Williams Petroleum Services, LLC
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P.O. Box 3483
Tulsa, OK 74101-3483

January 7, 2022

Mr. Don Lininger, CHMM
Chief, Waste Remediation & Permitting
Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Re: Quarterly Update – 4th Quarter 2021
Former Augusta Refinery (FAR) RCRA Facility Investigation (RFI)
Williams Petroleum Services (WPS), LLC
Augusta, Kansas – KSD007235138

Dear Mr. Lininger:

This letter is offered as the report of investigation activities at the Former Augusta Refinery (FAR) in accordance with Section X, "Reporting," of the Administrative Order on Consent dated October 24, 2003, Docket No. RCRA-07-2004-0009. This report addresses activities occurring during the period of October 1 through December 31, 2021.

Description of Activities

- In accordance with the August 26, 2015 LNAPL Corrective Measures Study (CMS) Work Plan Addendum, completed routine manual and passive light non-aqueous phase liquid (LNAPL) recovery efforts for the continued evaluation of LNAPL removal efficacy.
- In email correspondence dated October 1, 2021, provided notification of plans to initiate Walnut River Area of Interest (AOI) work to the KDHE.
- During the week of October 4, 2021, equipment was mobilized to the AOI and site preparation work initiated. However, due to significant rains and increase in Walnut River stage, the proposed AOI work was put on hold until the Walnut River returned to normal levels.
- In correspondence dated October 6, 2021, the 3rd quarter 2021 Quarterly Report was submitted to the USEPA and KDHE.

- In October 2021, requests for proposal were solicited for the cleaning and plugging of the oily-water sewer system (SWMU 12) and the separator (SWMU 16). A pre-bid meeting was held with responding contractors on November 4, 2021.

- In correspondence dated October 25, 2021 from Applied Natural Sciences to APTIM, the results of the phytoremediation study were presented and evaluation as a potential corrective measure application was initiated. Data generated for this evaluation is presented in **Appendix A**.

- In email correspondence dated November 30, 2021, provided notification of plans to re-mobilize and initiate Walnut River AOI work to the KDHE.

- During the week of December 6, 2021, completed the repair work at the AOI. The excavation was triangular shaped, measuring approximately 15 feet wide by 25 feet long and two feet deep. River water that infiltrated into the excavation was pumped into a frac tank. A geosynthetic clay liner was placed in the bottom and sidewalls of the excavation prior to placement and compaction of clean fill material. Fill material consisted of local clean borrow material mixed with approximately 4% by weight sodium bentonite. An erosion mat was installed over the top of the compacted fill, along with approximately 45 ton of new rip rap material. Approximately 50 tons of non-hazardous residual petroleum impacted soils and 30,000 gallons of non-hazardous water were generated during excavation activities.

- During the week of December 13, 2021, completed the annual post-closure groundwater monitoring event for SWMUs 1 & 2.

- On December 17, 2021, completed the 4th quarterly NPDES sampling.

- On December 28, 2021, downloaded transducer data and collected water levels as part of the continued Water Balance evaluation through the ongoing monitoring of water level data per the September 11, 2013 scope of work.

- On December 28, 2021, completed Walnut River AOI surface water performance sampling.

Summary of All Findings

- **Appendix A** describes the field activities and results associated with the evaluation of phytoremediation as a corrective measures alternative.

- A letter report will be submitted to the KDHE describing the Walnut River AOI repair field activities once disposition of the soil and water generated is complete.

Summaries of All EPA/KDHE Approved Changes

- None.

Summaries of All Contacts

- None.

Summaries of Problems Encountered

- Due to significant rains encountered after equipment mobilization and increased Walnut River stage in October 2021, the AOI repair work was delayed for approximately a month to allow the river stage to recede to acceptable levels.

Actions to Rectify Problems

- On November 16, 2021, APTIM contacted the U.S. Army Corps of Engineers (USACE) concerning recent discharges from El Dorado Lake to the Walnut River. Discharges from the lake had recently been reduced from 250 cubic feet per second (cfs) to 5 cfs with a decrease in the Walnut River stage in Augusta from 6.44 feet to less than 5.75 feet where the excavation activities were planned to take place. The USACE indicated that there were no more discharges greater than the current discharge planned from El Dorado Lake unless a significant rainfall event occurred. USACE indicated that they would work with APTIM on the timing of the start of discharge if needed.

Changes in Key Project Entities

- None.

Projected Work for the Next Reporting Period

The following activities will be performed or initiated during the next reporting period:

- Continue LNAPL monitoring and removal.
- Continue quarterly NPDES monitoring.
- Once disposition of the soil and water generated during the Walnut River AOI repairs has been completed, a letter report will be submitted to the KDHE describing the field activities completed
- Submit the 2021 Groundwater Sampling Event data package.
- Review contractor responses for the SWMU 12 and 16 work. If responses are adequate, a formal interim measures scope of work to complete the cleaning and abandonment of SWMU 12 and 16 will be submitted to the agencies.

Other Relevant Documentation

- None

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this submittal is true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with the procedures designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information,

or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Please provide all written correspondence regarding this Quarterly Update directly to Mr. Lee Andrews, with Williams Petroleum Services, LLC. If you have any questions, do not hesitate to contact Mr. Andrews at (918) 573-6912.

Sincerely,
Williams Petroleum Services, LLC

Mark A. Gebbia
Vice President, Environmental, Regulatory & Permitting

Appendix A – Phytoremediation Feasibility Assessment

c: Gary Blackburn, KDHE
Lee Andrews, Williams Petroleum Services, LLC
David Way, Aptim Environmental & Infrastructure, LLC.

Appendix A

PHYTOREMEDIATION FEASIBILITY ASSESSMENT

For the Corrective Measures Study (CMS), phytoremediation has been identified as a potential technology to be evaluated as a corrective measure at the Former Augusta Refinery (FAR).

Aptim contacted Applied Natural Sciences, Inc. (ANS) to provide a preliminary evaluation regarding the potential for phytoremediation through installing a *TreeWell* Phyto-Integrated® remediation system. ANS recommended collection of data to refine the evaluation and application of trees needed. A description of the ANS Phyto-Integrated remediation conceptual design is included as **Attachment 1**.

The area evaluated was located on the west side of Highway 77, upgradient of the petrofix pilot study area, on City of Augusta property (see **Figure A-1**).

This report describes the field activities and results associated with the evaluation of the phytoremediation alternative.

Key objectives for the data collection and assessment by ANS include:

- Identify potential fatal flaws for phytoremediation applicability to the Site.
- Develop an understanding of site hydrogeology and how conditions could affect phytoremediation feasibility and pose potential constructability challenges.
- Identify and characterize the existence of groundwater transmissive zones insofar as it may impact phytoremediation design.
- Evaluate whether existing groundwater quality would be deleterious for phytoremediation tree establishment and growth.

1.0 GENERAL SCOPE OF WORK AND METHODOLOGY

A direct push Geoprobe® unit was used for the collection of soil samples and temporary monitoring well installation. Three direct-push soil borings GP-1, GP-2, and GP-3 were completed and sampled to refusal at a total depth ranging from 30.5 feet to 36.5 feet below ground surface (bgs) (see **Figure A-1**). The soil borings were used to characterize site sediments with respect to installation and function of the *TreeWell* units.

These temporary monitoring wells allowed for the collection of groundwater samples for laboratory analysis of target analytes and additional select analysis for agronomic characteristics. Depth to groundwater was measured from these and additional monitoring wells to allow the calculation of groundwater gradient and direction within the area of study. Pneumatic slug testing was also completed in the three monitoring wells to estimate the hydraulic conductivity (K) in groundwater within the area of study.

1.1 Soil Sampling and Analysis

One unsaturated subsurface soil sample was collected from each of the soil borings just above the top of groundwater from a depth of 5 to 7 feet bgs for laboratory analytical analysis of VOCs, SVOCs, metals, total petroleum hydrocarbons (TPH) for low, medium, and high range hydrocarbons (LRH, MRH, and HRH).

Soil samples collected were shipped to ALS Environmental, 10450 Stancliff Road, Suite 120, Houston, Texas 77099, for analysis.

1.2 Groundwater Sampling and Analysis

1.2.1 Temporary Monitoring Well Installation

The temporary monitoring wells were constructed of 1-inch diameter flush joint, treaded, schedule 40 polyvinyl chloride (PVC) casing and a 5-foot length of 0.010-inch slotted 1-inch diameter PVC screen with the bottom of the well screen situated on the top of the weathered bedrock. A silica sand filter pack was placed from total depth to approximately one to two feet above the screened interval with a hydrated bentonite seal placed above the sand filter pack to within one foot of surface. The completion of each temporary well consisted of a one-inch diameter J-plug and lock. An APTIM field geologist was present to oversee the soil sampling and completion of the temporary monitoring well installation activities. Following installation, each of the temporary monitoring wells was developed. Specific boring logs and monitoring well completion diagrams are included in the **Attachment A-2**.

1.2.2 Fluid Level Measurements

Fluid levels were gauged in the three new temporary monitoring wells (GP-1, GP-2, and GP-3) after installation, development, and prior to the collection of groundwater samples. Fluid levels were also gauged in the existing monitoring wells DG-07D, DG-08D, DG-09D, DG-10D, DV-1D, DV-2, DV-3, DV-4, FAR01-2D, GM-10, and P-16D. Static water levels and LNAPL thickness (if applicable) were measured in each monitoring well using an oil/water interface

probe, capable of detecting LNAPL on the water to an accuracy of 0.01 feet. Results of the well gauging activities completed during the assessment activities are presented in **Table A-1**.

1.2.3 Groundwater Sampling

Groundwater samples were also collected from mid screen interval from each of the temporary monitoring wells for laboratory analytical analysis using low flow groundwater sampling procedures with a peristaltic pump.

Each of the monitoring wells were sampled for laboratory analytical analysis of VOCs, SVOCs, metals, and TPH LRH, MRH, and HRH. Additional samples were also collected by ANS representative for agronomic parameters.

Groundwater samples collected for the standard site analysis were shipped under chain of custody to ALS Environmental (ALS), Houston Texas for analysis. Groundwater samples collected for agronomic parameters were shipped under chain of custody to the agricultural laboratory Servi-Tech Laboratory, Dodge City, Kansas for analysis.

1.3 Pneumatic Aquifer Slug Testing

Pneumatic aquifer slug testing was completed on the three temporary monitoring wells, and existing monitoring wells DG-09D and DV-04.

A “Pneumatic Aquifer Slug Test System” wellhead setup was utilized to collect the data (Geoprobe®, 2002). The pneumatic aquifer slug test system includes a one to two-inch diameter wellhead adapter and a 2-inch diameter relief valve for instantaneous depressurization of the casing. An In-Situ® Level Troll® 700, 30 pound-force per square inch gauge (psig) transducer was set at a depth of 5 to 8 feet below the top of the water table. The pressurization of the casing was provided with a hand pump. The slug pressure ranged from 40 to 60 inches of water, which is also less than the depth of the top of the pressure transducer for the wells tested and to avoid forcing air from the top of the well screen into the formation. The recording frequency of the transducer was set to collect water surface elevation changes in a logarithmically decaying schedule at an initial rate of four data points per second.

Three pneumatic aquifer slug tests were run at each of the wells. The pneumatic aquifer slug test data was evaluated using AQTESOLV®, a software package for the analysis of aquifer test data. The aquifer slug test data were evaluated with Bouwer and Rice solution for an aquifer slug test in an unconfined aquifer. The observation data and the results for each of the aquifer slug test evaluations are included in the **Attachment A-3.**

2.0 MONITORING RESULTS

2.1 Well Gauging Activities

Results of the well gauging activities completed during the pilot test activities are presented in **Table A-1**. **Figure A-2** presents the deep monitoring well potentiometric surface contour map for the phytoremediation assessment area on May 13, 2021. The groundwater flow direction is to the east/southeast across the phytoremediation assessment area towards the Walnut River. The hydraulic gradient calculated for the deep monitoring wells across the area on May 13, 2021 was calculated at 0.0077.

2.2 Soil and Groundwater Sampling Results

Summary of the standard groundwater and soil analysis submitted to ALS are shown in **Tables A-2** and **A-3**, respectively. The complete ALS laboratory analytical reports are included in **Attachment A-4.** The laboratory reports and results of the groundwater samples submitted to Servi-Tech Laboratory for agriculture-related inorganic constituents are included in **Attachment A-1.**

Going from south to north across the assessment area, benzene was reported in groundwater samples at 260 µg/l in GP-1, 440 µg/l in GP-2, and 170 µg/l in GP-3. Groundwater analytical results were compared to EPA Maximum Contaminant Levels (MCLs). Concentrations of benzene and other constituent concentrations in groundwater above MCLs are shown on **Figure A-3**.

The highest reported concentration of hydrocarbon in soil were reported in the soil sample collected from GP-2 at a depth of 5 to 7 feet with reported TPH MRH concentration of 927 mg/kg and benzene concentration of 0.690 mg/kg. Soil analytical results were compared to KDHE Tier 2 non-residential Risk-Based Standards for Kansas (RSK) soil to groundwater screening levels. Concentrations of benzene and TPH MRH in soil reported above the RSK values are shown on **Figure A-4.**

Servi-Tech's laboratory results showed that groundwater collected from GP-1 and GP-2 were very similar, with conductivity, pH, salts, and metals all within the ideal range for trees anticipated to be used in a phytoremediation system. Groundwater collected from GP-3 had a slightly elevated conductivity as a result of slightly elevated chloride and sodium concentrations, but not to the extent to have an adverse impact on trees anticipated to be used.

2.3 Pneumatic Aquifer Slug Testing Results

The aquifer slug tests were conducted on GP-1, GP-2, GP-3, DG-09D, and DV-04 in the lower silty sand and gravel unit. Average hydraulic conductivity (K) values in GP-1, GP-2, GP-3, and DG-09D ranged from 71.4 feet per day (ft/d) in GP-1 to 53.9 ft/d in DG-09D. The K value in

the single test in DV-04 was 9.86 ft/d. See **Table A-4** for a summary of the aquifer slug test results.

A cumulative listing of historical and current aquifer test results for the silty sand and gravel unit at the FAR is shown in **Table A-5**. The K values for the silty sand and gravel unit range from 0.1 to 240 ft/d, with a geometric mean of 8.3 ft/d. These hydraulic conductivity values fall within the typical range of values for silty to well sorted sands (Fetter, 1988).

3.0 CONCEPTUAL PHYTOREMEDIATION DESIGN

Phytoremediation has been identified as a technology to be evaluated as a corrective measure at the FAR. Results of the feasibility assessment indicate phytoremediation is technologically feasible. Results of the agriculture related groundwater analysis showed groundwater quality suitable for establishment of phytoremediation trees, and as further described below, system preliminary design indicates phytoremediation will provide a measure of groundwater control. Further evaluation including cost analysis as compared to other alternatives will be completed in the CMS.

Based on the site conditions and geographical location ANS tentatively selected three deciduous trees likely to be suitable for phytoremediation at the FAR. This includes Weeping Willow, American Sycamore, and Siouxland Poplar.

ANS used a 20-foot wide tree spacing to calculate flow volume and estimate the number of *TreeWell* units and number of rows of trees required to establish groundwater control. Groundwater flow volume across a 500-foot front was estimated at just less than 5,000 gallons per day (gpd). ANS recommended a minimum of a four-row tree system that would contain 98 *TreeWell* units. A conceptual design and layout of the *TreeWell* units is included as **Figure A-5.** That number of *TreeWell* units has the potential to consume approximately 5,000 gpd during the growing season at maturity.

Additionally, the *TreeWell* units would provide groundwater access for implementation of other in-situ remediation technologies, such as air sparging and other means for increasing dissolved oxygen levels, if needed.

Tables

TABLE A-1
FLUID LEVEL MEASUREMENTS
PHYTOREMEDIATION FEASIBILITY ASSESSMENT
WILLIAMS PETROLEUM SERVICES, INC.
FORMER AUGUSTA REFINERY
AUGUSTA, KANSAS

Sample ID	Date	MP Elevation (feet)	Depth To Water (feet)	Water Elevation (feet)
GP-1	5/13/2021	1213.23	9.40	1203.83
GP-2	5/13/2021	1212.90	3.95	1208.95
GP-3	5/13/2021	1219.63	10.68	1208.95
DG-07D	5/13/2021	1220.82	12.00	1208.82
DG-08D	5/13/2021	1218.05	8.92	1209.13
DG-09D	5/13/2021	1218.86	12.66	1206.20
DG-10D	5/13/2021	1221.79	12.97	1208.82
FAR01-02D	5/13/2021	1219.37	10.25	1209.12
GM-10	5/13/2021	1217.42	8.17	1209.25
P-16D	5/13/2021	1218.11	16.85	1201.26
DV-1D	5/13/2021	1218.87	15.35	1203.52
DV-2	5/13/2021	1222.10	17.64	1204.46
DV-3	5/13/2021	1220.87	15.97	1204.90
DV-4	5/13/2021	1217.88	16.76	1201.12

TABLE A-2
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
PHYTOREMEDIATION FEASIBILITY ASSESSMENT
WILLIAMS PETROLEUM SERVICES, INC.
FORMER AUGUSTA REFINERY
AUGUSTA, KANSAS

Parameter	Sample ID / Sample Date		GP-1 5/11/2021	GP-2 5/11/2021	GP-3 5/11/2021
	Units	EPA MCL	Result	Result	Result
Total Petroleum Hydrocarbons					
Low-Range Hydrocarbon (C5 - C8)	mg/L	0.95*	0.383	0.677	0.192
Mid-Range Hydrocarbon (C9-C18)	mg/L	0.4*	**0.680**	**0.834**	**0.852**
High-Range Hydrocarbon (C19-C35)	mg/L	2.5*	0.205	0.161	0.350
Metals					
Arsenic	mg/L	0.01	**0.372**	**0.299**	**0.348**
Barium	mg/L	2	1.86	1.24	**2.00**
Cadmium	mg/L	0.005	<0.00200	<0.00200	<0.00200
Chromium	mg/L	0.1	<0.00400	<0.00400	0.000468J
Lead	mg/L	0.015	<0.00200	<0.00200	<0.00200
Selenium	mg/L	0.05	<0.00200	<0.00200	<0.00200
Silver	mg/L	--	<0.00200	<0.00200	<0.00200
Mercury	mg/L	0.002	<0.000200	<0.000200	<0.000200
Votalile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	mg/L	0.2	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/L	--	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/L	0.007	<0.001	<0.001	<0.001
Acetone	mg/L	--	<0.002	0.0026	<0.002
Benzene	mg/L	0.005	**0.260**	**0.440**	**0.170**
Carbon disulfide	mg/L	--	<0.002	<0.002	<0.002
Chlorobenzene	mg/L	0.1	<0.001	<0.001	<0.001
Ethylbenzene	mg/L	0.7	0.0011	0.0021	0.0011
Methyl tert-butyl ether	mg/L	--	<0.001	<0.001	<0.001
Methylene chloride	mg/L	--	<0.002	<0.002	<0.002
Tetrachloroethene	mg/L	0.005	<0.001	<0.001	<0.001
Toluene	mg/L	1	0.010	0.021	0.0053
Vinyl chloride	mg/L	0.002	<0.001	<0.001	<0.001
Xylenes, Total	mg/L	10	0.013	0.025	0.0061
Semivotalile Organic Compounds (SVOCs)					
2-Methylnaphthalene	mg/L	--	0.095	0.210	0.130
Benzoic acid	mg/L	--	<0.00020	<0.00020	<0.00020
Bis(2-ethylhexyl)phthalate	mg/L	--	0.00028	0.00018J	0.00010J
Chrysene	mg/L	--	<0.00010	<0.00010	<0.00010
Naphthalene	mg/L		0.00039	0.00077	<0.00010
Phenanthrene	mg/L	--	0.011	0.011	0.028
Pyrene	mg/L	--	<0.00010	0.000087J	0.00031

Notes:
* KDHE Tier 2 Non-Residential Screening Levels for TPH in Groundwater, Low-range (≥C5-≤9), Mid-Range (≥C9-≤19), and High-Range (≥C19-≤35).
MCL exceedences are shown in **blue bold font**
J - Analyte detected below quantitation limit

TABLE A-3
SUMMARY OR SOIL ANALYTICAL RESULTS
PHYTOREMEDIATION FEASIBILITY ASSESSMENT
WILLIAMS PETROLEUM SERVICES, INC.
FORMER AUGUSTA REFINERY
AUGUSTA, KANSAS

Parameter	Sample ID Depth (feet bgs) Sample Date		GP-1 5 - 7 5/11/2021	GP-2 5 - 7 5/11/2021	GP-3 5 - 7 5/11/2021
	Units	RSK	Result	Result	Result
Total Petroleum Hydrocarbons					
Low-Range Hydrocarbon (C5 - C8)	mg/kg	150	<0.147	42.3	<0.130
Mid-Range Hydrocarbon (C9-C18)	mg/kg	150	<19.5	**972**	109
High-Range Hydrocarbon (C19-C35)	mg/kg	13000	4.20J	45.7	11.3J
Metals					
Arsenic	mg/kg	--	3.02	3.78	2.97
Barium	mg/kg	--	158	175	171
Cadmium	mg/kg	--	0.210J	0.247J	0.243J
Chromium	mg/kg	--	20.6	18.4	19.1
Lead	mg/kg	--	11.5	11.3	14.6
Selenium	mg/kg	--	0.649	0.686	0.341J
Silver	mg/kg	--	0.0346J	0.0484J	0.0501J
Mercury	mg/kg	--	0.0207	0.00757	0.00887
Votalile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	mg/kg	2.8	<0.0042	<0.0044	<0.0044
1,1-Dichloroethane	mg/kg	0.496	<0.0042	<0.0044	<0.0044
1,1-Dichloroethene	mg/kg	0.0859	<0.0042	<0.0044	<0.0044
Acetone	mg/kg	204	<0.017	<0.017	<0.018
Benzene	mg/kg	0.168	<0.0042	**0.690**	0.0031J
Carbon disulfide	mg/kg	15.6	<0.0084	<0.0087	<0.0089
Chlorobenzene	mg/kg	5.1	<0.0042	<0.0044	<0.0044
Ethylbenzene	mg/kg	65.6	<0.0042	1.800	<0.0044
Methyl tert-butyl ether	mg/kg	1.66	<0.0042	<0.0044	<0.0044
Methylene chloride	mg/kg	0.0429	<0.0084	<0.0087	<0.0089
Tetrachloroethene	mg/kg	0.121	<0.0042	<0.0044	<0.0044
Toluene	mg/kg	51.2	<0.0042	0.072	<0.0044
Vinyl chloride	mg/kg	0.0205	<0.0017	<0.0017	<0.0018
Xylenes, Total	mg/kg	809	<0.0042	0.095	<0.0044
Semivotalile Organic Compounds (SVOCs)					
2-Methylnaphthalene	mg/kg	17.3	<0.0033	0.0013J	<0.0033
Benzoic acid	mg/kg		<0.0065	<0.0066	<0.0066
Bis(2-ethylhexyl)phthalate	mg/kg	144	0.0024J	<0.0066	0.0018J
Chrysene	mg/kg	2710	<0.0033	<0.0033	<0.0033
Naphthalene	mg/kg		<0.0033	0.0013J	<0.0033
Phenanthrene	mg/kg		<0.0033	<0.0033	<0.0033
Pyrene	mg/kg	11900	0.00078J	<0.0033	<0.0033

Notes:
RSK - Risk-Based Standards for Kansas, KDHE Tier 2 Non-residential Soil to GW SL
* KDHE Tier 2 Non-Residential Screening Levels for TPH Soil to Groundwater, Low-range (≥C5-≤9), Mid-Range (≥C9-≤19), and High-Range (≥C19-≤35)
RSK exceedences are shown in **blue bold font**
bgs - Below ground surface

TABLE A-4
SUMMARY OF AQUIFER SLUG TEST RESULTS
PHYTOREMEDIATION FEASIBILITY ASSESSMENT
WILLIAMS PETROLEUM SERVICES, INC.
FORMER AUGUSTA REFINERY
AUGUSTA, KANSAS

Well	Test	Hydraulic Conductivity	
		cm/sec	ft/day
GP-1	1	2.94E-02	83.34
	2	2.29E-02	64.82
	3	2.33E-02	66.14
	average	2.52E-02	71.44
GP-2	1	2.11E-02	59.76
	2	2.17E-02	61.59
	3	2.07E-02	58.63
	average	2.12E-02	60.00
GP-3	1	3.48E-02	98.63
	2	2.12E-02	60.19
	3	2.13E-02	60.39
	average	2.58E-02	73.07
DG-09D	1	1.98E-02	55.99
	2	1.87E-02	52.93
	3	1.86E-02	52.62
	average	1.90E-02	53.85
DV-04	1	3.48E-03	9.87
	2		
	3		
	average	3.48E-03	9.87

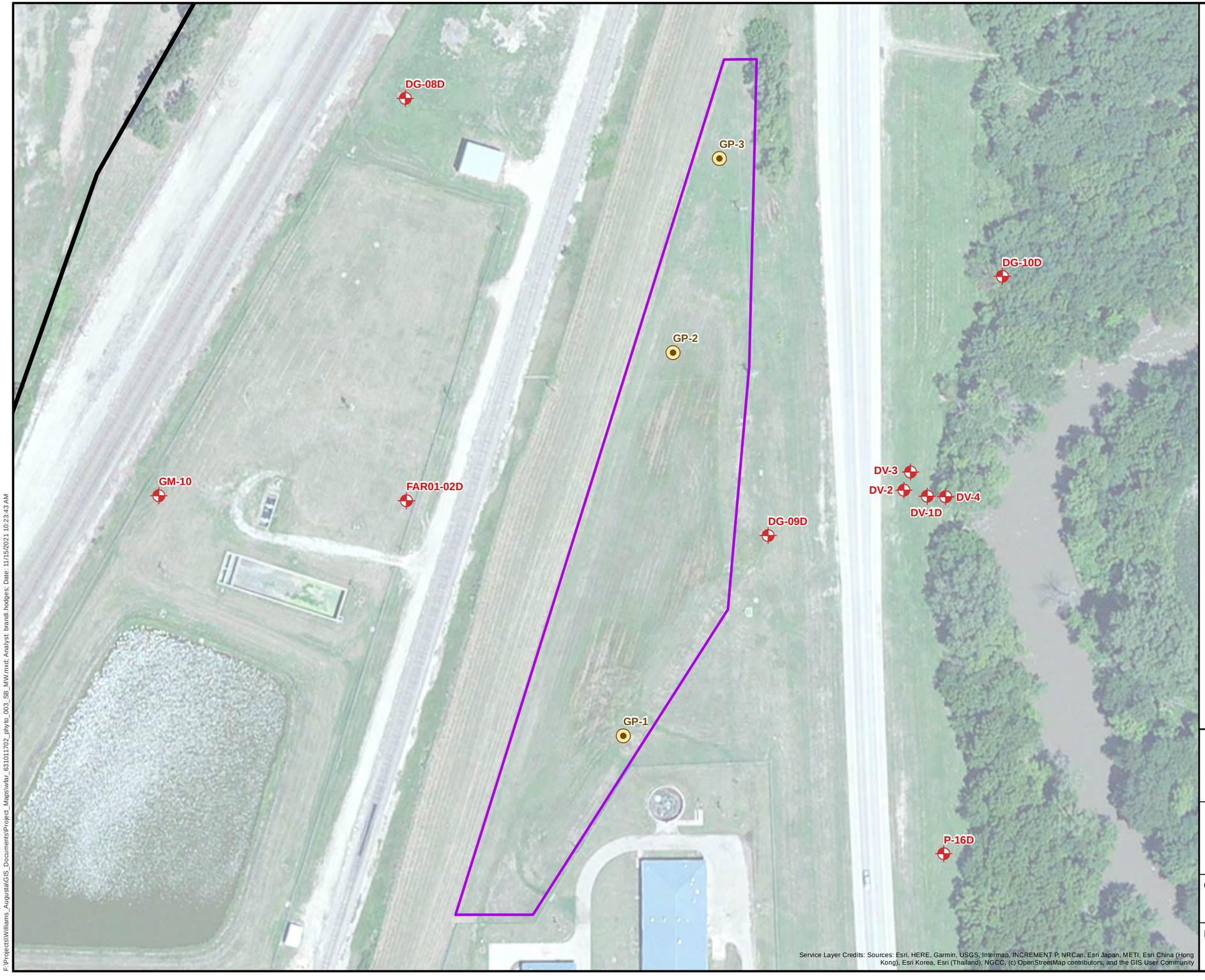
cm/sec: centimeters per second
ft/day: feet per day

TABLE A-5
SUMMARY OF DEEP MONITORING WELLS AQUIFER SLUG TEST RESULTS
PHYTOREMEDIATION FEASIBILITY ASSESSMENT
WILLIAMS PETROLEUM SERVICES, INC.
FORMER AUGUSTA REFINERY
AUGUSTA, KANSAS

Well	Hydraulic Conductivity K cm/s	K ft/d	Remarks
(Geraghty & Miller, 1993)			
GM-11	1.28E-03	3.63E+00	Single slug test
PW-1	7.30E-03	2.07E+01	Pump test
(Data Gap, Shaw 2005)			
P-02D	2.45E-03	6.95E+00	Average of four slug tests
P-03D	8.48E-02	2.40E+02	Average of four slug tests
P-04D	2.15E-03	6.10E+00	Average of three slug tests
P-08D	1.35E-04	3.82E-01	Average of three slug tests
P-15D	1.12E-02	3.16E+01	Average of four slug tests
P-16D	2.47E-02	6.99E+01	Average of four slug tests
P-17D	2.49E-03	7.05E+00	Average of three slug tests
P-18D	3.99E-05	1.13E-01	Average of four slug tests
P-19D	6.13E-03	1.74E+01	Average of three slug tests
(RFI Report, Shaw 2010)			
FAR08-01D	2.65E-04	7.51E-01	Average of three slug tests
FAR08-03D	8.94E-04	2.53E+00	Average of three slug tests
FAR08-05D	2.51E-04	7.11E-01	Average of three slug tests
FAR08-06D	2.08E-03	5.89E+00	Average of three slug tests
FAR08-08D	5.21E-04	1.48E+00	Average of three slug tests
FAR08-19D	6.51E-03	1.84E+01	Average of three slug tests
FAR08-22D	1.20E-03	3.39E+00	Average of three slug tests
FAR08-23D	4.05E-03	1.15E+01	Average of three slug tests
FAR08-26D	2.79E-03	7.91E+00	Average of three slug tests
Phytoremediation Assessment			
GP-1	2.52E-02	7.14E+01	Average of three slug tests
GP-2	2.12E-02	6.01E+01	Average of three slug tests
GP-3	2.13E-02	6.04E+01	Average of three slug tests
DG-09D	1.90E-02	5.39E+01	Average of three slug tests
DV-04	3.48E-03	9.86E+00	Single slug test
Geometric Mean	2.91E-03	8.25E+00	
Min	3.99E-05	1.13E-01	
Max	8.48E-02	2.40E+02	

cm/sec: centimeters per second
ft/day: feet per day

Figures



LEGEND

- Geoprobe Boring
- Deep Monitoring Well
- Facility Boundary
- Preferred Phyto Area

N

0 20 40 60 80100 200

Feet

APTIM

2872 NORTH RIDGE ROAD, SUITE 102B
WICHITA, KANSAS 67205
(316) 220-8020

SOIL BORING AND MONITORING WELL LOCATION

CLIENT: FORMER AUGUSTA REFINERY
WILLIAMS PETROLEUM SERVICES

LOCATION: 215 N OAK STREET
AUGUSTA, KANSAS 67010

FIGURE: A-1

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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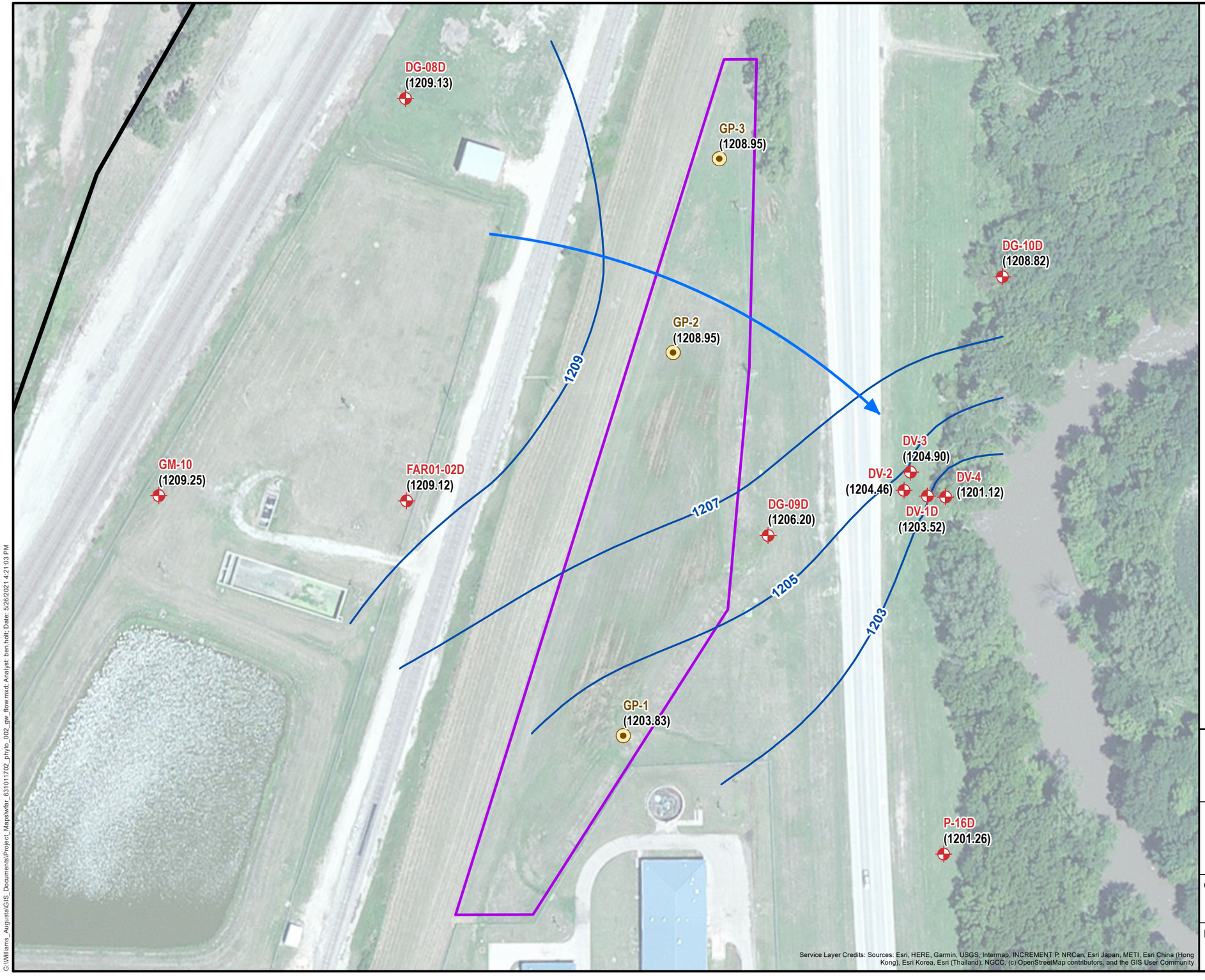


LEGEND

- Geoprobe Boring
- Deep Monitoring Well
- Groundwater Contours (ft)
- Facility Boundary
- Preferred Phyto Area

N

0 20 40 60 80 100 200

Feet

APTIM

2872 NORTH RIDGE ROAD, SUITE 102B
WICHITA, KANSAS 67205
(316) 220-8020

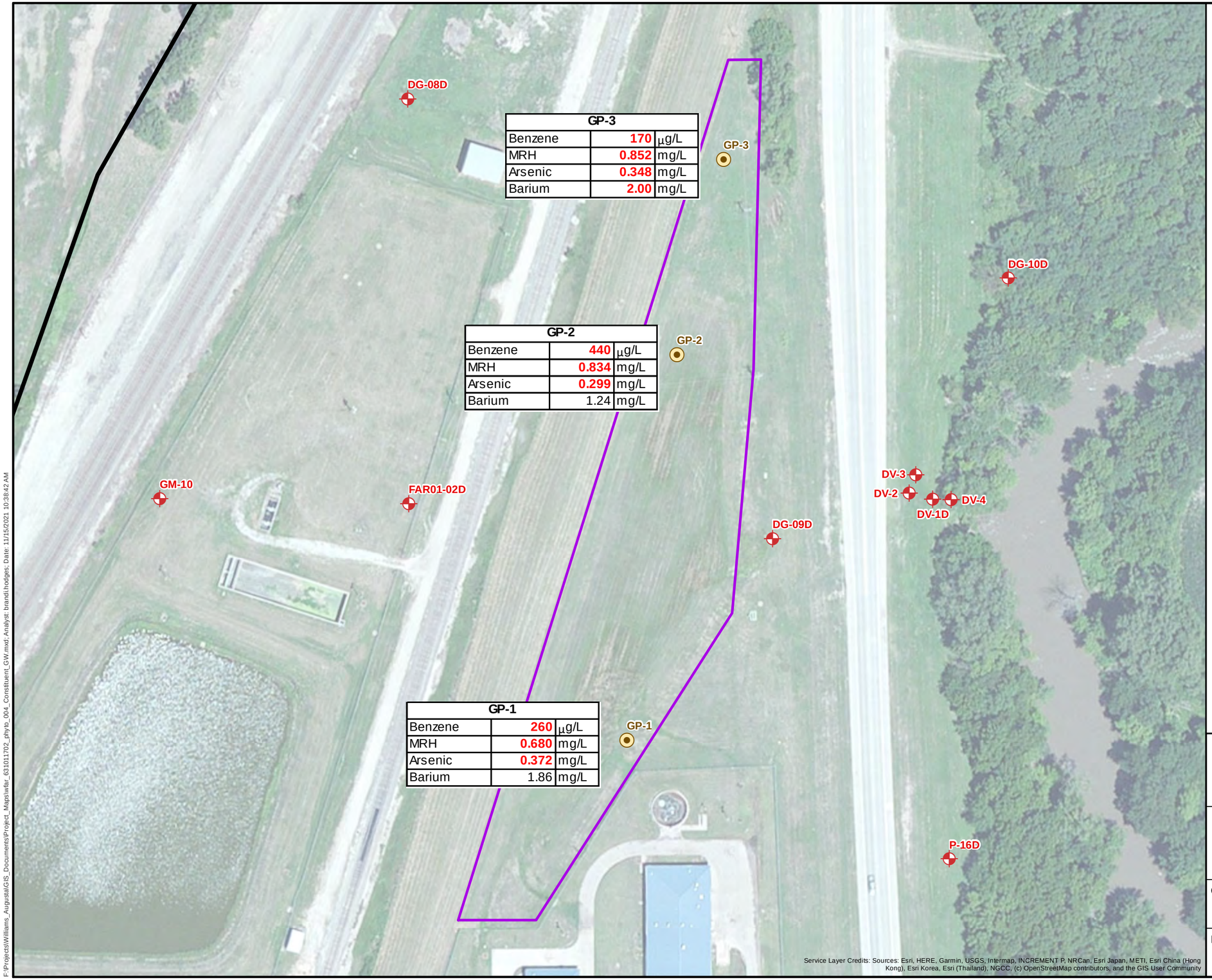
PHYTO AREA GROUNDWATER FLOW

CLIENT: FORMER AUGUSTA REFINERY
WILLIAMS PETROLEUM SERVICES

LOCATION: 215 N OAK STREET
AUGUSTA, KANSAS 67010

FIGURE: A-2

G:\Williams_Augusta\GIS_Documents\Project_Maps\wfar_631011702_phyto_002_gw_flow.mxd; Analyst: ben.holt; Date: 5/26/2021 4:21:03 PM



