

2A

WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA CASE No.: SAS No.: SDG NO.: EPR-032

	Sample NO.	SMC1 (BFB) #	SMC2 (DBFM)	SMC3 (DCE) #	SMC4 (TOL) #	TOT OUT
11	3019577(LCS)	98.3	95.9	99.0	94.8	0
12	3019576(MB)	102	95.2	103	96.0	0
13	12MW03S-20190919	104	95.4	102	96.0	0
14	12MW01S-20190919	104	96.0	102	96.2	0
15	12DUP01-20190919	104	97.7	103	96.2	0

	QC LIMITS
SMC1 (BFB) = 4-Bromofluorobenzene	(76-119)
SMC2 (DBFM) = Dibromofluoromethane	(85-115)
SMC3 (DCE) = 1,2-Dichloroethane-d4	(72-119)
SMC4 (TOL) = Toluene-d8	(81-120)

Column to be used to flag recovery values
* Values outside of contract required QC Limits
D Surrogate Diluted Out

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3017576

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
Acetone	100		115	115	(80-120)
Benzene	20		21.5	108	(80-120)
Bromochloromethane	20		20.5	102	(80-120)
Bromodichloromethane	20		21.4	107	(80-120)
Bromoform	20		21.8	109	(80-120)
Bromomethane	20		14.5	72.6*	(80-120)
2-Butanone	100		122	122*	(80-120)
Carbon Disulfide	20		20.7	104	(80-120)
Carbon Tetrachloride	20		22.9	114	(80-120)
Chlorobenzene	20		20.1	100	(80-120)
Chlorodibromomethane	20		20.9	105	(80-120)
Chloroethane	20		17.8	89	(80-120)
Chloroform	20		20.5	103	(80-120)
Chloromethane	20		19.2	95.9	(80-120)
Cyclohexane	20		23.0	115	(80-120)
1,2-Dibromo-3-Chloropro	20		19.8	98.8	(80-120)
1,2-Dibromoethane	20		20.3	101	(80-120)
1,2-Dichlorobenzene	20		20.4	102	(80-120)
1,3-Dichlorobenzene	20		20.3	101	(80-120)
1,4-Dichlorobenzene	20		19.5	97.6	(80-120)
Dichlorodifluoromethane	20		18.0	90.1	(80-120)
1,1-Dichloroethane	20		23.4	117	(80-120)
1,2-Dichloroethane	20		20.7	104	(80-120)
1,1-Dichloroethene	20		27.0	135*	(80-120)
cis-1,2-Dichloroethene	20		21.0	105	(80-120)
trans-1,2-Dichloroethen	20		24.4	122*	(80-120)
1,2-Dichloropropane	20		21.5	107	(80-120)
cis-1,3-Dichloropropene	20		21.0	105	(80-120)
trans-1,3-Dichloroprope	20		21.1	106	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 6 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3017576

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
1,4-Dioxane	500		903	181*	(80-120)
Ethylbenzene	20		20.7	103	(80-120)
Freon 113	20		20.9	105	(80-120)
2-Hexanone	100		95.0	95	(80-120)
Isopropylbenzene	20		22.7	114	(80-120)
Methyl acetate	20		25.4	127*	(80-120)
Methyl cyclohexane	20		22.7	114	(80-120)
Methyl t-Butyl Ether	20		21.8	109	(80-120)
4-Methyl-2-Pentanone(MI	100		97.1	97.1	(80-120)
Methylene Chloride	20		22.0	110	(80-120)
Styrene	20		21.6	108	(80-120)
1,1,2,2-Tetrachloroetha	20		21.0	105	(80-120)
Tetrachloroethene	20		21.2	106	(80-120)
Toluene	20		20.9	104	(80-120)
Total Xylenes	60		64.0	107	(80-120)
1,2,3-Trichlorobenzene	20		17.9	89.7	(80-120)
1,2,4-Trichlorobenzene	20		18.8	94	(80-120)
1,1,1-Trichloroethane	20		23.2	116	(80-120)
1,1,2-Trichloroethane	20		20.4	102	(80-120)
Trichloroethene	20		20.2	101	(80-120)
Trichlorofluoromethane	20		19.9	99.5	(80-120)
Vinyl Chloride	20		19.5	97.6	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 6 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3018650

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
Acetone	100		105	105	(39-160)
Benzene	20		20.9	105	(79-120)
Bromochloromethane	20		21.0	105	(78-123)
Bromodichloromethane	20		21.4	107	(79-125)
Bromoform	20		20.3	101	(66-130)
Bromomethane	20		17.3	86.6	(53-141)
2-Butanone	100		89.2	89.2	(56-143)
Carbon Disulfide	20		20.9	104	(64-133)
Carbon Tetrachloride	20		22.0	110	(72-136)
Chlorobenzene	20		19.7	98.4	(82-118)
Chlorodibromomethane	20		20.5	103	(74-126)
Chloroethane	20		20.2	101	(60-138)
Chloroform	20		20.4	102	(79-124)
Chloromethane	20		19.5	97.6	(50-139)
Cyclohexane	20		21.9	110	(71-130)
1,2-Dibromo-3-Chloropro	20		17.1	85.5	(62-128)
1,2-Dibromoethane	20		20.2	101	(77-121)
1,2-Dichlorobenzene	20		19.9	99.4	(80-119)
1,3-Dichlorobenzene	20		19.9	99.6	(80-119)
1,4-Dichlorobenzene	20		19.4	96.9	(79-118)
Dichlorodifluoromethane	20		18.7	93.5	(32-152)
1,1-Dichloroethane	20		22.7	113	(77-125)
1,2-Dichloroethane	20		20.8	104	(73-128)
1,1-Dichloroethene	20		25.9	129	(71-131)
cis-1,2-Dichloroethene	20		20.6	103	(78-123)
trans-1,2-Dichloroethen	20		23.7	119	(75-124)
1,2-Dichloropropane	20		20.9	105	(78-122)
cis-1,3-Dichloropropene	20		20.8	104	(75-124)
trans-1,3-Dichloroprope	20		21.0	105	(73-127)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 2 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3018650

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
1,4-Dioxane	500		1590	318*	(59-139)
Ethylbenzene	20		19.6	98	(79-121)
Freon 113	20		19.7	98.7	(70-136)
2-Hexanone	100		86.0	86	(57-139)
Isopropylbenzene	20		21.6	108	(72-131)
Methyl acetate	20		21.5	108	(56-136)
Methyl cyclohexane	20		21.3	107	(72-132)
Methyl t-Butyl Ether	20		21.1	106	(71-124)
4-Methyl-2-Pentanone(MI	100		81.8	81.8	(67-130)
Methylene Chloride	20		22.2	111	(74-124)
Styrene	20		21.0	105	(78-123)
1,1,2,2-Tetrachloroetha	20		19.3	96.6	(71-121)
Tetrachloroethene	20		20.5	103	(74-129)
Toluene	20		20.3	101	(80-121)
Total Xylenes	60		61.8	103	(79-121)
1,2,3-Trichlorobenzene	20		13.0	64.8*	(69-129)
1,2,4-Trichlorobenzene	20		15.7	78.3	(69-130)
1,1,1-Trichloroethane	20		22.3	111	(74-131)
1,1,2-Trichloroethane	20		19.7	98.3	(80-119)
Trichloroethene	20		19.6	98.1	(79-123)
Trichlorofluoromethane	20		20.5	103	(65-141)
Vinyl Chloride	20		20.3	101	(58-137)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 2 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3019577

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
Acetone	100		93.2	93.2	(80-120)
Benzene	20		22.4	112	(80-120)
Bromochloromethane	20		22.0	110	(80-120)
Bromodichloromethane	20		21.8	109	(80-120)
Bromoform	20		19.9	99.6	(80-120)
Bromomethane	20		20.0	100	(80-120)
2-Butanone	100		104	104	(80-120)
Carbon Disulfide	20		22.2	111	(80-120)
Carbon Tetrachloride	20		23.5	117	(80-120)
Chlorobenzene	20		20.8	104	(80-120)
Chlorodibromomethane	20		21.9	109	(80-120)
Chloroethane	20		20.3	102	(80-120)
Chloroform	20		21.3	106	(80-120)
Chloromethane	20		19.3	96.4	(80-120)
Cyclohexane	20		23.7	119	(80-120)
1,2-Dibromo-3-Chloropro	20		17.0	84.9	(80-120)
1,2-Dibromoethane	20		21.5	107	(80-120)
1,2-Dichlorobenzene	20		21.2	106	(80-120)
1,3-Dichlorobenzene	20		20.5	103	(80-120)
1,4-Dichlorobenzene	20		20.2	101	(80-120)
Dichlorodifluoromethane	20		20.4	102	(80-120)
1,1-Dichloroethane	20		23.9	120	(80-120)
1,2-Dichloroethane	20		21.6	108	(80-120)
1,1-Dichloroethene	20		26.7	133*	(80-120)
cis-1,2-Dichloroethene	20		21.8	109	(80-120)
trans-1,2-Dichloroethen	20		25.4	127*	(80-120)
1,2-Dichloropropane	20		21.8	109	(80-120)
cis-1,3-Dichloropropene	20		21.8	109	(80-120)
trans-1,3-Dichloroprope	20		22.4	112	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 5 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Laboratory Control Spike - Sample No: 3019577

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
1,4-Dioxane	500		654	131*	(80-120)
Ethylbenzene	20		21.4	107	(80-120)
Freon 113	20		21.5	108	(80-120)
2-Hexanone	100		93.5	93.5	(80-120)
Isopropylbenzene	20		22.7	114	(80-120)
Methyl acetate	20		24.3	121*	(80-120)
Methyl cyclohexane	20		19.3	96.4	(80-120)
Methyl t-Butyl Ether	20		22.2	111	(80-120)
4-Methyl-2-Pentanone(MI	100		94.3	94.3	(80-120)
Methylene Chloride	20		21.0	105	(80-120)
Styrene	20		22.5	113	(80-120)
1,1,2,2-Tetrachloroetha	20		21.1	106	(80-120)
Tetrachloroethene	20		21.2	106	(80-120)
Toluene	20		22.1	110	(80-120)
Total Xylenes	60		66.3	110	(80-120)
1,2,3-Trichlorobenzene	20		15.4	77*	(80-120)
1,2,4-Trichlorobenzene	20		16.8	83.9	(80-120)
1,1,1-Trichloroethane	20		23.6	118	(80-120)
1,1,2-Trichloroethane	20		21.1	106	(80-120)
Trichloroethene	20		21.1	105	(80-120)
Trichlorofluoromethane	20		23.0	115	(80-120)
Vinyl Chloride	20		19.1	95.7	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 5 out of 51 outside limits

Comments:

4A

VOLATILE METHOD BLANK SUMMARY

SAMPLE NO.

3017575

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719092616.D Lab Sample ID: 3017575

Date Analyzed: 9/27/2019 Time Analyzed: 04:40

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: ms07.i

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
3017576(LCS)	3017576	719092612.D	03:10
12TB01-20190919	3059461001	719092618.D	05:25
12MW020-20190919	3059461002	719092623.D	07:18
12MW02S-20190919	3059461003	719092624.D	07:41
12MW04S-20190919	3059461004	719092625.D	08:03

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3017575(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3017575

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719092616.D

Level (low/med): Date Received: 9/25/19

% Moisture: not dec. 100.0 Date Analyzed: 9/27/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3017575(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3017575

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719092616.D

Level (low/med): Date Received: 9/25/19

% Moisture: not dec. 100.0 Date Analyzed: 9/27/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

4A

VOLATILE METHOD BLANK SUMMARY

SAMPLE NO.

3018649

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719092705.D Lab Sample ID: 3018649

Date Analyzed: 9/27/2019 Time Analyzed: 15:20

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: ms07.i

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
3018650(LCS)	3018650	719092702.D	13:37
12MW040-20190919	3059461005	719092714.D	18:45
12MW010-20190919	3059461007	719092716.D	19:30

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3018649(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3018649

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719092705.D

Level (low/med): Date Received: 9/27/19

% Moisture: not dec. 100.0 Date Analyzed: 9/27/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	73.7	
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3018649(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3018649

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719092705.D

Level (low/med): Date Received: 9/27/19

% Moisture: not dec. 100.0 Date Analyzed: 9/27/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

4A

VOLATILE METHOD BLANK SUMMARY

SAMPLE NO.

3019576

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719100216.D Lab Sample ID: 3019576

Date Analyzed: 10/2/2019 Time Analyzed: 15:54

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: ms07.i

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
3019577(LCS)	3019577	719100212.D	14:23
12MW03S-20190919	3059461006	719100219.D	17:02
12MW01S-20190919	3059461008	719100220.D	17:25
12DUP01-20190919	3059461009	719100221.D	17:48

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3019576(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3019576

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100216.D

Level (low/med): Date Received: 9/30/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3019576(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Matrix (soil/water): WATER Lab Sample ID: 3019576

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100216.D

Level (low/med): Date Received: 9/30/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

5A

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719092600.D BFB Injection Date: 9/26/2019

Instrument ID: ms07.i BFB Injection Time: 22:31

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: Y/N N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	18.3
75	30.0 - 60.0% of mass 95	46.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.8
173	Less than 2.0% of mass 174	0.5(0.6) 1
174	50.0 - 100.0% of mass 95	78.3
175	5.0 - 9.0% of mass 174	6.1 (7.8) 1
176	95.0 - 101.0% of mass 174	76.7 (97.9) 1
177	5.0 - 9.0% of mass 176	5.1 (6.7) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
VSTD00.5	VSTD00.5	719092603.D	9/26/2019	23:47
1234	1234	719092604.D	9/27/2019	00:09
1235	1235	719092605.D	9/27/2019	00:32
1236	1236	719092606.D	9/27/2019	00:54
1237	1237	719092607.D	9/27/2019	01:17
1238	1238	719092608.D	9/27/2019	01:40
1239	1239	719092609.D	9/27/2019	02:02
3017576(LCS)	3017576	719092612.D	9/27/2019	03:10
3017575(MB)	3017575	719092616.D	9/27/2019	04:40
12TB01-20190919	3059461001	719092618.D	9/27/2019	05:25
12MW020-20190919	3059461002	719092623.D	9/27/2019	07:18
12MW02S-20190919	3059461003	719092624.D	9/27/2019	07:41
12MW04S-20190919	3059461004	719092625.D	9/27/2019	08:03
1801	1801	719092627.D	9/27/2019	08:49

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Acetone	0.01533	0.01533	0.01472	0.01369	0.01428	A
Acrolein	0.03523	0.04058	0.04107	0.03607	0.04088	A
Acrylonitrile	0.05703	0.06428	0.06696	0.06729	0.06725	A
Acetonitrile	0.01168	0.01094	0.01122	0.01248	0.01261	A
tert-Amyl Ethylether	0.34722	0.41909	0.44620	0.47213	0.48328	A
tert-Amyl methyl ether	0.43091	0.51704	0.50543	0.55696	0.53074	A
tert-Amyl Alcohol	0.00539	0.00560	0.00546	0.00689	0.00702	A
Benzene	0.81066	0.91459	0.89308	0.88666	0.86492	A
Benzyl Chloride	1554	12202	70296	232539	516936	Q
Bromobenzene	0.57380	0.62669	0.60196	0.59790	0.57517	A
Bromochloromethane	0.09380	0.10339	0.10599	0.10744	0.10314	A
Bromodichloromethane	0.22014	0.25593	0.26984	0.28105	0.28225	A
Bromoform *	0.26699	0.31167	0.33543	0.36312	0.35944	A
Bromomethane	0.10976	0.10352	0.10449	0.11363	0.10590	A
2-Butanone	0.02027	0.02430	0.02465	0.02560	0.02065	A
tert.- Butyl Alcohol	1812	9810	39299	120766	255104	Q
tert-Butylbenzene	0.35597	0.47430	0.45415	0.46336	0.44865	A
n-Butylbenzene	5854	44077	184480	524043	1116297	Q
sec-Butylbenzene	1.76895	2.55665	2.34318	2.39541	2.32093	A
Carbon Disulfide	0.60258	0.66306	0.64266	0.58631	0.64459	A
Carbon Tetrachloride	0.20423	0.25328	0.25911	0.26762	0.27122	A
Chloroacetonitrile	1078	6000	26562	85073	179862	L
Chlorobenzene *	1.25002	1.30158	1.26939	1.29361	1.27572	A
1-Chlorobutane	0.22043	0.24045	0.23293	0.23221	0.23159	A
Chlorodibromomethane	0.35038	0.39960	0.43652	0.47362	0.48966	A
Chloroethane	15790	59144	245257	601045	1145247	Q
2-Chloroethylvinyl ether	3720	22595	118597	364100	751930	L
Chloroform **	0.37977	0.40623	0.40130	0.39318	0.38929	A
1-Chlorohexane	13571	94961	381729	1074274	2269734	L
Chloromethane *	0.27762	0.24902	0.26272	0.26368	0.26617	A
Chloroprene	0.28514	0.32139	0.33481	0.33647	0.33626	A
3-Chloro-1-propene	0.26697	0.30422	0.30864	0.25836	0.29295	A
o-Chlorotoluene	1.70223	1.98772	1.97670	1.97744	1.88385	A
p-Chlorotoluene	1.56471	1.79886	1.80372	1.80607	1.74679	A

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Cyclohexane	0.28362	0.35942	0.34889	0.35544	0.35029	A
1,2-Dibromo-3-Chloropropane	870	6322	32425	108388	229700	Q
1,2-Dibromoethane	0.35706	0.40868	0.40888	0.43820	0.43774	A
Dibromomethane	0.11660	0.12875	0.12631	0.13031	0.12916	A
trans-1,4-Dichloro-2-butene	2150	14281	71280	207990	423333	L
1,2-Dichlorobenzene	0.83168	0.93821	0.93860	0.95915	0.93650	A
1,3-Dichlorobenzene	0.94755	1.04122	1.03189	1.06828	1.03546	A
1,4-Dichlorobenzene	1.06911	1.06757	1.03759	1.05707	1.02607	A
Dichlorodifluoromethane	0.30624	0.28693	0.33200	0.33072	0.32234	A
1,1-Dichloroethane *	0.33309	0.37401	0.37866	0.37880	0.37424	A
1,2-Dichloroethene, Total	0.27345	0.28695	0.29024	0.28945	0.28799	A
1,2-Dichloroethane	0.24311	0.26329	0.25772	0.25900	0.25686	A
1,1-Dichloroethene **	0.21839	0.27341	0.26399	0.24052	0.25792	A
cis-1,2-Dichloroethene	0.28428	0.29867	0.29748	0.29754	0.29728	A
trans-1,2-Dichloroethene	0.26263	0.27523	0.28300	0.28135	0.27871	A
Dichlorofluoromethane	0.35247	0.39368	0.38761	0.35767	0.37200	A
1,1-Dichloro-2-Propanone	792	4877	23693	70077	140566	L
2,2-Dichloropropane	0.24758	0.27224	0.27834	0.28674	0.28864	A
1,3-Dichloropropane	0.70798	0.75175	0.73873	0.76745	0.76596	A
1,2-Dichloropropane **	0.20170	0.22572	0.22924	0.23388	0.23441	A
1,1-Dichloropropene	0.27715	0.31536	0.31000	0.31344	0.31178	A
cis-1,3-Dichloropropene	0.61600	0.70296	0.74581	0.80297	0.81992	A
trans-1,3-Dichloropropene	0.54614	0.63940	0.67019	0.72458	0.73363	A
1,3-Dichloropropene, Total	0.58107	0.67118	0.70800	0.76378	0.77678	A
Diisobutylene	94278	251580	735884	1909231	3950992	L
Diisopropyl ether	0.56797	0.64325	0.66789	0.67982	0.67930	A
1,4-Dioxane	2957	2696	8258	25928	67515	L
Ethyl Acetate	0.16255	0.18359	0.18955	0.19626	0.19697	A
Ethyl ether	0.09555	0.12512	0.12182	0.11079	0.12171	A
Ethyl Methacrylate	12189	78122	355698	976872	2033299	L
Ethyl tert-butyl ether	0.48351	0.57239	0.58975	0.60989	0.61423	A
Ethylbenzene **	0.63913	0.70583	0.70414	0.71625	0.71297	A
Freon 113	0.17661	0.21679	0.21333	0.19195	0.21109	A
Heptane	6332	51204	165050	452981	977151	Q

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Hexachlorobutadiene	2980	21381	67650	198100	436061	Q
Hexachloroethane	4573	32718	142833	412739	906012	Q
Hexane	0.34677	0.44253	0.41930	0.44072	0.43908	A
2-Hexanone	12838	81344	370342	1040588	2182190	L
Iodomethane	1018	7586	56240	210517	609150	Q
Isobutyl alcohol	905	3406	13125	39820	82767	L
Isopropyl Alcohol	968	2927	11398	32253	79535	Q
Isopropylbenzene	2.12748	2.63648	2.61607	2.61783	2.47700	A
p-Isopropyltoluene	6580	55464	225938	621587	1308542	L
Methyl acetate	0.02543	0.03337	0.03419	0.03984	0.03308	A
Methyl acrylate	0.15663	0.18104	0.18876	0.20311	0.19524	A
Methacrylonitrile	0.07294	0.08564	0.09176	0.09500	0.09010	A
Methyl cyclohexane	0.68376	0.89654	0.82530	0.88039	0.89094	A
Methyl methacrylate	8542	49033	222581	641774	1274086	L
Methyl t-Butyl Ether	0.46404	0.51569	0.53156	0.55415	0.55109	A
4-Methyl-2-Pentanone(MIBK)	24656	153007	726677	2156173	4324882	L
Methylene Chloride	16681	70788	268246	619651	1379991	L
Naphthalene	1890	9697	197917	1051886	2442457	Q
Nitrobenzene	26.00000	138	2344	36347	139964	Q
2-Nitropropane	10017	59655	279666	812663	1646174	L
Octane	4431	35879	107379	290837	608395	Q
Pentachloroethane	0.33597	0.37854	0.39369	0.40422	0.38336	A
Pentane	0.23009	0.22333	0.20525	0.20814	0.18799	A
n-Propanol	0.01117	0.01217	0.01118	0.01122	0.01115	A
Propionitrile	0.01909	0.02144	0.02220	0.02401	0.02246	A
n-Propylbenzene	0.55724	0.69710	0.70588	0.70956	0.67524	A
Styrene	1.33448	1.58420	1.65133	1.66075	1.60409	A
1,1,1,2-Tetrachloroethane	0.36381	0.40739	0.41457	0.43702	0.44767	A
1,1,2,2-Tetrachloroethane *	0.64481	0.67762	0.67874	0.68210	0.63238	A
Tetrachloroethene	0.40024	0.44740	0.42149	0.43250	0.43226	A
Tetrahydrofuran	0.04413	0.05214	0.05285	0.05652	0.05367	A
Toluene **	1.08781	1.25581	1.22242	1.24630	1.23690	A
Total Xylenes	0.67491	0.81043	0.81879	0.84790	0.84255	A
1,2,3-Trichlorobenzene	550	11626	106736	418230	907463	Q

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
1,2,4-Trichlorobenzene	975	18013	144583	529123	1155374	Q
1,1,1-Trichloroethane	0.24959	0.29284	0.29992	0.30068	0.30573	A
1,1,2-Trichloroethane	0.32903	0.36824	0.35838	0.36818	0.36522	A
Trichloroethene	0.24316	0.23964	0.23296	0.23204	0.22957	A
Trichlorofluoromethane	0.35789	0.35074	0.38660	0.38208	0.34716	A
1,2,3-Trichloropropane	0.18596	0.19729	0.19581	0.19437	0.18202	A
1,2,4-Trimethylbenzene	1.51496	1.97844	1.97500	2.00469	1.91564	A
1,3,5-Trimethylbenzene	1.49668	1.99154	1.96706	1.99438	1.88472	A
Vinyl Acetate	2071	13026	54699	139058	317895	Q
Vinyl Chloride **	0.29448	0.28695	0.31896	0.32371	0.31235	A
o-Xylene	0.61586	0.75816	0.78784	0.82720	0.83554	A
mp-Xylene	0.70444	0.83657	0.83427	0.85825	0.84606	A
4-Bromofluorobenzene	0.56071	0.53914	0.54252	0.54706	0.53926	A
Dibromofluoromethane	0.17911	0.18181	0.18275	0.18519	0.18843	A
1,2-Dichloroethane-d4	0.21412	0.20343	0.20178	0.20413	0.20557	A
Toluene-d8	1.60130	1.62854	1.64767	1.69766	1.69093	A

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SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

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Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Acetone	0.01346	0.01779		A		0.014940		9.72530
Acrolein	0.04084	0.04027		A		0.039280		6.37445
Acrylonitrile	0.06764	0.05726		A		0.063960		7.48448
Acetonitrile	0.01137	0.01469		A		0.012140		10.60283
tert-Amyl Ethylether	0.50183	0.34883		A		0.431230		14.53917
tert-Amyl methyl ether	0.57569	0.43607		A		0.507550		10.99936
tert-Amyl Alcohol	0.00636	0.00621		A		0.006130		10.95928
Benzene	0.83536	0.83979		A		0.863580		4.27288
Benzyl Chloride	1148860	799		Q	0.000000	0.182610	0.005810	0.99977
Bromobenzene	0.57168	0.67537		A		0.603220		6.21513
Bromochloromethane	0.09923	0.11428		A		0.103900		6.20292
Bromodichloromethane	0.28973	0.22831		A		0.261030		10.51595
Bromoform *	0.37635	0.26183		A		0.324970		14.27814
Bromomethane	0.11006	0.12510		A		0.110350		6.71732
2-Butanone	0.02406	0.02174		A		0.023040		9.18130
tert.- Butyl Alcohol		1348		Q	0.000000	0.006570	0.000050	0.99927
tert-Butylbenzene	0.46494	0.37327		A		0.433520		11.07836
n-Butylbenzene	2479163	3028		Q	0.000000	0.410350	0.009990	0.99992
sec-Butylbenzene	2.31698	1.82224		A		2.217760		13.53333
Carbon Disulfide	0.63450	0.83838		A		0.658870		12.65808
Carbon Tetrachloride	0.28072	0.21948		A		0.250810		11.30024
Chloroacetonitrile	325357	713		L	0.000000	91.459923		0.99597
Chlorobenzene *	1.24804	1.38707		A		1.289350		3.68634
1-Chlorobutane	0.23863	0.23415		A		0.232910		2.76667
Chlorodibromomethane	0.51497	0.35990		A		0.432090		14.90078
Chloroethane	2210817	10662		Q	0.000000	0.179860	-0.003840	0.99983
2-Chloroethylvinyl ether	1680573	1897		L	0.000000	8.698240		0.99746
Chloroform **	0.39320	0.41264		A		0.396520		2.78577
1-Chlorohexane	4624078	6113		L	0.000000	1.324940		0.99967
Chloromethane *	0.25769	0.31838		A		0.270750		8.38752
Chloroprene	0.33818	0.28625		A		0.319790		7.48917
3-Chloro-1-propene	0.29895	0.28625		A		0.288050		6.58258
o-Chlorotoluene	1.88749	1.87318		A		1.898370		5.25915
p-Chlorotoluene	1.73718	1.72849		A		1.740830		4.85164
Cyclohexane	0.35738	0.28203		A		0.333870		10.50344
1,2-Dibromo-3-Chloropropane	507424	416		Q	0.000000	0.083760	0.002090	0.99968

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2-Dibromoethane	0.44954	0.38977		A		0.412840		7.84078
Dibromomethane	0.13391	0.12901		A		0.127720		4.23322
trans-1,4-Dichloro-2-butene	907411	1139		L	0.000000	5.779770		0.99935
1,2-Dichlorobenzene	0.96870	0.99943		A		0.938890		5.57942
1,3-Dichlorobenzene	1.06896	1.13995		A		1.047610		5.49156
1,4-Dichlorobenzene	1.04361	1.36325		A		1.094890		10.90314
Dichlorodifluoromethane	0.32073	0.30639		A		0.315050		5.12120
1,1-Dichloroethane *	0.37688	0.33502		A		0.364390		5.71218
1,2-Dichloroethene, Total	0.29385	0.29313		A		0.287870		2.37424
1,2-Dichloroethane	0.26320	0.26616		A		0.258480		2.93002
1,1-Dichloroethene **	0.27772	0.25226		A		0.254890		8.01169
cis-1,2-Dichloroethene	0.30282	0.30027		A		0.296900		1.99153
trans-1,2-Dichloroethene	0.28487	0.28600		A		0.278830		2.88111
Dichlorofluoromethane	0.36578	0.35784		A		0.369580		4.27659
1,1-Dichloro-2-Propanone	297043	413		L	0.000000	104		0.99922
2,2-Dichloropropane	0.29987	0.26023		A		0.276230		6.47745
1,3-Dichloropropane	0.77653	0.70408		A		0.744640		3.90206
1,2-Dichloropropane **	0.23871	0.19839		A		0.223150		7.32027
1,1-Dichloropropene	0.31971	0.28806		A		0.305070		5.23212
cis-1,3-Dichloropropene	0.85006	0.67531		A		0.744720		11.40394
trans-1,3-Dichloropropene	0.75815	0.60583		A		0.668270		11.45731
1,3-Dichloropropene, Total	0.80411	0.64057		A		0.706500		11.42265
Diisobutylene	8679520	80914		L	0.000000	1.675240		0.99851
Diisopropyl ether	0.67927	0.56837		A		0.640840		8.00127
1,4-Dioxane	129781			L	0.000000	2747		0.99473
Ethyl Acetate	0.20033	0.18433		A		0.187650		6.82027
Ethyl ether	0.12322	0.11877		A		0.116710		8.92665
Ethyl Methacrylate	4239907	5839		L	0.000000	1.451750		0.99950
Ethyl tert-butyl ether	0.62689	0.48414		A		0.568690		10.65261
Ethylbenzene **	0.71294	0.71766		A		0.701270		3.97217
Freon 113	0.21835	0.20312		A		0.204460		7.47496
Heptane	2390722	3875		Q	0.000000	0.117870	0.007350	0.99988
Hexachlorobutadiene	1036524	2507		Q	0.000000	0.148040	0.007700	0.99988
Hexachloroethane	2049078	2344		Q	0.000000	0.321780	0.010890	0.99997
Hexane	0.46599	0.34686		A		0.414460		11.61912
2-Hexanone	4490045	7376		L	0.000000	6.836340		0.99960

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Iodomethane	1382757	690		Q	0.000000	0.065470	0.004760	0.99724
Isobutyl alcohol	168180	517		L	0.000000	850		0.99968
Isopropyl Alcohol		1185		Q	0.000000	0.001570	0.000040	0.99988
Isopropylbenzene	2.34275	2.19256		A		2.430030		8.73367
p-Isopropyltoluene	2844196	3485		L	0.000000	1.852440		0.99897
Methyl acetate	0.03283	0.02783		A		0.032370		14.36391
Methyl acrylate	0.19858	0.16360		A		0.183850		9.68054
Methacrylonitrile	0.09031	0.07986		A		0.086520		8.90228
Methyl cyclohexane	0.95878	0.63939		A		0.825020		14.41250
Methyl methacrylate	2678305	4234		L	0.000000	5.366240		0.99972
Methyl t-Butyl Ether	0.55841	0.44727		A		0.517460		8.69166
4-Methyl-2-Pentanone(MIBK)	8879024	12389		L	0.000000	3.448350		0.99966
Methylene Chloride	2899030	9497		L	0.000000	4.978390		0.99930
Naphthalene		2728		Q	0.000000	0.638090	0.099290	0.99418
Nitrobenzene	450615			Q	0.000000	0.001710	0.000100	0.99898
2-Nitropropane	3447114	4933		L	0.000000	8.927850		0.99943
Octane	1511894	3305		Q	0.000000	0.166900	0.012050	0.99968
Pentachloroethane	0.40458	0.35670		A		0.379580		6.69181
Pentane	0.19020	0.20506		A		0.207150		7.50739
n-Propanol	0.01128	0.01190		A		0.011440		3.63945
Propionitrile	0.02073	0.02107		A		0.021570		7.15448
n-Propylbenzene	0.68317	0.55010		A		0.654040		10.64739
Styrene	1.58580	1.48293		A		1.557650		7.34088
1,1,1,2-Tetrachloroethane	0.46619	0.36484		A		0.414500		9.53153
1,1,2,2-Tetrachloroethane *	0.64083	0.66296		A		0.659920		3.10559
Tetrachloroethene	0.44703	0.43897		A		0.431410		3.81941
Tetrahydrofuran	0.05266	0.05143		A		0.051910		7.32001
Toluene **	1.24124	1.16688		A		1.208190		5.01601
Total Xylenes	0.82971	0.74878		A		0.796160		7.88005
1,2,3-Trichlorobenzene	2094670	1021		Q	0.000000	0.310050	0.014020	0.99934
1,2,4-Trichlorobenzene	2649638	1171		Q	0.000000	0.397690	0.016900	0.99954
1,1,1-Trichloroethane	0.31645	0.26607		A		0.290180		8.17051
1,1,2-Trichloroethane	0.37765	0.34913		A		0.359400		4.47380
Trichloroethene	0.23226	0.28984		A		0.242780		8.77286
Trichlorofluoromethane	0.33458	0.35633		A		0.359340		5.21498
1,2,3-Trichloropropane	0.18180	0.18892		A		0.189450		3.42303

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Calibration Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719092604.D RRF005 = 719092605.D RRF020 = 719092606.D RRF050 = 719092607.D

RRF100 = 719092608.D RRF200 = 719092609.D RRF00.5 = 719092603.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2,4-Trimethylbenzene	1.91349	1.50987		A		1.830300		12.00362
1,3,5-Trimethylbenzene	1.87638	1.54627		A		1.822430		11.60222
Vinyl Acetate	692025	986		Q	0.000000	0.041410	0.001050	0.99980
Vinyl Chloride **	0.30496	0.30731		A		0.306960		4.23454
o-Xylene	0.84888	0.68756		A		0.765860		11.26823
mp-Xylene	0.82013	0.77940		A		0.811300		6.57880
4-Bromofluorobenzene	0.52575	0.64131		A		0.556540		6.97396
Dibromofluoromethane	0.18276	0.19174		A		0.184540		2.32737
1,2-Dichloroethane-d4	0.20174	0.22815		A		0.208420		4.64370
Toluene-d8	1.56860	1.73642		A		1.653020		3.56307

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

ALS Environmental Services

RECOVERY REPORT

Client Name:
Client SDG: 7190926.b
Sample Matrix: LIQUID
Fraction: VOA
Lab Smp Id: 1801
Level: LOW
Operator: PDK
Data Type: MS DATA
SampleType: LCS
SpikeList File: DODENDCCV.spk
Quant Type: ISTD
Sublist File: DODall.sub
Method File: \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7190926.b\7-8260b09
Misc Info:

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
1 Dichlorodifluorome	50.0000	49.4331	98.87	50-150
2 Chloromethane	50.0000	46.6327	93.27	50-150
3 Vinyl Chloride	50.0000	49.2228	98.45	50-150
4 Bromomethane	50.0000	31.2470	62.49	50-150
5 Chloroethane	50.0000	46.4798	92.96	50-150
6 Pentane	50.0000	48.9894	97.98	50-150
7 Trichlorofluoromet	50.0000	50.2190	100.44	50-150
8 Dichlorofluorometh	50.0000	50.4643	100.93	50-150
9 Ethyl Ether	50.0000	50.3649	100.73	50-150
10 1,1-Dichloroethene	50.0000	53.4668	106.93	50-150
11 Freon 113	50.0000	51.4714	102.94	50-150
12 Carbon Disulfide	50.0000	49.2225	98.44	50-150
13 Iodomethane	50.0000	37.8290	75.66	50-150
14 Acrolein	250.000	246.563	98.63	50-150
15 Isopropyl Alcohol	250.000	289.127	115.65	50-150
16 3-Chloro-1-propene	50.0000	48.3260	96.65	50-150
17 Methylene Chloride	50.0000	48.7029	97.41	50-150
18 Acetone	250.000	247.747	99.10	50-150
19 Methyl acetate	50.0000	55.9541	111.91	50-150
20 trans-1,2-Dichloro	50.0000	50.2654	100.53	50-150
21 Hexane	50.0000	51.6499	103.30	50-150
22 Methyl t-Butyl Eth	50.0000	51.4378	102.88	50-150
23 tert.- Butyl Alcoh	250.000	280.406	112.16	50-150
24 Acetonitrile	250.000	275.892	110.36	50-150
25 Diisopropyl ether	50.0000	51.1359	102.27	50-150
26 Chloroprene	50.0000	51.9437	103.89	50-150
27 1,1-Dichloroethane	50.0000	51.1598	102.32	50-150
28 Acrylonitrile	250.000	259.711	103.88	50-150
30 n-Propanol	500.000	495.126	99.03	50-150
29 Ethyl tert-butyl e	50.0000	51.5410	103.08	50-150
31 Vinyl acetate	50.0000	48.3100	96.62	50-150
32 cis-1,2-Dichloroet	50.0000	49.3541	98.71	50-150
33 2,2-Dichloropropan	50.0000	45.7196	91.44	50-150
34 Bromochloromethane	50.0000	49.7825	99.56	50-150
35 Cyclohexane	50.0000	53.1752	106.35	50-150
36 Chloroform	50.0000	48.9869	97.97	50-150
37 Ethyl acetate	50.0000	52.5525	105.11	50-150
38 Methyl acrylate	50.0000	53.8258	107.65	50-150
39 Carbon Tetrachlori	50.0000	52.5352	105.07	50-150
40 Tetrahydrofuran	250.000	276.721	110.69	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
42 1,1,1-Trichloroeth	50.0000	52.0201	104.04	50-150
43 2-Butanone	250.000	278.470	111.39	50-150
44 1,1-Dichloropropen	50.0000	50.7760	101.55	50-150
45 1-Chlorobutane	50.0000	50.0906	100.18	50-150
46 Heptane	50.0000	53.0645	106.13	50-150
47 Benzene	50.0000	50.9223	101.84	50-150
48 Propionitrile	250.000	276.428	110.57	50-150
49 Methacrylonitrile	50.0000	53.9036	107.81	50-150
50 tert-amyl methyl E	50.0000	49.3869	98.77	50-150
54 Isobutyl alcohol	500.000	477.867	95.57	50-150
52 1,2-Dichloroethane	50.0000	48.6232	97.25	50-150
53 tert-Amyl Alcohol	250.000	302.841	121.14	50-150
56 Diisobutylene	50.0000	49.9800	99.96	50-150
57 Trichloroethene	50.0000	47.3009	94.60	50-150
58 Methyl cyclohexane	50.0000	53.0644	106.13	50-150
59 tert-Amyl Ethyleth	50.0000	52.8253	105.65	50-150
60 Dibromomethane	50.0000	48.8147	97.63	50-150
61 1,2-Dichloropropan	50.0000	51.5438	103.09	50-150
62 Bromodichlorometha	50.0000	52.1827	104.37	50-150
63 Methyl methacrylat	50.0000	49.2121	98.42	50-150
64 1,4-Dioxane	1250.00	669.709	53.58	50-150
65 2-Chloroethylvinyl	50.0000	43.4490	86.90	50-150
66 cis-1,3-Dichloropr	50.0000	50.0826	100.17	50-150
67 Octane	50.0000	52.9237	105.85	50-150
69 Toluene	50.0000	50.3049	100.61	50-150
70 Chloroacetonitrile	250.000	266.573	106.63	50-150
71 2-Nitropropane	250.000	238.445	95.38	50-150
72 1,1-Dichloro-2-pro	250.000	247.467	98.99	50-150
73 4-Methyl-2-Pentano	250.000	249.358	99.74	50-150
74 Tetrachloroethene	50.0000	50.6179	101.24	50-150
75 trans-1,3-Dichloro	50.0000	50.4539	100.91	50-150
76 Ethyl methacrylate	50.0000	46.4985	93.00	50-150
77 1,1,2-Trichloroeth	50.0000	49.2816	98.56	50-150
78 Chlorodibromometha	50.0000	51.6506	103.30	50-150
80 1,2-Dibromoethane	50.0000	50.3083	100.62	50-150
81 2-Hexanone	250.000	240.978	96.39	50-150
82 1-Chlorohexane	50.0000	46.6676	93.34	50-150
79 1,3-Dichloropropan	50.0000	49.4802	98.96	50-150
84 Chlorobenzene	50.0000	48.7185	97.44	50-150
85 Ethylbenzene	50.0000	49.9773	99.95	50-150
86 1,1,1,2-Tetrachlor	50.0000	51.3246	102.65	50-150
87 mp-Xylene	100.000	103.196	103.20	50-150
88 o-Xylene	50.0000	52.5274	105.05	50-150
89 Styrene	50.0000	51.3305	102.66	50-150
90 Bromoform	50.0000	51.4877	102.98	50-150
91 Isopropylbenzene	50.0000	52.9133	105.83	50-150
93 Bromobenzene	50.0000	47.6565	95.31	50-150
94 n-Propylbenzene	50.0000	52.6517	105.30	50-150
95 1,1,2,2-Tetrachlor	50.0000	50.1883	100.38	50-150
96 o-Chlorotoluene	50.0000	50.4589	100.92	50-150
M 100 1,2-Dichloroethene	100.000	99.6194	99.62	50-150
97 1,3,5-Trimethylben	50.0000	53.4385	106.88	50-150
98 1,2,3-Trichloropro	50.0000	50.3967	100.79	50-150
99 trans-1,4-Dichloro	50.0000	43.9703	87.94	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
101 p-Chlorotoluene	50.0000	50.0865	100.17	50-150
102 tert-Butylbenzene	50.0000	52.8065	105.61	50-150
103 Pentachloroethane	50.0000	46.9012	93.80	50-150
104 1,2,4-Trimethylben	50.0000	53.3317	106.66	50-150
105 sec-Butylbenzene	50.0000	54.6903	109.38	50-150
106 p-Isopropyltoluene	50.0000	48.4714	96.94	50-150
107 1,3-Dichlorobenzen	50.0000	48.3101	96.62	50-150
109 1,4-Dichlorobenzen	50.0000	45.7252	91.45	50-150
110 Benzyl Chloride	50.0000	41.1273	82.25	50-150
111 n-Butylbenzene	50.0000	52.0055	104.01	50-150
112 Hexachloroethane	50.0000	49.9970	99.99	50-150
113 1,2-Dichlorobenzen	50.0000	48.2756	96.55	50-150
114 1,2-Dibromo-3-chlo	50.0000	49.2004	98.40	50-150
115 Nitrobenzene	500.000	252.999	50.60	50-150
116 Hexachlorobutadien	50.0000	55.0433	110.09	50-150
117 1,2,4-Trichloroben	50.0000	47.3929	94.79	50-150
118 Naphthalene	50.0000	48.5814	97.16	50-150
M 120 1,3-Dichloropropen	100.000	100.536	100.54	50-150
119 1,2,3-Trichloroben	50.0000	47.6864	95.37	50-150
M 121 TOTAL XYLENES	150.000	155.723	103.82	50-150

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
$ 41 Dibromofluorometha	49.9980	48.0356	96.08	80-119
$ 51 1,2-Dichloroethane	49.9980	47.0890	94.18	81-118
$ 68 Toluene-d8	49.9980	47.8766	95.76	89-112
$ 92 4-Bromofluorobenze	49.9980	49.6578	99.32	85-114

5A

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719092700.D BFB Injection Date: 9/27/2019

Instrument ID: ms07.i BFB Injection Time: 11:57

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: Y/N N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.9
75	30.0 - 60.0% of mass 95	46.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.3
173	Less than 2.0% of mass 174	0.7(0.9) 1
174	50.0 - 100.0% of mass 95	76.0
175	5.0 - 9.0% of mass 174	5.8 (7.6) 1
176	95.0 - 101.0% of mass 174	75.0 (98.7) 1
177	5.0 - 9.0% of mass 176	4.6 (6.2) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
1800	1800	719092701.D	9/27/2019	12:25
3018650(LCS)	3018650	719092702.D	9/27/2019	13:37
3018649(MB)	3018649	719092705.D	9/27/2019	15:20
12MW040-20190919	3059461005	719092714.D	9/27/2019	18:45
12MW010-20190919	3059461007	719092716.D	9/27/2019	19:30
1801	1801	719092723.D	9/27/2019	22:08

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date/Time: 9/27/2019 12:25

Lab File ID: 719092701.D Init. Calib. Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Init. Calib. Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

COMPOUND	RRF	RRF050	Conc. CC std	MIN RRF	%D	MAX%D	CT	
Acetone	0.0149	0.0134			-10.5	20.0	A	
Acrolein	0.0393	32.0000			81369. *	20.0	A	NT
Acrylonitrile	0.0640	0.0735			14.9	20.0	A	
Acetonitrile	0.0121	0.0117			-3.8	20.0	A	
tert-Amyl Ethylether	0.4312	0.4903			13.7	20.0	A	
tert-Amyl methyl ether	0.5076	0.5665			11.6	20.0	A	
tert-Amyl Alcohol	0.0061	0.0042			-32.1 *	20.0	A	NT
Benzene	0.8636	0.9254			7.2	20.0	A	
Benzyl Chloride	50.0000		47.3050		-5.4	20.0	Q	
Bromobenzene	0.6032	0.6299			4.4	20.0	A	
Bromochloromethane	0.1039	0.1121			7.9	20.0	A	
Bromodichloromethane	0.2610	0.2941			12.7	20.0	A	
Bromoform	0.3250	0.3503		0.100	7.8	20.0	A	
Bromomethane	0.1103	0.1009			-8.6	20.0	A	
2-Butanone	0.0230	0.0226			-2.1	20.0	A	
tert.- Butyl Alcohol	250		158		-37.0 *	20.0	Q	NT
tert-Butylbenzene	0.4335	0.4980			14.9	20.0	A	
n-Butylbenzene	50.0000		58.4508		16.9	20.0	Q	
sec-Butylbenzene	2.2178	2.6443			19.2	20.0	A	
Carbon Disulfide	0.6589	0.6027			-8.5	20.0	A	
Carbon Tetrachloride	0.2508	0.2770			10.4	20.0	A	
Chloroacetonitrile	250		218		-12.8	20.0	L	
Chlorobenzene	1.2894	1.3623		0.300	5.7	20.0	A	
1-Chlorobutane	0.2329	0.2429			4.3	20.0	A	
Chlorodibromomethane	0.4321	0.4856			12.4	20.0	A	
Chloroethane	50.0000		50.7785		1.6	20.0	Q	
2-Chloroethylvinyl ether	50.0000		44.8410		-10.3	20.0	L	
Chloroform	0.3965	0.4112			3.7	20.0	A	
1-Chlorohexane	50.0000		50.4795		1.0	20.0	L	
Chloromethane	0.2707	0.2537		0.100	-6.3	20.0	A	
Chloroprene	0.3198	0.3436			7.4	20.0	A	
3-Chloro-1-propene	0.2880	0.3092			7.3	20.0	A	
o-Chlorotoluene	1.8984	2.0707			9.1	20.0	A	
p-Chlorotoluene	1.7408	1.8994			9.1	20.0	A	
Cyclohexane	0.3339	0.3651			9.3	20.0	A	

Calibration Type: A=Average Response Factor, L=Linear Regression, Q=Quadratic Regression
Compounds with "Calibration Type" other than "A" are calculated as % Drift due to alternate calibration type.

