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Characterization of a Shallow Urban Aquifer in Atlanta, Georgia

Jude Waguespack

CHARACTERIZATION OF A SHALLOW URBAN AQUIFER IN ATLANTA, GEORGIA

by

JUDE WAGUESPACK

Under the Direction of Brian Meyer, PhD

ABSTRACT

The City of Atlanta is a rapidly growing urban center in the Southeastern U.S. whose increasing population will place considerable strain on the city's water supply in terms of quality and availability. The purpose of this research is to characterize the water quality and provide lithological context of an unconfined aquifer on Georgia State University (GSU) campus as a prospective non-potable water supply to meet Atlanta's demand for water. Two groundwater monitoring wells were installed at 100 Auburn Avenue and serve as the network by which the surficial aquifer was characterized and water quality assessed. Based on groundwater monitoring, water quality varies due to the occurrence of volatile organic compounds in one well exceeding EPA drinking water standards. In addition, the depth to bedrock varied significantly with topography. As a result, water quality and availability would need to be assessed on a site basis for non-potable use and production needs.

INDEX WORDS: Groundwater quality, Urban, Aquifer, Lithology, Atlanta, Water science

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DEDICATION

I dedicate this thesis to my friend and mentor, Russell Walter Kirn III. His influence, above all else, has shaped me into the human I am today.

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I would like to thank Dr. Meyer for his guidance on this project. I would also like to thank my committee, Dr. Pangle and Dr. Elliott, for their assistance. This research could not have been completed without Fabian Zowam and his unwavering curiosity as to my progress on the project. Without his unrelenting questions, I never would have learned what my project was about. I would also like to thank the Field Methods summer class of 2018 for hauling the GPR up and down the streets of Atlanta.

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LIST OF ABBREVIATIONS

City of Atlanta	CoA
Georgia State University	GSU
Monitoring Well (#)	MW01
Soil Boring (#)	SB01
Below Land Surface	BLS
Water Table	WT
X-Ray Diffraction	XRD
Ground Penetrating Radar	GPR
Direct Push Technology	DPT
Hollow Stem Auger	HSA
Environmental Protection Agency	EPA
(Semi)Volatile Organic Compounds	(S)VOCs
Total Dissolved Solids	TDS
United States Geological Survey	USGS
Quality Assurance and Quality Control	QA/QC
Below Detection Limit	BDL
National Oceanic and Atmospheric Administration	NOAA
Ground Penetrating Radar	GPR
National Atmospheric Deposition Program	NADP
Total Area of Study	TAS
Monitoring Well Network	MWN
(Primary/Secondary) Maximum Contaminant Level	(P/S)MCL
Atlanta Metropolitan Region	AMR

1 INTRODUCTION

1.1 Purpose of the Study

The City of Atlanta (CoA) is a rapidly growing urban center in the Southeastern U.S. The population of the city is expected to increase by 2.5 million people by the year 2040 (Atlanta Regional Commission, 2015). The increasing population will place considerable strain on the city's water supply. 70% of the CoA's water supply comes from Lake Lanier, with an additional 13% supplied from the Chattahoochee and Coosa River Basins (Missimer et al., 2014). Aging and outdated infrastructure, as well as an increase in vehicle traffic, provide potential sources of water contaminants. Previous water quality studies of the CoA have focused predominantly on surface water, with little research existing regarding groundwater quality. Additionally, existing geologic cross-sections encompassing the study area are small scale and of lower resolution than the one created for this study. The purpose of this research is to determine the water quality and provide a detailed lithological context of the unconfined aquifer on GSU campus. The characterization of groundwater quality will allow for potential non-potable water use, including irrigation water and "make-up" water for heating, ventilation and air conditioning (HVAC) system needs.

This research will evaluate an alternative source of water by answering the following research questions: 1) *Does the shallow groundwater quality meet the water quality standards for non-potable use?* 2) *What is the physical framework of the shallow groundwater system and how does it vary spatially?*

The goals of the project will be accomplished by completing the following objectives: (1) Install two groundwater monitoring wells on Georgia State campus; (2) Collect and log continuous soil cores to approximately 40 feet below land surface; (3) Prepare boring logs and

monitoring well construction logs; (4) Collect and analyze water samples to characterize water quality; and (5) Assimilate lithological data into a cross-section of the study area. The analysis of these objectives will determine if the quality of shallow groundwater on Georgia State University campus meets non-potable water use standards. Future studies will then assess the availability and supply of water from the aquifer. Based on existing literature, we hypothesize that the water quality within an urban aquifer will not meet EPA drinking water standards but may instead be used as a non-potable water source.

Figure 1: Downtown Atlanta Area Map with Study Area

1.1.1 Importance of the Study

The study area lies within the Peachtree Creek Watershed. This watershed has shown a decreasing amount of groundwater recharge due to rapid runoff from an increasing amount of impervious surfaces (Rose and Peters, 2001). Fulton County withdraws 200.7 million gallons of water per day (Mgal/d) from surface water sources whereas only 4.8 Mgal/d is collected from groundwater (Lawrence, 2016). The monitoring wells used in this study will provide preliminary results of the quality of groundwater in downtown Atlanta with the intention of utilizing the groundwater as a non-potable water supply in the future. The ultimate goal of this research is to decrease reliance on surficial water sources by providing an alternative water supply.

1.2 Background

1.2.1 Geology, climate, land-use

Georgia State University is located downtown in the City of Atlanta in the Piedmont Province within the state of Georgia. The Piedmont Province is characterized by hilly topography and features numerous stream valleys. This region is underlain by Paleozoic metamorphic rock, topped by a regolith with a ranging thickness of 0 – 164 feet (Rose and Peters, 2001; Higgins, M. W., et al., 2003). The basement lithology is composed of discrete belts of metamorphic rock and intruded igneous plutons. The migmatitic metamorphic rocks consist of gneisses, schists, and amphibolites, while the plutons are mostly biotite granitoids (Horton and Zullo, 1991; Alexander Speer and McSween Jr., 1994). The regolith is composed mostly of alluvium, sandy clay saprolite, and soils (Rose and Peters, 2001).

The climate of Georgia is classified as humid subtropical with an average annual summer temperature range from 72°F in the northeast to 82°F in southern regions. Average annual winter

temperatures vary from 39°F in the north to 55°F in the south (NOAA, n.d.). The Atlanta region receives 49.7 inches of annual precipitation distributed evenly throughout the year. The hilly terrain and urban infrastructure within the study area produce high rates of runoff from large storm surge events (Rose and Peters, 2001).

The Atlanta metropolitan region is a sprawling mixture of urban and suburban environments with an area of 8,376 mi^2. The 2015 population was 4,450,487 and had increased by over 1 million people in 15 years. The population is forecasted to grow by another 2.5 million by the year 2040 (Atlanta Regional Commission, 2019). The increasing population brings with it an increasing amount of impervious surfaces and concrete infrastructure. In 2010, low density urban land cover in Atlanta accounted for roughly 50% of the total land space (Shem and Shepherd, 2008). Continuous addition of concrete infrastructure and vehicle traffic, coupled with aging utilities, will increase the risk of contamination to surface and groundwater in the city.

1.2.2 Water Quality of Urban Environments

Urban environments are characterized by the replacement of natural permeable soils with impervious surfaces. Increasing amounts of impervious surfaces show a decrease in groundwater recharge of urban watersheds and an increase in stormwater runoff (Peters, 2009). Storm runoff significantly increases both peak discharge and contaminant concentrations in urban streams within hours (Characklis and Wiesner, 1997; Horowitz, 2009; Peters, 2009; Rose and Peters, 2001). Greater rates of discharge erode urban stream channels at a significantly higher rate than stream channels in natural environments (Peters, 2009). Increased erosion leads to a higher concentration of suspended sediments. Suspended sediments account for ≥75% of annual fluxes of trace and major elements in Atlanta streams (Horowitz, 2009).

Contaminant concentrations in urban streams have been shown to exceed water quality standards for potable and non-potable use (Peters, 2009). Contamination sources include acidic rain, solid and liquid waste disposal, small and large scale industry discharges, stormwater runoff, leaking sewage systems, and automobile traffic (Carey et al., 2013; Choi, et al., 2005; Lee, et al., 2015; Rose and Peters, 2001). Trace metal concentrations of zinc (Zn) from surface street runoff are two orders of magnitude higher than non-urban stream concentrations. Zn is mobilized primarily during storm events from areas of traffic (Rose and Peters, 2001).

Urbanization directly affects stream quality by showing increased specific conductivity and increased concentrations of chloride (Cl^-), sulfate (SO_4^{2-}), and pesticides. Concentrations of nutrients in stream water did not necessarily correlate with urbanization but rather with the percentage of the watershed under forested cover (Gregory and Calhoun, 2007). However, streams in Atlanta showed elevated levels of SO_4^{2-}, Cl^-, K^+, and Na^+ that correlated with electrolytes found in human waste (Rose, 2007). Fecal coliform concentrations of Atlanta streams have been found to exceed the state of Georgia's water quality usage for any class. (Peters, 2009).

Urban aquifers also show a decline in water quality compared to non-urban and rural aquifers (Choi, et al., 2005; Lee, et al., 2015). Seoul, South Korea is a comparable city to Atlanta because of similar geologic bedrock (granite, gneiss, and schist) and the average amount of annual precipitation (51.2 inches). Groundwater in Seoul was shown to have a significantly higher concentration of total dissolved solids in industrialized areas (average 585 mg/L) compared to forested areas (average 151 mg/L). Additionally, sewage leakage was shown to be a significant source of groundwater contamination in the city, accounting for >90% of annual groundwater recharge (Choi, et al., 2005).

1.2.3 Total Area of Study

For the purposes of this research, the study area is classified into two categories: Total Area of Study (TAS), and the Monitoring Well Network (MWN). The intention of this division is to provide a broader lithological context (within the TAS) for the smaller area of the MWN. The total area of study consists of an 87,383 m^2 (940,584 ft^2) three block area in Downtown Atlanta on the GSU main campus. The northern and southern boundaries are John Wesley Dobbs Ave. and Auburn Ave., respectively. The western and eastern boundaries are Park Place and Piedmont Ave., respectively. This area encompasses soil borings SB01, SB02, and SB03; and monitoring wells MW01 and MW02. The subsurface lithology of the TAS was determined from the soil boring logs, XRD analysis of the sediment cores, and from survey of the area using ground penetrating radar (GPR).

Figure 2: Total Area of Study Location Map

1.2.4 Monitoring Well Network

The MWN consists of a smaller area within the TAS. The MWN encompasses an area of 1148 m^2 (12,357 $ft.^2$) and includes the groundwater monitoring wells MW01 and MW02, as well as soil boring SB03.

The monitoring wells were installed in April of 2018 at 100 Auburn Ave NE, Downtown Atlanta. An unsuccessful attempt was made to install two additional wells the same day but the drilling team experienced auger refusal due to the proximity of impenetrable bedrock to the land surface. Instead, at these locations, two soil cores (SB01 and SB02) were obtained with a recovery depth of 22 inches and 11.25 feet. Elevations of the top of the well casings of MW01 and MW02 are 1011.60’ and 1007.93’ above sea level, respectively. MW01 lies approximately

Figure 3: MWN Location Map

100 feet to the west of MW02. Each well extends 37 feet below land surface, screened from 21' BLS to 36' BLS. A complete soil core (SB03) was obtained from MW01. Water level was monitored manually at each well until the installation of a continuous water level data logger in MW01 in November of 2018 and MW02 in March 2019.

2 METHODS

2.1 Monitoring Wells

2.1.1 Well Installation

Two monitoring wells were installed by EMServices Inc. with a drill rig using Direct Push Technology (DPT) and a Hollow Stem Auger (HSA) system. Each well consists of a 2-inch diameter Schedule 40 PVC riser pipe that reaches a total depth of 37 feet BLS. The well screening is 15 feet in length and composed of Schedule 40 PVC with 0.01" slot size. The screen extends from 21-36 feet BLS. The PVC piping sits within a well-casing pipe filled with three distinct materials. The bottom 18 feet is filled with filter pack sand which surrounds the screened portion of the well to allow groundwater to enter the well. A bentonite clay seal 2 feet thick caps the top of the filter pack to provide a competent seal. Cement grout was placed from the bentonite seal to fill the remainder of the well-casing and to ensure stability of the riser pipe. A concrete pad 2'x 2' x 4" was installed at ground surface and serves as the housing and protection for the monitoring well. A traffic grade manhole cover within the concrete pad serves to protect and provide access to the wells.

2.1.2 Soil Borings

Initially, four monitoring wells were scheduled for installation but in two locations impenetrable bedrock was encountered close to the ground surface. Soil borings (SB01 and

SB02) were recovered in these locations with a recovery depth of 22 inches and 11.25 feet, respectively. A third soil boring (SB03) was obtained at the location of MW01 with a full recovery depth of 37 feet. Each soil core was obtained using DPT during the well installation and was removed from the HSA encased in a hollow plastic tube 1-inch in diameter. The cores were removed and stored in 5 foot intervals. Each boring was analyzed for mineral identification, grain size, sorting, and color. Sediment color was determined using the Munsell color system.

2.1.3 Water Level Logger

Depth to the water table in both wells was manually measured using a Solinst Water Level Meter Model 101 until the installation of a Solinst Levelogger Edge in MW01. The level logger was installed November 29, 2018 and programmed to record the water table depth in 12 hour intervals. Water table elevation was calculated by subtracting the depth to the water table from the elevation recorded at the top of the well casing. Barometric pressure data was obtained from the Hartsfield Jackson Airport weather station and used to correct the water table elevation from fluctuations associated with changes in atmospheric pressure. Atmospheric pressure was subtracted from the overhead pressure directly measured by the level logger within MW01.

2.1.4 Multiparameter Water Quality Meter

A YSI ProDSS multiparameter water quality meter was used to measure temperature, pH, conductivity, and dissolved oxygen and the instrument was calibrated for each parameter before use. A two-point calibration was performed for the pH sensor using known pH buffers of 4 and 7. Similarly, a traceable conductivity calibration solution was used to verify the accuracy of the conductivity sensors. The instrument was placed in an environment of 100% humidity for 5-10 minutes to calibrate the dissolved oxygen sensor using a one-point calibration. During

groundwater sampling or testing the instrument was allowed to operate until the parameter values stabilized, to ensure the collection of representative groundwater samples.

2.1.5 Groundwater Sample Collection and Geochemistry

Groundwater samples were obtained using a peristaltic pump. Each well was purged for a period of 15 minutes and geochemical parameters stabilized as per EPA methodologies before sample collection to assure an accurate analysis of the aquifer water and to ensure stable analyte concentrations. A total of 12 groundwater samples were collected during the course of this study.

The first two samples were collected in April of 2018. One liter of groundwater was collected from each well, preserved in coolers at temperatures not exceeding 2°C, and shipped to TestAmerica Laboratory in Savannah, GA. TestAmerica processed the samples and a blank according to applicable EPA standards for the following analytes: Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Cl^- and SO_4^{2-} Anions, Total Hardness (as $CaCO_3$), Metals, Mercury, Alkalinity, and Total Dissolved Solids (TDS).