GP-3		
Benzene	170	µg/L
MRH	0.852	mg/L
Arsenic	0.348	mg/L
Barium	2.00	mg/L

GP-2		
Benzene	440	µg/L
MRH	0.834	mg/L
Arsenic	0.299	mg/L
Barium	1.24	mg/L

GP-1		
Benzene	260	µg/L
MRH	0.680	mg/L
Arsenic	0.372	mg/L
Barium	1.86	mg/L

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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LEGEND

- Geoprobe Boring
- Deep Monitoring Well
- Facility Boundary
- Preferred Phyto Area

Parameter	Sample ID / Sample Date / Units	EPA MCL
Total Petroleum Hydrocarbons		
Mid-Range Hydrocarbon (C9-C18)	mg/L	0.4*
Metals		
Arsenic	mg/L	0.01
Barium	mg/L	2
Votalile Organic Compounds (VOCs)		
Benzene	mg/L	0.005

Notes:

* KDHE Tier 2 Non-Residential Screening Levels for TPH in Groundwater,

N

0 20 40 60 80100 200

Feet

APTIM

2872 NORTH RIDGE ROAD, SUITE 102B
WICHITA, KANSAS 67205
(316) 220-8020

CONSTITUENT CONCENTRATIONS IN GROUNDWATER (MAY 11, 2021)

CLIENT: FORMER AUGUSTA REFINERY
WILLIAMS PETROLEUM SERVICES

LOCATION: 215 N OAK STREET
AUGUSTA, KANSAS 67010

FIGURE: A-3

GP-3 (5 - 7 ft)		
Benzene	0.0031J	mg/kg
MRH	109	mg/kg

GP-2 (5 - 7 ft)		
Benzene	**0.690**	mg/kg
MRH	**972**	mg/kg

GP-1 (5 - 7 ft)		
Benzene	<0.0042	mg/kg
MRH	<19.5	mg/kg

DG-08D
GP-3
DG-10D
GP-2
GM-10
FAR01-02D
DV-3
DV-2
DV-1D
DV-4
DG-09D
GP-1
P-16D

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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LEGEND

- Geoprobe Boring
- Deep Monitoring Well
- Facility Boundary
- Preferred Phyto Area

Parameter	Sample ID / Depth (feet bgs) / Sample Date	Units	RSK
Total Petroleum Hydrocarbons			
Mid-Range Hydrocarbon (C9-C18)		mg/kg	150
Votalile Organic Compounds (VOCs)			
Benzene		mg/kg	0.168

Notes:
RSK - Risk-Based Standards for Kansas, KDHE Tier 2 Non-residential Soil to GW SL
bgs - Below ground surface

N

0 20 40 60 80100 200

Feet

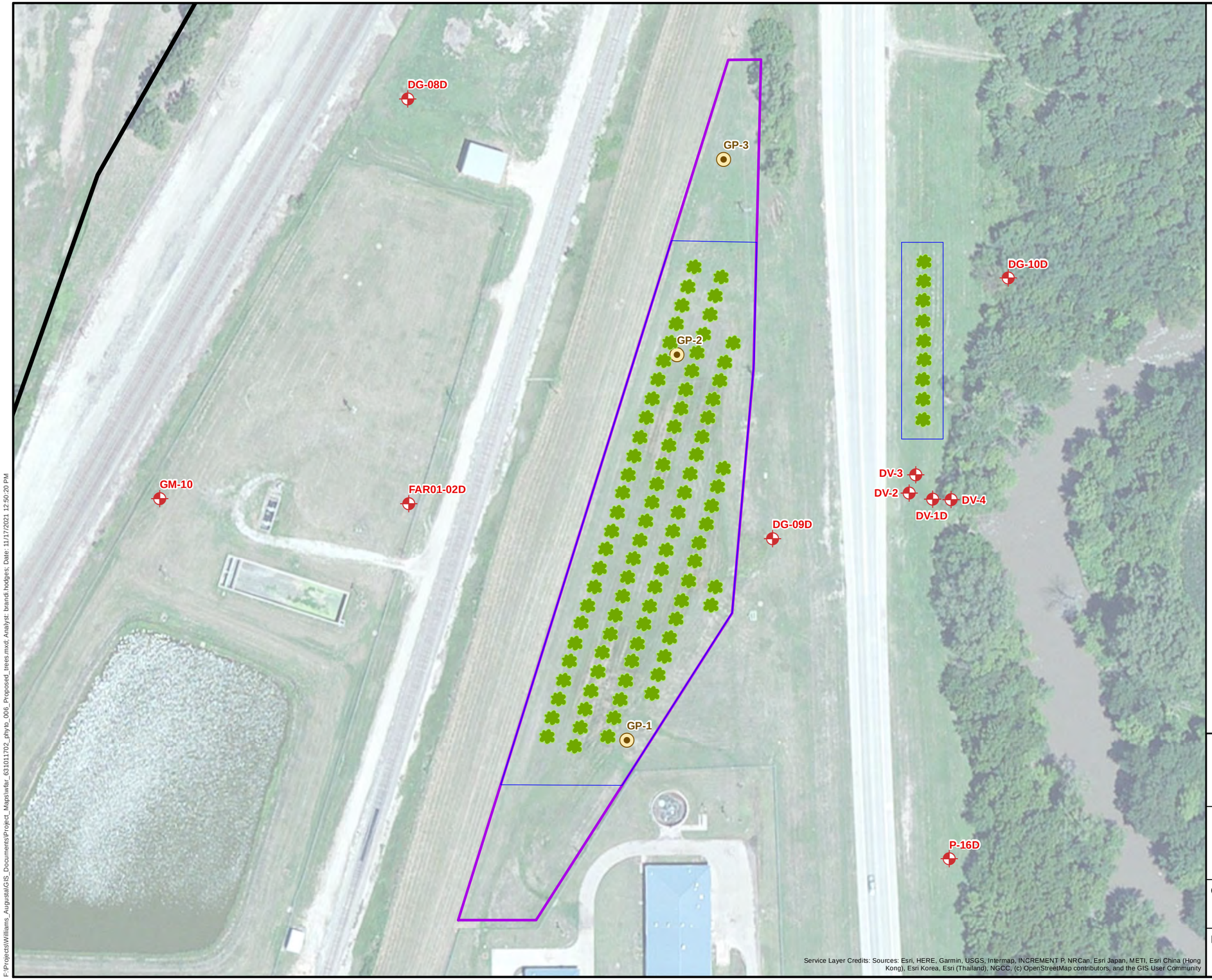
APTIM
2872 NORTH RIDGE ROAD, SUITE 102B
WICHITA, KANSAS 67205
(316) 220-8020

CONSTITUENT CONCENTRATIONS IN SOIL (MAY 11, 2021)

CLIENT: FORMER AUGUSTA REFINERY
WILLIAMS PETROLEUM SERVICES

LOCATION: 215 N OAK STREET
AUGUSTA, KANSAS 67010

FIGURE: A-4



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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LEGEND

- Conceptual Tree Layout
- Geoprobe Boring
- Deep Monitoring Well
- Facility Boundary
- Conceptual Phyto Planting
- Area Preferred Phyto Area

N

0 20 40 60 80100 200

Feet

APTIM

2872 NORTH RIDGE ROAD, SUITE 102B
WICHITA, KANSAS 67205
(316) 220-8020

CONCEPTUAL PHYTO AREA AND TREE LAYOUT

CLIENT: FORMER AUGUSTA REFINERY
WILLIAMS PETROLEUM SERVICES

LOCATION: 215 N OAK STREET
AUGUSTA, KANSAS 67010

FIGURE: A-5

Attachment A–1
ANS Pre-Design Investigation Report

Applied Natural Sciences, Inc.
7355 Dixon Dr
Fairfield Twp., Ohio 45011
Ph: 513-895-6061
Email: ans@treemediation.com
Web: www.treemediation.com

October 25, 2021

Phil Osborn
Environmental Geologist
APTIM
2872 N. Ridge Road, Suite 102
Wichita, KS 67205

Re: Pre-Design Investigation Report
PHYTO-INTEGRATED® Remediation
System at the Former Augusta Refinery
Augusta, Kansas

Dear Phil,

Applied Natural Sciences, Inc. (ANS) is pleased to submit this Pre-Design Investigation Report for a *TreeWell*® unit-based groundwater remediation system at the Former Augusta Refinery (FAR) located in Augusta, Kansas.

The boundary remediation target areas identified to ANS by APTIM are addressed in this Pre-Design Investigation. The following report presents the results of a field site assessment performed on May 11, 2021, and provides conceptual details and budget estimates for phytoremediation implementation at this Site.

Sincerely,
Applied Natural Sciences, Inc.

Paul R. Thomas
President

Brad L. Snow, P.E., P.G.
Senior Associate

cc: Tara Gatliff, ANS

ATTACHMENTS

1. Introduction and Background

1.1 Site Location and History

The Former Augusta Refinery (FAR) is located at 215 Oak Street in Augusta, Kansas. Based on information provided to date by APTIM, the primary contaminants of concern (COC) in the groundwater at the site are benzene and related constituents of concern, as well as arsenic. A designed and constructed phytoremediation system is under consideration to aid in the reduction and hydraulic containment of the COCs in migrating groundwater.

1.2 Project Objectives

An engineered phytoremediation approach is being considered by APTIM as a means of reducing the volume of shallow groundwater migrating away from the FAR in sand and gravel unit. A *PHYTO-INTEGRATED*® remediation system using *TreeWell* technology is proposed with the objective of consuming water from these permeable strata as a means of reducing the potential for offsite migration groundwater southeast of the FAR.

Additionally, the *TreeWell* units would provide groundwater access for implementation of other in situ remediation technologies, such as air sparging and other means for increasing dissolved oxygen levels, soil (backfill) vapor extraction, and introduction of chemical oxidants.

The area proposed and available for installation of a *TreeWell*-based system is shown on Figure 1.

1.3 Local Geology and Hydrology

The Site is located in the southern part of Augusta, Kansas adjacent on the west to the north-south oriented US Highway 77. The closest surface water body is the Walnut River, which is as close as approximately 210 feet east of the Site eastern boundary, and is separated by Highway 77. This nearby western meander loop of the Walnut River is the location of groundwater discharge. Preventing potential dissolved phase hydrocarbon discharges in the Walnut River is the primary focus of this phytoremediation project.

The confluence of the Walnut River and Whitewater River is an estimated 4,200 feet southwest of the Site southwest corner. The Whitewater River is as close as 2,100 feet southwest of the Site. Both rivers flow generally to the south; however, these mature streams have numerous meanders and abandoned channels and oxbow lakes in the area.

Based on boring logs (see Attachment A) developed during the May 2021 site assessment performed by ANS along with APTIM staff, the Alluvium ranges in depth from 29.4 feet to an estimated 35 feet below ground surface (bgs). The alluvium depths' variations are largely the consequence of varying ground surface elevations rather than differences in top of bedrock elevation. The Alluvium consists of silty clay to depths of 25.5 to 29.3 feet bgs. The silty clay contains varying very soft to stiff layers with a few very fine sand-filled fractures.

The silty clay is underlain by a basal permeable unit that consists of a well graded, very fine to coarse sand. The sand unit contains fine to medium size gravel, most of which are angular to subangular limestone and chert fragments, along with white platy shells. Below the Alluvium sand unit and grading downward is a limestone that is weathered and permeable. With depth, the limestone is less weathered and is hard, resulting in drilling refusal.

Groundwater in the immediate Site area flows generally toward the east to its discharge into the Walnut River. Background information provided by APTIM suggests that groundwater in the Alluvium basal sand unit discharges into the Walnut River, as does the much lower permeability Alluvium silty clay unit. It is assumed that the weathered limestone unit acts similarly to the basal sand and that, for hydrogeologic purposes, those two geologic units may be considered as one hydrogeologic unit.

2. Site Assessment Work Scope and Results

2.1 Assessment Objectives

The purpose and objectives of the site visit and data collection efforts included:

- Identify potential fatal flaws for phytoremediation applicability to the Site
- Develop an understanding of site hydrogeology and how conditions could affect phytoremediation feasibility and pose potential constructability challenges
- Identify and characterize the existence of groundwater transmissive zones within the identified Areas insofar as it may impact phytoremediation design
- Evaluate whether existing groundwater quality would be deleterious for phytoremediation tree establishment and growth

Representatives of ANS, Brad Snow and Tara Gatliff, visited the Site on May 11, 2021 to gather feasibility assessment data regarding the implementation of *PHYTO-INTEGRATED* remediation. The work was performed in general accordance with an ANS proposal to APTIM, dated October 29, 2020.

2.2 Soil Borings

During the visit, three soil borings were drilled to depths ranging from 30.5 to 36.5 feet below ground surface (bgs). The borings were installed in the Western and Southeastern Areas of the Site. ANS representatives were present to visually log soil samples from the three borings. The borings were designated GP-1, GP-2, and GP-3 and were located as shown on Figure 2. Soil boring logs are presented in Attachment A.

2.3 Groundwater Sampling and Laboratory Analyses

Groundwater samples were collected on May 11, 2021 from each of the three soil borings (GP-1, GP-2, and GP-3). Groundwater samples were placed in plastic containers and shipped under chain-of-custody documentation to ServiTech Laboratories in Dodge City, Kansas. The samples were analyzed by ServiTech for agriculture-related inorganic constituents important for evaluating the compatibility of phytoremediation tree species with the Site groundwater. ServiTech's report is included here as Attachment B. The laboratory reports present the results of analyses for the following constituents and parameters (measured and calculated) – all units in mg/L unless otherwise specified.

- Electrical Conductivity, µmhos/cm
- pH, s.u.
- Nitrate, expressed as Nitrogen
- Chloride
- Sulfate, as SO_4
- Sulfate, as S
- Bicarbonate, as HCO_3
- Carbonate, as CO_3
- Total Alkalinity, as $CaCO_3$
- Hardness, as $CaCO_3$, as mg/L and grains/gal
- Calcium, Total
- Magnesium, Total
- Potassium Total
- Sodium, Total
- Sodium Adsorption Ratio (SAR), calculated ratio
- Adjusted SAR, calculated ratio
- Boron, Total
- Iron, Total
- Manganese, Total
- Total Dissolved Solids
- Corrosion Indices: Langlier Saturation Index and Aggressive Index, calculated

ServiTech's laboratory reports also provided data interpretations of the water samples for: General Rating as Irrigation Water, Salinity Index, Permeability Hazard, and Boron Hazard. Results from Borings GP-1 and GP-2 are very similar. Conductivity, pH, salts, and metals are all within the ideal range. GP-3 has slightly elevated conductivity as a result of slightly elevated chloride and sodium. The concentrations are not elevated to the extent that adverse impact on trees used in the *TreeWell* system is anticipated. In summary, ANS concludes that the groundwater quality is

suitable for a broad range of tree species and there are no apparent fatal flaws for the establishment of phytoremediation trees at this Site. Therefore, tree selection may focus on factors other than water quality, such as suitability for the area climate conditions, ease of establishment, growth rates, and resistance to disease/predation.

3. Phytoremediation Preliminary Design

3.1 Objectives

The proposed *TreeMediation* program is intended to accomplish the following:

- Isolate the trees in *TreeWell* units from the effects of percolating precipitation
- Establish hydraulic control through the consumption of groundwater in each of the targeted areas

ANS has extensive experience in successfully installing *PHYTO-INTEGRATED* remediation systems using *TreeWell* technology that efficiently target specific depth ranges.

ANS also has utilized a wide range of plant species under many different site conditions and geographical locations. It should be considered, however, that both ANS and the community of phytoremediation practitioners in general have more experience with particular tree genera, i.e., *populus* (poplar) and *salix* (willows) whose water consumption rates have been well established (both by ANS and others). ANS has an advantage of experience with a wide range of other species used at other sites over the last twenty years and will bring this experience to the final tree selection process.

Other types of trees have been preliminarily assessed for this Site to address considerations of longevity and function, particularly tree species that are native or well adapted to the climate and Site soil conditions. Subject to availability at commercial nurseries, ANS has tentatively selected three candidate deciduous trees likely to be suitable for the Site: Weeping Willow, American Sycamore, and Siouxland Poplar.

3.2 Hydraulic Calculations and Preliminary Design

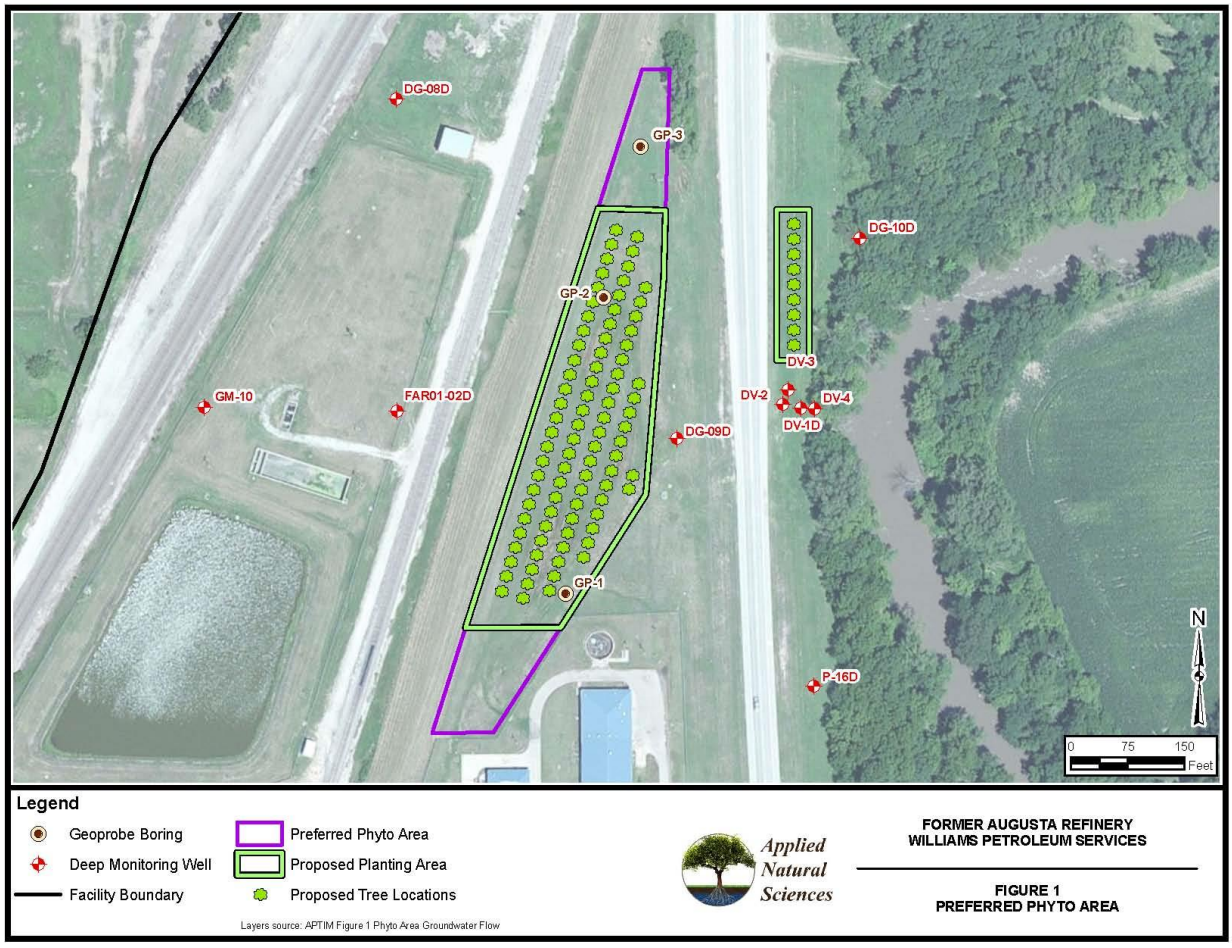
Groundwater flow potential through the water-bearing strata was estimated based on a range of estimated hydraulic conductivity (K) values, estimated gradient values, and thicknesses observed in the three test borings performed on May 11, 2021 (GP-1 through GP-3). ANS typically estimates Darcy lateral flow velocity and volume to assess the feasibility of using water consumption by trees as a means of hydraulic control and groundwater plume management.

Flow volume estimates were calculated through a 20-foot-wide section of the water-bearing sediments based on the observed lithologies in each boring. The 20-foot width is used because our standard *TreeWell* unit spacing is 20 feet and the flow volume estimate gives us a means of estimating the number of rows of *TreeWell* units required to control the groundwater.

The estimated daily groundwater flow volume through the area proposed for *TreeWell* unit installation is based on a saturated thickness of 8 feet and a hydraulic conductivity of 15 feet per day, a gradient of 0.0087, and an effective porosity of 28%. The length of cross-sectional area perpendicular to groundwater flow direction used for groundwater volume calculations was 500 feet.

The groundwater flow volume estimated across a 500-foot front was 4,875 gallons per day (gpd). Given the estimated flow volume through a 20-foot-wide section of this front (195 gpd), a staggered *TreeWell*-based system with three rows units has the potential to consume sufficient groundwater to control lateral flow during the growing season. 195 gpd is just within the performance limit of a three-row system, but a minimum four-row system is recommended in order to provide a factor of safety. The area available for planting is sufficient for a minimum four-row system and would contain 98 *TreeWell* units (Figure 1). This number of units has the potential to consume approximately 5,000 gpd during the growing season at maturity.

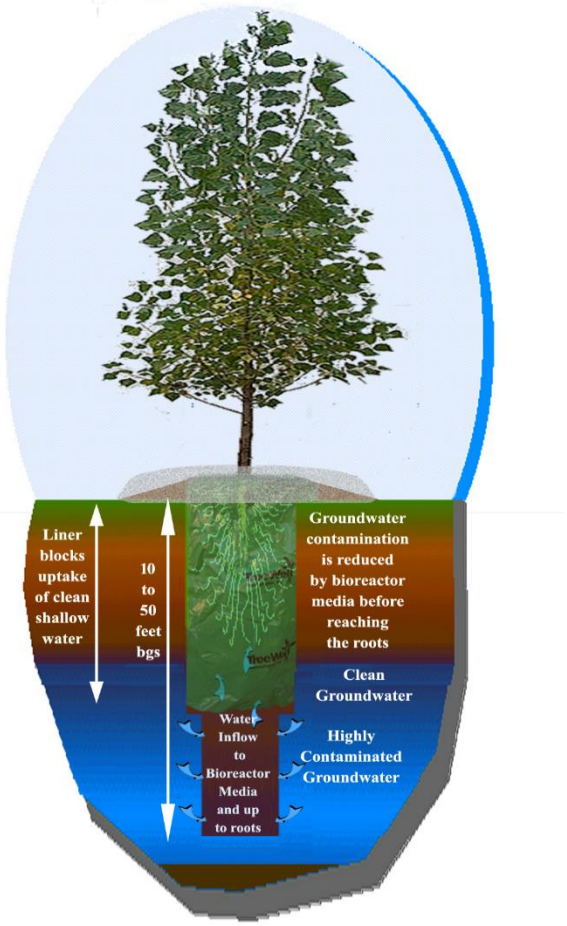
Figure 1. Conceptual *TreeWell* Unit Locations



3.3 *TreeWell* Unit Design

Figure 2 to the right is a conceptual representation of a *TreeWell* unit. The expectation is that the units will be drilled to a total depth of 30 to 35 feet using a 42-inch diameter auger, provided soil conditions allow. If borehole instability is encountered, the remainder of the hole will be excavated using a 24-inch auger. The *TreeWell* units will be lined to approximately 20 feet bgs with a *Root_Sleeve*™ liner and backfilled to the total drilled depth with amended sandy loam soil.

Figure 2. Conceptual *TreeWell* Unit



A surface mound will be created from soil cuttings and a tree will be planted at each location with the crown of the tree set approximately 1 to 2 feet above ground surface (ags). The purpose of the elevated planting mound is to create a barrier to surface water drainage into the *TreeWell* unit.

3.4 Proposed Tree Species

The following tree species are proposed based on their characteristics of water consumption, preferred soil conditions, and growth habit. Candidate species will be selected based on site objectives, experience at other phytoremediation projects, expectations of transplant stress, insect/animal predation, and extremes of weather.

Final selection will be based on required water consumption rates, drought tolerance, and plant availability. Preliminary choices include:

American Sycamore	*Platanus occidentalis*
Weeping Willow	*Salix babylonica*
Siouxland Poplar	*Populus deltoides 'Siouxland'*

3.5 Impact of *PHYTO-INTEGRATED* Remediation Systems on Site Hydrology

The proposed *PHYTO-INTEGRATED* remediation system will use *TreeWell* technology (see example in Figure 2 above) and will be designed to force the consumption of groundwater in the target area and to exclude the consumption of groundwater from percolating precipitation (above 20 feet). If

a tree spacing of 20 feet is assumed, a full in-row canopy is expected in three to four years depending on tree species and growth habits. Water consumption rates for a tree plantation are primarily a function of total leaf area and solar intensity (rather than the number of trees). An individual tree is expected to consume approximately 5 to 10 gallons per day (gpd) of water (averaged over the entire year) during the first growing season (depending on the initial size of the tree). This rate is conservatively expected to increase to 35 to 50 gpd over three to five years (depending on tree species and depth to groundwater). Optimization of the system may require the removal or replacement of some trees 6 to 8 years after planting to favor the better performing species. Canopy geometry and competition/shading from other trees are other factors that have the potential to impact water consumption rates.

3.6 Monitoring

Demonstration of effectiveness is the primary objective of the proposed Monitoring Program. This objective can be achieved by monitoring both the hydraulic effects of the *PHYTO-INTEGRATED* remediation system and the observed effects on the chemistry of samples from groundwater monitoring wells.

Typically, ANS monitors tree health and growth response through five growing seasons via two site visits per year. ANS can either provide comprehensive site evaluation reports regarding hydraulic and remedial effects or review data and documentation and provide input for said reports. At a minimum, ANS will annually report results from the spring/fall inspections. Time-sensitive information will be provided immediately via email or phone communications.

4. Budget Estimate

The estimated budget for the installation (10 days) and planting (3 day) are summarized below.

The total number of *TreeWell* units is subject to refinement as part of the final design process. However, for budgeting purposes it useful to estimate installation costs based on a unit cost range of approximately $4,000-$4,500 each that would include ANS labor, subcontractor drilling, subcontractor labor, materials, and travel/living expenses. Costs vary depending upon unit diameter, depth, backfill costs, etc. This would result in a cost of from $400,000 to $450,000 for the planting area described above.

Attachments

Attachment A

Boring Logs

SOIL BORING LOG

Applied Natural Sciences

Location: APTIM - Former Augusta Refinery, Kansas
Date/Time Drilled: 5/11/2021, 09:00
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-1
Latitude: 37° 39.943'
Longitude: -96° 58.926'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	Soil Sample No.	Soil Sample Depth	Soil Sample Rec.	Comments	Well
0	**(0.0-27.9') SILTY CLAY -** Topsoil (0-1.0'), medium plasticity, firm, moist, dark brown mottled grading to light brown with depth.	**CL**						Flush Completion
1								(0-23') bentonite chips
2			0.0		0-5'	4.3'/5'		
3								
4								
5	as above, softer 5-6.3', lighter brown.							
6								
7	Stiffer.		196		5-10'	5.0'/5'		
8								
9								
10	10.0-11.0' - Soft.							
11	Hydrocarbon odor with black streaks.							
12			341		10-15'	4.8'/5'		
13								
14								
15	45° fracture, fine with very-fine sand.							
16	Soft.							
17			104		15-20'	4.5'/5'		
18	18.0-19.3' - Gray, soft, very moist, coreless.							
19								

Applied Natural Sciences

SOIL BORING LOG

Location: APTIM - Former Augusta Refinery, Kansas

Date/Time Drilled: 5/11/2021, 09:00
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-1
Latitude: 37° 39.943'
Longitude: -96° 58.926'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	No.	Depth	Rec.	Comments	Well
20	20-21.2' - Brown, soft, slightly sandy, very moist, dark brown, stiff and firm.	CL						
21								
22	Gray, very soft, very moist.		174		20-25'	4.0'/5'		(23-25') bentonite chips (treated)
23								
24								
25								sand pack #20-40 mesh (25-32')
26	Stiff, dark brown, slightly moist.							
27			534		25-30'	3.0'/5'		1" ID PVC Screen 0.010" slot screen (27-32')
28	**(27.9-32') GRAVELLY SAND** - very fine-medium coarse, some silt, well graded with limestone clasts, approximately ¼", alternately clean and very silty layers.	SW						
29								
30								
31			315		30-32'	2.0'/2'	Refusal at 32' on limestone.	
32	Total depth = 32.0 feet							
33								
34								
35								
36								
37								
38								

SOIL BORING LOG

Applied Natural Sciences

Location: APTIM - Former Augusta Refinery, Kansas
Date/Time Drilled: 5/11/2021, 11:00
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-2
Latitude: 37° 40.099'
Longitude: -96° 58.913'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	Soil Sample No.	Soil Sample Depth	Soil Sample Rec.	Comments	Well
0								Flush Completion
0	**(0.0-25.5') SILTY CLAY -** Topsoil 0-1', organic, low-medium plasticity, soft, dark-brown, moist.	**CL**						
1	as above but firm hydrocarbon odor at approximately 2'.			0-2'				(0-21') bentonite chips
2			353		0-5'	4.8'/5'		
3				2-4'				
4								
5	as above with hydrocarbon odor, stiff.			4-6'				
6								
7				6-8'				
8			313		5-10'	5.0'/5'		
9				8-10'				
10								
11				10-12'				
12			323		10-15'	4.2'/5'		
13				12-14'				
14								
15				NS				
16				15-17'				
17			523	NS	15-20'	2.6'/5'		
18								
19								

Applied Natural Sciences

SOIL BORING LOG

Location: APTIM - Former Augusta Refinery, Kansas

Date/Time Drilled: 5/11/2021, 11:00
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-2
Latitude: 37° 40.099'
Longitude: -96° 58.913'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	No.	Depth	Rec.	Comments	Well
20		**CL**						
21				20-22'				(21-23') bentonite chips (treated)
22			263		20-25'	5.0'/5'		
23	23' - Grades to softer and gray, low plasticity.			22-24'				sand pack #20-40 mesh (23-30')
24								
25								
26	**(25.5-29.4') SAND/SILTY SAND -** Very fine-coarse with silt, with white platy fragments (shells), wet, loose, denser at 28.7', gray.	**SW SM**						
27			287	NS	25-30'			1" ID PVC Screen 0.010" slot screen (25-30')
28								
29								
30	**(29.4-30.5') WEATHERED LIMESTONE -** at top loose limestone fragments, graded to weathered hard/dense sandy gravel, white, possible Tonkawa Limestone.	**LS**					Refusal at 30.5'	Borehole collapse
31	Total depth = 30.5 feet							
32								
33								
34								
35								
36								
37								
38								

SOIL BORING LOG

Applied Natural Sciences

Location: APTIM - Former Augusta Refinery, Kansas
Date/Time Drilled: 5/11/2021, 13:10
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-3
Latitude: 37° 40.042'
Longitude: -96° 58.903'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	Soil Sample No.	Soil Sample Depth	Soil Sample Rec.	Comments	Well
0	**(0.0-29.3') SILTY CLAY -** low-medium plasticity, moist, firm, dark brown.	**CL**			0-5'	4.8'/5'		Flush Completion; (0-27') bentonite chips
5	Hydrocarbon odor, firm to stiff.				5-10'	5.0'/5'		
10	10-10.6' Soft. 10.6-16.2' Firm.				10-15'	5.0'/5'		
15	16.2-16.9' Soft. Firm-stiff.				15-20'	4.9'/5'		
20								

SOIL BORING LOG

Applied Natural Sciences

Location: APTIM - Former Augusta Refinery, Kansas

Date/Time Drilled: 5/11/2021, 13:10
Drilling Method: Direct Push
Driller: BGS - Doug, Alex
Logged By: Brad Snow, P.G.

Location: GP-3
Latitude: 37° 40.042'
Longitude: -96° 58.903'

Depth in Feet:	Lithologic Description	USCS	Soil Sample PID (ppm)	Soil Sample No.	Soil Sample Depth	Soil Sample Rec.	Comments	Well
20								
21								
22	21.7-22.8' Soft.				20-25'	4.2'/5'		
23	Firm-stiff.							
24								
25								
26								
27					25-30'	NR/5'		(27-29') bentonite chips (treated)
28								
29								sand pack #20-40 mesh (29-36')
	(29.3-29.7') CLAYEY SAND - Soft, loose, slight plasticity, very moist, gray.	**SC**						
30	**(29.7-33.8') SAND** - very fine-coarse, slightly silty, loose, wet, gray, well graded.	**SW**						
31								
32					30-35'	2.8'/5'		1" ID PVC Screen 0.010" slot screen (31-36')
33								
34	**(33.8-36.5') GRAVELLY SAND** - very fine-coarse, silty with limestone fragments in chert, dense, wet/saturated. More chert and less weathered with depth, wet, very permeable.	**SW**						
35								
36					35-36.5'	1.5'/1.5'	Casing refusal at 36.5'	
	Total depth = 36.5 feet							
37								
38								

Attachment B

Groundwater Data Reports

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Phone: 620.227.7123
800.557.7509
Fax: 620.227.2047

Lab #: **003719**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:06 p

Send To: 20304	APPLIED NATURAL SCIENCES EDD GATLIFF 7355 DIXON DR FAIRFIELD TOWNSHIP, OH 45011-8535

Sean H. Jenkins
QA Manager

Client Name:	AUGUSTA-APTIM	**Received:**	05/13/2021 10:35 am
Sample ID:	ANS GP-2	**Submitted By:**	UPS
Location:		**Invoice No:**	380796
Sampled:	05/11/2021 04:26 pm	**P.O. #:**	
Sampled By:	BRAD SNOW		

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Electrical Conductivity, at 18.9ºC	1080	µmho/cm		
pH, at 18.9ºC	7.1	unit		
Nitrate Nitrogen, NO3-N	<0.1	mg/L	<0.0	<0.0
Chloride, Cl	71	mg/L	16.2	2.0
Sulfate, SO4	<0.6	mg/L	<0.1	<0.0
Sulfate-Sulfur, SO4-S	<0.2	mg/L	<0.0	<0.0
Bicarbonate, HCO3	640	mg/L	145.1	10.5
Carbonate, CO3	<10	mg/L	<2.3	<0.3
Total Alkalinity, CaCO3	520	mg/L	117.9	10.4
Hardness (CaCO3)	490	mg/L		
Hardness (CaCO3)	28	grains/gal		
Total Calcium, Ca	127	mg/L	28.8	6.3
Total Magnesium, Mg	41	mg/L	9.3	3.4
Total Potassium, K	<2	mg/L	<0.5	<0.1
Total Sodium, Na	41	mg/L	9.3	1.8
Sodium Adsorption Ratio, SAR	0.8	ratio		
Adjusted SAR, SARa	1.1	ratio		
Total Boron, B	0.13	mg/L	<0.1	
Total Copper, Cu	<0.02	mg/L	<0.0	
Total Iron, Fe	17.2	mg/L	3.9	
Total Manganese, Mn	1.71	mg/L	0.4	
Total Zinc, Zn	<0.04	mg/L	<0.0	
Total Dissolved Solids (Calc), TDS	691	mg/L		

Corrosion Indices

Report formatted for regulatory compliance available upon request.

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Phone: 620.227.7123
800.557.7509
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Lab #: **003719**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:06 p

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Sample ID: ANS GP-2	**Client Name:** AUGUSTA-APTIM		**Location:**	
Corrosion Indices				
Langelier Index, LI	0.7			
Aggressive Index, AI	12.5			

Interpretations for Corrosive Indices

AGGRESSIVE INDEX (over 12.0): The Aggressive Index (AI) is a measure of the tendency of water to deteriorate the structure of asbestos-cement pipes. The result Indicates that this water is considered "non-aggressive". A water supply can be verry corrosive even though the pH is neutral. This occurs in water where there is no hardness or dissolved minerals to coat piping and protect it from the natural corrosiveness of the water.

LANGLIER SATURATION INDEX (LSI): A calculation that indicates the calcium carbonate (CaCO3) saturation of a water supply. An index value of 0.5 or greater is considered "positive".This indicates the water supply has an increasing tendency to precipitate calcium carbonate and form a protective scale layer. The water supply may be considered "non-corrosive", but there are other factors that may affect the ability to prevent corrosion. These factors include the type of metals used for piping and fixtures, water temperature, flow rate, and others.

Interpretations For Irrigation Use

GENERAL RATING - GOOD QUALITY IRRIGATION WATER

SALINITY HAZARD - LOW: Low potential for extended use of this irrigation water to result in salt accumulations and soil salinity problems, Extended use of this water source is considered satisfactory for establishment and growth most crops. This water source could affect growth of very salt-sensitive plant species, especially if conditions allow salts to accumulate in the active rooting zone.

PERMEABILITY HAZARD: VERY LOW. The sodium in this irrigation water (as determined by the adjusted SAR) is not expected to affect soil properties.