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date/Time: 9/27/2019 12:25

Lab File ID: 719092701.D Init. Calib. Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Init. Calib. Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

COMPOUND	RRF	RRF050	Conc. CC std	MIN RRF	%D	MAX%D	CT	
1,2-Dibromo-3-Chloropropane	50.0000		44.2950		-11.4	20.0	Q	
1,2-Dibromoethane	0.4128	0.4447			7.7	20.0	A	
Dibromomethane	0.1277	0.1360			6.5	20.0	A	
trans-1,4-Dichloro-2-butene	50.0000		45.1247		-9.8	20.0	L	
1,2-Dichlorobenzene	0.9389	1.0022			6.7	20.0	A	
1,3-Dichlorobenzene	1.0476	1.1157			6.5	20.0	A	
1,4-Dichlorobenzene	1.0949	1.1122			1.6	20.0	A	
Dichlorodifluoromethane	0.3151	0.3025			-4.0	20.0	A	
1,1-Dichloroethane	0.3644	0.3947			8.3	20.0	A	
1,2-Dichloroethene, Total	0.2879	0.3030			5.3	20.0	A	
1,2-Dichloroethane	0.2585	0.2721			5.3	20.0	A	
1,1-Dichloroethene	0.2549	0.2429			-4.7	20.0	A	
cis-1,2-Dichloroethene	0.2969	0.3132			5.5	20.0	A	
trans-1,2-Dichloroethene	0.2788	0.2928			5.0	20.0	A	
Dichlorofluoromethane	0.3696	0.3661			-0.9	20.0	A	
1,1-Dichloro-2-Propanone	250		187		-25.3 *	20.0	L	NT
2,2-Dichloropropane	0.2762	0.2843			2.9	20.0	A	
1,3-Dichloropropane	0.7446	0.7884			5.9	20.0	A	
1,2-Dichloropropane	0.2231	0.2460			10.2	20.0	A	
1,1-Dichloropropene	0.3051	0.3255			6.7	20.0	A	
cis-1,3-Dichloropropene	0.7447	0.8272			11.1	20.0	A	
trans-1,3-Dichloropropene	0.6683	0.7454			11.5	20.0	A	
1,3-Dichloropropene, Total	0.7065	0.7863			11.3	20.0	A	
Diisobutylene	50.0000		53.0234		6.0	20.0	L	
Diisopropyl ether	0.6408	0.7017			9.5	20.0	A	
1,4-Dioxane	1250		1206		-3.6	20.0	L	
Ethyl Acetate	0.1876	0.1808			-3.7	20.0	A	
Ethyl ether	0.1167	0.1091			-6.5	20.0	A	
Ethyl Methacrylate	50.0000		46.8022		-6.4	20.0	L	
Ethyl tert-butyl ether	0.5687	0.6244			9.8	20.0	A	
Ethylbenzene	0.7013	0.7570			7.9	20.0	A	
Freon 113	0.2045	0.1937			-5.3	20.0	A	
Heptane	50.0000		63.9668		27.9 *	20.0	Q	NT
Hexachlorobutadiene	50.0000		65.4516		30.9 *	20.0	Q	NT
Hexachloroethane	50.0000		54.7342		9.5	20.0	Q	

Calibration Type: A=Average Response Factor, L=Linear Regression, Q=Quadratic Regression
Compounds with "Calibration Type" other than "A" are calculated as % Drift due to alternate calibration type.

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date/Time: 9/27/2019 12:25

Lab File ID: 719092701.D Init. Calib. Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Init. Calib. Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

COMPOUND	RRF	RRF050	Conc. CC std	MIN RRF	%D	MAX%D	CT	
Hexane	0.4145	0.4543			9.6	20.0	A	
2-Hexanone	250		227		-9.3	20.0	L	
Iodomethane	50.0000		47.6320		-4.7	20.0	Q	
Isobutyl alcohol	500		333		-33.4 *	20.0	L	NT
Isopropyl Alcohol	250		185		-26.1 *	20.0	Q	NT
Isopropylbenzene	2.4300	2.7662			13.8	20.0	A	
p-Isopropyltoluene	50.0000		53.2283		6.5	20.0	L	
Methyl acetate	0.0324	0.0324			0.0	20.0	A	
Methyl acrylate	0.1839	0.1870			1.7	20.0	A	
Methacrylonitrile	0.0865	0.0891			3.0	20.0	A	
Methyl cyclohexane	0.8250	0.9287			12.6	20.0	A	
Methyl methacrylate	50.0000		47.4426		-5.1	20.0	L	
Methyl t-Butyl Ether	0.5175	0.5517			6.6	20.0	A	
4-Methyl-2-Pentanone(MIBK)	250		208		-16.7	20.0	L	
Methylene Chloride	50.0000		52.8276		5.7	20.0	L	
Naphthalene	50.0000		42.9041		-14.2	20.0	Q	
Nitrobenzene	500		213		-57.3 *	20.0	Q	NT
2-Nitropropane	250		219		-12.5	20.0	L	
Octane	50.0000		71.7600		43.5 *	20.0	Q	NT
Pentachloroethane	0.3796	0.4035			6.3	20.0	A	
Pentane	0.2071	0.2077			0.3	20.0	A	
n-Propanol	0.0114	0.0119			4.3	20.0	A	
Propionitrile	0.0216	0.0206			-4.3	20.0	A	
n-Propylbenzene	0.6540	0.7435			13.7	20.0	A	
Styrene	1.5576	1.7431			11.9	20.0	A	
1,1,1,2-Tetrachloroethane	0.4145	0.4573			10.3	20.0	A	
1,1,2,2-Tetrachloroethane	0.6599	0.6559		0.300	-0.6	20.0	A	
Tetrachloroethene	0.4314	0.4570			5.9	20.0	A	
Tetrahydrofuran	0.0519	0.0485			-6.7	20.0	A	
Toluene	1.2082	1.3115			8.6	20.0	A	
Total Xylenes	0.7962	0.8931			12.2	20.0	A	
1,2,3-Trichlorobenzene	50.0000		42.3883		-15.2	20.0	Q	
1,2,4-Trichlorobenzene	50.0000		48.3279		-3.3	20.0	Q	
1,1,1-Trichloroethane	0.2902	0.3147			8.5	20.0	A	
1,1,2-Trichloroethane	0.3594	0.3770			4.9	20.0	A	

Calibration Type: A=Average Response Factor, L=Linear Regression, Q=Quadratic Regression
Compounds with "Calibration Type" other than "A" are calculated as % Drift due to alternate calibration type.

7A

VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date/Time: 9/27/2019 12:25

Lab File ID: 719092701.D Init. Calib. Date(s): 9/26/2019 9/27/2019

Heated Purge: (Y/N) N Init. Calib. Time(s): 23:47 02:02

GC Column: RTXVRX ID: 0.25 (mm)

COMPOUND	RRF	RRF050	Conc. CC std	MIN RRF	%D	MAX%D	CT
Trichloroethene	0.2428	0.2446			0.8	20.0	A
Trichlorofluoromethane	0.3593	0.3655			1.7	20.0	A
1,2,3-Trichloropropane	0.1894	0.1889			-0.3	20.0	A
1,2,4-Trimethylbenzene	1.8303	2.1250			16.1	20.0	A
1,3,5-Trimethylbenzene	1.8224	2.1093			15.7	20.0	A
Vinyl Acetate	50.0000		50.1613		0.3	20.0	Q
Vinyl Chloride	0.3070	0.3033			-1.2	20.0	A
o-Xylene	0.7659	0.8694			13.5	20.0	A
mp-Xylene	0.8113	0.9050			11.5	20.0	A
4-Bromofluorobenzene	0.5565	0.5847			5.1	20.0	A
Dibromofluoromethane	0.1845	0.1863			1.0	20.0	A
1,2-Dichloroethane-d4	0.2084	0.2037			-2.2	20.0	A
Toluene-d8	1.6530	1.6695			1.0	20.0	A

Calibration Type: A=Average Response Factor, L=Linear Regression, Q=Quadratic Regression
Compounds with "Calibration Type" other than "A" are calculated as % Drift due to alternate calibration type.

ALS Environmental Services

RECOVERY REPORT

Client Name:
Client SDG: 7190927.b
Sample Matrix: LIQUID
Fraction: VOA
Lab Smp Id: 1801
Level: LOW
Operator: TMP
Data Type: MS DATA
SampleType: LCS
SpikeList File: DODENDCCV.spk
Quant Type: ISTD
Sublist File: DODall.sub
Method File: \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7190927.b\7-8260b09
Misc Info:

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
1 Dichlorodifluorome	50.0000	47.1877	94.38	50-150
2 Chloromethane	50.0000	45.3770	90.75	50-150
3 Vinyl Chloride	50.0000	47.8556	95.71	50-150
4 Bromomethane	50.0000	38.4551	76.91	50-150
5 Chloroethane	50.0000	49.6457	99.29	50-150
6 Pentane	50.0000	46.7645	93.53	50-150
7 Trichlorofluoromet	50.0000	50.6235	101.25	50-150
8 Dichlorofluorometh	50.0000	46.6316	93.26	50-150
9 Ethyl Ether	50.0000	44.7047	89.41	50-150
10 1,1-Dichloroethene	50.0000	44.2906	88.58	50-150
11 Freon 113	50.0000	43.4602	86.92	50-150
12 Carbon Disulfide	50.0000	41.3247	82.65	50-150
13 Iodomethane	50.0000	34.9430	69.89	50-150
14 Acrolein	250.000	197.740	79.10	50-150
15 Isopropyl Alcohol	250.000	231.984	92.79	50-150
16 3-Chloro-1-propene	50.0000	42.1116	84.22	50-150
17 Methylene Chloride	50.0000	43.5372	87.07	50-150
18 Acetone	250.000	194.600	77.84	50-150
19 Methyl acetate	50.0000	50.3207	100.64	50-150
20 trans-1,2-Dichloro	50.0000	44.3661	88.73	50-150
21 Hexane	50.0000	50.3502	100.70	50-150
22 Methyl t-Butyl Eth	50.0000	52.1606	104.32	50-150
23 tert.- Butyl Alcoh	250.000	247.042	98.82	50-150
24 Acetonitrile	250.000	263.660	105.46	50-150
25 Diisopropyl ether	50.0000	52.2839	104.57	50-150
26 Chloroprene	50.0000	50.5003	101.00	50-150
27 1,1-Dichloroethane	50.0000	51.1825	102.36	50-150
28 Acrylonitrile	250.000	305.228	122.09	50-150
30 n-Propanol	500.000	515.013	103.00	50-150
29 Ethyl tert-butyl e	50.0000	52.2131	104.43	50-150
31 Vinyl acetate	50.0000	44.3564	88.71	50-150
32 cis-1,2-Dichloroet	50.0000	49.4263	98.85	50-150
33 2,2-Dichloropropan	50.0000	42.5581	85.12	50-150
34 Bromochloromethane	50.0000	50.8763	101.75	50-150
35 Cyclohexane	50.0000	51.7502	103.50	50-150
36 Chloroform	50.0000	49.3149	98.63	50-150
37 Ethyl acetate	50.0000	49.9287	99.86	50-150
38 Methyl acrylate	50.0000	51.9680	103.94	50-150
39 Carbon Tetrachlori	50.0000	51.2207	102.44	50-150
40 Tetrahydrofuran	250.000	259.413	103.77	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
42 1,1,1-Trichloroeth	50.0000	50.3630	100.73	50-150
43 2-Butanone	250.000	260.479	104.19	50-150
44 1,1-Dichloropropen	50.0000	49.8270	99.65	50-150
45 1-Chlorobutane	50.0000	49.4507	98.90	50-150
46 Heptane	50.0000	54.3063	108.61	50-150
47 Benzene	50.0000	50.6803	101.36	50-150
48 Propionitrile	250.000	265.050	106.02	50-150
49 Methacrylonitrile	50.0000	53.2063	106.41	50-150
50 tert-amyl methyl E	50.0000	53.7648	107.53	50-150
54 Isobutyl alcohol	500.000	350.684	70.14	50-150
52 1,2-Dichloroethane	50.0000	50.3463	100.69	50-150
53 tert-Amyl Alcohol	250.000	268.619	107.45	50-150
56 Diisobutylene	50.0000	50.3258	100.65	50-150
57 Trichloroethene	50.0000	47.1808	94.36	50-150
58 Methyl cyclohexane	50.0000	52.3033	104.61	50-150
59 tert-Amyl Ethyleth	50.0000	53.0725	106.15	50-150
60 Dibromomethane	50.0000	50.6623	101.32	50-150
61 1,2-Dichloropropan	50.0000	52.4452	104.89	50-150
62 Bromodichlorometha	50.0000	53.4365	106.87	50-150
63 Methyl methacrylat	50.0000	48.2863	96.57	50-150
64 1,4-Dioxane	1250.00	450.136	36.01*	50-150
65 2-Chloroethylvinyl	50.0000	39.4100	78.82	50-150
66 cis-1,3-Dichloropr	50.0000	50.0571	100.11	50-150
67 Octane	50.0000	55.4003	110.80	50-150
69 Toluene	50.0000	49.6142	99.23	50-150
70 Chloroacetonitrile	250.000	257.747	103.10	50-150
71 2-Nitropropane	250.000	225.341	90.14	50-150
72 1,1-Dichloro-2-pro	250.000	226.131	90.45	50-150
73 4-Methyl-2-Pentano	250.000	227.502	91.00	50-150
74 Tetrachloroethene	50.0000	51.0851	102.17	50-150
75 trans-1,3-Dichloro	50.0000	50.6709	101.34	50-150
76 Ethyl methacrylate	50.0000	45.7071	91.41	50-150
77 1,1,2-Trichloroeth	50.0000	49.7161	99.43	50-150
78 Chlorodibromometha	50.0000	52.0037	104.01	50-150
80 1,2-Dibromoethane	50.0000	50.2268	100.45	50-150
81 2-Hexanone	250.000	224.864	89.95	50-150
82 1-Chlorohexane	50.0000	45.8230	91.65	50-150
79 1,3-Dichloropropan	50.0000	49.8281	99.66	50-150
84 Chlorobenzene	50.0000	48.6841	97.37	50-150
85 Ethylbenzene	50.0000	49.7589	99.52	50-150
86 1,1,1,2-Tetrachlor	50.0000	51.0227	102.05	50-150
87 mp-Xylene	100.000	103.138	103.14	50-150
88 o-Xylene	50.0000	52.7164	105.43	50-150
89 Styrene	50.0000	51.7163	103.43	50-150
90 Bromoform	50.0000	50.3952	100.79	50-150
91 Isopropylbenzene	50.0000	52.8044	105.61	50-150
93 Bromobenzene	50.0000	47.7679	95.54	50-150
94 n-Propylbenzene	50.0000	53.0011	106.00	50-150
95 1,1,2,2-Tetrachlor	50.0000	49.2090	98.42	50-150
96 o-Chlorotoluene	50.0000	50.5389	101.08	50-150
M 100 1,2-Dichloroethene	100.000	93.7924	93.79	50-150
97 1,3,5-Trimethylben	50.0000	54.0094	108.02	50-150
98 1,2,3-Trichloropro	50.0000	48.8465	97.69	50-150
99 trans-1,4-Dichloro	50.0000	40.6838	81.37	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
101 p-Chlorotoluene	50.0000	50.6415	101.28	50-150
102 tert-Butylbenzene	50.0000	52.9894	105.98	50-150
103 Pentachloroethane	50.0000	46.4476	92.90	50-150
104 1,2,4-Trimethylben	50.0000	54.1024	108.20	50-150
105 sec-Butylbenzene	50.0000	55.4762	110.95	50-150
106 p-Isopropyltoluene	50.0000	48.8530	97.71	50-150
107 1,3-Dichlorobenzen	50.0000	49.1044	98.21	50-150
109 1,4-Dichlorobenzen	50.0000	46.5334	93.07	50-150
110 Benzyl Chloride	50.0000	36.2379	72.48	50-150
111 n-Butylbenzene	50.0000	53.0139	106.03	50-150
112 Hexachloroethane	50.0000	50.4429	100.89	50-150
113 1,2-Dichlorobenzen	50.0000	49.6120	99.22	50-150
114 1,2-Dibromo-3-chlo	50.0000	45.1864	90.37	50-150
115 Nitrobenzene	500.000	117.085	23.42*	50-150
116 Hexachlorobutadien	50.0000	57.4080	114.82	50-150
117 1,2,4-Trichloroben	50.0000	46.5214	93.04	50-150
118 Naphthalene	50.0000	43.5883	87.18	50-150
M 120 1,3-Dichloropropen	100.000	100.728	100.73	50-150
119 1,2,3-Trichloroben	50.0000	44.8782	89.76	50-150
M 121 TOTAL XYLENES	150.000	155.854	103.90	50-150

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
$ 41 Dibromofluorometha	49.9980	48.4687	96.94	80-119
$ 51 1,2-Dichloroethane	49.9980	47.7458	95.50	81-118
$ 68 Toluene-d8	49.9980	47.4731	94.95	89-112
$ 92 4-Bromofluorobenze	49.9980	49.1331	98.27	85-114

5A

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-032

Lab File ID: 719100200.D BFB Injection Date: 10/2/2019

Instrument ID: ms07.i BFB Injection Time: 09:34

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: Y/N N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	18.1
75	30.0 - 60.0% of mass 95	47.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.0
173	Less than 2.0% of mass 174	0.7(0.8) 1
174	50.0 - 100.0% of mass 95	79.9
175	5.0 - 9.0% of mass 174	5.6 (7.0) 1
176	95.0 - 101.0% of mass 174	76.9 (96.2) 1
177	5.0 - 9.0% of mass 176	5.0 (6.5) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
VSTD00.5	VSTD00.5	719100203.D	10/2/2019	10:59
1234	1234	719100204.D	10/2/2019	11:22
1235	1235	719100205.D	10/2/2019	11:44
1236	1236	719100206.D	10/2/2019	12:07
1237	1237	719100207.D	10/2/2019	12:30
1238	1238	719100208.D	10/2/2019	12:52
1239	1239	719100209.D	10/2/2019	13:15
3019577(LCS)	3019577	719100212.D	10/2/2019	14:23
3019576(MB)	3019576	719100216.D	10/2/2019	15:54
12MW03S-20190919	3059461006	719100219.D	10/2/2019	17:02
12MW01S-20190919	3059461008	719100220.D	10/2/2019	17:25
12DUP01-20190919	3059461009	719100221.D	10/2/2019	17:48
1801	1801	719100227.D	10/2/2019	20:03

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Acetone	0.01923	0.01894	0.01742	0.01708	0.01913	A
Acrolein	0.03805	0.04087	0.03985	0.03956	0.04497	A
Acrylonitrile	0.07457	0.07922	0.07581	0.07801	0.09251	A
Acetonitrile	0.01837	0.01796	0.01637	0.01603	0.01834	A
tert-Amyl Ethylether	0.34053	0.35636	0.40292	0.41771	0.45829	A
tert-Amyl methyl ether	0.38692	0.44232	0.48744	0.50082	0.54023	A
tert-Amyl Alcohol	0.00981	0.01031	0.00967	0.01021	0.01215	A
Benzene	0.73500	0.78683	0.81854	0.78198	0.82869	A
Benzyl Chloride	1309	10634	62372	207215	521782	Q
Bromobenzene	0.60304	0.62667	0.62772	0.59470	0.62624	A
Bromochloromethane	0.09614	0.08893	0.09573	0.09249	0.09264	A
Bromodichloromethane	0.22360	0.22925	0.24477	0.24891	0.26970	A
Bromoform *	4866	29268	136357	391129	929255	Q
Bromomethane	5021	26151	114506	296212	615260	Q
2-Butanone	0.02556	0.02587	0.02657	0.02670	0.03006	A
tert.- Butyl Alcohol	0.01265	0.01349	0.01149	0.01101	0.01295	A
tert-Butylbenzene	0.37458	0.46256	0.51228	0.47356	0.50963	A
n-Butylbenzene	4987	36589	197930	504252	1190888	Q
sec-Butylbenzene	1.95084	2.44971	2.76463	2.51951	2.70618	A
Carbon Disulfide	0.48494	0.55518	0.58333	0.55069	0.59711	A
Carbon Tetrachloride	0.18558	0.21800	0.23757	0.23019	0.25846	A
Chloroacetonitrile	1604	10743	43757	121379	294303	L
Chlorobenzene *	1.28479	1.29784	1.31274	1.24517	1.32094	A
1-Chlorobutane	0.20365	0.20872	0.21518	0.20346	0.22154	A
Chlorodibromomethane	0.36577	0.39546	0.44019	0.45750	0.50673	A
Chloroethane	15820	53655	210340	525280	1051116	L
2-Chloroethylvinyl ether	3928	24504	118680	355759	860586	Q
Chloroform **	0.36176	0.35187	0.36339	0.35037	0.37138	A
1-Chlorohexane	12887	76631	371696	952657	2211812	L
Chloromethane *	0.19713	0.19536	0.21177	0.20869	0.22003	A
Chloroprene	0.23376	0.27624	0.29802	0.28887	0.31809	A
3-Chloro-1-propene	0.23776	0.25456	0.27474	0.26589	0.28603	A
o-Chlorotoluene	1.74924	2.05988	2.14747	1.98193	2.10911	A
p-Chlorotoluene	1.63556	1.87496	1.93871	1.82577	1.92797	A

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Cyclohexane	0.23074	0.29791	0.32489	0.30519	0.33318	A
1,2-Dibromo-3-Chloropropane	994	6831	33616	109611	285351	Q
1,2-Dibromoethane	0.38824	0.39667	0.41209	0.42597	0.46875	A
Dibromomethane	0.11496	0.11054	0.11571	0.11713	0.12597	A
trans-1,4-Dichloro-2-butene	2335	14440	69192	198878	478150	Q
1,2-Dichlorobenzene	0.90143	0.95966	0.99882	0.98573	1.03883	A
1,3-Dichlorobenzene	1.01099	1.09502	1.11711	1.07106	1.15551	A
1,4-Dichlorobenzene	1.09774	1.10669	1.11732	1.08007	1.14418	A
Dichlorodifluoromethane	0.20681	0.20732	0.22872	0.23244	0.24518	A
1,1-Dichloroethane *	0.32017	0.32369	0.34551	0.33181	0.35613	A
1,2-Dichloroethene, Total	0.24920	0.24621	0.26284	0.24786	0.26813	A
1,2-Dichloroethane	0.24173	0.22849	0.23588	0.23169	0.24638	A
1,1-Dichloroethene **	0.18509	0.22764	0.24439	0.23103	0.24271	A
cis-1,2-Dichloroethene	0.26294	0.25498	0.26973	0.26193	0.28284	A
trans-1,2-Dichloroethene	0.23546	0.23743	0.25595	0.23379	0.25342	A
Dichlorofluoromethane	0.31684	0.32449	0.33593	0.31054	0.34459	A
1,1-Dichloro-2-Propanone	860	6031	25530	74301	182974	Q
2,2-Dichloropropane	0.20746	0.22348	0.23827	0.23543	0.26138	A
1,3-Dichloropropane	0.73810	0.71910	0.75441	0.74793	0.80377	A
1,2-Dichloropropane **	0.18995	0.19860	0.20782	0.20828	0.22491	A
1,1-Dichloropropene	0.23287	0.26751	0.28546	0.27080	0.29645	A
cis-1,3-Dichloropropene	0.61947	0.66038	0.74583	0.76516	0.83925	A
trans-1,3-Dichloropropene	0.55461	0.60080	0.67168	0.69245	0.75505	A
1,3-Dichloropropene, Total	0.58704	0.63059	0.70876	0.72881	0.79715	A
Diisobutylene	90702	208273	771716	1798053	4108475	L
Diisopropyl ether	0.50752	0.56313	0.60949	0.60595	0.64567	A
1,4-Dioxane	1337	4900	15553	35545	96190	L
Ethyl Acetate	0.17759	0.18836	0.18773	0.20115	0.22826	A
Ethyl ether	0.09389	0.11029	0.10890	0.10502	0.11537	A
Ethyl Methacrylate	11333	67500	323156	903396	2090002	Q
Ethyl tert-butyl ether	0.47468	0.49529	0.54004	0.54344	0.58482	A
Ethylbenzene **	0.64582	0.70661	0.73210	0.68692	0.74299	A
Freon 113	0.13725	0.17920	0.19279	0.17978	0.19393	A
Heptane	5776	37435	192202	435241	1074443	Q

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
Hexachlorobutadiene	0.16956	0.17808	0.21702	0.19999	0.23780	A
Hexachloroethane	4585	29464	143562	387648	936487	Q
Hexane	0.31717	0.36131	0.41215	0.38851	0.43023	A
2-Hexanone	12368	72127	350868	1011868	2398471	Q
Iodomethane	813	6399	55357	223590	570364	Q
Isobutyl alcohol	0.00251	0.00176	0.00188	0.00195	0.00212	A
Isopropyl Alcohol	3272	10581	29886	68935	166650	Q
Isopropylbenzene	2.18220	2.63137	2.84358	2.63805	2.77201	A
p-Isopropyltoluene	6701	44090	231153	581903	1356615	L
Methyl acetate	0.03508	0.03493	0.03322	0.03631	0.04024	A
Methyl acrylate	0.16570	0.17788	0.18478	0.19543	0.21765	A
Methacrylonitrile	0.08311	0.08575	0.08869	0.09136	0.09980	A
Methyl cyclohexane	15733	99496	465698	1161606	2688368	L
Methyl methacrylate	8513	44272	206207	591111	1393385	Q
Methyl t-Butyl Ether	0.43990	0.46141	0.48855	0.49546	0.53168	A
4-Methyl-2-Pentanone(MIBK)	28314	165381	766089	2231020	5398276	L
Methylene Chloride	0.22009	0.18859	0.18444	0.17490	0.18595	A
Naphthalene	855	15384	218512	1029746	3052813	Q
Nitrobenzene		149	6531	58748	335476	L
2-Nitropropane	10813	60751	275993	812960	1965403	L
Octane	3339	20561	130330	297624	719630	Q
Pentachloroethane	0.35758	0.39524	0.40185	0.38844	0.41403	A
Pentane	0.15938	0.18130	0.19046	0.17288	0.17582	A
n-Propanol	0.01201	0.01085	0.01092	0.01040	0.01094	A
Propionitrile	0.02634	0.02905	0.02645	0.02673	0.02973	A
n-Propylbenzene	0.56428	0.71126	0.77083	0.71051	0.76581	A
Styrene	1.35075	1.59240	1.73007	1.64926	1.74477	A
1,1,1,2-Tetrachloroethane	0.36462	0.39429	0.42322	0.42013	0.46426	A
1,1,2,2-Tetrachloroethane *	0.70790	0.75784	0.73786	0.71719	0.75965	A
Tetrachloroethene	0.45434	0.45729	0.44599	0.41525	0.46185	A
Tetrahydrofuran	0.05123	0.05893	0.05714	0.05937	0.06665	A
Toluene **	1.09698	1.20711	1.24959	1.18592	1.28010	A
Total Xylenes	0.68719	0.79862	0.85316	0.81615	0.87669	A
1,2,3-Trichlorobenzene	372	15692	118355	414203	1086897	Q

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF001	RRF005	RRF020	RRF050	RRF100	CT
1,2,4-Trichlorobenzene	656	20459	149957	506786	1281924	Q
1,1,1-Trichloroethane	0.23004	0.25672	0.27248	0.26188	0.29046	A
1,1,2-Trichloroethane	0.34371	0.36036	0.36719	0.36139	0.38568	A
Trichloroethene	0.22344	0.21022	0.21174	0.20371	0.22129	A
Trichlorofluoromethane	0.25196	0.26926	0.29193	0.29063	0.27934	A
1,2,3-Trichloropropane	0.20159	0.22199	0.20981	0.20828	0.22242	A
1,2,4-Trimethylbenzene	1.54498	2.03101	2.17088	2.04750	2.16611	A
1,3,5-Trimethylbenzene	1.51858	2.03867	2.20539	2.02877	2.14471	A
Vinyl Acetate	0.03270	0.03521	0.03921	0.03859	0.04300	A
Vinyl Chloride **	0.24888	0.27404	0.29937	0.29352	0.30465	A
o-Xylene	0.64936	0.73290	0.80742	0.79400	0.86036	A
mp-Xylene	0.70610	0.83148	0.87603	0.82722	0.88486	A
4-Bromofluorobenzene	0.48449	0.53266	0.57676	0.54594	0.58816	A
Dibromofluoromethane	0.14068	0.16363	0.17595	0.17046	0.18005	A
1,2-Dichloroethane-d4	0.16440	0.18186	0.19304	0.18892	0.20022	A
Toluene-d8	1.29337	1.61756	1.73201	1.65262	1.76435	A

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

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Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Acetone	0.01665	0.02192		A		0.018630		9.64257
Acrolein	0.04219	0.03963		A		0.040730		5.55161
Acrylonitrile	0.07459	0.07499		A		0.078530		8.17495
Acetonitrile	0.01591	0.02134		A		0.017760		10.75593
tert-Amyl Ethylether	0.48315	0.35235		A		0.401620		13.76155
tert-Amyl methyl ether	0.55854	0.42259		A		0.476980		13.14868
tert-Amyl Alcohol	0.01055	0.01047		A		0.010450		7.81523
Benzene	0.79974	0.83518		A		0.797990		4.31049
Benzyl Chloride	1113271	792		Q	0.000000	0.205130	0.004680	0.99860
Bromobenzene	0.61945	0.62699		A		0.617830		2.17837
Bromochloromethane	0.09416	0.09435		A		0.093490		2.61133
Bromodichloromethane	0.27940	0.21981		A		0.245060		9.34882
Bromoform *	1981467	2476		Q	0.000000	0.381330	0.005780	0.99948
Bromomethane	1382738	4318		Q	0.000000	0.082090	0.001930	0.99983
2-Butanone	0.02714	0.02779		A		0.027100		5.55402
tert.- Butyl Alcohol	0.01117	0.01334		A		0.012300		8.55281
tert-Butylbenzene	0.50665	0.37605		A		0.459330		13.15393
n-Butylbenzene	2532896	2616		Q	0.000000	0.496070	0.006050	0.99957
sec-Butylbenzene	2.53599	1.87606		A		2.400420		14.61265
Carbon Disulfide	0.59173	0.69589		A		0.579840		10.99410
Carbon Tetrachloride	0.26953	0.20331		A		0.228950		12.92165
Chloroacetonitrile	504525	772		L	0.000000	55.111370		0.99164
Chlorobenzene *	1.30599	1.38765		A		1.307870		3.29265
1-Chlorobutane	0.22784	0.21622		A		0.213800		4.27262
Chlorodibromomethane	0.53756	0.37816		A		0.440200		14.83782
Chloroethane	2097621	10520		L	0.000000	6.859170		0.99908
2-Chloroethylvinyl ether	1810404	2199		Q	0.000000	0.109760	0.002270	0.99916
Chloroform **	0.37736	0.41423		A		0.370050		5.87687
1-Chlorohexane	4520683	6465		L	0.000000	1.282980		0.99908
Chloromethane *	0.23896	0.28305		A		0.222140		13.78745
Chloroprene	0.32433	0.27961		A		0.288420		10.47484
3-Chloro-1-propene	0.28303	0.27835		A		0.268620		6.44850
o-Chlorotoluene	2.03845	1.78204		A		1.981160		7.89912
p-Chlorotoluene	1.87166	1.62886		A		1.814790		7.17866
Cyclohexane	0.33852	0.23903		A		0.295640		14.88367
1,2-Dibromo-3-Chloropropane	546948	312		Q	0.000000	0.119680	-0.000490	0.99648

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2-Dibromoethane	0.47760	0.41051		A		0.425690		8.14249
Dibromomethane	0.13020	0.13058		A		0.120730		6.67327
trans-1,4-Dichloro-2-butene	943245	1118		Q	0.000000	0.206180	-0.000900	0.99870
1,2-Dichlorobenzene	1.04208	0.89254		A		0.974160		6.17326
1,3-Dichlorobenzene	1.15241	1.08454		A		1.098090		4.57157
1,4-Dichlorobenzene	1.13757	1.23597		A		1.131360		4.52317
Dichlorodifluoromethane	0.25327	0.26279		A		0.233790		9.25048
1,1-Dichloroethane *	0.36229	0.32941		A		0.338430		4.83788
1,2-Dichloroethene, Total	0.28147	0.27557		A		0.261610		5.43680
1,2-Dichloroethane	0.25501	0.24553		A		0.240670		3.84885
1,1-Dichloroethene **	0.26165	0.25771		A		0.235750		10.85740
cis-1,2-Dichloroethene	0.29140	0.28356		A		0.272480		4.97812
trans-1,2-Dichloroethene	0.27154	0.26759		A		0.250740		6.19789
Dichlorofluoromethane	0.34106	0.35528		A		0.332680		4.81876
1,1-Dichloro-2-Propanone	343517	339		Q	0.000000	0.012460	-0.000010	0.99760
2,2-Dichloropropane	0.27165	0.23095		A		0.238370		9.18673
1,3-Dichloropropane	0.81294	0.75483		A		0.761580		4.50340
1,2-Dichloropropane **	0.23045	0.20511		A		0.209300		6.75854
1,1-Dichloropropene	0.30677	0.25629		A		0.273740		9.15302
cis-1,3-Dichloropropene	0.87315	0.67695		A		0.740030		12.71099
trans-1,3-Dichloropropene	0.79550	0.59939		A		0.667070		13.19991
1,3-Dichloropropene, Total	0.83432	0.63817		A		0.703550		12.93630
Diisobutylene	8601701	79634		L	0.000000	1.703850		0.99913
Diisopropyl ether	0.65689	0.55014		A		0.591260		9.08462
1,4-Dioxane	171916	1572		L	0.000000	2066		0.99314
Ethyl Acetate	0.21532	0.20047		A		0.199840		8.72179
Ethyl ether	0.11567	0.11900		A		0.109730		7.68901
Ethyl Methacrylate	4267306	5279		Q	0.000000	0.693670	0.007290	0.99945
Ethyl tert-butyl ether	0.60560	0.47185		A		0.530820		9.92238
Ethylbenzene **	0.74704	0.64747		A		0.701280		6.10265
Freon 113	0.20076	0.16507		A		0.178390		12.15645
Heptane	2448529	2898		Q	0.000000	0.129980	0.005780	0.99952
Hexachlorobutadiene	0.24504	0.18639		A		0.204840		14.33758
Hexachloroethane	2069437	2385		Q	0.000000	0.372210	0.009910	0.99961
Hexane	0.44505	0.34405		A		0.385500		12.18536
2-Hexanone	4665129	6801		Q	0.000000	0.162430	0.000003	0.99870

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Iodomethane	1324326	443		Q	0.000000	0.063340	0.004210	0.99885
Isobutyl alcohol	0.00188	0.00226		A		0.002050		12.73782
Isopropyl Alcohol	284729	1607		Q	0.000000	0.005000	-0.000030	0.99660
Isopropylbenzene	2.55091	2.12033		A		2.534060		11.02087
p-Isopropyltoluene	2860816	3135		L	0.000000	1.663150		0.99931
Methyl acetate	0.03608	0.03392		A		0.035680		6.41414
Methyl acrylate	0.20701	0.16683		A		0.187900		10.54001
Methacrylonitrile	0.09425	0.08514		A		0.089730		6.53201
Methyl cyclohexane	5668995	8339		L	0.000000	1.030320		0.99852
Methyl methacrylate	2739819	4159		Q	0.000000	0.189980	-0.000140	0.99894
Methyl t-Butyl Ether	0.54595	0.46866		A		0.490230		7.75965
4-Methyl-2-Pentanone(MIBK)	9920293	14839		L	0.000000	2.855570		0.99651
Methylene Chloride	0.19269	0.25834		A		0.200720		14.46379
Naphthalene	6140480	1177		Q	0.000000	1.141120	0.025340	0.99354
Nitrobenzene	800184			L	0.000000	63.016418		0.95126
2-Nitropropane	3798137	5676		L	0.000000	7.553910		0.99801
Octane	1688290	1730		Q	0.000000	0.211010	0.012310	0.99965
Pentachloroethane	0.41516	0.37336		A		0.392240		5.38210
Pentane	0.17261	0.17163		A		0.174870		5.44915
n-Propanol	0.01112	0.01225		A		0.011210		5.95988
Propionitrile	0.02562	0.02812		A		0.027430		5.63005
n-Propylbenzene	0.74482	0.56993		A		0.691060		12.72168
Styrene	1.69793	1.37828		A		1.591920		10.28289
1,1,1,2-Tetrachloroethane	0.48496	0.37956		A		0.418720		10.47468
1,1,2,2-Tetrachloroethane *	0.70588	0.77245		A		0.736970		3.67987
Tetrachloroethene	0.47795	0.54332		A		0.465140		8.47338
Tetrahydrofuran	0.05918	0.05512		A		0.058230		8.09743
Toluene **	1.28779	1.15003		A		1.208220		5.80037
Total Xylenes	0.86374	0.72755		A		0.803300		8.93827
1,2,3-Trichlorobenzene	2210563	463		Q	0.000000	0.432770	0.005600	0.99720
1,2,4-Trichlorobenzene	2694614	436		Q	0.000000	0.507790	0.009670	0.99833
1,1,1-Trichloroethane	0.30322	0.25402		A		0.266970		9.12223
1,1,2-Trichloroethane	0.39220	0.38162		A		0.370310		4.59757
Trichloroethene	0.22344	0.24294		A		0.219540		5.81989
Trichlorofluoromethane	0.27364	0.32855		A		0.283620		8.47105
1,2,3-Trichloropropane	0.20678	0.21328		A		0.212020		3.67392

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-032

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2,4-Trimethylbenzene	2.07735	1.51345		A		1.935900		14.62567
1,3,5-Trimethylbenzene	2.04270	1.56081		A		1.934230		14.34080
Vinyl Acetate	0.04625	0.03159		A		0.038080		14.05431
Vinyl Chloride **	0.30549	0.33654		A		0.294640		9.31058
o-Xylene	0.87529	0.68691		A		0.772320		11.09087
mp-Xylene	0.85797	0.74788		A		0.818790		8.21353
4-Bromofluorobenzene	0.59536	0.60138		A		0.560680		7.52501
Dibromofluoromethane	0.18706	0.16425		A		0.168870		8.89042
1,2-Dichloroethane-d4	0.20955	0.18883		A		0.189540		7.51900
Toluene-d8	1.73276	1.64609		A		1.634110		9.77676

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

ALS Environmental Services

RECOVERY REPORT

Client Name:
Client SDG: 7191002.b
Sample Matrix: LIQUID
Fraction: VOA
Lab Smp Id: 1801
Level: LOW
Operator: TMP
Data Type: MS DATA
SampleType: LCS
SpikeList File: DODENDCCV.spk
Quant Type: ISTD
Sublist File: DODall.sub
Method File: \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7191002.b\7-8260b09
Misc Info:

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
1 Dichlorodifluorome	50.0000	47.5132	95.03	50-150
2 Chloromethane	50.0000	45.0608	90.12	50-150
3 Vinyl Chloride	50.0000	46.4600	92.92	50-150
4 Bromomethane	50.0000	32.6187	65.24	50-150
5 Chloroethane	50.0000	45.0924	90.18	50-150
6 Pentane	50.0000	45.9132	91.83	50-150
7 Trichlorofluoromet	50.0000	46.3208	92.64	50-150
8 Dichlorofluorometh	50.0000	49.8953	99.79	50-150
9 Ethyl Ether	50.0000	51.3287	102.66	50-150
10 1,1-Dichloroethene	50.0000	48.0082	96.02	50-150
11 Freon 113	50.0000	50.2060	100.41	50-150
12 Carbon Disulfide	50.0000	48.5873	97.17	50-150
13 Iodomethane	50.0000	47.3008	94.60	50-150
14 Acrolein	250.000	198.548	79.42	50-150
15 Isopropyl Alcohol	250.000	223.579	89.43	50-150
16 3-Chloro-1-propene	50.0000	49.2760	98.55	50-150
17 Methylene Chloride	50.0000	45.5067	91.01	50-150
18 Acetone	250.000	199.837	79.93	50-150
19 Methyl acetate	50.0000	56.5994	113.20	50-150
20 trans-1,2-Dichloro	50.0000	49.8211	99.64	50-150
21 Hexane	50.0000	49.0880	98.18	50-150
22 Methyl t-Butyl Eth	50.0000	52.5775	105.16	50-150
23 tert.- Butyl Alcoh	250.000	197.329	78.93	50-150
24 Acetonitrile	250.000	211.408	84.56	50-150
25 Diisopropyl ether	50.0000	52.1583	104.32	50-150
26 Chloroprene	50.0000	51.6746	103.35	50-150
27 1,1-Dichloroethane	50.0000	50.5997	101.20	50-150
28 Acrylonitrile	250.000	234.573	93.83	50-150
30 n-Propanol	500.000	471.605	94.32	50-150
29 Ethyl tert-butyl e	50.0000	53.1144	106.23	50-150
31 Vinyl acetate	50.0000	45.4826	90.97	50-150
32 cis-1,2-Dichloroet	50.0000	49.2064	98.41	50-150
33 2,2-Dichloropropan	50.0000	42.7026	85.41	50-150
34 Bromochloromethane	50.0000	52.0314	104.06	50-150
35 Cyclohexane	50.0000	51.6693	103.34	50-150
36 Chloroform	50.0000	48.0099	96.02	50-150
37 Ethyl acetate	50.0000	46.2821	92.56	50-150
38 Methyl acrylate	50.0000	50.0421	100.08	50-150
39 Carbon Tetrachlori	50.0000	51.2506	102.50	50-150
40 Tetrahydrofuran	250.000	239.655	95.86	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
42 1,1,1-Trichloroeth	50.0000	50.1427	100.29	50-150
43 2-Butanone	250.000	230.056	92.02	50-150
44 1,1-Dichloropropen	50.0000	50.1295	100.26	50-150
45 1-Chlorobutane	50.0000	48.3561	96.71	50-150
46 Heptane	50.0000	44.1872	88.37	50-150
47 Benzene	50.0000	49.9213	99.84	50-150
48 Propionitrile	250.000	222.215	88.89	50-150
49 Methacrylonitrile	50.0000	49.4380	98.88	50-150
50 tert-amyl methyl E	50.0000	54.0661	108.13	50-150
54 Isobutyl alcohol	500.000	290.767	58.15	50-150
52 1,2-Dichloroethane	50.0000	49.7211	99.44	50-150
53 tert-Amyl Alcohol	250.000	211.268	84.51	50-150
56 Diisobutylene	50.0000	44.2062	88.41	50-150
57 Trichloroethene	50.0000	47.4616	94.92	50-150
58 Methyl cyclohexane	50.0000	42.7956	85.59	50-150
59 tert-Amyl Ethyleth	50.0000	53.5816	107.16	50-150
60 Dibromomethane	50.0000	49.7213	99.44	50-150
61 1,2-Dichloropropan	50.0000	51.0557	102.11	50-150
62 Bromodichlorometha	50.0000	52.1118	104.22	50-150
63 Methyl methacrylat	50.0000	46.2659	92.53	50-150
64 1,4-Dioxane	1250.00	1173.17	93.85	50-150
65 2-Chloroethylvinyl	50.0000	41.9839	83.97	50-150
66 cis-1,3-Dichloropr	50.0000	51.3686	102.74	50-150
67 Octane	50.0000	44.1161	88.23	50-150
69 Toluene	50.0000	50.3092	100.62	50-150
70 Chloroacetonitrile	250.000	211.921	84.77	50-150
71 2-Nitropropane	250.000	212.032	84.81	50-150
72 1,1-Dichloro-2-pro	250.000	192.009	76.80	50-150
73 4-Methyl-2-Pentano	250.000	213.183	85.27	50-150
74 Tetrachloroethene	50.0000	49.5129	99.03	50-150
75 trans-1,3-Dichloro	50.0000	51.6470	103.29	50-150
76 Ethyl methacrylate	50.0000	46.5471	93.09	50-150
77 1,1,2-Trichloroeth	50.0000	49.6366	99.27	50-150
78 Chlorodibromometha	50.0000	53.0866	106.17	50-150
80 1,2-Dibromoethane	50.0000	51.0589	102.12	50-150
81 2-Hexanone	250.000	213.229	85.29	50-150
82 1-Chlorohexane	50.0000	43.5181	87.04	50-150
79 1,3-Dichloropropan	50.0000	50.3396	100.68	50-150
84 Chlorobenzene	50.0000	48.3680	96.74	50-150
85 Ethylbenzene	50.0000	49.5313	99.06	50-150
86 1,1,1,2-Tetrachlor	50.0000	51.3335	102.67	50-150
87 mp-Xylene	100.000	101.576	101.58	50-150
88 o-Xylene	50.0000	52.2592	104.52	50-150
89 Styrene	50.0000	53.2670	106.53	50-150
90 Bromoform	50.0000	47.6766	95.35	50-150
91 Isopropylbenzene	50.0000	51.9586	103.92	50-150
93 Bromobenzene	50.0000	49.3334	98.67	50-150
94 n-Propylbenzene	50.0000	51.1888	102.38	50-150
95 1,1,2,2-Tetrachlor	50.0000	48.2532	96.51	50-150
96 o-Chlorotoluene	50.0000	49.8726	99.75	50-150
M 100 1,2-Dichloroethene	100.000	99.0275	99.03	50-150
97 1,3,5-Trimethylben	50.0000	51.8519	103.70	50-150
98 1,2,3-Trichloropro	50.0000	48.7555	97.51	50-150
99 trans-1,4-Dichloro	50.0000	39.6183	79.24	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
101 p-Chlorotoluene	50.0000	50.1938	100.39	50-150
102 tert-Butylbenzene	50.0000	50.5257	101.05	50-150
103 Pentachloroethane	50.0000	44.6308	89.26	50-150
104 1,2,4-Trimethylben	50.0000	52.6378	105.28	50-150
105 sec-Butylbenzene	50.0000	51.7906	103.58	50-150
106 p-Isopropyltoluene	50.0000	45.0256	90.05	50-150
107 1,3-Dichlorobenzen	50.0000	48.7182	97.44	50-150
109 1,4-Dichlorobenzen	50.0000	46.8826	93.77	50-150
110 Benzyl Chloride	50.0000	33.0172	66.03	50-150
111 n-Butylbenzene	50.0000	45.7174	91.43	50-150
112 Hexachloroethane	50.0000	45.3926	90.79	50-150
113 1,2-Dichlorobenzen	50.0000	49.9297	99.86	50-150
114 1,2-Dibromo-3-chlo	50.0000	39.1415	78.28	50-150
115 Nitrobenzene	500.000	48.8659	9.77*	50-150
116 Hexachlorobutadien	50.0000	48.5988	97.20	50-150
117 1,2,4-Trichloroben	50.0000	41.0044	82.01	50-150
118 Naphthalene	50.0000	34.4205	68.84	50-150
M 120 1,3-Dichloropropen	100.000	103.016	103.02	50-150
119 1,2,3-Trichloroben	50.0000	37.8724	75.74	50-150
M 121 TOTAL XYLENES	150.000	153.835	102.56	50-150