A total of ten samples were collected in 60 mL HDPE bottles to be analyzed using two ThermoFisher Dionex™ Aquion™ Ion Chromatographs courtesy of Dr. Sarah Ledford. The samples were prepared and analyzed in the Ledford Urban Hydrology Lab in the Geosciences Department of GSU. To capture temporal variation of the aquifer geochemistry, six of the ten well samples were collected and analyzed in November 2018, and the remaining 4 in February 2019. Each sample was analyzed for the following anions and cations: F^-, Cl^-, NO_2^-, Br^-, NO_3^-, PO_4^{3-}, SO_4^{2-}, Na^+, NH_4^+, K^+, Mg^{2+}, and Ca^{2+}.

Each sample was filtered through 0.47 micron MilliPore filter to remove any solid or undissolved material prior to analysis within 48 hours of collection and stored at 4°C before and after filtration. The filtration process is critical to avoid damaging the instrument and to prevent

nitrogen species (NO_2^-, NO_3^-, NH_4^+) from reacting with any solid, organic material or microbes. The ion chromatographs were calibrated by running five in-house standards with known concentrations of each ion and two USGS standards for calibration verification. Linear calibration curves for each ion were made and all demonstrated R^2 values of 0.99, with the exception of ammonium which was fit with a quadratic. QA/QC was performed by calculating percent error of all standards as well as percent change of any samples rerun. With the exception of the lowest concentration standard, all errors were <10%.

Piper diagrams were created using GW_Chart, freely distributed software from the USGS to characterize groundwater facies and evaluate geochemical trends or changes in groundwater composition during the study period. Due to the limitations of the ion chromatograph, values of CO_3^{2-} and HCO_3^- were only obtained from the samples analyzed by TestAmerica and were used when plotting the in-house samples. For the purposes of this study, CO_3^{2-} and HCO_3^- concentrations were assumed to be constant.

Figure 4: ThermoFisher Ion Chromatograph

2.2 Precipitation Data

2.2.1 Sample Collection and Geochemical Analysis

One liter of precipitation was collected October 2018 in a five-gallon bucket with a 6-inch diameter funnel. An Olympic-standard ping-pong ball was placed inside the funnel and used to avert evaporation of collected rainwater thereby preventing an artificial increase in concentration of dissolved ions. An insect screen was fastened atop the funnel to prevent any detritus from falling inside the collector.

The rainwater was preserved in a cooler and shipped to the TestAmerica Laboratory for geochemical analysis. TestAmerica processed the samples and a blank according to applicable EPA standards for the following analytes: Cl^- and SO_4^{2-} Anions, Total Hardness (as $CaCO_3$), Metals, Alkalinity, and TDS. Ion concentrations were then plotted on a Piper Diagram. SO_4^{2-} and HCO_3^- values were both below the detection limit so according to standard practice the values were halved when plotted on the diagram. The full analytical report can be found in Appendix B.

Figure 5: Precipitation Collector

2.2.2 Additional Rain Data

Quantitative precipitation data (rainfall totals) were obtained from the National Oceanic and Atmospheric Administration (NOAA) for the years of 2018 and 2019, collected at station US1GADK0028 in the Candler Park community in Atlanta. Qualitative

precipitation data were obtained from the National Atmospheric Deposition Program (NADP) for the year of 2017, collected at station GA41 ten miles southwest of Griffin, Ga. This data included concentration values of the following ions: Cl^-, Br^-, NO_3^-, SO_4^{2-}, Na^+, NH_4^+, K^+, and Ca^{2+}. Additionally, the data contained values of pH and conductivity. This data was used to determine temporal variation of precipitation geochemistry and to provide a chemical baseline with which to compare the precipitation sample, RW01.

2.3 Lithology

2.3.1 Sample Collection and X-Ray Diffraction

A total of 19 sediment samples were taken from SB01, SB02, and SB03. When possible, samples were taken in increments of 30 inches until the end of the core. Due to the limited boring recovery only one sample was taken from SB01 at a depth of 12”, while five samples were taken from SB02 at depths of 25”, 60”, 80”, 120”, and 130”. SB03 features a full recovery of 35’ obtained in multiple cores 5’ in length. However, several of the 5’ sections contained less than 5’ of sediment representing consolidation or loss of the material. In the instances where the incomplete recovery of these cores overlapped the sampling scheme of 30-inch increments the sample was obtained as close as possible to the 30-inch mark. A total of 13 samples were obtained from SB03.

Each sample was dried in a Thelco lab oven at 55°C for 3 hours before being ground into powder using an SPEX sample pulverizer. The samples were pulverized for 15 minutes in a ceramic canister. Between each sample the canister was cleaned of sediment by running the instrument with standard quartz sand.

After pulverization, the samples were prepared in a randomly oriented mount and placed inside a Panalytical X’Pert Pro X-Ray Diffractometer. Mineral determination of the diffraction

peaks was done using the Panalytical HighScore Plus identification software and referenced by hand-sample analysis of the soil borings. Quartz and biotite were readily identified in hand-sample, while the remaining clay minerals and oxides were determined to be weathering products of common minerals found within the protolith. The clay minerals halloysite and kaolinite are created from the hydration of feldspar, while montmorillonite may sometimes occur intermixed with kaolinite. Gibbsite is an aluminum hydroxide formed as the weathering product of feldspars or amphiboles.

Typically, the verification of specific clay minerals requires additional methodologies, such as ethylene glycol solvation, oriented mounts, and the sieving of clay-size particles for separate analysis. However, due to time constraints these methodologies proved beyond the scope of this study. As such, the identification of clay minerals in this project provides a tentative baseline with which future studies may evaluate.

2.3.2 Ground Penetrating Radar

Using a MALA Model GroundExplorer HDR, several profiles of the subsurface within the study area were obtained. Multiple runs were completed over the same area utilizing a 160 MHz antenna which provided imagery at depths up to ~60 feet BLS.

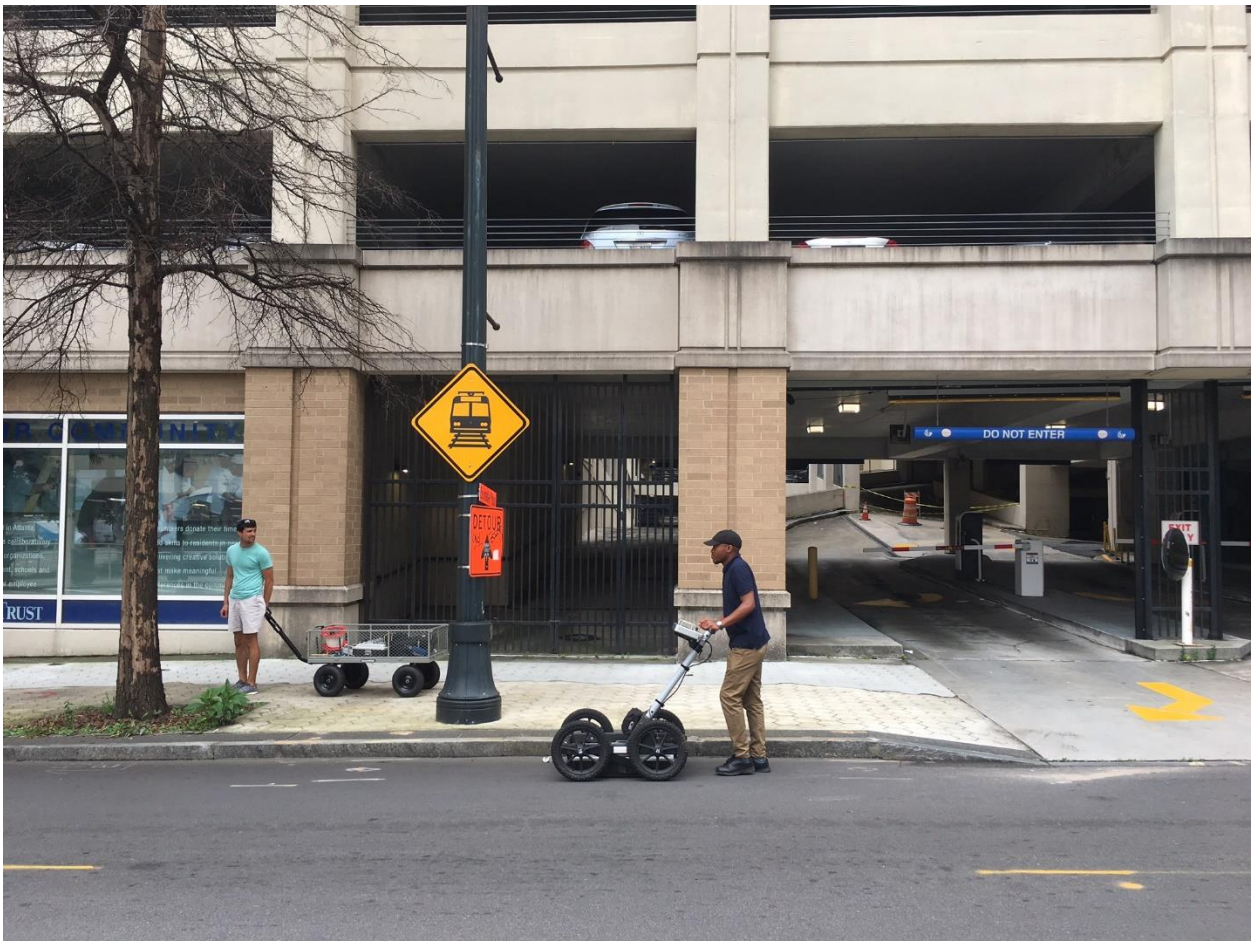

Figure 6: Researcher Fabian Zowam operating the GPR

The GPR data were post-processed for DC removal, Time-Zero adjustment, spatial interpolation, background removal, 2D spatial filtering, amplitude correction and bandpass filtering. The intention of DC removal is to remove a constant signal component if present. Time-Zero Adjustment corrects the zero-point of the vertical time scale to the time-zero of the radar wave emitted from the antenna. Spatial interpolation was used to recalculate the horizontal scale by interpolating the traces of the regular profile interval. Due to the nature of radar detection, the strongest signal received comes directly from the transmitting antenna. Background removal accounts for this signal and removes it as needed. 2D spatial filtering averages the raw sample signal to enhance the visual output. Amplitude correction acts as an

automatic gain control equalizing the wave amplitudes of the vertical traces. Bandpass filtering increases the signal/noise ratio by filtering either the low or high end frequencies received.

3 RESULTS

3.1 Water Quality

3.1.1 Chemical Composition

Initial results acquired from TestAmerica in April of 2018 indicate VOC and SVOC concentrations in MW01 to be below the EPA's Maximum Contaminant Level (MCL) of which there is no known or expected health risk. An exceedance was noted in MW02 for tetrachloroethylene (aka PCE) at 6.0 μg/L versus an MCL of 5.0 μg/L. A full report of the TestAmerica sample results can be found in Appendix B. Anion and cation concentrations of all samples are summarized in Table 1.

Table 1: Ion Concentrations of MW01, MW02, and RW01

Sample ID	Fluoride	Chloride	Nitrite	Bromide	Nitrate	Phosphate	Sulfate	Sodium	Ammonium	Potassium	Magnesium	Calcium
	mg F/L	mg Cl/L	mg N/L	mg Br/L	mg N/L	mg P/L	mg SO4/L	mg Na/L	mg N/L	mg K/L	mg Mg/L	mg Ca/L
MW01-1	0.0945	23.4090	bdl	0.1870	7.5076	bdl	141.7516	24.3467	bdl	4.1637	17.7545	17.4171
MW01-2	0.0807	23.4713	bdl	0.1828	7.5321	0.0965	137.7971	24.3933	0.0003	4.1309	17.6892	16.8818
MW01-3	0.0799	23.1835	bdl	0.1798	7.4160	0.0907	139.0176	24.3835	bdl	4.1307	17.7242	17.2051
MW01-A	0.0684	22.0876	0.0165	0.1280	7.7975	N/A	75.7813	27.3106	0.0717	4.3177	14.7481	1.1747
MW01-B	0.0915	22.1479	0.0166	0.1326	7.7741	N/A	76.0385	27.3776	0.0743	4.3577	14.6565	1.1589
MW01-TA	N/A	23	N/A	N/A	N/A	N/A	120	24	N/A	4.5	18	25
MW02-1	0.1052	24.4237	0.0359	0.1091	3.4590	bdl	146.3336	22.2760	0.0094	5.0466	14.8188	23.3293
MW02-2	0.0602	24.3309	0.0348	0.1100	3.4494	bdl	144.6595	22.3085	0.0082	4.8596	14.7205	23.6243
MW02-3	0.1030	24.7917	0.0344	0.1099	3.5242	bdl	146.8977	22.2758	0.0080	4.6739	14.5766	23.7703
MW02-A	0.0438	16.3012	N/A	0.0644	2.1952	N/A	82.0740	15.0470	0.0235	3.9196	9.0298	17.2103
MW02-B	0.0576	16.7115	N/A	0.0718	2.2716	0.0087	86.6997	15.7164	0.0228	3.9945	9.5845	17.7490
MW02-TA	N/A	24	N/A	N/A	N/A	N/A	160	27	N/A	6.4	20	35
RW01	N/A	0.41	N/A	N/A	N/A	N/A	0.20	0.49	N/A	0.66	0.13	0.61

MW01-TA and MW02-TA represent baseline concentration values obtained by TestAmerica. Samples MW01-1, MW01-2, MW01-3, MW02-1, MW02-2, and MW02-3 were analyzed in the Ledford Urban Hydrology Lab in November of 2018. Samples MW01-A, MW01-B, MW02-A, and MW02-B were analyzed from the same lab in February of 2019.

Groundwater temperature, pH, conductivity, and dissolved oxygen results collected from the YSI multiparameter meter are displayed below, in Table 2.

Table 2: Physiochemical data of MW01

Date: 06/12/18	*11:48*	*11:55*	*11:58*
Temperature (°C)	21.2	21.2	21.2
pH	5.20	5.20	5.20
Conductivity (µS/cm)	373.0	378.1	380.8
Dissolved Oxygen	34%	33%	32%

3.2 Additional Precipitation Analysis

3.2.1 Chemical Composition

Table 3: Ion concentrations established by NADP compared with sample RW01

Site Characteristics			Dissolved Constituents (mg/L)					
siteID	seas	yr	Ca	Mg	K	Na	Cl	SO4
GA41	Winter	2015	0.024	0.012	0.013	0.094	0.171	0.45
GA41	Spring	2015	0.067	0.034	0.108	0.148	0.259	0.525
GA41	Summer	2015	0.092	0.038	0.208	0.059	0.114	0.598
GA41	Fall	2015	0.02	0.018	0.082	0.066	0.123	0.271
GA41	Winter	2016	0.027	0.023	0.05	0.126	0.229	0.302
GA41	Spring	2016	0.067	0.018	0.035	0.115	0.199	0.456
GA41	Summer	2016	0.077	0.018	0.028	0.068	0.106	0.418
GA41	Fall	2016	0.03	0.023	0.051	0.114	0.187	0.206
GA41	Winter	2017	0.041	0.012	0.014	0.092	0.175	0.411
GA41	Spring	2017	0.096	0.03	0.043	0.183	0.331	0.575
GA41	Summer	2017	0.07	0.016	0.035	0.066	0.114	0.303
GA41	Fall	2017	0.024	0.02	0.09	0.123	0.237	0.208
RW01	Fall	2018	0.61	0.13	0.66	0.49	0.41	0.2

Data obtained from NADP, summarized in Table 3, was used to provide a baseline with which to compare the precipitation sample RW01 before the sample was compared with the

geochemistry of groundwater. The results obtained indicate higher concentrations of all dissolved constituents within RW01 with the exception of SO_4.