BORON HAZARD - VERY LOW: Boron is one of the essential plant nutrients required by plants for healthy growth but it is only needed in very small amounts and can therefore become toxic to plants even at very low concentrations. The boron concentration in this water source is considered safe for most field crops and landscape plants.

Report formatted for regulatory compliance available upon request.

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Lab #: **003720**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:07 p

Send To: 20304	APPLIED NATURAL SCIENCES EDD GATLIFF 7355 DIXON DR FAIRFIELD TOWNSHIP, OH 45011-8535

Sean H. Jenkins
QA Manager

Client Name:	AUGUSTA-APTIM	**Received:**	05/13/2021 10:35 am
Sample ID:	ANS GP-1	**Submitted By:**	UPS
Location:		**Invoice No:**	380796
Sampled:	05/11/2021 05:15 pm	**P.O. #:**	
Sampled By:	BRAD SNOW		

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Electrical Conductivity, at 18.9ºC	1180	µmho/cm		
pH, at 18.9ºC	7.1	unit		
Nitrate Nitrogen, NO3-N	<0.1	mg/L	<0.0	<0.0
Chloride, Cl	76	mg/L	17.1	2.1
Sulfate, SO4	<0.6	mg/L	<0.1	<0.0
Sulfate-Sulfur, SO4-S	<0.2	mg/L	<0.0	<0.0
Bicarbonate, HCO3	720	mg/L	163.2	11.8
Carbonate, CO3	<10	mg/L	<2.3	<0.3
Total Alkalinity, CaCO3	590	mg/L	133.8	11.8
Hardness (CaCO3)	540	mg/L		
Hardness (CaCO3)	31	grains/gal		
Total Calcium, Ca	142	mg/L	32.2	7.1
Total Magnesium, Mg	44	mg/L	10.0	3.6
Total Potassium, K	<2	mg/L	<0.5	<0.1
Total Sodium, Na	45	mg/L	10.2	2.0
Sodium Adsorption Ratio, SAR	0.8	ratio		
Adjusted SAR, SARa	1.2	ratio		
Total Boron, B	0.14	mg/L	<0.1	
Total Copper, Cu	<0.02	mg/L	<0.0	
Total Iron, Fe	17.5	mg/L	4.0	
Total Manganese, Mn	0.480	mg/L	0.1	
Total Zinc, Zn	<0.04	mg/L	<0.0	
Total Dissolved Solids (Calc), TDS	755	mg/L		

Corrosion Indices

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Lab #: **003720**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:07 p

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Sample ID: ANS GP-1	**Client Name:** AUGUSTA-APTIM		**Location:**	
Corrosion Indices				
Langelier Index, LI	0.8			
Aggressive Index, AI	12.6			

Interpretations for Corrosive Indices

AGGRESSIVE INDEX (over 12.0): The Aggressive Index (AI) is a measure of the tendency of water to deteriorate the structure of asbestos-cement pipes. The result Indicates that this water is considered "non-aggressive". A water supply can be verry corrosive even though the pH is neutral. This occurs in water where there is no hardness or dissolved minerals to coat piping and protect it from the natural corrosiveness of the water.

LANGLIER SATURATION INDEX (LSI): A calculation that indicates the calcium carbonate (CaCO3) saturation of a water supply. An index value of 0.5 or greater is considered "positive".This indicates the water supply has an increasing tendency to precipitate calcium carbonate and form a protective scale layer. The water supply may be considered "non-corrosive", but there are other factors that may affect the ability to prevent corrosion. These factors include the type of metals used for piping and fixtures, water temperature, flow rate, and others.

Interpretations For Irrigation Use

GENERAL RATING - GOOD QUALITY IRRIGATION WATER

SALINITY HAZARD - LOW: Low potential for extended use of this irrigation water to result in salt accumulations and soil salinity problems, Extended use of this water source is considered satisfactory for establishment and growth most crops. This water source could affect growth of very salt-sensitive plant species, especially if conditions allow salts to accumulate in the active rooting zone.

PERMEABILITY HAZARD: VERY LOW. The sodium in this irrigation water (as determined by the adjusted SAR) is not expected to affect soil properties.

BORON HAZARD - VERY LOW: Boron is one of the essential plant nutrients required by plants for healthy growth but it is only needed in very small amounts and can therefore become toxic to plants even at very low concentrations. The boron concentration in this water source is considered safe for most field crops and landscape plants.

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Lab #: **003721**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:08 p

Send To: 20304	APPLIED NATURAL SCIENCES EDD GATLIFF 7355 DIXON DR FAIRFIELD TOWNSHIP, OH 45011-8535		Sean H. Jenkins QA Manager
Client Name:	AUGUSTA-APTIM	**Received:**	05/13/2021 10:35 am
Sample ID:	ANS GP-3	**Submitted By:**	UPS
Location:		**Invoice No:**	380796
Sampled:	05/11/2021 05:53 pm	**P.O. #:**	
Sampled By:	BRAD SNOW		

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Electrical Conductivity, at 18.9ºC	1510	µmho/cm		
pH, at 18.9ºC	7.0	unit		
Nitrate Nitrogen, NO3-N	<0.1	mg/L	<0.0	<0.0
Chloride, Cl	104	mg/L	23.6	2.9
Sulfate, SO4	0.69	mg/L	0.2	<0.1
Sulfate-Sulfur, SO4-S	0.23	mg/L	0.1	<0.1
Bicarbonate, HCO3	900	mg/L	204.0	14.7
Carbonate, CO3	<10	mg/L	<2.3	<0.3
Total Alkalinity, CaCO3	740	mg/L	167.8	14.8
Hardness (CaCO3)	720	mg/L		
Hardness (CaCO3)	42	grains/gal		
Total Calcium, Ca	194	mg/L	44.0	9.7
Total Magnesium, Mg	57	mg/L	12.9	4.7
Total Potassium, K	<2	mg/L	<0.5	<0.1
Total Sodium, Na	66	mg/L	15.0	2.9
Sodium Adsorption Ratio, SAR	1.1	ratio		
Adjusted SAR, SARa	1.6	ratio		
Total Boron, B	0.20	mg/L	<0.1	
Total Copper, Cu	<0.02	mg/L	<0.0	
Total Iron, Fe	25.1	mg/L	5.7	
Total Manganese, Mn	1.14	mg/L	0.3	
Total Zinc, Zn	<0.04	mg/L	<0.0	
Total Dissolved Solids (Calc), TDS	966	mg/L		

Corrosion Indices

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Lab #: **003721**

LABORATORY ANALYSIS REPORT

Report Date: 05/18/2021 04:08 p

Analysis	Result	Unit	lbs / Acre Inch	meq / L
Sample ID: ANS GP-3	**Client Name:** AUGUSTA-APTIM		**Location:**	
Corrosion Indices				
Langelier Index, LI	0.9			
Aggressive Index, AI	12.7			

Interpretations for Corrosive Indices

AGGRESSIVE INDEX (over 12.0): The Aggressive Index (AI) is a measure of the tendency of water to deteriorate the structure of asbestos-cement pipes. The result Indicates that this water is considered "non-aggressive". A water supply can be verry corrosive even though the pH is neutral. This occurs in water where there is no hardness or dissolved minerals to coat piping and protect it from the natural corrosiveness of the water.

LANGLIER SATURATION INDEX (LSI): A calculation that indicates the calcium carbonate (CaCO3) saturation of a water supply. An index value of 0.5 or greater is considered "positive".This indicates the water supply has an increasing tendency to precipitate calcium carbonate and form a protective scale layer. The water supply may be considered "non-corrosive", but there are other factors that may affect the ability to prevent corrosion. These factors include the type of metals used for piping and fixtures, water temperature, flow rate, and others.

Interpretations For Irrigation Use

GENERAL RATING - ACCEPTABLE QUALITY IRRIGATION WATER

SALINITY HAZARD - MEDIUM: Extended use of this irrigation water is considered satisfactory for growth of many plants. Soluble salts have potential to accumulate to levels that may affect growth of moderately salt-sensitive species (e.g., alfalfa, corn, soybeans), may affect young seedlings, or may affect newly planted cuttings. Routine leaching by a degree of over irrigating may be needed to mobilize salts into the lower root zone, but good internal soil drainage is necessary. Test irrigation water and soil regularly to monitor salinity levels.

PERMEABILITY HAZARD: VERY LOW. The sodium in this irrigation water (as determined by the adjusted SAR) is not expected to affect soil properties.

BORON HAZARD - VERY LOW: Boron is one of the essential plant nutrients required by plants for healthy growth but it is only needed in very small amounts and can therefore become toxic to plants even at very low concentrations. The boron concentration in this water source is considered safe for most field crops and landscape plants.

Report formatted for regulatory compliance available upon request.

Attachment A–2
Well Logs

APTIM

2872 N. Ridge Road, Suite 102
Wichita, Kansas 67205
(316) 220-8020

Site Id: GP-1

Date Started: 05/11/21

Project Name: Williams FAR-Phyto Feas Assess	Coordinate X:
Project Number: 631011702	Coordinate Y:
Location: Augusta, KS	Static Water Level: 6.60'
Logged By: Craig Taylor	Measuring Point: Ground Level
Contractor: BGS	Total Depth: 31.58'
Drilling Method: Direct Push - Macro Core	Borehole Dia.: 3.25 in

Remarks:

Blank Casing:
type: PVC dia: 1.00in
fm: -2.78' to: 26.58

Screens:
type: Slotted size: 0.010in dia: 1.00in
fm: 26.58' to: 31.58'

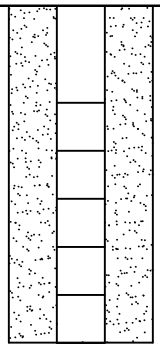
Annular Fill:
type: Bentonite Pellets fm: 0.00' to: 22.00'
type: Bentonite Chips fm: 22.00' to: 24.00'
type: Silica Sand Pack fm: 24.00' to: 31.58'

Completed Depth: 31.58'

Depth	Well Construction	Water Level	% Recovery	PID	Sample No.	USCS Code	Graphic Log	Material Description
0			95	0		CH		0-5' Clay: black brown, moist, semi-stiff, semi-plastic
5			100	196		CH		5-10' Clay: brown to black with depth, moist, semi-stiff, plastic
10			100	341		CH		10-15' Clay: brown gray black, medium plastic, semi-stiff, @ 11' black streaks, hydrocarbon odor
15			95	104		CH		15-18.5' Clay: dark reddish brown (5YR 3/2), moist, semi-stiff, plastic
20			90	534		CH		18.5-20' Clay: gley 1 (10Y 4/2), dark greenish gray, moist, soft, medium plastic
25						CH		20-25' Clay: gley 1 (10Y 3/1), very dark greenish gray, moist, stiff, medium plastic

APTIM

Site Id:	GP-1
Date Started:	05/11/21

Depth	Well Construction	Water Level	% Recovery	PID	Sample No.	USCS Code	Graphic Log	Material Description
25			100	315		ML		25-28' Clayey silt: gray, light gray, wet, soft, low plastic
30			40			CL		28-32' Sandy clay: fine grained, gray light tan, saturated, loose, fine and medium grained sand at 30', gray tan, limestone angular fragments
35								Probe Refusal @ 32'
40								
45								
50								
55								

APTIM
2872 N. Ridge Road, Suite 102
Wichita, Kansas 67205
(316) 220-8020

Site Id: GP-2

Date Started: 05/11/21

Project Name: Williams FAR-Phyto Feas Assess	Coordinate X:
Project Number: 631011702	Coordinate Y:
Location: Augusta, KS	Static Water Level: 1.50'
Logged By: Craig Taylor	Measuring Point: Ground Level
Contractor: BGS	Total Depth: 29.70'
Drilling Method: Direct Push - Macro Core	Borehole Dia.: 3.25 in

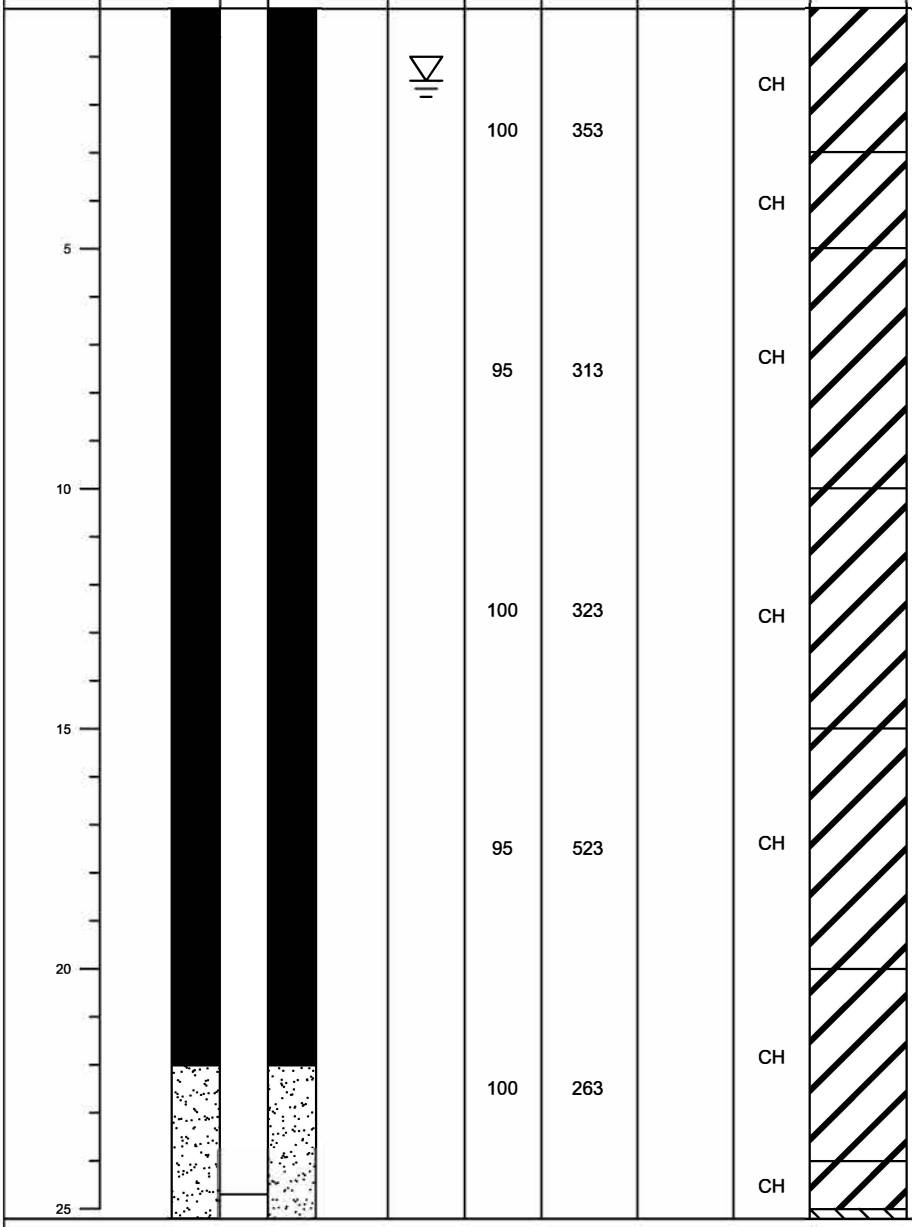
Remarks: Geoprobe 7822 DT Rig

Blank Casing:
type: PVC dia:1.00in
fm:-2.37' to: 24.70'

Screens:
type:Slotted size:0.010in dia: 1.00in
fm:24.70' to:29.70'

Annular Fill:
type: Bentonite Pellets fm: 0.00' to: 20.00'
type: Bentonite Chips fm: 20.00' to: 22.00'
type: Silica Sand Pack fm: 22.00' to: 29.70'

Completed Depth: 29.70'



Material Description

0-3' Clay: very dark brown (10YR 2/2), moist, semi-stiff, low plastic

3-5' Clay: gley 1 (10Y 3/1), very dark greenish gray, moist, stiff, medium plastic

5-10' Clay: black gray green, moist, semi-stiff, plastic

10-15' Clay: gley 1 (10Y 3/1), very dark greenish gray, moist, stiff, plastic

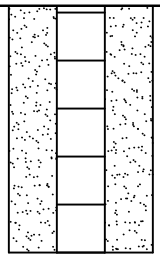
15-20' Clay: gley 1 (5GY 2.5/1), greenish black, moist, stiff, plastic

20-24' Clay: black greenish gray, moist, very stiff, plastic, brown 0.5" dirt layer

24-25' Clay: gray to light gray, moist, soft, non-plastic

APTIM

Site Id:	GP-2
Date Started:	05/11/21

Depth	Well Construction	Water Level	% Recovery	PID	Sample No.	USCS Code	Graphic Log	Material Description
25			40			CL		25-27' Silty clay: light gray white, wet, loose, non-plastic
						SC		27-29' Sand: medium-fine grained, dark gray, saturated, loose, limestone fragments, angular, metallic flakes
30						LS		29-30.5' Limestone: weathered, light tan white
								Probe Refusal @ 30.5'
35								
40								
45								
50								
55								

APTIM

2872 N. Ridge Road, Suite 102
Wichita, Kansas 67205
(316) 220-8020

Site Id: GP-3

Date Started: 05/11/21

Project Name: Williams FAR-Phyto Feas Assess	Coordinate X:
Project Number: 631011702	Coordinate Y:
Location: Augusta, KS	Static Water Level: 8.55'
Logged By: Craig Taylor	Measuring Point: Ground Level
Contractor: BGS	Total Depth: 36.38'
Drilling Method: Direct Push - Macro Core	Borehole Dia.: 3.25 in

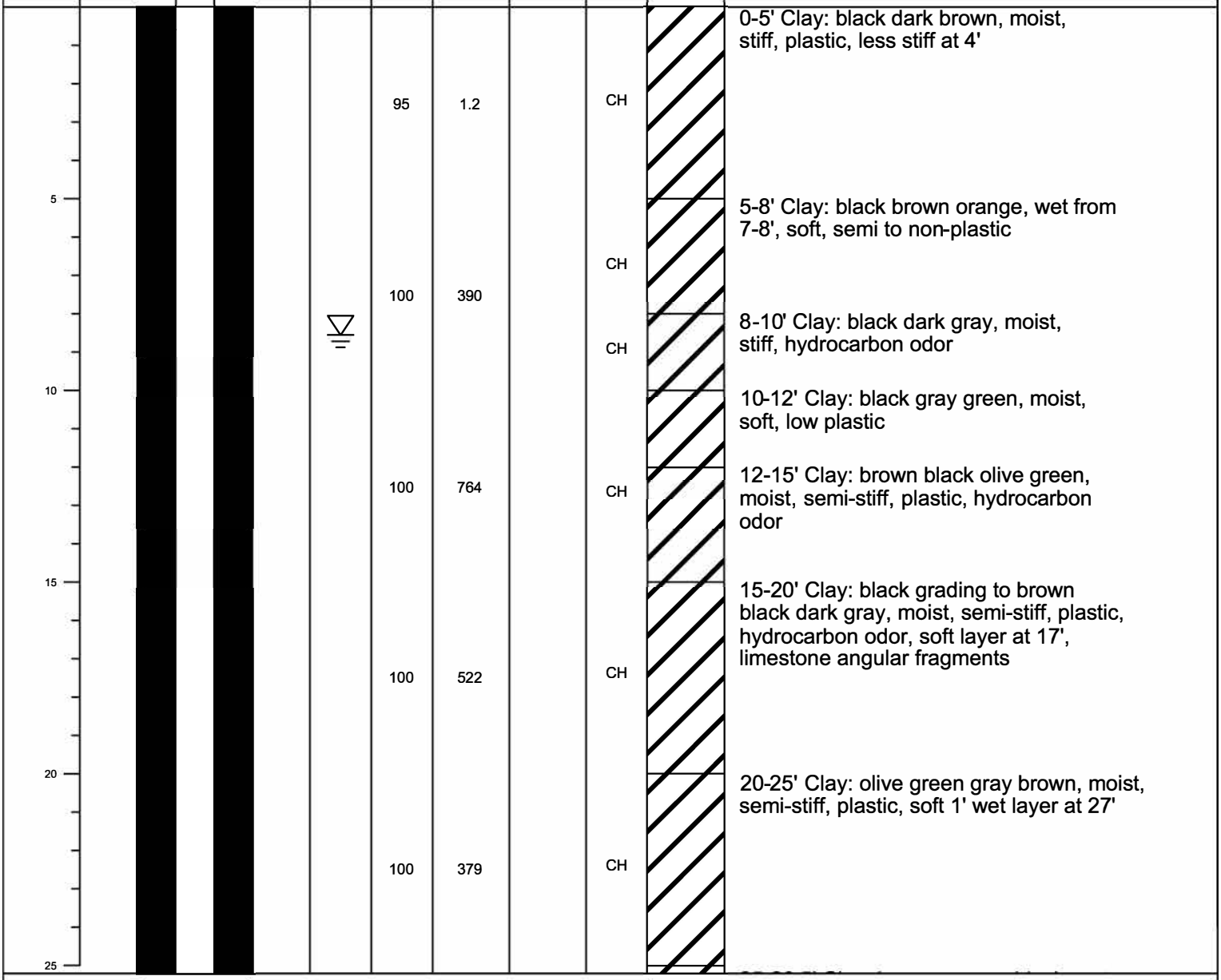
Blank Casing:
type: PVC dia: 1.00in
fm: -2.23' to: 31.38'

Screens:
type: Slotted size: 0.010in dia: 1.00in
fm: 31.38' to: 36.38'

Annular Fill:
type: Bentonite Pellets fm: 0.00' to: 27.00'
type: Bentonite Chips fm: 27.00' to: 29.00'
type: Silica Sand Pack fm: 29.00' to: 36.38'

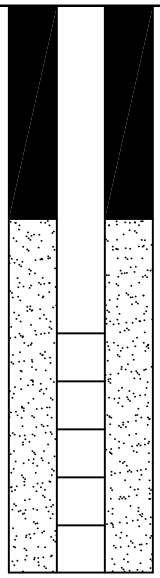
Remarks:

Completed Depth: 36.38'

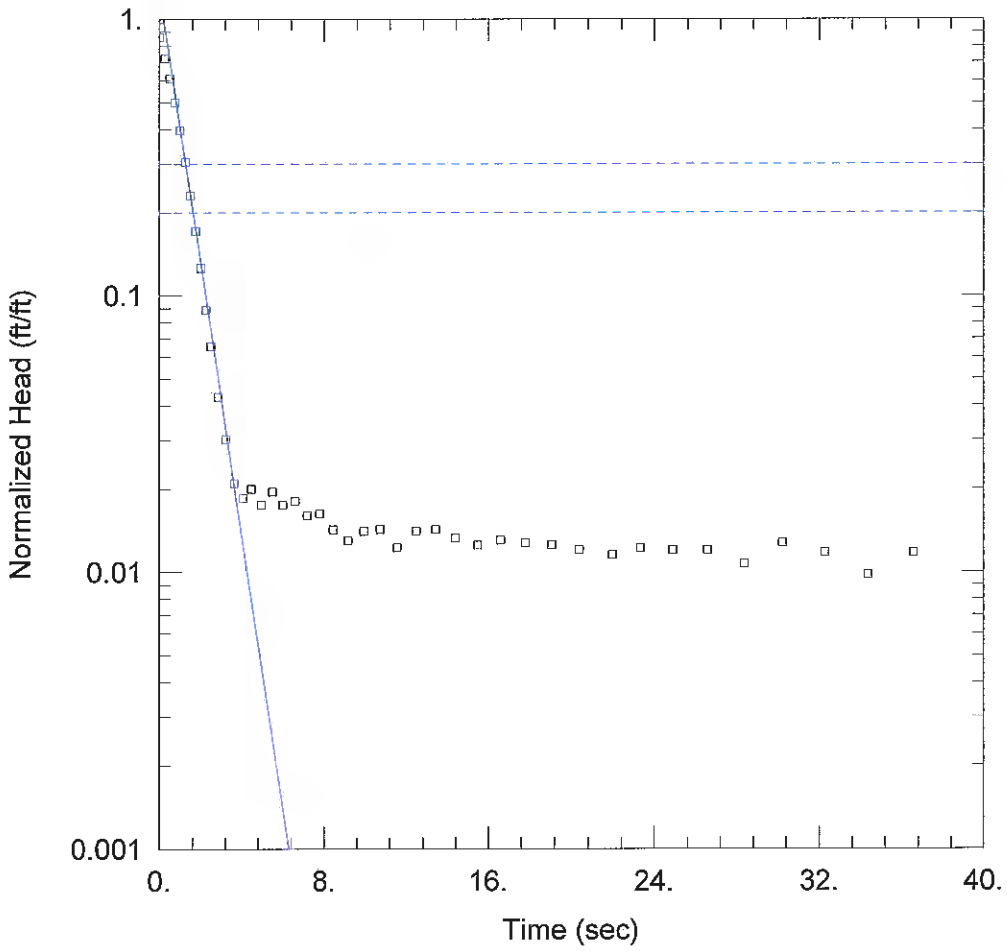


APTIM

Site Id:	GP-3
Date Started:	05/11/21

Depth	Well Construction	Water Level	% Recovery	PID	Sample No.	USCS Code	Graphic Log	Material Description
25			100	700		CH		25-26.5' Clay: brown orange black, wet, soft, non-plastic
						CH		26.5-27' Clay: olive green brown, moist, stiff, plastic
						CL		27-30' Silty clay: gray light gray tan, wet, soft 6" layer at 28', grades with depth to medium grained loose clay sand
30			30			SC		30-35' Sand: medium to fine coarse, gray light brown, saturated, angular chert nodules, limestone angular fragments
35						SC		35-36.5' Sand gravel: medium grained coarse, white light tan gray, saturated, angular limestone fragments
								Probe Refusal @ 36.5'
40								
45								
50								
55								

Attachment A-3
Aquifer Slug
Test Evaluations



GP-1 TEST 1

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test1.aqt
Date: 05/20/21 Time: 14:54:09

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-1
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-1)

Initial Displacement: 4. ft
Total Well Penetration Depth: 31.58 ft
Casing Radius: 0.042 ft
Static Water Column Height: 25.01 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 83.34 ft/day
y0 = 5.011 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test1.aqt
Title: GP-1 Test 1
Date: 05/20/21
Time: 14:56:29

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-1

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-1

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4. ft
Static Water Column Height: 25.01 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 31.58 ft

No. of Observations: 44

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	3.444	8.44	0.057
0.268	2.88	9.16	0.052
0.5	2.448	9.94	0.056
0.75	1.998	10.72	0.057
1.	1.586	11.56	0.049
1.25	1.223	12.46	0.056
1.5	0.92	13.42	0.057
1.75	0.686	14.38	0.053
2.	0.504	15.46	0.05
2.25	0.356	16.6	0.052
2.5	0.262	17.8	0.051
2.86	0.172	19.06	0.05
3.22	0.121	20.38	0.048
3.64	0.084	21.97	0.046
4.06	0.074	23.32	0.049
4.48	0.08	24.88	0.048
4.96	0.07	26.56	0.048
5.5	0.078	28.36	0.043
5.98	0.07	30.22	0.051
6.581	0.072	32.26	0.047
7.181	0.064	34.36	0.039
7.781	0.065	36.58	0.047

SOLUTION

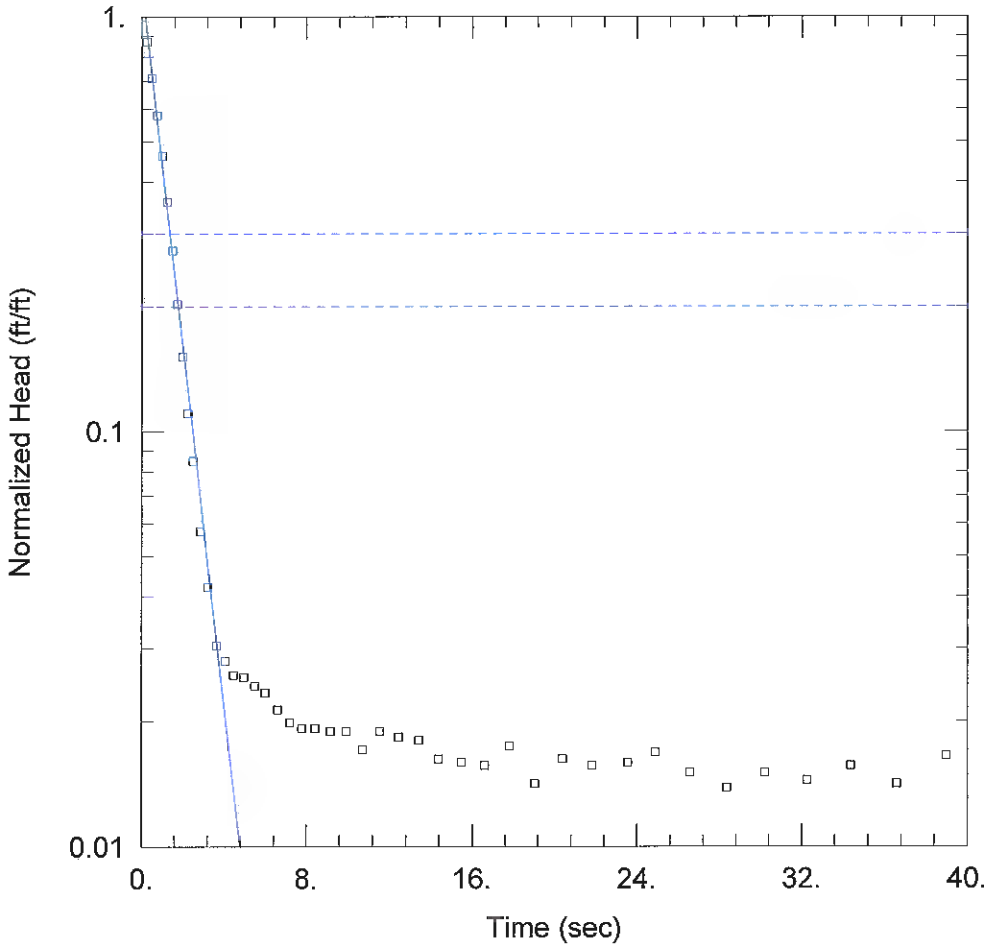
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.824

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	83.34	ft/day
y0	5.011	ft

K = 0.0294 cm/sec
T = K*b = 2119.4 ft²/day (22.79 sq. cm/sec)



GP-1 TEST 2

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test2.aqt
Date: 05/20/21 Time: 16:30:10

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-1
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-1)

Initial Displacement: 3.323 ft
Total Well Penetration Depth: 24.58 ft
Casing Radius: 0.042 ft
Static Water Column Height: 25.01 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 64.82 ft/day
y0 = 3.861 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test2.aqt
Title: GP-1 Test 2
Date: 05/20/21
Time: 16:31:06

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-1

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-1

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.323 ft
Static Water Column Height: 25.01 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 24.58 ft

No. of Observations: 45

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	3.323	9.16	0.063
0.25	2.885	9.94	0.063
0.5	2.362	10.72	0.057
0.75	1.923	11.56	0.063
1.	1.536	12.46	0.061
1.25	1.19	13.42	0.06
1.5	0.907	14.38	0.054
1.75	0.673	15.46	0.053
2.	0.502	16.6	0.052
2.25	0.367	17.8	0.058
2.5	0.282	19.06	0.047
2.86	0.191	20.38	0.054
3.22	0.14	21.82	0.052
3.64	0.101	23.55	0.053
4.06	0.093	24.88	0.056
4.48	0.086	26.56	0.05
4.96	0.085	28.36	0.046
5.5	0.081	30.22	0.05
5.98	0.078	32.26	0.048
6.58	0.071	34.36	0.052
7.18	0.066	36.58	0.047
7.78	0.064	38.98	0.055
8.44	0.064		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

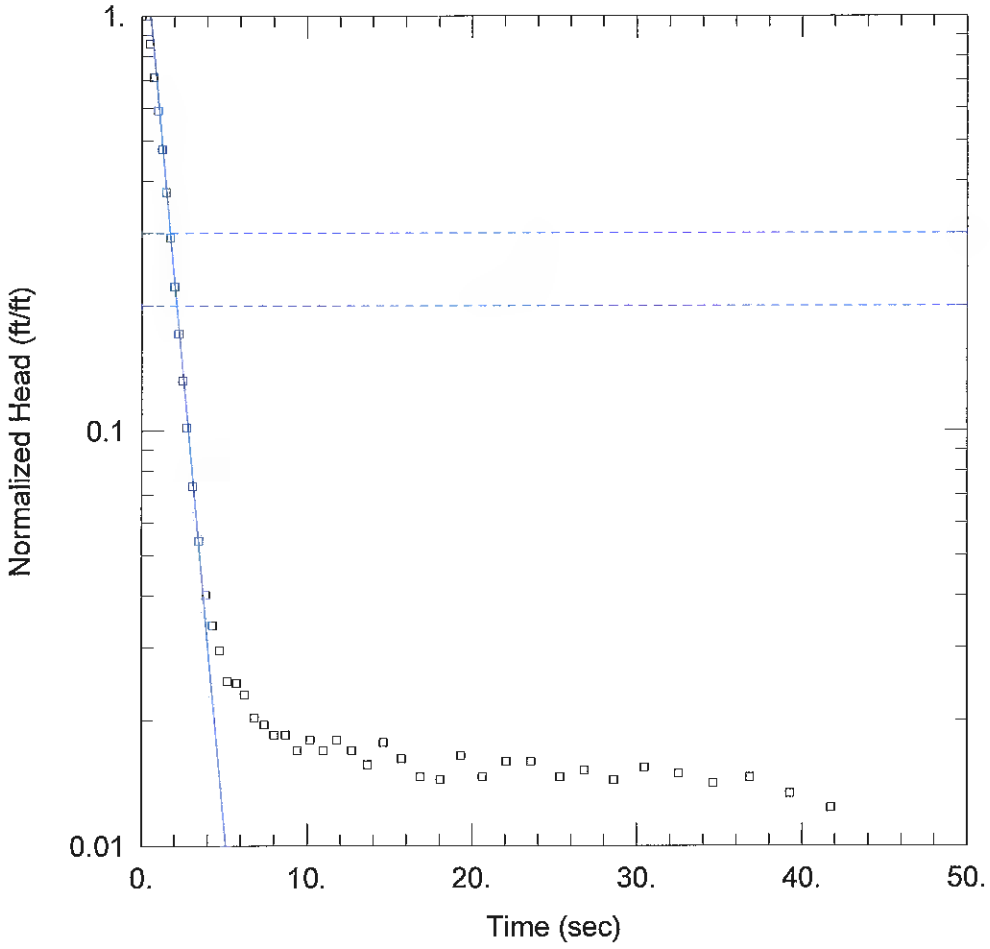
ln(Re/rw): 4.282

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	64.82	ft/day
y0	3.861	ft

K = 0.02287 cm/sec
T = K*b = 1648.4 ft²/day (17.72 sq. cm/sec)



GP-1 TEST 3

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test3.aqt
Date: 05/20/21 Time: 16:45:31

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-1
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-1)

Initial Displacement: 3.89 ft
Total Well Penetration Depth: 24.58 ft
Casing Radius: 0.042 ft
Static Water Column Height: 25.01 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 66.14 ft/day
y0 = 6.814 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP1 test3.aqt
Title: GP-1 Test 3
Date: 05/20/21
Time: 16:46:46

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-1

AQUIFER DATA

Saturated Thickness: 25.43 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-1

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.89 ft
Static Water Column Height: 25.01 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 24.58 ft

No. of Observations: 46

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	3.89	9.41	0.066
0.5	3.339	10.19	0.07
0.75	2.766	10.97	0.066
1.	2.304	11.81	0.07
1.25	1.857	12.71	0.066
1.5	1.465	13.67	0.061
1.75	1.136	14.63	0.069
2.	0.866	15.71	0.063
2.25	0.666	16.85	0.057
2.5	0.514	18.05	0.056
2.75	0.396	19.31	0.064
3.11	0.286	20.63	0.057
3.47	0.211	22.07	0.062
3.89	0.156	23.57	0.062
4.31	0.132	25.34	0.057
4.73	0.115	26.81	0.059
5.21	0.097	28.61	0.056
5.75	0.096	30.47	0.06
6.23	0.09	32.51	0.058
6.83	0.079	34.61	0.055
7.431	0.076	36.83	0.057
8.03	0.072	39.23	0.052
8.69	0.072	41.75	0.048

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

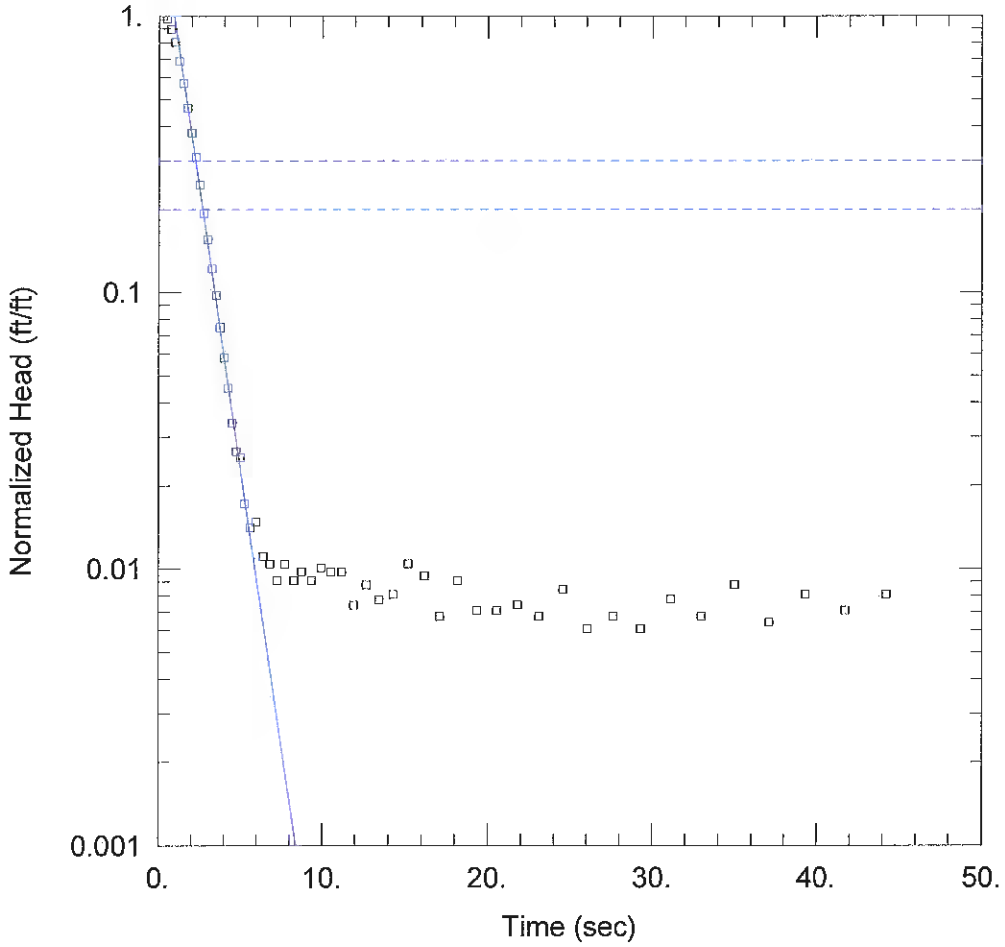
ln(Re/rw): 4.282

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	66.14	ft/day
y0	6.814	ft

K = 0.02333 cm/sec
T = K*b = 1681.8 ft²/day (18.08 sq. cm/sec)