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
$ 41 Dibromofluorometha	49.9980	47.1053	94.21	80-119
$ 51 1,2-Dichloroethane	49.9980	47.7902	95.58	81-118
$ 68 Toluene-d8	49.9980	47.1067	94.22	89-112
$ 92 4-Bromofluorobenze	49.9980	47.7612	95.53	85-114

8Az

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Lab File ID: 719092607.D Date Analyzed: 9/27/2019

Instrument ID: ms07.i Time Analyzed: 01:17

GC Column: RTXVRX ID: 0.2 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT#	IS2 AREA #	RT #	IS3 AREA #	RT #
12 HOUR STD	883686	6.053	715389	7.822	2024453	4.061
UPPER LIMIT	1767372	6.223	1430778	7.992	4048906	4.231
LOWER LIMIT	441843	5.883	357695	7.652	1012227	3.891
SAMPLE NO.						
3017576(LCS)	906591	6.053	704814	7.824	2043412	4.061
3017575(MB)	838721	6.056	605986	7.825	1972704	4.061
12TB01-20190919	815551	6.053	584595	7.825	1931201	4.061
12MW020-20190919	799919	6.056	570647	7.825	1895884	4.061
12MW02S-20190919	779693	6.053	565226	7.822	1853708	4.061
12MW04S-20190919	786980	6.056	565991	7.825	1862145	4.061
1801	867555	6.055	701195	7.824	1954668	4.061

IS1 = Chlorobenzene-d5
IS2 = 1,4-Dichlorobenzene-d4
IS3 = Fluorobenzene

AREA UPPER LIMIT = +2% of internal standard area
AREA LOWER LIMIT = -1% of internal standard area
RT UPPER LIMIT = +0.17 minutes of internal standard RT
RT LOWER LIMIT = -0.17 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8Az

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Lab File ID: 719092701.D Date Analyzed: 9/27/2019

Instrument ID: ms07.i Time Analyzed: 12:25

GC Column: RTXVRX ID: 0.2 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT#	IS2 AREA #	RT #	IS3 AREA #	RT #
12 HOUR STD	883686	6.056	715389	7.825	2024453	4.061
UPPER LIMIT	1767372	6.226	1430778	7.995	4048906	4.231
LOWER LIMIT	441843	5.886	357695	7.655	1012227	3.891
SAMPLE NO.						
1800	873858	6.056	707733	7.825	1987553	4.061
3018650(LCS)	908910	6.053	708992	7.825	2051458	4.061
3018649(MB)	826281	6.056	619124	7.825	1939049	4.061
12MW040-20190919	774118	6.053	553581	7.825	1814248	4.061
12MW010-20190919	785462	6.053	567420	7.822	1817099	4.061
1801	835826	6.053	678242	7.825	1852349	4.061

IS1 = Chlorobenzene-d5
IS2 = 1,4-Dichlorobenzene-d4
IS3 = Fluorobenzene

AREA UPPER LIMIT = +2% of internal standard area
AREA LOWER LIMIT = -1% of internal standard area
RT UPPER LIMIT = +0.17 minutes of internal standard RT
RT LOWER LIMIT = -0.17 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8Az

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-032

Lab File ID: 719100207.D Date Analyzed: 10/2/2019

Instrument ID: ms07.i Time Analyzed: 12:30

GC Column: RTXVRX ID: 0.2 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT#	IS2 AREA #	RT #	IS3 AREA #	RT #
12 HOUR STD	815680	6.056	638236	7.825	2017315	4.061
UPPER LIMIT	1631360	6.226	1276472	7.995	4034630	4.231
LOWER LIMIT	407840	5.886	319118	7.655	1008658	3.891
SAMPLE NO.						
3019577(LCS)	837242	6.056	646291	7.825	2087969	4.061
3019576(MB)	769810	6.053	548821	7.824	2002558	4.061
12MW03S-20190919	747473	6.053	516521	7.825	1948332	4.061
12MW01S-20190919	742335	6.056	513086	7.825	1929018	4.061
12DUP01-20190919	737081	6.055	512090	7.824	1902175	4.060
1801	829904	6.053	642326	7.824	2053500	4.061

IS1 = Chlorobenzene-d5
IS2 = 1,4-Dichlorobenzene-d4
IS3 = Fluorobenzene

AREA UPPER LIMIT = +2% of internal standard area
AREA LOWER LIMIT = -1% of internal standard area
RT UPPER LIMIT = +0.17 minutes of internal standard RT
RT LOWER LIMIT = -0.17 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

ALS ENVIRONMENTAL

6020 3015 DOD

- COVER PAGE -

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc.

SDG No.: EPR-032 **Method Type:** 6020 3015 DOD **SOW No.:**

Contract: EPR032|Willow Grove **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Lab Sample ID	Client Sample ID	QC Description
3059461002	12MW020-20190919	
3059461003	12MW02S-20190919	
3059461004	12MW04S-20190919	
3059461005	12MW040-20190919	
3059461006	12MW03S-20190919	
3059461007	12MW010-20190919	
3059461008	12MW01S-20190919	
3059461009	12DUP01-20190919	

Were ICP interelement corrections applied?	Yes/No	Yes	
Were ICP background corrections applied?	Yes/No	Yes	
If yes - were raw data generated before applications of background corrections?	Yes/No	No	

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name: **Matthew Olley**

Date: Title: **Metals Supervisor**

QA Department

6020 3015 DOD

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Antimony	0.1040	0.1000	104		90 - 110	M	10/1/2019	00:20	A093019E 0
	Arsenic	0.1014	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Beryllium	0.1009	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Cadmium	0.0996	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Chromium	0.1002	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Cobalt	0.0980	0.1000	98		90 - 110	M	10/1/2019	00:20	A093019E 0
	Copper	0.1007	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Iron	1.0401	1.0000	104		90 - 110	M	10/1/2019	00:20	A093019E 0
	Lead	0.1003	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Magnesium	1.0217	1.0000	102		90 - 110	M	10/1/2019	00:20	A093019E 0
	Manganese	0.1027	0.1000	103		90 - 110	M	10/1/2019	00:20	A093019E 0
	Nickel	0.1003	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Selenium	0.1070	0.1000	107		90 - 110	M	10/1/2019	00:20	A093019E 0
	Silver	0.0991	0.1000	99		90 - 110	M	10/1/2019	00:20	A093019E 0
	Sodium	1.0243	1.0000	102		90 - 110	M	10/1/2019	00:20	A093019E 0
	Thallium	0.0992	0.1000	99		90 - 110	M	10/1/2019	00:20	A093019E 0
	Vanadium	0.0997	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
LLICV										
	Antimony	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Arsenic	0.0030	0.0030	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Beryllium	0.0011	0.0010	110		80 - 120	M	10/1/2019	00:46	A093019E 0
	Cadmium	0.0010	0.0010	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Chromium	0.0020	0.0020	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Cobalt	0.0051	0.0050	102		80 - 120	M	10/1/2019	00:46	A093019E 0
	Copper	0.0053	0.0050	106		80 - 120	M	10/1/2019	00:46	A093019E 0
	Iron	0.0487	0.0500	97		80 - 120	M	10/1/2019	00:46	A093019E 0
	Lead	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Magnesium	0.0924	0.1000	92		80 - 120	M	10/1/2019	00:46	A093019E 0
	Manganese	0.0055	0.0050	110		80 - 120	M	10/1/2019	00:46	A093019E 0
	Nickel	0.0052	0.0050	104		80 - 120	M	10/1/2019	00:46	A093019E 0
	Selenium	0.0048	0.0050	96		80 - 120	M	10/1/2019	00:46	A093019E 0
	Silver	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Sodium	0.0910	0.1000	91		80 - 120	M	10/1/2019	00:46	A093019E 0
	Thallium	0.0010	0.0010	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Vanadium	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0

6020 3015 DOD

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Antimony	0.1037	0.1000	104		90 - 110	M	10/1/2019	01:56	A093019E 0
	Arsenic	0.1020	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Beryllium	0.1012	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Cadmium	0.1013	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Chromium	0.1017	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Cobalt	0.1008	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Copper	0.1033	0.1000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Iron	1.0256	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Lead	0.1023	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Magnesium	1.0261	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Manganese	0.1054	0.1000	105		90 - 110	M	10/1/2019	01:56	A093019E 0
	Nickel	0.1037	0.1000	104		90 - 110	M	10/1/2019	01:56	A093019E 0
	Selenium	0.1033	0.1000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Silver	0.1002	0.1000	100		90 - 110	M	10/1/2019	01:56	A093019E 0
	Sodium	1.0332	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Thallium	0.0989	0.1000	99		90 - 110	M	10/1/2019	01:56	A093019E 0
	Vanadium	0.1020	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
CCV										
	Antimony	0.1050	0.1000	105		90 - 110	M	10/1/2019	03:02	A093019E 0
	Beryllium	0.1074	0.1000	107		90 - 110	M	10/1/2019	03:02	A093019E 0
	Cadmium	0.1030	0.1000	103		90 - 110	M	10/1/2019	03:02	A093019E 0
	Chromium	0.1080	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0
	Cobalt	0.1071	0.1000	107		90 - 110	M	10/1/2019	03:02	A093019E 0
	Copper	0.1078	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0
	Lead	0.1047	0.1000	105		90 - 110	M	10/1/2019	03:02	A093019E 0
	Nickel	0.1094	0.1000	109		90 - 110	M	10/1/2019	03:02	A093019E 0
	Silver	0.1010	0.1000	101		90 - 110	M	10/1/2019	03:02	A093019E 0
	Thallium	0.1022	0.1000	102		90 - 110	M	10/1/2019	03:02	A093019E 0
	Vanadium	0.1077	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0

6020 3015 DOD

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Aluminum	0.1101	0.1000	110		90 - 110	M	10/1/2019	08:31	A100119 08
	Barium	0.0995	0.1000	100		90 - 110	M	10/1/2019	08:31	A100119 08
	Calcium	1.0480	1.0000	105		90 - 110	M	10/1/2019	08:31	A100119 08
	Iron	1.0543	1.0000	105		90 - 110	M	10/1/2019	08:31	A100119 08
	Magnesium	1.0106	1.0000	101		90 - 110	M	10/1/2019	08:31	A100119 08
	Manganese	0.1085	0.1000	108		90 - 110	M	10/1/2019	08:31	A100119 08
	Potassium	1.0107	1.0000	101		90 - 110	M	10/1/2019	08:31	A100119 08
	Selenium	0.1027	0.1000	103		90 - 110	M	10/1/2019	08:31	A100119 08
	Sodium	1.0232	1.0000	102		90 - 110	M	10/1/2019	08:31	A100119 08
	Zinc	0.1046	0.1000	105		90 - 110	M	10/1/2019	08:31	A100119 08
LLICV										
	Aluminum	0.0848	0.0800	106		80 - 120	M	10/1/2019	08:41	A100119 08
	Barium	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Calcium	0.0889	0.1000	89		80 - 120	M	10/1/2019	08:41	A100119 08
	Iron	0.0533	0.0500	107		80 - 120	M	10/1/2019	08:41	A100119 08
	Magnesium	0.1003	0.1000	100		80 - 120	M	10/1/2019	08:41	A100119 08
	Manganese	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Potassium	0.0998	0.1000	100		80 - 120	M	10/1/2019	08:41	A100119 08
	Selenium	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Sodium	0.0979	0.1000	98		80 - 120	M	10/1/2019	08:41	A100119 08
	Zinc	0.0051	0.0050	102		80 - 120	M	10/1/2019	08:41	A100119 08
CCV										
	Aluminum	0.1092	0.1000	109		90 - 110	M	10/1/2019	09:50	A100119 08
	Barium	0.0970	0.1000	97		90 - 110	M	10/1/2019	09:50	A100119 08
	Calcium	1.0374	1.0000	104		90 - 110	M	10/1/2019	09:50	A100119 08
	Iron	1.0820	1.0000	108		90 - 110	M	10/1/2019	09:50	A100119 08
	Magnesium	1.0026	1.0000	100		90 - 110	M	10/1/2019	09:50	A100119 08
	Manganese	0.1073	0.1000	107		90 - 110	M	10/1/2019	09:50	A100119 08
	Potassium	1.0199	1.0000	102		90 - 110	M	10/1/2019	09:50	A100119 08
	Selenium	0.1036	0.1000	104		90 - 110	M	10/1/2019	09:50	A100119 08
	Sodium	1.0418	1.0000	104		90 - 110	M	10/1/2019	09:50	A100119 08
	Zinc	0.1015	0.1000	102		90 - 110	M	10/1/2019	09:50	A100119 08

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Barium	0.0997	0.1000	100		90 - 110	M	10/1/2019	10:51	A100119 08
	Calcium	1.0748	1.0000	107		90 - 110	M	10/1/2019	10:51	A100119 08
	Iron	0.9392	1.0000	94		90 - 110	M	10/1/2019	10:51	A100119 08
	Magnesium	1.0185	1.0000	102		90 - 110	M	10/1/2019	10:51	A100119 08
	Manganese	0.1079	0.1000	108		90 - 110	M	10/1/2019	10:51	A100119 08
	Potassium	1.0328	1.0000	103		90 - 110	M	10/1/2019	10:51	A100119 08
	Selenium	0.0906	0.1000	91		90 - 110	M	10/1/2019	10:51	A100119 08
	Zinc	0.1028	0.1000	103		90 - 110	M	10/1/2019	10:51	A100119 08
ICV										
	Aluminum	0.1016	0.1000	102		90 - 110	M	10/1/2019	13:23	A100119A 1
	Arsenic	0.0992	0.1000	99		90 - 110	M	10/1/2019	13:23	A100119A 1
	Manganese	0.1033	0.1000	103		90 - 110	M	10/1/2019	13:23	A100119A 1
	Sodium	1.0067	1.0000	101		90 - 110	M	10/1/2019	13:23	A100119A 1
LLICV										
	Aluminum	0.0757	0.0800	95		80 - 120	M	10/1/2019	13:33	A100119A 1
	Arsenic	0.0034	0.0030	113		80 - 120	M	10/1/2019	13:33	A100119A 1
	Manganese	0.0049	0.0050	98		80 - 120	M	10/1/2019	13:33	A100119A 1
	Sodium	0.0915	0.1000	92		80 - 120	M	10/1/2019	13:33	A100119A 1
CCV										
	Aluminum	0.1007	0.1000	101		90 - 110	M	10/1/2019	14:17	A100119A 1
	Arsenic	0.1040	0.1000	104		90 - 110	M	10/1/2019	14:17	A100119A 1
	Manganese	0.1015	0.1000	102		90 - 110	M	10/1/2019	14:17	A100119A 1
	Sodium	0.9942	1.0000	99		90 - 110	M	10/1/2019	14:17	A100119A 1

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
ICB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	00:26	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	00:26	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	00:26	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	00:26	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	00:26	A093019E 001
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	00:26	A093019E 001
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/1/2019	00:26	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	01:59	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	01:59	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	01:59	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	01:59	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	01:59	A093019E 001
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	01:59	A093019E 001
	Thallium	0.0005	J	0.00066	0.0003	0.0010	M	10/1/2019	01:59	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	02:55	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	02:55	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/1/2019	02:55	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
ICB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	08:38	A100119 0821 1
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	08:38	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	09:53	A100119 0821 1
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	09:53	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
CCB										
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	10:44	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
ICB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	13:30	A100119A 131
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	13:30	A100119A 131
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	13:30	A100119A 131
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	13:30	A100119A 131
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	14:48	A100119A 131
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	14:48	A100119A 131
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	14:48	A100119A 131
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	14:48	A100119A 131

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PREPARATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result (mg/L)	Conc Qual	Q	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
3019442			**QC-WATER**								
	Aluminum	0.0889	U		0.044	0.0300	0.0889	M	10/1/2019	09:17	A100119 0821 1
	Antimony	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Arsenic	0.00333	U		0.0017	0.00100	0.00333	M	10/1/2019	01:23	A093019E 0010
	Barium	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	09:17	A100119 0821 1
	Beryllium	0.001111	U		0.0006	0.000300	0.001111	M	10/1/2019	01:23	A093019E 0010
	Cadmium	0.00111	U		0.0006	0.00037	0.00111	M	10/1/2019	01:23	A093019E 0010
	Calcium	0.1111	U		0.056	0.0370	0.1111	M	10/1/2019	09:17	A100119 0821 1
	Chromium	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Cobalt	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Copper	0.00556	U		0.0028	0.00185	0.00556	M	10/1/2019	01:23	A093019E 0010
	Iron	0.05556	U		0.028	0.01900	0.05556	M	10/1/2019	01:23	A093019E 0010
	Lead	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Magnesium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	01:23	A093019E 0010
	Manganese	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Nickel	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Potassium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	09:17	A100119 0821 1
	Selenium	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Silver	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Sodium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	01:23	A093019E 0010
	Thallium	0.00111	U		0.0006	0.00030	0.00111	M	10/1/2019	01:23	A093019E 0010
	Vanadium	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Zinc	0.00221	J		0.0028	0.00185	0.00556	M	10/1/2019	09:17	A100119 0821 1

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSA									
	Antimony	0.0002				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Arsenic	0.0001				-0.00600 - -0.00600	10/1/2019	00:54	A093019E 00
	Beryllium	0.00000				-0.002000 - -0.002000	10/1/2019	00:54	A093019E 00
	Cadmium	0.0011				-0.00200 - -0.00200	10/1/2019	00:54	A093019E 00
	Chromium	0.0001				-0.00800 - -0.00800	10/1/2019	00:54	A093019E 00
	Cobalt	0.0005				-0.01200 - -0.01200	10/1/2019	00:54	A093019E 00
	Copper	0.0014				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Iron	103.0466	100.00000	103		80 - 120%	10/1/2019	00:54	A093019E 00
	Lead	0.0001				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Magnesium	91.0674	100.00000	91		80 - 120%	10/1/2019	00:54	A093019E 00
	Manganese	0.0012				-0.02000 - -0.02000	10/1/2019	00:54	A093019E 00
	Nickel	0.0010				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Selenium	0.0001				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Silver	0.0000				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Sodium	91.2743	100.00000	91		80 - 120%	10/1/2019	00:54	A093019E 00
	Thallium	0.00004				-0.002000 - -0.002000	10/1/2019	00:54	A093019E 00
	Vanadium	0.0000				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSAB									
	Antimony	0.0004				-0.00200 - -0.00200	10/1/2019	00:57	A093019E 00
	Arsenic	0.0207	0.02000	104		80 - 120%	10/1/2019	00:57	A093019E 00
	Beryllium	0.00000				-0.001000 - -0.001000	10/1/2019	00:57	A093019E 00
	Cadmium	0.0103	0.01000	103		80 - 120%	10/1/2019	00:57	A093019E 00
	Chromium	0.0181	0.02000	90		80 - 120%	10/1/2019	00:57	A093019E 00
	Cobalt	0.0350	0.04000	88		80 - 120%	10/1/2019	00:57	A093019E 00
	Copper	0.0182	0.02000	91		80 - 120%	10/1/2019	00:57	A093019E 00
	Iron	102.9018	100.00000	103		80 - 120%	10/1/2019	00:57	A093019E 00
	Lead	0.0001				-0.00200 - -0.00200	10/1/2019	00:57	A093019E 00
	Magnesium	94.6175	100.00000	95		80 - 120%	10/1/2019	00:57	A093019E 00
	Manganese	0.0196	0.02000	98		80 - 120%	10/1/2019	00:57	A093019E 00
	Nickel	0.0349	0.04000	87		80 - 120%	10/1/2019	00:57	A093019E 00
	Selenium	0.0197	0.02000	98		80 - 120%	10/1/2019	00:57	A093019E 00
	Silver	0.0189	0.02000	94		80 - 120%	10/1/2019	00:57	A093019E 00
	Sodium	94.3258	100.00000	94		80 - 120%	10/1/2019	00:57	A093019E 00
	Thallium	-0.00002				-0.001000 - -0.001000	10/1/2019	00:57	A093019E 00
	Vanadium	0.0370	0.04000	92		80 - 120%	10/1/2019	00:57	A093019E 00
ICSA									
	Aluminum	88.0	100.0000	88		80 - 120%	10/1/2019	08:48	A100119 0821
	Barium	0.0005				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821
	Calcium	81.5	100.0000	82		80 - 120%	10/1/2019	08:48	A100119 0821
	Iron	91.6537	100.00000	92		80 - 120%	10/1/2019	08:48	A100119 0821
	Magnesium	91.4438	100.00000	91		80 - 120%	10/1/2019	08:48	A100119 0821
	Manganese	0.0012				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821
	Potassium	94.9676	100.00000	95		80 - 120%	10/1/2019	08:48	A100119 0821
	Selenium	0.0002				-0.01000 - -0.01000	10/1/2019	08:48	A100119 0821
	Sodium	93.6722	100.00000	94		80 - 120%	10/1/2019	08:48	A100119 0821
	Zinc	0.0016				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821

6020 3015 DOD

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSAB									
	Aluminum	91.6	100.0000	92		80 - 120%	10/1/2019	08:52	A100119 0821
	Barium	0.0007				-0.00500 - -0.00500	10/1/2019	08:52	A100119 0821
	Calcium	85.5	100.0000	86		80 - 120%	10/1/2019	08:52	A100119 0821
	Iron	96.6882	100.00000	97		80 - 120%	10/1/2019	08:52	A100119 0821
	Magnesium	87.4889	100.00000	87		80 - 120%	10/1/2019	08:52	A100119 0821
	Manganese	0.0197	0.02000	98		80 - 120%	10/1/2019	08:52	A100119 0821
	Potassium	91.1853	100.00000	91		80 - 120%	10/1/2019	08:52	A100119 0821
	Selenium	0.0194	0.02000	97		80 - 120%	10/1/2019	08:52	A100119 0821
	Sodium	89.4605	100.00000	89		80 - 120%	10/1/2019	08:52	A100119 0821
	Zinc	0.0181	0.02000	90		80 - 120%	10/1/2019	08:52	A100119 0821
ICSA									
	Aluminum	81.4	100.0000	81		80 - 120%	10/1/2019	13:37	A100119A 13
	Arsenic	0.0001				-0.00600 - -0.00600	10/1/2019	13:37	A100119A 13
	Manganese	0.0011				-0.02000 - -0.02000	10/1/2019	13:37	A100119A 13
	Sodium	88.4741	100.00000	88		80 - 120%	10/1/2019	13:37	A100119A 13
ICSAB									
	Aluminum	88.7	100.0000	89		80 - 120%	10/1/2019	13:40	A100119A 13
	Arsenic	0.0191	0.02000	96		80 - 120%	10/1/2019	13:40	A100119A 13
	Manganese	0.0190	0.02000	95		80 - 120%	10/1/2019	13:40	A100119A 13
	Sodium	89.8256	100.00000	90		80 - 120%	10/1/2019	13:40	A100119A 13

6020 3015 DOD

LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3019443									
	Aluminum	mg/L	2.2220	2.2315		100		84 - 117	M
	Antimony	mg/L	0.2220	0.2184		98		85 - 117	M
	Arsenic	mg/L	0.2220	0.2207		99		84 - 116	M
	Barium	mg/L	2.2220	1.9983		90		86 - 114	M
	Beryllium	mg/L	0.2220	0.2141		96		83 - 121	M
	Cadmium	mg/L	0.2220	0.2132		96		87 - 115	M
	Calcium	mg/L	2.2220	2.2808		103		87 - 118	M
	Chromium	mg/L	0.2220	0.2197		99		85 - 116	M
	Cobalt	mg/L	0.2220	0.2175		98		86 - 115	M
	Copper	mg/L	0.2220	0.2241		101		85 - 118	M
	Iron	mg/L	2.2220	2.2876		103		87 - 118	M
	Lead	mg/L	0.2220	0.2162		97		88 - 115	M
	Magnesium	mg/L	2.2220	2.1453		97		83 - 118	M
	Manganese	mg/L	0.2220	0.2238		101		87 - 115	M
	Nickel	mg/L	0.2220	0.2215		100		85 - 117	M
	Potassium	mg/L	2.2220	2.2148		100		87 - 115	M
	Selenium	mg/L	0.2220	0.2323		105		80 - 120	M
	Silver	mg/L	0.1110	0.1033		93		85 - 116	M
	Sodium	mg/L	2.2220	2.3677		107		85 - 117	M
	Thallium	mg/L	0.2220	0.2141		96		82 - 116	M
	Vanadium	mg/L	0.2220	0.2203		99		86 - 115	M
	Zinc	mg/L	0.2220	0.2189		99		83 - 119	M

6020 3015 DOD

LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3019444									
	Aluminum	mg/L	2.2220	2.1771		98		84 - 117	M
	Antimony	mg/L	0.2220	0.2239		101		85 - 117	M
	Arsenic	mg/L	0.2220	0.2388		108		84 - 116	M
	Barium	mg/L	2.2220	2.1021		95		86 - 114	M
	Beryllium	mg/L	0.2220	0.2087		94		83 - 121	M
	Cadmium	mg/L	0.2220	0.2171		98		87 - 115	M
	Calcium	mg/L	2.2220	2.3806		107		87 - 118	M
	Chromium	mg/L	0.2220	0.2129		96		85 - 116	M
	Cobalt	mg/L	0.2220	0.2097		94		86 - 115	M
	Copper	mg/L	0.2220	0.2148		97		85 - 118	M
	Iron	mg/L	2.2220	1.9898		90		87 - 118	M
	Lead	mg/L	0.2220	0.2209		100		88 - 115	M
	Magnesium	mg/L	2.2220	1.9232		87		83 - 118	M
	Manganese	mg/L	0.2220	0.2158		97		87 - 115	M
	Nickel	mg/L	0.2220	0.2148		97		85 - 117	M
	Potassium	mg/L	2.2220	2.2493		101		87 - 115	M
	Selenium	mg/L	0.2220	0.2404		108		80 - 120	M
	Silver	mg/L	0.1110	0.1050		95		85 - 116	M
	Sodium	mg/L	2.2220	1.9178		86		85 - 117	M
	Thallium	mg/L	0.2220	0.2185		98		82 - 116	M
	Vanadium	mg/L	0.2220	0.2131		96		86 - 115	M
	Zinc	mg/L	0.2220	0.2248		101		83 - 119	M

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SAMPLE PREPARATION SUMMARY

Client: Earth Toxics Inc.

SDG No.: EPR-032

Contract: EPR032|Willow Grove Sites **Lab Code:** ALS
3 an

Method: MS

Case No.: WE04 **SAS No.:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number:	545244						
3019442	MB for HBN 545244 [MDIG/8015	MB	QC-WAT	9/29/19	45.0	50.0	
3019443	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3019444	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3059461002	12MW020-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461003	12MW02S-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461004	12MW04S-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461005	12MW040-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461006	12MW03S-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461007	12MW010-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461008	12MW01S-20190919	SAM	WATER	9/29/19	45.0	50.0	
3059461009	12DUP01-20190919	SAM	WATER	9/29/19	45.0	50.0	

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A093019E 001

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	0010																									
BLK	1.00	0013			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
STANDARD 5	1.00	0017			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICV	1.00	0020			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0023																									
ICB	1.00	0026			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0030																									
LLICV	1.00	0046			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICSA	1.00	0054			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICSAB	1.00	0057			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0101																									
ZZZZZZ	1.00	0107																									
MB for HBN 545244 [	1.00	0123			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
LCS for HBN 545244 [	1.00	0126			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
LCS for HBN 545244 [	1.00	0129			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
12MW020-20190919	1.00	0133			X	X		X	X		X	X	X	X	X	X			X		X	X	X	X	X		
12MW02S-20190919	1.00	0136			X	X		X	X		X	X	X		X				X		X	X		X	X		
12MW04S-20190919	1.00	0139			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
12MW040-20190919	1.00	0142			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
12MW03S-20190919	1.00	0146			X	X		X	X		X	X	X	X	X	X			X		X	X	X	X	X		
12MW010-20190919	1.00	0149			X	X		X	X		X	X	X	X	X	X			X		X	X	X	X	X		
12MW01S-20190919	1.00	0152			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
CCV	1.00	0156			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
CCB	1.00	0159			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0214																									
ZZZZZZ	1.00	0217																									
12DUP01-20190919	1.00	0221			X			X	X		X	X	X		X				X			X		X	X		
ZZZZZZ	1.00	0224																									
ZZZZZZ	1.00	0227																									
ZZZZZZ	1.00	0231																									
ZZZZZZ	1.00	0234																									
ZZZZZZ	1.00	0237																									
ZZZZZZ	1.00	0240																									
ZZZZZZ	1.00	0244																									
ZZZZZZ	1.00	0247																									
ZZZZZZ	1.00	0250																									

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A093019E 001

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
CCB	1.00	0255			X			X	X		X	X	X		X				X			X		X	X		
ZZZZZZ	1.00	0258																									
CCV	1.00	0302			X			X	X		X	X	X		X				X			X		X	X		

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119 0821

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	0821																									
BLK	1.00	0825		X			X			X				X		X	X			X	X		X			X	
STANDARD 5	1.00	0828		X			X			X				X		X	X			X	X		X			X	
ICV	1.00	0831		X			X			X				X		X	X			X	X		X			X	
ZZZZZZ	1.00	0835																									
ICB	1.00	0838		X			X			X				X		X	X			X	X		X			X	
LLICV	1.00	0841		X			X			X				X		X	X			X	X		X			X	
ICSA	1.00	0848		X			X			X				X		X	X			X	X		X			X	
ICSAB	1.00	0852		X			X			X				X		X	X			X	X		X			X	
ZZZZZZ	1.00	0855																									
ZZZZZZ	1.00	0900																									
ZZZZZZ	1.00	0903																									
ZZZZZZ	1.00	0907																									
ZZZZZZ	1.00	0911																									
ZZZZZZ	1.00	0914																									
MB for HBN 545244 [	1.00	0917		X			X			X										X						X	
LCS for HBN 545244 [	1.00	0920		X			X			X										X						X	
ZZZZZZ	1.00	0924																									
12MW020-20190919	1.00	0927		X			X			X										X						X	
12MW02S-20190919	1.00	0930		X			X			X				X		X	X			X			X			X	
12MW04S-20190919	1.00	0933		X			X			X										X						X	
12MW040-20190919	1.00	0937		X			X			X										X						X	
12MW03S-20190919	1.00	0940		X			X			X							X			X						X	
12MW010-20190919	1.00	0943		X			X			X							X			X						X	
12MW01S-20190919	1.00	0947		X			X			X										X						X	
CCV	1.00	0950		X			X			X				X		X	X			X	X		X			X	
CCB	1.00	0953		X			X			X				X		X	X			X	X		X			X	
12DUP01-20190919	1.00	0956					X			X				X		X	X			X	X					X	
LCS for HBN 545244 [	1.00	1001					X			X										X						X	
ZZZZZZ	1.00	1011																									
ZZZZZZ	1.00	1015																									
ZZZZZZ	1.00	1018																									
ZZZZZZ	1.00	1021																									
ZZZZZZ	1.00	1024																									
ZZZZZZ	1.00	1028																									
ZZZZZZ	1.00	1031																									

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119 0821

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1034																									
ZZZZZZ	1.00	1038																									
ZZZZZZ	1.00	1041																									
CCB	1.00	1044					X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	1047																									
CCV	1.00	1051					X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	1057																									
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1104																									
ZZZZZZ	1.00	1107																									
ZZZZZZ	1.00	1110																									
ZZZZZZ	1.00	1113																									

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119A 131

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1313																									
BLK	1.00	1317		X		X											X						X				
STANDARD 5	1.00	1320		X		X											X						X				
ICV	1.00	1323		X		X											X						X				
ZZZZZZ	1.00	1327																									
ICB	1.00	1330		X		X											X						X				
LLICV	1.00	1333		X		X											X						X				
ICSA	1.00	1337		X		X											X						X				
ICSAB	1.00	1340		X		X											X						X				
ZZZZZZ	1.00	1343																									
ZZZZZZ	1.00	1346																									
ZZZZZZ	1.00	1359																									
ZZZZZZ	1.00	1404																									
LCS for HBN 545244 [	1.00	1407		X																							
12DUP01-20190919	1.00	1410		X		X																	X				
12MW020-20190919	10.00	1414															X										
CCV	1.00	1417		X		X											X						X				
CCB	1.00	1448		X		X											X						X				
ZZZZZZ	1.00	1536																									
ZZZZZZ	1.00	1540																									
ZZZZZZ	1.00	1543																									
ZZZZZZ	1.00	1546																									
ZZZZZZ	1.00	1550																									
ZZZZZZ	1.00	1553																									
ZZZZZZ	1.00	1556																									
ZZZZZZ	1.00	1559																									
ZZZZZZ	1.00	1603																									
ZZZZZZ	1.00	1606																									
ZZZZZZ	1.00	1609																									
ZZZZZZ	1.00	1614																									
ZZZZZZ	1.00	1617																									
ZZZZZZ	1.00	1621																									
ZZZZZZ	1.00	1624																									
ZZZZZZ	1.00	1633																									
ZZZZZZ	1.00	1639																									
ZZZZZZ	1.00	1642																									

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119A 131

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1646																									
ZZZZZZ	1.00	1649																									

6020 3015 DOD

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-032

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	0010												
BLK	BLK	0013	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	0017	108		105		105		106		112		107	
ICV	ICV	0020	109		106		107		107		113		107	
ICB1	ZZZZZZ	0023												
ICB2	ICB	0026	99		97		97		103		105		98	
LLICV	ZZZZZZ	0030												
LLICV	LLICV	0046	95		94		94		110		102		94	
ICS-A1	ICSA	0054	95		100		120	*	115		112		103	
ICS-AB1	ICSAB	0057	101		103		115		114		116		107	
CHECK	ZZZZZZ	0101												
CHECK	ZZZZZZ	0107												
3019442	MB for HBN 54524	0123	97		97		94		98		103		97	
3019443	LCS for HBN 5452	0126	113		110		108		114		115		112	
3019444	LCS for HBN 5452	0129	115		114		116		103		109		115	
3059461002	12MW020-20190919	0133	100		102		104		104		110		103	
3059461003	12MW02S-20190919	0136	101		102		106		109		122	*	103	
3059461004	12MW04S-20190919	0139	102		101		100		101		105		103	
3059461005	12MW040-20190919	0142	96		94		91		102		101		95	
3059461006	12MW03S-20190919	0146	104		106		106		103		110		107	
3059461007	12MW010-20190919	0149	94		94		93		103		110		94	
3059461008	12MW01S-20190919	0152	95		94		96		101		105		95	
CCV1	CCV	0156	111		109		108		109		116		110	
CCB1	CCB	0159	104		102		101		103		104		103	
3019442	ZZZZZZ	0214												
3019444	ZZZZZZ	0217												
3059461009	12DUP01-20190919	0221	100		100		99		102		102		102	
3059732002	ZZZZZZ	0224												
3059836021	ZZZZZZ	0227												
3059836022	ZZZZZZ	0231												
3059836023	ZZZZZZ	0234												
3059836024	ZZZZZZ	0237												
3059836025	ZZZZZZ	0240												
3059836026	ZZZZZZ	0244												
CCV2	ZZZZZZ	0247												
CCB2	ZZZZZZ	0250												
CCB3	CCB	0255	100		98		98		100		107		98	
CCV3	ZZZZZZ	0258												
CCV4	CCV	0302	105		104		100		99		103		104	

6020 3015 DOD

15-IN

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-032

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	0821												
BLK	BLK	0825	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	0828	109		109		109		109		111		106	
ICV	ICV	0831	110		109		106		110		110		109	
ICB1	ZZZZZZ	0835												
ICB2	ICB	0838	104		103		105		102		107		104	
LLICV	LLICV	0841	103		105		106		108		108		104	
ICS-A1	ICSA	0848	95		99		117		108		115		104	
ICS-AB1	ICSAB	0852	99		103		114		115		112		108	
CHECK	ZZZZZZ	0855												
CHECK	ZZZZZZ	0900												
LDR	ZZZZZZ	0903												
LDR	ZZZZZZ	0907												
CHECK	ZZZZZZ	0911												
CHECK	ZZZZZZ	0914												
3019442	MB for HBN 54524	0917	105		105		107		107		107		105	
3019443	LCS for HBN 5452	0920	112		112		109		112		114		113	
3019444	ZZZZZZ	0924												
3059461002	12MW020-20190919	0927	104		106		106		109		110		108	
3059461003	12MW02S-20190919	0930	103		103		106		110		110		104	
3059461004	12MW04S-20190919	0933	101		103		101		102		108		105	
3059461005	12MW040-20190919	0937	105		105		107		108		100		105	
3059461006	12MW03S-20190919	0940	103		105		108		108		109		106	
3059461007	12MW010-20190919	0943	105		105		108		105		92		109	
3059461008	12MW01S-20190919	0947	96		99		101		103		104		101	
CCV1	CCV	0950	113		113		109		111		110		113	
CCB1	CCB	0953	109		110		112		108		106		111	
3059461009	12DUP01-20190919	0956	104		106		108		103		108		106	
3019444	LCS for HBN 5452	1001	109		109		106		109		124	*	108	
3059732002	ZZZZZZ	1011												
3059836021	ZZZZZZ	1015												
3059836022	ZZZZZZ	1018												
3059836023	ZZZZZZ	1021												
3059836024	ZZZZZZ	1024												
3059836025	ZZZZZZ	1028												
3059836026	ZZZZZZ	1031												
3059836027	ZZZZZZ	1034												
CCV2	ZZZZZZ	1038												
CCB2	ZZZZZZ	1041												
CCB3	CCB	1044	99		101		102		101		107		100	
CCV3	ZZZZZZ	1047												
CCV4	CCV	1051	105		104		103		105		118		105	
3059836028	ZZZZZZ	1057												
3059839029	ZZZZZZ	1100												

6020 3015 DOD

15-IN

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-032

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
3059839030	ZZZZZZ	1104												
3059839031	ZZZZZZ	1107												
CCV5	ZZZZZZ	1110												
CCB4	ZZZZZZ	1113												

6020 3015 DOD

15-IN

ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-032

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	1313												
BLK	BLK	1317	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	1320	104		104		96		108		108		104	
ICV	ICV	1323	109		107		97		109		108		107	
ICB1	ZZZZZZ	1327												
ICB2	ICB	1330	98		97		97		104		94		99	
LLICV	LLICV	1333	103		101		98		109		105		102	
ICS-A1	ICSA	1337	95		97		111		116		111		103	
ICS-AB1	ICSAB	1340	99		100		105		115		113		106	
CHECK	ZZZZZZ	1343												
CHECK	ZZZZZZ	1346												
LDR	ZZZZZZ	1359												
CHECK	ZZZZZZ	1404												
3019444	LCS for HBN 5452	1407	109		108		98		112		113		107	
3059461009	12DUP01-20190919	1410	100		101		97		104		106		101	
3059461002	12MW020-20190919	1414	104		102		100		107		103		103	
CCV1	CCV	1417	112		109		100		110		104		108	
CCB1	CCB	1448	97		97		96		99		90		98	
3059732002	ZZZZZZ	1536												
3059836021	ZZZZZZ	1540												
3059836022	ZZZZZZ	1543												
3059836023	ZZZZZZ	1546												
3059836024	ZZZZZZ	1550												
3059836025	ZZZZZZ	1553												
3059836026	ZZZZZZ	1556												
3059836027	ZZZZZZ	1559												
3059836028	ZZZZZZ	1603												
3059839029	ZZZZZZ	1606												
CCV2	ZZZZZZ	1609												
CCB2	ZZZZZZ	1614												
CCB3	ZZZZZZ	1617												
3059839030	ZZZZZZ	1621												
3059839031	ZZZZZZ	1624												
3059836026	ZZZZZZ	1633												
CHECK	ZZZZZZ	1639												
CHECK	ZZZZZZ	1642												
CCV3	ZZZZZZ	1646												
CCB4	ZZZZZZ	1649												

ALS ENVIRONMENTAL

7470 DOD
- COVER PAGE -
INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc.

SDG No.: EPR-032 **Method Type:** 7470 DOD **SOW No.:**

Contract: EPR032|Willow Grove **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Lab Sample ID	Client Sample ID	QC Description
3059461002	12MW020-20190919	
3059461003	12MW02S-20190919	
3059461004	12MW04S-20190919	
3059461005	12MW040-20190919	
3059461006	12MW03S-20190919	
3059461007	12MW010-20190919	
3059461008	12MW01S-20190919	
3059461009	12DUP01-20190919	

Were ICP interelement corrections applied?	Yes/No	Yes	
Were ICP background corrections applied?	Yes/No	Yes	
If yes - were raw data generated before applications of background corrections?	Yes/No	No	

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name: **Matthew Olley**

Date: Title: **Metals Supervisor**

QA Department

7470 DOD

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: CAS MIXED

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Mercury	0.0042	0.004	105		90 - 110	CV	9/27/2019	17:45	092719W
CCV										
	Mercury	0.0036	0.004	90		90 - 110	CV	9/27/2019	18:10	092719W
CCV										
	Mercury	0.0037	0.004	92		90 - 110	CV	9/27/2019	18:22	092719W

7470 DOD

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
ICB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	17:48	092719W
CCB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	18:11	092719W
CCB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	18:23	092719W

7470 DOD
- 3b -
PREPARATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result (mg/L)	Conc Qual	Q	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
3018753			**QC-WATER**								
	Mercury	0.000500	U		0.0003	0.000160	0.000500	CV	9/27/2019	17:50	092719W

7470 DOD

LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-032

Contract: EPR032|Willow Grove Sites 3 an **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: CAS MIXED **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3018754									
	Mercury	mg/L	0.0020	0.0019		95		82 - 119	CV

7470 DOD
- 13 -
SAMPLE PREPARATION SUMMARY

Client: Earth Toxics Inc.