3.3 Physical Framework of Aquifer System

3.3.1 Water Table and Precipitation Accumulation

Depth to the water table was first recorded on 6/27/2018 and was 12.75’ BLS at MW01 and 9.60’ BLS at MW02. The calculated elevation (hydraulic head) of the water table on this date was 998.85’ ASL at MW01. The water table elevation did not fluctuate significantly during the course of this study. The greatest deviation was measured to be 1.10’. Groundwater temperature did not vary more than 0.25°C from November to March.

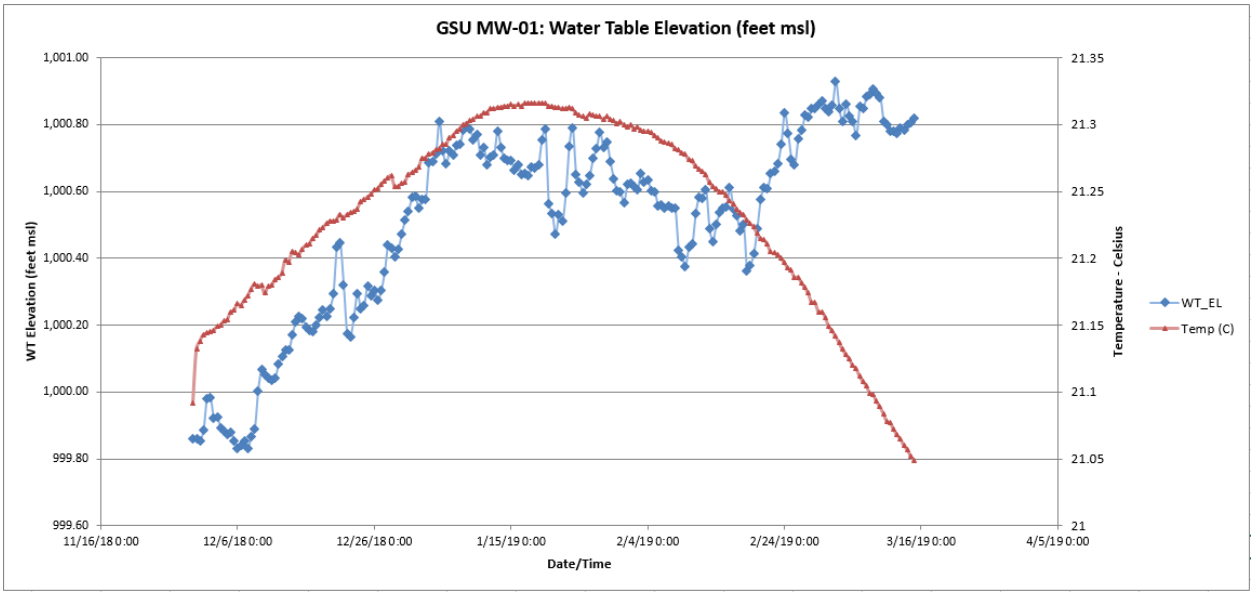

Figure 7: Water Table Elevation and Temperature

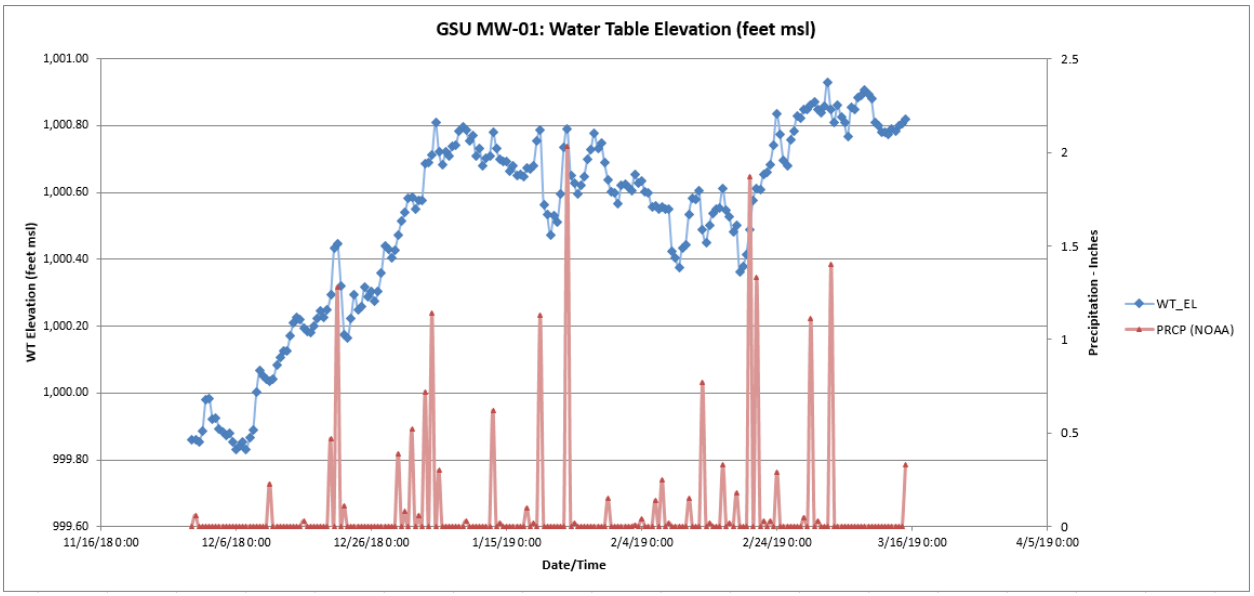

Figure 8: Water Table Elevation and Precipitation Accumulation

Water table response to rain events occurs within a period of one to two days. The water table begins to fall within a similar time period after several days without precipitation.

3.3.2 Soil Boring and XRD

Three soil borings were obtained and characterized for this study. The soil boring and monitoring well construction logs can be found in Appendix A. A total of 19 samples were collected for XRD analysis between the three borings, and the diffraction patterns can be found in Appendix C. SB01 was obtained from 26 Auburn Ave. and has a recovery depth of 22”. Three attempts were made to install a complete monitoring well, and each attempt experienced auger refusal at depths from 2’, 5.5’, and 17’ BLS. Refusal was due to impenetrable bedrock, and the varying depths in such a small area showcase the uneven topography of the bedrock surface. SB01 consists of a light gray sand with extensive lithics, with most ranging in size from 1-2 mm and the largest of 25.4 mm. XRD Analysis revealed the dominant mineralogy to be quartz, biotite, and halloysite.

SB02 was obtained behind the College of Law at 85 Park Place and has a recovery depth of 135". Of the 135" depth, only 65.5" of sediment was recovered representing consolidation of sediment. Auger refusal occurred at 11.25' BLS once again due to impenetrable bedrock. SB02 consists of a 12" top layer of brown sand rich in organic material with some lithics. The rest of the boring is a mixture of sand and fine sand with color ranging from an oxidized reddish brown to a lighter grey with lithics at greater depths. XRD analysis revealed the dominant mineralogy to be quartz, biotite, gibbsite, and clay minerals of montmorillonite and kaolinite.

SB03 was obtained from the completed MW01 at 100 Auburn Ave. and features a full recovery depth of 35'. Loose, unconsolidated sands compose the first ten feet of the core. From 10 – 27', the sandy sediments are more densely packed than those above. From 27 – 35' the material was harder and more compacted and composed of fine sands mixed with lithic fragments in the final three feet. Of particular importance are the abundance of lithics within the final three feet representing partially weathered bedrock, further showing the proximity of bedrock close to the land surface within the study area. XRD analysis revealed the dominant mineralogy to be quartz, biotite, gibbsite, and K-feldspar throughout the boring. Clay mineralogy transitions from halloysite and montmorillonite near the land surface to kaolinite below the water table (from depths of 13' to the bottom of the well).

3.3.3 GPR

Four GPR profiles of the TAS were made, and the transects are classified as follows: (1) A W-E transect along Auburn Ave. from Woodruff Park to Piedmont Ave.; (2) A N-S transect along Courtland St. from John Wesley Dobbs Ave. to Auburn Ave.; (3) A 140 ft. transect

obtained at the site of SB02 behind the GSU College of Law; and (4) A W-E transect from MW01 to MW02.

The four GPR profiles are displayed in Figures 12-15 and the image contrast was adjusted for ease of visibility. The raw images are attached in Appendix D. Monitoring well, soil borings, and street locations are labeled on each. Soil borings and monitoring wells are represented to scale within their respective profiles. Hatch marks were drawn to establish the screened portion of each monitoring well.

Figure 9: GPR Transect Location Map

Transects 2-4 display four distinct units or radar facies as determined by differences in reflective banding. The top unit ranges from 0-10 feet BLS and consists of lightly colored broad reflections. The second unit consists of much brighter but equally broad reflections with a varying total depth throughout each profile. The third unit displays lighter and more narrow banding than the first two, while the fourth unit is lighter still and more broad than the third.