GP-2 TEST 1

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test1.aqt
Date: 05/24/21 Time: 11:11:45

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-1
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-2)

Initial Displacement: 2.97 ft
Total Well Penetration Depth: 28.2 ft
Casing Radius: 0.042 ft
Static Water Column Height: 28.2 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 59.76 ft/day
y0 = 6.99 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test1.aqt
Title: GP-2 Test 1
Date: 05/24/21
Time: 11:13:52

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-1

AQUIFER DATA

Saturated Thickness: 30.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-2

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.97 ft
Static Water Column Height: 28.2 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.2 ft

No. of Observations: 56

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	2.97	8.73	0.029
0.5	2.906	9.33	0.027
0.75	2.667	9.93	0.03
1.	2.392	10.53	0.029
1.25	2.038	11.19	0.029
1.5	1.694	11.91	0.022
1.75	1.379	12.69	0.026
2.	1.124	13.47	0.023
2.25	0.916	14.31	0.024
2.5	0.731	15.21	0.031
2.75	0.576	16.17	0.028
3.	0.461	17.13	0.02
3.25	0.362	18.21	0.027
3.5	0.29	19.35	0.021
3.75	0.222	20.55	0.021
4.	0.173	21.81	0.022
4.25	0.134	23.13	0.02
4.5	0.1	24.57	0.025
4.75	0.079	26.07	0.018
5.	0.075	27.63	0.02
5.25	0.051	29.31	0.018
5.609	0.042	31.11	0.023
5.97	0.044	32.97	0.02
6.39	0.033	35.01	0.026
6.81	0.031	37.11	0.019
7.23	0.027	39.33	0.024
7.71	0.031	41.73	0.021
8.25	0.027	44.25	0.024

SOLUTION

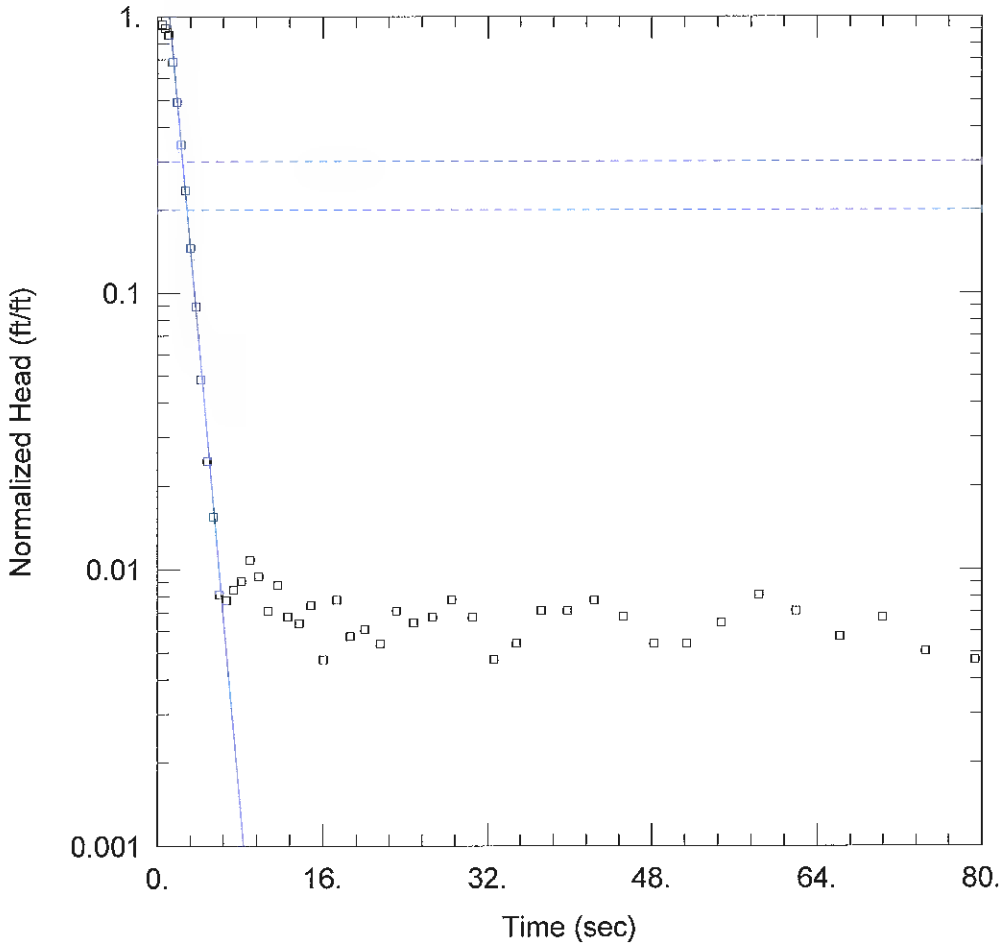
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.227

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	59.76	ft/day
y0	6.99	ft

K = 0.02108 cm/sec
T = K*b = 1822.8 ft²/day (19.6 sq. cm/sec)



GP-2 TEST 2

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test2.aqt
Date: 05/24/21 Time: 11:32:13

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-2
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-2)

Initial Displacement: 2.97 ft
Total Well Penetration Depth: 28.2 ft
Casing Radius: 0.042 ft
Static Water Column Height: 28.2 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 61.59 ft/day
y0 = 8.994 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test2.aqt
Title: GP-2 Test 2
Date: 05/24/21
Time: 11:33:45

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-2

AQUIFER DATA

Saturated Thickness: 30.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-2

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 2.97 ft
Static Water Column Height: 28.2 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.2 ft

No. of Observations: 49

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.25	4.117	17.31	0.023
0.5	2.78	18.63	0.017
0.75	2.7	20.07	0.018
1.11	2.545	21.57	0.016
1.47	2.035	23.13	0.021
1.89	1.462	24.81	0.019
2.31	1.022	26.61	0.02
2.73	0.699	28.47	0.023
3.21	0.433	30.51	0.02
3.75	0.265	32.61	0.014
4.23	0.144	34.83	0.016
4.83	0.073	37.23	0.021
5.43	0.046	39.75	0.021
6.03	0.024	42.39	0.023
6.69	0.023	45.21	0.02
7.41	0.025	48.21	0.016
8.19	0.027	51.39	0.016
8.97	0.032	54.75	0.019
9.81	0.028	58.35	0.024
10.71	0.021	61.95	0.021
11.67	0.026	66.15	0.017
12.63	0.02	70.35	0.02
13.71	0.019	74.55	0.015
14.85	0.022	79.35	0.014
16.05	0.014		

SOLUTION

Slug Test
Aquifer Model: Unconfined

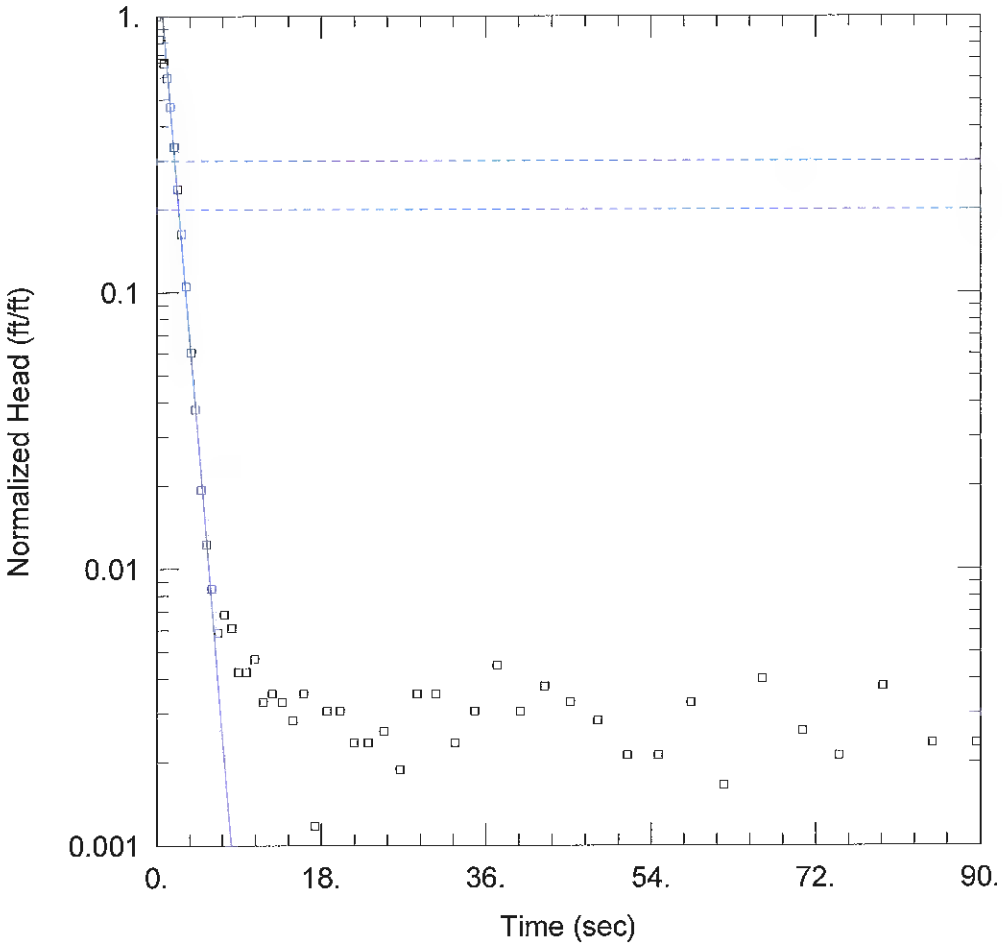
Solution Method: Bouwer-Rice
ln(Re/rw): 4.227

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	61.59	ft/day
y0	8.994	ft

K = 0.02173 cm/sec
T = K*b = 1878.6 ft²/day (20.2 sq. cm/sec)



GP-2 TEST 3

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test3.aqt
Date: 05/24/21 Time: 11:43:55

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-2
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-2)

Initial Displacement: 4.25 ft
Total Well Penetration Depth: 28.2 ft
Casing Radius: 0.042 ft
Static Water Column Height: 28.2 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 58.63 ft/day
y0 = 7.158 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP2 test3.aqt
Title: GP-2 Test 3
Date: 05/24/21
Time: 11:44:38

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-2

AQUIFER DATA

Saturated Thickness: 30.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-2

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.25 ft
Static Water Column Height: 28.2 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.2 ft

No. of Observations: 52

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.25	17.31	0.005
0.25	3.499	18.63	0.013
0.5	2.988	20.07	0.013
0.75	2.871	21.57	0.01
1.11	2.533	23.13	0.01
1.47	1.993	24.81	0.011
1.89	1.434	26.61	0.008
2.31	1.007	28.47	0.015
2.73	0.692	30.51	0.015
3.21	0.446	32.61	0.01
3.75	0.258	34.83	0.013
4.23	0.16	37.23	0.019
4.83	0.082	39.75	0.013
5.43	0.052	42.39	0.016
6.03	0.036	45.21	0.014
6.69	0.025	48.21	0.012
7.41	0.029	51.39	0.009
8.19	0.026	54.75	0.009
8.97	0.018	58.35	0.014
9.81	0.018	61.95	0.007
10.71	0.02	66.15	0.017
11.67	0.014	70.56	0.011
12.63	0.015	74.55	0.009
13.71	0.014	79.35	0.016
14.85	0.012	84.75	0.01
16.05	0.015	89.55	0.01

SOLUTION

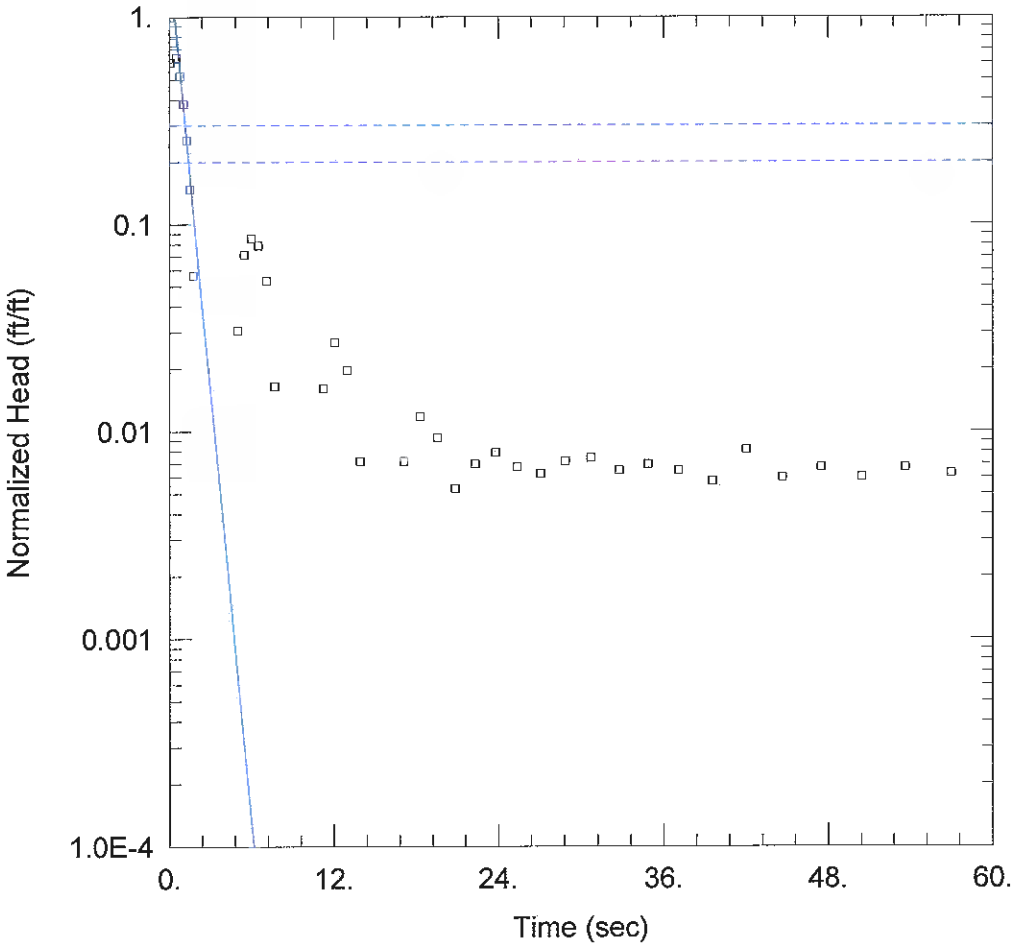
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.227

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	58.63	ft/day
y0	7.158	ft

K = 0.02068 cm/sec
T = K*b = 1788.3 ft²/day (19.23 sq. cm/sec)



GP-3 TEST 1

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test1.aqt
Date: 05/24/21 Time: 15:54:04

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-3
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 36.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-3)

Initial Displacement: 4.17 ft
Total Well Penetration Depth: 27.83 ft
Casing Radius: 0.042 ft
Static Water Column Height: 27.83 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 98.62 ft/day
y0 = 7.631 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test1.aqt
Title: GP-3 Test 1
Date: 05/24/21
Time: 15:54:42

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-3

AQUIFER DATA

Saturated Thickness: 36.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-3

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.17 ft
Static Water Column Height: 27.83 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 27.83 ft

No. of Observations: 53

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.056	2.514	11.22	0.067
0.251	3.13	12.06	0.112
0.501	2.655	12.96	0.082
0.751	2.165	13.92	0.03
1.001	1.593	14.88	-0.008
1.251	1.057	15.96	-0.004
1.501	0.616	17.1	0.03
1.751	0.236	18.3	0.049
2.001	-0.078	19.56	0.039
2.251	-0.313	20.88	0.022
2.501	-0.476	22.32	0.029
2.751	-0.587	23.82	0.033
3.001	-0.627	25.38	0.028
3.361	-0.593	27.06	0.026
3.721	-0.473	28.86	0.03
4.141	-0.277	30.72	0.031
4.561	-0.057	32.76	0.027
4.981	0.128	34.86	0.029
5.461	0.296	37.08	0.027
6.001	0.357	39.55	0.024
6.481	0.329	42.	0.034
7.081	0.222	44.64	0.025
7.681	0.069	47.46	0.028
8.281	-0.052	50.46	0.025
9.941	-0.072	53.64	0.028
10.07	-0.062	57.	0.026
10.44	-0.018		

SOLUTION

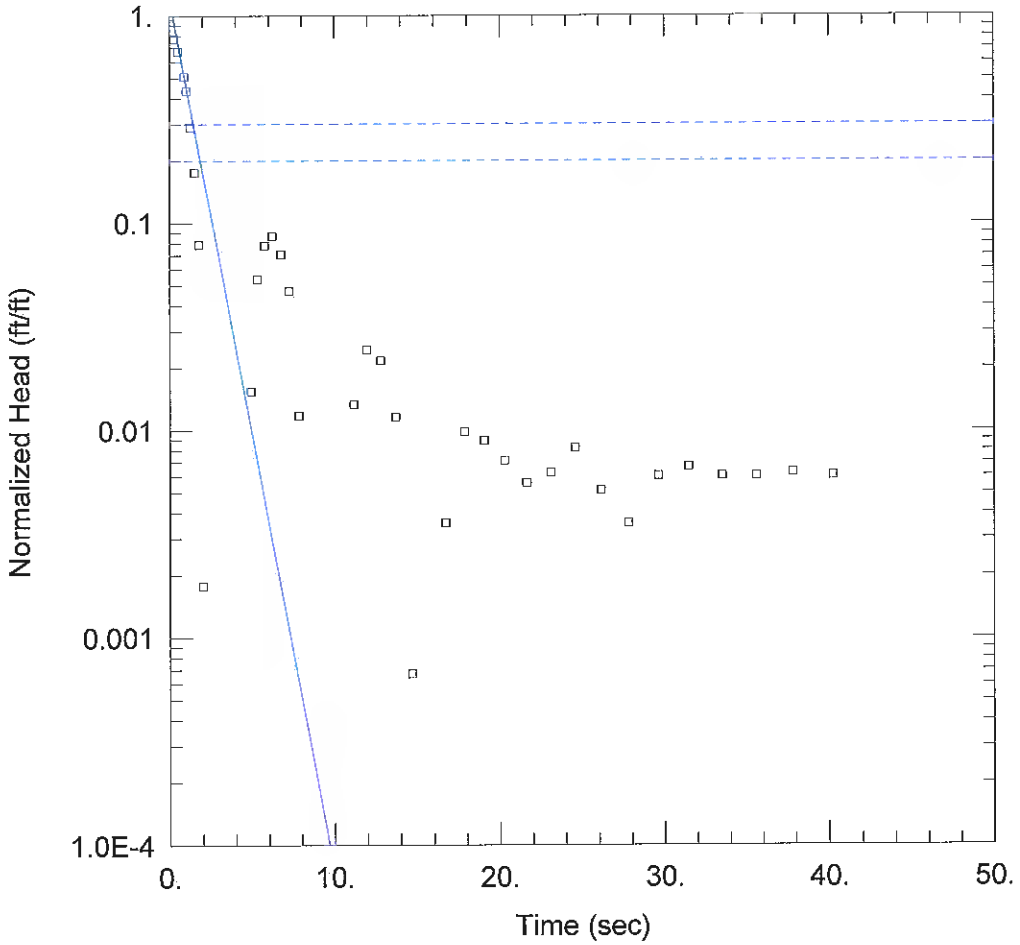
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.067

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	98.62	ft/day
y0	7.631	ft

K = 0.03479 cm/sec
T = K*b = 3599.5 ft²/day (38.7 sq. cm/sec)



GP-3 TEST 2

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test2.aqt
Date: 05/24/21 Time: 16:02:28

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-3
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 36.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-3)

Initial Displacement: 4.5 ft
Total Well Penetration Depth: 27.83 ft
Casing Radius: 0.042 ft
Static Water Column Height: 27.83 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 60.19 ft/day
y0 = 5.407 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test2.aqt
Title: GP-3 Test 2
Date: 05/24/21
Time: 16:03:14

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-3

AQUIFER DATA

Saturated Thickness: 36.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-3

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.5 ft
Static Water Column Height: 27.83 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 27.83 ft

No. of Observations: 50

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.5	8.43	-0.079
0.25	3.485	9.03	-0.132
0.5	3.03	9.69	-0.116
0.868	2.285	10.41	-0.034
1.	1.95	11.19	0.06
1.25	1.307	11.97	0.11
1.5	0.789	12.81	0.097
1.75	0.354	13.71	0.052
2.	0.008	14.67	0.003
2.25	-0.273	15.89	-0.005
2.5	-0.474	16.71	0.016
2.75	-0.6	17.85	0.044
3.	-0.67	19.05	0.04
3.25	-0.679	20.31	0.032
3.5	-0.632	21.63	0.025
3.75	-0.543	23.07	0.028
4.11	-0.353	24.57	0.037
4.47	-0.15	26.13	0.023
4.89	0.069	27.81	0.016
5.31	0.241	29.61	0.027
5.73	0.351	31.47	0.03
6.21	0.389	33.51	0.027
6.75	0.318	35.61	0.027
7.23	0.211	37.83	0.028
7.83	0.053	40.23	0.027

SOLUTION

Slug Test

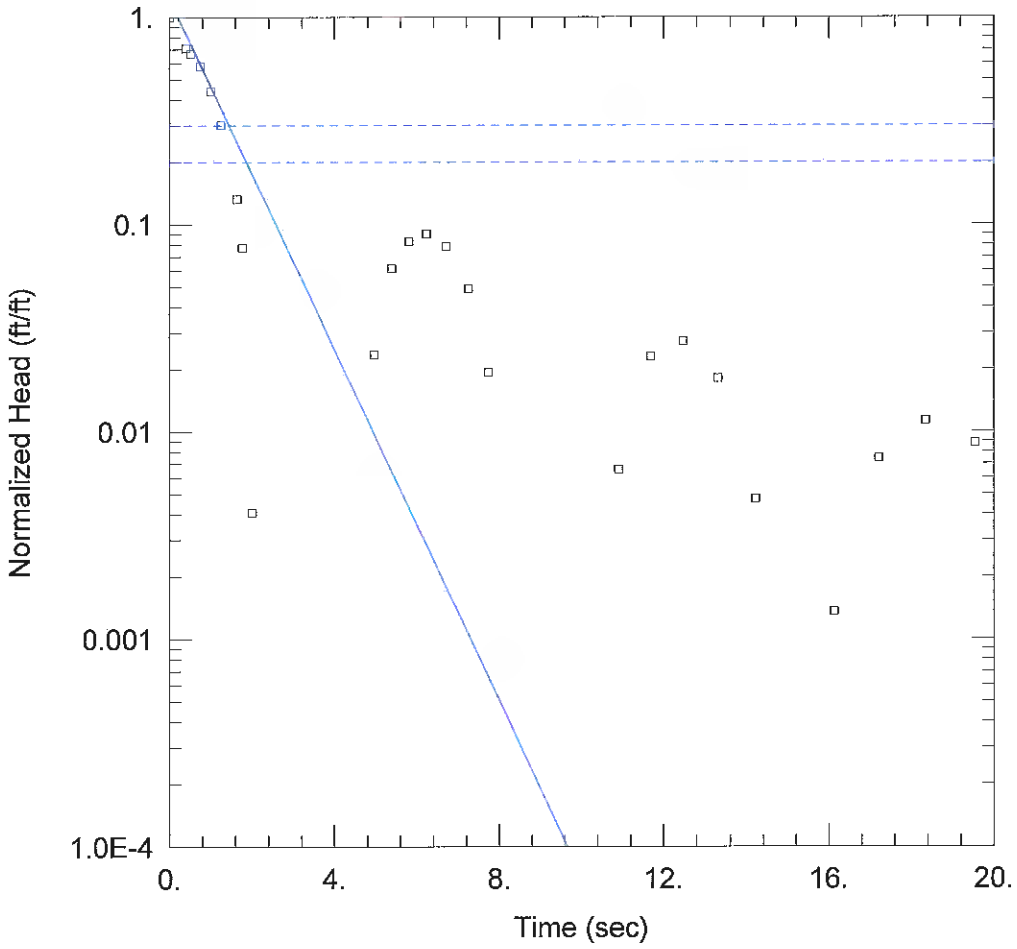
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.067

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	60.19	ft/day
y0	5.407	ft

K = 0.02123 cm/sec
T = K*b = 2196.8 ft²/day (23.62 sq. cm/sec)



GP-3 TEST 3

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test3.aqt
Date: 05/24/21 Time: 16:21:09

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: GP-3
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 36.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GP-3)

Initial Displacement: 4.42 ft
Total Well Penetration Depth: 27.83 ft
Casing Radius: 0.042 ft
Static Water Column Height: 27.83 ft
Screen Length: 5. ft
Well Radius: 0.042 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 60.37 ft/day
y0 = 5.394 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\GP3 test3.aqt
Title: GP-3 Test 3
Date: 05/24/21
Time: 16:21:51

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: GP-3

AQUIFER DATA

Saturated Thickness: 36.5 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: GP-3

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.42 ft
Static Water Column Height: 27.83 ft
Casing Radius: 0.042 ft
Well Radius: 0.042 ft
Well Skin Radius: 0.135 ft
Screen Length: 5. ft
Total Well Penetration Depth: 27.83 ft

No. of Observations: 40

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.42	5.39	0.271
0.394	3.129	5.81	0.367
0.517	2.943	6.23	0.398
0.75	2.568	6.71	0.345
1.	1.941	7.25	0.217
1.25	1.334	7.73	0.085
1.639	0.585	8.33	-0.046
1.763	0.341	8.93	-0.121
2.	0.018	9.53	-0.129
2.25	-0.272	10.19	-0.068
2.5	-0.473	10.91	0.029
2.75	-0.605	11.69	0.102
3.	-0.676	12.47	0.12
3.25	-0.683	13.31	0.08
3.5	-0.64	14.21	0.021
3.75	-0.55	15.17	-0.013
4.	-0.423	16.13	0.006
4.25	-0.283	17.21	0.033
4.61	-0.082	18.35	0.05
4.97	0.104	19.55	0.039

SOLUTION

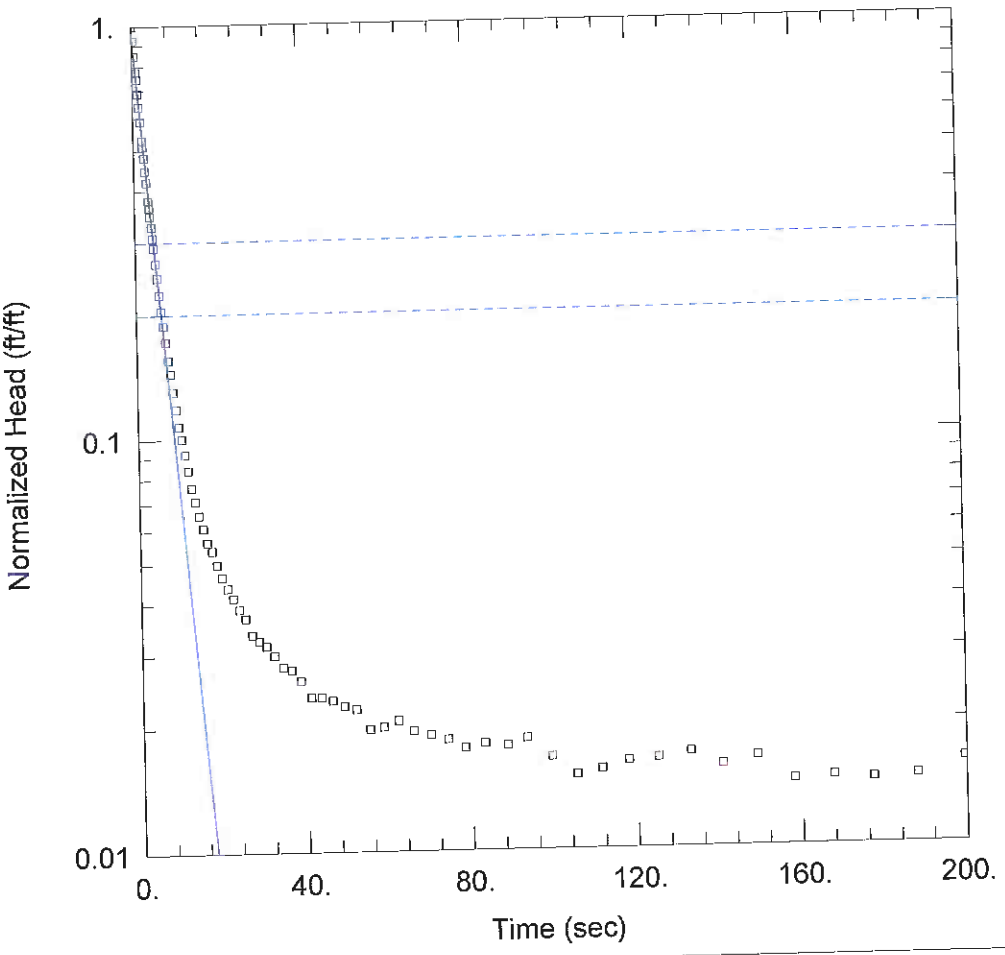
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.067

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	60.37	ft/day
y0	5.394	ft

K = 0.0213 cm/sec
T = K*b = 2203.3 ft²/day (23.69 sq. cm/sec)



DG-09D TEST 1

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test1.aqt
Date: 05/25/21 Time: 09:41:06

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: DG-09D
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DG-09D)

Initial Displacement: 4.32 ft
Total Well Penetration Depth: 28.13 ft
Casing Radius: 0.083 ft
Static Water Column Height: 30.13 ft
Screen Length: 5. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
K = 55.99 ft/day
Solution Method: Bouwer-Rice
y0 = 4.138 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test1.aqt
Title: DG-09D Test 1
Date: 05/25/21
Time: 09:40:26

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: DG-09D

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: DG-09D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.32 ft
Static Water Column Height: 30.13 ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.333 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.13 ft

No. of Observations: 80

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.324	19.8	0.2
0.251	3.999	21.06	0.188
0.501	3.667	22.38	0.178
0.885	3.351	23.82	0.167
1.009	3.229	25.32	0.159
1.251	2.976	26.88	0.145
1.501	2.764	28.56	0.14
1.751	2.55	30.36	0.136
2.143	2.29	32.22	0.129
2.267	2.212	34.26	0.121
2.501	2.081	36.36	0.119
2.751	1.935	38.58	0.112
3.001	1.816	40.98	0.102
3.407	1.636	43.5	0.102
3.531	1.579	46.14	0.1
3.751	1.5	48.96	0.097
4.001	1.414	51.96	0.095
4.251	1.33	55.14	0.085
4.501	1.257	58.5	0.086
4.86	1.152	62.1	0.089
5.221	1.064	65.7	0.084
5.64	0.967	69.9	0.082
6.06	0.884	74.1	0.08
6.481	0.815	78.3	0.076
6.961	0.746	83.1	0.078
7.5	0.671	88.5	0.077
7.981	0.624	93.3	0.08
8.58	0.562	99.3	0.072
9.181	0.511	105.3	0.065

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.78	0.465	111.3	0.067
10.44	0.433	117.9	0.07
11.16	0.397	125.1	0.071
11.94	0.364	132.9	0.073
12.72	0.33	140.7	0.068
13.56	0.306	149.1	0.071
14.46	0.283	158.1	0.062
15.43	0.263	167.7	0.063
16.38	0.243	177.3	0.062
17.46	0.232	188.1	0.063
18.6	0.215	199.5	0.069

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.656

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	62.76	ft/day
y0	4.138	ft

K = 0.02214 cm/sec
T = K*b = 1891.1 ft²/day (20.33 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	55.99	1.277	+/- 2.543	43.83	ft/day
y0	4.138	0.05561	+/- 0.1107	74.41	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = 0.01975 cm/sec
T = K*b = 1687.1 ft²/day (18.14 sq. cm/sec)

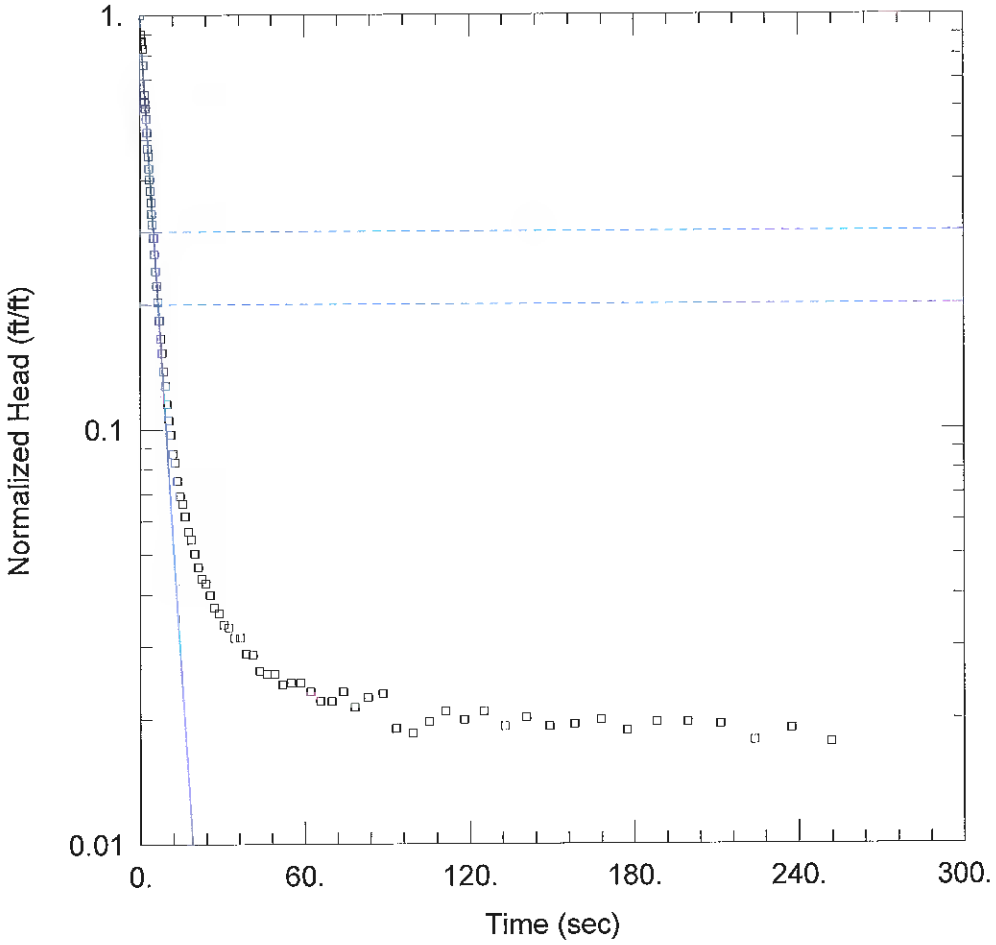
Parameter Correlations

	K	y0
K	1.00	0.71
y0	0.71	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . 0.9381 ft^2
Variance . . . . . 0.01203 ft^2
Std. Deviation . . . . . 0.1097 ft
Mean . . . . . 0.07002 ft
No. of Residuals 80
No. of Estimates 2



DG-09D TEST 2

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test2.aqt
Date: 05/25/21 Time: 09:48:33

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: DG-09D
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DG-09D)

Initial Displacement: 4.17 ft
Total Well Penetration Depth: 28.13 ft
Casing Radius: 0.083 ft
Static Water Column Height: 30.13 ft
Screen Length: 5. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 52.92 ft/day
y0 = 4.128 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test2.aqt
Title: DG-09D Test 2
Date: 05/25/21
Time: 09:49:17

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: DG-09D

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: DG-09D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.17 ft
Static Water Column Height: 30.13 ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.333 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.13 ft

No. of Observations: 84

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.17	22.38	0.182
0.25	3.742	23.82	0.177
0.645	3.614	25.32	0.166
0.768	3.544	26.88	0.155
1.	3.459	28.56	0.15
1.25	3.164	30.36	0.141
1.785	2.679	32.22	0.139
1.909	2.578	34.26	0.131
2.032	2.486	36.36	0.131
2.25	2.343	38.58	0.12
2.5	2.173	40.98	0.119
2.834	1.986	43.5	0.109
3.	1.903	46.14	0.107
3.25	1.78	48.96	0.107
3.5	1.675	51.96	0.101
3.75	1.57	55.14	0.102
4.	1.472	58.5	0.102
4.25	1.382	62.1	0.097
4.5	1.303	65.7	0.092
4.86	1.208	69.9	0.092
5.22	1.104	74.1	0.097
5.64	1.005	78.3	0.089
6.06	0.926	83.1	0.094
6.48	0.845	88.5	0.096
6.96	0.765	93.3	0.079
7.5	0.691	99.3	0.077
7.98	0.638	105.3	0.082
8.6	0.577	111.3	0.087
9.18	0.53	117.9	0.083

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.78	0.48	125.1	0.087
10.44	0.438	132.9	0.08
11.16	0.405	140.7	0.084
11.94	0.365	149.1	0.08
12.72	0.347	158.1	0.081
13.56	0.313	167.7	0.083
14.46	0.288	177.3	0.078
15.42	0.276	188.1	0.082
16.38	0.257	199.5	0.082
17.46	0.236	211.5	0.081
18.6	0.226	224.1	0.074
19.8	0.209	237.3	0.079
21.06	0.194	251.7	0.073