SDG No.: EPR-032

Contract: EPR032|Willow Grove Sites **Lab Code:** ALS
3 an

Method: CV

Case No.: WE04 **SAS No.:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number:	544635						
3018753	MB for HBN 544635 [MDIG/8011	MB	QC-WAT	9/27/19	5.0	5.0	
3018754	LCS for HBN 544635 [MDIG/8011	LCS	QC-WAT	9/27/19	5.0	5.0	
3059461002	12MW020-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461003	12MW02S-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461004	12MW04S-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461005	12MW040-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461006	12MW03S-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461007	12MW010-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461008	12MW01S-20190919	SAM	WATER	9/27/19	5.0	5.0	
3059461009	12DUP01-20190919	SAM	WATER	9/27/19	5.0	5.0	

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: Cetac Hg Method: CV Run Number: 092719W

Start Date: 9/27/2019 End Date: 9/27/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
Calibration Blank	1.00	1738																X									
Standard #1 (0.2 ug	1.00	1739																X									
Standard #2 (1 ug/L	1.00	1740																X									
Standard #3 (2 ug/L	1.00	1741																X									
Standard #4 (4 ug/L	1.00	1743																X									
Standard #5 (10 ug/	1.00	1744																X									
ICV	1.00	1745																X									
ICB	1.00	1748																X									
ZZZZZZ	5.00	1749																									
MB for HBN 544635 [	1.00	1750																X									
LCS for HBN 544635 [	1.00	1751																X									
12MW020-20190919	1.00	1752																X									
12MW02S-20190919	1.00	1754																X									
12MW04S-20190919	1.00	1755																X									
12MW040-20190919	1.00	1756																X									
12MW03S-20190919	1.00	1757																X									
12MW010-20190919	1.00	1758																X									
12MW01S-20190919	1.00	1800																X									
ZZZZZZ	1.00	1801																									
ZZZZZZ	1.00	1808																									
CCV	1.00	1810																X									
CCB	1.00	1811																X									
12DUP01-20190919	1.00	1813																X									
ZZZZZZ	1.00	1814																									
ZZZZZZ	1.00	1815																									
ZZZZZZ	1.00	1816																									
ZZZZZZ	1.00	1817																									
ZZZZZZ	1.00	1819																									
ZZZZZZ	1.00	1820																									
ZZZZZZ	5.00	1821																									
CCV	1.00	1822																X									
CCB	1.00	1823																X									
ZZZZZZ	1.00	1825																									
ZZZZZZ	1.00	1826																									
ZZZZZZ	1.00	1827																									
ZZZZZZ	1.00	1828																									

7470 DOD
14
ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: Cetac Hg Method: CV Run Number: 092719W

Start Date: 9/27/2019 End Date: 9/27/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1829																									
ZZZZZZ	1.00	1831																									
ZZZZZZ	1.00	1832																									
ZZZZZZ	1.00	1833																									
ZZZZZZ	1.00	1834																									
ZZZZZZ	1.00	1836																									
ZZZZZZ	1.00	1837																									
ZZZZZZ	1.00	1838																									
ZZZZZZ	1.00	1839																									
ZZZZZZ	1.00	1840																									
ZZZZZZ	1.00	1842																									
ZZZZZZ	1.00	1843																									
ZZZZZZ	1.00	1844																									
ZZZZZZ	1.00	1845																									
ZZZZZZ	1.00	1846																									
ZZZZZZ	1.00	1848																									
ZZZZZZ	1.00	1849																									
ZZZZZZ	1.00	1850																									
ZZZZZZ	1.00	1851																									
ZZZZZZ	1.00	1852																									
ZZZZZZ	1.00	1854																									
ZZZZZZ	1.00	1855																									
ZZZZZZ	1.00	1857																									
ZZZZZZ	1.00	1859																									
ZZZZZZ	1.00	1900																									
ZZZZZZ	1.00	1902																									
ZZZZZZ	1.00	1903																									
ZZZZZZ	1.00	1904																									
ZZZZZZ	1.00	1905																									
ZZZZZZ	1.00	1906																									
ZZZZZZ	1.00	1908																									
ZZZZZZ	1.00	1909																									
ZZZZZZ	1.00	1910																									
ZZZZZZ	1.00	1911																									
ZZZZZZ	1.00	1913																									
ZZZZZZ	1.00	1914																									

7470 DOD
14
ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR032|Willow Grove Sites 3 an

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-032

Instrument ID Number: Cetac Hg Method: CV Run Number: 092719W

Start Date: 9/27/2019 End Date: 9/27/2019

EPA Sample No.	D/F	Time	% R	Analytes																								
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1915																									

VOC Calibration Calculations:

Initial Calibration 9/26/2019
Instrument MS07.i

Benzene

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
1	53212	1969216	30	0.81066	0.81066
5	297083	1948961	30	0.91459	0.91459
20	1172453	1969231	30	0.89308	0.89308
50	2991656	2024453	30	0.88666	0.88666
100	6018947	2087693	30	0.86492	0.86492
200	11956903	2147025	30	0.83536	0.83536
0.5	27308	1951054	30	0.83979	0.83979
			Average	0.86358	0.86358
			Standard Deviation	0.0369	
			RSD	0.0427	
			%RSD	4.27288	4.27288

Sample Calculation
Sample Identification LCS (3017576)
Compound Benzene 21.5 ug/L

Compound Area	1266101	Volume of sample (ml)	5
Internal Standard Amount (ng)	30	Volume purged (ml)	5
Dilution Factor	1	Injection Volume (µl)	1
Internal Standard Area	2043412		
Average RRF	0.86358		

Concentration 21.52 ug/L

LCS %R LCS (3017576)

Benzene	Spike amount	LCS concentration
107.50	20	21.50

ALS Environmental Services

VOLATILE REPORT SW-846 Method 8260

Data file : \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7190926.b\719092612.
Lab Smp Id: 3017576 Client Smp ID: LCS for HBN 544174
Inj Date : 27-SEP-2019 03:10
Operator : PDK Inst ID: ms07.i
Smp Info : 3017576;;1;3;;LCS;1;
Misc Info : ZZ VOMS 52445 D8260W
Comment :
Method : \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7190926.b\7-8260b09.
Meth Date : 27-Sep-2019 13:24 tmp Quant Type: ISTD
Cal Date : 27-SEP-2019 01:40 Cal File: 719092608.D
Als bottle: 12 QC Sample: LCS
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: DODall.sub
Target Version: 4.14
Processing Host: ALMDTW7047

Concentration Formula: Amt * DF * Uf * 5/Vo * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	1.000	ng unit correction factor
Vo	5.000	Sample Volume purged
DF	1.000	sample dilution factor
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/L)	REVIEW CODE
1 Dichlorodifluoromethane	85	1.437	1.435	(0.354)	386595	18.0153	18.0153	
2 Chloromethane	50	1.585	1.582	(0.390)	353766	19.1826	19.1826	
3 Vinyl Chloride	62	1.634	1.634	(0.403)	407966	19.5123	19.5123	
4 Bromomethane	94	1.851	1.851	(0.456)	109142	14.5203	14.5203(R)	
5 Chloroethane	64	1.930	1.930	(0.475)	215404	17.8085	17.8085	
6 Pentane	41	2.008	2.011	(0.495)	265698	18.8307	18.8307	
7 Trichlorofluoromethane	101	2.014	2.014	(0.496)	486893	19.8928	19.8928	
8 Dichlorofluoromethane	67	2.040	2.040	(0.502)	513424	20.3955	20.3955	
9 Ethyl Ether	74	2.193	2.190	(0.540)	167136	21.0244	21.0244	
10 1,1-Dichloroethene	61	2.320	2.320	(0.572)	469302	27.0316	27.0316(R)	
12 Carbon Disulfide	76	2.355	2.355	(0.580)	930310	20.7297	20.7297	
11 Freon 113	101	2.332	2.332	(0.574)	291481	20.9295	20.9295	
13 Iodomethane	127	2.416	2.416	(0.595)	47139	10.3128	10.3128(R)	
14 Acrolein	56	2.509	2.506	(0.618)	391964	146.508	146.508	
16 3-Chloro-1-propene	41	2.584	2.584	(0.636)	434026	22.1216	22.1216	
15 Isopropyl Alcohol	45	2.564	2.558	(0.631)	19478	159.358	159.358(RM)	
17 Methylene Chloride	84	2.642	2.642	(0.651)	300769	21.9830	21.9830	
18 Acetone	58	2.665	2.662	(0.656)	117466	115.398	115.398	
19 Methyl acetate	74	2.723	2.720	(0.671)	55954	25.3791	25.3791(QR)	
20 trans-1,2-Dichloroethene	61	2.732	2.729	(0.673)	462890	24.3729	24.3729(R)	
21 Hexane	57	2.763	2.763	(0.681)	653080	23.1337	23.1337	

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/L)	REVIEW CODE
22 Methyl t-Butyl Ether	73	2.775	2.775	(0.683)	768122	21.7931	21.7931	
23 tert.- Butyl Alcohol	59	2.801	2.799	(0.690)	58911	127.809	127.809(R)	
24 Acetonitrile	41	2.926	2.926	(0.721)	97486	117.876	117.876	
25 Diisopropyl ether	45	2.966	2.966	(0.731)	958053	21.9486	21.9486	
26 Chloroprene	53	3.050	3.050	(0.751)	472339	21.6851	21.6851	
27 1,1-Dichloroethane	63	3.067	3.065	(0.755)	579742	23.3582	23.3582	
28 Acrylonitrile	53	3.050	3.050	(0.751)	472339	108.422	108.422	
30 n-Propanol	41	3.163	3.166	(0.779)	158647	203.633	203.633	
29 Ethyl tert-butyl ether	59	3.163	3.163	(0.779)	850743	21.9630	21.9630	
31 Vinyl acetate	86	3.177	3.178	(0.783)	60136	20.9505	20.9505(Q)	
32 cis-1,2-Dichloroethene	61	3.354	3.354	(0.826)	424837	21.0074	21.0074	
33 2,2-Dichloropropane	77	3.421	3.421	(0.842)	404103	21.4774	21.4774	
M 100 1,2-Dichloroethene, Total	61				887727	45.3803	45.3803	
34 Bromochloromethane	128	3.467	3.467	(0.854)	145003	20.4900	20.4900	
35 Cyclohexane	84	3.481	3.482	(0.857)	524140	23.0482	23.0482	
36 Chloroform	83	3.490	3.490	(0.860)	554303	20.5235	20.5235	
37 Ethyl acetate	43	3.536	3.537	(0.871)	280358	21.9342	21.9342	
38 Methyl acrylate	55	3.554	3.554	(0.875)	280021	22.3609	22.3609	
39 Carbon Tetrachloride	117	3.592	3.589	(0.885)	390899	22.8816	22.8816	
40 Tetrahydrofuran	42	3.594	3.594	(0.885)	400827	113.354	113.354	
$ 41 Dibromofluoromethane	113	3.594	3.594	(0.885)	374310	29.7784	29.7784	
42 1,1,1-Trichloroethane	97	3.629	3.626	(0.894)	458646	23.2046	23.2046	
43 2-Butanone	72	3.661	3.661	(0.902)	191669	122.139	122.139(R)	
44 1,1-Dichloropropene	75	3.690	3.690	(0.909)	456095	21.9493	21.9493	
45 1-Chlorobutane	41	3.713	3.713	(0.914)	336669	21.2216	21.2216	
46 Heptane	71	3.777	3.777	(0.930)	234855	27.6617	27.6617(R)	
48 Propionitrile	54	3.838	3.838	(0.945)	174772	118.958	118.958	
47 Benzene	78	3.832	3.832	(0.944)	1266101	21.5244	21.5244	
49 Methacrylonitrile	67	3.849	3.849	(0.948)	131772	22.3609	22.3609	
50 tert-amyl methyl Ether	73	3.867	3.867	(0.952)	742689	21.4830	21.4830	
$ 51 1,2-Dichloroethane-d4	65	3.904	3.904	(0.962)	418221	29.4602	29.4602	
54 Isobutyl alcohol	43	3.953	3.948	(0.974)	17561	219.129	219.129(M)	H
52 1,2-Dichloroethane	62	3.945	3.945	(0.971)	364653	20.7120	20.7120	
53 tert-Amyl Alcohol	59	3.953	3.948	(0.974)	52812	126.441	126.441(R)	
* 55 Fluorobenzene	96	4.061	4.061	(1.000)	2043412	30.0000		
56 Diisobutylene	57	4.066	4.066	(1.001)	889986	21.8889	21.8889	
57 Trichloroethene	95	4.156	4.156	(1.024)	333768	20.1833	20.1833	
58 Methyl cyclohexane	83	4.162	4.162	(0.688)	566688	22.7296	22.7296	
59 tert-Amyl Ethylether	59	4.260	4.260	(1.049)	651811	22.1912	22.1912	
60 Dibromomethane	93	4.414	4.411	(1.087)	178430	20.5101	20.5101	
61 1,2-Dichloropropane	63	4.472	4.472	(1.101)	326237	21.4635	21.4635	
62 Bromodichloromethane	83	4.492	4.492	(1.106)	381268	21.4436	21.4436	
63 Methyl methacrylate	41	4.561	4.562	(1.123)	251448	19.8100	19.8100	
64 1,4-Dioxane	88	4.614	4.611	(1.136)	22401	903.407	903.407(QRM)	
65 2-Chloroethylvinyl ether	63	4.822	4.823	(1.188)	137509	17.5601	17.5601	
66 cis-1,3-Dichloropropene	75	4.883	4.883	(0.807)	471640	20.9569	20.9569	
67 Octane	85	4.886	4.886	(0.807)	158690	29.3842	29.3842(R)	
$ 68 Toluene-d8	98	5.004	5.005	(0.827)	1463657	29.3003	29.3003	
69 Toluene	92	5.039	5.040	(0.833)	762276	20.8778	20.8778	
70 Chloroacetonitrile	75	5.097	5.098	(0.842)	38717	117.177	117.177	
71 2-Nitropropane	41	5.190	5.190	(0.857)	318798	94.1829	94.1829	
72 1,1-Dichloro-2-propanone	63	5.201	5.202	(0.859)	28490	97.8487	97.8487(Q)	
73 4-Methyl-2-Pentanone(MIBK)	43	5.196	5.196	(0.858)	850703	97.0732	97.0732	
75 trans-1,3-Dichloropropene	75	5.294	5.294	(0.875)	426267	21.1075	21.1075	

Sample Report

Sample Table

Sample Name	3059461002
Data File Name	016SMPL.d
Data Path Name	C:\Agilent\ICPMH\1\DATA\A093019E.b
Acq Date Time	2019-10-01T01:33:03-04:00
Sample Type	Sample
Dilution	1
Comment	70180 LXC
ISTD Ref FileName	002CALB.d
Sample QC Pass/Fail	Pass
ISTD Pass/Fail	Pass
Vial	3104

Zn, Al, K, Ba, Ca, Ba OUT

Mn 1/20

SAMPLE 12MW020-20190919

CHROMIUM REPORTED RESULT 0.06 MG/L

53.913 * 50 / 45 /1000 = 0.05990 MG/L

QC Analyte Table

Name	Mass	Tune Step	Tune Mode	Conc	FinalConc	Conc %RSD	CPS	%RSD	LDR	QC Flag
V	51	1	No Gas	1.242	1.242	19.68	11652	0.01	9000	
Cr	52	1	No Gas	53.913	53.913	3.01	325751	0.02	9000	
Mn	55	1	No Gas	4378.218	4378.218	3.64	32543283	0.01	18000	
Co	59	1	No Gas	5.884	5.884	3.43	33476	0.02	9000	
Ni	60	1	No Gas	52.197	52.197	4.03	61408	0.08	9000	
Cu	63	1	No Gas	4.275	4.275	3.93	11995	0.04	9000	
Sr	88	1	No Gas	124.211	124.211	2.59	1043496	0.01	9000	
Ag	107	1	No Gas	0.066	0.066	19.36	233	0.03	900	
Al	27	1	No Gas	428.362	428.362	3.78	2625339	0.02	180000	
Sn	118	1	No Gas	2.711	2.711	14.92	7176	0.04	9000	
Ti	47	1	No Gas	3.999	3.999	7.98	2678	0.15	9000	
Zn	66	1	No Gas	5.650	5.650	6.36	3734	0.15	9000	
As	75	3	HeHe	1.975	1.975	23.18	80	2.48	9000	
As	75	1	No Gas	1.551	1.551	58.28	6184	0.03	9000	
Sb	121	1	No Gas	0.431	0.431	11.61	1113	0.04	900	
Hg	201	1	No Gas	0.026	0.026	56.00	15	0.17	4	
Be	9	1	No Gas	0.255	0.255	16.09	715	0.04	9000	
Pb	208	1	No Gas	1.121	1.121	9.86	6175	0.02	9000	
Se	82	1	No Gas	0.411	0.411	67.57	26	1.56	9000	
Kr	83	1	No Gas	-27258.310	-27258.310	-8.51	40	-68145.78	10000	
Mo	98	1	No Gas	10.831	10.831	11.16	23516	0.05	9000	
Ba	137	1	No Gas	268.077	268.077	3.31	255803	0.10	9000	
Tl	205	1	No Gas	0.200	0.200	24.43	1037	0.02	9000	
U	238	1	No Gas	0.964	0.964	14.46	5108	0.02	9000	
Na	23	2	he	12093.398	12093.398	2.61	8232703	0.15	180000	
Mg	24	2	he	15822.845	15822.845	2.12	5563320	0.28	180000	
K	39	2	he	2317.491	2317.491	1.31	908220	0.26	180000	
Se	82	3	HeHe	1.562	1.562	34.92	5	30.13	9000	
Se	78	1	No Gas	1.937	1.937	36.14	5416	0.04	9000	
Cd	114	1	No Gas	0.293	0.293	11.83	460	0.06	9000	
Ca	44	1	No Gas	28651.504	28651.504	3.08	6305947	0.45	180000	
B	11	1	No Gas	4.971	4.971	31.15	66956	0.01	9000	
Fe	56	3	HeHe	4319.347	4319.347	2.67	2274444	0.19	180000	
Se	78	3	HeHe	0.854	0.854	89.43	5	16.00	9000	

QC ISTD Table

Name	Mass	Tune Step	Tune Mode	CPS	%RSD	Ref CPS	%Rec	%QC Low	%QC High	QC Flag
Sc	45	1	No Gas	1208114	3.41	1166199	103.59	70	120	
Sc	45	2	he	156281	1.99	149991	104.19	70	120	
In	115	1	No Gas	531280	1.56	523259	101.53	70	120	
Tb	159	1	No Gas	636309	1.30	620639	102.52	70	120	
Bi	209	1	No Gas	285730	0.43	286340	99.79	70	120	
Sc	45	3	HeHe	18106	2.69	16501	109.73	70	120	

TETRA TECH

INTERNAL CORRESPONDENCE

TO:	**T. MOORE**	**DATE:**	**DECEMBER 17, 2019**
FROM:	**J. KALINYAK**	**COPIES:**	**DV FILE**

SUBJECT: **DATA VALIDATION – VOC, METALS**
WILLOW GROVE NAS JRB
SAMPLE DELIVERY GROUP (SDG) EPR-033

SAMPLES: **3 / Aqueous – VOC**

03MW02-20190923 RB02-20190920 TB05-20190920

2 **/ Aqueous – Metals**

03MW02-20190923 RB02-20190920

Overview

The sample set for Willow Grove NAS JRB, SDG EPR-033, consisted of one (1) aqueous sample, one (1) aqueous rinse blank (RB) sample, and one (1) aqueous Trip Blank (TB) sample. All aqueous samples were analyzed for Volatile Organic Compounds (VOCs). The one (1) aqueous sample and the one (1) rinse blank sample were also analyzed for total metals including mercury, as listed above. No field duplicate sample pairs were associated with this SDG.

The samples were collected by Tetra Tech on September 20 and 23, 2019 and analyzed by ALS Environmental for all analyses listed above. All analyses were conducted in accordance with EPA SW-846 Methods 8260C for VOCs, 6020A (ICP/MS) for total metals, and 7470A for mercury, analytical and reporting protocols.

The data contained in this SDG was validated at a EPA Stage Level 2B with regard to the following parameters: data completeness, holding times, initial & continuing calibration results, blank results, laboratory control sample (LCS), matrix spike (MS)/MS duplicate (MSD) recoveries, surrogate spike recoveries, internal standard recoveries, chromatographic resolution, ICP interference results, ICP serial dilution results, analyte identification, analyte quantitation, and detection limits. Areas of concern are listed below.

Major Problems

No major problems were identified.

Minor Problems

- Detected results reported below the quantitation limit but above the method detection limit (MDL) were qualified as estimated, (J).

- The LCS was treated by the laboratory as an initial calibration verification (ICV) in addition to being an LCS. The ICV percent differences (%Ds) were greater than the 20% quality control (QC) limit and the percent recoveries (%Rs) were greater than the LCS QC limit for 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, and methyl acetate for instrument ms07 on 10/02/2019 @ 14:23 affecting all the VOC samples. The ICV %D was greater than the 20% QC limit and the %R was less than the LCS QC limit for 1,2,3-trichlorobenzene for instrument ms07 on 10/02/2019 @ 14:23 affecting all the VOC samples. The VOC sample 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, methyl acetate, and 1,2,3-trichlorobenzene non-detected results were qualified estimated, (UJ), for the ICV %D QC exceedances. The VOC sample 1,2,3-trichlorobenzene non-detected results were qualified estimated, (UJ), for the LCS %R being less

than the QC limits. No action was taken for the LCS %Rs QC limit exceedances for 1,1-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, and methyl acetate as the affected samples had non-detected results for the aforementioned analytes.

- For the VOC analysis, the MS percent recovery (%R) were less than the QC limit for 1,2,3-trichlorobenzene for spiked sample 03MW02-20190923. The sample 03MW02-20190923 had a non-detected 1,2,3-trichlorobenzene result which was qualified estimated, (UJ).

- For the metals fraction, metals were detected in the method blank at the following maximum concentrations affecting the metal analysis sample as listed below.

Analyte	Maximum Concentration	Limit of Quantitation (LOQ) > or <
Manganese (1)	0.00198 mg/l	<LOQ
Zinc (1)	0.00206 mg/l	<LOQ

(1) Maximum concentration detected in method blank for batch 547022 affecting metal analysis sample 03MW02-20190923.

The sample 03MW02-20190923 had a manganese detected result <LOQ which was qualified non-detected, (U). The sample 03MW02-20190923 had a zinc result >LOQ which was not qualified.

- For the metals analysis, the MSD %R was less than the QC limit for sodium for spiked sample 03MW02-20190923. The only sample in the sample batch was sample 03MW02-20190923. No post digestion spike analysis was performed by the laboratory The sample 03MW02-20190923 had a detected sodium result which was qualified estimated low, (J-).

Notes

Non-detected sample analyte results were reported to the Limit of Detection (LOD).

For the VOC analysis, the MSD %Rs for 1,1-dichloroethene, trans-1,2-dichloroethene, and 1,4-dioxane were greater than the QC limit for spiked sample 03MW02-20190923. Additionally, the MS/MSD %R relative percent difference (RPD) was greater than the 30% QC limit for 1,4-dioxane for the spiked sample. No action was taken as the sample 03MW02-20190923 had non-detected results for 1,1-dichloroethene, trans-1,2-dichloroethene, and 1,4-dioxane.

For the metals fraction, metals were detected in the continuing calibration blank (CCB) and method blank affecting the rinse blank sample metal analysis at the following maximum concentrations as listed below.

Analyte	Maximum Concentration	Limit of Quantitation (LOQ) > or <
Thallium (1)	0.0005 mg/l	<LOQ
Sodium (2)	0.0749 mg/l	<LOQ
Zinc (3)	0.00221 mg/l	<LOQ

(1) Maximum concentration detected in a CCB on 10/01/3019 @ 01:59 affecting metal analysis sample RB02-20190920.
(2) Maximum concentration detected in a CCB on 10/01/3019 @ 16:17 affecting metal analysis sample RB02-20190920.
(3) Maximum concentration detected in method blank for batch 545244 affecting metal analysis sample RB02-20190920.

Sample RB02-20190920 was a rinse blank sample which was not qualified for blank contamination.

The rinse blank sample RB02-20190920 was not used to qualify the SDG sample 03MW02-20190923 for blank contamination.

For the metals analysis, an interference check had an internal standard %Rs above the QC limit. No action was taken for this issue and it is noted for completeness only.

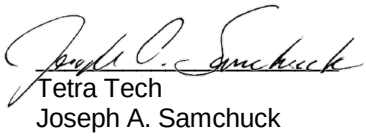
EXECUTIVE SUMMARY

Laboratory Performance Issues: Sample VOC results were qualified for ICV %D and an LCS %R outside the QC limits. A sample manganese result was qualified non-detected for method blank contamination.

Other Factors Affecting Data Quality: Detected results reported below the quantitation limit but above the MDL were qualified as estimated, (J). Sample VOC and sodium results were qualified for MS/MSD %R results outside the QC limits.

The data for these analyses were reviewed with reference to the USEPA National Functional Guidelines for Superfund Organic Methods Data Review (January 2017) and USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (January 2017).

Tetra Tech
Joseph Kalinyak
Data Validator/Environmental Scientist



Tetra Tech
Joseph A. Samchuck
Data Validation Manager

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted detection limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
NJ	The analyte has been “tentatively identified” or “presumptively” as present and the associated numerical value is the estimated concentration in the sample.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's r < 0.995
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate
Z4 = Sample activity is less than the at uncertainty at 3 standard deviations and greater than the MDC
Z5 = Sample activity is less than the at uncertainty at 3 standard deviations and less than the MDC

PROJ_NO: 08005-WE04	NSAMPLE	03MW02-20190923			RB02-20190920			TB05-20190920		
SDG: EPR-033	LAB_ID	3059732003			3059732002			3059732001		
FRACTION: OV	SAMP_DATE	9/23/2019			9/20/2019			9/20/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U	
1,1,2,2-TETRACHLOROETHANE		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROETHANE		0.75	U		0.75	U		0.75	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHANE		0.75	U		0.75	U		0.75	U	
1,1-DICHLOROETHENE		0.75	UJ	C	0.75	UJ	C	0.75	UJ	C
1,2,3-TRICHLOROBENZENE		0.75	UJ	CDE	0.75	UJ	CE	0.75	UJ	CE
1,2,4-TRICHLOROBENZENE		0.75	U		0.75	U		0.75	U	
1,2-DIBROMO-3-CHLOROPROPANE		2.5	U		2.5	U		2.5	U	
1,2-DIBROMOETHANE		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROETHANE		0.75	U		0.75	U		0.75	U	
1,2-DICHLOROPROPANE		0.75	U		0.75	U		0.75	U	
1,3-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U	
1,4-DICHLOROBENZENE		0.75	U		0.75	U		0.75	U	
1,4-DIOXANE		62.5	UJ	C	62.5	UJ	C	62.5	UJ	C
2-BUTANONE		3.8	U		3.8	U		3.8	U	
2-HEXANONE		3.8	U		3.8	U		3.8	U	
4-METHYL-2-PENTANONE		3.8	U		3.8	U		3.8	U	
ACETONE		6.8			3.8	U		3.8	U	
BENZENE		0.75	U		0.75	U		0.75	U	
BROMOCHLOROMETHANE		0.75	U		0.75	U		0.75	U	
BROMODICHLOROMETHANE		0.75	U		0.75	U		0.75	U	
BROMOFORM		0.75	U		0.75	U		0.75	U	
BROMOMETHANE		0.75	U		0.75	U		0.4	J	P
CARBON DISULFIDE		0.75	U		0.75	U		0.75	U	
CARBON TETRACHLORIDE		0.75	U		0.75	U		0.75	U	
CHLOROBENZENE		0.75	U		0.75	U		0.75	U	
CHLORODIBROMOMETHANE		0.75	U		0.75	U		0.75	U	
CHLOROETHANE		0.75	U		0.75	U		0.75	U	
CHLOROFORM		0.75	U		0.75	U		0.75	U	
CHLOROMETHANE		0.75	U		0.75	U		0.75	U	
CIS-1,2-DICHLOROETHENE		0.75	U		0.75	U		0.75	U	
CIS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U	
CYCLOHEXANE		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	03MW02-20190923			RB02-20190920			TB05-20190920		
SDG: EPR-033	LAB_ID	3059732003			3059732002			3059732001		
FRACTION: OV	SAMP_DATE	9/23/2019			9/20/2019			9/20/2019		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
DICHLORODIFLUOROMETHANE		0.75	U		0.75	U		0.75	U	
ETHYLBENZENE		0.75	U		0.75	U		0.75	U	
ISOPROPYLBENZENE		0.75	U		0.75	U		0.75	U	
METHYL ACETATE		0.75	UJ	C	0.75	UJ	C	0.75	UJ	C
METHYL CYCLOHEXANE		0.75	U		0.75	U		0.75	U	
METHYL TERT-BUTYL ETHER		0.75	U		0.75	U		0.75	U	
METHYLENE CHLORIDE		0.75	U		0.75	U		0.75	U	
STYRENE		0.75	U		0.75	U		0.75	U	
TETRACHLOROETHENE		0.75	U		0.75	U		0.75	U	
TOLUENE		0.75	U		0.75	U		0.75	U	
TOTAL XYLENES		2.3	U		2.3	U		2.3	U	
TRANS-1,2-DICHLOROETHENE		0.75	UJ	C	0.75	UJ	C	0.75	UJ	C
TRANS-1,3-DICHLOROPROPENE		0.75	U		0.75	U		0.75	U	
TRICHLOROETHENE		0.75	U		0.75	U		0.75	U	
TRICHLOROFLUOROMETHANE		0.75	U		0.75	U		0.75	U	
VINYL CHLORIDE		0.75	U		0.75	U		0.75	U	

PROJ_NO: 08005-WE04	NSAMPLE	03MW02-20190923			RB02-20190920		
SDG: EPR-033	LAB_ID	3059732003			3059732002		
FRACTION: M	SAMP_DATE	9/23/2019			9/20/2019		
MEDIA: WATER	QC_TYPE	NM			NM		
	UNITS	MG/L			MG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		0.059	U		0.059	U	
ANTIMONY		0.0015	U		0.0015	U	
ARSENIC		0.002	U		0.002	U	
BARIUM		0.12			0.032		
BERYLLIUM		0.0007	U		0.0007	U	
CADMIUM		0.0007	U		0.0007	U	
CALCIUM		13.3			30.9		
CHROMIUM		0.0012	J	P	0.0015	U	
COBALT		0.0037	U		0.0037	U	
COPPER		0.0037	U		0.0037	U	
IRON		0.028	J	P	0.021	J	P
LEAD		0.0015	U		0.0015	U	
MAGNESIUM		4.9			7.3		
MANGANESE		0.0033	U	A	0.0037	U	
MERCURY		0.00033	U		0.00033	U	
NICKEL		0.0039	J	P	0.0037	U	
POTASSIUM		0.74			2.7		
SELENIUM		0.0037	U		0.0037	U	
SILVER		0.0015	U		0.0015	U	
SODIUM		8.1	J-	D	17.9		
THALLIUM		0.0007	U		0.0007	U	
VANADIUM		0.0015	U		0.0015	U	
ZINC		0.017			0.13		

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

TB05-20190920

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100217.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.40	J
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

TB05-20190920

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732001

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100217.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

RB02-20190920

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732002

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100218.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

RB02-20190920

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732002

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100218.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

03MW02-20190923

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732003

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100222.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	6.8	
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

03MW02-20190923

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732003

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100222.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

ALS ENVIRONMENTAL

6020 3015 DoD

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc. **SDG No.:** EPR-033 **Method Type:** 6020 3015 DoD

Sample ID: 3059732002 **Client ID:** RB02-20190920

Matrix: WATER **Date Received:** 9/24/2019 **Level:** Low

% Solids: **Sample Wt/Vol:** 45.00 **Final Vol:** 50.0

Prep Batch ID: 545244 **Prep Date:** 9/29/2019 **Total/Dissolved:** TOTAL

Analyte	CAS No.	Concentration	Units	C	Qual	M	LOQ	LOD	MDL	Dil	Analytical Date	Analytical Time
Aluminum	7429-90-5	0.059	mg/L	U		M	0.089	0.059	0.030	1.00	10/1/2019	15:36:56
Antimony	7440-36-0	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/1/2019	02:24:29
Arsenic	7440-38-2	0.0020	mg/L	U		M	0.0033	0.002	0.0010	1.00	10/1/2019	15:36:56
Barium	7440-39-3	0.032	mg/L			M	0.0056	0.0037	0.0019	1.00	10/1/2019	10:11:47
Beryllium	7440-41-7	0.00070	mg/L	U		M	0.0011	0.0007	0.00030	1.00	10/1/2019	02:24:29
Cadmium	7440-43-9	0.00070	mg/L	U		M	0.0011	0.0007	0.00037	1.00	10/1/2019	02:24:29
Calcium	7440-70-2	30.9	mg/L			M	0.11	0.073	0.037	1.00	10/1/2019	10:11:47
Chromium	7440-47-3	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/1/2019	02:24:29
Cobalt	7440-48-4	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/1/2019	02:24:29
Copper	7440-50-8	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/1/2019	02:24:29
Iron	7439-89-6	0.021	mg/L	J		M	0.056	0.037	0.019	1.00	10/1/2019	10:11:47
Lead	7439-92-1	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/1/2019	02:24:29
Magnesium	7439-95-4	7.3	mg/L			M	0.11	0.073	0.037	1.00	10/1/2019	10:11:47
Manganese	7439-96-5	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/1/2019	10:11:47
Nickel	7440-02-0	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/1/2019	02:24:29
Potassium	7440-09-7	2.7	mg/L			M	0.11	0.073	0.037	1.00	10/1/2019	10:11:47
Selenium	7782-49-2	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/1/2019	10:11:47
Silver	7440-22-4	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/1/2019	02:24:29
Sodium	7440-23-5	17.9	mg/L			M	0.11	0.073	0.037	1.00	10/1/2019	15:36:56
Thallium	7440-28-0	0.00070	mg/L	U		M	0.0011	0.0007	0.00030	1.00	10/1/2019	02:24:29
Vanadium	7440-62-2	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/1/2019	02:24:29
Zinc	7440-66-6	0.13	mg/L			M	0.0056	0.0037	0.0019	1.00	10/1/2019	10:11:47

Comments:

-

ALS ENVIRONMENTAL

6020 3015 DoD

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc. **SDG No.:** EPR-033 **Method Type:** 6020 3015 DoD

Sample ID: 3059732003 **Client ID:** 03MW02-20190923

Matrix: WATER **Date Received:** 9/24/2019 **Level:** Low

% Solids: **Sample Wt/Vol:** 45.00 **Final Vol:** 50.0

Prep Batch ID: 547022 **Prep Date:** 10/4/2019 **Total/Dissolved:** TOTAL

Analyte	CAS No.	Concentration	Units	C	Qual	M	LOQ	LOD	MDL	Dil	Analytical Date	Analytical Time
Aluminum	7429-90-5	0.059	mg/L	U		M	0.089	0.059	0.030	1.00	10/9/2019	13:27:39
Antimony	7440-36-0	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/9/2019	17:21:47
Arsenic	7440-38-2	0.0020	mg/L	U		M	0.0033	0.002	0.0010	1.00	10/9/2019	13:27:39
Barium	7440-39-3	0.12	mg/L			M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39
Beryllium	7440-41-7	0.00070	mg/L	U		M	0.0011	0.0007	0.00030	1.00	10/9/2019	13:27:39
Cadmium	7440-43-9	0.00070	mg/L	U		M	0.0011	0.0007	0.00037	1.00	10/9/2019	13:27:39
Calcium	7440-70-2	13.3	mg/L			M	0.11	0.073	0.037	1.00	10/9/2019	13:27:39
Chromium	7440-47-3	0.0012	mg/L	J		M	0.0022	0.0015	0.00074	1.00	10/9/2019	13:27:39
Cobalt	7440-48-4	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39
Copper	7440-50-8	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39
Iron	7439-89-6	0.028	mg/L	J		M	0.056	0.037	0.019	1.00	10/9/2019	13:27:39
Lead	7439-92-1	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/9/2019	13:27:39
Magnesium	7439-95-4	4.9	mg/L			M	0.11	0.073	0.037	1.00	10/9/2019	13:27:39
Manganese	7439-96-5	0.0033	mg/L	J		M	0.0056	0.0037	0.0019	1.00	10/9/2019	17:21:47
Nickel	7440-02-0	0.0039	mg/L	J		M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39
Potassium	7440-09-7	0.74	mg/L			M	0.11	0.073	0.037	1.00	10/9/2019	13:27:39
Selenium	7782-49-2	0.0037	mg/L	U		M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39
Silver	7440-22-4	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/9/2019	13:27:39
Sodium	7440-23-5	8.1	mg/L			M	0.11	0.073	0.037	1.00	10/9/2019	17:21:47
Thallium	7440-28-0	0.00070	mg/L	U		M	0.0011	0.0007	0.00030	1.00	10/9/2019	13:27:39
Vanadium	7440-62-2	0.00150	mg/L	U		M	0.0022	0.0015	0.00074	1.00	10/9/2019	13:27:39
Zinc	7440-66-6	0.017	mg/L			M	0.0056	0.0037	0.0019	1.00	10/9/2019	13:27:39

Comments:

-

7470 DOD

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc. **SDG No.:** EPR-033 **Method Type:** 7470 DOD

Sample ID: 3059732002 **Client ID:** RB02-20190920

Matrix: WATER **Date Received:** 9/24/2019 **Level:** Low

% Solids: **Sample Wt/Vol:** 5.00 **Final Vol:** 5.0

Prep Batch ID: 544635 **Prep Date:** 9/27/2019 **Total/Dissolved:** TOTAL

Analyte	CAS No.	Concentration	Units	C	Qual	M	LOQ	LOD	MDL	Dil	Analytical Date	Analytical Time
Mercury	7439-97-6	0.00033	mg/L	U		CV	0.00050	0.00033	0.00016	1.00	9/27/2019	18:14:22

Comments:

-

7470 DOD

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc. **SDG No.:** EPR-033 **Method Type:** 7470 DOD

Sample ID: 3059732003 **Client ID:** 03MW02-20190923

Matrix: WATER **Date Received:** 9/24/2019 **Level:** Low

% Solids: **Sample Wt/Vol:** 5.00 **Final Vol:** 5.0

Prep Batch ID: 544635 **Prep Date:** 9/27/2019 **Total/Dissolved:** TOTAL

Analyte	CAS No.	Concentration	Units	C	Qual	M	LOQ	LOD	MDL	Dil	Analytical Date	Analytical Time
Mercury	7439-97-6	0.00033	mg/L	U		CV	0.00050	0.00033	0.00016	1.00	9/27/2019	18:15:33

Comments:

-

APPENDIX C

SUPPORT DOCUMENTATION

301 Fulling Mill Road
Middletown, PA 17057
P. 717-944-5541
F. 717-944-1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

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

COC #:
ALS Que

3059732

Client Name: Tetra Tech
Address: 234 Mall Boulevard Suite 260 King of Prussia, PA 19406
Contact: Tricia Moore
Phone#: 610 382 1171
Project Name/#: Willow Grove Sites 3 and 12
Bill To: Tetra Tech Foster Plaza 7

TAT: [x] Normal-Standard TAT is 10-12 business days. [ ] Rush-Subject to ALS approval and surcharges.
Date Required: Approved?
Email? [ ] -Y
Fax? [ ] -Y No.:

W.O. Temp: 6 Therm ID: 402
Analyst Initials:
Courier/Tracking #:
Purchase Order #:
Project Comments:

ALS Field Services: ☐ Pickup ☐ Labor ☐ Composite Sampling ☐ Rental Equipment
Other:

ANALYSES/METHOD REQUESTED

	Sample Description/Location (as it will appear on the lab report)	Date Collected mm/dd/yy	Time hh:mm	*G or C	**Matrix	40 ml VOA Vial VOC's	125 ml Poly	1 Liter Poly Strontium 90	1 Liter Poly Uranium 238	1 Liter Poly Radium 226						Sample/COC Comments
						Enter Number of Containers Per Sample or Field Results Below.										
1	TB05-20190920	9/20/19	1800	G	Ag	2										Laboratory Supplied
2	RB02-20190920	9/20/19	1810	G	Ag	2	1	1	1	1						Laboratory Supplied water
3	02MW02-20190923	9/23/19	1145	G	GW	6	3	3	3	3						Do MS/MSD
4																
5																
6																
7																
8																
9																
10																

SAMPLED BY (Please Print): Charles Meyer

Sampler Comments:

	Relinquished By / Company Name	Date	Time		Received By / Company Name	Date	Time
1	Charles Meyer Tetra Tech	9/24/19	1605	2	Chris Fdenick	92419	1605
3	Chris Fdenick	92419	1800	4	COMMON COURIER / ALS COURIER		
5	COMMON COURIER / ALS COURIER			6	[signature]	9/24/19	2:22
7				8			
9				10			

Data Deliverables: [x] Standard [ ] CLP-like [ ] USACE/DOD [ ]

Special Processing: USACE [ ] [ ] [ ]

State Samples Collected In: [ ] NY [ ] NJ [x] PA [ ] [ ] other

Reportable to PADEP? Yes [ ] No [x]
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 SHIPPING ADDRESS: 301 Fulling Mill Road, Middletown, PA 17057

Rev 04/19

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

Condition of Sample Receipt Form

Client:	Work Order #:	Initials:	Date:
Tetra Tech	3059732	LW	9-25-19

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):	6							
Thermometer ID:	4C2							
Radiological (µCi):								

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

Rev. 4/29/2019

ALS Environmental
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Internal Chain of Custody

Work Order: 3059732

3059732001-A G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732001-B G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732001-C COC - Chain of Custody

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-A G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-B G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-C P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-C1 OPHG - Output Container - HG

Transfer Date	To Location	Transfer Reason	Transferred To
09-29-19 21:34	META-PREP		Christian, Sarah

3059732002-D P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-E P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea

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Internal Chain of Custody

Work Order: 3059732

3059732002-E (cont) — P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-24-19 21:22	*Sample Received At Lab*		

3059732002-F — P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732002-G — COC - Chain of Custody

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-A — G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-D — G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-E — G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-F — G - CLEAR GLASS

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:59	V47	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-G — P - PLASTIC

Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-G1 — OPHG - Output Container - HG

Transfer Date	To Location	Transfer Reason	Transferred To
10-08-19 10:52	META-LAB	6020/3015 ANALYSIS	Olley, Mr. Matthew
10-04-19 16:52	META-PREP		Issis, Ms. Antoinette H

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Internal Chain of Custody

Work Order: 3059732

3059732003-H	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-I	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-J	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-K	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-L	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-M	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-N	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-O	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

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Internal Chain of Custody

Work Order: 3059732

3059732003-P	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-Q	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-R	P - PLASTIC		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 07:54	META-PREP	Storage	Wickline, Chelsea
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

3059732003-S	COC - Chain of Custody		
Transfer Date	To Location	Transfer Reason	Transferred To
09-25-19 06:56	RECEIVING	LOGIN	Wickline, Chelsea
09-24-19 21:22	*Sample Received At Lab*		

Tetra Tech

ALS-Middletown
Case Narrative
EPR-033 (3059554)

Sample Management

This report contains the results of the analysis of three (3) water samples collected on September 20 and 23, 2019. Analytical results and quality control information are summarized in this data package.

Qualifier Symbol Definitions:

U = Qualifier indicates that the analyte was not detected above the LOD.
J = Qualifier indicates that the analyte value is between the DL and the LOQ.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds the calibration range.
P = Qualifier indicates that the RPD between the two analytical columns is >40%.
NSC = Qualifier indicates that spike recoveries were not calculated based on the spiking concentration.

Result Symbol Definitions:

DL = The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence.
LOD = The smallest analyte concentration that must be present in a sample in order to be detected at a high level of confidence.
LOQ = The lowest concentration that produces a quantitative result within specified limits of precision or bias.

Manual Integration Symbol Definitions

I = Peak was not integrated properly by chromatographic software. This may be due to baseline irregularities resulting from sample matrix, elevated baseline, or incorrect integration by software on a sample. Integration was adjusted by operator to ensure proper quantitation.
H = The incorrect peak was identified or the chromatographic software did not identify an analyte peak. Operator manually identified the correct peak as the appropriate target analyte. This flag is automatically assigned by the Target software.
SP = Peak was erroneously split. The operator manually integrated the peak to include all the area of the analyte peak to ensure proper quantitation.
MP = Two peaks were erroneously merged. This may include two discrete peaks separated by a distinguishable valley or a larger peak with a clearly identifiable shoulder. Operator manually split peaks.
AB = Integration of group of adjacent peaks did not follow baseline. Operator manually assigned integration to follow baseline.
NP = Negative spike in the baseline resulted in overstating area of analyte peaks. Analyte peaks were re-assigned.
AC = Integration of aggregate or multi-component analyte to include area off all components of the analyte (i.e., toxaphene).

Sample Receipt

Samples arrived at ALS via courier on September 24, 2019. Upon receipt, the samples were inspected and compared to the Chain of Custody. Sample temperature was documented on the enclosed Chain of Custody. Samples were received intact and properly preserved, unless noted on the enclosed Certificate of Analysis and/or Chain of Custody.