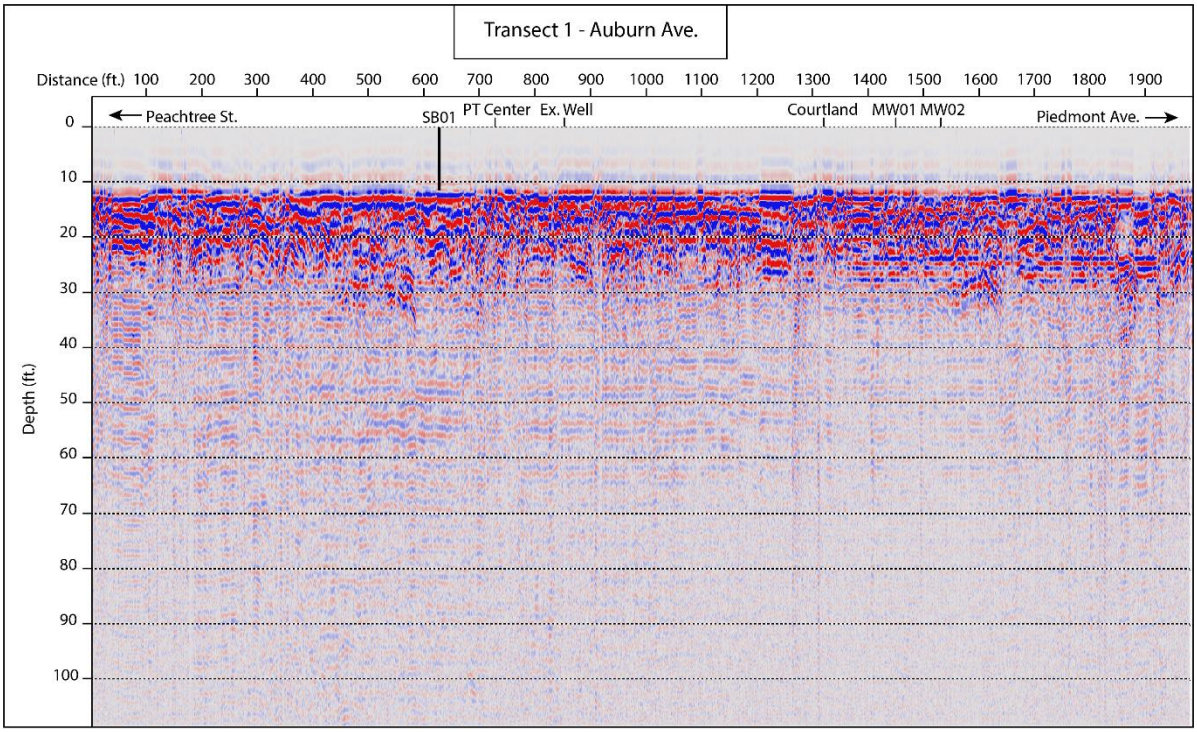

Figure 10: Transect 1

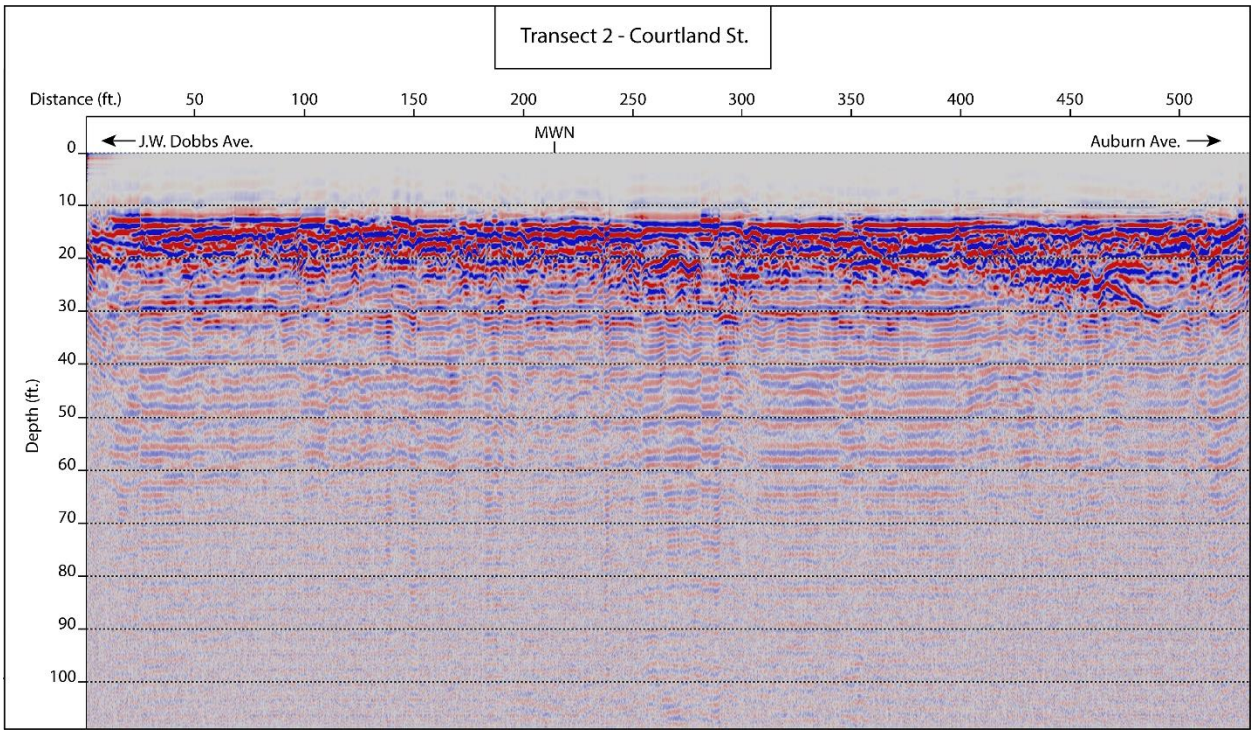

Figure 11: Transect 2

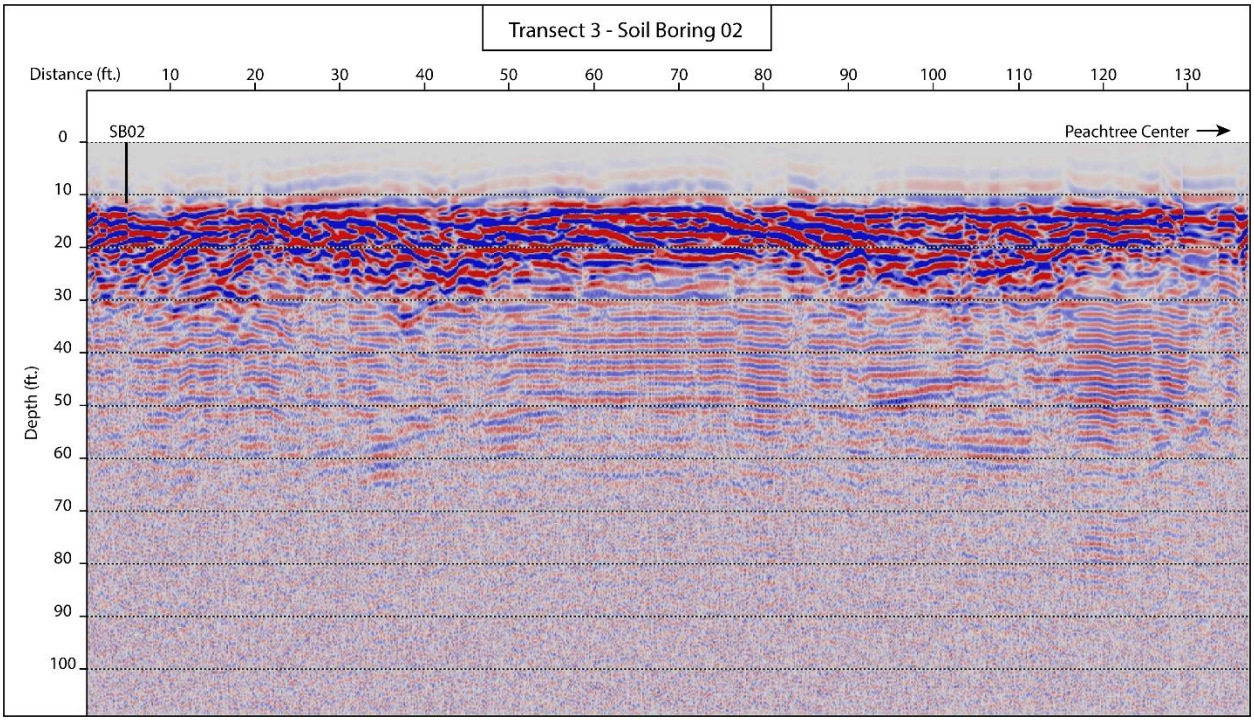

Figure 12: Transect 3

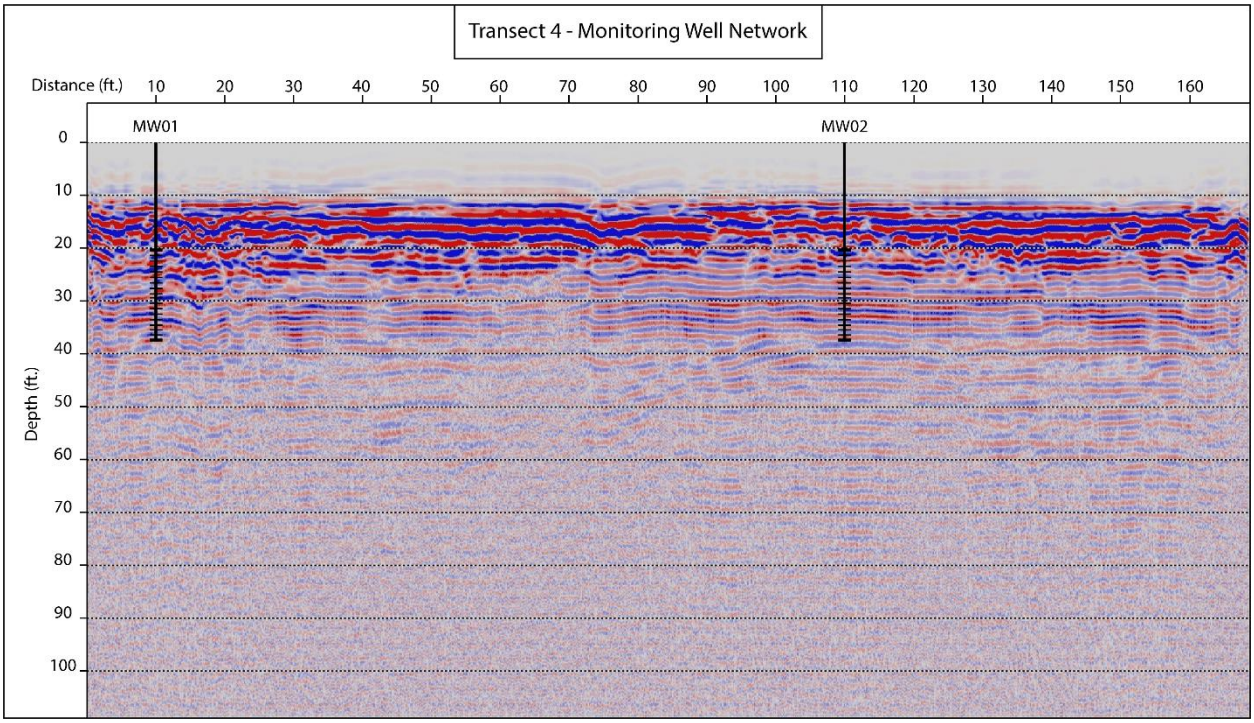

Figure 13: Transect 4

Transect 1 represents a cross-sectional profile of the TAS and as such, the reflective bandings display more complex features over a wider area. The four distinctly banded units seen in transects 2 – 4 are similar in appearance in Transect 1. However, the depths of each unit vary spatially throughout the profile. Additionally, several unique banding patterns were identified near Courtland St. featuring prominently bright and broad reflections that vary in terms of horizontality.

4 DISCUSSION

4.1 Evaluation of Water Quality

4.1.1 Chemical Analysis

On a piper diagram displayed in Figure 16, the groundwater samples showed no dominant cation type, a sulfate rich anion type, and plots within the Ca-SO_4 hydrochemical facies. The precipitation sample, RW01, shows no dominant cation type, a bicarbonate rich anion type, and plots close to the boundary between the magnesium bicarbonate and mixed type hydrochemical facies. The facies distinction between precipitation and groundwater is most likely attributed to groundwater mixing with wastewater effluents rich in SO_4^{2-} and Cl^-.

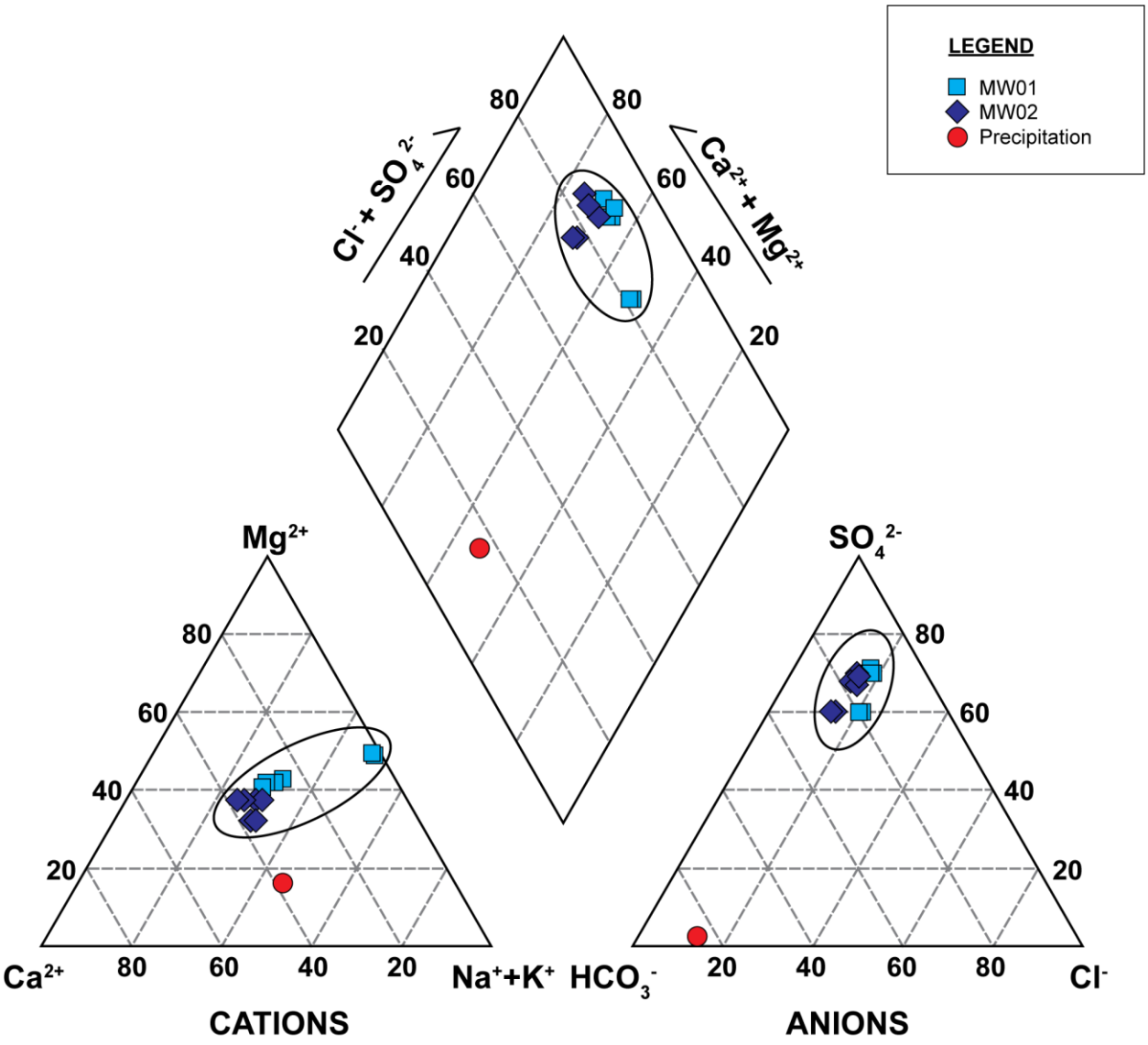

Figure 14: Piper Diagram of MW01, MW02, and RW01

The geochemistry of MW01 samples showed little to no temporal change in Cl and K. The samples obtained in the fall show an increase in SO_4 concentration by 20 ppm from the baseline data, a decrease in Ca concentration by 8 ppm, and little change in Na and Mg values. Those tested in February show a marked decrease in SO_4, Mg, and Ca concentrations of ~65 ppm, 3 ppm, and 16 ppm, respectively. Na values increased by 3 ppm from November to February.

Groundwater geochemistry of MW02 exhibited decreasing concentrations of all ions from fall to spring. The Cl concentration in the fall was similar to the baseline values, but decreased by 8 ppm in February. SO_4 values dropped from the baseline of 160 ppm to ~145 ppm in November, then further to ~84 ppm in February. Similarly, Na values decreased from 27 ppm to 22 ppm to 15 ppm, Mg from 20 ppm to 14 ppm to 9 ppm, and Ca from 35 ppm to 23 ppm to 17 ppm. K values decreased from 6.4 ppm to 4.8 ppm to 4.0 ppm.

Although cation and anion concentrations in MW02 decreased from November to February, their relative percentages remained around the same as indicated by their fixed positions on the piper diagram. This indicates dilution of the groundwater, probably due to a high amount of precipitation and groundwater recharge during this time period. The same phenomenon was not seen in MW01, as the relative percentages of cations and anions fluctuated in the samples analyzed in February. This fluctuation was driven primarily by a decrease in Ca, suggesting dilution may not be the only factor leading to temporal changes in cation/anion concentrations. One interpretation is that Na values increased slightly during this time, possibly due to ion-exchange of Na and Ca, but the seasonal mechanism of this exchange remains unknown. Future studies could offer greater insight into the temporal variation of groundwater geochemistry and determine the groundwater source contributions from precipitation and inflow from sanitary sewer systems.

Water Quality Standards

EPA guidelines have established National Drinking Water Regulations that determine water quality standards for public and private use. PMCLs are mandatory water quality standards established for drinking water contaminants proven to pose a risk to human health. The primary standards relevant to this study include disinfectants, disinfection byproducts, and inorganic and

organic chemicals. SMCls are non-mandatory water quality guidelines for 15 contaminants that do not pose a health risk but assist in managing drinking water for aesthetic concerns such as color, odor, and taste. Secondary standard contaminants, while not dangerous to human health, pose several problems related to aesthetic, cosmetic, and technical effects produced by elevated contamination levels and low pH. Excess metals within drinking water can cause unpleasant odors or taste, and excess silver can cause skin discoloration (although does not impair bodily function). Some metals, such as copper, iron, manganese, and zinc, can lead to corrosive water that may compromise utility pipes and underground infrastructure. Excess chloride and low pH has also been shown to increase corrosivity of water (EPA, 2017).

Baseline results of groundwater samples collected from MW01 indicate VOC and SVOC concentrations to be below PMCL standards. A tetrachloroethylene (aka PCE) concentration of 6.0 μg/L in MW02 exceeds the EPA's MCL of 5.0 μg/L. MW01 was determined to have a Mn concentration of 0.32 ppm. MW02 was determined to have concentrations of Mn, Al, and Fe, equal to 2.9 ppm, 2.4 ppm, and 2.7 ppm, respectively. These values exceed the EPA's recommended SMCL of 0.05 ppm Mn, 0.05 to 0.2 ppm Al, and 0.3 ppm Fe. The pH of the groundwater within the MWN is moderately acidic at 5.20, below the SMCL range of 6.5 – 8.5. The elevated levels of Mn and Fe, coupled with the low pH, could lead to the corrosion of utility pipes within the study area. If compromised, the leaking sewage pipes would provide a future source of contamination within the aquifer system.