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.656

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	55.99	ft/day
y0	4.138	ft

K = 0.01975 cm/sec
T = K*b = 1687.1 ft²/day (18.14 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	52.92	1.209	+/- 2.404	43.78	ft/day
y0	4.128	0.05528	+/- 0.11	74.68	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = 0.01867 cm/sec
T = K*b = 1594.4 ft²/day (17.14 sq. cm/sec)

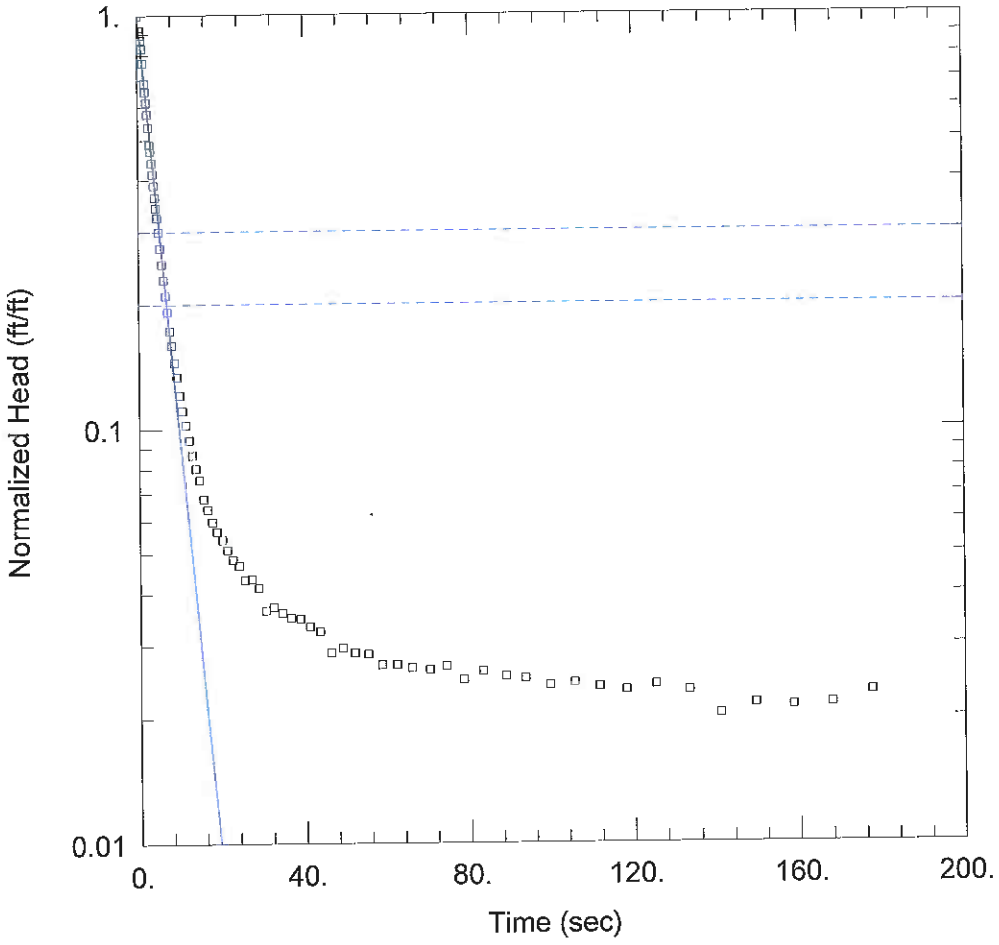
Parameter Correlations

	K	y0
K	1.00	0.72
y0	0.72	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . 0.9927 ft^2
Variance . . . . . 0.01211 ft^2
Std. Deviation . . . . . 0.11 ft
Mean . . . . . 0.07075 ft
No. of Residuals 84
No. of Estimates 2



DG-09D TEST 3

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test3.aqt
Date: 05/25/21 Time: 09:54:19

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: DG-09D
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DG-09D)

Initial Displacement: 4.17 ft
Total Well Penetration Depth: 28.13 ft
Casing Radius: 0.083 ft
Static Water Column Height: 30.13 ft
Screen Length: 5. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
K = 52.6 ft/day
Solution Method: Bouwer-Rice
y0 = 4.245 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DG09D test3.aqt
Title: DG-09D Test 3
Date: 05/25/21
Time: 09:55:01

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: DG-09D

AQUIFER DATA

Saturated Thickness: 30.13 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: DG-09D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 4.17 ft
Static Water Column Height: 30.13 ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.333 ft
Screen Length: 5. ft
Total Well Penetration Depth: 28.13 ft

No. of Observations: 78

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	4.17	18.6	0.236
0.521	3.845	19.95	0.225
0.645	3.747	21.06	0.213
0.769	3.637	22.38	0.202
1.001	3.473	23.82	0.195
1.251	3.199	25.32	0.18
1.662	2.861	26.88	0.181
1.786	2.733	28.56	0.172
2.001	2.577	30.36	0.152
2.251	2.406	32.22	0.155
2.501	2.241	34.26	0.15
2.85	2.034	36.36	0.146
3.001	1.962	38.58	0.145
3.251	1.833	40.98	0.139
3.501	1.727	43.5	0.135
3.751	1.621	46.14	0.12
4.001	1.517	48.96	0.123
4.251	1.431	51.96	0.12
4.501	1.354	55.14	0.119
4.861	1.248	58.5	0.112
5.221	1.141	62.1	0.112
5.641	1.044	65.7	0.11
6.061	0.958	70.06	0.109
6.481	0.876	74.1	0.111
6.961	0.801	78.3	0.103
7.501	0.72	83.1	0.108
7.981	0.665	88.5	0.105
8.581	0.605	93.3	0.104
9.181	0.557	99.3	0.1

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.781	0.504	105.3	0.101
10.44	0.463	111.3	0.099
11.16	0.428	117.9	0.097
11.94	0.393	125.1	0.1
12.72	0.361	133.1	0.097
13.56	0.335	140.7	0.085
14.46	0.314	149.1	0.09
15.42	0.283	158.2	0.089
16.38	0.267	167.7	0.09
17.46	0.249	177.3	0.096

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.656

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	52.92	ft/day
y0	4.128	ft

K = 0.01867 cm/sec
T = K*b = 1594.4 ft²/day (17.14 sq. cm/sec)

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	Approx. C.I.	t-Ratio	
K	52.6	1.306	+/- 2.601	40.29	ft/day
y0	4.245	0.06186	+/- 0.1232	68.62	ft

C.I. is approximate 95% confidence interval for parameter
t-ratio = estimate/std. error
No estimation window

K = 0.01856 cm/sec
T = K*b = 1584.9 ft²/day (17.04 sq. cm/sec)

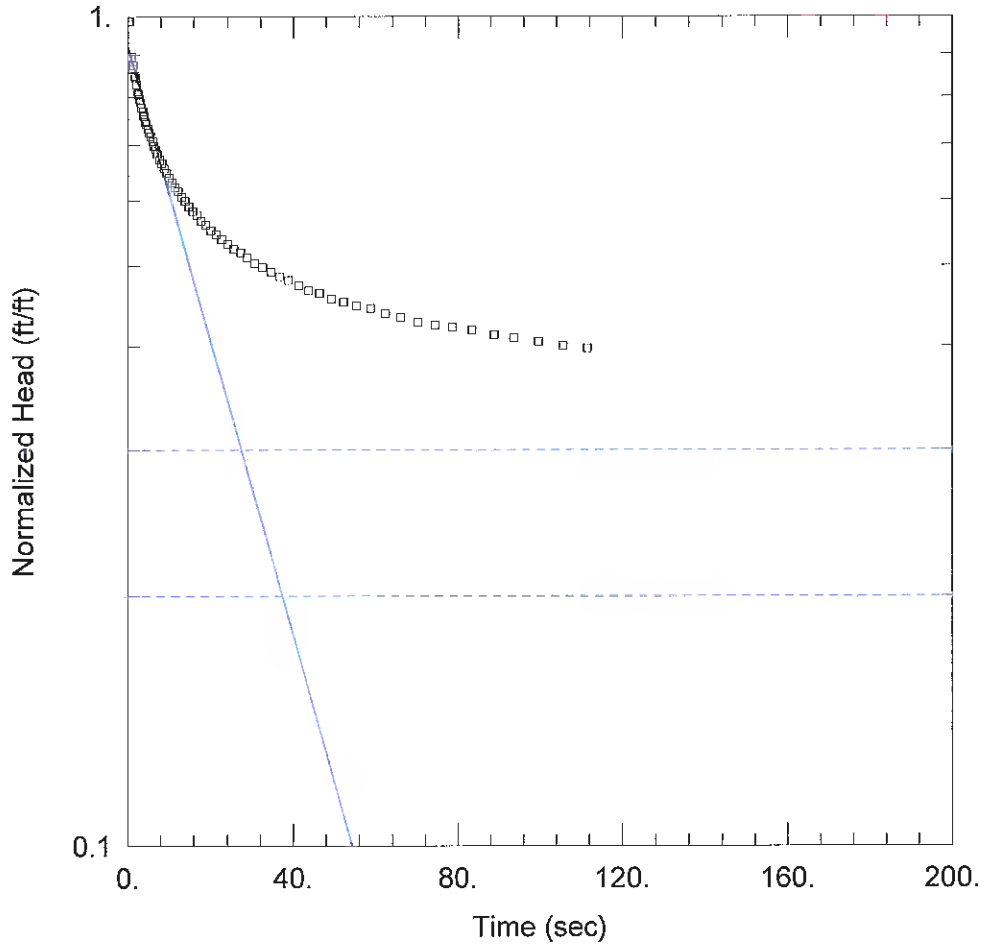
Parameter Correlations

	K	y0
K	1.00	0.73
y0	0.73	1.00

Residual Statistics

for weighted residuals

Sum of Squares . . . . . 1.11 ft^2
Variance . . . . . 0.01461 ft^2
Std. Deviation . . . . . 0.1209 ft
Mean . . . . . 0.07895 ft
No. of Residuals 78
No. of Estimates 2



DV-4 TEST 1

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DV4 Test 1.aqt
Date: 05/25/21 Time: 11:11:52

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Well: DG-09D
Test Date: 05-13-2021

AQUIFER DATA

Saturated Thickness: 22.62 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (DV-4)

Initial Displacement: 3.75 ft
Total Well Penetration Depth: 22.62 ft
Casing Radius: 0.083 ft
Static Water Column Height: 22.62 ft
Screen Length: 5. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 9.873 ft/day
y0 = 3.447 ft

Data Set: C:\Users\phil.osborn\Documents\WinSitu Data\Exported Data\Williams FAR\DV4 Test 1.aqt
Title: DV-4 Test 1
Date: 05/25/21
Time: 11:12:41

PROJECT INFORMATION

Company: APTIM
Client: Williams Petroleum Servivces
Project: 631011702
Location: FAR Augusta, Kansas
Test Date: 05-13-2021
Test Well: DG-09D

AQUIFER DATA

Saturated Thickness: 22.62 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: DV-4

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.75 ft
Static Water Column Height: 22.62 ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft
Well Skin Radius: 0.333 ft
Screen Length: 5. ft
Total Well Penetration Depth: 22.62 ft

No. of Observations: 71

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	3.75	14.71	2.212
0.25	3.702	15.67	2.185
0.5	3.7	16.63	2.161
0.75	3.354	17.71	2.126
1.135	3.241	18.85	2.103
1.26	3.278	20.05	2.07
1.5	3.184	21.31	2.048
1.75	3.16	22.63	2.02
2.	3.109	24.07	1.992
2.395	3.031	25.57	1.966
2.519	3.021	27.13	1.947
2.75	2.987	28.81	1.919
3.	2.954	30.61	1.89
3.25	2.913	32.47	1.868
3.656	2.882	34.51	1.845
3.78	2.846	36.61	1.822
4.	2.84	38.83	1.803
4.25	2.8	41.23	1.776
4.5	2.78	43.75	1.751
4.921	2.746	46.39	1.737
5.11	2.715	49.21	1.712
5.47	2.688	52.21	1.695
6.046	2.653	55.39	1.678
6.31	2.619	58.75	1.666
6.73	2.594	62.35	1.643
7.21	2.56	65.95	1.624
7.75	2.519	70.15	1.605
8.23	2.497	74.35	1.591
8.83	2.458	78.55	1.581

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
9.43	2.428	83.35	1.568
10.03	2.398	88.75	1.549
10.69	2.367	93.55	1.536
11.41	2.336	99.55	1.518
12.19	2.308	105.6	1.503
12.97	2.275	111.6	1.492
13.81	2.247		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.066

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	9.873	ft/day
y0	3.447	ft

K = 0.003483 cm/sec
T = K*b = 223.3 ft²/day (2.401 sq. cm/sec)

Attachment A-4
Laboratory
Reports

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

May 20, 2021

Phil Osborn
Aptim Environmental & Infrastructure
2872 N Ridge Rd, Suite 102B
Wichita, KS 67205

Work Order: **HS21050580**

Laboratory Results for: **Williams FAR Phyto Sampling**

Dear Phil Osborn,

ALS Environmental received 4 sample(s) on May 12, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Ragen Giga
Project Manager

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Work Order: HS21050580

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21050580-01	GP-1 (5'-7')	Soil		11-May-2021 09:00	12-May-2021 09:55	☐
HS21050580-02	GP-2 (5'-7')	Soil		11-May-2021 11:11	12-May-2021 09:55	☐
HS21050580-03	GP-3 (5'-7')	Soil		11-May-2021 13:35	12-May-2021 09:55	☐
HS21050580-04	Trip Blank	Water	CG-031621-348	11-May-2021 00:00	12-May-2021 09:55	☐

Client: Aptim Environmental & Infrastructure **CASE NARRATIVE**
Project: Williams FAR Phyto Sampling
Work Order: HS21050580

GC Semivolatiles by Method KDHE MRH-HRH

Batch ID: 165800

Sample ID: GP-2 (5'-7') (HS21050580-02)

- The surrogate recoveries could not be determined due to dilution below the calibration range.

GC Volatiles by Method KDHE LRH

Batch ID: R383704

Sample ID: GP-2 (5'-7') (HS21050580-02)

- Surrogate recoveries were outside of the control limits due to matrix interference.

GCMS Semivolatiles by Method SW8270

Batch ID: 165829

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260

Batch ID: R383794

Sample ID: HS21050564-02MS

- MS and MSD are for an unrelated sample

Batch ID: R383706

Sample ID: HS21050513-13MS

- MS and MSD are for an unrelated sample

Batch ID: R383701

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: R383669

Sample ID: HS21050330-01MS

- MS and MSD are for an unrelated sample

Metals by Method SW7471B

Batch ID: 165950

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 165861

Sample ID: HS21050716-01MS

- MS/MSD and DUPs are for an unrelated sample

Client: Aptim Environmental & Infrastructure **CASE NARRATIVE**
Project: Williams FAR Phyto Sampling
Work Order: HS21050580

WetChemistry by Method SW3550

Batch ID: R383988

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-1 (5'-7')
Collection Date: 11-May-2021 09:00

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
1,1,1-Trichloroethane	U		0.42	4.2	ug/Kg	1	15-May-2021 14:00
1,1-Dichloroethane	U		0.42	4.2	ug/Kg	1	15-May-2021 14:00
1,1-Dichloroethene	U		0.42	4.2	ug/Kg	1	15-May-2021 14:00
Acetone	U		1.7	17	ug/Kg	1	15-May-2021 14:00
Benzene	U		0.42	4.2	ug/Kg	1	15-May-2021 14:00
Carbon disulfide	U		0.50	8.4	ug/Kg	1	15-May-2021 14:00
Chlorobenzene	U		0.50	4.2	ug/Kg	1	15-May-2021 14:00
Ethylbenzene	U		0.59	4.2	ug/Kg	1	15-May-2021 14:00
m,p-Xylene	U		1.3	8.4	ug/Kg	1	15-May-2021 14:00
Methyl tert-butyl ether	U		0.42	4.2	ug/Kg	1	15-May-2021 14:00
Methylene chloride	U		0.84	8.4	ug/Kg	1	15-May-2021 14:00
o-Xylene	U		0.84	4.2	ug/Kg	1	15-May-2021 14:00
Tetrachloroethene	U		0.59	4.2	ug/Kg	1	15-May-2021 14:00
Toluene	U		0.50	4.2	ug/Kg	1	15-May-2021 14:00
Vinyl chloride	U		0.67	1.7	ug/Kg	1	15-May-2021 14:00
Xylenes, Total	U		0.84	4.2	ug/Kg	1	15-May-2021 14:00
Surr: 1,2-Dichloroethane-d4	*94.7*			*70-126*	*%REC*	*1*	*15-May-2021 14:00*
Surr: 4-Bromofluorobenzene	*94.6*			*70-130*	*%REC*	*1*	*15-May-2021 14:00*
Surr: Dibromofluoromethane	*94.7*			*70-130*	*%REC*	*1*	*15-May-2021 14:00*
Surr: Toluene-d8	*103*			*70-130*	*%REC*	*1*	*15-May-2021 14:00*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	U		0.147	0.147	mg/Kg	50	14-May-2021 09:28
Surr: 2,5-Dibromotoluene	*122*			*70-130*	*%REC*	*50*	*14-May-2021 09:28*
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 14-May-2021		Analyst: ACN
2-Methylnaphthalene	U		0.50	3.3	ug/Kg	1	18-May-2021 21:45
Benzoic acid	U		1.4	6.5	ug/Kg	1	18-May-2021 21:45
Bis(2-ethylhexyl)phthalate	**2.4**	J	**1.7**	**6.5**	**ug/Kg**	1	18-May-2021 21:45
Chrysene	U		0.79	3.3	ug/Kg	1	18-May-2021 21:45
Naphthalene	U		0.59	3.3	ug/Kg	1	18-May-2021 21:45
Phenanthrene	U		1.5	3.3	ug/Kg	1	18-May-2021 21:45
Pyrene	**0.78**	J	**0.59**	**3.3**	**ug/Kg**	1	18-May-2021 21:45
Surr: 2,4,6-Tribromophenol	*119*			*36-126*	*%REC*	*1*	*18-May-2021 21:45*
Surr: 2-Fluorobiphenyl	*94.2*			*43-125*	*%REC*	*1*	*18-May-2021 21:45*
Surr: 2-Fluorophenol	*43.2*			*37-125*	*%REC*	*1*	*18-May-2021 21:45*
Surr: 4-Terphenyl-d14	*102*			*32-125*	*%REC*	*1*	*18-May-2021 21:45*
Surr: Nitrobenzene-d5	*52.2*			*37-125*	*%REC*	*1*	*18-May-2021 21:45*
Surr: Phenol-d6	*43.9*			*40-125*	*%REC*	*1*	*18-May-2021 21:45*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-1 (5'-7')
Collection Date: 11-May-2021 09:00

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 14-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	**4.20**	J	**2.53**	**19.5**	**mg/Kg**	1	17-May-2021 16:37
Mid-Range Hydrocarbon (C9-C18)	U		2.92	19.5	mg/Kg	1	17-May-2021 16:37
Surr: 1-Chlorooctadecane	*48.4*			*40-140*	*%REC*	*1*	*17-May-2021 16:37*
METALS BY SW6020A	**Method:SW6020A**				Prep:SW3050B / 18-May-2021		Analyst: JC
Arsenic	**3.02**		**0.0676**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Barium	**158**		**0.0290**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Cadmium	**0.210**	J	**0.0261**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Chromium	**20.6**		**0.0222**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Lead	**11.5**		**0.0126**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Selenium	**0.649**		**0.0879**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
Silver	**0.0346**	J	**0.0145**	**0.483**	**mg/Kg**	1	18-May-2021 16:54
MERCURY BY SW7471B	**Method:SW7471B**				Prep:SW7471B / 19-May-2021		Analyst: MSC
Mercury	**20.7**		**0.476**	**3.37**	**ug/Kg**	1	19-May-2021 13:23
MOISTURE	**Method:SW3550**						Analyst: JW
Percent Moisture	**17.4**		**0.0100**	**0.0100**	**wt%**	1	19-May-2021 15:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-2 (5'-7')
Collection Date: 11-May-2021 11:11

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
1,1,1-Trichloroethane	U		0.44	4.4	ug/Kg	1	15-May-2021 23:31
1,1-Dichloroethane	U		0.44	4.4	ug/Kg	1	15-May-2021 23:31
1,1-Dichloroethene	U		0.44	4.4	ug/Kg	1	15-May-2021 23:31
Acetone	U		1.7	17	ug/Kg	1	15-May-2021 23:31
Benzene	**690**		**21**	**210**	**ug/Kg**	50	18-May-2021 13:10
Carbon disulfide	U		0.52	8.7	ug/Kg	1	15-May-2021 23:31
Chlorobenzene	U		0.52	4.4	ug/Kg	1	15-May-2021 23:31
Ethylbenzene	**1,800**		**30**	**210**	**ug/Kg**	50	18-May-2021 13:10
m,p-Xylene	**65**		**1.4**	**8.7**	**ug/Kg**	1	15-May-2021 23:31
Methyl tert-butyl ether	U		0.44	4.4	ug/Kg	1	15-May-2021 23:31
Methylene chloride	U		0.87	8.7	ug/Kg	1	15-May-2021 23:31
o-Xylene	**31**		**0.87**	**4.4**	**ug/Kg**	1	15-May-2021 23:31
Tetrachloroethene	U		0.61	4.4	ug/Kg	1	15-May-2021 23:31
Toluene	**72**		**0.52**	**4.4**	**ug/Kg**	1	15-May-2021 23:31
Vinyl chloride	U		0.70	1.7	ug/Kg	1	15-May-2021 23:31
Xylenes, Total	**95**		**0.87**	**4.4**	**ug/Kg**	1	15-May-2021 23:31
Surr: 1,2-Dichloroethane-d4	*101*			*70-126*	*%REC*	*1*	*15-May-2021 23:31*
Surr: 1,2-Dichloroethane-d4	*93.1*			*70-126*	*%REC*	*50*	*18-May-2021 13:10*
Surr: 4-Bromofluorobenzene	*84.4*			*70-130*	*%REC*	*1*	*15-May-2021 23:31*
Surr: 4-Bromofluorobenzene	*111*			*70-130*	*%REC*	*50*	*18-May-2021 13:10*
Surr: Dibromofluoromethane	*98.0*			*70-130*	*%REC*	*1*	*15-May-2021 23:31*
Surr: Dibromofluoromethane	*93.8*			*70-130*	*%REC*	*50*	*18-May-2021 13:10*
Surr: Toluene-d8	*125*			*70-130*	*%REC*	*1*	*15-May-2021 23:31*
Surr: Toluene-d8	*112*			*70-130*	*%REC*	*50*	*18-May-2021 13:10*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	**42.3**		**0.630**	**0.630**	**mg/Kg**	250	14-May-2021 16:40
Surr: 2,5-Dibromotoluene	*210*	*S*		*70-130*	*%REC*	*250*	*14-May-2021 16:40*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-2 (5'-7')
Collection Date: 11-May-2021 11:11

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3541 / 14-May-2021		Analyst: ACN
2-Methylnaphthalene	**1.3**	J	**0.50**	**3.3**	**ug/Kg**	1	19-May-2021 20:42
Benzoic acid	U		1.4	6.6	ug/Kg	1	19-May-2021 20:42
Bis(2-ethylhexyl)phthalate	U		1.7	6.6	ug/Kg	1	19-May-2021 20:42
Chrysene	U		0.80	3.3	ug/Kg	1	19-May-2021 20:42
Naphthalene	**1.3**	J	**0.60**	**3.3**	**ug/Kg**	1	19-May-2021 20:42
Phenanthrene	U		1.5	3.3	ug/Kg	1	19-May-2021 20:42
Pyrene	U		0.60	3.3	ug/Kg	1	19-May-2021 20:42
Surr: 2,4,6-Tribromophenol	*53.9*			*36-126*	*%REC*	*1*	*19-May-2021 20:42*
Surr: 2-Fluorobiphenyl	*79.6*			*43-125*	*%REC*	*1*	*19-May-2021 20:42*
Surr: 2-Fluorophenol	*90.1*			*37-125*	*%REC*	*1*	*19-May-2021 20:42*
Surr: 4-Terphenyl-d14	*86.2*			*32-125*	*%REC*	*1*	*19-May-2021 20:42*
Surr: Nitrobenzene-d5	*84.1*			*37-125*	*%REC*	*1*	*19-May-2021 20:42*
Surr: Phenol-d6	*94.8*			*40-125*	*%REC*	*1*	*19-May-2021 20:42*
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 14-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	**45.7**		**2.57**	**19.8**	**mg/Kg**	1	17-May-2021 18:14
Mid-Range Hydrocarbon (C9-C18)	**972**		**29.7**	**198**	**mg/Kg**	10	18-May-2021 10:41
Surr: 1-Chlorooctadecane	*0*	*S*		*40-140*	*%REC*	*10*	*18-May-2021 10:41*
Surr: 1-Chlorooctadecane	*58.6*			*40-140*	*%REC*	*1*	*17-May-2021 18:14*
METALS BY SW6020A	**Method:SW6020A**				Prep:SW3050B / 18-May-2021		Analyst: JC
Arsenic	**3.78**		**0.0656**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
Barium	**175**		**0.562**	**9.37**	**mg/Kg**	20	19-May-2021 12:12
Cadmium	**0.247**	J	**0.0253**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
Chromium	**18.4**		**0.0216**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
Lead	**11.3**		**0.0122**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
Selenium	**0.686**		**0.0853**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
Silver	**0.0484**	J	**0.0141**	**0.469**	**mg/Kg**	1	18-May-2021 16:56
MERCURY BY SW7471B	**Method:SW7471B**				Prep:SW7471B / 19-May-2021		Analyst: MSC
Mercury	**7.57**		**0.485**	**3.43**	**ug/Kg**	1	19-May-2021 13:38
MOISTURE	**Method:SW3550**						Analyst: JW
Percent Moisture	**17.6**		**0.0100**	**0.0100**	**wt%**	1	19-May-2021 15:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-3 (5'-7')
Collection Date: 11-May-2021 13:35

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
1,1,1-Trichloroethane	U		0.44	4.4	ug/Kg	1	15-May-2021 14:22
1,1-Dichloroethane	U		0.44	4.4	ug/Kg	1	15-May-2021 14:22
1,1-Dichloroethene	U		0.44	4.4	ug/Kg	1	15-May-2021 14:22
Acetone	U		1.8	18	ug/Kg	1	15-May-2021 14:22
Benzene	**3.1**	J	**0.44**	**4.4**	**ug/Kg**	1	15-May-2021 14:22
Carbon disulfide	U		0.53	8.9	ug/Kg	1	15-May-2021 14:22
Chlorobenzene	U		0.53	4.4	ug/Kg	1	15-May-2021 14:22
Ethylbenzene	U		0.62	4.4	ug/Kg	1	15-May-2021 14:22
m,p-Xylene	U		1.4	8.9	ug/Kg	1	15-May-2021 14:22
Methyl tert-butyl ether	U		0.44	4.4	ug/Kg	1	15-May-2021 14:22
Methylene chloride	U		0.89	8.9	ug/Kg	1	15-May-2021 14:22
o-Xylene	U		0.89	4.4	ug/Kg	1	15-May-2021 14:22
Tetrachloroethene	U		0.62	4.4	ug/Kg	1	15-May-2021 14:22
Toluene	U		0.53	4.4	ug/Kg	1	15-May-2021 14:22
Vinyl chloride	U		0.71	1.8	ug/Kg	1	15-May-2021 14:22
Xylenes, Total	U		0.89	4.4	ug/Kg	1	15-May-2021 14:22
Surr: 1,2-Dichloroethane-d4	*94.9*			*70-126*	*%REC*	*1*	*15-May-2021 14:22*
Surr: 4-Bromofluorobenzene	*95.3*			*70-130*	*%REC*	*1*	*15-May-2021 14:22*
Surr: Dibromofluoromethane	*96.0*			*70-130*	*%REC*	*1*	*15-May-2021 14:22*
Surr: Toluene-d8	*104*			*70-130*	*%REC*	*1*	*15-May-2021 14:22*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	U		0.130	0.130	mg/Kg	50	14-May-2021 10:24
Surr: 2,5-Dibromotoluene	*119*			*70-130*	*%REC*	*50*	*14-May-2021 10:24*
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 14-May-2021		Analyst: ACN
2-Methylnaphthalene	U		0.50	3.3	ug/Kg	1	18-May-2021 22:24
Benzoic acid	U		1.4	6.6	ug/Kg	1	18-May-2021 22:24
Bis(2-ethylhexyl)phthalate	**1.8**	J	**1.7**	**6.6**	**ug/Kg**	1	18-May-2021 22:24
Chrysene	U		0.80	3.3	ug/Kg	1	18-May-2021 22:24
Naphthalene	U		0.60	3.3	ug/Kg	1	18-May-2021 22:24
Phenanthrene	U		1.5	3.3	ug/Kg	1	18-May-2021 22:24
Pyrene	U		0.60	3.3	ug/Kg	1	18-May-2021 22:24
Surr: 2,4,6-Tribromophenol	*122*			*36-126*	*%REC*	*1*	*18-May-2021 22:24*
Surr: 2-Fluorobiphenyl	*92.4*			*43-125*	*%REC*	*1*	*18-May-2021 22:24*
Surr: 2-Fluorophenol	*40.7*			*37-125*	*%REC*	*1*	*18-May-2021 22:24*
Surr: 4-Terphenyl-d14	*97.6*			*32-125*	*%REC*	*1*	*18-May-2021 22:24*
Surr: Nitrobenzene-d5	*38.2*			*37-125*	*%REC*	*1*	*18-May-2021 22:24*
Surr: Phenol-d6	*41.1*			*40-125*	*%REC*	*1*	*18-May-2021 22:24*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-3 (5'-7')
Collection Date: 11-May-2021 13:35

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 14-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	U		2.54	19.6	mg/Kg	1	17-May-2021 18:46
Mid-Range Hydrocarbon (C9-C18)	U		2.93	19.6	mg/Kg	1	17-May-2021 18:46
Surr: 1-Chlorooctadecane	*58.1*			*40-140*	*%REC*	*1*	*17-May-2021 18:46*
METALS BY SW6020A	**Method:SW6020A**				Prep:SW3050B / 18-May-2021		Analyst: JC
Arsenic	**4.18**		**0.0669**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Barium	**159**		**0.0287**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Cadmium	**0.109**	J	**0.0258**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Chromium	**20.2**		**0.0220**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Lead	**10.4**		**0.0124**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Selenium	**0.864**		**0.0870**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
Silver	**0.0636**	J	**0.0143**	**0.478**	**mg/Kg**	1	18-May-2021 16:58
MERCURY BY SW7471B	**Method:SW7471B**				Prep:SW7471B / 19-May-2021		Analyst: MSC
Mercury	**14.9**		**0.497**	**3.51**	**ug/Kg**	1	19-May-2021 13:39
MOISTURE	**Method:SW3550**						Analyst: JW
Percent Moisture	**19.7**		**0.0100**	**0.0100**	**wt%**	1	19-May-2021 15:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: Trip Blank
Collection Date: 11-May-2021 00:00

ANALYTICAL REPORT
WorkOrder:HS21050580
Lab ID:HS21050580-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	14-May-2021 17:56
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	14-May-2021 17:56
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	14-May-2021 17:56
Acetone	U		2.0	2.0	ug/L	1	14-May-2021 17:56
Benzene	U		0.20	1.0	ug/L	1	14-May-2021 17:56
Carbon disulfide	U		0.60	2.0	ug/L	1	14-May-2021 17:56
Chlorobenzene	U		0.30	1.0	ug/L	1	14-May-2021 17:56
Ethylbenzene	U		0.30	1.0	ug/L	1	14-May-2021 17:56
m,p-Xylene	U		0.50	2.0	ug/L	1	14-May-2021 17:56
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	14-May-2021 17:56
Methylene chloride	U		1.0	2.0	ug/L	1	14-May-2021 17:56
o-Xylene	U		0.30	1.0	ug/L	1	14-May-2021 17:56
Tetrachloroethene	U		0.30	1.0	ug/L	1	14-May-2021 17:56
Toluene	U		0.20	1.0	ug/L	1	14-May-2021 17:56
Vinyl chloride	U		0.20	1.0	ug/L	1	14-May-2021 17:56
Xylenes, Total	U		0.30	1.0	ug/L	1	14-May-2021 17:56
Surr: 1,2-Dichloroethane-d4	*102*			*70-126*	*%REC*	*1*	*14-May-2021 17:56*
Surr: 4-Bromofluorobenzene	*96.2*			*81-113*	*%REC*	*1*	*14-May-2021 17:56*
Surr: Dibromofluoromethane	*101*			*77-123*	*%REC*	*1*	*14-May-2021 17:56*
Surr: Toluene-d8	*100*			*82-127*	*%REC*	*1*	*14-May-2021 17:56*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Weight / Prep Log

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

Batch ID: 4268 **Start Date:** 12 May 2021 08:55 **End Date:** 12 May 2021 08:55
Method: KDHE LOW RANGE HYDROCARBONS **Prep Code:**

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050580-01	1	5.115 (g)	5 (mL)	0.98	TerraCore (5035A)
HS21050580-02	1	5.966 (g)	5 (mL)	0.84	TerraCore (5035A)
HS21050580-03	1	5.734 (g)	5 (mL)	0.87	TerraCore (5035A)

Batch ID: 4276 **Start Date:** 14 May 2021 11:50 **End Date:** 14 May 2021 11:50
Method: VOLATILES BY SW8260C

Sample ID	Container	Sample Wt/Vol	Final Volume	Weight Factor	Container Type
HS21050580-01	1	5.963 (g)	5 (mL)	0.84	TerraCore (5035A)
HS21050580-02	1	5.774 (g)	5 (mL)	0.87	TerraCore (5035A)
HS21050580-02	3	5.856 (g)	5 (mL)	0.85	TerraCore (5035A)
HS21050580-03	1	5.602 (g)	5 (mL)	0.89	TerraCore (5035A)

Batch ID: 165800 **Start Date:** 14 May 2021 09:30 **End Date:** 14 May 2021 12:30
Method: KANSAS MRH-HRH EXTRACTION - SOLID **Prep Code:** KS MRH-HRH_SPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050580-01		10.28 (grams)	2 (mL)	0.1946	4-oz glass, Neat
HS21050580-02		10.1 (grams)	2 (mL)	0.198	4-oz glass, Neat
HS21050580-03		10.23 (grams)	2 (mL)	0.1955	4-oz glass, Neat

Batch ID: 165829 **Start Date:** 14 May 2021 12:00 **End Date:** 14 May 2021 15:00
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050580-01		30.26 (g)	1 (mL)	0.03305	4-oz glass, Neat
HS21050580-02		30.14 (g)	1 (mL)	0.03318	4-oz glass, Neat
HS21050580-03		30.17 (g)	1 (mL)	0.03315	4-oz glass, Neat

Batch ID: 165861 **Start Date:** 18 May 2021 07:30 **End Date:** 18 May 2021 13:30
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050580-01		0.5177 (g)	50 (mL)	96.58	4-oz glass, Neat
HS21050580-02		0.5336 (g)	50 (mL)	93.7	4-oz glass, Neat
HS21050580-03		0.523 (g)	50 (mL)	95.6	4-oz glass, Neat

Batch ID: 165950 **Start Date:** 19 May 2021 09:00 **End Date:** 19 May 2021 11:00
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050580-01		0.5925 (grams)	40 (mL)	67.51	4-oz glass, Neat
HS21050580-02		0.581 (grams)	40 (mL)	68.85	4-oz glass, Neat
HS21050580-03		0.5679 (grams)	40 (mL)	70.43	4-oz glass, Neat

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 165800 (0)	**Test Name :** KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00		14 May 2021 09:30	17 May 2021 16:37	1
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		14 May 2021 09:30	18 May 2021 10:41	10
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		14 May 2021 09:30	17 May 2021 18:14	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35		14 May 2021 09:30	17 May 2021 18:46	1
Batch ID: 165829 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00		14 May 2021 12:00	18 May 2021 21:45	1
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		14 May 2021 12:00	19 May 2021 20:42	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35		14 May 2021 12:00	18 May 2021 22:24	1
Batch ID: 165861 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00		18 May 2021 13:30	18 May 2021 16:54	1
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		18 May 2021 13:30	19 May 2021 12:12	20
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		18 May 2021 13:30	18 May 2021 16:56	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35		18 May 2021 13:30	18 May 2021 16:58	1
Batch ID: 165950 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00		19 May 2021 11:00	19 May 2021 13:23	1
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11		19 May 2021 11:00	19 May 2021 13:38	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35		19 May 2021 11:00	19 May 2021 13:39	1
Batch ID: R383669 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Water	
HS21050580-04	Trip Blank	11 May 2021 00:00			14 May 2021 17:56	1
Batch ID: R383701 (0)	**Test Name :** VOLATILES BY SW8260C				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00			15 May 2021 14:00	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35			15 May 2021 14:22	1
Batch ID: R383704 (0)	**Test Name :** KDHE LOW RANGE HYDROCARBONS				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00			14 May 2021 09:28	50
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11			14 May 2021 16:40	250
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35			14 May 2021 10:24	50
Batch ID: R383706 (0)	**Test Name :** VOLATILES BY SW8260C				**Matrix:** Soil	
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11			15 May 2021 23:31	1
Batch ID: R383794 (0)	**Test Name :** VOLATILES BY SW8260C				**Matrix:** Soil	
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11			18 May 2021 13:10	50
Batch ID: R383988 (0)	**Test Name :** MOISTURE				**Matrix:** Soil	
HS21050580-01	GP-1 (5'-7')	11 May 2021 09:00			19 May 2021 15:16	1
HS21050580-02	GP-2 (5'-7')	11 May 2021 11:11			19 May 2021 15:16	1
HS21050580-03	GP-3 (5'-7')	11 May 2021 13:35			19 May 2021 15:16	1

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165800 (0) **Instrument: FID-7** **Method: KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS**

MBLK Sample ID: **MBLK-165800** Units: **mg/Kg** Analysis Date: **17-May-2021 15:32**
Client ID: Run ID: **FID-7_383866** SeqNo: **6097729** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	U	20.0								
Mid-Range Hydrocarbon (C9-C18)	U	20.0								
Surr: 1-Chlorooctadecane	*5.182*	*2.00*	*8*	*0*	*64.8*	*40 - 140*				