Subcontracted Data

Two (2) water samples were submitted to ALS Fort Collins, Colorado for the analysis of isotopic uranium, radium-226, and strontium-90. The data has been included at the end of this data package.

Manual Integrations

If manual integrations were performed they are indicated on the raw data quantification files for each method.

Volatile Organics by SW-846 Method 8260

Sample Handling. Three (3) ground water samples were analyzed by SW-846 Method 8260 for volatile organic compounds. All analyses were performed within holding time.

Initial Calibrations Initial calibrations were properly analyzed and met method criteria for all target analytes. **Note:** The batch LCS also serves as a second source (ICV).

Continuing Calibration Verification. Samples were run immediately after initial calibration.

Blanks. Target analytes were not detected in the method blanks.

Surrogates. Recoveries were within control limits.

Laboratory control samples. Target analytes were within control limits, except as follows:

- In 3019577 LCS, 1,1-Dichloroethene, trans-1,2-Dichloroethene, 1,4-Dioxane, Methyl acetate and 1,2,3-Trichlorobenzene were recovered outside control limits.

Matrix and Matrix Spike samples. Target analytes were within control limits, except as follows:

- In 3021417 MS, 1,2,3-Trichlorobenzene was recovered below control limits.
- In 3021418 MSD, 1,1-Dichloroethene, trans-1,2-Dichloroethene and 1,4-Dioxane were recovered outside control limits.

Internal Standards. Internal standard results met method criteria.

Total Metals by SW-846 Method 6020A

Sample handling. Two (2) water samples were digested by SW-846 Method 3015 and analyzed for total metals on the Agilent 7700x ICP-MS, using SW-846 Method 6020A. The samples were digested and analyzed within the six-month holding time established for the method.

Calibration. All criteria associated with the calibration and calibration verification standards were within control limits

Blanks. Metals were not detected above the reporting limit in the blanks.

Laboratory Control Samples. Recoveries were within the control limits.

Spikes. A matrix spike and matrix spike duplicate analysis was performed on sample 3059732002 (RB02-20190920). Recoveries were within QC criteria, with the following exception:

- Na recovered outside of acceptable QC criteria in one of the two spikes, possibly due to matrix interferences.

Dilution Test. A dilution test was not performed on a sample in this data deliverable.

Total Mercury in Water by EPA Method 7470A

Sample handling. Two (2) water samples were analyzed for total mercury using EPA method 7470A. The samples were digested and analyzed within the 28-day holding time established for the method.

Calibration. All criteria associated with the calibration and check standards were within control limits.

Blanks. Metals were not detected above the reporting limit in the blanks.

Laboratory Control Sample. The laboratory control sample was recovered within the control limits.

Spikes. A matrix spike and matrix spike duplicate analysis was performed on sample 3059732003 (03MW02-20190923). All recoveries were within method acceptance limits.

ALS Environmental

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

SAMPLE SUMMARY

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID	Sample ID	Matrix	Date Collected	Date Received	Collected By
3059732001	TB05-20190920	Water	9/20/2019 18:00	9/24/2019 21:22	Collected by Client
3059732002	RB02-20190920	Water	9/20/2019 18:10	9/24/2019 21:22	Collected by Client
3059732003	03MW02-20190923	Water	9/23/2019 11:45	9/24/2019 21:22	Collected by Client

ALS Environmental

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

SAMPLE SUMMARY

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

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

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

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

ANALYSIS - PREP METHOD CROSS REFERENCE TABLE

Workorder: 3059732 EPR033|Willow Grove Sites 3 a

Lab ID	Sample ID	Analysis Method	Prep Method
3059732001	TB05-20190920	SW846 8260C	
3059732002	RB02-20190920	SW846 6020A	SW846 3015
3059732002	RB02-20190920	SW846 7470A	SW846 7470A
3059732002	RB02-20190920	SW846 8260C	
3059732002	RB02-20190920	Subcontract	
3059732003	03MW02-20190923	SW846 6020A	SW846 3015
3059732003	03MW02-20190923	SW846 7470A	SW846 7470A
3059732003	03MW02-20190923	SW846 8260C	
3059732003	03MW02-20190923	Subcontract	

Volatile Organic Compounds by Method 8260 Summary Forms

5A

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-033

Lab File ID: 719100200.D BFB Injection Date: 10/2/2019

Instrument ID: ms07.i BFB Injection Time: 09:34

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: Y/N N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	18.1
75	30.0 - 60.0% of mass 95	47.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.0
173	Less than 2.0% of mass 174	0.7(0.8) 1
174	50.0 - 100.0% of mass 95	79.9
175	5.0 - 9.0% of mass 174	5.6 (7.0) 1
176	95.0 - 101.0% of mass 174	76.9 (96.2) 1
177	5.0 - 9.0% of mass 176	5.0 (6.5) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
VSTD00.5	VSTD00.5	719100203.D	10/2/2019	10:59
1234	1234	719100204.D	10/2/2019	11:22
1235	1235	719100205.D	10/2/2019	11:44
1236	1236	719100206.D	10/2/2019	12:07
1237	1237	719100207.D	10/2/2019	12:30
1238	1238	719100208.D	10/2/2019	12:52
1239	1239	719100209.D	10/2/2019	13:15
3019577(LCS)	3019577	719100212.D	10/2/2019	14:23
3019576(MB)	3019576	719100216.D	10/2/2019	15:54
TB05-20190920	3059732001	719100217.D	10/2/2019	16:17
RB02-20190920	3059732002	719100218.D	10/2/2019	16:39
03MW02-20190923	3059732003	719100222.D	10/2/2019	18:10
02MW02-20190923MS	3021417	719100225.D	10/2/2019	19:18
02MW02-20190923MSD	3021418	719100226.D	10/2/2019	19:41
1801	1801	719100227.D	10/2/2019	20:03

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-033

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Acetone	0.01665	0.02192		A		0.018630		9.64257
Acrolein	0.04219	0.03963		A		0.040730		5.55161
Acrylonitrile	0.07459	0.07499		A		0.078530		8.17495
Acetonitrile	0.01591	0.02134		A		0.017760		10.75593
tert-Amyl Ethylether	0.48315	0.35235		A		0.401620		13.76155
tert-Amyl methyl ether	0.55854	0.42259		A		0.476980		13.14868
tert-Amyl Alcohol	0.01055	0.01047		A		0.010450		7.81523
Benzene	0.79974	0.83518		A		0.797990		4.31049
Benzyl Chloride	1113271	792		Q	0.000000	0.205130	0.004680	0.99860
Bromobenzene	0.61945	0.62699		A		0.617830		2.17837
Bromochloromethane	0.09416	0.09435		A		0.093490		2.61133
Bromodichloromethane	0.27940	0.21981		A		0.245060		9.34882
Bromoform *	1981467	2476		Q	0.000000	0.381330	0.005780	0.99948
Bromomethane	1382738	4318		Q	0.000000	0.082090	0.001930	0.99983
2-Butanone	0.02714	0.02779		A		0.027100		5.55402
tert.- Butyl Alcohol	0.01117	0.01334		A		0.012300		8.55281
tert-Butylbenzene	0.50665	0.37605		A		0.459330		13.15393
n-Butylbenzene	2532896	2616		Q	0.000000	0.496070	0.006050	0.99957
sec-Butylbenzene	2.53599	1.87606		A		2.400420		14.61265
Carbon Disulfide	0.59173	0.69589		A		0.579840		10.99410
Carbon Tetrachloride	0.26953	0.20331		A		0.228950		12.92165
Chloroacetonitrile	504525	772		L	0.000000	55.111370		0.99164
Chlorobenzene *	1.30599	1.38765		A		1.307870		3.29265
1-Chlorobutane	0.22784	0.21622		A		0.213800		4.27262
Chlorodibromomethane	0.53756	0.37816		A		0.440200		14.83782
Chloroethane	2097621	10520		L	0.000000	6.859170		0.99908
2-Chloroethylvinyl ether	1810404	2199		Q	0.000000	0.109760	0.002270	0.99916
Chloroform **	0.37736	0.41423		A		0.370050		5.87687
1-Chlorohexane	4520683	6465		L	0.000000	1.282980		0.99908
Chloromethane *	0.23896	0.28305		A		0.222140		13.78745
Chloroprene	0.32433	0.27961		A		0.288420		10.47484
3-Chloro-1-propene	0.28303	0.27835		A		0.268620		6.44850
o-Chlorotoluene	2.03845	1.78204		A		1.981160		7.89912
p-Chlorotoluene	1.87166	1.62886		A		1.814790		7.17866
Cyclohexane	0.33852	0.23903		A		0.295640		14.88367
1,2-Dibromo-3-Chloropropane	546948	312		Q	0.000000	0.119680	-0.000490	0.99648

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-033

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2-Dibromoethane	0.47760	0.41051		A		0.425690		8.14249
Dibromomethane	0.13020	0.13058		A		0.120730		6.67327
trans-1,4-Dichloro-2-butene	943245	1118		Q	0.000000	0.206180	-0.000900	0.99870
1,2-Dichlorobenzene	1.04208	0.89254		A		0.974160		6.17326
1,3-Dichlorobenzene	1.15241	1.08454		A		1.098090		4.57157
1,4-Dichlorobenzene	1.13757	1.23597		A		1.131360		4.52317
Dichlorodifluoromethane	0.25327	0.26279		A		0.233790		9.25048
1,1-Dichloroethane *	0.36229	0.32941		A		0.338430		4.83788
1,2-Dichloroethene, Total	0.28147	0.27557		A		0.261610		5.43680
1,2-Dichloroethane	0.25501	0.24553		A		0.240670		3.84885
1,1-Dichloroethene **	0.26165	0.25771		A		0.235750		10.85740
cis-1,2-Dichloroethene	0.29140	0.28356		A		0.272480		4.97812
trans-1,2-Dichloroethene	0.27154	0.26759		A		0.250740		6.19789
Dichlorofluoromethane	0.34106	0.35528		A		0.332680		4.81876
1,1-Dichloro-2-Propanone	343517	339		Q	0.000000	0.012460	-0.000010	0.99760
2,2-Dichloropropane	0.27165	0.23095		A		0.238370		9.18673
1,3-Dichloropropane	0.81294	0.75483		A		0.761580		4.50340
1,2-Dichloropropane **	0.23045	0.20511		A		0.209300		6.75854
1,1-Dichloropropene	0.30677	0.25629		A		0.273740		9.15302
cis-1,3-Dichloropropene	0.87315	0.67695		A		0.740030		12.71099
trans-1,3-Dichloropropene	0.79550	0.59939		A		0.667070		13.19991
1,3-Dichloropropene, Total	0.83432	0.63817		A		0.703550		12.93630
Diisobutylene	8601701	79634		L	0.000000	1.703850		0.99913
Diisopropyl ether	0.65689	0.55014		A		0.591260		9.08462
1,4-Dioxane	171916	1572		L	0.000000	2066		0.99314
Ethyl Acetate	0.21532	0.20047		A		0.199840		8.72179
Ethyl ether	0.11567	0.11900		A		0.109730		7.68901
Ethyl Methacrylate	4267306	5279		Q	0.000000	0.693670	0.007290	0.99945
Ethyl tert-butyl ether	0.60560	0.47185		A		0.530820		9.92238
Ethylbenzene **	0.74704	0.64747		A		0.701280		6.10265
Freon 113	0.20076	0.16507		A		0.178390		12.15645
Heptane	2448529	2898		Q	0.000000	0.129980	0.005780	0.99952
Hexachlorobutadiene	0.24504	0.18639		A		0.204840		14.33758
Hexachloroethane	2069437	2385		Q	0.000000	0.372210	0.009910	0.99961
Hexane	0.44505	0.34405		A		0.385500		12.18536
2-Hexanone	4665129	6801		Q	0.000000	0.162430	0.000003	0.99870

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-033

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Iodomethane	1324326	443		Q	0.000000	0.063340	0.004210	0.99885
Isobutyl alcohol	0.00188	0.00226		A		0.002050		12.73782
Isopropyl Alcohol	284729	1607		Q	0.000000	0.005000	-0.000030	0.99660
Isopropylbenzene	2.55091	2.12033		A		2.534060		11.02087
p-Isopropyltoluene	2860816	3135		L	0.000000	1.663150		0.99931
Methyl acetate	0.03608	0.03392		A		0.035680		6.41414
Methyl acrylate	0.20701	0.16683		A		0.187900		10.54001
Methacrylonitrile	0.09425	0.08514		A		0.089730		6.53201
Methyl cyclohexane	5668995	8339		L	0.000000	1.030320		0.99852
Methyl methacrylate	2739819	4159		Q	0.000000	0.189980	-0.000140	0.99894
Methyl t-Butyl Ether	0.54595	0.46866		A		0.490230		7.75965
4-Methyl-2-Pentanone(MIBK)	9920293	14839		L	0.000000	2.855570		0.99651
Methylene Chloride	0.19269	0.25834		A		0.200720		14.46379
Naphthalene	6140480	1177		Q	0.000000	1.141120	0.025340	0.99354
Nitrobenzene	800184			L	0.000000	63.016418		0.95126
2-Nitropropane	3798137	5676		L	0.000000	7.553910		0.99801
Octane	1688290	1730		Q	0.000000	0.211010	0.012310	0.99965
Pentachloroethane	0.41516	0.37336		A		0.392240		5.38210
Pentane	0.17261	0.17163		A		0.174870		5.44915
n-Propanol	0.01112	0.01225		A		0.011210		5.95988
Propionitrile	0.02562	0.02812		A		0.027430		5.63005
n-Propylbenzene	0.74482	0.56993		A		0.691060		12.72168
Styrene	1.69793	1.37828		A		1.591920		10.28289
1,1,1,2-Tetrachloroethane	0.48496	0.37956		A		0.418720		10.47468
1,1,2,2-Tetrachloroethane *	0.70588	0.77245		A		0.736970		3.67987
Tetrachloroethene	0.47795	0.54332		A		0.465140		8.47338
Tetrahydrofuran	0.05918	0.05512		A		0.058230		8.09743
Toluene **	1.28779	1.15003		A		1.208220		5.80037
Total Xylenes	0.86374	0.72755		A		0.803300		8.93827
1,2,3-Trichlorobenzene	2210563	463		Q	0.000000	0.432770	0.005600	0.99720
1,2,4-Trichlorobenzene	2694614	436		Q	0.000000	0.507790	0.009670	0.99833
1,1,1-Trichloroethane	0.30322	0.25402		A		0.266970		9.12223
1,1,2-Trichloroethane	0.39220	0.38162		A		0.370310		4.59757
Trichloroethene	0.22344	0.24294		A		0.219540		5.81989
Trichlorofluoromethane	0.27364	0.32855		A		0.283620		8.47105
1,2,3-Trichloropropane	0.20678	0.21328		A		0.212020		3.67392

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-033

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
1,2,4-Trimethylbenzene	2.07735	1.51345		A		1.935900		14.62567
1,3,5-Trimethylbenzene	2.04270	1.56081		A		1.934230		14.34080
Vinyl Acetate	0.04625	0.03159		A		0.038080		14.05431
Vinyl Chloride **	0.30549	0.33654		A		0.294640		9.31058
o-Xylene	0.87529	0.68691		A		0.772320		11.09087
mp-Xylene	0.85797	0.74788		A		0.818790		8.21353
4-Bromofluorobenzene	0.59536	0.60138		A		0.560680		7.52501
Dibromofluoromethane	0.18706	0.16425		A		0.168870		8.89042
1,2-Dichloroethane-d4	0.20955	0.18883		A		0.189540		7.51900
Toluene-d8	1.73276	1.64609		A		1.634110		9.77676

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.
SPCC Compounds (*) with required minimum RRF.
CCC Compounds (**) with required maximum %RSD.

ALS Environmental Services

RECOVERY REPORT

Client Name:
Client SDG: 7191002.b
Sample Matrix: LIQUID
Fraction: VOA
Lab Smp Id: 1801
Level: LOW
Operator: TMP
Data Type: MS DATA
SampleType: LCS
SpikeList File: DODENDCCV.spk
Quant Type: ISTD
Sublist File: DODall.sub
Method File: \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7191002.b\7-8260b09
Misc Info:

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
1 Dichlorodifluorome	50.0000	47.5132	95.03	50-150
2 Chloromethane	50.0000	45.0608	90.12	50-150
3 Vinyl Chloride	50.0000	46.4600	92.92	50-150
4 Bromomethane	50.0000	32.6187	65.24	50-150
5 Chloroethane	50.0000	45.0924	90.18	50-150
6 Pentane	50.0000	45.9132	91.83	50-150
7 Trichlorofluoromet	50.0000	46.3208	92.64	50-150
8 Dichlorofluorometh	50.0000	49.8953	99.79	50-150
9 Ethyl Ether	50.0000	51.3287	102.66	50-150
10 1,1-Dichloroethene	50.0000	48.0082	96.02	50-150
11 Freon 113	50.0000	50.2060	100.41	50-150
12 Carbon Disulfide	50.0000	48.5873	97.17	50-150
13 Iodomethane	50.0000	47.3008	94.60	50-150
14 Acrolein	250.000	198.548	79.42	50-150
15 Isopropyl Alcohol	250.000	223.579	89.43	50-150
16 3-Chloro-1-propene	50.0000	49.2760	98.55	50-150
17 Methylene Chloride	50.0000	45.5067	91.01	50-150
18 Acetone	250.000	199.837	79.93	50-150
19 Methyl acetate	50.0000	56.5994	113.20	50-150
20 trans-1,2-Dichloro	50.0000	49.8211	99.64	50-150
21 Hexane	50.0000	49.0880	98.18	50-150
22 Methyl t-Butyl Eth	50.0000	52.5775	105.16	50-150
23 tert.- Butyl Alcoh	250.000	197.329	78.93	50-150
24 Acetonitrile	250.000	211.408	84.56	50-150
25 Diisopropyl ether	50.0000	52.1583	104.32	50-150
26 Chloroprene	50.0000	51.6746	103.35	50-150
27 1,1-Dichloroethane	50.0000	50.5997	101.20	50-150
28 Acrylonitrile	250.000	234.573	93.83	50-150
30 n-Propanol	500.000	471.605	94.32	50-150
29 Ethyl tert-butyl e	50.0000	53.1144	106.23	50-150
31 Vinyl acetate	50.0000	45.4826	90.97	50-150
32 cis-1,2-Dichloroet	50.0000	49.2064	98.41	50-150
33 2,2-Dichloropropan	50.0000	42.7026	85.41	50-150
34 Bromochloromethane	50.0000	52.0314	104.06	50-150
35 Cyclohexane	50.0000	51.6693	103.34	50-150
36 Chloroform	50.0000	48.0099	96.02	50-150
37 Ethyl acetate	50.0000	46.2821	92.56	50-150
38 Methyl acrylate	50.0000	50.0421	100.08	50-150
39 Carbon Tetrachlori	50.0000	51.2506	102.50	50-150
40 Tetrahydrofuran	250.000	239.655	95.86	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
42 1,1,1-Trichloroeth	50.0000	50.1427	100.29	50-150
43 2-Butanone	250.000	230.056	92.02	50-150
44 1,1-Dichloropropen	50.0000	50.1295	100.26	50-150
45 1-Chlorobutane	50.0000	48.3561	96.71	50-150
46 Heptane	50.0000	44.1872	88.37	50-150
47 Benzene	50.0000	49.9213	99.84	50-150
48 Propionitrile	250.000	222.215	88.89	50-150
49 Methacrylonitrile	50.0000	49.4380	98.88	50-150
50 tert-amyl methyl E	50.0000	54.0661	108.13	50-150
54 Isobutyl alcohol	500.000	290.767	58.15	50-150
52 1,2-Dichloroethane	50.0000	49.7211	99.44	50-150
53 tert-Amyl Alcohol	250.000	211.268	84.51	50-150
56 Diisobutylene	50.0000	44.2062	88.41	50-150
57 Trichloroethene	50.0000	47.4616	94.92	50-150
58 Methyl cyclohexane	50.0000	42.7956	85.59	50-150
59 tert-Amyl Ethyleth	50.0000	53.5816	107.16	50-150
60 Dibromomethane	50.0000	49.7213	99.44	50-150
61 1,2-Dichloropropan	50.0000	51.0557	102.11	50-150
62 Bromodichlorometha	50.0000	52.1118	104.22	50-150
63 Methyl methacrylat	50.0000	46.2659	92.53	50-150
64 1,4-Dioxane	1250.00	1173.17	93.85	50-150
65 2-Chloroethylvinyl	50.0000	41.9839	83.97	50-150
66 cis-1,3-Dichloropr	50.0000	51.3686	102.74	50-150
67 Octane	50.0000	44.1161	88.23	50-150
69 Toluene	50.0000	50.3092	100.62	50-150
70 Chloroacetonitrile	250.000	211.921	84.77	50-150
71 2-Nitropropane	250.000	212.032	84.81	50-150
72 1,1-Dichloro-2-pro	250.000	192.009	76.80	50-150
73 4-Methyl-2-Pentano	250.000	213.183	85.27	50-150
74 Tetrachloroethene	50.0000	49.5129	99.03	50-150
75 trans-1,3-Dichloro	50.0000	51.6470	103.29	50-150
76 Ethyl methacrylate	50.0000	46.5471	93.09	50-150
77 1,1,2-Trichloroeth	50.0000	49.6366	99.27	50-150
78 Chlorodibromometha	50.0000	53.0866	106.17	50-150
80 1,2-Dibromoethane	50.0000	51.0589	102.12	50-150
81 2-Hexanone	250.000	213.229	85.29	50-150
82 1-Chlorohexane	50.0000	43.5181	87.04	50-150
79 1,3-Dichloropropan	50.0000	50.3396	100.68	50-150
84 Chlorobenzene	50.0000	48.3680	96.74	50-150
85 Ethylbenzene	50.0000	49.5313	99.06	50-150
86 1,1,1,2-Tetrachlor	50.0000	51.3335	102.67	50-150
87 mp-Xylene	100.000	101.576	101.58	50-150
88 o-Xylene	50.0000	52.2592	104.52	50-150
89 Styrene	50.0000	53.2670	106.53	50-150
90 Bromoform	50.0000	47.6766	95.35	50-150
91 Isopropylbenzene	50.0000	51.9586	103.92	50-150
93 Bromobenzene	50.0000	49.3334	98.67	50-150
94 n-Propylbenzene	50.0000	51.1888	102.38	50-150
95 1,1,2,2-Tetrachlor	50.0000	48.2532	96.51	50-150
96 o-Chlorotoluene	50.0000	49.8726	99.75	50-150
M 100 1,2-Dichloroethene	100.000	99.0275	99.03	50-150
97 1,3,5-Trimethylben	50.0000	51.8519	103.70	50-150
98 1,2,3-Trichloropro	50.0000	48.7555	97.51	50-150
99 trans-1,4-Dichloro	50.0000	39.6183	79.24	50-150

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
101 p-Chlorotoluene	50.0000	50.1938	100.39	50-150
102 tert-Butylbenzene	50.0000	50.5257	101.05	50-150
103 Pentachloroethane	50.0000	44.6308	89.26	50-150
104 1,2,4-Trimethylben	50.0000	52.6378	105.28	50-150
105 sec-Butylbenzene	50.0000	51.7906	103.58	50-150
106 p-Isopropyltoluene	50.0000	45.0256	90.05	50-150
107 1,3-Dichlorobenzen	50.0000	48.7182	97.44	50-150
109 1,4-Dichlorobenzen	50.0000	46.8826	93.77	50-150
110 Benzyl Chloride	50.0000	33.0172	66.03	50-150
111 n-Butylbenzene	50.0000	45.7174	91.43	50-150
112 Hexachloroethane	50.0000	45.3926	90.79	50-150
113 1,2-Dichlorobenzen	50.0000	49.9297	99.86	50-150
114 1,2-Dibromo-3-chlo	50.0000	39.1415	78.28	50-150
115 Nitrobenzene	500.000	48.8659	9.77*	50-150
116 Hexachlorobutadien	50.0000	48.5988	97.20	50-150
117 1,2,4-Trichloroben	50.0000	41.0044	82.01	50-150
118 Naphthalene	50.0000	34.4205	68.84	50-150
M 120 1,3-Dichloropropen	100.000	103.016	103.02	50-150
119 1,2,3-Trichloroben	50.0000	37.8724	75.74	50-150
M 121 TOTAL XYLENES	150.000	153.835	102.56	50-150

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
$ 41 Dibromofluorometha	49.9980	47.1053	94.21	80-119
$ 51 1,2-Dichloroethane	49.9980	47.7902	95.58	81-118
$ 68 Toluene-d8	49.9980	47.1067	94.22	89-112
$ 92 4-Bromofluorobenze	49.9980	47.7612	95.53	85-114

4A

VOLATILE METHOD BLANK SUMMARY

SAMPLE NO.

3019576

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG NO.: EPR-033

Lab File ID: 719100216.D Lab Sample ID: 3019576

Date Analyzed: 10/2/2019 Time Analyzed: 15:54

GC Column: RTXVRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: ms07.i

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
3019577(LCS)	3019577	719100212.D	14:23
TB05-20190920	3059732001	719100217.D	16:17
RB02-20190920	3059732002	719100218.D	16:39
03MW02-20190923	3059732003	719100222.D	18:10
02MW02-20190923MS	3021417	719100225.D	19:18
02MW02-20190923MSD	3021418	719100226.D	19:41

COMMENTS:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3019576(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3019576

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100216.D

Level (low/med): Date Received: 9/30/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	3.8	U
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

3019576(MB)

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3019576

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100216.D

Level (low/med): Date Received: 9/30/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS No.	Compound	(ug/L or ug/Kg) UG/L	Q
98-82-8	Isopropylbenzene	0.75	U
79-20-9	Methyl acetate	0.75	U
108-87-2	Methyl cyclohexane	0.75	U
1634-04-4	Methyl t-Butyl Ether	0.75	U
108-10-1	4-Methyl-2-Pentanone(MIBK)	3.8	U
75-09-2	Methylene Chloride	0.75	U
100-42-5	Styrene	0.75	U
79-34-5	1,1,2,2-Tetrachloroethane	0.75	U
127-18-4	Tetrachloroethene	0.75	U
108-88-3	Toluene	0.75	U
1330-20-7	Total Xylenes	2.3	U
87-61-6	1,2,3-Trichlorobenzene	0.75	U
120-82-1	1,2,4-Trichlorobenzene	0.75	U
71-55-6	1,1,1-Trichloroethane	0.75	U
79-00-5	1,1,2-Trichloroethane	0.75	U
79-01-6	Trichloroethene	0.75	U
75-69-4	Trichlorofluoromethane	0.75	U
75-01-4	Vinyl Chloride	0.75	U

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Laboratory Control Spike - Sample No: 3019577

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
Acetone	100		93.2	93.2	(80-120)
Benzene	20		22.4	112	(80-120)
Bromochloromethane	20		22.0	110	(80-120)
Bromodichloromethane	20		21.8	109	(80-120)
Bromoform	20		19.9	99.6	(80-120)
Bromomethane	20		20.0	100	(80-120)
2-Butanone	100		104	104	(80-120)
Carbon Disulfide	20		22.2	111	(80-120)
Carbon Tetrachloride	20		23.5	117	(80-120)
Chlorobenzene	20		20.8	104	(80-120)
Chlorodibromomethane	20		21.9	109	(80-120)
Chloroethane	20		20.3	102	(80-120)
Chloroform	20		21.3	106	(80-120)
Chloromethane	20		19.3	96.4	(80-120)
Cyclohexane	20		23.7	119	(80-120)
1,2-Dibromo-3-Chloropro	20		17.0	84.9	(80-120)
1,2-Dibromoethane	20		21.5	107	(80-120)
1,2-Dichlorobenzene	20		21.2	106	(80-120)
1,3-Dichlorobenzene	20		20.5	103	(80-120)
1,4-Dichlorobenzene	20		20.2	101	(80-120)
Dichlorodifluoromethane	20		20.4	102	(80-120)
1,1-Dichloroethane	20		23.9	120	(80-120)
1,2-Dichloroethane	20		21.6	108	(80-120)
1,1-Dichloroethene	20		26.7	133*	(80-120)
cis-1,2-Dichloroethene	20		21.8	109	(80-120)
trans-1,2-Dichloroethen	20		25.4	127*	(80-120)
1,2-Dichloropropane	20		21.8	109	(80-120)
cis-1,3-Dichloropropene	20		21.8	109	(80-120)
trans-1,3-Dichloroprope	20		22.4	112	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 5 out of 51 outside limits

Comments:

3A

WATER VOLATILE LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Laboratory Control Spike - Sample No: 3019577

COMPOUND	SPIKE ADDED (ug/L)		LCS CONCENTRATION (ug/L)	LCS % REC#	QC LIMIT REC
1,4-Dioxane	500		654	131*	(80-120)
Ethylbenzene	20		21.4	107	(80-120)
Freon 113	20		21.5	108	(80-120)
2-Hexanone	100		93.5	93.5	(80-120)
Isopropylbenzene	20		22.7	114	(80-120)
Methyl acetate	20		24.3	121*	(80-120)
Methyl cyclohexane	20		19.3	96.4	(80-120)
Methyl t-Butyl Ether	20		22.2	111	(80-120)
4-Methyl-2-Pentanone(MI	100		94.3	94.3	(80-120)
Methylene Chloride	20		21.0	105	(80-120)
Styrene	20		22.5	113	(80-120)
1,1,2,2-Tetrachloroetha	20		21.1	106	(80-120)
Tetrachloroethene	20		21.2	106	(80-120)
Toluene	20		22.1	110	(80-120)
Total Xylenes	60		66.3	110	(80-120)
1,2,3-Trichlorobenzene	20		15.4	77*	(80-120)
1,2,4-Trichlorobenzene	20		16.8	83.9	(80-120)
1,1,1-Trichloroethane	20		23.6	118	(80-120)
1,1,2-Trichloroethane	20		21.1	106	(80-120)
Trichloroethene	20		21.1	105	(80-120)
Trichlorofluoromethane	20		23.0	115	(80-120)
Vinyl Chloride	20		19.1	95.7	(80-120)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 5 out of 51 outside limits

Comments:

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: _____ SAS No.: _____ SDG No.: EPR-033

Matrix Spike - Sample No: 02MW02-20190923MS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC#	QC LIMIT REC
Acetone	100	6.8	77.4	70.6	(39-160)
Benzene	20	0	23.0	115	(79-120)
Bromochloromethane	20	0	22.4	112	(78-123)
Bromodichloromethane	20	0	21.8	109	(79-125)
Bromoform	20	0	19.2	95.8	(66-130)
Bromomethane	20	0	14.1	70.5	(53-141)
2-Butanone	100	0	97.1	97.1	(56-143)
Carbon Disulfide	20	0	20.2	101	(64-133)
Carbon Tetrachloride	20	0	24.3	122	(72-136)
Chlorobenzene	20	0	21.0	105	(82-118)
Chlorodibromomethane	20	0	21.1	105	(74-126)
Chloroethane	20	0	21.8	109	(60-138)
Chloroform	20	0	21.1	106	(79-124)
Chloromethane	20	0	18.4	92.1	(50-139)
Cyclohexane	20	0	25.5	127	(71-130)
1,2-Dibromo-3-chloropropane	20	0	15.5	77.3	(62-128)
1,2-Dibromoethane	20	0	20.6	103	(77-121)
1,2-Dichlorobenzene	20	0	21.2	106	(80-119)
1,3-Dichlorobenzene	20	0	20.9	105	(80-119)
1,4-Dichlorobenzene	20	0	20.3	102	(79-118)
Dichlorodifluoromethane	20	0	20.3	102	(32-152)
1,1-Dichloroethane	20	0	21.7	108	(77-125)
1,2-Dichloroethane	20	0	21.6	108	(73-128)
1,1-Dichloroethene	20	0	24.4	122	(71-131)
cis-1,2-Dichloroethene	20	0	21.9	110	(78-123)
trans-1,2-Dichloroethene	20	0	22.9	114	(75-124)
1,2-Dichloropropane	20	0	21.9	110	(78-122)
cis-1,3-Dichloropropene	20	0	21.2	106	(75-124)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 1 out of 51 outside limits

Comments: _____

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: _____ SAS No.: _____ SDG No.: EPR-033

Matrix Spike - Sample No: 02MW02-20190923MS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC#	QC LIMIT REC
trans-1,3-Dichloropropene	20	0	21.0	105	(73-127)
1,4-Dioxane	500	0	412	82.3	(59-139)
Ethylbenzene	20	0	22.1	110	(79-121)
Freon 113	20	0	20.7	104	(70-136)
2-Hexanone	100	0	75.3	75.3	(57-139)
Isopropylbenzene	20	0	23.4	117	(72-131)
Methyl acetate	20	0	14.9	74.7	(56-136)
Methyl cyclohexane	20	0	20.6	103	(72-132)
Methyl t-Butyl Ether	20	0	18.5	92.4	(71-124)
4-Methyl-2-Pentanone(MIBK)	100	0	87.1	87.1	(67-130)
Methylene Chloride	20	0	18.6	93	(74-124)
Styrene	20	0	22.7	113	(78-123)
1,1,2,2-Tetrachloroethane	20	0	20.6	103	(71-121)
Tetrachloroethene	20	0	19.6	97.8	(74-129)
Toluene	20	0	22.3	112	(80-121)
TOTAL XYLENES	60	0	67.3	112	(79-121)
1,2,3-Trichlorobenzene	20	0	13.6	67.8*	(69-129)
1,2,4-Trichlorobenzene	20	0	15.2	75.8	(69-130)
1,1,1-Trichloroethane	20	0	24.6	123	(74-131)
1,1,2-Trichloroethane	20	0	20.8	104	(80-119)
Trichloroethene	20	0	22.0	110	(79-123)
Trichlorofluoromethane	20	0	25.7	129	(65-141)
Vinyl Chloride	20	0	19.3	96.3	(58-137)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 0 out of 0 outside limits

Spike Recovery: 1 out of 51 outside limits

Comments: _____

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix Spike - Sample No: 02MW02-20190923MSD

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	MSD % RPD #	QC LIMITS RPD	QC LIMITS REC
Acetone	100	97.0	90.2	22.5	30	(39-160)
Benzene	20	23.4	117	1.5	30	(79-120)
Bromochloromethane	20	22.4	112	.02	30	(78-123)
Bromodichloromethane	20	22.2	111	1.85	30	(79-125)
Bromoform	20	19.2	95.8	.08	30	(66-130)
Bromomethane	20	13.6	68.1	3.55	30	(53-141)
2-Butanone	100	101	101	4.05	30	(56-143)
Carbon Disulfide	20	23.4	117	14.6	30	(64-133)
Carbon Tetrachloride	20	25.0	125	2.97	30	(72-136)
Chlorobenzene	20	21.4	107	1.81	30	(82-118)
Chlorodibromomethane	20	21.7	108	2.89	30	(74-126)
Chloroethane	20	20.9	105	3.82	30	(60-138)
Chloroform	20	22.0	110	4.22	30	(79-124)
Chloromethane	20	20.3	102	9.83	30	(50-139)
Cyclohexane	20	25.9	129	1.56	30	(71-130)
1,2-Dibromo-3-chloropropane	20	15.9	79.5	2.72	30	(62-128)
1,2-Dibromoethane	20	21.1	106	2.39	30	(77-121)
1,2-Dichlorobenzene	20	21.4	107	.71	30	(80-119)
1,3-Dichlorobenzene	20	21.0	105	.44	30	(80-119)
1,4-Dichlorobenzene	20	20.6	103	1.27	30	(79-118)
Dichlorodifluoromethane	20	21.8	109	6.97	30	(32-152)
1,1-Dichloroethane	20	25.1	125	14.7	30	(77-125)
1,2-Dichloroethane	20	22.0	110	1.54	30	(73-128)
1,1-Dichloroethene	20	28.7	144*	16.4	30	(71-131)
cis-1,2-Dichloroethene	20	22.6	113	3.29	30	(78-123)
trans-1,2-Dichloroethene	20	27.1	136*	17.1	30	(75-124)
1,2-Dichloropropane	20	22.4	112	2.19	30	(78-122)
cis-1,3-Dichloropropene	20	21.8	109	2.78	30	(75-124)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 51 outside limits

Spike Recovery: 3 out of 51 outside limits

Comments:

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix Spike - Sample No: 02MW02-20190923MSD

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	MSD % RPD #	QC LIMITS RPD	QC LIMITS REC
trans-1,3-Dichloropropene	20	22.0	110	4.39	30	(73-127)
1,4-Dioxane	500	709	142*	53.2*	30	(59-139)
Ethylbenzene	20	22.3	112	1.25	30	(79-121)
Freon 113	20	24.2	121	15.4	30	(70-136)
2-Hexanone	100	76.1	76.1	1.07	30	(57-139)
Isopropylbenzene	20	23.8	119	1.83	30	(72-131)
Methyl acetate	20	17.3	86.7	14.9	30	(56-136)
Methyl cyclohexane	20	20.8	104	1.02	30	(72-132)
Methyl t-Butyl Ether	20	21.5	108	15.3	30	(71-124)
4-Methyl-2-Pentanone(MIBK)	100	88.5	88.5	1.63	30	(67-130)
Methylene Chloride	20	21.5	108	14.5	30	(74-124)
Styrene	20	23.0	115	1.22	30	(78-123)
1,1,2,2-Tetrachloroethane	20	20.7	104	.43	30	(71-121)
Tetrachloroethene	20	20.2	101	2.93	30	(74-129)
Toluene	20	23.0	115	2.9	30	(80-121)
TOTAL XYLENES	60	68.5	114	1.79	30	(79-121)
1,2,3-Trichlorobenzene	20	14.2	71.2	4.94	30	(69-129)
1,2,4-Trichlorobenzene	20	15.9	79.4	4.62	30	(69-130)
1,1,1-Trichloroethane	20	25.0	125	1.63	30	(74-131)
1,1,2-Trichloroethane	20	21.1	106	1.41	30	(80-119)
Trichloroethene	20	22.0	110	.31	30	(79-123)
Trichlorofluoromethane	20	25.6	128	.57	30	(65-141)
Vinyl Chloride	20	20.3	102	5.35	30	(58-137)

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD: 1 out of 51 outside limits

Spike Recovery: 3 out of 51 outside limits

Comments:

2A

WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA CASE No.: SAS No.: SDG NO.: EPR-033

	Sample NO.	SMC1 (BFB) #	SMC2 (DBFM)	SMC3 (DCE) #	SMC4 (TOL) #	TOT OUT
01	3019577(LCS)	98.3	95.9	99.0	94.8	0
02	3019576(MB)	102	95.2	103	96.0	0
03	TB05-20190920	105	95.7	102	97.0	0
04	RB02-20190920	106	95.7	104	96.7	0
05	03MW02-20190923	102	95.7	102	96.7	0
06	02MW02-20190923MS	97.6	96.1	99.1	94.8	0
07	02MW02-20190923MSD	98.2	96.4	100	95.2	0

	QC LIMITS
SMC1 (BFB) = 4-Bromofluorobenzene	(76-119)
SMC2 (DBFM) = Dibromofluoromethane	(85-115)
SMC3 (DCE) = 1,2-Dichloroethane-d4	(72-119)
SMC4 (TOL) = Toluene-d8	(81-120)

Column to be used to flag recovery values

* Values outside of contract required QC Limits

D Surrogate Diluted Out

8Az

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Lab File ID: 719100207.D Date Analyzed: 10/2/2019

Instrument ID: ms07.i Time Analyzed: 12:30

GC Column: RTXVRX ID: 0.2 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT#	IS2 AREA #	RT #	IS3 AREA #	RT #
12 HOUR STD	815680	6.056	638236	7.825	2017315	4.061
UPPER LIMIT	1631360	6.226	1276472	7.995	4034630	4.231
LOWER LIMIT	407840	5.886	319118	7.655	1008658	3.891
SAMPLE NO.						
3019577(LCS)	837242	6.056	646291	7.825	2087969	4.061
3019576(MB)	769810	6.053	548821	7.824	2002558	4.061
TB05-20190920	754560	6.053	519080	7.825	1966007	4.061
RB02-20190920	751652	6.053	516905	7.825	1952454	4.061
03MW02-20190923	728754	6.056	509383	7.822	1899077	4.061
02MW02-20190923MS	774228	6.053	593141	7.825	1918984	4.061
02MW02-20190923MS	804522	6.053	616722	7.825	2001516	4.061
1801	829904	6.053	642326	7.824	2053500	4.061

IS1 = Chlorobenzene-d5
IS2 = 1,4-Dichlorobenzene-d4
IS3 = Fluorobenzene

AREA UPPER LIMIT = +2% of internal standard area
AREA LOWER LIMIT = -1% of internal standard area
RT UPPER LIMIT = +0.17 minutes of internal standard RT
RT LOWER LIMIT = -0.17 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Data File: \\GC01\TargetData\Chem2\ms07.i\7-2019\7191002.b

GCMS ANALYSIS - VOLATILE ORGANICS

DATE(S):	10/2/2019	Analyst:	TMP				
DATA FILE:	7191002xx.d	BFB INJ :	10/2/19 9:34	INSTRUMENT: MS07	METHOD(S)	8260W	D8260W	8260W_C
BATCH:	7191002.b	12-HOUR ENDING:	10/2/19 21:34	ICAL DATE: 10/2/2019	LIMS BATCH:		52501	

Pos #	Run #	ALS Sample ID (w/ Container ID)	Dilution	Test	pH	HDSP / Wt.	CL-	Comment	Pos #	Run #	ALS Sample ID (w/ Container ID)	Dilution	Test	pH	HDSP / Wt.	CL-	Comment
0	00	1000	1	BFB	-	-	-		32	33							
1	01	WP	1	8260	-	-	-		33	34							
2	02	WP	1	8260	-	-	-		34	35							
3	03	VSTD00.5	1	8260	-	-	-		35	36							
4	04	1234	1	8260	-	-	-		36	37							
5	05	1235	1	8260	-	-	-		37	38							
6	06	1236	1	8260	-	-	-		38	39							
7	07	1237	1	8260	-	-	-		39	40							
8	08	1238	1	8260	-	-	-		40	41							
9	09	1239	1	8260	-	-	-		41	42							
10	10	WP	1	8260	-	-	-		42	43							
11	11	WP	1	8260	-	-	-		43	44							
12	12	3019577	1	8260	-	-	-		44	45							
13	13	WP	1	8260	-	-	-		45	46							
14	14	WP	1	8260	-	-	-		46	47							
15	15	WP	1	8260	-	-	-		47	48							
16	16	3019576	1	8260	-	-	-		48	49							
17	17	3059732001-A	1	D8260W V	<2	N	N		49	50							
18	18	3059732002-A	1	D8260W V	<2	N	N		50	51							
19	19	3059461006-B	1	D8260W V	<2	N	N	(RR)	51	52							
20	20	3059461008-B	1	D8260W V	<2	N	N	(RR)	52	53							
21	21	3059461009-B	1	D8260W V	<2	N	N	(RR)	53	54							
22	22	3059732003-A	1	D8260W V	<2	N	N	MS/D PAID QC	54	55							
23	23	3059836013-C	1	D8260W V	<2	N	N		55	56							
24	24	3059836015-C	1	D8260W V	<2	N	N		56	57							
25	25	3021417	1	D8260W V	<2	N	N		57	58							
26	26	3021418	1	D8260W V	<2	N	N		58	59							
27	27	1801	1	D8260W V	-	-	-		59	60							
28	28								60	61							
29	29								61	62							
30	30								62	63							
31	31								63	64							
32	32								64	65							

IS:	VOA14-67-01	Vnew:	VOA14-70-06
SS:	VOA14-60-01	Vgas:	VOA14-72-23
BFB:	VOA14-53-16	Qvoa:	VOA14-72-01
1-4DIOX		Qgas:	VOA14-71-26
524IS/SS			

ABBREVIATIONS

CO:	Suspect Carryover	SS:	Surrogate Failure
LS:	Library Search	IS:	ISTD Failure
RR:	Rerun same dilution	DNR:	Do not Report
DFx:	Rerun @ less diln x	NU:	Not Used
DLx:	Rerun @ diln x	AF:	Antifoam was used

Prev		Prev	
Current		Current	
Total		Total	
Needs QC?		Needs QC?	

Total Metals by Method 6020 Summary Forms

ALS ENVIRONMENTAL

6020 3015 DoD

- COVER PAGE -

INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc.