Table 4: Summary of physiochemical data comparison between Atlanta surface waters, Seoul groundwater, and Atlanta groundwater

Site Characteristics			Dissolved Constituents (mg/L)						pH
			Ca	Mg	Na	K	Cl	SO_4	
Atlanta Surface Water (Rose, 2007)	Rural Streams	Mean	2.48	2.10	3.68	1.33	4.87	2.11	6.16
	N = 12	SD	*	*	*	*	*	*	0.17
	Chattahoochee River	Mean	5.42	1.25	10.65	2.65	14.21	7.01	6.42
	N = 9	SD	*	*	*	*	*	*	0.23
	Developed Basins within AMR	Mean	9.62	2.09	8.14	2.46	12.15	5.28	6.56
	N = 9	SD	*	*	*	*	*	*	0.23
	AMR CSO Basins	Mean	18.36	3.61	18.35	4.80	31.78	22.42	6.45
	N = 5	SD	*	*	*	*	*	*	0.42
Seoul, SK Ground-water (Choi, et al., 2004)	Forested	Mean	21.9	1.5	11.9	1.1	11.1	13.2	6.9
	N = 15	SD	6.6	0.4	4.4	0.5	6.4	4.6	0.5
	Residential	Mean	51.6	11.4	26.5	3.1	59.3	33	6.5
	N = 22	SD	10.9	5.5	10.0	1.5	15.5	30.0	0.4
	Agricultural	Mean	46.2	9.6	25.5	3.8	53.7	21.1	6.4
	N = 14	SD	20.2	3.7	10.6	1.9	33.6	16.3	0.3
	Traffic	Mean	54.7	8.5	47.4	7	49.9	56.1	6.4
	N = 16	SD	19.5	2.0	18.7	7.2	11.5	13.1	0.3
	Industrialized	Mean	84.2	23.1	42.2	2.4	97.5	74.9	6.6
	N = 12	SD	32.3	6.0	38.0	0.8	43.2	60.5	0.3
Atlanta Ground-water	MW01-Nov	Mean	17.17	17.72	24.37	4.14	23.35	139.52	5.2
	N = 3	SD	0.22	0.03	0.02	0.02	0.12	1.65	**
	MW01-Feb	Mean	1.17	14.70	27.34	4.34	22.12	75.91	5.2
	N = 2	SD	0.01	0.05	0.03	0.02	0.03	0.13	**
	MW02-Nov	Mean	23.57	14.71	22.29	4.86	24.52	145.96	5.2
	N = 3	SD	0.18	0.10	0.02	0.15	0.20	0.95	**
	MW02-Feb	Mean	17.48	9.31	15.38	3.96	16.51	84.39	5.2
	N = 2	SD	0.27	0.28	0.34	0.04	0.21	2.31	**

Table 4 presents a summary comparison of the pH and dissolved constituents found within Atlanta surface waters, Seoul groundwater, and Atlanta groundwater. Atlanta surface water data was obtained and adapted from Rose, 2007. The mean values of the dissolved constituents obtained from Rose were converted from meq/L to mg/L, and so the standard deviations could not be converted or displayed in this table. The standard deviation values can instead be found within the article source. The standard deviation of pH values were not calculated for the monitoring well samples due to the limited data set obtained.

In a 2007 study, Seth Rose determined the highest concentrations of surface water pollutants within the Atlanta Metropolitan Region (AMR) were found in “urbanized basins

directly receiving treated effluent and combined sewer overflow (CSO) basins". Urban basins with main sewage trunk lines and urbanized basins represent the basin types with succeeding levels of solute concentration. Rose suggested that leaking sewer lines and septic tank systems were the predominant sources of low-level non-point contamination that is affecting shallow groundwater chemistry within the AMR. Rose also determined that Na, K, and Cl ion concentrations were atypical of waters with a comparable lithological subsurface and noted that these ions are the prevailing electrolytes in human waste. Similarly, in a 2004 study, Byoung-Young Choi and colleagues determined the highest concentrations of groundwater contaminants (Ca, Mg, Na, K, Cl, and SO^4) in Seoul, South Korea were found in industrialized and traffic areas. Na, K, and Cl ion contamination sources were determined to originate from wastewater, industrial effluents, and deicing road salt.

Chemical analysis of MW01 and MW02 reveal Ca concentrations comparable to those found within AMR CSO Basins, but below the levels found within forested areas in Seoul. This suggests the contaminant origin in Seoul could likely be contributed to sources other than wastewater, such as leather industry or deicing salt (Choi, et al. 2005) and is not as great a concern in Atlanta. Mg and Na values were determined to exceed values in AMR CSO Basins and are similar to several urban environment types in Seoul. K concentrations are comparable to AMR CSO Basins and agricultural areas in Seoul. Cl levels within the monitoring wells were significantly lower than urban environments in Seoul, once again suggesting the prevalence of deicing salt in South Korea. Cl ions were found to be less than those in AMR CSO Basins but greater than developed basins. Notably, sulfate concentrations were considerably higher than found in both Atlanta surface waters and groundwater in Seoul. Vehicle traffic and waste-water treatment has been shown to be a significant source of sulfate pollution within urban

groundwaters (Pitt, et al. 1999; Rose, 2007). Given similar traffic densities between both cities, this suggests that a larger contribution of sulfate contamination in Atlanta comes from sewer leakage.

The pH within the MWN is more acidic than both the surface waters in the AMR and the groundwater in Seoul. Groundwater pH typically decreases due to anthropogenic pollution related to acidic wastewater rich in organic matter and industrial effluents (Choi, et al., 2005). Water-rock interactions typically raise the pH of groundwater. As the groundwater within the MWN displays a much lower pH than those seen in Atlanta surface waters and Seoul groundwater, anthropogenic pollution must increase the acidity to a greater extent than the bedrock neutralizes.

4.2 Additional Precipitation Analysis

4.2.1 Chemical and Seasonal Variation

Sample RW01 plots within range of the NADP baseline data. Cyclical variation was seen in calcium concentrations as they decreased in colder months and increased in warmer months. It should be noted that RW01 was collected in the Fall but displays a calcium concentration equal to NADP's Spring and Summer samples. However, as RW01 contained higher concentrations of all dissolved constituents (with the exception of SO_4), it is possible that with a larger sample size the same cyclical variation could be seen at higher concentrations. Seasonal variation of precipitation chemistry and its effect on groundwater geochemistry may be addressed in future studies.

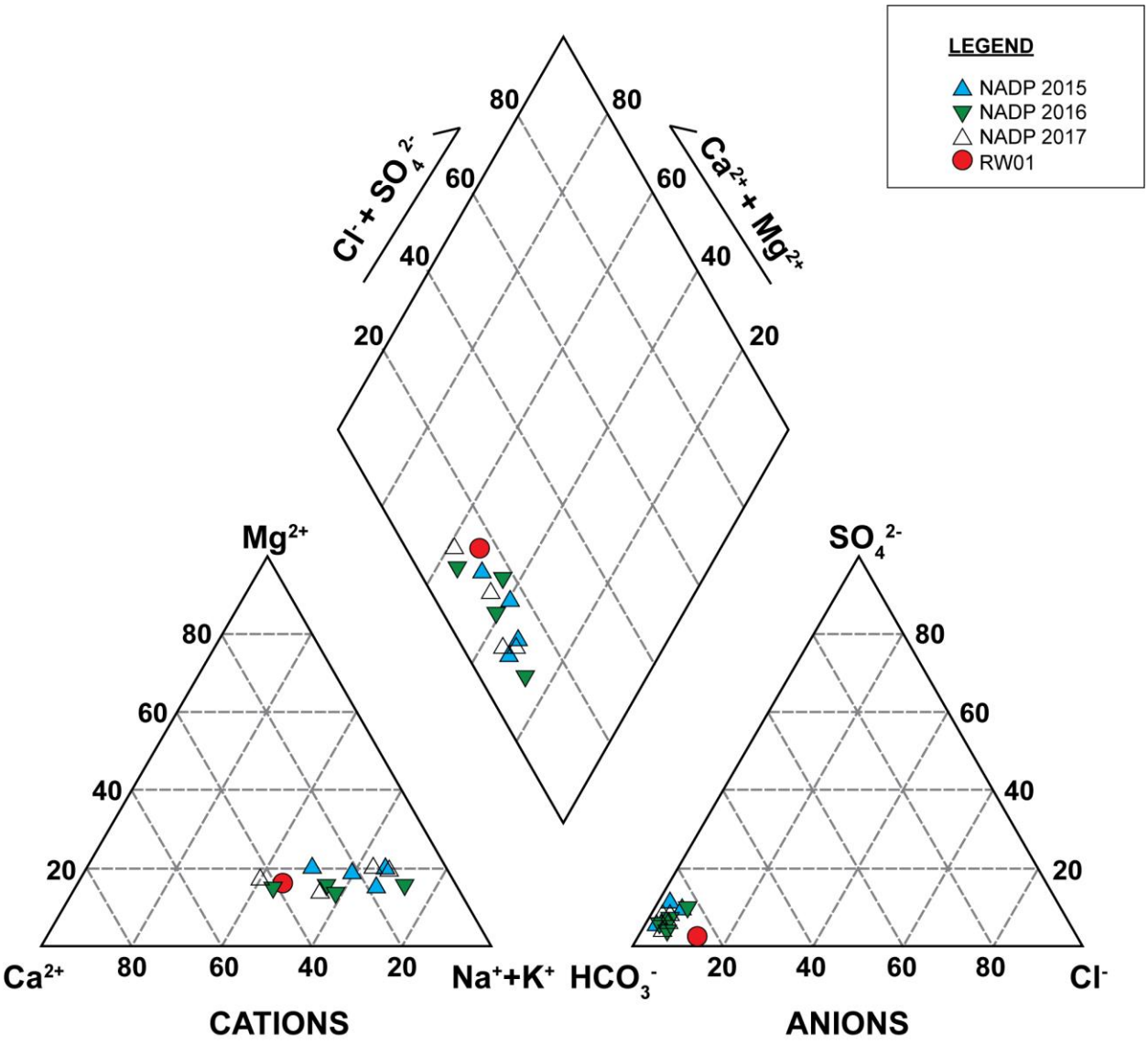

Figure 15: Piper Diagram of NADP data and sample RW01

4.3 Physical Framework of Aquifer System

4.3.1 Soil Boring and XRD

Based upon the soil boring logs and XRD analysis of 19 samples, sediment mineralogy and grain size did not vary significantly. The greatest amount of variation was seen in SB03, as loose, unconsolidated sediments transition into more compacted materials below 10 feet. The difference in consolidation marks a distinct boundary between a surficial alluvium layer and a

layer of saprolite. Below the extent of the saprolite the materials became harder and more compacted in the final eight feet of the soil boring. Lithic fragments became more abundant within the last three feet of the boring, implying proximity to the upper extent of a weathered regolith and bedrock.

The separation of alluvium and saprolite layers was also indicated by XRD analysis of samples taken from the three soil borings. The mineralogy of SB03 transitions from a dominance of quartz, biotite, halloysite, and montmorillonite to a prominence of kaolinite below the water table. The kaolinite within the sediments most likely occurs as a hydration product of halloysite.

4.3.2 GPR

Transects 2 and 4 showcase similar lithological features as interpreted based upon the four distinct banding units or radar facies mentioned previously. A surficial layer of loose, unconsolidated residuum approximately 12 feet thick is distinguished by a lack of reflections, indicating a porous medium lacking in compositional variation. Immediately below, a layer of saturated sediments is evidenced by brightly contrasting broad reflectors. These reflections are indicative of a greater variation within the medium, as water-saturated sediments alter GPR transmission speeds within a small spatial area due to variance in water composition and sediment compaction. The transition between these two layers indicates the surface of the water table, at approximately 13’ BLS, and is verified by water level measurements from MW01 and MW02. This layer varies in thickness, extending to ~28’ BLS at MW01 and ~25’ BLS at MW02, and undulating in between. The layer of saturated sediments corresponds to the loosely compacted layers of sand evident within SB03. A compacted or dense layer of weathered bedrock lies below the saturated sediments as indicated by fainter and more narrow reflective banding due to considerable attenuation of the radar signal. This layer shows less variance in

sediment compaction and saturation indicated by consistent band thickness and relative horizontality. This layer corresponds to the more compacted layers of sand seen with SB03. The thickness of this unit varies more at the upper contact than the lower, extending to ~40’ BLS at MW01 and ~38’ BLS at MW02, undulating slightly in between. The deepest unit of bedrock is indicated by the very light reflective banding due to almost complete attenuation of the radar signal that remains horizontal throughout the profile, showcasing even less compositional variation than the weathered bedrock and saturated sediments found above. Depth to the bedrock begins ~40’ BLS and extends further than the maximum vertical range of the GPR (60’ BLS).