LCS Sample ID: **LCS-165800** Units: **mg/Kg** Analysis Date: **17-May-2021 16:05**
Client ID: Run ID: **FID-7_383866** SeqNo: **6097730** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	84.75	20.0	80	0	106	40 - 140				
Mid-Range Hydrocarbon (C9-C18)	52.69	20.0	60	0	87.8	40 - 140				
Surr: 1-Chlorooctadecane	*5.546*	*2.00*	*8*	*0*	*69.3*	*40 - 140*				

MS Sample ID: **HS21050580-01MS** Units: **mg/Kg** Analysis Date: **17-May-2021 17:09**
Client ID: **GP-1 (5'-7')** Run ID: **FID-7_383866** SeqNo: **6097732** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	72.75	19.7	78.74	4.205	87.0	40 - 140				
Mid-Range Hydrocarbon (C9-C18)	47.31	19.7	59.06	0.9923	78.4	40 - 140				
Surr: 1-Chlorooctadecane	*4.566*	*1.97*	*7.874*	*0*	*58.0*	*40 - 140*				

MSD Sample ID: **HS21050580-01MSD** Units: **mg/Kg** Analysis Date: **17-May-2021 17:41**
Client ID: **GP-1 (5'-7')** Run ID: **FID-7_383866** SeqNo: **6097733** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	80.51	19.3	77.15	4.205	98.9	40 - 140	72.75	10.1	25	
Mid-Range Hydrocarbon (C9-C18)	51.66	19.3	57.86	0.9923	87.6	40 - 140	47.31	8.79	25	
Surr: 1-Chlorooctadecane	*4.861*	*1.93*	*7.715*	*0*	*63.0*	*40 - 140*	*4.566*	*6.26*	*25*	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383704 (0) **Instrument: FID-14** **Method: KDHE LOW RANGE HYDROCARBONS**

MBLK Sample ID: **MBLK-210514** Units: **mg/Kg** Analysis Date: **14-May-2021 09:00**
Client ID: Run ID: **FID-14_383704** SeqNo: **6093627** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	U	0.150								
Surr: 2,5-Dibromotoluene	*14.54*	*0.500*	*12.5*	*0*	*116*	*70 - 130*				

LCS Sample ID: **LCS-210514** Units: **mg/Kg** Analysis Date: **14-May-2021 07:37**
Client ID: Run ID: **FID-14_383704** SeqNo: **6093625** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.08241	0.00300	0.075	0	110	70 - 130				
Surr: 2,5-Dibromotoluene	*0.2662*	*0.0100*	*0.25*	*0*	*106*	*70 - 130*				

LCSD Sample ID: **LCSD-210514** Units: **mg/Kg** Analysis Date: **14-May-2021 08:05**
Client ID: Run ID: **FID-14_383704** SeqNo: **6093626** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.0742	0.00300	0.075	0	98.9	70 - 130	0.08241	10.5	25	
Surr: 2,5-Dibromotoluene	*0.2454*	*0.0100*	*0.25*	*0*	*98.2*	*70 - 130*	*0.2662*	*8.14*	*25*	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165861 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-165861** Units: **mg/Kg** Analysis Date: **18-May-2021 16:20**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097992** PrepDate: **18-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.500								
Barium	U	0.500								
Cadmium	U	0.500								
Chromium	U	0.500								
Lead	U	0.500								
Selenium	U	0.500								
Silver	U	0.500								

LCS Sample ID: **LCS-165861** Units: **mg/Kg** Analysis Date: **18-May-2021 16:22**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097993** PrepDate: **18-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	9.594	0.500	10	0	95.9	80 - 120				
Barium	10.23	0.500	10	0	102	80 - 120				
Cadmium	10.17	0.500	10	0	102	80 - 120				
Chromium	9.95	0.500	10	0	99.5	80 - 120				
Lead	10.13	0.500	10	0	101	80 - 120				
Selenium	10.09	0.500	10	0	101	80 - 120				
Silver	10.63	0.500	10	0	106	80 - 120				

MS Sample ID: **HS21050716-01MS** Units: **mg/Kg** Analysis Date: **18-May-2021 16:28**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097996** PrepDate: **18-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.44	0.460	9.196	3.398	76.5	75 - 125				
Barium	116.2	0.460	9.196	97.58	203	75 - 125				SO
Cadmium	9.18	0.460	9.196	0.04522	99.3	75 - 125				
Chromium	20.81	0.460	9.196	37.48	-181	75 - 125				SO
Lead	18.76	0.460	9.196	11.8	75.7	75 - 125				
Selenium	9.051	0.460	9.196	0.4132	93.9	75 - 125				
Silver	9.336	0.460	9.196	0.02702	101	75 - 125				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165861 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MSD Sample ID: **HS21050716-01MSD** Units: **mg/Kg** Analysis Date: **18-May-2021 16:30**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097997** PrepDate: **18-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.84	0.500	9.998	3.398	74.4	75 - 125	10.44	3.79	20	S
Barium	110.8	0.500	9.998	97.58	132	75 - 125	116.2	4.84	20	SO
Cadmium	9.914	0.500	9.998	0.04522	98.7	75 - 125	9.18	7.68	20	
Chromium	23.44	0.500	9.998	37.48	-140	75 - 125	20.81	11.9	20	S
Lead	19.47	0.500	9.998	11.8	76.7	75 - 125	18.76	3.69	20	
Selenium	9.839	0.500	9.998	0.4132	94.3	75 - 125	9.051	8.35	20	
Silver	10.16	0.500	9.998	0.02702	101	75 - 125	9.336	8.46	20	

PDS Sample ID: **HS21050716-01PDS** Units: **mg/Kg** Analysis Date: **18-May-2021 16:32**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097998** PrepDate: **18-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	12.83	0.479	9.58	3.398	98.4	75 - 125				
Barium	110.5	0.479	9.58	97.58	134	75 - 125				SO
Cadmium	9.838	0.479	9.58	0.04522	102	75 - 125				
Chromium	46.74	0.479	9.58	37.48	96.7	75 - 125				
Lead	21.91	0.479	9.58	11.8	106	75 - 125				
Selenium	10.14	0.479	9.58	0.4132	102	75 - 125				
Silver	9.848	0.479	9.58	0.02702	103	75 - 125				

SD Sample ID: **HS21050716-01SD** Units: **mg/Kg** Analysis Date: **18-May-2021 16:26**
Client ID: Run ID: **ICPMS04_383853** SeqNo: **6097995** PrepDate: **18-May-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	3.588	2.40					3.398	5.61	10	
Barium	94.59	2.40					97.58	3.06	10	
Cadmium	U	2.40					0.04522	0	10	
Chromium	36.1	2.40					37.48	3.68	10	
Lead	10.98	2.40					11.8	6.96	10	
Selenium	0.4742	2.40					0.4132	0	10	J
Silver	U	2.40					0.02702	0	10	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165950 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-165950** Units: **ug/Kg** Analysis Date: **19-May-2021 13:19**
Client ID: Run ID: **HG03_383950** SeqNo: **6099869** PrepDate: **19-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.8787	3.37								J

LCS Sample ID: **LCS-165950** Units: **ug/Kg** Analysis Date: **19-May-2021 13:21**
Client ID: Run ID: **HG03_383950** SeqNo: **6099870** PrepDate: **19-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	388.1	3.43	343.5	0	113	80 - 120				

MS Sample ID: **HS21050580-01MS** Units: **ug/Kg** Analysis Date: **19-May-2021 13:24**
Client ID: **GP-1 (5'-7')** Run ID: **HG03_383950** SeqNo: **6099872** PrepDate: **19-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	399.9	3.59	359.6	20.66	105	80 - 120				

MSD Sample ID: **HS21050580-01MSD** Units: **ug/Kg** Analysis Date: **19-May-2021 13:34**
Client ID: **GP-1 (5'-7')** Run ID: **HG03_383950** SeqNo: **6099875** PrepDate: **19-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	389.6	3.53	353.5	20.66	104	80 - 120	399.9	2.61	20	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165829 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-165829** Units: **ug/Kg** Analysis Date: **18-May-2021 10:52**
Client ID: Run ID: **SV-7_383861** SeqNo: **6098559** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	U	3.3								
Benzoic acid	U	6.6								
Bis(2-ethylhexyl)phthalate	U	6.6								
Chrysene	U	3.3								
Naphthalene	U	3.3								
Phenanthrene	U	3.3								
Pyrene	U	3.3								
Surr: 2,4,6-Tribromophenol	*104*	*0*	*167*	*0*	*62.2*	*36 - 126*				
Surr: 2-Fluorobiphenyl	*149.4*	*0*	*167*	*0*	*89.4*	*43 - 125*				
Surr: 2-Fluorophenol	*119*	*0*	*167*	*0*	*71.3*	*37 - 125*				
Surr: 4-Terphenyl-d14	*139.8*	*0*	*167*	*0*	*83.7*	*32 - 125*				
Surr: Nitrobenzene-d5	*142.1*	*0*	*167*	*0*	*85.1*	*37 - 125*				
Surr: Phenol-d6	*134.9*	*0*	*167*	*0*	*80.8*	*40 - 125*				

LCS Sample ID: **LCS-165829** Units: **ug/Kg** Analysis Date: **18-May-2021 11:11**
Client ID: Run ID: **SV-7_383861** SeqNo: **6098560** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	133	3.3	167	0	79.6	50 - 120				
Benzoic acid	102.7	6.6	167	0	61.5	10 - 120				
Bis(2-ethylhexyl)phthalate	109.1	6.6	167	0	65.3	21 - 148				
Chrysene	128.9	3.3	167	0	77.2	50 - 130				
Naphthalene	129	3.3	167	0	77.2	50 - 125				
Phenanthrene	131.9	3.3	167	0	79.0	50 - 125				
Pyrene	120.8	3.3	167	0	72.3	45 - 130				
Surr: 2,4,6-Tribromophenol	*124.9*	*0*	*167*	*0*	*74.8*	*36 - 126*				
Surr: 2-Fluorobiphenyl	*156.4*	*0*	*167*	*0*	*93.6*	*43 - 125*				
Surr: 2-Fluorophenol	*132.2*	*0*	*167*	*0*	*79.2*	*37 - 125*				
Surr: 4-Terphenyl-d14	*141.6*	*0*	*167*	*0*	*84.8*	*32 - 125*				
Surr: Nitrobenzene-d5	*121.6*	*0*	*167*	*0*	*72.8*	*37 - 125*				
Surr: Phenol-d6	*130.6*	*0*	*167*	*0*	*78.2*	*40 - 125*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: 165829 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21050350-01MS** Units: **ug/Kg** Analysis Date: **18-May-2021 14:59**
Client ID: Run ID: **SV-7_383861** SeqNo: **6098562** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
2-Methylnaphthalene	168.3	3.3	166.8	0	101	50 - 120				
Benzoic acid	109.3	6.6	166.8	0	65.5	10 - 120				
Bis(2-ethylhexyl)phthalate	131.5	6.6	166.8	0	78.8	21 - 148				
Chrysene	142.6	3.3	166.8	0	85.5	50 - 130				
Naphthalene	156.2	3.3	166.8	0	93.6	50 - 125				
Phenanthrene	150.7	3.3	166.8	0	90.3	50 - 125				
Pyrene	155.4	3.3	166.8	0	93.1	45 - 130				
Surr: 2,4,6-Tribromophenol	*149*	*0*	*166.8*	*0*	*89.3*	*36 - 126*				
Surr: 2-Fluorobiphenyl	*165*	*0*	*166.8*	*0*	*98.9*	*43 - 125*				
Surr: 2-Fluorophenol	*114.3*	*0*	*166.8*	*0*	*68.5*	*37 - 125*				
Surr: 4-Terphenyl-d14	*170.5*	*0*	*166.8*	*0*	*102*	*32 - 125*				
Surr: Nitrobenzene-d5	*148.5*	*0*	*166.8*	*0*	*89.0*	*37 - 125*				
Surr: Phenol-d6	*107.7*	*0*	*166.8*	*0*	*64.6*	*40 - 125*				

MSD Sample ID: **HS21050350-01MSD** Units: **ug/Kg** Analysis Date: **18-May-2021 15:18**
Client ID: Run ID: **SV-7_383861** SeqNo: **6098563** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
2-Methylnaphthalene	151.4	3.3	166.1	0	91.2	50 - 120	168.3	10.5	30	
Benzoic acid	89.84	6.6	166.1	0	54.1	10 - 120	109.3	19.5	30	
Bis(2-ethylhexyl)phthalate	136.8	6.6	166.1	0	82.4	21 - 148	131.5	3.97	30	
Chrysene	144.8	3.3	166.1	0	87.1	50 - 130	142.6	1.47	30	
Naphthalene	152.8	3.3	166.1	0	92.0	50 - 125	156.2	2.18	30	
Phenanthrene	152.7	3.3	166.1	0	91.9	50 - 125	150.7	1.3	30	
Pyrene	150.1	3.3	166.1	0	90.4	45 - 130	155.4	3.43	30	
Surr: 2,4,6-Tribromophenol	*148.4*	*0*	*166.1*	*0*	*89.4*	*36 - 126*	*149*	*0.387*	*30*	
Surr: 2-Fluorobiphenyl	*163.5*	*0*	*166.1*	*0*	*98.4*	*43 - 125*	*165*	*0.933*	*30*	
Surr: 2-Fluorophenol	*114.2*	*0*	*166.1*	*0*	*68.7*	*37 - 125*	*114.3*	*0.0683*	*30*	
Surr: 4-Terphenyl-d14	*172.7*	*0*	*166.1*	*0*	*104*	*32 - 125*	*170.5*	*1.32*	*30*	
Surr: Nitrobenzene-d5	*147.3*	*0*	*166.1*	*0*	*88.7*	*37 - 125*	*148.5*	*0.803*	*30*	
Surr: Phenol-d6	*116.5*	*0*	*166.1*	*0*	*70.1*	*40 - 125*	*107.7*	*7.84*	*30*	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383669 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-210514** Units: **ug/L** Analysis Date: **14-May-2021 12:04**
Client ID: Run ID: **VOA4_383669** SeqNo: **6092645** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
Acetone	U	2.0								
Benzene	U	1.0								
Carbon disulfide	U	2.0								
Chlorobenzene	U	1.0								
Ethylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl tert-butyl ether	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*50.65*	*1.0*	*50*	*0*	*101*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*47.43*	*1.0*	*50*	*0*	*94.9*	*82 - 115*				
Surr: Dibromofluoromethane	*49.39*	*1.0*	*50*	*0*	*98.8*	*73 - 126*				
Surr: Toluene-d8	*51.34*	*1.0*	*50*	*0*	*103*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383669 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-210514** Units: **ug/L** Analysis Date: **14-May-2021 11:20**
Client ID: Run ID: **VOA4_383669** SeqNo: **6092644** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.79	1.0	20	0	98.9	70 - 130				
1,1-Dichloroethane	19.68	1.0	20	0	98.4	71 - 122				
1,1-Dichloroethene	20.04	1.0	20	0	100	70 - 130				
Acetone	34.71	2.0	40	0	86.8	70 - 130				
Benzene	19.51	1.0	20	0	97.6	74 - 120				
Carbon disulfide	40.93	2.0	40	0	102	70 - 130				
Chlorobenzene	19.28	1.0	20	0	96.4	76 - 113				
Ethylbenzene	19.85	1.0	20	0	99.3	77 - 117				
m,p-Xylene	41.01	2.0	40	0	103	77 - 122				
Methyl tert-butyl ether	14.88	1.0	20	0	74.4	70 - 130				
Methylene chloride	20.21	2.0	20	0	101	70 - 127				
o-Xylene	21.16	1.0	20	0	106	75 - 119				
Tetrachloroethene	19.18	1.0	20	0	95.9	76 - 119				
Toluene	19.44	1.0	20	0	97.2	77 - 118				
Vinyl chloride	19.64	1.0	20	0	98.2	70 - 130				
Xylenes, Total	62.17	1.0	60	0	104	75 - 122				
Surr: 1,2-Dichloroethane-d4	*48.84*	*1.0*	*50*	*0*	*97.7*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.41*	*1.0*	*50*	*0*	*101*	*82 - 115*				
Surr: Dibromofluoromethane	*50.73*	*1.0*	*50*	*0*	*101*	*73 - 126*				
Surr: Toluene-d8	*51.48*	*1.0*	*50*	*0*	*103*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383669 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21050330-01MS** Units: **ug/L** Analysis Date: **14-May-2021 13:32**
Client ID: Run ID: **VOA4_383669** SeqNo: **6092649** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.61	1.0	20	0	98.1	70 - 130				
1,1-Dichloroethane	19.14	1.0	20	0	95.7	70 - 127				
1,1-Dichloroethene	20.08	1.0	20	0	100	70 - 130				
Acetone	33.77	2.0	40	0	84.4	70 - 130				
Benzene	18.8	1.0	20	0	94.0	70 - 127				
Carbon disulfide	40.65	2.0	40	0	102	70 - 130				
Chlorobenzene	18.18	1.0	20	0	90.9	70 - 114				
Ethylbenzene	19.21	1.0	20	0	96.0	70 - 124				
m,p-Xylene	38.69	2.0	40	0	96.7	70 - 130				
Methyl tert-butyl ether	13.87	1.0	20	0	69.3	70 - 130				S
Methylene chloride	19.06	2.0	20	0	95.3	70 - 128				
o-Xylene	18.98	1.0	20	0	94.9	70 - 124				
Tetrachloroethene	18.81	1.0	20	0	94.0	70 - 130				
Toluene	19	1.0	20	0	95.0	70 - 123				
Vinyl chloride	19.41	1.0	20	0	97.0	70 - 130				
Xylenes, Total	57.68	1.0	60	0	96.1	70 - 130				
Surr: 1,2-Dichloroethane-d4	*49.72*	*1.0*	*50*	*0*	*99.4*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.27*	*1.0*	*50*	*0*	*98.5*	*81 - 113*				
Surr: Dibromofluoromethane	*50.68*	*1.0*	*50*	*0*	*101*	*77 - 123*				
Surr: Toluene-d8	*49.65*	*1.0*	*50*	*0*	*99.3*	*82 - 127*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383669 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21050330-01MSD** Units: **ug/L** Analysis Date: **14-May-2021 13:54**
Client ID: Run ID: **VOA4_383669** SeqNo: **6092650** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.03	1.0	20	0	100	70 - 130	19.61	2.08	20	
1,1-Dichloroethane	18.89	1.0	20	0	94.5	70 - 127	19.14	1.29	20	
1,1-Dichloroethene	19.37	1.0	20	0	96.8	70 - 130	20.08	3.59	20	
Acetone	34.43	2.0	40	0	86.1	70 - 130	33.77	1.95	20	
Benzene	18.81	1.0	20	0	94.0	70 - 127	18.8	0.0571	20	
Carbon disulfide	39.71	2.0	40	0	99.3	70 - 130	40.65	2.33	20	
Chlorobenzene	17.79	1.0	20	0	89.0	70 - 114	18.18	2.17	20	
Ethylbenzene	19.09	1.0	20	0	95.5	70 - 124	19.21	0.585	20	
m,p-Xylene	38.68	2.0	40	0	96.7	70 - 130	38.69	0.0242	20	
Methyl tert-butyl ether	12.6	1.0	20	0	63.0	70 - 130	13.87	9.59	20	S
Methylene chloride	18.54	2.0	20	0	92.7	70 - 128	19.06	2.75	20	
o-Xylene	19.75	1.0	20	0	98.7	70 - 124	18.98	3.95	20	
Tetrachloroethene	18.08	1.0	20	0	90.4	70 - 130	18.81	3.93	20	
Toluene	18.39	1.0	20	0	91.9	70 - 123	19	3.25	20	
Vinyl chloride	19.56	1.0	20	0	97.8	70 - 130	19.41	0.772	20	
Xylenes, Total	58.43	1.0	60	0	97.4	70 - 130	57.68	1.3	20	
Surr: 1,2-Dichloroethane-d4	*47.06*	*1.0*	*50*	*0*	*94.1*	*70 - 126*	*49.72*	*5.5*	*20*	
Surr: 4-Bromofluorobenzene	*48.72*	*1.0*	*50*	*0*	*97.4*	*81 - 113*	*49.27*	*1.12*	*20*	
Surr: Dibromofluoromethane	*50.65*	*1.0*	*50*	*0*	*101*	*77 - 123*	*50.68*	*0.0529*	*20*	
Surr: Toluene-d8	*49.19*	*1.0*	*50*	*0*	*98.4*	*82 - 127*	*49.65*	*0.942*	*20*	

The following samples were analyzed in this batch: HS21050580-04

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383701 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKS1-051521** Units: **ug/Kg** Analysis Date: **15-May-2021 09:35**
Client ID: Run ID: **VOA5_383701** SeqNo: **6093484** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	5.0								
1,1-Dichloroethane	U	5.0								
1,1-Dichloroethene	U	5.0								
Acetone	U	20								
Benzene	U	5.0								
Carbon disulfide	U	10								
Chlorobenzene	U	5.0								
Ethylbenzene	U	5.0								
m,p-Xylene	U	10								
Methyl tert-butyl ether	U	5.0								
Methylene chloride	U	10								
o-Xylene	U	5.0								
Tetrachloroethene	U	5.0								
Toluene	U	5.0								
Vinyl chloride	U	2.0								
Xylenes, Total	U	5.0								
Surr: 1,2-Dichloroethane-d4	*47.51*	*0*	*50*	*0*	*95.0*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*48.05*	*0*	*50*	*0*	*96.1*	*80 - 120*				
Surr: Dibromofluoromethane	*47.59*	*0*	*50*	*0*	*95.2*	*80 - 119*				
Surr: Toluene-d8	*50.57*	*0*	*50*	*0*	*101*	*81 - 118*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383701 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-051521** Units: **ug/Kg** Analysis Date: **15-May-2021 08:51**
Client ID: Run ID: **VOA5_383701** SeqNo: **6093483** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	49.61	5.0	50	0	99.2	72 - 130				
1,1-Dichloroethane	49.65	5.0	50	0	99.3	76 - 128				
1,1-Dichloroethene	49.14	5.0	50	0	98.3	72 - 130				
Acetone	96.85	20	100	0	96.9	70 - 130				
Benzene	48.03	5.0	50	0	96.1	75 - 124				
Carbon disulfide	90.22	10	100	0	90.2	70 - 122				
Chlorobenzene	48.16	5.0	50	0	96.3	78 - 122				
Ethylbenzene	47.62	5.0	50	0	95.2	70 - 123				
m,p-Xylene	96.44	10	100	0	96.4	77 - 125				
Methyl tert-butyl ether	47.36	5.0	50	0	94.7	70 - 128				
Methylene chloride	46.59	10	50	0	93.2	71 - 125				
o-Xylene	48.74	5.0	50	0	97.5	78 - 122				
Tetrachloroethene	46.86	5.0	50	0	93.7	70 - 130				
Toluene	47.35	5.0	50	0	94.7	76 - 122				
Vinyl chloride	50.29	2.0	50	0	101	70 - 130				
Xylenes, Total	145.2	5.0	150	0	96.8	77 - 128				
Surr: 1,2-Dichloroethane-d4	*51.96*	*0*	*50*	*0*	*104*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*50.39*	*0*	*50*	*0*	*101*	*80 - 120*				
Surr: Dibromofluoromethane	*51.97*	*0*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*49.93*	*0*	*50*	*0*	*99.9*	*81 - 118*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383701 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MS Sample ID: **HS21050447-25MS** Units: **ug/Kg** Analysis Date: **15-May-2021 10:19**
Client ID: Run ID: **VOA5_383701** SeqNo: **6093486** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	48.4	4.8	48.5	0	99.8	70 - 130				
1,1-Dichloroethane	46.22	4.8	48.5	0	95.3	70 - 130				
1,1-Dichloroethene	48.65	4.8	48.5	0	100	70 - 130				
Acetone	85.73	19	97	0	88.4	70 - 130				
Benzene	44.36	4.8	48.5	0	91.5	70 - 130				
Carbon disulfide	84.42	9.7	97	0	87.0	70 - 130				
Chlorobenzene	44.28	4.8	48.5	0	91.3	70 - 130				
Ethylbenzene	45.36	4.8	48.5	0	93.5	70 - 130				
m,p-Xylene	90.07	9.7	97	0	92.9	70 - 130				
Methyl tert-butyl ether	43.85	4.8	48.5	0	90.4	70 - 130				
Methylene chloride	42.63	9.7	48.5	0	87.9	70 - 130				
o-Xylene	44.96	4.8	48.5	0	92.7	70 - 130				
Tetrachloroethene	45.16	4.8	48.5	0	93.1	70 - 130				
Toluene	45.12	4.8	48.5	0	93.0	70 - 130				
Vinyl chloride	45.62	1.9	48.5	0	94.1	70 - 130				
Xylenes, Total	135	4.8	145.5	0	92.8	70 - 130				
Surr: 1,2-Dichloroethane-d4	*48.24*	*0*	*48.5*	*0*	*99.5*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*47.18*	*0*	*48.5*	*0*	*97.3*	*70 - 130*				
Surr: Dibromofluoromethane	*48.19*	*0*	*48.5*	*0*	*99.4*	*70 - 130*				
Surr: Toluene-d8	*47.5*	*0*	*48.5*	*0*	*97.9*	*70 - 130*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383701 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21050447-25MSD** Units: **ug/Kg** Analysis Date: **15-May-2021 10:41**
Client ID: Run ID: **VOA5_383701** SeqNo: **6093487** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	44.03	4.8	48.5	0	90.8	70 - 130	48.4	9.45	30	
1,1-Dichloroethane	41.3	4.8	48.5	0	85.2	70 - 130	46.22	11.2	30	
1,1-Dichloroethene	42.89	4.8	48.5	0	88.4	70 - 130	48.65	12.6	30	
Acetone	86.39	19	97	0	89.1	70 - 130	85.73	0.77	30	
Benzene	40.3	4.8	48.5	0	83.1	70 - 130	44.36	9.59	30	
Carbon disulfide	77.98	9.7	97	0	80.4	70 - 130	84.42	7.93	30	
Chlorobenzene	40.28	4.8	48.5	0	83.0	70 - 130	44.28	9.47	30	
Ethylbenzene	40.67	4.8	48.5	0	83.9	70 - 130	45.36	10.9	30	
m,p-Xylene	81.48	9.7	97	0	84.0	70 - 130	90.07	10	30	
Methyl tert-butyl ether	40.03	4.8	48.5	0	82.5	70 - 130	43.85	9.11	30	
Methylene chloride	39.53	9.7	48.5	0	81.5	70 - 130	42.63	7.54	30	
o-Xylene	40.35	4.8	48.5	0	83.2	70 - 130	44.96	10.8	30	
Tetrachloroethene	40.52	4.8	48.5	0	83.6	70 - 130	45.16	10.8	30	
Toluene	40.76	4.8	48.5	0	84.0	70 - 130	45.12	10.2	30	
Vinyl chloride	40.64	1.9	48.5	0	83.8	70 - 130	45.62	11.5	30	
Xylenes, Total	121.8	4.8	145.5	0	83.7	70 - 130	135	10.3	30	
Surr: 1,2-Dichloroethane-d4	*49.86*	*0*	*48.5*	*0*	*103*	*70 - 126*	*48.24*	*3.31*	*30*	
Surr: 4-Bromofluorobenzene	*49.31*	*0*	*48.5*	*0*	*102*	*70 - 130*	*47.18*	*4.41*	*30*	
Surr: Dibromofluoromethane	*49.82*	*0*	*48.5*	*0*	*103*	*70 - 130*	*48.19*	*3.34*	*30*	
Surr: Toluene-d8	*49.21*	*0*	*48.5*	*0*	*101*	*70 - 130*	*47.5*	*3.54*	*30*	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383706 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKS1-051521** Units: **ug/Kg** Analysis Date: **15-May-2021 14:45**
Client ID: Run ID: **VOA8_383706** SeqNo: **6093649** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	5.0								
1,1-Dichloroethane	U	5.0								
1,1-Dichloroethene	U	5.0								
Acetone	U	20								
Carbon disulfide	U	10								
Chlorobenzene	U	5.0								
m,p-Xylene	U	10								
Methyl tert-butyl ether	U	5.0								
Methylene chloride	U	10								
o-Xylene	U	5.0								
Tetrachloroethene	U	5.0								
Toluene	U	5.0								
Vinyl chloride	U	2.0								
Xylenes, Total	U	5.0								
Surr: 1,2-Dichloroethane-d4	*47.93*	*0*	*50*	*0*	*95.9*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*49.71*	*0*	*50*	*0*	*99.4*	*80 - 120*				
Surr: Dibromofluoromethane	*51.32*	*0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*51.4*	*0*	*50*	*0*	*103*	*81 - 118*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383706 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-051521** Units: **ug/Kg** Analysis Date: **15-May-2021 14:00**
Client ID: Run ID: **VOA8_383706** SeqNo: **6093648** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	49.64	5.0	50	0	99.3	72 - 130				
1,1-Dichloroethane	49.77	5.0	50	0	99.5	76 - 128				
1,1-Dichloroethene	49.58	5.0	50	0	99.2	72 - 130				
Acetone	79.89	20	100	0	79.9	70 - 130				
Carbon disulfide	98.25	10	100	0	98.2	70 - 122				
Chlorobenzene	47.64	5.0	50	0	95.3	78 - 122				
m,p-Xylene	93.89	10	100	0	93.9	77 - 125				
Methyl tert-butyl ether	49.65	5.0	50	0	99.3	70 - 128				
Methylene chloride	47.25	10	50	0	94.5	71 - 125				
o-Xylene	48.23	5.0	50	0	96.5	78 - 122				
Tetrachloroethene	46.59	5.0	50	0	93.2	70 - 130				
Toluene	47.79	5.0	50	0	95.6	76 - 122				
Vinyl chloride	47.94	2.0	50	0	95.9	70 - 130				
Xylenes, Total	142.1	5.0	150	0	94.7	77 - 128				
Surr: 1,2-Dichloroethane-d4	*53.24*	*0*	*50*	*0*	*106*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*52.06*	*0*	*50*	*0*	*104*	*80 - 120*				
Surr: Dibromofluoromethane	*52.77*	*0*	*50*	*0*	*106*	*80 - 119*				
Surr: Toluene-d8	*49.92*	*0*	*50*	*0*	*99.8*	*81 - 118*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383706 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

MS Sample ID: **HS21050513-13MS** Units: **ug/Kg** Analysis Date: **15-May-2021 17:02**
Client ID: Run ID: **VOA8_383706** SeqNo: **6093655** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	54.27	5.6	56.5	0	96.1	70 - 130				
1,1-Dichloroethane	53.69	5.6	56.5	0	95.0	70 - 130				
1,1-Dichloroethene	53.29	5.6	56.5	0	94.3	70 - 130				
Acetone	161.6	23	113	86.73	66.3	70 - 130				S
Carbon disulfide	101.9	11	113	0	90.1	70 - 130				
Chlorobenzene	44.62	5.6	56.5	0	79.0	70 - 130				
m,p-Xylene	90.18	11	113	0	79.8	70 - 130				
Methyl tert-butyl ether	49.69	5.6	56.5	0	87.9	70 - 130				
Methylene chloride	49.81	11	56.5	0	88.2	70 - 130				
o-Xylene	46.1	5.6	56.5	0	81.6	70 - 130				
Tetrachloroethene	45.47	5.6	56.5	0	80.5	70 - 130				
Toluene	47.9	5.6	56.5	0	84.8	70 - 130				
Vinyl chloride	53.23	2.3	56.5	0	94.2	70 - 130				
Xylenes, Total	136.3	5.6	169.5	0	80.4	70 - 130				
Surr: 1,2-Dichloroethane-d4	*62.35*	*0*	*56.5*	*0*	*110*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*59.27*	*0*	*56.5*	*0*	*105*	*70 - 130*				
Surr: Dibromofluoromethane	*60.79*	*0*	*56.5*	*0*	*108*	*70 - 130*				
Surr: Toluene-d8	*55.89*	*0*	*56.5*	*0*	*98.9*	*70 - 130*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383706 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21050513-13MSD** Units: **ug/Kg** Analysis Date: **15-May-2021 17:25**
Client ID: Run ID: **VOA8_383706** SeqNo: **6093656** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	62.9	6.6	66.5	0	94.6	70 - 130	54.27	14.7	30	
1,1-Dichloroethane	62.38	6.6	66.5	0	93.8	70 - 130	53.69	15	30	
1,1-Dichloroethene	61.03	6.6	66.5	0	91.8	70 - 130	53.29	13.5	30	
Acetone	114.8	27	133	86.73	21.1	70 - 130	161.6	33.9	30	SR
Carbon disulfide	116.6	13	133	0	87.7	70 - 130	101.9	13.5	30	
Chlorobenzene	56.7	6.6	66.5	0	85.3	70 - 130	44.62	23.9	30	
m,p-Xylene	113.1	13	133	0	85.0	70 - 130	90.18	22.6	30	
Methyl tert-butyl ether	60.42	6.6	66.5	0	90.9	70 - 130	49.69	19.5	30	
Methylene chloride	58.6	13	66.5	0	88.1	70 - 130	49.81	16.2	30	
o-Xylene	56.98	6.6	66.5	0	85.7	70 - 130	46.1	21.1	30	
Tetrachloroethene	56.06	6.6	66.5	0	84.3	70 - 130	45.47	20.9	30	
Toluene	57.91	6.6	66.5	0	87.1	70 - 130	47.9	18.9	30	
Vinyl chloride	59.59	2.7	66.5	0	89.6	70 - 130	53.23	11.3	30	
Xylenes, Total	170.1	6.6	199.5	0	85.3	70 - 130	136.3	22.1	30	
Surr: 1,2-Dichloroethane-d4	*70.19*	*0*	*66.5*	*0*	*106*	*70 - 126*	*62.35*	*11.8*	*30*	
Surr: 4-Bromofluorobenzene	*65.76*	*0*	*66.5*	*0*	*98.9*	*70 - 130*	*59.27*	*10.4*	*30*	
Surr: Dibromofluoromethane	*69.34*	*0*	*66.5*	*0*	*104*	*70 - 130*	*60.79*	*13.1*	*30*	
Surr: Toluene-d8	*65.19*	*0*	*66.5*	*0*	*98.0*	*70 - 130*	*55.89*	*15.4*	*30*	

The following samples were analyzed in this batch: HS21050580-02

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383794 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **MBLKW1-051821** Units: **ug/Kg** Analysis Date: **18-May-2021 09:25**
Client ID: Run ID: **VOA8_383794** SeqNo: **6096788** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	U	250								
Ethylbenzene	U	250								
Surr: 1,2-Dichloroethane-d4	*2501*	*0*	*2500*	*0*	*100*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*2499*	*0*	*2500*	*0*	*100.0*	*80 - 120*				
Surr: Dibromofluoromethane	*2477*	*0*	*2500*	*0*	*99.1*	*80 - 119*				
Surr: Toluene-d8	*2525*	*0*	*2500*	*0*	*101*	*81 - 118*				

LCS Sample ID: **VLCSW1-051821** Units: **ug/Kg** Analysis Date: **18-May-2021 08:35**
Client ID: Run ID: **VOA8_383794** SeqNo: **6096787** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	52.56	5.0	50	0	105	75 - 124				
Ethylbenzene	53.64	5.0	50	0	107	70 - 123				
Surr: 1,2-Dichloroethane-d4	*47.07*	*0*	*50*	*0*	*94.1*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*51.89*	*0*	*50*	*0*	*104*	*80 - 120*				
Surr: Dibromofluoromethane	*49.54*	*0*	*50*	*0*	*99.1*	*80 - 119*				
Surr: Toluene-d8	*49.95*	*0*	*50*	*0*	*99.9*	*81 - 118*				

MS Sample ID: **HS21050564-02MS** Units: **ug/Kg** Analysis Date: **18-May-2021 11:30**
Client ID: Run ID: **VOA8_383794** SeqNo: **6097306** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	5729	150	1525	2789	193	70 - 130				S
Ethylbenzene	1880	150	1525	57.61	119	70 - 130				
Surr: 1,2-Dichloroethane-d4	*1411*	*0*	*1525*	*0*	*92.6*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*1474*	*0*	*1525*	*0*	*96.6*	*70 - 130*				
Surr: Dibromofluoromethane	*1532*	*0*	*1525*	*0*	*100*	*70 - 130*				
Surr: Toluene-d8	*1587*	*0*	*1525*	*0*	*104*	*70 - 130*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: R383794 (0) **Instrument: VOA8** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21050564-02MSD** Units: **ug/Kg** Analysis Date: **18-May-2021 11:55**
Client ID: Run ID: **VOA8_383794** SeqNo: **6097307** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	5410	150	1525	2789	172	70 - 130	5729	5.72	30	S
Ethylbenzene	1747	150	1525	57.61	111	70 - 130	1880	7.34	30	
Surr: 1,2-Dichloroethane-d4	*1399*	*0*	*1525*	*0*	*91.7*	*70 - 126*	*1411*	*0.892*	*30*	
Surr: 4-Bromofluorobenzene	*1435*	*0*	*1525*	*0*	*94.1*	*70 - 130*	*1474*	*2.67*	*30*	
Surr: Dibromofluoromethane	*1487*	*0*	*1525*	*0*	*97.5*	*70 - 130*	*1532*	*2.96*	*30*	
Surr: Toluene-d8	*1521*	*0*	*1525*	*0*	*99.7*	*70 - 130*	*1587*	*4.29*	*30*	

The following samples were analyzed in this batch: HS21050580-02

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050580

QC BATCH REPORT

Batch ID: **R383988 (0)** **Instrument:** **Balance1** **Method:** **MOISTURE**

DUP Sample ID: **HS21050580-01DUP** Units: **wt%** Analysis Date: **19-May-2021 15:16**
Client ID: **GP-1 (5'-7')** Run ID: **Balance1_383988** SeqNo: **6100955** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Percent Moisture	17.1	0.0100					17.4	1.74	20	

The following samples were analyzed in this batch: HS21050580-01 HS21050580-02 HS21050580-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: **HS21050580**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-30-07/01/2020	30-Jun-2021
Kansas	E-10352 2020-2021	31-Jul-2021
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2020-2021	30-Jun-2021
North Carolina	624-2021	31-Dec-2021
Oklahoma	2020-165	31-Aug-2021
Texas	T104704231-21-27	30-Apr-2022

Sample Receipt Checklist

Work Order ID: HS21050580 **Date/Time Received:** **12-May-2021 09:55**

Client Name: CBI-Wichita **Received by:** **Pablo Marinez**

Completed By: */S/ Pablo Marinez* (eSignature) 12-May-2021 16:00 (Date/Time) **Reviewed by:** */S/ Ragen Giga* (eSignature) 13-May-2021 12:27 (Date/Time)

Matrices: **soil** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☑	No ☐	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:236701
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	0.5c uc/c	IR 31	
Cooler(s)/Kit(s):	25284		
Date/Time sample(s) sent to storage:			
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 236701

HS21050580

Aptim Environmental & Infrastructure
Williams FAR Phyto Sampling

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Williams FAR Phyto Sampling
Work Order		Project Number	
Company Name	Aptim Environmental & Infrastruct	Bill To Company	Aptim Environmental & Infrastruct
Send Report To	Phil Osborn	Invoice Attn	AP
Address	2872 N Ridge Rd, Suite 102B	Address	2872 N Ridge Rd, Suite 102B
City/State/Zip	Wichita, KS 67205	City/State/Zip	Wichita KS 67205
Phone	(316) 220-8020	Phone	(316) 220-8020
Fax		Fax	
e-Mail Address	phil.osborn@aptim.com	e-Mail Address	accountspayable@aptim.com

A	8260 VOC (Williams FAR Table 2 analyte list)
B	8270 SVOC (Williams FAR Table 2 analyte list)
C	Kansas LRH
D	Kansas MRH-HRH
E	Metals (Williams FAR Table 2 analyte list)
F	MOIST_SW3550 (for dry-weight corrected results)
G	
H	
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	GP-1 (5'-7')	5-11-21	0900	Soil	1,7,8	8	X	X	X	X	X	X					
2	GP-2 (5'-7')	"	1111	"	"	"	X	X	X	X	X	X					
3	GP-3 (5'-7')	"	1335	"	"	"	X	X	X	X	X	X					
4																	
5																	
6																	
7																	
8																	
9																	
10	Trip Blank	—	—	W	1,8	2	X										

Sampler(s) Please Print & Sign: Craig Taylor

Shipment Method: Fedex

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

	Date:	Time:		
Relinquished by:	5-11-21	02100	Received by: Fedex	
Relinquished by:	5.12.21	9:55	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes: Williams FAR Phyto Sampling

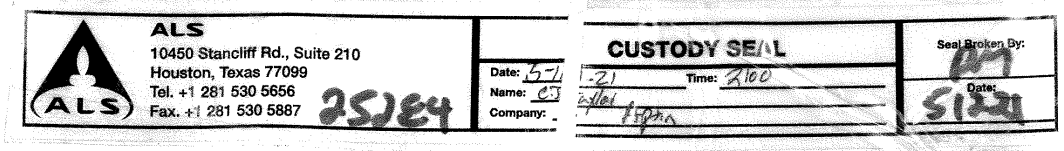
Cooler ID	Cooler Temp.
25284	0.5C
	IR81

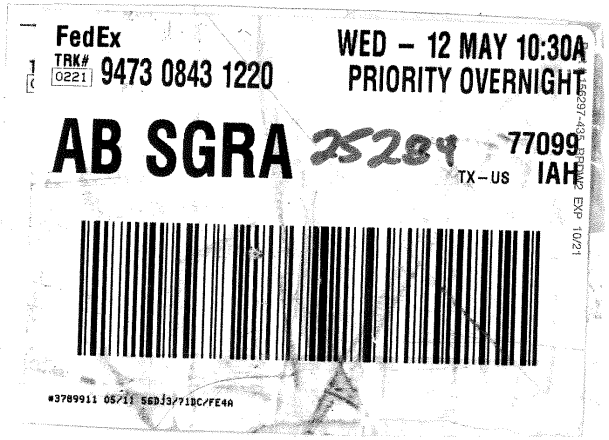
QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Data
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.