SDG No.: EPR-033 **Method Type:** 6020 3015 DoD **SOW No.:**

Contract: EPR033|Willow Grove **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Lab Sample ID	Client Sample ID	QC Description
3059732002	RB02-20190920	
3059732003	03MW02-20190923	
3059732003S	03MW02-20190923S	Matrix Spike
3059732003SD	03MW02-20190923SD	Matrix Spike Duplicate

Were ICP interelement corrections applied?	Yes/No	Yes	
Were ICP background corrections applied?	Yes/No	Yes	
If yes - were raw data generated before applications of background corrections?	Yes/No	No	

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name: **Matthew Olley**

Date: Title: **Metals Supervisor**

QA Department

6020 3015 DoD

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A093019E 001

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	0010																									
BLK	1.00	0013			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
STANDARD 5	1.00	0017			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICV	1.00	0020			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0023																									
ICB	1.00	0026			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0030																									
LLICV	1.00	0046			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICSA	1.00	0054			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ICSAB	1.00	0057			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0101																									
ZZZZZZ	1.00	0107																									
MB for HBN 545244 [	1.00	0123			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
LCS for HBN 545244 [	1.00	0126			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
LCS for HBN 545244 [	1.00	0129			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0133																									
ZZZZZZ	1.00	0136																									
ZZZZZZ	1.00	0139																									
ZZZZZZ	1.00	0142																									
ZZZZZZ	1.00	0146																									
ZZZZZZ	1.00	0149																									
ZZZZZZ	1.00	0152																									
CCV	1.00	0156			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
CCB	1.00	0159			X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	X		
ZZZZZZ	1.00	0214																									
ZZZZZZ	1.00	0217																									
ZZZZZZ	1.00	0221																									
RB02-20190920	1.00	0224			X			X	X		X	X	X		X				X			X		X	X		
ZZZZZZ	1.00	0227																									
ZZZZZZ	1.00	0231																									
ZZZZZZ	1.00	0234																									
ZZZZZZ	1.00	0237																									
ZZZZZZ	1.00	0240																									
ZZZZZZ	1.00	0244																									
ZZZZZZ	1.00	0247																									
ZZZZZZ	1.00	0250																									

6020 3015 DoD

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A093019E 001

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
CCB	1.00	0255			X			X	X		X	X	X		X				X			X		X	X		
ZZZZZZ	1.00	0258																									
CCV	1.00	0302			X			X	X		X	X	X		X				X			X		X	X		

6020 3015 DoD

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Antimony	0.1040	0.1000	104		90 - 110	M	10/1/2019	00:20	A093019E 0
	Arsenic	0.1014	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Beryllium	0.1009	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Cadmium	0.0996	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Chromium	0.1002	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Cobalt	0.0980	0.1000	98		90 - 110	M	10/1/2019	00:20	A093019E 0
	Copper	0.1007	0.1000	101		90 - 110	M	10/1/2019	00:20	A093019E 0
	Iron	1.0401	1.0000	104		90 - 110	M	10/1/2019	00:20	A093019E 0
	Lead	0.1003	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Magnesium	1.0217	1.0000	102		90 - 110	M	10/1/2019	00:20	A093019E 0
	Manganese	0.1027	0.1000	103		90 - 110	M	10/1/2019	00:20	A093019E 0
	Nickel	0.1003	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
	Selenium	0.1070	0.1000	107		90 - 110	M	10/1/2019	00:20	A093019E 0
	Silver	0.0991	0.1000	99		90 - 110	M	10/1/2019	00:20	A093019E 0
	Sodium	1.0243	1.0000	102		90 - 110	M	10/1/2019	00:20	A093019E 0
	Thallium	0.0992	0.1000	99		90 - 110	M	10/1/2019	00:20	A093019E 0
	Vanadium	0.0997	0.1000	100		90 - 110	M	10/1/2019	00:20	A093019E 0
LLICV										
	Antimony	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Arsenic	0.0030	0.0030	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Beryllium	0.0011	0.0010	110		80 - 120	M	10/1/2019	00:46	A093019E 0
	Cadmium	0.0010	0.0010	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Chromium	0.0020	0.0020	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Cobalt	0.0051	0.0050	102		80 - 120	M	10/1/2019	00:46	A093019E 0
	Copper	0.0053	0.0050	106		80 - 120	M	10/1/2019	00:46	A093019E 0
	Iron	0.0487	0.0500	97		80 - 120	M	10/1/2019	00:46	A093019E 0
	Lead	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Magnesium	0.0924	0.1000	92		80 - 120	M	10/1/2019	00:46	A093019E 0
	Manganese	0.0055	0.0050	110		80 - 120	M	10/1/2019	00:46	A093019E 0
	Nickel	0.0052	0.0050	104		80 - 120	M	10/1/2019	00:46	A093019E 0
	Selenium	0.0048	0.0050	96		80 - 120	M	10/1/2019	00:46	A093019E 0
	Silver	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0
	Sodium	0.0910	0.1000	91		80 - 120	M	10/1/2019	00:46	A093019E 0
	Thallium	0.0010	0.0010	100		80 - 120	M	10/1/2019	00:46	A093019E 0
	Vanadium	0.0021	0.0020	105		80 - 120	M	10/1/2019	00:46	A093019E 0

6020 3015 DoD

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Antimony	0.1037	0.1000	104		90 - 110	M	10/1/2019	01:56	A093019E 0
	Arsenic	0.1020	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Beryllium	0.1012	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Cadmium	0.1013	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Chromium	0.1017	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Cobalt	0.1008	0.1000	101		90 - 110	M	10/1/2019	01:56	A093019E 0
	Copper	0.1033	0.1000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Iron	1.0256	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Lead	0.1023	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
	Magnesium	1.0261	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Manganese	0.1054	0.1000	105		90 - 110	M	10/1/2019	01:56	A093019E 0
	Nickel	0.1037	0.1000	104		90 - 110	M	10/1/2019	01:56	A093019E 0
	Selenium	0.1033	0.1000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Silver	0.1002	0.1000	100		90 - 110	M	10/1/2019	01:56	A093019E 0
	Sodium	1.0332	1.0000	103		90 - 110	M	10/1/2019	01:56	A093019E 0
	Thallium	0.0989	0.1000	99		90 - 110	M	10/1/2019	01:56	A093019E 0
	Vanadium	0.1020	0.1000	102		90 - 110	M	10/1/2019	01:56	A093019E 0
CCV										
	Antimony	0.1050	0.1000	105		90 - 110	M	10/1/2019	03:02	A093019E 0
	Beryllium	0.1074	0.1000	107		90 - 110	M	10/1/2019	03:02	A093019E 0
	Cadmium	0.1030	0.1000	103		90 - 110	M	10/1/2019	03:02	A093019E 0
	Chromium	0.1080	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0
	Cobalt	0.1071	0.1000	107		90 - 110	M	10/1/2019	03:02	A093019E 0
	Copper	0.1078	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0
	Lead	0.1047	0.1000	105		90 - 110	M	10/1/2019	03:02	A093019E 0
	Nickel	0.1094	0.1000	109		90 - 110	M	10/1/2019	03:02	A093019E 0
	Silver	0.1010	0.1000	101		90 - 110	M	10/1/2019	03:02	A093019E 0
	Thallium	0.1022	0.1000	102		90 - 110	M	10/1/2019	03:02	A093019E 0
	Vanadium	0.1077	0.1000	108		90 - 110	M	10/1/2019	03:02	A093019E 0

6020 3015 DoD

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
ICB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	00:26	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	00:26	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	00:26	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	00:26	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	00:26	A093019E 001
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	00:26	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	00:26	A093019E 001
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/1/2019	00:26	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	00:26	A093019E 001

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	01:59	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	01:59	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	01:59	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	01:59	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	01:59	A093019E 001
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	01:59	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	01:59	A093019E 001
	Thallium	0.0005	J	0.00066	0.0003	0.0010	M	10/1/2019	01:59	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	01:59	A093019E 001
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/1/2019	02:55	A093019E 001
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/1/2019	02:55	A093019E 001
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	02:55	A093019E 001
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/1/2019	02:55	A093019E 001
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/1/2019	02:55	A093019E 001

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119 0821

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	0821																									
BLK	1.00	0825		X			X			X				X		X	X			X	X					X	
STANDARD 5	1.00	0828		X			X			X				X		X	X			X	X					X	
ICV	1.00	0831		X			X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	0835																									
ICB	1.00	0838		X			X			X				X		X	X			X	X					X	
LLICV	1.00	0841		X			X			X				X		X	X			X	X					X	
ICSA	1.00	0848		X			X			X				X		X	X			X	X					X	
ICSAB	1.00	0852		X			X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	0855																									
ZZZZZZ	1.00	0900																									
ZZZZZZ	1.00	0903																									
ZZZZZZ	1.00	0907																									
ZZZZZZ	1.00	0911																									
ZZZZZZ	1.00	0914																									
MB for HBN 545244 [	1.00	0917		X			X			X										X						X	
LCS for HBN 545244 [	1.00	0920		X			X			X										X						X	
ZZZZZZ	1.00	0924																									
ZZZZZZ	1.00	0927																									
ZZZZZZ	1.00	0930																									
ZZZZZZ	1.00	0933																									
ZZZZZZ	1.00	0937																									
ZZZZZZ	1.00	0940																									
ZZZZZZ	1.00	0943																									
ZZZZZZ	1.00	0947																									
CCV	1.00	0950		X			X			X				X		X	X			X	X					X	
CCB	1.00	0953		X			X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	0956																									
LCS for HBN 545244 [	1.00	1001					X			X										X						X	
RB02-20190920	1.00	1011					X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	1015																									
ZZZZZZ	1.00	1018																									
ZZZZZZ	1.00	1021																									
ZZZZZZ	1.00	1024																									
ZZZZZZ	1.00	1028																									
ZZZZZZ	1.00	1031																									

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119 0821

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1034																									
ZZZZZZ	1.00	1038																									
ZZZZZZ	1.00	1041																									
CCB	1.00	1044					X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	1047																									
CCV	1.00	1051					X			X				X		X	X			X	X					X	
ZZZZZZ	1.00	1057																									
ZZZZZZ	1.00	1100																									
ZZZZZZ	1.00	1104																									
ZZZZZZ	1.00	1107																									
ZZZZZZ	1.00	1110																									
ZZZZZZ	1.00	1113																									

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Aluminum	0.1101	0.1000	110		90 - 110	M	10/1/2019	08:31	A100119 08
	Barium	0.0995	0.1000	100		90 - 110	M	10/1/2019	08:31	A100119 08
	Calcium	1.0480	1.0000	105		90 - 110	M	10/1/2019	08:31	A100119 08
	Iron	1.0543	1.0000	105		90 - 110	M	10/1/2019	08:31	A100119 08
	Magnesium	1.0106	1.0000	101		90 - 110	M	10/1/2019	08:31	A100119 08
	Manganese	0.1085	0.1000	108		90 - 110	M	10/1/2019	08:31	A100119 08
	Potassium	1.0107	1.0000	101		90 - 110	M	10/1/2019	08:31	A100119 08
	Selenium	0.1027	0.1000	103		90 - 110	M	10/1/2019	08:31	A100119 08
	Zinc	0.1046	0.1000	105		90 - 110	M	10/1/2019	08:31	A100119 08
LLICV										
	Aluminum	0.0848	0.0800	106		80 - 120	M	10/1/2019	08:41	A100119 08
	Barium	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Calcium	0.0889	0.1000	89		80 - 120	M	10/1/2019	08:41	A100119 08
	Iron	0.0533	0.0500	107		80 - 120	M	10/1/2019	08:41	A100119 08
	Magnesium	0.1003	0.1000	100		80 - 120	M	10/1/2019	08:41	A100119 08
	Manganese	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Potassium	0.0998	0.1000	100		80 - 120	M	10/1/2019	08:41	A100119 08
	Selenium	0.0052	0.0050	104		80 - 120	M	10/1/2019	08:41	A100119 08
	Zinc	0.0051	0.0050	102		80 - 120	M	10/1/2019	08:41	A100119 08
CCV										
	Aluminum	0.1092	0.1000	109		90 - 110	M	10/1/2019	09:50	A100119 08
	Barium	0.0970	0.1000	97		90 - 110	M	10/1/2019	09:50	A100119 08
	Calcium	1.0374	1.0000	104		90 - 110	M	10/1/2019	09:50	A100119 08
	Iron	1.0820	1.0000	108		90 - 110	M	10/1/2019	09:50	A100119 08
	Magnesium	1.0026	1.0000	100		90 - 110	M	10/1/2019	09:50	A100119 08
	Manganese	0.1073	0.1000	107		90 - 110	M	10/1/2019	09:50	A100119 08
	Potassium	1.0199	1.0000	102		90 - 110	M	10/1/2019	09:50	A100119 08
	Selenium	0.1036	0.1000	104		90 - 110	M	10/1/2019	09:50	A100119 08
	Zinc	0.1015	0.1000	102		90 - 110	M	10/1/2019	09:50	A100119 08

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Barium	0.0997	0.1000	100		90 - 110	M	10/1/2019	10:51	A100119 08
	Calcium	1.0748	1.0000	107		90 - 110	M	10/1/2019	10:51	A100119 08
	Iron	0.9392	1.0000	94		90 - 110	M	10/1/2019	10:51	A100119 08
	Magnesium	1.0185	1.0000	102		90 - 110	M	10/1/2019	10:51	A100119 08
	Manganese	0.1079	0.1000	108		90 - 110	M	10/1/2019	10:51	A100119 08
	Potassium	1.0328	1.0000	103		90 - 110	M	10/1/2019	10:51	A100119 08
	Selenium	0.0906	0.1000	91		90 - 110	M	10/1/2019	10:51	A100119 08
	Zinc	0.1028	0.1000	103		90 - 110	M	10/1/2019	10:51	A100119 08
ICV										
	Aluminum	0.1016	0.1000	102		90 - 110	M	10/1/2019	13:23	A100119A 1
	Arsenic	0.0992	0.1000	99		90 - 110	M	10/1/2019	13:23	A100119A 1
	Sodium	1.0067	1.0000	101		90 - 110	M	10/1/2019	13:23	A100119A 1
LLICV										
	Aluminum	0.0757	0.0800	95		80 - 120	M	10/1/2019	13:33	A100119A 1
	Arsenic	0.0034	0.0030	113		80 - 120	M	10/1/2019	13:33	A100119A 1
	Sodium	0.0915	0.1000	92		80 - 120	M	10/1/2019	13:33	A100119A 1
CCV										
	Aluminum	0.1007	0.1000	101		90 - 110	M	10/1/2019	14:17	A100119A 1
	Arsenic	0.1040	0.1000	104		90 - 110	M	10/1/2019	14:17	A100119A 1
	Sodium	0.9942	1.0000	99		90 - 110	M	10/1/2019	14:17	A100119A 1
CCV										
	Aluminum	0.0937	0.1000	94		90 - 110	M	10/1/2019	16:09	A100119A 1
	Arsenic	0.0985	0.1000	98		90 - 110	M	10/1/2019	16:09	A100119A 1
	Sodium	1.0403	1.0000	104		90 - 110	M	10/1/2019	16:09	A100119A 1

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
ICB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	08:38	A100119 0821 1
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	08:38	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	08:38	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	08:38	A100119 0821 1
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	09:53	A100119 0821 1
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	09:53	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	09:53	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	09:53	A100119 0821 1
CCB										
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/1/2019	10:44	A100119 0821 1
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	10:44	A100119 0821 1
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/1/2019	10:44	A100119 0821 1

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100119A 131

Start Date: 10/1/2019 End Date: 10/1/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1313																									
BLK	1.00	1317		X		X																	X				
STANDARD 5	1.00	1320		X		X																	X				
ICV	1.00	1323		X		X																	X				
ZZZZZZ	1.00	1327																									
ICB	1.00	1330		X		X																	X				
LLICV	1.00	1333		X		X																	X				
ICSA	1.00	1337		X		X																	X				
ICSAB	1.00	1340		X		X																	X				
ZZZZZZ	1.00	1343																									
ZZZZZZ	1.00	1346																									
ZZZZZZ	1.00	1359																									
ZZZZZZ	1.00	1404																									
LCS for HBN 545244 [	1.00	1407		X																							
ZZZZZZ	1.00	1410																									
ZZZZZZ	10.00	1414																									
CCV	1.00	1417		X		X																	X				
CCB	1.00	1448		X		X																	X				
RB02-20190920	1.00	1536		X		X																	X				
ZZZZZZ	1.00	1540																									
ZZZZZZ	1.00	1543																									
ZZZZZZ	1.00	1546																									
ZZZZZZ	1.00	1550																									
ZZZZZZ	1.00	1553																									
ZZZZZZ	1.00	1556																									
ZZZZZZ	1.00	1559																									
ZZZZZZ	1.00	1603																									
ZZZZZZ	1.00	1606																									
CCV	1.00	1609		X		X																	X				
ZZZZZZ	1.00	1614																									
CCB	1.00	1617		X		X																	X				
ZZZZZZ	1.00	1621																									
ZZZZZZ	1.00	1624																									
ZZZZZZ	1.00	1633																									
ZZZZZZ	1.00	1639																									
ZZZZZZ	1.00	1642																									

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Barium	0.0997	0.1000	100		90 - 110	M	10/1/2019	10:51	A100119 08
	Calcium	1.0748	1.0000	107		90 - 110	M	10/1/2019	10:51	A100119 08
	Iron	0.9392	1.0000	94		90 - 110	M	10/1/2019	10:51	A100119 08
	Magnesium	1.0185	1.0000	102		90 - 110	M	10/1/2019	10:51	A100119 08
	Manganese	0.1079	0.1000	108		90 - 110	M	10/1/2019	10:51	A100119 08
	Potassium	1.0328	1.0000	103		90 - 110	M	10/1/2019	10:51	A100119 08
	Selenium	0.0906	0.1000	91		90 - 110	M	10/1/2019	10:51	A100119 08
	Zinc	0.1028	0.1000	103		90 - 110	M	10/1/2019	10:51	A100119 08
ICV										
	Aluminum	0.1016	0.1000	102		90 - 110	M	10/1/2019	13:23	A100119A 1
	Arsenic	0.0992	0.1000	99		90 - 110	M	10/1/2019	13:23	A100119A 1
	Sodium	1.0067	1.0000	101		90 - 110	M	10/1/2019	13:23	A100119A 1
LLICV										
	Aluminum	0.0757	0.0800	95		80 - 120	M	10/1/2019	13:33	A100119A 1
	Arsenic	0.0034	0.0030	113		80 - 120	M	10/1/2019	13:33	A100119A 1
	Sodium	0.0915	0.1000	92		80 - 120	M	10/1/2019	13:33	A100119A 1
CCV										
	Aluminum	0.1007	0.1000	101		90 - 110	M	10/1/2019	14:17	A100119A 1
	Arsenic	0.1040	0.1000	104		90 - 110	M	10/1/2019	14:17	A100119A 1
	Sodium	0.9942	1.0000	99		90 - 110	M	10/1/2019	14:17	A100119A 1
CCV										
	Aluminum	0.0937	0.1000	94		90 - 110	M	10/1/2019	16:09	A100119A 1
	Arsenic	0.0985	0.1000	98		90 - 110	M	10/1/2019	16:09	A100119A 1
	Sodium	1.0403	1.0000	104		90 - 110	M	10/1/2019	16:09	A100119A 1

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
ICB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	13:30	A100119A 131
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	13:30	A100119A 131
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	13:30	A100119A 131
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	14:48	A100119A 131
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	14:48	A100119A 131
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/1/2019	14:48	A100119A 131
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/1/2019	16:17	A100119A 131
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/1/2019	16:17	A100119A 131
	Sodium	0.0749	J	0.081	0.0370	0.1000	M	10/1/2019	16:17	A100119A 131

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100919D 122

Start Date: 10/9/2019 End Date: 10/9/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1228																									
BLK	1.00	1231		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
STANDARD 5	1.00	1235		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ICV	1.00	1238		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ZZZZZZ	1.00	1241																									
ICB	1.00	1244		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
LLICV	1.00	1248		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ICSA	1.00	1251		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ICSAB	1.00	1254		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ZZZZZZ	1.00	1257																									
ZZZZZZ	1.00	1317																									
MB for HBN 547022 [	1.00	1321		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
LCS for HBN 547022 [	1.00	1324		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
03MW02-20190923	1.00	1327		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
03MW02-20190923S	1.00	1330		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
03MW02-20190923SD	1.00	1334		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ZZZZZZ	1.00	1337																									
ZZZZZZ	1.00	1350																									
CCV	1.00	1353		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
CCB	1.00	1357		X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	
ZZZZZZ	1.00	1405																									
ZZZZZZ	1.00	1408																									
ZZZZZZ	1.00	1411																									
ZZZZZZ	10.00	1415																									
ZZZZZZ	10.00	1418																									
ZZZZZZ	10.00	1421																									
ZZZZZZ	10.00	1424																									
ZZZZZZ	10.00	1428																									
ZZZZZZ	10.00	1431																									
ZZZZZZ	10.00	1434																									
ZZZZZZ	1.00	1437																									
ZZZZZZ	1.00	1441																									
ZZZZZZ	10.00	1444																									
ZZZZZZ	10.00	1447																									
ZZZZZZ	10.00	1451																									
ZZZZZZ	10.00	1454																									

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Aluminum	0.0999	0.1000	100		90 - 110	M	10/9/2019	12:38	A100919D 1
	Arsenic	0.1055	0.1000	106		90 - 110	M	10/9/2019	12:38	A100919D 1
	Barium	0.1027	0.1000	103		90 - 110	M	10/9/2019	12:38	A100919D 1
	Beryllium	0.1027	0.1000	103		90 - 110	M	10/9/2019	12:38	A100919D 1
	Cadmium	0.1056	0.1000	106		90 - 110	M	10/9/2019	12:38	A100919D 1
	Calcium	1.0288	1.0000	103		90 - 110	M	10/9/2019	12:38	A100919D 1
	Chromium	0.0952	0.1000	95		90 - 110	M	10/9/2019	12:38	A100919D 1
	Cobalt	0.1096	0.1000	110		90 - 110	M	10/9/2019	12:38	A100919D 1
	Copper	0.1045	0.1000	104		90 - 110	M	10/9/2019	12:38	A100919D 1
	Iron	1.0766	1.0000	108		90 - 110	M	10/9/2019	12:38	A100919D 1
	Lead	0.1068	0.1000	107		90 - 110	M	10/9/2019	12:38	A100919D 1
	Magnesium	1.0525	1.0000	105		90 - 110	M	10/9/2019	12:38	A100919D 1
	Nickel	0.1045	0.1000	104		90 - 110	M	10/9/2019	12:38	A100919D 1
	Potassium	1.0279	1.0000	103		90 - 110	M	10/9/2019	12:38	A100919D 1
	Selenium	0.1014	0.1000	101		90 - 110	M	10/9/2019	12:38	A100919D 1
	Silver	0.1038	0.1000	104		90 - 110	M	10/9/2019	12:38	A100919D 1
	Thallium	0.1062	0.1000	106		90 - 110	M	10/9/2019	12:38	A100919D 1
	Vanadium	0.0929	0.1000	93		90 - 110	M	10/9/2019	12:38	A100919D 1
	Zinc	0.1055	0.1000	106		90 - 110	M	10/9/2019	12:38	A100919D 1

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
LLICV										
	Aluminum	0.0692	0.0800	86		80 - 120	M	10/9/2019	12:48	A100919D 1
	Arsenic	0.0029	0.0030	97		80 - 120	M	10/9/2019	12:48	A100919D 1
	Barium	0.0050	0.0050	100		80 - 120	M	10/9/2019	12:48	A100919D 1
	Beryllium	0.0010	0.0010	100		80 - 120	M	10/9/2019	12:48	A100919D 1
	Cadmium	0.0012	0.0010	120		80 - 120	M	10/9/2019	12:48	A100919D 1
	Calcium	0.0891	0.1000	89		80 - 120	M	10/9/2019	12:48	A100919D 1
	Chromium	0.0018	0.0020	90		80 - 120	M	10/9/2019	12:48	A100919D 1
	Cobalt	0.0050	0.0050	100		80 - 120	M	10/9/2019	12:48	A100919D 1
	Copper	0.0048	0.0050	96		80 - 120	M	10/9/2019	12:48	A100919D 1
	Iron	0.0489	0.0500	98		80 - 120	M	10/9/2019	12:48	A100919D 1
	Lead	0.0021	0.0020	105		80 - 120	M	10/9/2019	12:48	A100919D 1
	Magnesium	0.1017	0.1000	102		80 - 120	M	10/9/2019	12:48	A100919D 1
	Nickel	0.0046	0.0050	92		80 - 120	M	10/9/2019	12:48	A100919D 1
	Potassium	0.0977	0.1000	98		80 - 120	M	10/9/2019	12:48	A100919D 1
	Selenium	0.0055	0.0050	110		80 - 120	M	10/9/2019	12:48	A100919D 1
	Silver	0.0020	0.0020	100		80 - 120	M	10/9/2019	12:48	A100919D 1
	Thallium	0.0010	0.0010	100		80 - 120	M	10/9/2019	12:48	A100919D 1
	Vanadium	0.0019	0.0020	95		80 - 120	M	10/9/2019	12:48	A100919D 1
	Zinc	0.0044	0.0050	88		80 - 120	M	10/9/2019	12:48	A100919D 1

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Aluminum	0.0978	0.1000	98		90 - 110	M	10/9/2019	13:53	A100919D 1
	Arsenic	0.1086	0.1000	109		90 - 110	M	10/9/2019	13:53	A100919D 1
	Barium	0.1024	0.1000	102		90 - 110	M	10/9/2019	13:53	A100919D 1
	Beryllium	0.1042	0.1000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Cadmium	0.1081	0.1000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Calcium	1.0155	1.0000	102		90 - 110	M	10/9/2019	13:53	A100919D 1
	Chromium	0.0955	0.1000	96		90 - 110	M	10/9/2019	13:53	A100919D 1
	Cobalt	0.1090	0.1000	109		90 - 110	M	10/9/2019	13:53	A100919D 1
	Copper	0.1027	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Iron	1.0814	1.0000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Lead	0.1082	0.1000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Magnesium	1.0523	1.0000	105		90 - 110	M	10/9/2019	13:53	A100919D 1
	Nickel	0.1030	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Potassium	1.0353	1.0000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Selenium	0.1040	0.1000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Silver	0.1026	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Thallium	0.1070	0.1000	107		90 - 110	M	10/9/2019	13:53	A100919D 1
	Vanadium	0.0924	0.1000	92		90 - 110	M	10/9/2019	13:53	A100919D 1
	Zinc	0.1028	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
ICV										
	Antimony	0.1082	0.1000	108		90 - 110	M	10/9/2019	16:48	A100919E 1
	Manganese	0.0913	0.1000	91		90 - 110	M	10/9/2019	16:48	A100919E 1
	Sodium	0.9530	1.0000	95		90 - 110	M	10/9/2019	16:48	A100919E 1
LLICV										
	Antimony	0.0022	0.0020	110		80 - 120	M	10/9/2019	16:58	A100919E 1
	Manganese	0.0041	0.0050	82		80 - 120	M	10/9/2019	16:58	A100919E 1
	Sodium	0.0907	0.1000	91		80 - 120	M	10/9/2019	16:58	A100919E 1
CCV										
	Antimony	0.1081	0.1000	108		90 - 110	M	10/9/2019	17:31	A100919E 1
	Manganese	0.0925	0.1000	92		90 - 110	M	10/9/2019	17:31	A100919E 1
	Sodium	0.9544	1.0000	95		90 - 110	M	10/9/2019	17:31	A100919E 1

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
ICB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/9/2019	12:44	A100919D 122
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/9/2019	12:44	A100919D 122
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/9/2019	12:44	A100919D 122
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/9/2019	12:44	A100919D 122
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	12:44	A100919D 122
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	12:44	A100919D 122
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/9/2019	12:44	A100919D 122
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	12:44	A100919D 122
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	12:44	A100919D 122
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	12:44	A100919D 122
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	12:44	A100919D 122
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/9/2019	12:44	A100919D 122
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	12:44	A100919D 122
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	12:44	A100919D 122

ALS ENVIRONMENTAL

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/9/2019	13:57	A100919D 122
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/9/2019	13:57	A100919D 122
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/9/2019	13:57	A100919D 122
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/9/2019	13:57	A100919D 122
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/9/2019	13:57	A100919D 122
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/9/2019	13:57	A100919D 122
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
ICB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	16:55	A100919E 163
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	16:55	A100919E 163
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	16:55	A100919E 163
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	17:34	A100919E 163
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	17:34	A100919E 163
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	17:34	A100919E 163

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ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: AGILENT 7700 ICPMS Method: M Run Number: A100919E 163

Start Date: 10/9/2019 End Date: 10/9/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
ZZZZZZ	1.00	1639																									
BLK	1.00	1642			X												X						X				
STANDARD 5	1.00	1645			X												X						X				
ICV	1.00	1648			X												X						X				
ZZZZZZ	1.00	1652																									
ICB	1.00	1655			X												X						X				
LLICV	1.00	1658			X												X						X				
ICSA	1.00	1701			X												X						X				
ICSAB	1.00	1709			X												X						X				
MB for HBN 547022 [	1.00	1715			X												X						X				
LCS for HBN 547022 [	1.00	1718			X												X						X				
03MW02-20190923	1.00	1721			X												X						X				
03MW02-20190923S	1.00	1725			X												X						X				
03MW02-20190923SD	1.00	1728			X												X						X				
CCV	1.00	1731			X												X						X				
CCB	1.00	1734			X												X						X				
ZZZZZZ	1.00	1804																									
ZZZZZZ	1.00	1807																									
ZZZZZZ	1.00	1810																									
ZZZZZZ	1.00	1814																									
ZZZZZZ	1.00	1817																									
ZZZZZZ	1.00	1820																									
ZZZZZZ	1.00	1824																									
ZZZZZZ	1.00	1827																									
ZZZZZZ	1.00	1830																									
ZZZZZZ	1.00	1833																									
ZZZZZZ	1.00	1837																									
ZZZZZZ	1.00	1840																									
ZZZZZZ	1.00	1843																									
ZZZZZZ	1.00	1852																									
ZZZZZZ	1.00	1856																									
ZZZZZZ	1.00	1903																									
ZZZZZZ	1.00	1906																									
ZZZZZZ	1.00	1910																									
ZZZZZZ	1.00	1913																									
ZZZZZZ	1.00	1916																									

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INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
CCV										
	Aluminum	0.0978	0.1000	98		90 - 110	M	10/9/2019	13:53	A100919D 1
	Arsenic	0.1086	0.1000	109		90 - 110	M	10/9/2019	13:53	A100919D 1
	Barium	0.1024	0.1000	102		90 - 110	M	10/9/2019	13:53	A100919D 1
	Beryllium	0.1042	0.1000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Cadmium	0.1081	0.1000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Calcium	1.0155	1.0000	102		90 - 110	M	10/9/2019	13:53	A100919D 1
	Chromium	0.0955	0.1000	96		90 - 110	M	10/9/2019	13:53	A100919D 1
	Cobalt	0.1090	0.1000	109		90 - 110	M	10/9/2019	13:53	A100919D 1
	Copper	0.1027	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Iron	1.0814	1.0000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Lead	0.1082	0.1000	108		90 - 110	M	10/9/2019	13:53	A100919D 1
	Magnesium	1.0523	1.0000	105		90 - 110	M	10/9/2019	13:53	A100919D 1
	Nickel	0.1030	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Potassium	1.0353	1.0000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Selenium	0.1040	0.1000	104		90 - 110	M	10/9/2019	13:53	A100919D 1
	Silver	0.1026	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
	Thallium	0.1070	0.1000	107		90 - 110	M	10/9/2019	13:53	A100919D 1
	Vanadium	0.0924	0.1000	92		90 - 110	M	10/9/2019	13:53	A100919D 1
	Zinc	0.1028	0.1000	103		90 - 110	M	10/9/2019	13:53	A100919D 1
ICV										
	Antimony	0.1082	0.1000	108		90 - 110	M	10/9/2019	16:48	A100919E 1
	Manganese	0.0913	0.1000	91		90 - 110	M	10/9/2019	16:48	A100919E 1
	Sodium	0.9530	1.0000	95		90 - 110	M	10/9/2019	16:48	A100919E 1
LLICV										
	Antimony	0.0022	0.0020	110		80 - 120	M	10/9/2019	16:58	A100919E 1
	Manganese	0.0041	0.0050	82		80 - 120	M	10/9/2019	16:58	A100919E 1
	Sodium	0.0907	0.1000	91		80 - 120	M	10/9/2019	16:58	A100919E 1
CCV										
	Antimony	0.1081	0.1000	108		90 - 110	M	10/9/2019	17:31	A100919E 1
	Manganese	0.0925	0.1000	92		90 - 110	M	10/9/2019	17:31	A100919E 1
	Sodium	0.9544	1.0000	95		90 - 110	M	10/9/2019	17:31	A100919E 1

ALS ENVIRONMENTAL

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INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
CCB										
	Aluminum	0.0800	U	0.066	0.0300	0.0800	M	10/9/2019	13:57	A100919D 122
	Arsenic	0.0030	U	0.0022	0.0010	0.0030	M	10/9/2019	13:57	A100919D 122
	Barium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Beryllium	0.001000	U	0.00066	0.000300	0.001000	M	10/9/2019	13:57	A100919D 122
	Cadmium	0.0010	U	0.00088	0.0004	0.0010	M	10/9/2019	13:57	A100919D 122
	Calcium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Chromium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Cobalt	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Copper	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Iron	0.0500	U	0.042	0.0190	0.0500	M	10/9/2019	13:57	A100919D 122
	Lead	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Magnesium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Nickel	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Potassium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	13:57	A100919D 122
	Selenium	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
	Silver	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Thallium	0.0010	U	0.00066	0.0003	0.0010	M	10/9/2019	13:57	A100919D 122
	Vanadium	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	13:57	A100919D 122
	Zinc	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	13:57	A100919D 122
ICB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	16:55	A100919E 163
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	16:55	A100919E 163
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	16:55	A100919E 163
CCB										
	Antimony	0.0020	U	0.0015	0.0007	0.0020	M	10/9/2019	17:34	A100919E 163
	Manganese	0.0050	U	0.0042	0.0019	0.0050	M	10/9/2019	17:34	A100919E 163
	Sodium	0.1000	U	0.081	0.0370	0.1000	M	10/9/2019	17:34	A100919E 163

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SAMPLE PREPARATION SUMMARY

Client: Earth Toxics Inc.

SDG No.: EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS

Method: MS

Case No.: WE04 **SAS No.:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number:	545244						
3019442	MB for HBN 545244 [MDIG/8015	MB	QC-WAT	9/29/19	45.0	50.0	
3019443	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3019444	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3059732002	RB02-20190920	SAM	WATER	9/29/19	45.0	50.0	
3019442	MB for HBN 545244 [MDIG/8015	MB	QC-WAT	9/29/19	45.0	50.0	
3019444	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3059732002	RB02-20190920	SAM	WATER	9/29/19	45.0	50.0	
3019444	LCS for HBN 545244 [MDIG/8015	LCS	QC-WAT	9/29/19	45.0	50.0	
3059732002	RB02-20190920	SAM	WATER	9/29/19	45.0	50.0	

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PREPARATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result (mg/L)	Conc Qual	Q	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
3019442			**QC-WATER**								
	Aluminum	0.0889	U		0.044	0.0300	0.0889	M	10/1/2019	09:17	A100119 0821 1
	Antimony	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Arsenic	0.00333	U		0.0017	0.00100	0.00333	M	10/1/2019	01:23	A093019E 0010
	Barium	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	09:17	A100119 0821 1
	Beryllium	0.001111	U		0.0006	0.000300	0.001111	M	10/1/2019	01:23	A093019E 0010
	Cadmium	0.00111	U		0.0006	0.00037	0.00111	M	10/1/2019	01:23	A093019E 0010
	Calcium	0.1111	U		0.056	0.0370	0.1111	M	10/1/2019	09:17	A100119 0821 1
	Chromium	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Cobalt	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Copper	0.00556	U		0.0028	0.00185	0.00556	M	10/1/2019	01:23	A093019E 0010
	Iron	0.05556	U		0.028	0.01900	0.05556	M	10/1/2019	01:23	A093019E 0010
	Lead	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Magnesium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	01:23	A093019E 0010
	Manganese	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Nickel	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Potassium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	09:17	A100119 0821 1
	Selenium	0.00556	U		0.0028	0.00190	0.00556	M	10/1/2019	01:23	A093019E 0010
	Silver	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Sodium	0.11111	U		0.056	0.03700	0.11111	M	10/1/2019	01:23	A093019E 0010
	Thallium	0.00111	U		0.0006	0.00030	0.00111	M	10/1/2019	01:23	A093019E 0010
	Vanadium	0.00222	U		0.0011	0.00074	0.00222	M	10/1/2019	01:23	A093019E 0010
	Zinc	0.00221	J		0.0028	0.00185	0.00556	M	10/1/2019	09:17	A100119 0821 1

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3019443									
	Aluminum	mg/L	2.2220	2.2315		100		84 - 117	M
	Antimony	mg/L	0.2220	0.2184		98		85 - 117	M
	Arsenic	mg/L	0.2220	0.2207		99		84 - 116	M
	Barium	mg/L	2.2220	1.9983		90		86 - 114	M
	Beryllium	mg/L	0.2220	0.2141		96		83 - 121	M
	Cadmium	mg/L	0.2220	0.2132		96		87 - 115	M
	Calcium	mg/L	2.2220	2.2808		103		87 - 118	M
	Chromium	mg/L	0.2220	0.2197		99		85 - 116	M
	Cobalt	mg/L	0.2220	0.2175		98		86 - 115	M
	Copper	mg/L	0.2220	0.2241		101		85 - 118	M
	Iron	mg/L	2.2220	2.2876		103		87 - 118	M
	Lead	mg/L	0.2220	0.2162		97		88 - 115	M
	Magnesium	mg/L	2.2220	2.1453		97		83 - 118	M
	Manganese	mg/L	0.2220	0.2238		101		87 - 115	M
	Nickel	mg/L	0.2220	0.2215		100		85 - 117	M
	Potassium	mg/L	2.2220	2.2148		100		87 - 115	M
	Selenium	mg/L	0.2220	0.2323		105		80 - 120	M
	Silver	mg/L	0.1110	0.1033		93		85 - 116	M
	Sodium	mg/L	2.2220	2.3677		107		85 - 117	M
	Thallium	mg/L	0.2220	0.2141		96		82 - 116	M
	Vanadium	mg/L	0.2220	0.2203		99		86 - 115	M
	Zinc	mg/L	0.2220	0.2189		99		83 - 119	M

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3019444									
	Aluminum	mg/L	2.2220	2.1771		98		84 - 117	M
	Antimony	mg/L	0.2220	0.2239		101		85 - 117	M
	Arsenic	mg/L	0.2220	0.2388		108		84 - 116	M
	Barium	mg/L	2.2220	2.1021		95		86 - 114	M
	Beryllium	mg/L	0.2220	0.2087		94		83 - 121	M
	Cadmium	mg/L	0.2220	0.2171		98		87 - 115	M
	Calcium	mg/L	2.2220	2.3806		107		87 - 118	M
	Chromium	mg/L	0.2220	0.2129		96		85 - 116	M
	Cobalt	mg/L	0.2220	0.2097		94		86 - 115	M
	Copper	mg/L	0.2220	0.2148		97		85 - 118	M
	Iron	mg/L	2.2220	1.9898		90		87 - 118	M
	Lead	mg/L	0.2220	0.2209		100		88 - 115	M
	Magnesium	mg/L	2.2220	1.9232		87		83 - 118	M
	Manganese	mg/L	0.2220	0.2158		97		87 - 115	M
	Nickel	mg/L	0.2220	0.2148		97		85 - 117	M
	Potassium	mg/L	2.2220	2.2493		101		87 - 115	M
	Selenium	mg/L	0.2220	0.2404		108		80 - 120	M
	Silver	mg/L	0.1110	0.1050		95		85 - 116	M
	Sodium	mg/L	2.2220	1.9178		86		85 - 117	M
	Thallium	mg/L	0.2220	0.2185		98		82 - 116	M
	Vanadium	mg/L	0.2220	0.2131		96		86 - 115	M
	Zinc	mg/L	0.2220	0.2248		101		83 - 119	M

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SAMPLE PREPARATION SUMMARY

Client: Earth Toxics Inc.