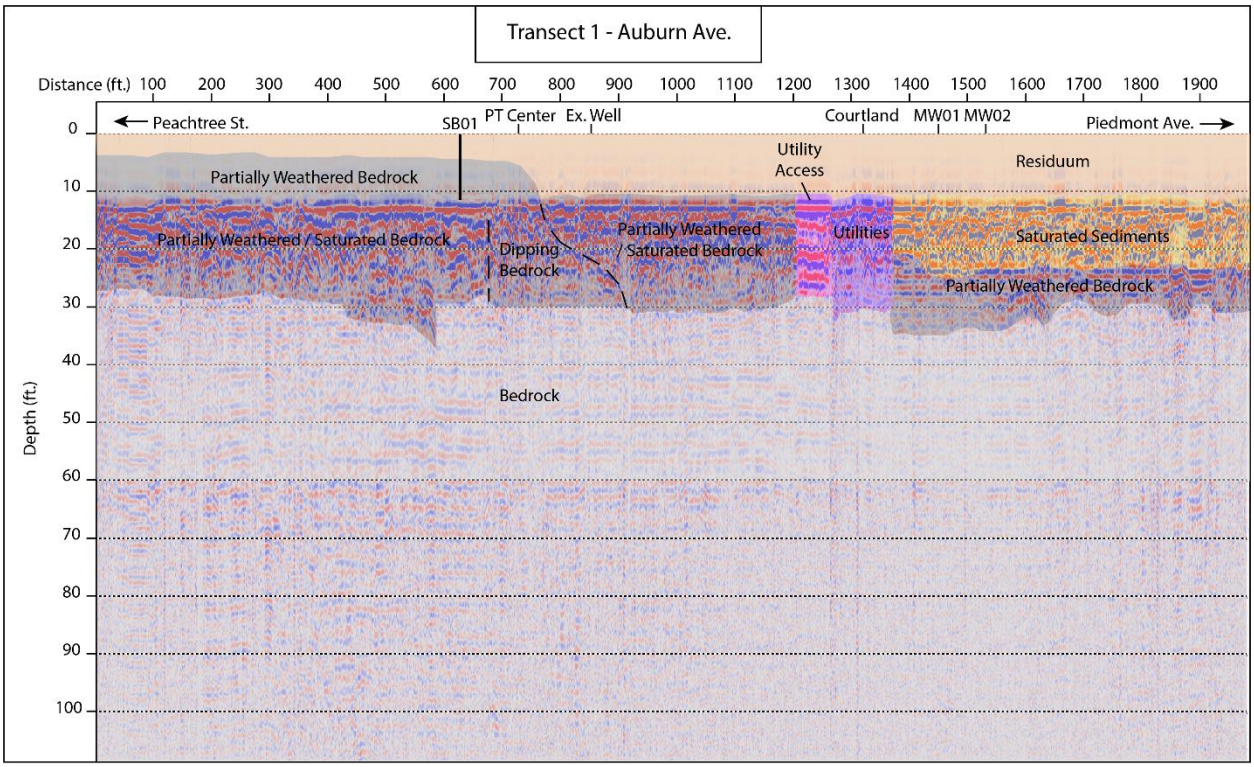

Figure 16: Transect 1 with labeled features

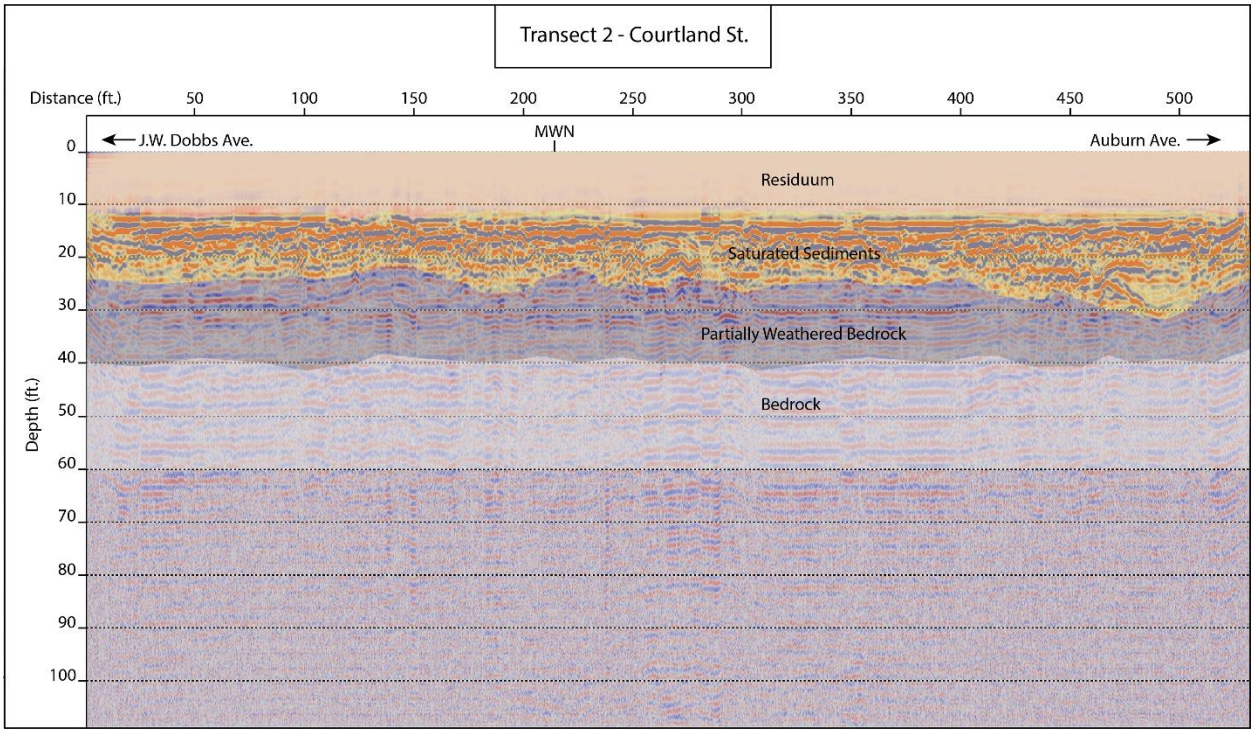

Figure 17: Transect 2 with labeled features

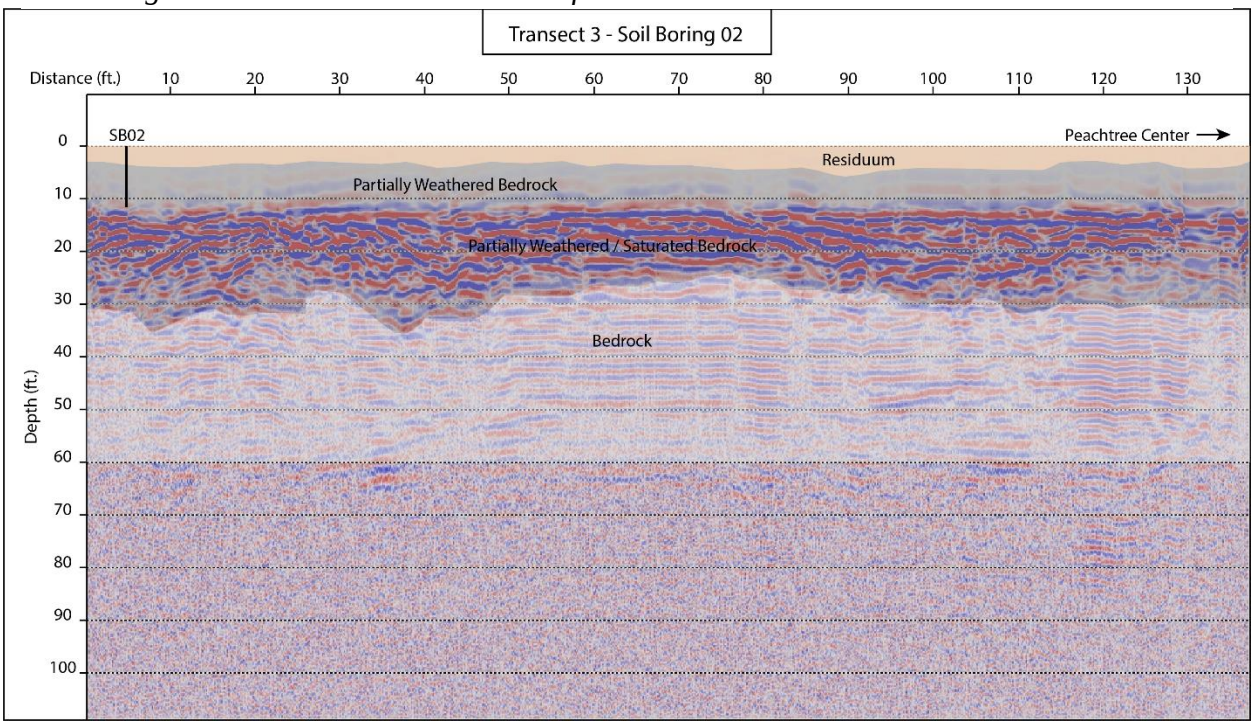

Figure 18: Transect 3 with labeled features

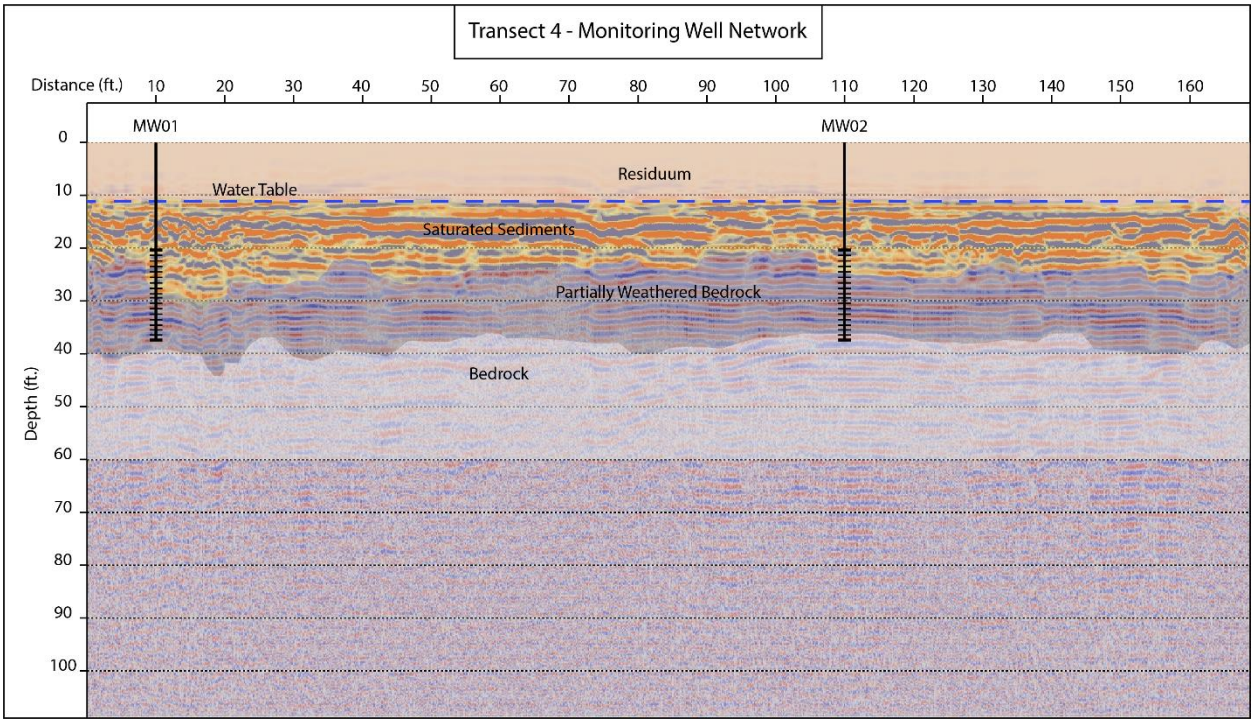

Figure 19: Transect 4 with labeled features

Transect 3 features 4 reflective banding units similar in appearance to those seen in Transects 2 and 4, but auger refusal during SB02 collection leads to a different lithological interpretation. A surficial layer of loose, unconsolidated residuum is seen again, but with a thickness of only 3 – 5’ BLS. Immediately below, broad and lightly contrasting reflections indicate a partially weathered bedrock that extends to depths ~12’ BLS. The undulatory nature of the banding implies the regolith is composed of large, fractured blocks of impenetrable bedrock close to the land surface. Brightly contrasting broad bands below this unit are interpreted as a partially weathered and saturated bedrock as water flows through a network of fractures. Beginning at a depth ranging from 25 – 30’ BLS, and extending further than the maximum vertical range of the GPR, the bedrock is shown to have features similar to the bedrock seen in the other transects. The lightly contrasting horizontal reflective bands imply a lack of fractures or faulting and therefore does not allow the transmission of water through the unit.

Transect 1 represents a cross-sectional profile of the TAS and includes a combination of features seen within transects 2 – 4. From Peachtree St. to a distance of 1200 feet the extent of the weathered bedrock atop the bedrock is shown to vary significantly. Around 100 feet to the east of SB01, the brightly contrasting and broadly undulating reflective bands representing partially weathered and saturated bedrock transition into an equally bright but more tightly undulating series of reflections. From around 750 – 900 feet distance a clear sinuous reflection is seen dipping from ~12' BLS before ending at bedrock 30' BLS. This reflection represents the termination of the large, fractured blocks of impenetrable bedrock that led to augur refusal at SB01 and SB02. At this boundary, the surficial layer of residuum increases in thickness from 5 to 12' and is underlain by a saturated and more heavily weathered bedrock. Underneath Courtland St., from a distance of 1200 – 1375 feet, brightly contrasting and very broad reflective banding transition into a series of bright parabolas indicating a possible sewage access area and several utility pipes underneath the surface. The final 600 feet of the profile show a similar subsurface lithology seen in transect 4 of the MWN.

4.3.3 Subsurface Lithology

A cross section of the TAS and MWN was made based upon observations of the soil borings and GPR transects and can be found in Figure 22.

Paleozoic metamorphic rock consisting of gneiss, schist, and amphibolite compose the bedrock underneath the study area. Depth to the bedrock surface was found to vary from ~28' BLS west of the existing well to greater than 40' BLS further east. Weathering of the bedrock has produced a fractured regolith with a varying spatial extent and is composed mostly of residuum and a fine sandy saprolite. The behavior of the regolith varies according to the degree of weathering. I believe the regolith encountered at soil boring locations SB01 and SB02 to be

less-weathered than in the MWN due to the rejection of the auger when drilling SB01 and SB02. Auger refusal is indicative of larger blocks of impenetrable bedrock intermingled within the regolith. Greater amounts of weathering in the MWN have created a layer of saprolite in between surficial residuum and the upper boundary of weathered bedrock. The contact between the residuum and saprolite layers was found to correspond with the water table, suggesting that the spatial extent of the aquifer is limited within the TAS to the MWN. It should be noted that the limit of the aquifer is not an immediate boundary, but rather a transitional one. The aquifer is most likely recharged from inaccessible groundwater flowing east from within the fractured bedrock underlying the TAS. This is verified by a measurement taken at the existing well (with a total well depth of 37.5’ BLS) that determined the depth to the water table to be 34.2’ BLS. With only 3.3 feet of water within the well, the existing well most likely passes through bedrock. Knowing the vertical extent of the bedrock is critical for future research within the study area if additional monitoring wells are to be installed.

Groundwater flow direction is dictated by the hydraulic head, calculated to be 1006.3’ ASL at the existing well, 998.7’ ASL at MW01, and 998.1’ ASL at MW02. In the MWN, groundwater flows from West to East following the topography downhill until it recharges one of the many tributaries of Peachtree Creek.