10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

May 27, 2021

Phil Osborn
Aptim Environmental & Infrastructure
2872 N Ridge Rd, Suite 102B
Wichita, KS 67205

Work Order: **HS21050659**

Laboratory Results for: **Williams FAR Phyto Sampling**

Dear Phil Osborn,

ALS Environmental received 6 sample(s) on May 13, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Ragen Giga
Project Manager

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Work Order: HS21050659

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21050659-01	GP-2	GW		11-May-2021 16:35	13-May-2021 09:35	☐
HS21050659-02	GP-1	GW		11-May-2021 17:25	13-May-2021 09:35	☐
HS21050659-03	GP-3	GW		11-May-2021 18:00	13-May-2021 09:35	☐
HS21050659-04	DUP A	GW		11-May-2021 00:00	13-May-2021 09:35	☐
HS21050659-05	Trip Blank	Water	CG-031621-330	11-May-2021 00:00	13-May-2021 09:35	☐
HS21050659-06	Trip Blank 2	Water	CG-031621-331	11-May-2021 00:00	13-May-2021 09:35	☐

Client: Aptim Environmental & Infrastructure **CASE NARRATIVE**
Project: Williams FAR Phyto Sampling
Work Order: HS21050659

Work Order Comments

• DUP A - Kansas LRH test code not selected on COC, Bottles received for test, bottles logged in with no test code assigned
GP-3 - Insufficient sample Volume to include/run MS/MSD for MRH/HRH analyses

GC Semivolatiles by Method KDHE MRH-HRH

Batch ID: 165880,165880

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GC Volatiles by Method KDHE LRH

Batch ID: R383813

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: R383717

Sample ID: GP-1 (HS21050659-02)

• Surrogate recoveries were outside of the control limits due to matrix interference.

Sample ID: GP-3 (HS21050659-03)

• Surrogate recoveries were outside of the control limits due to matrix interference.

GCMS Sample Preparation by Method SW3510

Batch ID: 165786

Sample ID: DUP A (HS21050659-04)

• ph adj 1/13

Sample ID: GP-1 (HS21050659-02)

• ph adj 1/13

Sample ID: GP-2 (HS21050659-01)

• ph adj 1/13

Sample ID: GP-3 (HS21050659-03)

• ph adj 1/13

Sample ID: GP-3 (HS21050659-03MS)

• ph adj 1/13

Sample ID: GP-3 (HS21050659-03MSD)

• ph adj 1/13

Sample ID: LCS-165786

• ph adj 1/13

Sample ID: MBLK-165786

Client: Aptim Environmental & Infrastructure **CASE NARRATIVE**
Project: Williams FAR Phyto Sampling
Work Order: HS21050659

GCMS Sample Preparation by Method SW3510

Batch ID: 165786

- ph adj 1/13

GCMS Semivolatiles by Method SW8270

Batch ID: 165786

Sample ID: DUP A (HS21050659-04)

- The surrogate recoveries could not be determined due to dilution below the calibration range.

Sample ID: GP-2 (HS21050659-01)

- The surrogate recoveries could not be determined due to dilution below the calibration range.

Sample ID: GP-3 (HS21050659-03)

- The surrogate recoveries could not be determined due to dilution below the calibration range.

Sample ID: GP-3 (HS21050659-03MS)

- The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

Sample ID: GP-3 (HS21050659-03MSD)

- The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.
- The RPD between the MS and MSD was outside of the control limit.

GCMS Volatiles by Method SW8260

Batch ID: R383898,R384080,R384080,R384122,R384122

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: R383898

Sample ID: GP-3 (HS21050659-03MS)

- MS recovered outside control limits for Benzene

Metals by Method SW6020A

Batch ID: 166145

Sample ID: GP-3 (HS21050659-03MS)

- The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Barium)

Metals by Method SW7470A

Batch ID: 165815,165815

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-2
Collection Date: 11-May-2021 16:35

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-01
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 15:23
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 15:23
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	18-May-2021 15:23
Acetone	**2.6**		**2.0**	**2.0**	**ug/L**	1	18-May-2021 15:23
Benzene	**440**		**1.0**	**5.0**	**ug/L**	5	21-May-2021 14:25
Carbon disulfide	U		0.60	2.0	ug/L	1	18-May-2021 15:23
Chlorobenzene	U		0.30	1.0	ug/L	1	18-May-2021 15:23
Ethylbenzene	**2.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:23
m,p-Xylene	**21**		**0.50**	**2.0**	**ug/L**	1	18-May-2021 15:23
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	18-May-2021 15:23
Methylene chloride	U		1.0	2.0	ug/L	1	18-May-2021 15:23
o-Xylene	**4.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:23
Tetrachloroethene	U		0.30	1.0	ug/L	1	18-May-2021 15:23
Toluene	**21**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 15:23
Vinyl chloride	U		0.20	1.0	ug/L	1	18-May-2021 15:23
Xylenes, Total	**25**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:23
Surr: 1,2-Dichloroethane-d4	*103*			*70-126*	*%REC*	*1*	*18-May-2021 15:23*
Surr: 1,2-Dichloroethane-d4	*101*			*70-126*	*%REC*	*5*	*21-May-2021 14:25*
Surr: 4-Bromofluorobenzene	*101*			*81-113*	*%REC*	*1*	*18-May-2021 15:23*
Surr: 4-Bromofluorobenzene	*99.8*			*81-113*	*%REC*	*5*	*21-May-2021 14:25*
Surr: Dibromofluoromethane	*99.0*			*77-123*	*%REC*	*1*	*18-May-2021 15:23*
Surr: Dibromofluoromethane	*99.4*			*77-123*	*%REC*	*5*	*21-May-2021 14:25*
Surr: Toluene-d8	*99.6*			*82-127*	*%REC*	*1*	*18-May-2021 15:23*
Surr: Toluene-d8	*99.6*			*82-127*	*%REC*	*5*	*21-May-2021 14:25*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	**0.677**		**0.0100**	**0.0150**	**mg/L**	5	17-May-2021 22:46
Surr: 2,5-Dibromotoluene	*123*			*70-130*	*%REC*	*5*	*17-May-2021 22:46*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-2
Collection Date: 11-May-2021 16:35

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-01
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 14-May-2021		Analyst: GEY
2-Methylnaphthalene	**210**		**1.9**	**10**	**ug/L**	100	24-May-2021 16:57
Benzoic acid	U		0.022	0.20	ug/L	1	19-May-2021 19:27
Bis(2-ethylhexyl)phthalate	**0.18**	J	**0.037**	**0.20**	**ug/L**	1	19-May-2021 19:27
Chrysene	U		0.021	0.10	ug/L	1	19-May-2021 19:27
Naphthalene	**0.77**		**0.020**	**0.10**	**ug/L**	1	19-May-2021 19:27
Phenanthrene	**11**		**0.21**	**1.0**	**ug/L**	10	24-May-2021 16:17
Pyrene	**0.087**	J	**0.019**	**0.10**	**ug/L**	1	19-May-2021 19:27
Surr: 2,4,6-Tribromophenol	*0*	*JS*		*34-129*	*%REC*	*100*	*24-May-2021 16:57*
Surr: 2,4,6-Tribromophenol	*69.2*			*34-129*	*%REC*	*1*	*19-May-2021 19:27*
Surr: 2,4,6-Tribromophenol	*95.7*			*34-129*	*%REC*	*10*	*24-May-2021 16:17*
Surr: 2-Fluorobiphenyl	*78.6*			*40-125*	*%REC*	*10*	*24-May-2021 16:17*
Surr: 2-Fluorobiphenyl	*81.6*			*40-125*	*%REC*	*1*	*19-May-2021 19:27*
Surr: 2-Fluorobiphenyl	*0*	*JS*		*40-125*	*%REC*	*100*	*24-May-2021 16:57*
Surr: 2-Fluorophenol	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 16:57*
Surr: 2-Fluorophenol	*59.0*			*20-120*	*%REC*	*1*	*19-May-2021 19:27*
Surr: 2-Fluorophenol	*62.7*			*20-120*	*%REC*	*10*	*24-May-2021 16:17*
Surr: 4-Terphenyl-d14	*85.7*			*40-135*	*%REC*	*10*	*24-May-2021 16:17*
Surr: 4-Terphenyl-d14	*81.1*			*40-135*	*%REC*	*1*	*19-May-2021 19:27*
Surr: 4-Terphenyl-d14	*0*	*JS*		*40-135*	*%REC*	*100*	*24-May-2021 16:57*
Surr: Nitrobenzene-d5	*0*	*JS*		*41-120*	*%REC*	*100*	*24-May-2021 16:57*
Surr: Nitrobenzene-d5	*99.8*			*41-120*	*%REC*	*1*	*19-May-2021 19:27*
Surr: Nitrobenzene-d5	*53.3*			*41-120*	*%REC*	*10*	*24-May-2021 16:17*
Surr: Phenol-d6	*68.5*			*20-120*	*%REC*	*10*	*24-May-2021 16:17*
Surr: Phenol-d6	*49.8*			*20-120*	*%REC*	*1*	*19-May-2021 19:27*
Surr: Phenol-d6	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 16:57*
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 17-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	**0.161**		**0.00740**	**0.100**	**mg/L**	1	17-May-2021 21:59
Mid-Range Hydrocarbon (C9-C18)	**0.834**		**0.00540**	**0.200**	**mg/L**	2	18-May-2021 11:13
Surr: 1-Chlorooctadecane	*76.6*			*40-140*	*%REC*	*2*	*18-May-2021 11:13*
Surr: 1-Chlorooctadecane	*71.5*			*40-140*	*%REC*	*1*	*17-May-2021 21:59*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 24-May-2021		Analyst: JHD
Arsenic	**0.299**		**0.000400**	**0.00200**	**mg/L**	1	26-May-2021 20:55
Barium	**1.24**		**0.00190**	**0.00400**	**mg/L**	1	26-May-2021 20:55
Cadmium	U		0.000200	0.00200	mg/L	1	26-May-2021 20:55
Chromium	U		0.000400	0.00400	mg/L	1	26-May-2021 20:55
Lead	U		0.000600	0.00200	mg/L	1	26-May-2021 20:55
Selenium	U		0.00110	0.00200	mg/L	1	26-May-2021 20:55
Silver	U		0.000200	0.00200	mg/L	1	26-May-2021 20:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-2
Collection Date: 11-May-2021 16:35

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-01
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A	**Method:SW7470A**				Prep:SW7470A / 14-May-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-May-2021 14:04

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-1
Collection Date: 11-May-2021 17:25

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-02
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 15:02
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 15:02
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	18-May-2021 15:02
Acetone	U		2.0	2.0	ug/L	1	18-May-2021 15:02
Benzene	**260**		**1.0**	**5.0**	**ug/L**	5	21-May-2021 14:46
Carbon disulfide	U		0.60	2.0	ug/L	1	18-May-2021 15:02
Chlorobenzene	U		0.30	1.0	ug/L	1	18-May-2021 15:02
Ethylbenzene	**1.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:02
m,p-Xylene	**10**		**0.50**	**2.0**	**ug/L**	1	18-May-2021 15:02
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	18-May-2021 15:02
Methylene chloride	U		1.0	2.0	ug/L	1	18-May-2021 15:02
o-Xylene	**3.0**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:02
Tetrachloroethene	U		0.30	1.0	ug/L	1	18-May-2021 15:02
Toluene	**10**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 15:02
Vinyl chloride	U		0.20	1.0	ug/L	1	18-May-2021 15:02
Xylenes, Total	**13**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 15:02
Surr: 1,2-Dichloroethane-d4	*102*			*70-126*	*%REC*	*1*	*18-May-2021 15:02*
Surr: 1,2-Dichloroethane-d4	*104*			*70-126*	*%REC*	*5*	*21-May-2021 14:46*
Surr: 4-Bromofluorobenzene	*101*			*81-113*	*%REC*	*1*	*18-May-2021 15:02*
Surr: 4-Bromofluorobenzene	*99.0*			*81-113*	*%REC*	*5*	*21-May-2021 14:46*
Surr: Dibromofluoromethane	*97.1*			*77-123*	*%REC*	*1*	*18-May-2021 15:02*
Surr: Dibromofluoromethane	*98.9*			*77-123*	*%REC*	*5*	*21-May-2021 14:46*
Surr: Toluene-d8	*98.7*			*82-127*	*%REC*	*1*	*18-May-2021 15:02*
Surr: Toluene-d8	*97.9*			*82-127*	*%REC*	*5*	*21-May-2021 14:46*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	**0.383**		**0.00200**	**0.00300**	**mg/L**	1	14-May-2021 16:12
Surr: 2,5-Dibromotoluene	*283*	*S*		*70-130*	*%REC*	*1*	*14-May-2021 16:12*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-1
Collection Date: 11-May-2021 17:25

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-02
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 14-May-2021		Analyst: GEY
2-Methylnaphthalene	**95**		**0.19**	**1.0**	**ug/L**	10	24-May-2021 17:16
Benzoic acid	U		0.022	0.20	ug/L	1	19-May-2021 19:46
Bis(2-ethylhexyl)phthalate	**0.28**		**0.037**	**0.20**	**ug/L**	1	19-May-2021 19:46
Chrysene	U		0.021	0.10	ug/L	1	19-May-2021 19:46
Naphthalene	**0.39**		**0.020**	**0.10**	**ug/L**	1	19-May-2021 19:46
Phenanthrene	**11**		**0.21**	**1.0**	**ug/L**	10	24-May-2021 17:16
Pyrene	U		0.019	0.10	ug/L	1	19-May-2021 19:46
Surr: 2,4,6-Tribromophenol	*109*			*34-129*	*%REC*	*1*	*19-May-2021 19:46*
Surr: 2,4,6-Tribromophenol	*88.7*			*34-129*	*%REC*	*10*	*24-May-2021 17:16*
Surr: 2-Fluorobiphenyl	*81.8*			*40-125*	*%REC*	*10*	*24-May-2021 17:16*
Surr: 2-Fluorobiphenyl	*77.8*			*40-125*	*%REC*	*1*	*19-May-2021 19:46*
Surr: 2-Fluorophenol	*60.3*			*20-120*	*%REC*	*1*	*19-May-2021 19:46*
Surr: 2-Fluorophenol	*62.4*			*20-120*	*%REC*	*10*	*24-May-2021 17:16*
Surr: 4-Terphenyl-d14	*79.4*			*40-135*	*%REC*	*10*	*24-May-2021 17:16*
Surr: 4-Terphenyl-d14	*91.9*			*40-135*	*%REC*	*1*	*19-May-2021 19:46*
Surr: Nitrobenzene-d5	*55.2*			*41-120*	*%REC*	*10*	*24-May-2021 17:16*
Surr: Nitrobenzene-d5	*109*			*41-120*	*%REC*	*1*	*19-May-2021 19:46*
Surr: Phenol-d6	*52.8*			*20-120*	*%REC*	*1*	*19-May-2021 19:46*
Surr: Phenol-d6	*66.5*			*20-120*	*%REC*	*10*	*24-May-2021 17:16*
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 17-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	**0.205**		**0.00740**	**0.100**	**mg/L**	1	17-May-2021 22:32
Mid-Range Hydrocarbon (C9-C18)	**0.680**		**0.00540**	**0.200**	**mg/L**	2	18-May-2021 11:45
Surr: 1-Chlorooctadecane	*64.4*			*40-140*	*%REC*	*1*	*17-May-2021 22:32*
Surr: 1-Chlorooctadecane	*71.4*			*40-140*	*%REC*	*2*	*18-May-2021 11:45*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 24-May-2021		Analyst: JHD
Arsenic	**0.372**		**0.000400**	**0.00200**	**mg/L**	1	26-May-2021 20:57
Barium	**1.86**		**0.0190**	**0.0400**	**mg/L**	10	27-May-2021 11:47
Cadmium	U		0.000200	0.00200	mg/L	1	26-May-2021 20:57
Chromium	U		0.000400	0.00400	mg/L	1	26-May-2021 20:57
Lead	U		0.000600	0.00200	mg/L	1	26-May-2021 20:57
Selenium	U		0.00110	0.00200	mg/L	1	26-May-2021 20:57
Silver	U		0.000200	0.00200	mg/L	1	26-May-2021 20:57
MERCURY BY SW7470A	**Method:SW7470A**				Prep:SW7470A / 14-May-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-May-2021 14:05

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-3
Collection Date: 11-May-2021 18:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-03
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 14:20
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 14:20
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	18-May-2021 14:20
Acetone	U		2.0	2.0	ug/L	1	18-May-2021 14:20
Benzene	**170**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 14:20
Carbon disulfide	U		0.60	2.0	ug/L	1	18-May-2021 14:20
Chlorobenzene	U		0.30	1.0	ug/L	1	18-May-2021 14:20
Ethylbenzene	**1.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:20
m,p-Xylene	**4.2**		**0.50**	**2.0**	**ug/L**	1	18-May-2021 14:20
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	18-May-2021 14:20
Methylene chloride	U		1.0	2.0	ug/L	1	18-May-2021 14:20
o-Xylene	**1.9**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:20
Tetrachloroethene	U		0.30	1.0	ug/L	1	18-May-2021 14:20
Toluene	**5.3**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 14:20
Vinyl chloride	U		0.20	1.0	ug/L	1	18-May-2021 14:20
Xylenes, Total	**6.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:20
Surr: 1,2-Dichloroethane-d4	*104*			*70-126*	*%REC*	*1*	*18-May-2021 14:20*
Surr: 4-Bromofluorobenzene	*101*			*81-113*	*%REC*	*1*	*18-May-2021 14:20*
Surr: Dibromofluoromethane	*99.9*			*77-123*	*%REC*	*1*	*18-May-2021 14:20*
Surr: Toluene-d8	*101*			*82-127*	*%REC*	*1*	*18-May-2021 14:20*
KDHE LOW RANGE HYDROCARBONS		**Method:KDHE LRH**					Analyst: QX
Low-Range Hydrocarbon (C5 - C8)	**0.192**		**0.00200**	**0.00300**	**mg/L**	1	14-May-2021 17:08
Surr: 2,5-Dibromotoluene	*591*	*S*		*70-130*	*%REC*	*1*	*14-May-2021 17:08*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-3
Collection Date: 11-May-2021 18:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-03
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 14-May-2021		Analyst: GEY
2-Methylnaphthalene	**130**		**1.9**	**10**	**ug/L**	100	24-May-2021 17:56
Benzoic acid	U		0.022	0.20	ug/L	1	19-May-2021 16:16
Bis(2-ethylhexyl)phthalate	**0.10**	J	**0.037**	**0.20**	**ug/L**	1	19-May-2021 16:16
Chrysene	U		0.021	0.10	ug/L	1	19-May-2021 16:16
Naphthalene	U		0.020	0.10	ug/L	1	19-May-2021 16:16
Phenanthrene	**28**		**0.21**	**1.0**	**ug/L**	10	19-May-2021 16:35
Pyrene	**0.31**		**0.019**	**0.10**	**ug/L**	1	19-May-2021 16:16
Surr: 2,4,6-Tribromophenol	*83.1*			*34-129*	*%REC*	*1*	*19-May-2021 16:16*
Surr: 2,4,6-Tribromophenol	*0*	*JS*		*34-129*	*%REC*	*100*	*24-May-2021 17:56*
Surr: 2,4,6-Tribromophenol	*74.3*			*34-129*	*%REC*	*10*	*19-May-2021 16:35*
Surr: 2-Fluorobiphenyl	*59.1*			*40-125*	*%REC*	*10*	*19-May-2021 16:35*
Surr: 2-Fluorobiphenyl	*0*	*JS*		*40-125*	*%REC*	*100*	*24-May-2021 17:56*
Surr: 2-Fluorobiphenyl	*95.3*			*40-125*	*%REC*	*1*	*19-May-2021 16:16*
Surr: 2-Fluorophenol	*61.6*			*20-120*	*%REC*	*1*	*19-May-2021 16:16*
Surr: 2-Fluorophenol	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 17:56*
Surr: 2-Fluorophenol	*39.7*	*J*		*20-120*	*%REC*	*10*	*19-May-2021 16:35*
Surr: 4-Terphenyl-d14	*78.9*			*40-135*	*%REC*	*10*	*19-May-2021 16:35*
Surr: 4-Terphenyl-d14	*0*	*JS*		*40-135*	*%REC*	*100*	*24-May-2021 17:56*
Surr: 4-Terphenyl-d14	*95.5*			*40-135*	*%REC*	*1*	*19-May-2021 16:16*
Surr: Nitrobenzene-d5	*120*			*41-120*	*%REC*	*1*	*19-May-2021 16:16*
Surr: Nitrobenzene-d5	*0*	*JS*		*41-120*	*%REC*	*100*	*24-May-2021 17:56*
Surr: Nitrobenzene-d5	*82.2*			*41-120*	*%REC*	*10*	*19-May-2021 16:35*
Surr: Phenol-d6	*25.4*	*J*		*20-120*	*%REC*	*10*	*19-May-2021 16:35*
Surr: Phenol-d6	*59.9*			*20-120*	*%REC*	*1*	*19-May-2021 16:16*
Surr: Phenol-d6	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 17:56*
KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS	**Method:KDHE MRH-HRH**				Prep:KDHE MRH-HRH / 17-May-2021		Analyst: PPM
High-Range Hydrocarbon (C19-C35)	**0.350**		**0.00740**	**0.100**	**mg/L**	1	17-May-2021 23:04
Mid-Range Hydrocarbon (C9-C18)	**0.852**		**0.00540**	**0.200**	**mg/L**	2	18-May-2021 12:18
Surr: 1-Chlorooctadecane	*86.8*			*40-140*	*%REC*	*2*	*18-May-2021 12:18*
Surr: 1-Chlorooctadecane	*76.8*			*40-140*	*%REC*	*1*	*17-May-2021 23:04*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 24-May-2021		Analyst: JHD
Arsenic	**0.348**		**0.000400**	**0.00200**	**mg/L**	1	26-May-2021 20:28
Barium	**2.00**		**0.0190**	**0.0400**	**mg/L**	10	27-May-2021 11:49
Cadmium	U		0.000200	0.00200	mg/L	1	26-May-2021 20:28
Chromium	**0.000468**	J	**0.000400**	**0.00400**	**mg/L**	1	26-May-2021 20:28
Lead	U		0.000600	0.00200	mg/L	1	26-May-2021 20:28
Selenium	U		0.00110	0.00200	mg/L	1	26-May-2021 20:28
Silver	U		0.000200	0.00200	mg/L	1	26-May-2021 20:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: GP-3
Collection Date: 11-May-2021 18:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-03
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 14-May-2021		Analyst: MSC
Mercury		U	0.0000300	0.000200	mg/L	1	14-May-2021 13:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: DUP A
Collection Date: 11-May-2021 00:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-04
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 14:41
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	18-May-2021 14:41
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	18-May-2021 14:41
Acetone	U		2.0	2.0	ug/L	1	18-May-2021 14:41
Benzene	**180**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 14:41
Carbon disulfide	U		0.60	2.0	ug/L	1	18-May-2021 14:41
Chlorobenzene	U		0.30	1.0	ug/L	1	18-May-2021 14:41
Ethylbenzene	**1.0**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:41
m,p-Xylene	**3.9**		**0.50**	**2.0**	**ug/L**	1	18-May-2021 14:41
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	18-May-2021 14:41
Methylene chloride	U		1.0	2.0	ug/L	1	18-May-2021 14:41
o-Xylene	**2.1**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:41
Tetrachloroethene	U		0.30	1.0	ug/L	1	18-May-2021 14:41
Toluene	**5.4**		**0.20**	**1.0**	**ug/L**	1	18-May-2021 14:41
Vinyl chloride	U		0.20	1.0	ug/L	1	18-May-2021 14:41
Xylenes, Total	**6.0**		**0.30**	**1.0**	**ug/L**	1	18-May-2021 14:41
Surr: 1,2-Dichloroethane-d4	*101*			*70-126*	*%REC*	*1*	*18-May-2021 14:41*
Surr: 4-Bromofluorobenzene	*102*			*81-113*	*%REC*	*1*	*18-May-2021 14:41*
Surr: Dibromofluoromethane	*97.1*			*77-123*	*%REC*	*1*	*18-May-2021 14:41*
Surr: Toluene-d8	*97.5*			*82-127*	*%REC*	*1*	*18-May-2021 14:41*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: DUP A
Collection Date: 11-May-2021 00:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-04
Matrix:GW

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3510 / 14-May-2021		Analyst: GEY
2-Methylnaphthalene	**160**		**1.9**	**10**	**ug/L**	100	24-May-2021 18:35
Benzoic acid	U		0.022	0.20	ug/L	1	19-May-2021 20:05
Bis(2-ethylhexyl)phthalate	**0.052**	J	**0.037**	**0.20**	**ug/L**	1	19-May-2021 20:05
Chrysene	U		0.021	0.10	ug/L	1	19-May-2021 20:05
Naphthalene	**0.43**		**0.020**	**0.10**	**ug/L**	1	19-May-2021 20:05
Phenanthrene	**28**		**0.21**	**1.0**	**ug/L**	10	24-May-2021 18:16
Pyrene	**0.27**		**0.019**	**0.10**	**ug/L**	1	19-May-2021 20:05
Surr: 2,4,6-Tribromophenol	*82.7*			*34-129*	*%REC*	*1*	*19-May-2021 20:05*
Surr: 2,4,6-Tribromophenol	*81.4*			*34-129*	*%REC*	*10*	*24-May-2021 18:16*
Surr: 2,4,6-Tribromophenol	*0*	*JS*		*34-129*	*%REC*	*100*	*24-May-2021 18:35*
Surr: 2-Fluorobiphenyl	*70.5*			*40-125*	*%REC*	*10*	*24-May-2021 18:16*
Surr: 2-Fluorobiphenyl	*0*	*JS*		*40-125*	*%REC*	*100*	*24-May-2021 18:35*
Surr: 2-Fluorobiphenyl	*75.4*			*40-125*	*%REC*	*1*	*19-May-2021 20:05*
Surr: 2-Fluorophenol	*59.2*			*20-120*	*%REC*	*1*	*19-May-2021 20:05*
Surr: 2-Fluorophenol	*59.2*			*20-120*	*%REC*	*10*	*24-May-2021 18:16*
Surr: 2-Fluorophenol	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 18:35*
Surr: 4-Terphenyl-d14	*77.8*			*40-135*	*%REC*	*10*	*24-May-2021 18:16*
Surr: 4-Terphenyl-d14	*0*	*JS*		*40-135*	*%REC*	*100*	*24-May-2021 18:35*
Surr: 4-Terphenyl-d14	*78.3*			*40-135*	*%REC*	*1*	*19-May-2021 20:05*
Surr: Nitrobenzene-d5	*110*			*41-120*	*%REC*	*1*	*19-May-2021 20:05*
Surr: Nitrobenzene-d5	*50.7*			*41-120*	*%REC*	*10*	*24-May-2021 18:16*
Surr: Nitrobenzene-d5	*0*	*JS*		*41-120*	*%REC*	*100*	*24-May-2021 18:35*
Surr: Phenol-d6	*59.5*			*20-120*	*%REC*	*10*	*24-May-2021 18:16*
Surr: Phenol-d6	*0*	*JS*		*20-120*	*%REC*	*100*	*24-May-2021 18:35*
Surr: Phenol-d6	*44.5*			*20-120*	*%REC*	*1*	*19-May-2021 20:05*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 24-May-2021		Analyst: JHD
Arsenic	**0.382**		**0.000400**	**0.00200**	**mg/L**	1	26-May-2021 20:59
Barium	**2.23**		**0.0190**	**0.0400**	**mg/L**	10	27-May-2021 11:55
Cadmium	U		0.000200	0.00200	mg/L	1	26-May-2021 20:59
Chromium	U		0.000400	0.00400	mg/L	1	26-May-2021 20:59
Lead	U		0.000600	0.00200	mg/L	1	26-May-2021 20:59
Selenium	U		0.00110	0.00200	mg/L	1	26-May-2021 20:59
Silver	U		0.000200	0.00200	mg/L	1	26-May-2021 20:59
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 14-May-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-May-2021 14:07

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: Trip Blank
Collection Date: 11-May-2021 00:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	20-May-2021 18:29
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	20-May-2021 18:29
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	20-May-2021 18:29
Acetone	U		2.0	2.0	ug/L	1	20-May-2021 18:29
Benzene	U		0.20	1.0	ug/L	1	20-May-2021 18:29
Carbon disulfide	U		0.60	2.0	ug/L	1	20-May-2021 18:29
Chlorobenzene	U		0.30	1.0	ug/L	1	20-May-2021 18:29
Ethylbenzene	U		0.30	1.0	ug/L	1	20-May-2021 18:29
m,p-Xylene	U		0.50	2.0	ug/L	1	20-May-2021 18:29
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	20-May-2021 18:29
Methylene chloride	U		1.0	2.0	ug/L	1	20-May-2021 18:29
o-Xylene	U		0.30	1.0	ug/L	1	20-May-2021 18:29
Tetrachloroethene	U		0.30	1.0	ug/L	1	20-May-2021 18:29
Toluene	U		0.20	1.0	ug/L	1	20-May-2021 18:29
Vinyl chloride	U		0.20	1.0	ug/L	1	20-May-2021 18:29
Xylenes, Total	U		0.30	1.0	ug/L	1	20-May-2021 18:29
Surr: 1,2-Dichloroethane-d4	*93.1*			*70-126*	*%REC*	*1*	*20-May-2021 18:29*
Surr: 4-Bromofluorobenzene	*90.6*			*81-113*	*%REC*	*1*	*20-May-2021 18:29*
Surr: Dibromofluoromethane	*92.4*			*77-123*	*%REC*	*1*	*20-May-2021 18:29*
Surr: Toluene-d8	*111*			*82-127*	*%REC*	*1*	*20-May-2021 18:29*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
Sample ID: Trip Blank 2
Collection Date: 11-May-2021 00:00

ANALYTICAL REPORT
WorkOrder:HS21050659
Lab ID:HS21050659-06
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
1,1,1-Trichloroethane		U	0.20	1.0	ug/L	1	20-May-2021 18:50
1,1-Dichloroethane		U	0.20	1.0	ug/L	1	20-May-2021 18:50
1,1-Dichloroethene		U	0.20	1.0	ug/L	1	20-May-2021 18:50
Acetone		U	2.0	2.0	ug/L	1	20-May-2021 18:50
Benzene		U	0.20	1.0	ug/L	1	20-May-2021 18:50
Carbon disulfide		U	0.60	2.0	ug/L	1	20-May-2021 18:50
Chlorobenzene		U	0.30	1.0	ug/L	1	20-May-2021 18:50
Ethylbenzene		U	0.30	1.0	ug/L	1	20-May-2021 18:50
m,p-Xylene		U	0.50	2.0	ug/L	1	20-May-2021 18:50
Methyl tert-butyl ether		U	0.20	1.0	ug/L	1	20-May-2021 18:50
Methylene chloride		U	1.0	2.0	ug/L	1	20-May-2021 18:50
o-Xylene		U	0.30	1.0	ug/L	1	20-May-2021 18:50
Tetrachloroethene		U	0.30	1.0	ug/L	1	20-May-2021 18:50
Toluene		U	0.20	1.0	ug/L	1	20-May-2021 18:50
Vinyl chloride		U	0.20	1.0	ug/L	1	20-May-2021 18:50
Xylenes, Total		U	0.30	1.0	ug/L	1	20-May-2021 18:50
Surr: 1,2-Dichloroethane-d4	*89.2*			*70-126*	*%REC*	*1*	*20-May-2021 18:50*
Surr: 4-Bromofluorobenzene	*88.4*			*81-113*	*%REC*	*1*	*20-May-2021 18:50*
Surr: Dibromofluoromethane	*92.2*			*77-123*	*%REC*	*1*	*20-May-2021 18:50*
Surr: Toluene-d8	*109*			*82-127*	*%REC*	*1*	*20-May-2021 18:50*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Weight / Prep Log

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

Batch ID: 165786 **Start Date:** 14 May 2021 09:00 **End Date:** 14 May 2021 14:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050659-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21050659-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21050659-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21050659-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 165815 **Start Date:** 14 May 2021 08:00 **End Date:** 14 May 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050659-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-04		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 165880 **Start Date:** 17 May 2021 12:30 **End Date:** 17 May 2021 15:00
Method: KANSAS MRH-HRH EXTRACTION - WATER **Prep Code:** KS MRH-HRH_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050659-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, HCl to pH <2
HS21050659-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, HCl to pH <2
HS21050659-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, HCl to pH <2

Batch ID: 166145 **Start Date:** 24 May 2021 10:00 **End Date:** 24 May 2021 14:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21050659-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21050659-04		10 (mL)	10 (mL)	1	120 plastic HNO3

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 165786 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35		14 May 2021 07:56	24 May 2021 16:57	100
HS21050659-01	GP-2	11 May 2021 16:35		14 May 2021 07:56	24 May 2021 16:17	10
HS21050659-01	GP-2	11 May 2021 16:35		14 May 2021 07:56	19 May 2021 19:27	1
HS21050659-02	GP-1	11 May 2021 17:25		14 May 2021 07:56	24 May 2021 17:16	10
HS21050659-02	GP-1	11 May 2021 17:25		14 May 2021 07:56	19 May 2021 19:46	1
HS21050659-03	GP-3	11 May 2021 18:00		14 May 2021 07:56	24 May 2021 17:56	100
HS21050659-03	GP-3	11 May 2021 18:00		14 May 2021 07:56	19 May 2021 16:35	10
HS21050659-03	GP-3	11 May 2021 18:00		14 May 2021 07:56	19 May 2021 16:16	1
HS21050659-04	DUP A	11 May 2021 00:00		14 May 2021 07:56	24 May 2021 18:35	100
HS21050659-04	DUP A	11 May 2021 00:00		14 May 2021 07:56	24 May 2021 18:16	10
HS21050659-04	DUP A	11 May 2021 00:00		14 May 2021 07:56	19 May 2021 20:05	1
Batch ID: 165815 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35		14 May 2021 11:00	14 May 2021 14:04	1
HS21050659-02	GP-1	11 May 2021 17:25		14 May 2021 11:00	14 May 2021 14:05	1
HS21050659-03	GP-3	11 May 2021 18:00		14 May 2021 11:00	14 May 2021 13:15	1
HS21050659-04	DUP A	11 May 2021 00:00		14 May 2021 11:00	14 May 2021 14:07	1
Batch ID: 165880 (0)	**Test Name :** KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35		17 May 2021 13:56	18 May 2021 11:13	2
HS21050659-01	GP-2	11 May 2021 16:35		17 May 2021 13:56	17 May 2021 21:59	1
HS21050659-02	GP-1	11 May 2021 17:25		17 May 2021 13:56	18 May 2021 11:45	2
HS21050659-02	GP-1	11 May 2021 17:25		17 May 2021 13:56	17 May 2021 22:32	1
HS21050659-03	GP-3	11 May 2021 18:00		17 May 2021 13:56	18 May 2021 12:18	2
HS21050659-03	GP-3	11 May 2021 18:00		17 May 2021 13:56	17 May 2021 23:04	1
Batch ID: 166145 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35		24 May 2021 14:00	26 May 2021 20:55	1
HS21050659-02	GP-1	11 May 2021 17:25		24 May 2021 14:00	27 May 2021 11:47	10
HS21050659-02	GP-1	11 May 2021 17:25		24 May 2021 14:00	26 May 2021 20:57	1
HS21050659-03	GP-3	11 May 2021 18:00		24 May 2021 14:00	27 May 2021 11:49	10
HS21050659-03	GP-3	11 May 2021 18:00		24 May 2021 14:00	26 May 2021 20:28	1
HS21050659-04	DUP A	11 May 2021 00:00		24 May 2021 14:00	27 May 2021 11:55	10
HS21050659-04	DUP A	11 May 2021 00:00		24 May 2021 14:00	26 May 2021 20:59	1
Batch ID: R383717 (0)	**Test Name :** KDHE LOW RANGE HYDROCARBONS				**Matrix:** GW	
HS21050659-02	GP-1	11 May 2021 17:25			14 May 2021 16:12	1
HS21050659-03	GP-3	11 May 2021 18:00			14 May 2021 17:08	1
Batch ID: R383813 (0)	**Test Name :** KDHE LOW RANGE HYDROCARBONS				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35			17 May 2021 22:46	5