SDG No.: EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS

Method: MS

Case No.: WE04 **SAS No.:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number:	547022						
3023073	MB for HBN 547022 [MDIG/8025	MB	QC-WAT	10/4/19	45.0	50.0	
3023074	LCS for HBN 547022 [MDIG/8025	LCS	QC-WAT	10/4/19	45.0	50.0	
3059732003	03MW02-20190923	SAM	WATER	10/4/19	45.0	50.0	
3059732003S	03MW02-20190923S	MS	WATER	10/4/19	45.0	50.0	
3059732003SD	03MW02-20190923SD	MSD	WATER	10/4/19	45.0	50.0	
3059732003	03MW02-20190923	SAM	WATER	10/4/19	45.0	50.0	

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PREPARATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result (mg/L)	Conc Qual	Q	QC Criteria	MDL	CRQL	M	Analysis Date	Analysis Time	Run
3023073			**QC-WATER**								
	Aluminum	0.0889	U		0.044	0.0300	0.0889	M	10/9/2019	13:21	A100919D 1228
	Antimony	0.00222	U		0.0011	0.00074	0.00222	M	10/9/2019	17:15	A100919E 1639
	Arsenic	0.00333	U		0.0017	0.00100	0.00333	M	10/9/2019	13:21	A100919D 1228
	Barium	0.00556	U		0.0028	0.00190	0.00556	M	10/9/2019	13:21	A100919D 1228
	Beryllium	0.001111	U		0.0006	0.000300	0.001111	M	10/9/2019	13:21	A100919D 1228
	Cadmium	0.00111	U		0.0006	0.00037	0.00111	M	10/9/2019	13:21	A100919D 1228
	Calcium	0.1111	U		0.056	0.0370	0.1111	M	10/9/2019	13:21	A100919D 1228
	Chromium	0.00222	U		0.0011	0.00074	0.00222	M	10/9/2019	13:21	A100919D 1228
	Cobalt	0.00556	U		0.0028	0.00190	0.00556	M	10/9/2019	13:21	A100919D 1228
	Copper	0.00556	U		0.0028	0.00185	0.00556	M	10/9/2019	13:21	A100919D 1228
	Iron	0.05556	U		0.028	0.01900	0.05556	M	10/9/2019	13:21	A100919D 1228
	Lead	0.00222	U		0.0011	0.00074	0.00222	M	10/9/2019	13:21	A100919D 1228
	Magnesium	0.11111	U		0.056	0.03700	0.11111	M	10/9/2019	13:21	A100919D 1228
	Manganese	0.00198	J		0.0028	0.00190	0.00556	M	10/9/2019	17:15	A100919E 1639
	Nickel	0.00556	U		0.0028	0.00190	0.00556	M	10/9/2019	13:21	A100919D 1228
	Potassium	0.11111	U		0.056	0.03700	0.11111	M	10/9/2019	13:21	A100919D 1228
	Selenium	0.00556	U		0.0028	0.00190	0.00556	M	10/9/2019	13:21	A100919D 1228
	Silver	0.00222	U		0.0011	0.00074	0.00222	M	10/9/2019	13:21	A100919D 1228
	Sodium	0.11111	U		0.056	0.03700	0.11111	M	10/9/2019	17:15	A100919E 1639
	Thallium	0.00111	U		0.0006	0.00030	0.00111	M	10/9/2019	13:21	A100919D 1228
	Vanadium	0.00222	U		0.0011	0.00074	0.00222	M	10/9/2019	13:21	A100919D 1228
	Zinc	0.00206	J		0.0028	0.00185	0.00556	M	10/9/2019	13:21	A100919D 1228

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3023074									
	Aluminum	mg/L	2.2220	2.0529		92		84 - 117	M
	Antimony	mg/L	0.2220	0.2278		103		85 - 117	M
	Arsenic	mg/L	0.2220	0.2199		99		84 - 116	M
	Barium	mg/L	2.2220	2.2986		103		86 - 114	M
	Beryllium	mg/L	0.2220	0.2044		92		83 - 121	M
	Cadmium	mg/L	0.2220	0.2115		95		87 - 115	M
	Calcium	mg/L	2.2220	2.0538		92		87 - 118	M
	Chromium	mg/L	0.2220	0.1931		87		85 - 116	M
	Cobalt	mg/L	0.2220	0.2229		100		86 - 115	M
	Copper	mg/L	0.2220	0.2041		92		85 - 118	M
	Iron	mg/L	2.2220	2.1799		98		87 - 118	M
	Lead	mg/L	0.2220	0.2139		96		88 - 115	M
	Magnesium	mg/L	2.2220	2.1479		97		83 - 118	M
	Manganese	mg/L	0.2220	0.2093		94		87 - 115	M
	Nickel	mg/L	0.2220	0.2035		92		85 - 117	M
	Potassium	mg/L	2.2220	2.0807		94		87 - 115	M
	Selenium	mg/L	0.2220	0.2129		96		80 - 120	M
	Silver	mg/L	0.1110	0.1007		91		85 - 116	M
	Sodium	mg/L	2.2220	2.1106		95		85 - 117	M
	Thallium	mg/L	0.2220	0.2100		95		82 - 116	M
	Vanadium	mg/L	0.2220	0.2058		93		86 - 115	M
	Zinc	mg/L	0.2220	0.2080		94		83 - 119	M

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSA									
	Antimony	0.0002				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Arsenic	0.0001				-0.00600 - -0.00600	10/1/2019	00:54	A093019E 00
	Beryllium	0.00000				-0.002000 - -0.002000	10/1/2019	00:54	A093019E 00
	Cadmium	0.0011				-0.00200 - -0.00200	10/1/2019	00:54	A093019E 00
	Chromium	0.0001				-0.00800 - -0.00800	10/1/2019	00:54	A093019E 00
	Cobalt	0.0005				-0.01200 - -0.01200	10/1/2019	00:54	A093019E 00
	Copper	0.0014				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Iron	103.0466	100.00000	103		80 - 120%	10/1/2019	00:54	A093019E 00
	Lead	0.0001				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Magnesium	91.0674	100.00000	91		80 - 120%	10/1/2019	00:54	A093019E 00
	Manganese	0.0012				-0.02000 - -0.02000	10/1/2019	00:54	A093019E 00
	Nickel	0.0010				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Selenium	0.0001				-0.01000 - -0.01000	10/1/2019	00:54	A093019E 00
	Silver	0.0000				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00
	Sodium	91.2743	100.00000	91		80 - 120%	10/1/2019	00:54	A093019E 00
	Thallium	0.00004				-0.002000 - -0.002000	10/1/2019	00:54	A093019E 00
	Vanadium	0.0000				-0.00400 - -0.00400	10/1/2019	00:54	A093019E 00

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSAB									
	Antimony	0.0004				-0.00200 - -0.00200	10/1/2019	00:57	A093019E 00
	Arsenic	0.0207	0.02000	104		80 - 120%	10/1/2019	00:57	A093019E 00
	Beryllium	0.00000				-0.001000 - -0.001000	10/1/2019	00:57	A093019E 00
	Cadmium	0.0103	0.01000	103		80 - 120%	10/1/2019	00:57	A093019E 00
	Chromium	0.0181	0.02000	90		80 - 120%	10/1/2019	00:57	A093019E 00
	Cobalt	0.0350	0.04000	88		80 - 120%	10/1/2019	00:57	A093019E 00
	Copper	0.0182	0.02000	91		80 - 120%	10/1/2019	00:57	A093019E 00
	Iron	102.9018	100.00000	103		80 - 120%	10/1/2019	00:57	A093019E 00
	Lead	0.0001				-0.00200 - -0.00200	10/1/2019	00:57	A093019E 00
	Magnesium	94.6175	100.00000	95		80 - 120%	10/1/2019	00:57	A093019E 00
	Manganese	0.0196	0.02000	98		80 - 120%	10/1/2019	00:57	A093019E 00
	Nickel	0.0349	0.04000	87		80 - 120%	10/1/2019	00:57	A093019E 00
	Selenium	0.0197	0.02000	98		80 - 120%	10/1/2019	00:57	A093019E 00
	Silver	0.0189	0.02000	94		80 - 120%	10/1/2019	00:57	A093019E 00
	Sodium	94.3258	100.00000	94		80 - 120%	10/1/2019	00:57	A093019E 00
	Thallium	-0.00002				-0.001000 - -0.001000	10/1/2019	00:57	A093019E 00
	Vanadium	0.0370	0.04000	92		80 - 120%	10/1/2019	00:57	A093019E 00
ICSA									
	Aluminum	88.0	100.0000	88		80 - 120%	10/1/2019	08:48	A100119 0821
	Barium	0.0005				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821
	Calcium	81.5	100.0000	82		80 - 120%	10/1/2019	08:48	A100119 0821
	Iron	91.6537	100.00000	92		80 - 120%	10/1/2019	08:48	A100119 0821
	Magnesium	91.4438	100.00000	91		80 - 120%	10/1/2019	08:48	A100119 0821
	Manganese	0.0012				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821
	Potassium	94.9676	100.00000	95		80 - 120%	10/1/2019	08:48	A100119 0821
	Selenium	0.0002				-0.01000 - -0.01000	10/1/2019	08:48	A100119 0821
	Zinc	0.0016				-0.02000 - -0.02000	10/1/2019	08:48	A100119 0821

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSAB									
	Aluminum	91.6	100.0000	92		80 - 120%	10/1/2019	08:52	A100119 0821
	Barium	0.0007				-0.00500 - -0.00500	10/1/2019	08:52	A100119 0821
	Calcium	85.5	100.0000	86		80 - 120%	10/1/2019	08:52	A100119 0821
	Iron	96.6882	100.00000	97		80 - 120%	10/1/2019	08:52	A100119 0821
	Magnesium	87.4889	100.00000	87		80 - 120%	10/1/2019	08:52	A100119 0821
	Manganese	0.0197	0.02000	98		80 - 120%	10/1/2019	08:52	A100119 0821
	Potassium	91.1853	100.00000	91		80 - 120%	10/1/2019	08:52	A100119 0821
	Selenium	0.0194	0.02000	97		80 - 120%	10/1/2019	08:52	A100119 0821
	Zinc	0.0181	0.02000	90		80 - 120%	10/1/2019	08:52	A100119 0821
ICSA									
	Aluminum	81.4	100.0000	81		80 - 120%	10/1/2019	13:37	A100119A 13
	Arsenic	0.0001				-0.00600 - -0.00600	10/1/2019	13:37	A100119A 13
	Sodium	88.4741	100.00000	88		80 - 120%	10/1/2019	13:37	A100119A 13
ICSAB									
	Aluminum	88.7	100.0000	89		80 - 120%	10/1/2019	13:40	A100119A 13
	Arsenic	0.0191	0.02000	96		80 - 120%	10/1/2019	13:40	A100119A 13
	Sodium	89.8256	100.00000	90		80 - 120%	10/1/2019	13:40	A100119A 13

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSA									
	Aluminum	88.0	100.0000	88		80 - 120%	10/9/2019	12:51	A100919D 12
	Arsenic	0.0002				-0.00600 - -0.00600	10/9/2019	12:51	A100919D 12
	Barium	0.0004				-0.02000 - -0.02000	10/9/2019	12:51	A100919D 12
	Beryllium	0.00000				-0.002000 - -0.002000	10/9/2019	12:51	A100919D 12
	Cadmium	0.0012				-0.00200 - -0.00200	10/9/2019	12:51	A100919D 12
	Calcium	91.1	100.0000	91		80 - 120%	10/9/2019	12:51	A100919D 12
	Chromium	0.0004				-0.00800 - -0.00800	10/9/2019	12:51	A100919D 12
	Cobalt	0.0006				-0.01200 - -0.01200	10/9/2019	12:51	A100919D 12
	Copper	0.0015				-0.01000 - -0.01000	10/9/2019	12:51	A100919D 12
	Iron	108.3546	100.00000	108		80 - 120%	10/9/2019	12:51	A100919D 12
	Lead	0.0001				-0.00400 - -0.00400	10/9/2019	12:51	A100919D 12
	Magnesium	102.0680	100.00000	102		80 - 120%	10/9/2019	12:51	A100919D 12
	Nickel	0.0011				-0.01000 - -0.01000	10/9/2019	12:51	A100919D 12
	Potassium	103.0438	100.00000	103		80 - 120%	10/9/2019	12:51	A100919D 12
	Selenium	0.0002				-0.01000 - -0.01000	10/9/2019	12:51	A100919D 12
	Silver	0.0000				-0.00400 - -0.00400	10/9/2019	12:51	A100919D 12
	Thallium	0.00005				-0.002000 - -0.002000	10/9/2019	12:51	A100919D 12
	Vanadium	0.0000				-0.00400 - -0.00400	10/9/2019	12:51	A100919D 12
	Zinc	0.0023				-0.02000 - -0.02000	10/9/2019	12:51	A100919D 12

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INTERFERENCE CHECK SAMPLE

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

ICS Source: Inorganic Ventures **Instrument ID:** AGILENT 7700 ICPMS

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	Analysis Date	Analysis Time	Run Number
ICSAB									
	Aluminum	92.0	100.0000	92		80 - 120%	10/9/2019	12:54	A100919D 12
	Arsenic	0.0192	0.02000	96		80 - 120%	10/9/2019	12:54	A100919D 12
	Barium	0.0006				-0.00500 - -0.00500	10/9/2019	12:54	A100919D 12
	Beryllium	0.00000				-0.001000 - -0.001000	10/9/2019	12:54	A100919D 12
	Cadmium	0.0109	0.01000	109		80 - 120%	10/9/2019	12:54	A100919D 12
	Calcium	95.4	100.0000	95		80 - 120%	10/9/2019	12:54	A100919D 12
	Chromium	0.0170	0.02000	85		80 - 120%	10/9/2019	12:54	A100919D 12
	Cobalt	0.0379	0.04000	95		80 - 120%	10/9/2019	12:54	A100919D 12
	Copper	0.0184	0.02000	92		80 - 120%	10/9/2019	12:54	A100919D 12
	Iron	109.1188	100.00000	109		80 - 120%	10/9/2019	12:54	A100919D 12
	Lead	0.0001				-0.00200 - -0.00200	10/9/2019	12:54	A100919D 12
	Magnesium	101.1055	100.00000	101		80 - 120%	10/9/2019	12:54	A100919D 12
	Nickel	0.0353	0.04000	88		80 - 120%	10/9/2019	12:54	A100919D 12
	Potassium	103.3261	100.00000	103		80 - 120%	10/9/2019	12:54	A100919D 12
	Selenium	0.0201	0.02000	100		80 - 120%	10/9/2019	12:54	A100919D 12
	Silver	0.0190	0.02000	95		80 - 120%	10/9/2019	12:54	A100919D 12
	Thallium	-0.00001				-0.001000 - -0.001000	10/9/2019	12:54	A100919D 12
	Vanadium	0.0336	0.04000	84		80 - 120%	10/9/2019	12:54	A100919D 12
	Zinc	0.0197	0.02000	98		80 - 120%	10/9/2019	12:54	A100919D 12
ICSA									
	Antimony	0.0003				-0.00400 - -0.00400	10/9/2019	17:01	A100919E 16
	Manganese	0.0011				-0.02000 - -0.02000	10/9/2019	17:01	A100919E 16
	Sodium	87.8435	100.00000	88		80 - 120%	10/9/2019	17:01	A100919E 16
ICSAB									
	Antimony	0.0005				-0.00200 - -0.00200	10/9/2019	17:09	A100919E 16
	Manganese	0.0161	0.02000	80		80 - 120%	10/9/2019	17:09	A100919E 16
	Sodium	88.0765	100.00000	88		80 - 120%	10/9/2019	17:09	A100919E 16

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MATRIX SPIKE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003 **Client ID:** 03MW02-20190923S **LIMS ID:** 3023084

Percent Solids for Sample: 0.00 **Spiked ID:** 3059732003S **Percent Solids for Spike Sample:** 0.00

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Aluminum	mg/L	84 - 117	2.08		0.09	U	2.222	94		M
Antimony	mg/L	85 - 117	0.23		0.00		0.222	104		M
Arsenic	mg/L	84 - 116	0.225		0.001		0.222	101		M
Barium	mg/L	86 - 114	2.471		0.119		2.222	106		M
Beryllium	mg/L	83 - 121	0.21250		0.00111	U	0.22222	96		M
Cadmium	mg/L	87 - 115	0.213		0.000		0.222	96		M
Calcium	mg/L	87 - 118	15.54		13.27		2.22	102		M
Chromium	mg/L	85 - 116	0.202		0.001		0.222	91		M
Cobalt	mg/L	86 - 115	0.233		0.006	U	0.222	105		M
Copper	mg/L	85 - 118	0.215		0.006	U	0.222	97		M
Iron	mg/L	87 - 118	2.178		0.028		2.222	97		M
Lead	mg/L	88 - 115	0.217		0.001		0.222	97		M
Magnesium	mg/L	83 - 118	7.059		4.899		2.222	97		M
Manganese	mg/L	87 - 115	0.214		0.003		0.222	95		M
Nickel	mg/L	85 - 117	0.218		0.004		0.222	96		M
Potassium	mg/L	87 - 115	2.762		0.739		2.222	91		M
Selenium	mg/L	80 - 120	0.219		0.006	U	0.222	99		M
Silver	mg/L	85 - 116	0.103		0.002	U	0.111	93		M
Sodium	mg/L	85 - 117	9.959		8.065		2.222	85		M
Thallium	mg/L	82 - 116	0.2136		0.0011	U	0.2222	96		M
Vanadium	mg/L	86 - 115	0.213		0.002	U	0.222	96		M
Zinc	mg/L	83 - 119	0.219		0.017		0.222	91		M

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MATRIX SPIKE DUPLICATE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003 **Client ID:** 03MW02-20190923SD **LIMS ID:** 3023085

Percent Solids for Sample: 0.00 **Spiked ID:** 3059732003SD **Percent Solids for Spike Sample:** 0.00

Analyte	Units	Acceptance Limit %R	MSD Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Aluminum	mg/L	84 - 117	2.05		0.09	U	2.222	92		M
Antimony	mg/L	85 - 117	0.24		0.00		0.222	108		M
Arsenic	mg/L	84 - 116	0.230		0.001		0.222	103		M
Barium	mg/L	86 - 114	2.503		0.119		2.222	107		M
Beryllium	mg/L	83 - 121	0.21217		0.00111	U	0.22222	95		M
Cadmium	mg/L	87 - 115	0.219		0.000		0.222	99		M
Calcium	mg/L	87 - 118	15.28		13.27		2.22	91		M
Chromium	mg/L	85 - 116	0.215		0.001		0.222	96		M
Cobalt	mg/L	86 - 115	0.219		0.006	U	0.222	99		M
Copper	mg/L	85 - 118	0.207		0.006	U	0.222	93		M
Iron	mg/L	87 - 118	2.211		0.028		2.222	98		M
Lead	mg/L	88 - 115	0.223		0.001		0.222	100		M
Magnesium	mg/L	83 - 118	7.020		4.899		2.222	95		M
Manganese	mg/L	87 - 115	0.217		0.003		0.222	96		M
Nickel	mg/L	85 - 117	0.210		0.004		0.222	93		M
Potassium	mg/L	87 - 115	2.785		0.739		2.222	92		M
Selenium	mg/L	80 - 120	0.229		0.006	U	0.222	103		M
Silver	mg/L	85 - 116	0.104		0.002	U	0.111	94		M
Sodium	mg/L	85 - 117	9.476		8.065		2.222	64	*	M
Thallium	mg/L	82 - 116	0.2211		0.0011	U	0.2222	100		M
Vanadium	mg/L	86 - 115	0.215		0.002	U	0.222	97		M
Zinc	mg/L	83 - 119	0.209		0.017		0.222	86		M

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DUPLICATE SAMPLE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003S **Client ID:** 03MW02-20190923SD **LIMS ID:** 3023085

Percent Solids for Sample: 0.00 **Duplicate ID:** 3059732003SD **Percent Solids for Duplicate:** 0.00

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Aluminum	mg/L	0 - 20	2.08		2.05		1.45		M
Antimony	mg/L	0 - 20	0.23		0.24		4		M
Arsenic	mg/L	0 - 20	0.225		0.230		2		M
Barium	mg/L	0 - 20	2.471		2.503		1		M
Beryllium	mg/L	0 - 20	0.21250		0.21217		0		M
Cadmium	mg/L	0 - 20	0.213		0.219		3		M
Calcium	mg/L	0 - 20	15.54		15.28		2		M
Chromium	mg/L	0 - 20	0.202		0.215		6		M
Cobalt	mg/L	0 - 20	0.233		0.219		6		M
Copper	mg/L	0 - 20	0.215		0.207		4		M
Iron	mg/L	0 - 20	2.178		2.211		2		M
Lead	mg/L	0 - 20	0.217		0.223		3		M
Magnesium	mg/L	0 - 20	7.059		7.020		1		M
Manganese	mg/L	0 - 20	0.214		0.217		1		M
Nickel	mg/L	0 - 20	0.218		0.210		4		M
Potassium	mg/L	0 - 20	2.762		2.785		1		M
Selenium	mg/L	0 - 20	0.219		0.229		4		M
Silver	mg/L	0 - 20	0.103		0.104		1		M
Sodium	mg/L	0 - 20	9.959		9.476		5		M
Thallium	mg/L	0 - 20	0.2136		0.2211		3		M
Vanadium	mg/L	0 - 20	0.213		0.215		1		M
Zinc	mg/L	0 - 20	0.219		0.209		5		M

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-033

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	0010												
BLK	BLK	0013	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	0017	108		105		105		106		112		107	
ICV	ICV	0020	109		106		107		107		113		107	
ICB1	ZZZZZZ	0023												
ICB2	ICB	0026	99		97		97		103		105		98	
LLICV	ZZZZZZ	0030												
LLICV	LLICV	0046	95		94		94		110		102		94	
ICS-A1	ICSA	0054	95		100		120	*	115		112		103	
ICS-AB1	ICSAB	0057	101		103		115		114		116		107	
CHECK	ZZZZZZ	0101												
CHECK	ZZZZZZ	0107												
3019442	MB for HBN 54524	0123												
3019443	LCS for HBN 5452	0126												
3019444	LCS for HBN 5452	0129												
3059461002	ZZZZZZ	0133												
3059461003	ZZZZZZ	0136												
3059461004	ZZZZZZ	0139												
3059461005	ZZZZZZ	0142												
3059461006	ZZZZZZ	0146												
3059461007	ZZZZZZ	0149												
3059461008	ZZZZZZ	0152												
CCV1	CCV	0156	111		109		108		109		116		110	
CCB1	CCB	0159	104		102		101		103		104		103	
3019442	ZZZZZZ	0214												
3019444	ZZZZZZ	0217												
3059461009	ZZZZZZ	0221												
3059732002	RB02-20190920	0224	101		101		100		101		107		102	
3059836021	ZZZZZZ	0227												
3059836022	ZZZZZZ	0231												
3059836023	ZZZZZZ	0234												
3059836024	ZZZZZZ	0237												
3059836025	ZZZZZZ	0240												
3059836026	ZZZZZZ	0244												
CCV2	ZZZZZZ	0247												
CCB2	ZZZZZZ	0250												
CCB3	CCB	0255	100		98		98		100		107		98	
CCV3	ZZZZZZ	0258												
CCV4	CCV	0302	105		104		100		99		103		104	

6020 3015 DoD

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-033

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	0821												
BLK	BLK	0825	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	0828	109		109		109		109		111		106	
ICV	ICV	0831	110		109		106		110		110		109	
ICB1	ZZZZZZ	0835												
ICB2	ICB	0838	104		103		105		102		107		104	
LLICV	LLICV	0841	103		105		106		108		108		104	
ICS-A1	ICSA	0848	95		99		117		108		115		104	
ICS-AB1	ICSAB	0852	99		103		114		115		112		108	
CHECK	ZZZZZZ	0855												
CHECK	ZZZZZZ	0900												
LDR	ZZZZZZ	0903												
LDR	ZZZZZZ	0907												
CHECK	ZZZZZZ	0911												
CHECK	ZZZZZZ	0914												
3019442	MB for HBN 54524	0917												
3019443	LCS for HBN 5452	0920												
3019444	ZZZZZZ	0924												
3059461002	ZZZZZZ	0927												
3059461003	ZZZZZZ	0930												
3059461004	ZZZZZZ	0933												
3059461005	ZZZZZZ	0937												
3059461006	ZZZZZZ	0940												
3059461007	ZZZZZZ	0943												
3059461008	ZZZZZZ	0947												
CCV1	CCV	0950	113		113		109		111		110		113	
CCB1	CCB	0953	109		110		112		108		106		111	
3059461009	ZZZZZZ	0956												
3019444	LCS for HBN 5452	1001												
3059732002	RB02-20190920	1011	99		101		104		102		106		101	
3059836021	ZZZZZZ	1015												
3059836022	ZZZZZZ	1018												
3059836023	ZZZZZZ	1021												
3059836024	ZZZZZZ	1024												
3059836025	ZZZZZZ	1028												
3059836026	ZZZZZZ	1031												
3059836027	ZZZZZZ	1034												
CCV2	ZZZZZZ	1038												
CCB2	ZZZZZZ	1041												
CCB3	CCB	1044	99		101		102		101		107		100	
CCV3	ZZZZZZ	1047												
CCV4	CCV	1051	105		104		103		105		118		105	
3059836028	ZZZZZZ	1057												
3059839029	ZZZZZZ	1100												

6020 3015 DoD

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-033

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/01/2019 End Date: 10/01/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	1313												
BLK	BLK	1317	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	1320	104		104		96		108		108		104	
ICV	ICV	1323	109		107		97		109		108		107	
ICB1	ZZZZZZ	1327												
ICB2	ICB	1330	98		97		97		104		94		99	
LLICV	LLICV	1333	103		101		98		109		105		102	
ICS-A1	ICSA	1337	95		97		111		116		111		103	
ICS-AB1	ICSAB	1340	99		100		105		115		113		106	
CHECK	ZZZZZZ	1343												
CHECK	ZZZZZZ	1346												
LDR	ZZZZZZ	1359												
CHECK	ZZZZZZ	1404												
3019444	LCS for HBN 5452	1407												
3059461009	ZZZZZZ	1410												
3059461002	ZZZZZZ	1414												
CCV1	CCV	1417	112		109		100		110		104		108	
CCB1	CCB	1448	97		97		96		99		90		98	
3059732002	RB02-20190920	1536	93		95		96		101		90		95	
3059836021	ZZZZZZ	1540												
3059836022	ZZZZZZ	1543												
3059836023	ZZZZZZ	1546												
3059836024	ZZZZZZ	1550												
3059836025	ZZZZZZ	1553												
3059836026	ZZZZZZ	1556												
3059836027	ZZZZZZ	1559												
3059836028	ZZZZZZ	1603												
3059839029	ZZZZZZ	1606												
CCV2	CCV	1609	108		106		102		111		108		108	
CCB2	ZZZZZZ	1614												
CCB3	CCB	1617	101		101		100		103		102		102	
3059839030	ZZZZZZ	1621												
3059839031	ZZZZZZ	1624												
3059836026	ZZZZZZ	1633												
CHECK	ZZZZZZ	1639												
CHECK	ZZZZZZ	1642												
CCV3	ZZZZZZ	1646												
CCB4	ZZZZZZ	1649												

6020 3015 DoD

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-033

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/09/2019 End Date: 10/09/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	1228												
BLK	BLK	1231	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	1235	111		107		102		105		104		108	
ICV	ICV	1238	108		106		100		105		103		108	
ICB1	ZZZZZZ	1241												
ICB2	ICB	1244	101		98		100		98		96		100	
LLICV	LLICV	1248	101		100		100		100		99		101	
ICS-A1	ICSA	1251	92		94		110		111		107		101	
ICS-AB1	ICSAB	1254	95		97		105		109		106		103	
CHECK	ZZZZZZ	1257												
CHECK	ZZZZZZ	1317												
3023073	MB for HBN 54702	1321												
3023074	LCS for HBN 5470	1324												
3059732003	03MW02-20190923	1327	102		102		103		102		98		103	
3059732003S	03MW02-20190923S	1330												
3059732003S	03MW02-20190923S	1334												
3059732003P	ZZZZZZ	1337												
CHECK	ZZZZZZ	1350												
CCV1	CCV	1353	103		100		99		101		96		103	
CCB1	CCB	1357	97		96		97		97		92		98	
3017610	ZZZZZZ	1405												
3017611	ZZZZZZ	1408												
3017612	ZZZZZZ	1411												
3059836001	ZZZZZZ	1415												
3059836002	ZZZZZZ	1418												
3059836003	ZZZZZZ	1421												
3059836004	ZZZZZZ	1424												
3059836005	ZZZZZZ	1428												
3059836006	ZZZZZZ	1431												
3059836007	ZZZZZZ	1434												
CCV2	ZZZZZZ	1437												
CCB2	ZZZZZZ	1441												
3059836008	ZZZZZZ	1444												
3059836009	ZZZZZZ	1447												
3059836010	ZZZZZZ	1451												
3059836011	ZZZZZZ	1454												
3059836012	ZZZZZZ	1457												
3059836013	ZZZZZZ	1500												
3059836014	ZZZZZZ	1504												
3059836015	ZZZZZZ	1507												
3059836016	ZZZZZZ	1510												
3059836017	ZZZZZZ	1514												
CCV3	ZZZZZZ	1517												
CCB3	ZZZZZZ	1520												

6020 3015 DoD

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ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY

Lab Name: ALS ENVIRONMENTAL Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 NRAS No.: _____ SDG NO.: EPR-033

ICP-MS Instrument ID: AGILENT 7700 ICPMS Start Date: 10/09/2019 End Date: 10/09/2019

Sample No.	Client ID	Time	Internal Standards %RI For:											
			Element Bi_209	Q	Element In_115	Q	Element Sc_45	Q	Element Sc_45-2	Q	Element Sc_45-3	Q	Element Tb_159	Q
BLK	ZZZZZZ	1639												
BLK	BLK	1642	100		100		100		100		100		100	
STANDARD 5	STANDARD 5	1645	109		105		102		103		109		110	
ICV	ICV	1648	108		105		105		103		106		108	
ICB1	ZZZZZZ	1652												
ICB2	ICB	1655	99		99		89		99		101		101	
LLICV	LLICV	1658	101		100		106		100		106		101	
ICS-A1	ICSA	1701	95		98		116		114		117		104	
ICS-AB1	ICSAB	1709	99		103		116		115		115		111	
3023073	MB for HBN 54702	1715												
3023074	LCS for HBN 5470	1718												
3059732003	03MW02-20190923	1721	108		107		110		105		110		109	
3059732003S	03MW02-20190923S	1725												
3059732003S	03MW02-20190923S	1728												
CCV1	CCV	1731	115		115		109		109		113		117	
CCB1	CCB	1734	107		106		110		106		110		109	
3024752	ZZZZZZ	1804												
3024753	ZZZZZZ	1807												
3024754	ZZZZZZ	1810												
3061491001	ZZZZZZ	1814												
3061491002	ZZZZZZ	1817												
3061491003	ZZZZZZ	1820												
3061491007	ZZZZZZ	1824												
3061491008	ZZZZZZ	1827												
3061491010	ZZZZZZ	1830												
3061495002	ZZZZZZ	1833												
CCV2	ZZZZZZ	1837												
CCB2	ZZZZZZ	1840												
LLCCV	ZZZZZZ	1843												
3061495003	ZZZZZZ	1852												
3061194008	ZZZZZZ	1856												
3061495003	ZZZZZZ	1903												
3061194008	ZZZZZZ	1906												
CCV3	ZZZZZZ	1910												
CCB3	ZZZZZZ	1913												
LLCCV	ZZZZZZ	1916												

Microwave 3015 Prep (Water) (Version 2- 11/12/2015)

Note: All TCLP matrix spikes are spiked prior to preservation as noted in the TCLP logbook.

Batch: 80150	**Queue:** MDIG	**HBN:** 545244	**RULE:** D3015/6020	**ALSI SOP:** 09-3015	
File Name: 80150_190929-215226			**METHOD:** 3015	**Microwave ID:**	

Batch Type:	**Comment Codes:**	**Reagents:**		**Pipettes:**		**Start**	**Finish**
T: TCLP	1. Sample failed initial digestion due to a weight loss >5g	HNO3:	190124005	03-345	**Date:**	09/29/2019	09/29/2019
S: SPLP	2. Sample reacts with reagent	HCL:	180920001	03-306	**Time:**	22:40:00	23:10:00
M: 6020	3. Less sample used due to high metal content	Balance ID:	BAL-11	03-309	**Tech:**	SXC	SXC
W: 6010	4. Less sample used to result in successful microwave digestion				**Reviewed/Approved By:**		
A: ASTM	5. Sample does not digest by microwave, digest by method 3050				**Date:**		

Sample ID	Cont ID	Samp Type	Vessel Initial WT, grams	Vessel Final WT, grams	Difference grams	Spike Amt uL of Each	Spike Lot#	Sample Size, mL	Final Vol mL	Batch Type	Parent Sample ID	Comment Code
3019442		MB	211.152	211.140	0.012			45	50	M		
3019443		LCS	213.669	213.652	0.017	40/50/50/50/50	010/190125008/190	45	50	M		
3019444		LCS	211.161	211.101	0.060	40/50/50/50/50	010/190125008/190	45	50	M		
3059836021	A	S	212.594	212.565	0.029			45	50	M		
3059836022	A	S	212.917	212.880	0.037			45	50	M		
3059836023	A	S	212.746	212.724	0.022			45	50	M		
3059836024	A	S	211.483	211.423	0.060			45	50	M		
3059836025	A	S	213.295	213.252	0.043			45	50	M		
3059836026	A	S	210.262	210.221	0.041			45	50	M		
3059836027	A	S	211.167	211.123	0.044			45	50	M		
3059836028	A	S	213.336	213.309	0.027			45	50	M		
3059836029	A	S	211.593	211.547	0.046			45	50	M		
3059836030	A	S	211.638	211.603	0.035			45	50	M		
3059836031	A	S	214.947	214.882	0.065			45	50	M		
3059461002	C	S	210.193	210.082	0.111			45	50	M		
3059461003	C	S	210.450	210.415	0.035			45	50	M		
3059461004	C	S	212.513	212.468	0.045			45	50	M		
3059461005	C	S	210.485	210.435	0.050			45	50	M		
3059461006	C	S	213.010	212.944	0.066			45	50	M		
3059461007	C	S	211.480	211.437	0.043			45	50	M		
3059461008	C	S	213.973	213.935	0.038			45	50	M		
3059461009	C	S	211.211	211.189	0.022			45	50	M		
3059732002	C	S	211.046	210.021	1.025			45	50	M		

End

Microwave 3015 Prep (Water) (Version 2- 11/12/2015)

Note: All TCLP matrix spikes are spiked prior to preservation as noted in the TCLP logbook.

Batch: 80256	**Queue:** MDIG	**HBN:** 547022	**RULE:** D3015/6020	**ALSI SOP:**	09-3015
File Name: 80256_191004-173001			**METHOD:** 3015	**Microwave ID:**	MWV-1

Batch Type:	**Comment Codes:**	**Reagents:**		**Pipettes:**		**Start**	**Finish**
T: TCLP	1. Sample failed initial digestion due to a weight loss >5g	HNO3:	190124005	03-345	**Date:**	10/04/2019	10/04/2019
S: SPLP	2. Sample reacts with reagent	HCL:	180920001	03-306	**Time:**	17:30:00	18:00:00
M: 6020	3. Less sample used due to high metal content	Balance ID:	BAL-11	03-309	**Tech:**	AHI	AHI
W: 6010	4. Less sample used to result in successful microwave digestion				**Reviewed/Approved By:**		
A: ASTM	5. Sample does not digest by microwave, digest by method 3050				**Date:**		

Sample ID	Cont ID	Samp Type	Vessel Initial WT, grams	Vessel Final WT, grams	Difference grams	Spike Amt uL of Each	Spike Lot#	Sample Size, mL	Final Vol mL	Batch Type	Parent Sample ID	Comment Code
3023073		MB	208.997	208.939	0.058			45	50	M		
3023074		LCS	210.735	210.696	0.039	40/50/50/50/50	010/190125008/190	45	50	M		
3060135001	A	S	211.650	211.613	0.037			45	50	M		
3060135002	A	S	209.230	209.193	0.037			45	50	M		
3060135003	A	S	211.587	211.549	0.038			45	50	M		
3060135004	A	S	208.626	208.551	0.075			45	50	M		
3060135005	A	S	211.885	211.822	0.063			45	50	M		
3060135006	A	S	209.862	209.821	0.041			45	50	M		
3060135007	A	S	209.391	209.341	0.050			45	50	M		
3060135008	A	S	209.838	209.797	0.041			45	50	M		
3060135009	A	S	215.139	215.084	0.055			45	50	M		
3060135010	A	S	210.269	210.235	0.034			45	50	M		
3060135011	A	S	209.142	209.072	0.070			45	50	M		
3060135012	A	S	210.555	210.464	0.091			45	50	M		
3060135013	A	S	211.713	211.645	0.068			45	50	M		
3060135014	A	S	212.858	212.813	0.045			45	50	M		
3060135015	A	S	210.483	210.438	0.045			45	50	M		
3060135016	A	S	211.300	211.103	0.197			45	50	M		
3060135017	A	S	210.701	210.643	0.058			45	50	M		
3060135018	A	S	212.036	211.994	0.042			45	50	M		
3060135019	A	S	209.464	209.421	0.043			45	50	M		
3059732003	G	S	210.243	210.203	0.040			45	50	M		
3023084		MS	210.080	210.023	0.057	40/50/50/50/50	010/190125008/190	45	50	M	3059732003	
3023085		MSD	204.640	204.640	0.000	40/50/50/50/50	010/190125008/190	45	50	M	3059732003	

End

Total Mercury by Method 7470 Summary Forms

ALS ENVIRONMENTAL

7470 DOD
- COVER PAGE -
INORGANIC ANALYSIS DATA PACKAGE

Client: Earth Toxics Inc.

SDG No.: EPR-033 **Method Type:** 7470 DOD **SOW No.:**

Contract: EPR033|Willow Grove **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Lab Sample ID	Client Sample ID	QC Description
3059732002	RB02-20190920	
3059732003	03MW02-20190923	
3059732003S	03MW02-20190923S	Matrix Spike
3059732003SD	03MW02-20190923SD	Matrix Spike Duplicate

Were ICP interelement corrections applied?	Yes/No	Yes	
Were ICP background corrections applied?	Yes/No	Yes	
If yes - were raw data generated before applications of background corrections?	Yes/No	No	

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name: **Matthew Olley**

Date: Title: **Metals Supervisor**

QA Department

Report Generated By Teledyne Leeman QuickTrace

Analyst: ALMDT.NoUser

Worksheet file: C:\Users\Public\Documents\Teledyne CETAC\QuickTrace\Worksheets\092719W.wszf

Creation Date: 9/27/2019 5:29:42 PM

Comment: REVIEWED BY AHI 9/27/19 19:30

APPROVED
By Meghan Pettis at 7:52 am, Sep 30, 2019

Results

Sample Name	Type	Date/Time	Conc (ug/L)	µAbs	Residual	Flags	DF	% Recovery
Calibration Blank	STD	09/27/19 05:38:15 pm	0.000	249	28.44		1.00	N/A
Replicates	249.6	269.6	235.0	242.5				
Standard #1 (0.2 ug/L)	STD	09/27/19 05:39:28 pm	0.200	1939	13.04		1.00	N/A
Replicates	1856.1	1952.0	1931.2	2016.0				
Standard #2 (1 ug/L)	STD	09/27/19 05:40:40 pm	1.000	9461	34.87		1.00	N/A
Replicates	9048.9	9459.7	9604.2	9730.4				
Standard #3 (2 ug/L)	STD	09/27/19 05:41:53 pm	2.000	18217	-8.48		1.00	N/A
Replicates	17369.1	18226.8	18572.3	18699.3				
Standard #4 (4 ug/L)	STD	09/27/19 05:43:06 pm	4.000	35596	-109.70		1.00	N/A
Replicates	33766.9	35592.3	36357.8	36666.8				
Standard #5 (10 ug/L)	STD	09/27/19 05:44:20 pm	10.000	91900	41.83		1.00	N/A
Replicates	87896.0	91805.9	93598.9	94297.4				

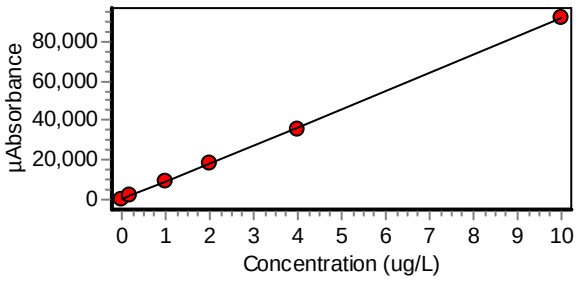
Calibration

Equation: Abs = 9152.784x + -11.125

R2: 0.99978

SEE: 579.7827

Flags:



ICV	ICV	09/27/19 05:45:34 pm	4.170	38114			1.00	104.14
Replicates	36267.3	38133.9	38827.0	39228.9				
ICB	ICB	09/27/19 05:48:03 pm	0.024	204			1.00	N/A
Replicates	211.7	206.0	211.4	188.4				
LL CCV 0.5 ug/L RECOVERED AT93.2% AHI 9/27/19	UNK	09/27/19 05:49:14 pm	0.466	4257			1.00	N/A
Replicates	4119.7	4246.3	4320.9	4341.6				
3018753	UNK	09/27/19 05:50:26 pm	0.012	100			1.00	N/A
Replicates	56.8	126.6	84.0	131.0				
3018754	UNK	09/27/19 05:51:38 pm	1.930	17643			1.00	N/A
Replicates	16850.5	17579.5	17960.0	18183.8				
3059461002	UNK	09/27/19 05:52:49 pm	0.012	97			1.00	N/A
Replicates	132.9	72.9	71.2	112.5				
3059461003	UNK	09/27/19 05:54:01 pm	0.011	91			1.00	N/A
Replicates	34.3	67.5	116.9	144.7				

7470 DOD
14
ANALYSIS RUN LOG

Client: Earth Toxics Inc. Contract: EPR033|Willow Grove Sites 3 a

Lab Code: ALS Case No.: WE04 SAS No.: SDG No.: EPR-033

Instrument ID Number: Cetac Hg Method: CV Run Number: 092719W

Start Date: 9/27/2019 End Date: 9/27/2019

EPA Sample No.	D/F	Time	% R	Analytes																							
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
Calibration Blank	1.00	1738																X									
Standard #1 (0.2 ug	1.00	1739																X									
Standard #2 (1 ug/L	1.00	1740																X									
Standard #3 (2 ug/L	1.00	1741																X									
Standard #4 (4 ug/L	1.00	1743																X									
Standard #5 (10 ug/	1.00	1744																X									
ICV	1.00	1745																X									
ICB	1.00	1748																X									
ZZZZZZ	5.00	1749																									
MB for HBN 544635 [	1.00	1750																X									
LCS for HBN 544635 [	1.00	1751																X									
ZZZZZZ	1.00	1752																									
ZZZZZZ	1.00	1754																									
ZZZZZZ	1.00	1755																									
ZZZZZZ	1.00	1756																									
ZZZZZZ	1.00	1757																									
ZZZZZZ	1.00	1758																									
ZZZZZZ	1.00	1800																									
ZZZZZZ	1.00	1801																									
ZZZZZZ	1.00	1808																									
CCV	1.00	1810																X									
CCB	1.00	1811																X									
ZZZZZZ	1.00	1813																									
RB02-20190920	1.00	1814																X									
03MW02-20190923	1.00	1815																X									
03MW02-20190923S	1.00	1816																X									
03MW02-20190923SD	1.00	1817																X									
ZZZZZZ	1.00	1819																									
ZZZZZZ	1.00	1820																									
ZZZZZZ	5.00	1821																									
CCV	1.00	1822																X									
CCB	1.00	1823																X									
ZZZZZZ	1.00	1825																									
ZZZZZZ	1.00	1826																									
ZZZZZZ	1.00	1827																									
ZZZZZZ	1.00	1828																									

7470 DOD

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Initial Calibration Source: Inorganic Ventures

Continuing Calibration Source: CAS MIXED

Sample ID	Analyte	Result mg/L	True Value mg/L	% Recovery	Q	QC Criteria	M	Analysis Date	Analysis Time	Run Number
ICV										
	Mercury	0.0042	0.004	105		90 - 110	CV	9/27/2019	17:45	092719W
CCV										
	Mercury	0.0036	0.004	90		90 - 110	CV	9/27/2019	18:10	092719W
CCV										
	Mercury	0.0037	0.004	92		90 - 110	CV	9/27/2019	18:22	092719W

7470 DOD

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result mg/L	Conc Qual	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
ICB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	17:48	092719W
CCB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	18:11	092719W
CCB										
	Mercury	0.00050	U	0.00035	0.00016	0.00050	CV	9/27/2019	18:23	092719W

7470 DOD

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SAMPLE PREPARATION SUMMARY

Client: Earth Toxics Inc.

SDG No.: EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS

Method: CV

Case No.: WE04 **SAS No.:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number:	544635						
3018753	MB for HBN 544635 [MDIG/8011	MB	QC-WAT	9/27/19	5.0	5.0	
3018754	LCS for HBN 544635 [MDIG/8011	LCS	QC-WAT	9/27/19	5.0	5.0	
3059732002	RB02-20190920	SAM	WATER	9/27/19	5.0	5.0	
3059732003	03MW02-20190923	SAM	WATER	9/27/19	5.0	5.0	
3059732003S	03MW02-20190923S	MS	WATER	9/27/19	5.0	5.0	
3059732003SD	03MW02-20190923SD	MSD	WATER	9/27/19	5.0	5.0	

7470 DOD
- 3b -
PREPARATION BLANK SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Sample ID	Analyte	Result (mg/L)	Conc Qual	Q	QC Criteria	MDL	PQL	M	Analysis Date	Analysis Time	Run
3018753			**QC-WATER**								
	Mercury	0.000500	U		0.0003	0.000160	0.000500	CV	9/27/2019	17:50	092719W

7470 DOD

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Earth Toxics Inc. **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Aqueous LCS Source: CAS MIXED **Solid LCS Source:**

Sample ID	Analyte	Units	True Value	Result	C	% Recovery	Q	QC Criteria	M
3018754									
	Mercury	mg/L	0.0020	0.0019		95		82 - 119	CV

7470 DOD

- 5a -

MATRIX SPIKE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003 **Client ID:** 03MW02-20190923S **LIMS ID:** 3018756

Percent Solids for Sample: 0.00 **Spiked ID:** 3059732003S **Percent Solids for Spike Sample:** 0.00

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Mercury	mg/L	82 - 119	0.0048		0.0005	U	0.0050	96.00		CV

7470 DOD

- 5a -

MATRIX SPIKE DUPLICATE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003 **Client ID:** 03MW02-20190923SD **LIMS ID:** 3018757

Percent Solids for Sample: 0.00 **Spiked ID:** 3059732003SD **Percent Solids for Spike Sample:** 0.00

Analyte	Units	Acceptance Limit %R	MSD Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Mercury	mg/L	82 - 119	0.0050		0.0005	U	0.0050	100.00		CV

7470 DOD

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DUPLICATE SAMPLE SUMMARY

Client: Earth Toxics Inc. **Level:** Low **SDG No.:** EPR-033

Contract: EPR033|Willow Grove Sites 3 a **Lab Code:** ALS **Case No.:** WE04 **SAS No.:**

Matrix: WATER **Sample ID:** 3059732003S **Client ID:** 03MW02-20190923SD **LIMS ID:** 3018757

Percent Solids for Sample: 0.00 **Duplicate ID:** 3059732003SD **Percent Solids for Duplicate:** 0.00

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Mercury	mg/L	0 - 20	0.0048		0.0050		4.1		CV

Mercury 7470 Prep (Water) rev 11/12/2015

Batch: 80119	**Queue:** MDIG	**HBN:** 544635	**RULE:** D7470PREP	**ALS SOP:**
File Name: 80119_190927-142237				**WaterBath ID:**

Comments:	**Thermometer:**			**Start**
1)	ID:	TH-048	**Date:**	09/27/2019
2)	Starting ºC:	95ºC	**Time:**	12:30:00
3)	Ending ºC:	95ºC	**Tech:**	AHI
4)			**Reviewed/Approved By:**	
5)			**Date:**	

Reagents and Working Standards	Reagent ID	Pipette ID
Intermediate STD: 0.1 mL 1000 ppm to 100mL	MR18785	03-034
Intermediate QC: 0.1 mL 1000 ppm to 100mL	MR18786	03-034
5% KMnO4:	MR18186	
5% K2S2O8:	MR18765	
H2SO4:	190221011	
HNO3:	190321004	
Working STD: 2.5mL Intermediate STD+300uL HNO3 to 100mL	MR18907	GEN-006
Working QC: 2.5mL Intermediate QC+300uL HNO3 to 100mL	MR18908	GEN-006

Calibration and Check Standards	Num
S0(ICB, CCB):# of S0's made:	3
S0.2: 0.200 mL Working Std into 25 mL:	MR18909
S1.0: 1.0 mL Working Std into 25 mL:	MR18910
S2.0: 2.0 mL Working Std into 25 mL:	MR18911
S4.0: 4.0 mL Working Std into 25 mL:	MR18912
S10: 10.0 mL Working Std into 25 mL:	MR18913
CCV: 4.0 mL Working QC into 25 mL:	MR18914
ICV: 4.0 mL Working Std into 25 mL:	MR18915
# of CCV's made:	3

Sample ID	Cont ID	Samp Type	Parent Sample ID	Sample Size, mL	Additional KMnO4, mL	Final Vol mL	Spike Amt mL	Spike Std #	Pipette ID#	Com
3018753		MB		5		5				
3018754		LCS		5		5	0.4	MR1907	GEN-004	
3059461002	C	S		5		5				
3059461003	C	S		5		5				
3059461004	C	S		5		5				
3059461005	C	S		5		5				
3059461006	C	S		5		5				
3059461007	C	S		5		5				
3059461008	C	S		5		5				
3059461009	C	S		5		5				
3059732002	C	S		5		5				
3059732003	G	S		5		5				
3018756		MS	3059732003	5		5	0.025	MR18785	03-034	
3018757		MSD	3059732003	5		5	0.025	MR18785	03-034	
3059836027	A	S		5		5				

VOC CALCULATION	SAMPLE 03MW02-20190923		
TARGET ANALYTE	acetone		
ANALYTE RESPONSE	7995		
INTERNAL STANDARD	fluorobenzene		
I.S. RESPONSE	1899077		
I.S. CONCENTRATION	30	µg/l	
ANALYTE CAL. RF	0.01863		
DILUTION FACTOR (DF)	1		
INITIAL SAMPLE VOLUME - V1	5	ml	
FINAL SAMPLE VOLUME - V2	5	ml	
ON COLUMN AMOUNT	6.779291274	µg/l	
(ANALYTE RESPONSE) x (I.S. CONCENTRATION) X DF x V2	=	**6.78**	**µg/l**
(I.S. RESPONSE) x (CAL. R.F.) x V1	=	**0.00677929**	**mg/l**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

03MW02-20190923

Lab Name: ALS Global Contract: VOMS

Lab Code: VOA Case No.: SAS No.: SDG No.: EPR-033

Matrix (soil/water): WATER Lab Sample ID: 3059732003

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: 719100222.D

Level (low/med): Date Received: 9/24/19

% Moisture: not dec. 100.0 Date Analyzed: 10/2/19

GC Column: RTXVRX ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS No.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
67-64-1	Acetone	6.8	
71-43-2	Benzene	0.75	U
74-97-5	Bromochloromethane	0.75	U
75-27-4	Bromodichloromethane	0.75	U
75-25-2	Bromoform	0.75	U
74-83-9	Bromomethane	0.75	U
78-93-3	2-Butanone	3.8	U
75-15-0	Carbon Disulfide	0.75	U
56-23-5	Carbon Tetrachloride	0.75	U
108-90-7	Chlorobenzene	0.75	U
124-48-1	Chlorodibromomethane	0.75	U
75-00-3	Chloroethane	0.75	U
67-66-3	Chloroform	0.75	U
74-87-3	Chloromethane	0.75	U
110-82-7	Cyclohexane	0.75	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.5	U
106-93-4	1,2-Dibromoethane	0.75	U
95-50-1	1,2-Dichlorobenzene	0.75	U
541-73-1	1,3-Dichlorobenzene	0.75	U
106-46-7	1,4-Dichlorobenzene	0.75	U
75-71-8	Dichlorodifluoromethane	0.75	U
75-34-3	1,1-Dichloroethane	0.75	U
107-06-2	1,2-Dichloroethane	0.75	U
75-35-4	1,1-Dichloroethene	0.75	U
156-59-2	cis-1,2-Dichloroethene	0.75	U
156-60-5	trans-1,2-Dichloroethene	0.75	U
78-87-5	1,2-Dichloropropane	0.75	U
10061-01-5	cis-1,3-Dichloropropene	0.75	U
10061-02-6	trans-1,3-Dichloropropene	0.75	U
123-91-1	1,4-Dioxane	62.5	U
100-41-4	Ethylbenzene	0.75	U
76-13-1	Freon 113	0.75	U
591-78-6	2-Hexanone	3.8	U

ALS Environmental Services

VOLATILE REPORT SW-846 Method 8260

Data file : \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7191002.b\719100222.
Lab Smp Id: 3059732003 Client Smp ID: 02MW02-20190923
Inj Date : 02-OCT-2019 18:10
Operator : TMP Inst ID: ms07.i
Smp Info : 3059732003;;1;;;;;
Misc Info : ZZ VOMS 52501 D8260W
Comment :
Method : \\ALMDTWS014\TargetData\Chem2\ms07.i\7-2019\7191002.b\7-8260b09.
Meth Date : 02-Oct-2019 19:56 pdk Quant Type: ISTD
Cal Date : 02-OCT-2019 13:15 Cal File: 719100209.D
Als bottle: 22
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: DODall.sub
Target Version: 4.14
Processing Host: ALMDTW7047

Concentration Formula: Amt * DF * Uf * 5/Vo * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	1.000	ng unit correction factor
Vo	5.000	Sample Volume purged
DF	1.000	sample dilution factor
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/L)	REVIEW CODE
1 Dichlorodifluoromethane	85	Compound Not Detected.						
2 Chloromethane	50	Compound Not Detected.						
3 Vinyl Chloride	62	Compound Not Detected.						
4 Bromomethane	94	Compound Not Detected.						
5 Chloroethane	64	Compound Not Detected.						
6 Pentane	41	Compound Not Detected.						
7 Trichlorofluoromethane	101	Compound Not Detected.						
8 Dichlorofluoromethane	67	Compound Not Detected.						
9 Ethyl Ether	74	Compound Not Detected.						
10 1,1-Dichloroethene	61	Compound Not Detected.						
12 Carbon Disulfide	76	Compound Not Detected.						
11 Freon 113	101	Compound Not Detected.						
13 Iodomethane	127	Compound Not Detected.						
14 Acrolein	56	Compound Not Detected.						
16 3-Chloro-1-propene	41	Compound Not Detected.						
15 Isopropyl Alcohol	45	2.561	2.561	(0.631)	64027	211.737	211.737	
17 Methylene Chloride	84	Compound Not Detected.						
18 Acetone	58	2.665	2.666	(0.656)	7995	6.78091	6.78091(a)	
19 Methyl acetate	74	Compound Not Detected.						
20 trans-1,2-Dichloroethene	61	Compound Not Detected.						
21 Hexane	57	Compound Not Detected.						