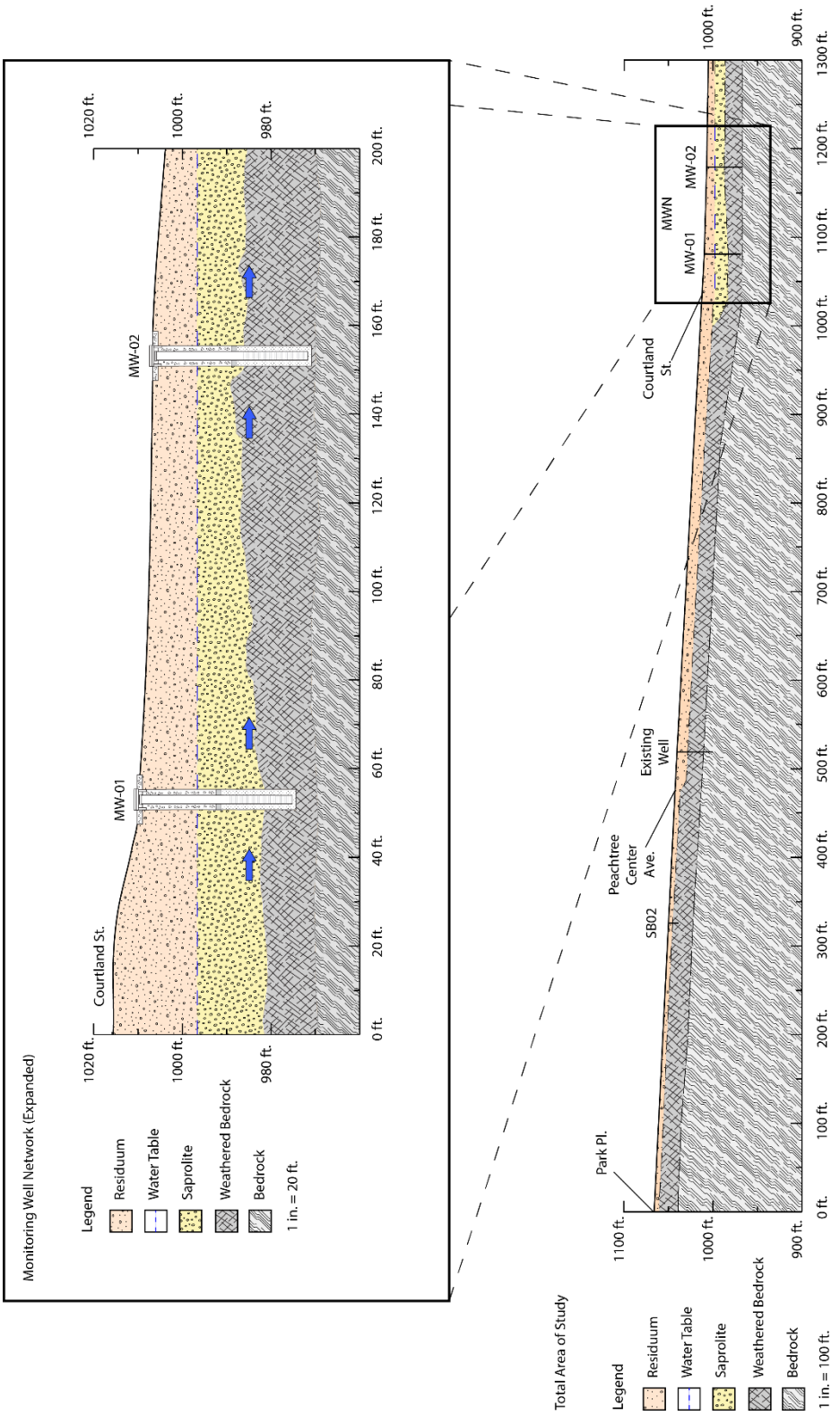

Figure 20: Subsurface lithology of the Total Area of Study and Monitoring Well Network; blue arrows indicate groundwater flow direction

5 CONCLUSIONS

Surface water quality in the City of Atlanta has been shown to contain higher concentrations of contaminants than rural or non-urban watersheds (Peters, 2009; Rose, 2007). Elevated levels of SO_4^{2-}, Cl^-, K^+, and Na^+ in Atlanta streams have been attributed to sewage overflow and infiltration (Rose, 2007). Of the two monitoring wells that compose the MWN, water quality was determined to be variable based on the occurrence of PCE in MW02. While non-potable use would not normally consider drinking water standards, non-potable water use for irrigation would still have to consider direct human exposure and incidental ingestion. As a result, water quality would need to be assessed on a site basis for non-potable use. Additionally, chemical analysis of 12 groundwater samples determined that concentrations of the dissolved constituents Ca, Mg, Na, K, and SO_4 were greater than those found within surface waters surrounding the study area.

A lithological map of the study area was produced to provide a broader geologic context for the MWN. Four GPR transects of the TAS indicate a varying subsurface lithology consisting of four distinct units. A surficial layer of loose, unconsolidated residuum increases in thickness from West to East and is underlain by a layer of saturated sediments within the MWN. A transitional layer of partially weathered regolith and bedrock underlie the TAS and depth to bedrock is extremely variable and related to topography. As a result, water availability would need to be assessed on a site basis to meet production needs.

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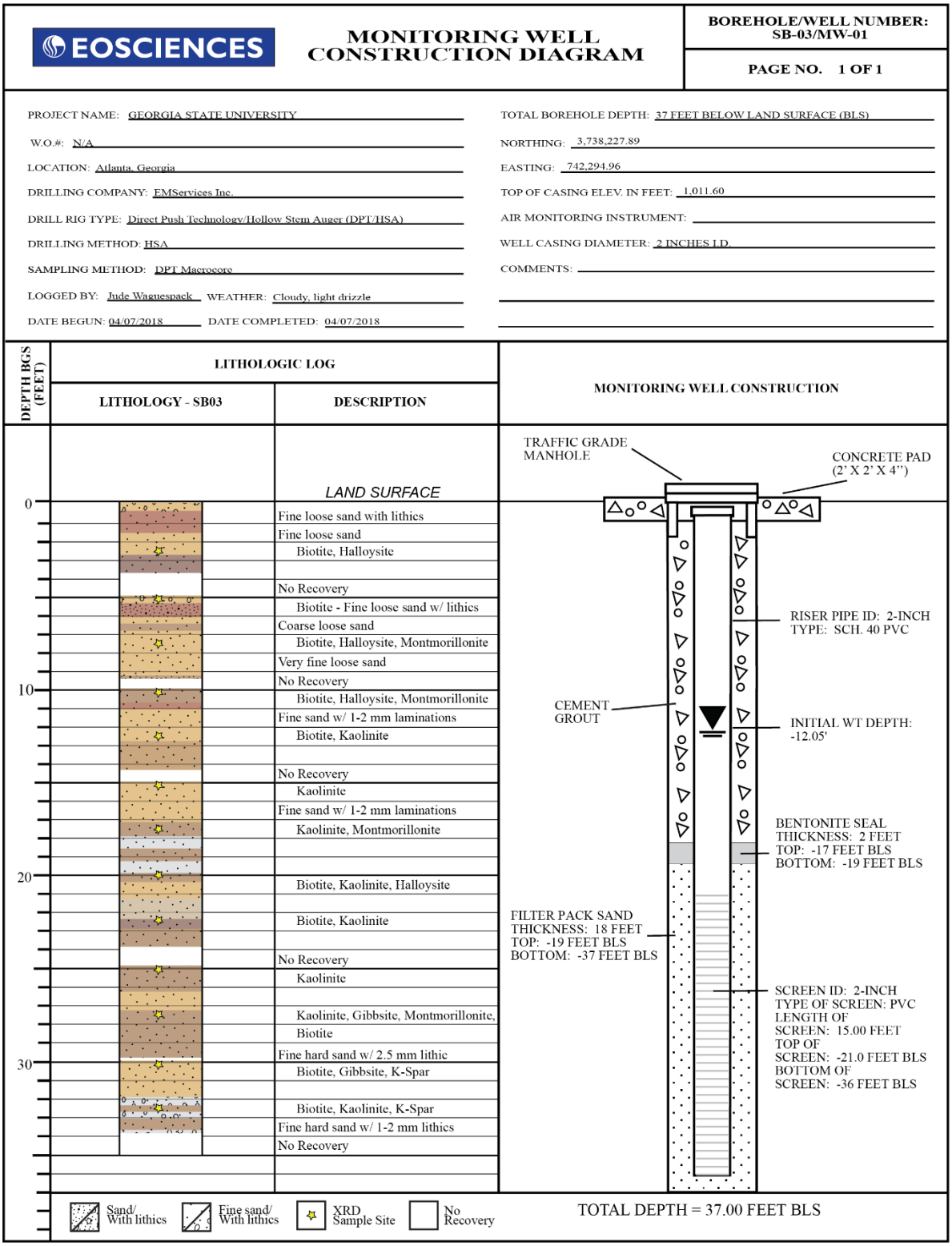
APPENDICES

Appendix A: Monitoring Well Construction Log and Soil Boring Logs



EOSCIENCES

MONITORING WELL CONSTRUCTION DIAGRAM

BOREHOLE/WELL NUMBER: SB-03/MW-01

PAGE NO. 1 OF 1

PROJECT NAME: GEORGIA STATE UNIVERSITY
W.O.#: N/A
LOCATION: Atlanta, Georgia
DRILLING COMPANY: EMServices Inc.
DRILL RIG TYPE: Direct Push Technology/Hollow Stem Auger (DPT/HSA)
DRILLING METHOD: HSA
SAMPLING METHOD: DPT Macrocore
LOGGED BY: Jude Waguespack WEATHER: Cloudy, light drizzle
DATE BEGUN: 04/07/2018 DATE COMPLETED: 04/07/2018

TOTAL BOREHOLE DEPTH: 37 FEET BELOW LAND SURFACE (BLS)
NORTHING: 3,738,227.89
EASTING: 742,294.96
TOP OF CASING ELEV. IN FEET: 1,011.60
AIR MONITORING INSTRUMENT:
WELL CASING DIAMETER: 2 INCHES I.D.
COMMENTS:

DEPTH BGS (FEET)	LITHOLOGIC LOG: LITHOLOGY - SB03	LITHOLOGIC LOG: DESCRIPTION
		LAND SURFACE
0		Fine loose sand with lithics
		Fine loose sand
		Biotite, Halloysite
		No Recovery
		Biotite - Fine loose sand w/ lithics
		Coarse loose sand
		Biotite, Halloysite, Montmorillonite
		Very fine loose sand
		No Recovery
10		Biotite, Halloysite, Montmorillonite
		Fine sand w/ 1-2 mm laminations
		Biotite, Kaolinite
		No Recovery
		Kaolinite
		Fine sand w/ 1-2 mm laminations
		Kaolinite, Montmorillonite
20		Biotite, Kaolinite, Halloysite
		Biotite, Kaolinite
		No Recovery
		Kaolinite
		Kaolinite, Gibbsite, Montmorillonite, Biotite
		Fine hard sand w/ 2.5 mm lithic
30		Biotite, Gibbsite, K-Spar
		Biotite, Kaolinite, K-Spar
		Fine hard sand w/ 1-2 mm lithics
		No Recovery

MONITORING WELL CONSTRUCTION

TRAFFIC GRADE MANHOLE
CONCRETE PAD (2' X 2' X 4")
RISER PIPE ID: 2-INCH TYPE: SCH. 40 PVC
CEMENT GROUT
INITIAL WT DEPTH: -12.05'
BENTONITE SEAL THICKNESS: 2 FEET TOP: -17 FEET BLS BOTTOM: -19 FEET BLS
FILTER PACK SAND THICKNESS: 18 FEET TOP: -19 FEET BLS BOTTOM: -37 FEET BLS
SCREEN ID: 2-INCH TYPE OF SCREEN: PVC LENGTH OF SCREEN: 15.00 FEET TOP OF SCREEN: -21.0 FEET BLS BOTTOM OF SCREEN: -36 FEET BLS

Sand/ With lithics
Fine sand/ With lithics
XRD Sample Site
No Recovery

TOTAL DEPTH = 37.00 FEET BLS

EOSCIENCES

SOIL BORING LOG

BOREHOLE NUMBER: SB-01/SB-02

PAGE NO. 1 OF 1

PROJECT NAME: GEORGIA STATE UNIVERSITY
W.O.#: N/A
LOCATION: Atlanta, Georgia
DRILLING COMPANY: EMServices Inc.
DRILL RIG TYPE: Direct Push Technology/Hollow Stem Auger (DPT/HSA)
DRILLING METHOD: HSA
SAMPLING METHOD: DPT Macrocore
LOGGED BY: Jude Waguespack WEATHER: Cloudy, light drizzle
DATE BEGUN: 04/07/2018 DATE COMPLETED: 04/07/2018

TOTAL BOREHOLE DEPTH: 5 FEET (SB-01)/11.25 FEET (SB02) BLS
NORTHING: 3,738,147 (SB01); 3,738,238 (SB02)
EASTING: 742,058 (SB01); 742,060 (SB02)
TOP OF CASING ELEV. IN FEET: N/A
AIR MONITORING INSTRUMENT:
WELL CASING DIAMETER: N/A
COMMENTS:

DEPTH BGS (FEET)	LITHOLOGIC LOG		LITHOLOGIC LOG	
	LITHOLOGY - SB01	DESCRIPTION	LITHOLOGY - SB02	DESCRIPTION
		LAND SURFACE		*LAND SURFACE*
0		Fine loose sand with lithics Biotite, Halloysite		Fine loose sand with lithics Gibbsite, Montmorillonite
		No Recovery		No Recovery
				Gibbsite - Fine sand Gibbsite, Montmorillonite
				No Recovery
10				Kaolinite, Montmorillonite Biotite, Gibbsite - Fine sand
20				
30				


Sand/
With lithics


Fine sand/
With lithics


XRD
Sample Site

No
Recovery

Appendix B: TestAmerica Results

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

TestAmerica Job ID: 680-150889-1
Client Project/Site: Monitoring Well Installation

For:
Georgia State University
Dept of GeoSciences
24 Peachtree Center Avenue
Suite 340
Atlanta, Georgia 30303

Attn: Dr. Brian Meyer

Authorized for release by:
4/20/2018 4:48:23 PM

Keaton Conner, Project Manager I
(813)885-7427
keaton.conner@testamericainc.com

Definitions/Glossary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD is outside acceptance limits.
*	RPD of the LCS and LCSD exceeds the control limits

GC/MS Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
X	Surrogate is outside control limits

HPLC/IC

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
B	Compound was found in the blank and sample.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit

Definitions/Glossary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Sample Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-150889-1	SB04	Solid	04/09/18 14:00	04/10/18 08:00
680-150889-2	MW-01	Water	04/09/18 09:00	04/10/18 08:00
680-150889-3	MW-02	Water	04/09/18 09:55	04/10/18 08:00
680-150889-4	Trip Blank	Water	04/09/18 00:00	04/10/18 08:00

Case Narrative

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Job ID: 680-150889-1

Laboratory: TestAmerica Savannah

Narrative

CASE NARRATIVE

Client: Georgia State University

Project: Monitoring Well Installation

Report Number: 680-150889-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

RECEIPT
The samples were received on 4/10/2018 8:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.2º C and 1.7º C.

RECEIPT EXCEPTIONS
A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC).

The COC was incomplete as received: A sample collection date nor sample collection time was not provided for samples -2 (MW-01) and -3 (MW-02). The client supplied this information via phone.

TCLP VOLATILE ORGANIC COMPOUNDS (GC-MS)
Sample SB04 (680-150889-1) was analyzed for TCLP volatile organic compounds (GC-MS) in accordance with EPA SW-846 Methods 1311/8260B. The samples were leached on 04/11/2018 and analyzed on 04/13/2018.

Sample SB04 (680-150889-1)[20X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOLATILE ORGANIC COMPOUNDS (GC-MS)
Sample SB04 (680-150889-1) was analyzed for Volatile Organic Compounds (GC-MS) in accordance with EPA SW-846 Method 8260B. The samples were prepared and analyzed on 04/11/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOLATILE ORGANIC COMPOUNDS (GC-MS)
Samples MW-01 (680-150889-2), MW-02 (680-150889-3) and Trip Blank (680-150889-4) were analyzed for Volatile Organic Compounds (GC-MS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 04/11/2018.

4-Methyl-2-pentanone recovered outside of criteria low for LCSD 680-519398/5. 4-Methyl-2-pentanone exceeded the RPD limit. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)
Sample SB04 (680-150889-1) was analyzed for TCLP semivolatile organic compounds (GC-MS) in accordance with EPA SW846 Methods 1311 / 8270D. The samples were leached on 04/11/2018, prepared on 04/12/2018 and analyzed on 04/17/2018.