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R383898 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35			18 May 2021 15:23	1
HS21050659-02	GP-1	11 May 2021 17:25			18 May 2021 15:02	1
HS21050659-03	GP-3	11 May 2021 18:00			18 May 2021 14:20	1
HS21050659-04	DUP A	11 May 2021 00:00			18 May 2021 14:41	1
Batch ID: R384080 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Water	
HS21050659-05	Trip Blank	11 May 2021 00:00			20 May 2021 18:29	1
HS21050659-06	Trip Blank 2	11 May 2021 00:00			20 May 2021 18:50	1
Batch ID: R384122 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** GW	
HS21050659-01	GP-2	11 May 2021 16:35			21 May 2021 14:25	5
HS21050659-02	GP-1	11 May 2021 17:25			21 May 2021 14:46	5

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 165880 (0) **Instrument: FID-7** **Method: KANSAS MID RANGE AND HIGH RANGE HYDROCARBONS**

MBLK Sample ID: **MBLK-165880** Units: **mg/L** Analysis Date: **17-May-2021 19:18**
Client ID: Run ID: **FID-7_383864** SeqNo: **6097689** PrepDate: **17-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	U	0.100								
Mid-Range Hydrocarbon (C9-C18)	U	0.100								
Surr: 1-Chlorooctadecane	*0.01914*	*0.0100*	*0.04*	*0*	*47.9*	*40 - 140*				

LCS Sample ID: **LCS-165880** Units: **mg/L** Analysis Date: **17-May-2021 19:50**
Client ID: Run ID: **FID-7_383864** SeqNo: **6097690** PrepDate: **17-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	0.3267	0.100	0.4	0	81.7	40 - 140				
Mid-Range Hydrocarbon (C9-C18)	0.2331	0.100	0.3	0	77.7	40 - 140				
Surr: 1-Chlorooctadecane	*0.02295*	*0.0100*	*0.04*	*0*	*57.4*	*40 - 140*				

LCSD Sample ID: **LCSD-165880** Units: **mg/L** Analysis Date: **17-May-2021 20:22**
Client ID: Run ID: **FID-7_383864** SeqNo: **6097691** PrepDate: **17-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
High-Range Hydrocarbon (C19-C35)	0.3192	0.100	0.4	0	79.8	40 - 140	0.3267	2.34	25	
Mid-Range Hydrocarbon (C9-C18)	0.2302	0.100	0.3	0	76.7	40 - 140	0.2331	1.24	25	
Surr: 1-Chlorooctadecane	*0.02157*	*0.0100*	*0.04*	*0*	*53.9*	*40 - 140*	*0.02295*	*6.19*	*25*	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02 HS21050659-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383717 (0) **Instrument: FID-14** **Method: KDHE LOW RANGE HYDROCARBONS**

MBLK Sample ID: **MBLK-210514** Units: **mg/L** Analysis Date: **14-May-2021 08:33**
Client ID: Run ID: **FID-14_383717** SeqNo: **6094041** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	U	0.00300								
Surr: 2,5-Dibromotoluene	*0.3088*	*0.0100*	*0.25*	*0*	*124*	*70 - 130*				

LCS Sample ID: **LCS-210514** Units: **mg/L** Analysis Date: **14-May-2021 07:37**
Client ID: Run ID: **FID-14_383717** SeqNo: **6094039** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.08241	0.00300	0.075	0	110	70 - 130				
Surr: 2,5-Dibromotoluene	*0.2662*	*0.0100*	*0.25*	*0*	*106*	*70 - 130*				

LCSD Sample ID: **LCSD-210514** Units: **mg/L** Analysis Date: **14-May-2021 08:05**
Client ID: Run ID: **FID-14_383717** SeqNo: **6094040** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.07423	0.00300	0.075	0	99.0	70 - 130	0.08241	10.4	25	
Surr: 2,5-Dibromotoluene	*0.2454*	*0.0100*	*0.25*	*0*	*98.2*	*70 - 130*	*0.2662*	*8.13*	*25*	

MS Sample ID: **HS21050659-03MS** Units: **mg/L** Analysis Date: **14-May-2021 17:36**
Client ID: **GP-3** Run ID: **FID-14_383717** SeqNo: **6094048** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.8733	0.0300	0.75	0.142	97.5	70 - 130				
Surr: 2,5-Dibromotoluene	*3.083*	*0.100*	*2.5*	*0*	*123*	*70 - 130*				

MSD Sample ID: **HS21050659-03MSD** Units: **mg/L** Analysis Date: **14-May-2021 18:04**
Client ID: **GP-3** Run ID: **FID-14_383717** SeqNo: **6094049** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.8515	0.0300	0.75	0.142	94.6	70 - 130	0.8733	2.53	25	
Surr: 2,5-Dibromotoluene	*3.011*	*0.100*	*2.5*	*0*	*120*	*70 - 130*	*3.083*	*2.36*	*25*	

The following samples were analyzed in this batch: HS21050659-02 HS21050659-03

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383813 (0) **Instrument: FID-14** **Method: KDHE LOW RANGE HYDROCARBONS**

MBLK Sample ID: **MBLK-210517** Units: **mg/L** Analysis Date: **17-May-2021 19:30**
Client ID: Run ID: **FID-14_383813** SeqNo: **6096608** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	U	0.00300								
Surr: 2,5-Dibromotoluene	*0.3007*	*0.0100*	*0.25*	*0*	*120*	*70 - 130*				

LCS Sample ID: **LCS-210517** Units: **mg/L** Analysis Date: **17-May-2021 18:34**
Client ID: Run ID: **FID-14_383813** SeqNo: **6096606** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.06831	0.00300	0.075	0	91.1	70 - 130				
Surr: 2,5-Dibromotoluene	*0.2926*	*0.0100*	*0.25*	*0*	*117*	*70 - 130*				

LCSD Sample ID: **LCSD-210517** Units: **mg/L** Analysis Date: **17-May-2021 19:02**
Client ID: Run ID: **FID-14_383813** SeqNo: **6096607** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Low-Range Hydrocarbon (C5 - C8)	0.07468	0.00300	0.075	0	99.6	70 - 130	0.06831	8.91	25	
Surr: 2,5-Dibromotoluene	*0.2537*	*0.0100*	*0.25*	*0*	*101*	*70 - 130*	*0.2926*	*14.3*	*25*	

The following samples were analyzed in this batch: HS21050659-01

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 165815 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-165815** Units: **mg/L** Analysis Date: **14-May-2021 13:12**
Client ID: Run ID: **HG03_383638** SeqNo: **6092717** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-165815** Units: **mg/L** Analysis Date: **14-May-2021 13:14**
Client ID: Run ID: **HG03_383638** SeqNo: **6092718** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00478	0.000200	0.005	0	95.6	80 - 120				

MS Sample ID: **HS21050659-03MS** Units: **mg/L** Analysis Date: **14-May-2021 13:17**
Client ID: **GP-3** Run ID: **HG03_383638** SeqNo: **6092720** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00395	0.000200	0.005	-0.000045	79.9	75 - 125				

MSD Sample ID: **HS21050659-03MSD** Units: **mg/L** Analysis Date: **14-May-2021 13:19**
Client ID: **GP-3** Run ID: **HG03_383638** SeqNo: **6092721** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00395	0.000200	0.005	-0.000045	79.9	75 - 125	0.00395	0	20	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02 HS21050659-03 HS21050659-04

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 166145 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-166145** Units: **mg/L** Analysis Date: **26-May-2021 20:24**
Client ID: Run ID: **ICPMS06_384409** SeqNo: **6112064** PrepDate: **24-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.00200								
Barium	U	0.00400								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Lead	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								

LCS Sample ID: **LCS-166145** Units: **mg/L** Analysis Date: **26-May-2021 20:26**
Client ID: Run ID: **ICPMS06_384409** SeqNo: **6112065** PrepDate: **24-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.04825	0.00200	0.05	0	96.5	80 - 120				
Barium	0.05078	0.00400	0.05	0	102	80 - 120				
Cadmium	0.05044	0.00200	0.05	0	101	80 - 120				
Chromium	0.04949	0.00400	0.05	0	99.0	80 - 120				
Lead	0.04913	0.00200	0.05	0	98.3	80 - 120				
Selenium	0.0497	0.00200	0.05	0	99.4	80 - 120				
Silver	0.05018	0.00200	0.05	0	100	80 - 120				

MS Sample ID: **HS21050659-03MS** Units: **mg/L** Analysis Date: **26-May-2021 20:32**
Client ID: **GP-3** Run ID: **ICPMS06_384409** SeqNo: **6112068** PrepDate: **24-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.3904	0.00200	0.05	0.3484	83.9	80 - 120				O
Barium	1.911	0.00400	0.05	1.946	-69.3	80 - 120				SEO
Cadmium	0.04758	0.00200	0.05	0	95.2	80 - 120				
Chromium	0.04807	0.00400	0.05	0.000468	95.2	80 - 120				
Lead	0.04826	0.00200	0.05	0	96.5	80 - 120				
Selenium	0.04679	0.00200	0.05	0	93.6	80 - 120				
Silver	0.04736	0.00200	0.05	0	94.7	80 - 120				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 166145 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21050659-03MSD** Units: **mg/L** Analysis Date: **26-May-2021 20:34**
Client ID: **GP-3** Run ID: **ICPMS06_384409** SeqNo: **6112069** PrepDate: **24-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.3915	0.00200	0.05	0.3484	86.2	80 - 120	0.3904	0.293	20	O
Barium	1.924	0.00400	0.05	1.946	-44.2	80 - 120	1.911	0.656	20	SEO
Cadmium	0.04676	0.00200	0.05	0	93.5	80 - 120	0.04758	1.74	20	
Chromium	0.04712	0.00400	0.05	0.000468	93.3	80 - 120	0.04807	1.99	20	
Lead	0.04816	0.00200	0.05	0	96.3	80 - 120	0.04826	0.205	20	
Selenium	0.04516	0.00200	0.05	0	90.3	80 - 120	0.04679	3.54	20	
Silver	0.04598	0.00200	0.05	0	92.0	80 - 120	0.04736	2.96	20	

PDS Sample ID: **HS21050659-03PDS** Units: **mg/L** Analysis Date: **27-May-2021 13:05**
Client ID: **GP-3** Run ID: **ICPMS06_384492** SeqNo: **6113234** PrepDate: **24-May-2021** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	3.026	0.0400	1	2	103	75 - 125				

PDS Sample ID: **HS21050659-03PDS** Units: **mg/L** Analysis Date: **26-May-2021 20:36**
Client ID: **GP-3** Run ID: **ICPMS06_384409** SeqNo: **6112070** PrepDate: **24-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Cadmium	0.1087	0.00200	0.1	0.000036	109	75 - 125				
Chromium	0.1097	0.00400	0.1	0.000468	109	75 - 125				
Lead	0.1115	0.00200	0.1	0.000142	111	75 - 125				
Selenium	0.1055	0.00200	0.1	0.000548	105	75 - 125				
Silver	0.09729	0.00200	0.1	-0.000049	97.3	75 - 125				

SD Sample ID: **HS21050659-03SD** Units: **mg/L** Analysis Date: **26-May-2021 20:30**
Client ID: **GP-3** Run ID: **ICPMS06_384409** SeqNo: **6112067** PrepDate: **24-May-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	0.3518	0.0100					0.3484	0.964	10	
Cadmium	U	0.0100					0.000036	0	10	
Chromium	U	0.0200					0.000468	0	10	
Lead	U	0.0100					0.000142	0	10	
Selenium	U	0.0100					0.000548	0	10	
Silver	U	0.0100					-0.000049	0	10	

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 166145 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21050659-03SD** Units: **mg/L** Analysis Date: **27-May-2021 11:51**
Client ID: **GP-3** Run ID: **ICPMS06_384492** SeqNo: **6113021** PrepDate: **24-May-2021** DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Barium	2.004	0.200					2	0.207	10	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02 HS21050659-03 HS21050659-04

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 165786 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-165786** Units: **ug/L** Analysis Date: **19-May-2021 12:09**
Client ID: Run ID: **SV-7_383926** SeqNo: **6099307** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	U	0.10								
Benzoic acid	U	0.20								
Bis(2-ethylhexyl)phthalate	U	0.20								
Chrysene	U	0.10								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*3.495*	*0.20*	*5*	*0*	*69.9*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.923*	*0.20*	*5*	*0*	*98.5*	*40 - 125*				
Surr: 2-Fluorophenol	*3.677*	*0.20*	*5*	*0*	*73.5*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.348*	*0.20*	*5*	*0*	*87.0*	*40 - 135*				
Surr: Nitrobenzene-d5	*5.972*	*0.20*	*5*	*0*	*119*	*41 - 120*				
Surr: Phenol-d6	*3.943*	*0.20*	*5*	*0*	*78.9*	*20 - 120*				

LCS Sample ID: **LCS-165786** Units: **ug/L** Analysis Date: **19-May-2021 12:28**
Client ID: Run ID: **SV-7_383926** SeqNo: **6099308** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	4.394	0.10	5	0	87.9	50 - 120				
Benzoic acid	3.351	0.20	5	0	67.0	10 - 110				
Bis(2-ethylhexyl)phthalate	3.504	0.20	5	0	70.1	40 - 139				
Chrysene	3.234	0.10	5	0	64.7	43 - 120				
Naphthalene	4.322	0.10	5	0	86.4	45 - 120				
Phenanthrene	4.18	0.10	5	0	83.6	45 - 121				
Pyrene	3.962	0.10	5	0	79.2	40 - 130				
Surr: 2,4,6-Tribromophenol	*3.68*	*0.20*	*5*	*0*	*73.6*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.586*	*0.20*	*5*	*0*	*91.7*	*40 - 125*				
Surr: 2-Fluorophenol	*3.293*	*0.20*	*5*	*0*	*65.9*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.534*	*0.20*	*5*	*0*	*90.7*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.066*	*0.20*	*5*	*0*	*81.3*	*41 - 120*				
Surr: Phenol-d6	*3.09*	*0.20*	*5*	*0*	*61.8*	*20 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: 165786 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21050659-03MS** Units: **ug/L** Analysis Date: **19-May-2021 14:41**
Client ID: **GP-3** Run ID: **SV-7_383926** SeqNo: **6100182** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	156.6	0.10	5	160.7	-81.7	50 - 120				SEO
Benzoic acid	3.678	0.20	5	0	73.6	10 - 110				
Bis(2-ethylhexyl)phthalate	3.61	0.20	5	0.1018	70.2	40 - 139				
Chrysene	3.52	0.10	5	0	70.4	43 - 120				
Naphthalene	4.246	0.10	5	0	84.9	45 - 120				
Phenanthrene	38.75	0.10	5	30.06	174	45 - 121				SEO
Pyrene	4.3	0.10	5	0.3115	79.8	40 - 130				
Surr: 2,4,6-Tribromophenol	*4.767*	*0.20*	*5*	*0*	*95.3*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.403*	*0.20*	*5*	*0*	*68.1*	*40 - 125*				
Surr: 2-Fluorophenol	*3.063*	*0.20*	*5*	*0*	*61.3*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.563*	*0.20*	*5*	*0*	*91.3*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.755*	*0.20*	*5*	*0*	*95.1*	*41 - 120*				
Surr: Phenol-d6	*2.262*	*0.20*	*5*	*0*	*45.2*	*20 - 120*				

MSD Sample ID: **HS21050659-03MSD** Units: **ug/L** Analysis Date: **19-May-2021 15:00**
Client ID: **GP-3** Run ID: **SV-7_383926** SeqNo: **6100183** PrepDate: **14-May-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2-Methylnaphthalene	144.9	0.10	5	160.7	-316	50 - 120	156.6	7.77	20	SEO
Benzoic acid	2.637	0.20	5	0	52.7	10 - 110	3.678	33	20	R
Bis(2-ethylhexyl)phthalate	3.705	0.20	5	0.1018	72.1	40 - 139	3.61	2.6	20	
Chrysene	4.338	0.10	5	0	86.8	43 - 120	3.52	20.8	20	R
Naphthalene	5.37	0.10	5	0	107	45 - 120	4.246	23.4	20	R
Phenanthrene	32.15	0.10	5	30.06	41.9	45 - 121	38.75	18.6	20	SEO
Pyrene	4.265	0.10	5	0.3115	79.1	40 - 130	4.3	0.817	20	
Surr: 2,4,6-Tribromophenol	*3.767*	*0.20*	*5*	*0*	*75.3*	*34 - 129*	*4.767*	*23.4*	*20*	R
Surr: 2-Fluorobiphenyl	*3.82*	*0.20*	*5*	*0*	*76.4*	*40 - 125*	*3.403*	*11.6*	*20*	
Surr: 2-Fluorophenol	*2.952*	*0.20*	*5*	*0*	*59.0*	*20 - 120*	*3.063*	*3.67*	*20*	
Surr: 4-Terphenyl-d14	*4.727*	*0.20*	*5*	*0*	*94.5*	*40 - 135*	*4.563*	*3.52*	*20*	
Surr: Nitrobenzene-d5	*5.582*	*0.20*	*5*	*0*	*112*	*41 - 120*	*4.755*	*16*	*20*	
Surr: Phenol-d6	*2.695*	*0.20*	*5*	*0*	*53.9*	*20 - 120*	*2.262*	*17.5*	*20*	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02 HS21050659-03 HS21050659-04

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383898 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-210518** Units: **ug/L** Analysis Date: **18-May-2021 12:55**
Client ID: Run ID: **VOA9_383898** SeqNo: **6098681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
Acetone	U	2.0								
Benzene	U	1.0								
Carbon disulfide	U	2.0								
Chlorobenzene	U	1.0								
Ethylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl tert-butyl ether	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*51.61*	*1.0*	*50*	*0*	*103*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.35*	*1.0*	*50*	*0*	*98.7*	*82 - 115*				
Surr: Dibromofluoromethane	*50.12*	*1.0*	*50*	*0*	*100*	*73 - 126*				
Surr: Toluene-d8	*49.28*	*1.0*	*50*	*0*	*98.6*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383898 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-210518** Units: **ug/L** Analysis Date: **18-May-2021 12:13**
Client ID: Run ID: **VOA9_383898** SeqNo: **6098680** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.23	1.0	20	0	101	70 - 130				
1,1-Dichloroethane	20.36	1.0	20	0	102	71 - 122				
1,1-Dichloroethene	18.05	1.0	20	0	90.2	70 - 130				
Acetone	40.87	2.0	40	0	102	70 - 130				
Benzene	20.26	1.0	20	0	101	74 - 120				
Carbon disulfide	37.88	2.0	40	0	94.7	70 - 130				
Chlorobenzene	20.53	1.0	20	0	103	76 - 113				
Ethylbenzene	19.94	1.0	20	0	99.7	77 - 117				
m,p-Xylene	42.14	2.0	40	0	105	77 - 122				
Methyl tert-butyl ether	20.69	1.0	20	0	103	70 - 130				
Methylene chloride	21.01	2.0	20	0	105	70 - 127				
o-Xylene	21.18	1.0	20	0	106	75 - 119				
Tetrachloroethene	19.31	1.0	20	0	96.6	76 - 119				
Toluene	19.84	1.0	20	0	99.2	77 - 118				
Vinyl chloride	17.52	1.0	20	0	87.6	70 - 130				
Xylenes, Total	63.32	1.0	60	0	106	75 - 122				
Surr: 1,2-Dichloroethane-d4	*50.92*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*51.1*	*1.0*	*50*	*0*	*102*	*82 - 115*				
Surr: Dibromofluoromethane	*49.99*	*1.0*	*50*	*0*	*100.0*	*73 - 126*				
Surr: Toluene-d8	*50.64*	*1.0*	*50*	*0*	*101*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383898 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21050659-03MS** Units: **ug/L** Analysis Date: **18-May-2021 16:05**
Client ID: **GP-3** Run ID: **VOA9_383898** SeqNo: **6098688** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	25.56	1.0	20	0	128	70 - 130				
1,1-Dichloroethane	22.08	1.0	20	0	110	70 - 127				
1,1-Dichloroethene	23.83	1.0	20	0	119	70 - 130				
Acetone	46.61	2.0	40	0	117	70 - 130				
Benzene	199.3	1.0	20	173.6	128	70 - 127				SO
Carbon disulfide	43.13	2.0	40	0	108	70 - 130				
Chlorobenzene	21.46	1.0	20	0	107	70 - 114				
Ethylbenzene	24.65	1.0	20	1.068	118	70 - 124				
m,p-Xylene	51.52	2.0	40	4.186	118	70 - 130				
Methyl tert-butyl ether	23.13	1.0	20	0	116	70 - 130				
Methylene chloride	21.52	2.0	20	0	108	70 - 128				
o-Xylene	24.66	1.0	20	1.897	114	70 - 124				
Tetrachloroethene	23.77	1.0	20	0	119	70 - 130				
Toluene	26.72	1.0	20	5.251	107	70 - 123				
Vinyl chloride	23.06	1.0	20	0	115	70 - 130				
Xylenes, Total	76.18	1.0	60	6.083	117	70 - 130				
Surr: 1,2-Dichloroethane-d4	*50.96*	*1.0*	*50*	*0*	*102*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.7*	*1.0*	*50*	*0*	*99.4*	*81 - 113*				
Surr: Dibromofluoromethane	*50.41*	*1.0*	*50*	*0*	*101*	*77 - 123*				
Surr: Toluene-d8	*49.43*	*1.0*	*50*	*0*	*98.9*	*82 - 127*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R383898 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21050659-03MSD** Units: **ug/L** Analysis Date: **18-May-2021 16:27**
Client ID: **GP-3** Run ID: **VOA9_383898** SeqNo: **6098689** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	24.38	1.0	20	0	122	70 - 130	25.56	4.72	20	
1,1-Dichloroethane	21.11	1.0	20	0	106	70 - 127	22.08	4.53	20	
1,1-Dichloroethene	22.63	1.0	20	0	113	70 - 130	23.83	5.19	20	
Acetone	41.98	2.0	40	0	105	70 - 130	46.61	10.4	20	
Benzene	193.3	1.0	20	173.6	98.4	70 - 127	199.3	3.06	20	O
Carbon disulfide	41.61	2.0	40	0	104	70 - 130	43.13	3.59	20	
Chlorobenzene	21.4	1.0	20	0	107	70 - 114	21.46	0.297	20	
Ethylbenzene	23.98	1.0	20	1.068	115	70 - 124	24.65	2.75	20	
m,p-Xylene	51.2	2.0	40	4.186	118	70 - 130	51.52	0.615	20	
Methyl tert-butyl ether	22.65	1.0	20	0	113	70 - 130	23.13	2.07	20	
Methylene chloride	20.76	2.0	20	0	104	70 - 128	21.52	3.62	20	
o-Xylene	24.69	1.0	20	1.897	114	70 - 124	24.66	0.101	20	
Tetrachloroethene	23.04	1.0	20	0	115	70 - 130	23.77	3.09	20	
Toluene	26.19	1.0	20	5.251	105	70 - 123	26.72	2	20	
Vinyl chloride	21.8	1.0	20	0	109	70 - 130	23.06	5.64	20	
Xylenes, Total	75.89	1.0	60	6.083	116	70 - 130	76.18	0.383	20	
Surr: 1,2-Dichloroethane-d4	*49.8*	*1.0*	*50*	*0*	*99.6*	*70 - 126*	*50.96*	*2.3*	*20*	
Surr: 4-Bromofluorobenzene	*50.59*	*1.0*	*50*	*0*	*101*	*81 - 113*	*49.7*	*1.78*	*20*	
Surr: Dibromofluoromethane	*49.32*	*1.0*	*50*	*0*	*98.6*	*77 - 123*	*50.41*	*2.2*	*20*	
Surr: Toluene-d8	*50.21*	*1.0*	*50*	*0*	*100*	*82 - 127*	*49.43*	*1.58*	*20*	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02 HS21050659-03 HS21050659-04

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384080 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-210520** Units: **ug/L** Analysis Date: **20-May-2021 12:47**
Client ID: Run ID: **VOA6_384080** SeqNo: **6103128** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
Acetone	U	2.0								
Benzene	U	1.0								
Carbon disulfide	U	2.0								
Chlorobenzene	U	1.0								
Ethylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl tert-butyl ether	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*46.84*	*1.0*	*50*	*0*	*93.7*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*46.5*	*1.0*	*50*	*0*	*93.0*	*82 - 115*				
Surr: Dibromofluoromethane	*45.32*	*1.0*	*50*	*0*	*90.6*	*73 - 126*				
Surr: Toluene-d8	*54.86*	*1.0*	*50*	*0*	*110*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384080 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-210520** Units: **ug/L** Analysis Date: **20-May-2021 12:05**
Client ID: Run ID: **VOA6_384080** SeqNo: **6103127** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	17.63	1.0	20	0	88.2	70 - 130				
1,1-Dichloroethane	18.12	1.0	20	0	90.6	71 - 122				
1,1-Dichloroethene	16.93	1.0	20	0	84.7	70 - 130				
Acetone	50.74	2.0	40	0	127	70 - 130				
Benzene	18.8	1.0	20	0	94.0	74 - 120				
Carbon disulfide	38.23	2.0	40	0	95.6	70 - 130				
Chlorobenzene	18.74	1.0	20	0	93.7	76 - 113				
Ethylbenzene	18.53	1.0	20	0	92.6	77 - 117				
m,p-Xylene	36.01	2.0	40	0	90.0	77 - 122				
Methyl tert-butyl ether	19.27	1.0	20	0	96.4	70 - 130				
Methylene chloride	18.52	2.0	20	0	92.6	70 - 127				
o-Xylene	17.78	1.0	20	0	88.9	75 - 119				
Tetrachloroethene	18.13	1.0	20	0	90.7	76 - 119				
Toluene	19.4	1.0	20	0	97.0	77 - 118				
Vinyl chloride	17.16	1.0	20	0	85.8	70 - 130				
Xylenes, Total	53.79	1.0	60	0	89.6	75 - 122				
Surr: 1,2-Dichloroethane-d4	*52.68*	*1.0*	*50*	*0*	*105*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.31*	*1.0*	*50*	*0*	*98.6*	*82 - 115*				
Surr: Dibromofluoromethane	*49.4*	*1.0*	*50*	*0*	*98.8*	*73 - 126*				
Surr: Toluene-d8	*50.43*	*1.0*	*50*	*0*	*101*	*81 - 120*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384080 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21050898-99MS** Units: **ug/L** Analysis Date: **20-May-2021 15:41**
Client ID: Run ID: **VOA6_384080** SeqNo: **6103130** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.14	1.0	20	0	95.7	70 - 130				
1,1-Dichloroethane	16.78	1.0	20	0	83.9	70 - 127				
1,1-Dichloroethene	18.94	1.0	20	0	94.7	70 - 130				
Acetone	34.76	2.0	40	0	86.9	70 - 130				
Benzene	18.66	1.0	20	0	93.3	70 - 127				
Carbon disulfide	40.23	2.0	40	0	101	70 - 130				
Chlorobenzene	19.26	1.0	20	0	96.3	70 - 114				
Ethylbenzene	21.07	1.0	20	0	105	70 - 124				
m,p-Xylene	40.86	2.0	40	0	102	70 - 130				
Methyl tert-butyl ether	16.08	1.0	20	0	80.4	70 - 130				
Methylene chloride	16.93	2.0	20	0	84.7	70 - 128				
o-Xylene	19.02	1.0	20	0	95.1	70 - 124				
Tetrachloroethene	21.73	1.0	20	0	109	70 - 130				
Toluene	20.23	1.0	20	0	101	70 - 123				
Vinyl chloride	18.42	1.0	20	0	92.1	70 - 130				
Xylenes, Total	59.89	1.0	60	0	99.8	70 - 130				
Surr: 1,2-Dichloroethane-d4	*45.42*	*1.0*	*50*	*0*	*90.8*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.02*	*1.0*	*50*	*0*	*98.0*	*81 - 113*				
Surr: Dibromofluoromethane	*45.93*	*1.0*	*50*	*0*	*91.9*	*77 - 123*				
Surr: Toluene-d8	*52.59*	*1.0*	*50*	*0*	*105*	*82 - 127*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384080 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21050898-99MSD** Units: **ug/L** Analysis Date: **20-May-2021 16:02**
Client ID: Run ID: **VOA6_384080** SeqNo: **6103131** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.36	1.0	20	0	91.8	70 - 130	19.14	4.15	20	
1,1-Dichloroethane	15.93	1.0	20	0	79.6	70 - 127	16.78	5.23	20	
1,1-Dichloroethene	19.22	1.0	20	0	96.1	70 - 130	18.94	1.46	20	
Acetone	38.99	2.0	40	0	97.5	70 - 130	34.76	11.5	20	
Benzene	18.51	1.0	20	0	92.5	70 - 127	18.66	0.8	20	
Carbon disulfide	39.45	2.0	40	0	98.6	70 - 130	40.23	1.97	20	
Chlorobenzene	18.86	1.0	20	0	94.3	70 - 114	19.26	2.08	20	
Ethylbenzene	19.87	1.0	20	0	99.4	70 - 124	21.07	5.85	20	
m,p-Xylene	39.48	2.0	40	0	98.7	70 - 130	40.86	3.46	20	
Methyl tert-butyl ether	17.07	1.0	20	0	85.4	70 - 130	16.08	5.99	20	
Methylene chloride	16.92	2.0	20	0	84.6	70 - 128	16.93	0.0697	20	
o-Xylene	19.23	1.0	20	0	96.1	70 - 124	19.02	1.06	20	
Tetrachloroethene	20.51	1.0	20	0	103	70 - 130	21.73	5.75	20	
Toluene	20.09	1.0	20	0	100	70 - 123	20.23	0.684	20	
Vinyl chloride	18.25	1.0	20	0	91.3	70 - 130	18.42	0.925	20	
Xylenes, Total	58.7	1.0	60	0	97.8	70 - 130	59.89	2	20	
Surr: 1,2-Dichloroethane-d4	*48.22*	*1.0*	*50*	*0*	*96.4*	*70 - 126*	*45.42*	*5.99*	*20*	
Surr: 4-Bromofluorobenzene	*49.39*	*1.0*	*50*	*0*	*98.8*	*81 - 113*	*49.02*	*0.744*	*20*	
Surr: Dibromofluoromethane	*47.26*	*1.0*	*50*	*0*	*94.5*	*77 - 123*	*45.93*	*2.84*	*20*	
Surr: Toluene-d8	*53.49*	*1.0*	*50*	*0*	*107*	*82 - 127*	*52.59*	*1.7*	*20*	

The following samples were analyzed in this batch: HS21050659-05 HS21050659-06

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384122 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-210521** Units: **ug/L** Analysis Date: **21-May-2021 12:18**
Client ID: Run ID: **VOA9_384122** SeqNo: **6104101** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	U	1.0								
Cyclohexane	U	1.0								
Surr: 1,2-Dichloroethane-d4	*51.84*	*1.0*	*50*	*0*	*104*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.51*	*1.0*	*50*	*0*	*101*	*82 - 115*				
Surr: Dibromofluoromethane	*49.67*	*1.0*	*50*	*0*	*99.3*	*73 - 126*				
Surr: Toluene-d8	*49.28*	*1.0*	*50*	*0*	*98.6*	*81 - 120*				

LCS Sample ID: **VLCSW-210521** Units: **ug/L** Analysis Date: **21-May-2021 11:36**
Client ID: Run ID: **VOA9_384122** SeqNo: **6104100** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	19.39	1.0	20	0	96.9	74 - 120				
Cyclohexane	14.58	1.0	20	0	72.9	70 - 130				
Surr: 1,2-Dichloroethane-d4	*51*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.62*	*1.0*	*50*	*0*	*99.2*	*82 - 115*				
Surr: Dibromofluoromethane	*50.75*	*1.0*	*50*	*0*	*101*	*73 - 126*				
Surr: Toluene-d8	*49.97*	*1.0*	*50*	*0*	*99.9*	*81 - 120*				

MS Sample ID: **HS21051057-01MS** Units: **ug/L** Analysis Date: **21-May-2021 13:22**
Client ID: Run ID: **VOA9_384122** SeqNo: **6104104** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Benzene	20.27	1.0	20	0	101	70 - 127				
Cyclohexane	23.92	1.0	20	0	120	70 - 130				
Surr: 1,2-Dichloroethane-d4	*52.02*	*1.0*	*50*	*0*	*104*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.89*	*1.0*	*50*	*0*	*99.8*	*81 - 113*				
Surr: Dibromofluoromethane	*50.59*	*1.0*	*50*	*0*	*101*	*77 - 123*				
Surr: Toluene-d8	*49.39*	*1.0*	*50*	*0*	*98.8*	*82 - 127*				

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: HS21050659

QC BATCH REPORT

Batch ID: R384122 (0) **Instrument: VOA9** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21051057-01MSD** Units: **ug/L** Analysis Date: **21-May-2021 13:43**
Client ID: Run ID: **VOA9_384122** SeqNo: **6104105** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Benzene	20.75	1.0	20	0	104	70 - 127	20.27	2.31	20	
Cyclohexane	24.36	1.0	20	0	122	70 - 130	23.92	1.82	20	
Surr: 1,2-Dichloroethane-d4	*50.99*	*1.0*	*50*	*0*	*102*	*70 - 126*	*52.02*	*2.01*	*20*	
Surr: 4-Bromofluorobenzene	*49.77*	*1.0*	*50*	*0*	*99.5*	*81 - 113*	*49.89*	*0.248*	*20*	
Surr: Dibromofluoromethane	*49.53*	*1.0*	*50*	*0*	*99.1*	*77 - 123*	*50.59*	*2.11*	*20*	
Surr: Toluene-d8	*49.69*	*1.0*	*50*	*0*	*99.4*	*82 - 127*	*49.39*	*0.602*	*20*	

The following samples were analyzed in this batch: HS21050659-01 HS21050659-02

Client: Aptim Environmental & Infrastructure
Project: Williams FAR Phyto Sampling
WorkOrder: **HS21050659**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-30-07/01/2020	30-Jun-2021
Kansas	E-10352 2020-2021	31-Jul-2021
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2020-2021	30-Jun-2021
North Carolina	624-2021	31-Dec-2021
Oklahoma	2020-165	31-Aug-2021
Texas	T104704231-21-27	30-Apr-2022

Sample Receipt Checklist

Work Order ID: HS21050659 **Date/Time Received:** **13-May-2021 09:35**

Client Name: CBI-Wichita **Received by:** **Jared R. Makan**

Completed By: */S/ Pablo Marinez* 13-May-2021 17:19 **Reviewed by:** */S/ Ragen Giga* 14-May-2021 12:51

eSignature Date/Time eSignature Date/Time

Matrices: **WATER** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:236700
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	1.4°C, 1.2°C UC/C	IR 31
Cooler(s)/Kit(s):	46568, 44170	
Date/Time sample(s) sent to storage:	5/13/21 17:30	

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: DUP A - Kansas LRH test code not selected, but received volume for test, bottles logged in with no test code
GP-3 - Insufficient Volume for MRH/HRH, not run for MS/MSD

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 236700

HS21050659

WV

Aptim Environmental & Infrastructure
Williams FAR Phyto Sampling

2 Coolers

ALS Project Manager:

Customer Information		Project Information			
Purchase Order	21216302	Project Name	Williams FAR Phyto Sampling	A	8260 VOC (Williams FAR Table 2 analyte list)
Work Order		Project Number	631011702.132	B	8270 SVOC (Williams FAR Table 2 analyte list)
Company Name	Aptim Environmental & Infrastruct	Bill To Company	Aptim Environmental & Infrastruct	C	Kansas LRH
Send Report To	Phil Osborn	Invoice Attn	AP	D	Kansas MRH-HRH
Address	2872 N Ridge Rd, Suite 102B	Address	2872 N Ridge Rd, Suite 102B	E	Metals (Williams FAR Table 2 analyte list)
				F	MOIST_SW3550 (for dry-weight corrected results)
City/State/Zip	Wichita, KS 67205	City/State/Zip	Wichita KS 67205	G	
Phone	(316) 220-8020	Phone	(316) 220-8020	H	
Fax		Fax		I	
e-Mail Address	phil.osborn@aptim.com	e-Mail Address	accountspayable@aptim.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	GP-2 ·	5-11-21	1635	GW	1,2,8	11	X	X	X	X	X						
2	GP-1 ·	" | "	1725	" | "	" | "	11	X	X	X	X	X						
3	GP-3 ·	" | "	1800	" | "	" | "	11	X	X	X	X	X						
4																	
5																	
6																	
7																	
8	MS/MSD	5-11-21	1800	GW	1,2,8	9	X	X			X						
9	DupA ·	5-11-21		GW	1,2,8	9	X	X			X						
10	Trip Blank			W	1,8	2	X										(2 per Cooler)

Sampler(s) Please Print & Sign: Craig Taylor

Shipment Method: Fedex

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

	Date:	Time:	
Relinquished by:	5-12-21	1030	Received by: Fedex
Relinquished by:	5/13/21	09:35	Received by (Laboratory): J. Nunnery
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes: Williams FAR Phyto Sampling MS/MSD Collected @ GP-3

Cooler ID	Cooler Temp.
	1ec
46568	1.4°C
44170	1.2°,
1431	CFO

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Data
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.