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/L)	REVIEW CODE
22 Methyl t-Butyl Ether	73	Compound Not Detected.						
23 tert.- Butyl Alcohol	59	2.798	2.802	(0.689)	2903	3.72774	3.72774(a)	
24 Acetonitrile	41	Compound Not Detected.						
25 Diisopropyl ether	45	Compound Not Detected.						
26 Chloroprene	53	Compound Not Detected.						
27 1,1-Dichloroethane	63	Compound Not Detected.						
28 Acrylonitrile	53	Compound Not Detected.						
30 n-Propanol	41	Compound Not Detected.						
29 Ethyl tert-butyl ether	59	Compound Not Detected.						
31 Vinyl acetate	86	Compound Not Detected.						
32 cis-1,2-Dichloroethene	61	Compound Not Detected.						
33 2,2-Dichloropropane	77	Compound Not Detected.						
M 100 1,2-Dichloroethene, Total	61	Compound Not Detected.						
34 Bromochloromethane	128	Compound Not Detected.						
35 Cyclohexane	84	Compound Not Detected.						
36 Chloroform	83	Compound Not Detected.						
37 Ethyl acetate	43	Compound Not Detected.						
38 Methyl acrylate	55	Compound Not Detected.						
39 Carbon Tetrachloride	117	Compound Not Detected.						
40 Tetrahydrofuran	42	Compound Not Detected.						
$ 41 Dibromofluoromethane	113	3.595	3.595	(0.885)	307066	28.7249	28.7249	
42 1,1,1-Trichloroethane	97	Compound Not Detected.						
43 2-Butanone	72	Compound Not Detected.						
44 1,1-Dichloropropene	75	Compound Not Detected.						
45 1-Chlorobutane	41	Compound Not Detected.						
46 Heptane	71	Compound Not Detected.						
48 Propionitrile	54	Compound Not Detected.						
47 Benzene	78	Compound Not Detected.						
49 Methacrylonitrile	67	Compound Not Detected.						
50 tert-amyl methyl Ether	73	Compound Not Detected.						
$ 51 1,2-Dichloroethane-d4	65	3.907	3.908	(0.962)	365701	30.4786	30.4786	
54 Isobutyl alcohol	43	Compound Not Detected.						
52 1,2-Dichloroethane	62	Compound Not Detected.						
53 tert-Amyl Alcohol	59	Compound Not Detected.						
* 55 Fluorobenzene	96	4.061	4.061	(1.000)	1899077	30.0000		
56 Diisobutylene	57	Compound Not Detected.						
57 Trichloroethene	95	Compound Not Detected.						
58 Methyl cyclohexane	83	Compound Not Detected.						
59 tert-Amyl Ethylether	59	Compound Not Detected.						
60 Dibromomethane	93	Compound Not Detected.						
61 1,2-Dichloropropane	63	Compound Not Detected.						
62 Bromodichloromethane	83	Compound Not Detected.						
63 Methyl methacrylate	41	Compound Not Detected.						
64 1,4-Dioxane	88	Compound Not Detected.						
65 2-Chloroethylvinyl ether	63	Compound Not Detected.						
66 cis-1,3-Dichloropropene	75	Compound Not Detected.						
67 Octane	85	Compound Not Detected.						
$ 68 Toluene-d8	98	5.005	5.005	(0.826)	1151337	29.0042	29.0042	
69 Toluene	92	Compound Not Detected.						
70 Chloroacetonitrile	75	Compound Not Detected.						
71 2-Nitropropane	41	Compound Not Detected.						
72 1,1-Dichloro-2-propanone	63	Compound Not Detected.						
73 4-Methyl-2-Pentanone(MIBK)	43	Compound Not Detected.						
75 trans-1,3-Dichloropropene	75	Compound Not Detected.						

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: ALS Global SDG No.: EPR-033

Instrument ID: ms07.i Calibration Date(s): 10/2/2019 10/2/2019

Heated Purge: (Y/N) N Calibration Time(s): 10:59 13:15

GC Column: RTXVRX ID: 0.25 (mm)

LAB FILE ID: RRF001 = 719100204.D RRF005 = 719100205.D RRF020 = 719100206.D RRF050 = 719100207.D

RRF100 = 719100208.D RRF200 = 719100209.D RRF00.5 = 719100203.D

COMPOUND	RRF200	RRF00.5		CT	b	m1	m2	% RSD or R^2
Acetone	0.01665	0.02192		A		0.018630		9.64257
Acrolein	0.04219	0.03963		A		0.040730		5.55161
Acrylonitrile	0.07459	0.07499		A		0.078530		8.17495
Acetonitrile	0.01591	0.02134		A		0.017760		10.75593
tert-Amyl Ethylether	0.48315	0.35235		A		0.401620		13.76155
tert-Amyl methyl ether	0.55854	0.42259		A		0.476980		13.14868
tert-Amyl Alcohol	0.01055	0.01047		A		0.010450		7.81523
Benzene	0.79974	0.83518		A		0.797990		4.31049
Benzyl Chloride	1113271	792		Q	0.000000	0.205130	0.004680	0.99860
Bromobenzene	0.61945	0.62699		A		0.617830		2.17837
Bromochloromethane	0.09416	0.09435		A		0.093490		2.61133
Bromodichloromethane	0.27940	0.21981		A		0.245060		9.34882
Bromoform *	1981467	2476		Q	0.000000	0.381330	0.005780	0.99948
Bromomethane	1382738	4318		Q	0.000000	0.082090	0.001930	0.99983
2-Butanone	0.02714	0.02779		A		0.027100		5.55402
tert.- Butyl Alcohol	0.01117	0.01334		A		0.012300		8.55281
tert-Butylbenzene	0.50665	0.37605		A		0.459330		13.15393
n-Butylbenzene	2532896	2616		Q	0.000000	0.496070	0.006050	0.99957
sec-Butylbenzene	2.53599	1.87606		A		2.400420		14.61265
Carbon Disulfide	0.59173	0.69589		A		0.579840		10.99410
Carbon Tetrachloride	0.26953	0.20331		A		0.228950		12.92165
Chloroacetonitrile	504525	772		L	0.000000	55.111370		0.99164
Chlorobenzene *	1.30599	1.38765		A		1.307870		3.29265
1-Chlorobutane	0.22784	0.21622		A		0.213800		4.27262
Chlorodibromomethane	0.53756	0.37816		A		0.440200		14.83782
Chloroethane	2097621	10520		L	0.000000	6.859170		0.99908
2-Chloroethylvinyl ether	1810404	2199		Q	0.000000	0.109760	0.002270	0.99916
Chloroform **	0.37736	0.41423		A		0.370050		5.87687
1-Chlorohexane	4520683	6465		L	0.000000	1.282980		0.99908
Chloromethane *	0.23896	0.28305		A		0.222140		13.78745
Chloroprene	0.32433	0.27961		A		0.288420		10.47484
3-Chloro-1-propene	0.28303	0.27835		A		0.268620		6.44850
o-Chlorotoluene	2.03845	1.78204		A		1.981160		7.89912
p-Chlorotoluene	1.87166	1.62886		A		1.814790		7.17866
Cyclohexane	0.33852	0.23903		A		0.295640		14.88367
1,2-Dibromo-3-Chloropropane	546948	312		Q	0.000000	0.119680	-0.000490	0.99648

CT Column contains the Calibration Type. A - Average Response Factor, L - Linear Regression, and Q - Quadratic.

SPCC Compounds (*) with required minimum RRF.

CCC Compounds (**) with required maximum %RSD.

APPENDIX D
PROJECT ACTION LIMITS

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SAP Worksheet #15 -- Reference Limits and Evaluation Table
(UFP-QAPP Manual Section 2.8.1)

Matrix: Groundwater
Analytical Group: VOCs

Analyte	CAS Number	PAL (µg/L)	PAL Reference[1]	PQLG (µg/L)	ALS Middleton		
		HHRA	HHRA		LOQ (µg/L)	LOD (µg/L)	DL (µg/L)
1,1-DICHLOROETHANE	75-34-3	2.8	Tap Water RSL	0.77	1	0.75	0.33
1,1,1-TRICHLOROETHANE	71-55-6	200	MCL	70	1	0.75	0.33
1,1,2-TRICHLOROETHANE	**79-00-5**	**0.041**	**Tap Water RSL**	**0.014**	**1**	**0.75**	**0.33**
1,1,2,2-TETRACHLOROETHANE	**79-34-5**	**0.076**	**Tap Water RSL**	**0.025**	**1**	**0.75**	**0.33**
1,1,2-TRICHLORO-1,2,2- TRIFLUORO-ETHANE	76-13-1	1000	Tap Water RSL	300	1	0.75	0.33
1,1-DICHLOROETHENE	75-35-4	7	MCL	2	1	0.75	0.33
1,2-DICHLOROBENZENE	95-50-1	30	Tap Water RSL	10	1	0.75	0.33
1,2-DICHLOROETHANE	**107-06-2**	**0.17**	**Tap Water RSL**	**0.06**	**1**	**0.75**	**0.33**
1,2,3-TRICHLOROBENZENE	**87-61-6**	**0.7**	**Tap Water RSL**	**0.2**	**1**	**0.75**	**0.33**
1,2,4-TRICHLOROBENZENE	**120-82-1**	**0.4**	**Tap Water RSL**	**0.1**	**1**	**0.75**	**0.33**
1,2-DIBROMO-3- CHLOROPROPANE	**96-12-8**	**0.00033**	**Tap Water RSL**	**0.00011**	**5**	**2.5**	**1.6**
1,2-DIBROMOETHANE	**106-93-4**	**0.0075**	**Tap Water RSL**	**0.0025**	**1**	**0.75**	**0.33**
1,2-DICHLOROPROPANE	**78-87-5**	**0.14**	**Tap Water RSL**	**0.05**	**1**	**0.75**	**0.33**
1,3-DICHLOROBENZENE[2]	**541-73-1**	**0.48**	**Tap Water RSL**	**0.16**	**1**	**0.75**	**0.33**
1,4-DICHLOROBENZENE	**106-46-7**	**0.48**	**Tap Water RSL**	**0.16**	**1**	**0.75**	**0.33**
1,4-DIOXANE	**123-91-1**	**0.46**	**Tap Water RSL**	**0.15**	**125**	**63**	**42**
2-BUTANONE	78-93-3	560	Tap Water RSL	190	5	3.75	1.6
2-HEXANONE	591-78-6	3.8	Tap Water RSL	1.3	5	3.75	1.6

Analyte	CAS Number	PAL (µg/L)	PAL Reference[1]	PQLG (µg/L)	ALS Middleton		
		HHRA	HHRA		LOQ (µg/L)	LOD (µg/L)	DL (µg/L)
4-METHYL-2-PENTANONE	108-10-1	630	Tap Water RSL	210	5	3.75	1.6
ACETONE	67-64-1	1400	Tap Water RSL	470	5	3.75	1.6
BENZENE	**71-43-2**	**0.46**	**Tap Water RSL**	**0.15**	**1**	**0.75**	**0.33**
BROMOCHLOROMETHANE	74-97-5	8.3	Tap Water RSL	2.8	1	0.75	0.33
BROMODICHLOROMETHANE	**75-27-4**	**0.13**	**Tap Water RSL**	**0.04**	**1**	**0.75**	**0.33**
BROMOFORM	75-25-2	3.3	Tap Water RSL	1.1	1	0.75	0.33
BROMOMETHANE	**74-83-9**	**0.75**	**Tap Water RSL**	**0.25**	**1**	**0.75**	**0.33**
CARBON DISULFIDE	75-15-0	81	Tap Water RSL	27	1	0.75	0.33
CARBON TETRACHLORIDE	**56-23-5**	**0.46**	**Tap Water RSL**	**0.15**	**1**	**0.75**	**0.33**
CHLOROBENZENE	108-90-7	7.8	Tap Water RSL	2.6	1	0.75	0.33
CHLOROETHANE	75-00-3	2100	Tap Water RSL	700	1	0.75	0.33
CHLOROFORM	**67-66-3**	**0.22**	**Tap Water RSL**	**0.07**	**1**	**0.75**	**0.33**
CHLOROMETHANE	74-87-3	19	Tap Water RSL	6.3	1	0.75	0.33
CIS-1,2-DICHLOROETHENE	156-59-2	3.6	Tap Water RSL	1.2	1	0.75	0.33
CIS-1,3-DICHLOROPROPENE[3]	**10061-01-5**	**0.47**	**Tap Water RSL**	**0.16**	**1**	**0.75**	**0.33**
CYCLOHEXANE	110-82-7	1300	Tap Water RSL	430	1	0.75	0.33
DIBROMOCHLOROMETHANE	**124-48-1**	**0.87**	**Tap Water RSL**	**0.29**	**1**	**0.75**	**0.33**
DICHLORODIFLUOROMETHANE	75-71-8	20	Tap Water RSL	6.7	1	0.75	0.33
ETHYLBENZENE	100-41-4	1.5	Tap Water RSL	0.5	1	0.75	0.33
ISOPROPYLBENZENE	98-82-8	45	Tap Water RSL	15	1	0.75	0.33
METHYL ACETATE	79-20-9	2000	Tap Water RSL	700	1	0.75	0.33
METHYL TERT-BUTYL ETHER	1634-04-4	14	Tap Water RSL	4.7	1	0.75	0.33

Analyte	CAS Number	PAL (µg/L)	PAL Reference[1]	PQLG (µg/L)	ALS Middleton		
		HHRA	HHRA		LOQ (µg/L)	LOD (µg/L)	DL (µg/L)
METHYL CYCLOHEXANE	108-87-2	NC	None	NC	1	0.75	0.33
METHYLENE CHLORIDE	75-09-2	5	MCL	2	1	0.75	0.33
STYRENE	100-42-5	100	MCL	30	1	0.75	0.33
TETRACHLOROETHENE	127-18-4	4.1	MCL	1.4	1	0.75	0.33
TOLUENE	108-88-3	110	Tap Water RSL	37	1	0.75	0.33
TOTAL XYLENES	1330-20-7	19	Tap Water RSL	6.3	3	2.25	1
TRANS-1,2-DICHLOROETHENE	156-60-5	36	Tap Water RSL	12	1	0.75	0.33
TRANS-1,3- DICHLOROPROPENE[3]	**10061-02-6**	**0.47**	**Tap Water RSL**	**0.16**	**1**	**0.75**	**0.33**
TRICHLOROETHENE	**79-01-6**	**0.28**	**Tap Water RSL**	**0.09**	**1**	**0.75**	**0.33**
TRICHLOROFLUOROMETHANE	75-69-4	520	Tap Water RSL	170	1	0.75	0.33
VINYL CHLORIDE	**75-01-4**	**0.019**	**Tap Water RSL**	**0.006**	**1**	**0.75**	**0.33**

1 The PAL references for groundwater are the following: Tap Water RSL - Regional Screening Level for Tapwater (EPA, 2017c); MCL – USEPA Maximum Contaminant Level (2012).
2 The value for 1,4-dichlorobenzene was used for 1,3- dichlorobenzene.
3 The value for 1,3-dichloropropene has been used as surrogate for cis- and trans-1,3-dichloropropene.

Bolded rows indicate that the PAL is between the laboratory LOQ and DL. The Project Team has agreed to accept these data, as reported, for decision making.

Shaded and Bolded rows indicate the PAL is less than the DL. In these cases the Project Team has agreed to report non-detected results at the LOD and any limitations on data use that result from having detection limits that are greater than PALs will be described in the technical memorandum for Site 3 and Site 12.

Matrix: Groundwater
Analytical Group: Metals (Total and Dissolved)

Analyte	CAS Number	PAL (µg/L)	PAL Reference[1]	PQLG (µg/L)	ALS Middleton		
		HHRA	HHRA		LOQ (µg/L)	LOD (µg/L)	DL (µg/L)
ALUMINUM[2]	7429-90-5	200	MCL	70	89	59	30
ANTIMONY	**7440-36-0**	**0.78**	**Tap Water RSL**	**0.26**	**2.2**	**1.5**	**0.74**
ARSENIC	**7440-38-2**	**0.052**	**Tap Water RSL**	**0.026**	**3**	**2**	**1**
BARIUM	7440-39-3	380	Tap Water RSL	130	5.6	3.7	1.9
BERYLLIUM	7440-41-7	2.5	Tap Water RSL	0.83	1	0.7	0.3
CADMIUM	**7440-43-9**	**0.92**	**Tap Water RSL**	**0.31**	**1.1**	**0.7**	**0.37**
CALCIUM	7440-70-2	NC	None	NC	111	73	37
CHROMIUM (total)	7440-47-3	100	MCL	33	2.2	1.5	0.74
COBALT	**7440-48-4**	**0.6**	**Tap Water RSL**	**0.2**	**5.6**	**3.7**	**1.9**
COPPER	7440-50-8	80	Tap Water RSL	30	5.6	3.7	1.9
IRON[2]	7439-89-6	300	MCL	100	56	37	19
LEAD	7439-92-1	15	MCL	5	2.2	1.5	0.74
MERCURY	**7439-97-6**	**0.063**	**Tap Water RSL**	**0.021**	**0.5**	**0.33**	**0.16**
MAGNESIUM	7439-95-4	NC	None	NC	111	73	37
MANGANESE	7439-96-5	43	Tap Water RSL	14	5.6	3.7	1.9
NICKEL	7440-02-0	39	Tap Water RSL	13	5.6	3.7	1.9
POTASSIUM	7440-09-7	NC	None	NC	111	73	37
SELENIUM	7782-49-2	10	Tap Water RSL	3	5.6	3.7	1.9

Analyte	CAS Number	PAL (µg/L)	PAL Reference[1]	PQLG (µg/L)	ALS Middleton		
		HHRA	HHRA		LOQ (µg/L)	LOD (µg/L)	DL (µg/L)
SILVER	7440-22-4	9.4	Tap Water RSL	.1	2.2	1.5	0.74
SODIUM[3]	7440-23-5	20000	Health Advisory	7000	111	73	37
THALLIUM	**7440-28-0**	**0.02**	**Tap Water RSL**	**0.007**	**1**	**0.7**	**0.3**
VANADIUM	7440-62-2	8.6	Tap Water RSL	2.9	2.2	1.5	0.74
ZINC	7440-66-6	600	Tap Water RSL	200	5.6	3.7	1.9

1 The PAL references for groundwater are the following: Tap Water RSL - Regional Screening Level for Tapwater (EPA, 2017c); MCL – USEPA Maximum Contaminant Level (2012).
2 Secondary MCLs are presented for Aluminum and Iron.
3 A Health Advisory is presented for Sodium.

Bolded rows indicate that the PAL is between the laboratory LOQ and DL. The Project Team has agreed to accept these data, as reported, for decision making.

Shaded and Bolded rows indicate the PAL is less than the DL. In these cases, the Project Team has agreed to report non-detected results at the LOD and any limitations on data use that result from having detection limits that are greater than PALs will be described in the technical memorandum for Site 3 and Site 12.

Matrix: Groundwater
Analytical Group: Radiological

Analyte	CAS Number	PAL (pCi/L)	PAL Reference[1]	PQLG (pCi/L)	ALS Fort Collins
		HHRA	HHRA		Minimum Detectable Concentration (MDC) picocuries per liter (pCi/L)
Radium-226	13982-63-3	0.0004	None	NC	1.0
Strontium-90	10098-97-2	0.065	Tap Water RSL	1600	1.0
Uranium-238	7440-61-1	0.00039	Tap Water RSL	7.7	0.2

1 The PAL references for radionuclides are the following: Preliminary Remediation Goals for Radionuclides (PRG) Internet Site (EPA, 2017d).

Shaded and Bolded rows indicate the PAL is less than the MDC. Any limitations on data use that result from having MDCs that are greater than PALs will be described in the technical memorandum for Site 3 and Site 12.

APPENDIX E

DERIVED CONCENTRATIONS OF BETA AND PHOTON EMITTERS IN DRINKING WATER

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Derived Concentrations (pCi/l) of Beta and Photon Emitters in Drinking Water

Yielding a Dose of 4 mrem/yr to the Total Body or to any Critical Organ as defined in NBS Handbook 69

Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l
H-3	20,000	Ni-65	300	Nb-95	300	Sb-124	60	Nd-147	200	Os-191	600
Be-7	6,000	Cu-64	900	Nb-97	3,000	Sb-125	300	Nd-149	900	Os-191m	9,000
C-14	2,000	Zn-65	300	Mo-99	600	Te-125m	600	Pm-147	600	Os-193	200
F-18	2,000	Zn-69	6,000	Tc-96	300	Te-127	900	Pm-149	100	Ir-190	600
Na-22	400	Zn-69m	200	Tc-96m	30,000	Te-127m	200	Sm-151	1,000	Ir-192	100
Na-24	600	Ga-72	100	Tc-97	6,000	Te-129	2,000	Sm-153	200	Ir-194	90
Si-31	3,000	Ge-71	6,000	Tc-97m	1,000	Te-129m	90	Eu-152	200	Pt-191	300
P-32	30	As-73	1,000	Tc-99	900	Te-131m	200	Eu-154	60	Pt-193	3,000
S-35 inorg	500	As-74	100	Tc-99m	20,000	Te-132	90	Eu-155	600	Pt-193m	3,000
Cl-36	700	As-76	60	Ru-97	1,000	I-126	3	Gd-153	600	Pt-197	300
Cl-38	1,000	As-77	200	Ru-103	200	I-129	1	Gd-159	200	Pt-197m	3,000
K-42	900	Se-75	900	Ru-105	200	I-131	3	Tb-160	100	Au-196	600
Ca-45	10	Br-82	100	Ru-106	30	I-132	90	Dy-165	1,000	Au-198	100
Ca-47	80	Rb-86	600	Rh-103m	30,000	I-133	10	Dy-166	100	Au-199	600
Sc-46	100	Rb-87	300	Rh-105	300	I-134	100	Ho-166	90	Hg-197	900
Sc-47	300	Sr-85 m	20,000	Pd-103	900	I-135	30	Er-169	300	Hg-197m	600
Sc-48	80	Sr-85	900	Pd-109	300	Cs-131	20,000	Er-171	300	Hg-203	60
V-48	90	Sr-89	20	Ag-105	300	Cs-134	80	Tm-170	100	Tl-200	1,000
Cr-51	6,000	Sr-90	8	Ag-110m	90	Cs-134m	20,000	Tm-171	1,000	Tl-201	900
Mn-52	90	Sr-91	200	Ag-111	100	Cs-135	900	Yb-175	300	Tl-202	300
Mn-54	300	Sr-92	200	Cd-109	600	Cs-136	800	Lu-177	300	Tl-204	300
Mn-56	300	Y-90	60	Cd-115	90	Cs-137	200	Hf-181	200	Pb-203	1,000
Fe-55	2,000	Y-91	90	Cd-115m	90	Ba-131	600	Ta-182	100	Bi-206	100
Fe-59	200	Y-91m	9,000	In-113m	3,000	Ba-140	90	W-181	1,000	Bi-207	200
Co-57	1,000	Y-92	200	In-114m	60	La-140	60	W-185	300	Pa-230	600
Co-58	300	Y-93	90	In-115	300	Ce-141	300	W-187	200	Pa-233	300
Co-58m	9000	Zr-93	2,000	In-115m	1,000	Ce-143	100	Re-186	300	Np-239	300
Co-60	100	Zr-95	200	Sn-113	300	Ce-144	30	Re-187	9,000	Pu-241	300
Ni-59	300	Zr-97	60	Sn-125	60	Pr-142	90	Re-188	200	Bk-249	2,000
Ni-63	50	Nb-93m	1,000	Sb-122	90	Pr-143	100	Os-185	200		

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APPENDIX F
USEPA DIRECTIVE 9283.1-14

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV - 6 2001

Directive no. 9283.1-14

MEMORANDUM

SUBJECT: Use of Uranium Drinking Water Standards under 40 CFR 141 and 40 CFR 192 as Remediation Goals for Groundwater at CERCLA sites

FROM: Elaine F. Davies, Acting Director
Office of Emergency and Remedial Response (OERR)
Office of Solid Waste and Emergency Response

Stephen D. Page, Director
Office of Radiation and Indoor Air (ORIA)
Office of Air and Radiation

TO: Addressees

PURPOSE

This memorandum addresses the use of uranium standards in 40 CFR Part 141 and 40 CFR Part 192 when setting remediation goals for ground waters that are current or potential sources of drinking water at Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites. Today's memorandum will be of interest to site decisionmakers that have uranium as a contaminant of concern in groundwater at their CERCLA site.

This document provides guidance to Regional staff, in dealing with the public and the regulated community, regarding how EPA intends to implement the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It describes national policy. This document is not a substitute for EPA's statutes or regulations, nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances.

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Directive no. 9283.1-14

MEMORANDUM

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BACKGROUND

All remedial actions at CERCLA sites must be protective of human health and the environment and comply with applicable or relevant and appropriate requirements (ARARs) unless a waiver is justified. Cleanup levels for response actions under CERCLA are developed based on site-specific risk assessments, ARARs, and/or to-be-considered material[1] (TBCs). The determination of whether a requirement is applicable, or relevant and appropriate, must be made on a site-specific basis (see 40 CFR §300.400(g)).

CERCLA GROUNDWATER PROTECTION

"EPA expects to return usable ground waters to their beneficial uses whenever practicable." (see 40 CFR §300.430(a)(1)(iii)(F)). In general, drinking water standards provide relevant and appropriate cleanup levels for ground waters that are a current or potential source of drinking water. However, drinking water standards generally are not relevant and appropriate for ground waters that are not a current or potential source of drinking water (see 55 FR 8732, March 8, 1990). Drinking water standards include federal maximum contaminant levels (MCLs) and/or non-zero maximum contaminant level goals (MCLGs) established under the Safe Drinking Water Act (SDWA), or more stringent state drinking water standards. Other regulations may also be ARARs as provided in CERCLA §121(d)(2)(B).

The Agency issued guidance concerning ground water use determinations in a memo from Office of Solid Waste and Emergency Response Assistant Administrator to the Regions entitled "The Role of CSGWPPs in EPA Remediation Programs" (OSWER Directive 9283.1-09), April 4, 1997. This guidance states that EPA generally defers to State determination of current and future groundwater uses, when the State has a Comprehensive State Ground Water Protection Program (CSGWPP) that has been endorsed by EPA and has provisions for site-specific decisions. For States that do not have an EPA-endorsed CSGWPP (or whose CSGWPPs do not have provisions for making site-specific determinations of groundwater use, resource value, priority or vulnerability), EPA uses either "EPA Guidelines for Ground-Water Classification" (Final Draft, December 1986), or State groundwater classifications or similar State designations, whichever classification scheme leads to more stringent remediation goals.

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[1]To-be-considered material, TBCs include non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of potential ARARs. However, TBCs should be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of health and the environment.

MASS AND ACTIVITY (pCi/L and µg/L)

Concentrations of radionuclides in water are typically expressed in terms of "activity" of the radionuclide per unit of volume in the water (e.g., picocuries per liter or pCi/L). Activity measures the rate of disintegration of a radionuclide per unit mass (for soil, sediment, and foodstuffs) or volume (for air and water). Because the carcinogenic effect of a radionuclide is due to its disintegration rate, which occurs during its decay process, concentrations of radionuclides are generally measured in terms of activity for health evaluation purposes.

Uranium is the only radionuclide for which the chemical toxicity has been identified to be comparable to or greater than the radiotoxicity, and for which a reference dose (RfD) has been established to evaluate chemical toxicity. The RfD is an estimate of a daily ingestion exposure to the population, including sensitive subgroups, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Uranium in soluble form is a kidney toxin. The relative risk of uranium kidney toxin effects correspond to the level of exposure to the uranium mass concentrations; the oral RfD of uranium is expressed in terms of mass (0.6 µg/kg/day).

RADIONUCLIDE MCLs

On July 9, 1976, EPA promulgated 40 CFR Part 141 *Drinking Water Regulations: Radionuclides* (1976 MCL rule). This 1976 MCL rule included the following MCLs: 5 pCi/L for radium-226 and radium-228 combined; 15 pCi/L for gross alpha particle activity (including radium 226, but excluding uranium and radon); and a concentration that produces a dose equivalent of 4 mrem/yr or less to the total body or any internal organ for the sum of the doses from man-made beta particles and photon emitters. A list of radionuclides that are addressed by the gross alpha MCL are provided in Attachment A to today's memorandum. Also, provided in Attachment B to today's memorandum is a list of radionuclide concentrations calculated using the 4 mrem/yr beta particles and photon emitters MCL standard.

On December 7, 2000, EPA amended 40 CFR Part 141 (65 FR 76708, December 7, 2000) *National Primary Drinking Water Regulations; Radionuclides* (2000 MCL rule). This 2000 MCL rule established requirements for uranium, and retained the existing requirements for combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon radioactivity. The 2000 MCL rule did include MCLGs of zero for the last four contaminants (see 40 CFR § 141.55).

The 2000 MCL rule established an MCL for uranium of 30 micrograms per liter (µg/L). For the MCL rulemaking, EPA assumed a typical conversion factor of 0.9 pCi/µg for the mix of uranium isotopes found at public water systems, which means that an MCL of 30 µg/L will typically correspond to 27 pCi/L. EPA considered the 30 µg/L level (which corresponds to a

27 pCi/L level) to be appropriate since it is protective for both kidney toxicity and cancer. However, the relationship between mass concentration (µg/L) and activity (pCi/L) is dependent upon the relative mix of the radioactive isotopes (e.g., uranium-234, uranium-235, uranium-238) that comprise the uranium at a particular drinking water source.[2] In circumstances with more extreme conversion factors (> 1.5 pCi/µg), uranium activity levels may exceed 40 pCi/L. In these circumstances, EPA recommends in the 2000 MCL rule that drinking water systems mitigate uranium levels to 30 pCi/L or less, to provide greater assurance that adequate protection from cancer health effects is being afforded (see 65 FR at page 76715).

UMTRCA GROUNDWATER STANDARDS

On January 11, 1995, EPA promulgated 40 CFR Part 192 (60 FR 2854, January 11, 1995) *Groundwater Standards for Remedial Actions at Inactive Uranium Processing Sites* (UMTRCA rule).[3] Included in these standards is a constituent concentration limit for the combined level of uranium-234 and uranium-238 in groundwater. These standards were developed specifically for the cleanup of uranium mill tailings at 24 sites designated under Section 102(a)(1) of UMTRCA (Title I sites). The list of 24 Title I sites is a closed set chosen in 1979 that cannot be expanded without congressional action. The standards were developed to ensure that all currently used and reasonably expected drinking water supplies near these 24 sites, both public and private, are adequately protected for use by present and future generations. The concentration limit for the combined level of uranium-234 and uranium-238 is 30 pCi/L.

IMPLEMENTATION

The following subsections will clarify the use of standards under 40 CFR Part 141 and 40 CFR Part 192 as ARARs when setting remediation levels for uranium in groundwater at CERCLA sites.

MCLs AND UMTRCA AS APPLICABLE REQUIREMENTS

The uranium drinking water standards contained within 40 CFR Part 141 are potentially applicable requirements only for community water systems designated under § 141.26 (see 65 FR 76708, 76748 (December 7, 2000)). The uranium groundwater standards contained within

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[2]For further discussion of mass and activity, including the formula to convert between the two measurement units, see U.S. EPA "Radiation Risk Assessment At CERCLA Sites: Q & A" EPA 540/R/99/006, December 1999, pp. 5-6.

[3]These standards were developed pursuant to Section 275 of the Atomic Energy Act (42 U.S.C. 2022), as amended by Section 206 of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. 7918) (UMTRCA).

40 CFR Part 192 are potentially applicable requirements only for the 24 Title I sites designated under Section 206 of UMTRCA.

MCLs AND UMTRCA AS RELEVANT AND APPROPRIATE REQUIREMENTS

In general, because the MCLG is zero for the radionuclides included in 40 CFR Part 141, the MCLs for these radionuclides are potentially relevant and appropriate requirements at sites with radioactive contamination in groundwaters that are current or potential sources of drinking water. In particular, **the uranium MCL of 30 µg/L is a potentially relevant and appropriate requirement for groundwaters that are current or potential sources of drinking water that have any of the uranium isotopes as a contaminant of concern**. Thus, for these radionuclides, the MCL concentration of 30 µg/L is generally used as the cleanup level for groundwater that is a current or potential source of drinking water, and is to be attained throughout the plume at the completion of the response action.

If either uranium-234 or uranium-238 is a contaminant of concern in ground waters that are current or potential sources of drinking water, and the site is not a Title I UMTRCA site, then the uranium UMTRCA standard under 40 CFR Part 192 of 30 pCi/L is a potentially relevant and appropriate requirement. Please note that this means both the uranium MCL (40 CFR Part 141) and the uranium UMTRCA (40 CFR Part 192) standards may be selected as relevant and appropriate requirements for addressing uranium contamination in ground water at the same CERCLA site. Since both standards establish levels of uranium in groundwater that are acceptable for drinking, EPA would expect that whenever the uranium UMTRCA ground water standard is a relevant and appropriate requirement, the uranium MCL will also be a relevant and appropriate standard. Selecting both the MCL and UMTRCA standards will ensure that the kidney toxicity and carcinogenic health effects posed by uranium are adequately addressed.

MCL PREAMBLE AS A TO-BE-CONSIDERED

In addition, the preamble recommendation to public water systems concerning extreme pCi/µg conversion factors in the uranium 2000 MCL rulemaking may be a TBC. **In situations where the mix of uranium isotopes means that attaining the uranium MCL of 30 µg/L may result in residual activity levels of uranium of greater than 40 pCi/L for total uranium, and a site-specific risk assessment demonstrates that 30 pCi/L is protective, then we recommend 30 pCi/L as a suitable cleanup level in addition to 30 µg/L.** This recommendation is made to ensure an equivalent level of protection from the carcinogenic effects of uranium at CERCLA sites and public water systems, and is therefore consistent with the recommendation made in the preamble to the 2000 MCL rule.

CONDUCTING GROUNDWATER RESPONSES FOR 40 CFR PART 141 AND/OR 40 CFR PART 192 ARAR COMPLIANCE

When either the uranium MCL and/or the 30 pCi/L uranium UMTRCA standard is considered a relevant and appropriate requirement, or the preamble to the uranium 2000 MCL rulemaking is a TBC, then CERCLA response actions should be conducted using the approach found in the NCP and Superfund guidance (e.g., determining groundwater use, point of compliance, areas of flexibility). Because the CERCLA approach for attaining the uranium MCL is more stringent than the UMTRCA approach 40 CFR Part 192, using the CERCLA approach automatically insures compliance with the UMTRCA groundwater standard as an ARAR. For example, the CERCLA approach for complying with the MCL throughout the plume is more stringent than the UMTRCA approach of complying with the groundwater standard only in the uppermost aquifer. Thus if an MCL is attained throughout the plume, the groundwater standard will also be attained in the uppermost aquifer. Key documents that include guidance on the Superfund approach to evaluating and remediating groundwater include: "Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites" (OSWER Directive No. 9283.1-12), October 1996; "The Role of CSGWPPs in EPA Remediation Programs" (OSWER Directive No. 9283.1-09), April 4, 1997, and; the "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (OSWER Directive No. 9200.4-17P), April 21, 1999). These and other Superfund groundwater guidance documents may be found on the Internet at: http://www.epa.gov/superfund/resources/gwdocs/index.htm.

Guidance documents that address establishing contaminant levels in soil to protect groundwater include: "Soil Screening Guidance for Radionuclides: User's Guide" (OSWER Directive No. 9355.4-16A), October 2000, and "Soil Screening Guidance for Radionuclides: Technical Background Document" (OSWER Directive No. 9355.4-16), October 2000. These Superfund guidance documents may be found on the Internet at: http://www.epa.gov/superfund/resources/radiation/radssg.htm.

FURTHER INFORMATION

The subject matter specialist for this directive is Stuart Walker of OERR 703-603-8748. General questions about this directive, should be directed to 1-800-424-9346.

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Attachment A: **List of Man-made and Naturally-Occurring Radionuclides addressed by 15 pCi/L gross alpha particle activity MCL standard**[4]

Nd-144	Ra-219	U-235
Sm-147	Ra-223	U-236
Sm-148	Ra-224	U-238
Po-208	Ra-226	Pa-231
Bi-210	Rn-220	Pu-236
Bi-211	Fr-221	Pu-238
Bi-212	Fr-223	Pu 239
Bi-213	Ac-225	Pu-240
Bi-214	Ac-227	Pu-241
Po-210	Th-227	Pu-242
Po-212	Th-228	Np-237
Po-213	Th-229	Am-241
Po-214	Th-230	Cm-242
Po-215	Th-232	Cm-244
Po-216	U-230	Cm-245
Po-218	U-232	Cm-248
At-217	U-233	Bk-248
At-218	U-234	Cf-250
Tl-217		

[4]This list includes only those radionuclides with half lives exceeding 4 days.

Attachment B: List of Radionuclides addressed by 4 mrem/yr man-made beta particles and photon emitters MCL standard[5]

Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	
H-3	20,000	Sr-85 m	20,000	Sb-124	60	Er-169	300
Be-7	6,000	Sr-85	900	Sb-125	300	Er-171	300
C-14	2,000	Sr-89	20	Te-125m	600	Tm-170	100
F-18	2,000	Sr-90	8	Te-127	900	Tm-171	1,000
Na-22	400	Sr-91	200	Te-127m	200	Yb-175	300
Na-24	600	Sr-92	200	Te-129	2,000	Lu-177	300
Si-31	3,000	Y-90	60	Te-129m	90	Hf-181	200
P-32	30	Y-91	90	Te-131m	200	Ta-182	100
S-35 inorg	500	Y-91m	9,000	Te-132	90	W-181	1,000
Cl-36	700	Y-92	200	I-126	3	W-185	300
Cl-38	1,000	Y-93	90	I-129	1	W-187	200
K-42	900	Zr-93	2,000	I-131	3	Re-186	300
Ca-45	10	Zr-95	200	I-132	90	Re-187	9,000
Ca-47	80	Zr-97	60	I-133	10	Re-188	200
Sc-46	100	Nb-93m	1,000	I-134	100	Os-185	200
Sc-47	300	Nb-95	300	I-135	30	Os-191	600
Sc-48	80	Nb-97	3,000	Cs-131	20,000	Os-191m	9,000
V-48	90	Mo-99	600	Cs-134	80	Os-193	200
Cr-51	6,000	Tc-96	300	Cs-134m	20,000	Ir-190	600
Mn-52	90	Tc-96m	30,000	Cs-135	900	Ir-192	100
Mn-54	300	Tc-97	6,000	Cs-136	800	Ir-194	90
Mn-56	300	Tc-97m	1,000	Cs-137	200	Pt-191	300
Fe-55	2,000	Tc-99	900	Ba-131	600	Pt-193	3,000
Fe-59	200	Tc-99m	20,000	Ba-140	90	Pt-193m	3,000
Co-57	1,000	Ru-97	1,000	La-140	60	Pt-197	300
Co-58	300	Ru-103	200	Ce-141	300	Pt-197m	3,000
Co-58m	9000	Ru-105	200	Ce-143	100	Au-196	600
Co-60	100	Ru-106	30	Ce-144	30	Au-198	100
Ni-59	300	Rh-103m	30,000	Pr-142	90	Au-199	600
Ni-63	50	Rh-105	300	Pr-143	100	Hg-197	900
Ni-65	300	Pd-103	900	Nd-147	200	Hg-197m	600
Cu-64	900	Pd-109	300	Nd-149	900	Hg-203	60
Zn-65	300	Ag-105	300	Pm-147	600	Tl-200	1,000
Zn-69	6,000	Ag-110m	90	Pm-149	100	Tl-201	900
Zn-69m	200	Ag-111	100	Sm-151	1,000	Tl-202	300
Ga-72	100	Cd-109	600	Sm-153	200	Tl-204	300

[5]For those isotopes where an MCL is calculated, concentration values were rounded using the same format as EPA guidance for the 1976 MCL rulemaking.

Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	pCi/l	Nuclide	
Ge-71	6,000	Cd-115	90	Eu-152	200	Pb-203	1,000
As-73	1,000	Cd-115m	90	Eu-154	60	Bi-206	100
As-74	100	In-113m	3,000	Eu-155	600	Bi-207	200
As-76	60	In-114m	60	Gd-153	600	Pa-230	600
As-77	200	In-115	300	Gd-159	200	Pa-233	300
Se-75	900	In-115m	1,000	Tb-160	100	Np-239	300
Br-82	100	Sn-113	300	Dy-165	1,000	Pu-241	300
Rb-86	600	Sn-125	60	Dy-166	100	Bk-249	2,000
Rb-87	300	Sb-122	90	Ho-166	90		