Case Narrative

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Job ID: 680-150889-1 (Continued)

Laboratory: TestAmerica Savannah (Continued)

2,4,6-Tribromophenol (Surr), 2-Fluorobiphenyl, 2-Fluorophenol (Surr), Nitrobenzene-d5 (Surr), Phenol-d5 (Surr) and Terphenyl-d14 (Surr) recovered outside of criteria high for LB 680-519572/1-B. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)
Sample SB04 (680-150889-1) was analyzed for Semivolatile Organic Compounds (GC-MS) in accordance with EPA SW-846 Method 8270D. The samples were prepared on 04/11/2018 and analyzed on 04/15/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (AQUEOUS)
Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for Semivolatile Organic Compounds (Aqueous) in accordance with EPA SW-846 Method 8270D. The samples were prepared on 04/12/2018 and analyzed on 04/16/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

METALS (ICP) - TCLP
Sample SB04 (680-150889-1) was analyzed for Metals (ICP) - TCLP in accordance with EPA SW-846 Methods 1311/6010C. The samples were leached on 04/11/2018, prepared on 04/18/2018 and analyzed on 04/19/2018.

Arsenic and Silver recovered outside of criteria low for the MS and MSD of sample SB04 (680-150889-1) in batch 680-520874. Silver exceeded the RPD limit.

The presence of the '4' qualifier indicates analytes where the concentration in the unspiked sample exceeded four times the spiking amount.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

METALS (ICP)
Sample SB04 (680-150889-1) was analyzed for Metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared and analyzed on 04/11/2018.

Chromium recovered outside of criteria low for the MS of sample SB04 (680-150889-1) in batch 680-519787. Barium failed the recovery criteria high.

Chromium and Selenium recovered outside of criteria low for the MSD of sample SB04 (680-150889-1) in batch 680-519787.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

METALS (ICP)
Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for Metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 04/14/2018 and analyzed on 04/18/2018.

Iron was detected in method blank MB 680-520055/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

MERCURY - TCLP
Sample SB04 (680-150889-1) was analyzed for mercury - TCLP in accordance with EPA SW-846 Methods 1311/7470A. The samples were leached on 04/11/2018, prepared on 04/13/2018 and analyzed on 04/16/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Case Narrative

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Job ID: 680-150889-1 (Continued)

Laboratory: TestAmerica Savannah (Continued)

TOTAL MERCURY
Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were prepared on 04/11/2018 and analyzed on 04/13/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL MERCURY
Sample SB04 (680-150889-1) was analyzed for total mercury in accordance with EPA SW-846 Method 7471B. The samples were prepared on 04/10/2018 and analyzed on 04/12/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

IGNITABILITY FOR SOLIDS
Sample SB04 (680-150889-1) was analyzed for ignitability for solids in accordance with EPA SW-846 Method 1030. The samples were analyzed on 04/12/2018.

The following sample did not ignite: SB04 (680-150889-1); therefore, an ignitability value could not be obtained. The result has been reported as "No Burn" (NB).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ALKALINITY
Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for alkalinity in accordance with SM 2320B. The samples were analyzed on 04/10/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL DISSOLVED SOLIDS
Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for total dissolved solids in accordance with SM 2540C. The samples were analyzed on 04/11/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL CYANIDE
Sample SB04 (680-150889-1) was analyzed for total cyanide in accordance with EPA SW-846 Method 9012B. The samples were prepared and analyzed on 04/12/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL SULFIDE
Sample SB04 (680-150889-1) was analyzed for total sulfide in accordance with EPA SW-846 Method 9034. The samples were prepared and analyzed on 04/12/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

CORROSIVITY (PH)
Sample SB04 (680-150889-1) was analyzed for corrosivity (pH) in accordance with EPA SW-846 Method 9045D. The samples were analyzed on 04/19/2018.

This analysis is considered a field test and is to be performed within 15 minutes of collection. This sample(s) was performed in the laboratory outside the 15 minute timeframe.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Case Narrative

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Job ID: 680-150889-1 (Continued)

Laboratory: TestAmerica Savannah (Continued)

9056 ANIONS

Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for 9056 Anions in accordance with SW 846 9056. The samples were analyzed on 04/12/2018.

Samples MW-01 (680-150889-2)[5X] and MW-02 (680-150889-3)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS/MOISTURE

Sample SB04 (680-150889-1) was analyzed for Percent Solids/Moisture in accordance with TestAmerica SOP. The samples were analyzed on 04/11/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL HARDNESS (AS CACO3) BY CALCULATION

Samples MW-01 (680-150889-2) and MW-02 (680-150889-3) were analyzed for total hardness (as CaCO3) by calculation in accordance with SM 2340B. The samples were analyzed on 04/20/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	14	J	50	11	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Benzene	0.73	U	5.0	0.73	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Bromobenzene	1.7	U	5.0	1.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Bromochloromethane	3.3	U	5.0	3.3	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Bromodichloromethane	0.97	U	5.0	0.97	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Bromoform	1.5	U	5.0	1.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Bromomethane	1.5	U	5.0	1.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
2-Butanone (MEK)	2.4	U	25	2.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
n-Butylbenzene	2.4	U	5.0	2.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
sec-Butylbenzene	2.1	U	5.0	2.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
tert-Butylbenzene	1.8	U	5.0	1.8	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Carbon disulfide	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Carbon tetrachloride	0.83	U	5.0	0.83	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Chlorobenzene	0.96	U	5.0	0.96	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Chloroethane	2.7	U	5.0	2.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Chloroform	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Chloromethane	1.0	U	5.0	1.0	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
2-Chlorotoluene	2.0	U	5.0	2.0	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
4-Chlorotoluene	1.7	U	5.0	1.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Dibromochloromethane	1.7	U	5.0	1.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2-Dibromo-3-Chloropropane	4.4	U	10	4.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2-Dibromoethane	1.5	U	5.0	1.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Dibromomethane	1.7	U	5.0	1.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Dichlorodifluoromethane	0.94	U	5.0	0.94	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1-Dichloroethane	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2-Dichloroethane	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
cis-1,2-Dichloroethene	1.4	U	5.0	1.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
trans-1,2-Dichloroethene	0.63	U	5.0	0.63	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2-Dichloroethene, Total	0.63	U	10	0.63	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1-Dichloroethene	1.5	U	5.0	1.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2-Dichloropropane	0.86	U	5.0	0.86	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,3-Dichloropropane	1.8	U	5.0	1.8	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
2,2-Dichloropropane	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1-Dichloropropene	0.95	U	5.0	0.95	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
cis-1,3-Dichloropropene	0.83	U	5.0	0.83	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
trans-1,3-Dichloropropene	0.87	U	5.0	0.87	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Ethylbenzene	1.3	U	5.0	1.3	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
2-Hexanone	3.3	U	25	3.3	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Isopropylbenzene	1.9	U	5.0	1.9	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
p-Isopropyltoluene	2.2	U	5.0	2.2	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Methylene Chloride	0.98	U	5.0	0.98	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
4-Methyl-2-pentanone	4.2	U	25	4.2	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Methyl tert-butyl ether	1.0	U	5.0	1.0	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
N-Propylbenzene	2.7	U	5.0	2.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Styrene	0.93	U	5.0	0.93	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1,1,2-Tetrachloroethane	2.4	U	5.0	2.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1,2,2-Tetrachloroethane	1.6	U	5.0	1.6	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Tetrachloroethene	1.9	U	5.0	1.9	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Toluene	0.84	U	5.0	0.84	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3-Trichlorobenzene	1.6	U	5.0	1.6	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1,1-Trichloroethane	0.59	U	5.0	0.59	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,1,2-Trichloroethane	1.3	U	5.0	1.3	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Trichloroethene	1.3	U	5.0	1.3	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,2,4-Trimethylbenzene	1.4	U	5.0	1.4	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
1,3,5-Trimethylbenzene	1.7	U	5.0	1.7	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Vinyl acetate	2.5	U	10	2.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Vinyl chloride	1.5	U	5.0	1.5	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
o-Xylene	1.1	U	5.0	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
m-Xylene & p-Xylene	2.6	U	5.0	2.6	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1
Xylenes, Total	1.1	U	10	1.1	ug/Kg	☼	04/11/18 09:15	04/11/18 18:08	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*100*		*70 - 130*	*04/11/18 09:15*	*04/11/18 18:08*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*70 - 130*	*04/11/18 09:15*	*04/11/18 18:08*	*1*
Dibromofluoromethane (Surr)	*95*		*70 - 130*	*04/11/18 09:15*	*04/11/18 18:08*	*1*
4-Bromofluorobenzene (Surr)	*104*		*70 - 130*	*04/11/18 09:15*	*04/11/18 18:08*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0086	U	0.020	0.0086	mg/L			04/13/18 14:41	20
2-Butanone	0.068	U	0.20	0.068	mg/L			04/13/18 14:41	20
Carbon tetrachloride	0.0066	U	0.020	0.0066	mg/L			04/13/18 14:41	20
Chlorobenzene	0.0052	U	0.020	0.0052	mg/L			04/13/18 14:41	20
Chloroform	0.010	U	0.020	0.010	mg/L			04/13/18 14:41	20
1,4-Dichlorobenzene	0.0092	U	0.020	0.0092	mg/L			04/13/18 14:41	20
1,2-Dichloroethane	0.010	U	0.020	0.010	mg/L			04/13/18 14:41	20
1,1-Dichloroethene	0.0072	U	0.020	0.0072	mg/L			04/13/18 14:41	20
Hexachlorobutadiene	0.050	U	0.10	0.050	mg/L			04/13/18 14:41	20
Tetrachloroethene	0.015	U	0.020	0.015	mg/L			04/13/18 14:41	20
Trichloroethene	0.0096	U	0.020	0.0096	mg/L			04/13/18 14:41	20
Vinyl chloride	0.010	U	0.020	0.010	mg/L			04/13/18 14:41	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*100*		*80 - 120*		*04/13/18 14:41*	*20*
1,2-Dichloroethane-d4 (Surr)	*93*		*73 - 131*		*04/13/18 14:41*	*20*
4-Bromofluorobenzene (Surr)	*93*		*80 - 120*		*04/13/18 14:41*	*20*
Dibromofluoromethane (Surr)	*99*		*80 - 122*		*04/13/18 14:41*	*20*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1'-Biphenyl	2100	U	2100	2100	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4,5-Trichlorophenol	44	U	420	44	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4,6-Trichlorophenol	37	U	420	37	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4-Dichlorophenol	44	U	420	44	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4-Dimethylphenol	56	U	420	56	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4-Dinitrophenol	1000	U	2100	1000	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,4-Dinitrotoluene	62	U	420	62	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2-Chlorophenol	51	U	420	51	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chloronaphthalene	44	U	420	44	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2-Methylnaphthalene	48	U	420	48	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2-Methylphenol	34	U	420	34	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2-Nitroaniline	57	U	2100	57	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2-Nitrophenol	52	U	420	52	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
3 & 4 Methylphenol	54	U	420	54	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
3,3'-Dichlorobenzidine	35	U	830	35	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
3-Nitroaniline	58	U	2100	58	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4,6-Dinitro-2-methylphenol	210	U	2100	210	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Bromophenyl phenyl ether	45	U	420	45	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Chloro-3-methylphenol	44	U	420	44	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Chloroaniline	66	U	830	66	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Chlorophenyl phenyl ether	56	U	420	56	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Nitroaniline	62	U	2100	62	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Acenaphthene	52	U	420	52	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Acenaphthylene	45	U	420	45	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Acetophenone	35	U	420	35	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Anthracene	32	U	420	32	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzo[a]anthracene	40	J	420	34	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzo[a]pyrene	66	U	420	66	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzo[b]fluoranthene	48	U	420	48	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzo[g,h,i]perylene	28	U	420	28	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzo[k]fluoranthene	82	U	420	82	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Bis(2-chloroethoxy)methane	49	U	420	49	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Bis(2-chloroethyl)ether	57	U	420	57	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Bis(2-ethylhexyl) phthalate	37	U	420	37	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Chrysene	59	J	420	27	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Dibenz(a,h)anthracene	49	U	420	49	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Dibenzofuran	42	U	420	42	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Di-n-butyl phthalate	38	U	420	38	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Diethyl phthalate	47	U	420	47	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Dimethyl phthalate	43	U	420	43	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Di-n-octyl phthalate	37	U	420	37	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Fluoranthene	140	J	420	40	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Fluorene	45	U	420	45	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Hexachlorobenzene	49	U	420	49	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Hexachlorobutadiene	45	U	420	45	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Hexachlorocyclopentadiene	52	U	420	52	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Hexachloroethane	35	U	420	35	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Indeno[1,2,3-cd]pyrene	35	U	420	35	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Isophorone	42	U	420	42	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Naphthalene	38	U	420	38	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Nitrobenzene	33	U	420	33	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
N-Nitrosodiphenylamine	42	U	420	42	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
N-Nitrosodi-n-propylamine	40	U	420	40	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Pentachlorophenol	420	U	2100	420	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Phenanthrene	85	J	420	34	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Phenol	43	U	420	43	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Pyrene	120	J	420	34	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Butyl benzyl phthalate	33	U	420	33	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
bis (2-chloroisopropyl) ether	38	U	420	38	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Carbazole	38	U	420	38	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
2,6-Dinitrotoluene	53	U	420	53	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
4-Nitrophenol	420	U	2100	420	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Atrazine	29	U	420	29	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Benzaldehyde	73	U	420	73	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1
Caprolactam	83	U	420	83	ug/Kg	☼	04/11/18 08:30	04/15/18 21:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*86*		*45 - 129*	*04/11/18 08:30*	*04/15/18 21:02*	*1*
2-Fluorobiphenyl (Surr)	*86*		*41 - 116*	*04/11/18 08:30*	*04/15/18 21:02*	*1*
2-Fluorophenol (Surr)	*83*		*39 - 114*	*04/11/18 08:30*	*04/15/18 21:02*	*1*
Terphenyl-d14 (Surr)	*90*		*46 - 126*	*04/11/18 08:30*	*04/15/18 21:02*	*1*
Phenol-d5 (Surr)	*81*		*38 - 122*	*04/11/18 08:30*	*04/15/18 21:02*	*1*
Nitrobenzene-d5 (Surr)	*76*		*37 - 115*	*04/11/18 08:30*	*04/15/18 21:02*	*1*

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0026	U	0.049	0.0026	mg/L		04/12/18 15:10	04/17/18 01:31	1
Pyridine	0.012	U	0.24	0.012	mg/L		04/12/18 15:10	04/17/18 01:31	1
Hexachlorobenzene	0.0039	U	0.049	0.0039	mg/L		04/12/18 15:10	04/17/18 01:31	1
2,4-Dinitrotoluene	0.0058	U	0.049	0.0058	mg/L		04/12/18 15:10	04/17/18 01:31	1
Hexachloroethane	0.0037	U	0.049	0.0037	mg/L		04/12/18 15:10	04/17/18 01:31	1
Hexachlorobutadiene	0.0030	U	0.049	0.0030	mg/L		04/12/18 15:10	04/17/18 01:31	1
Pentachlorophenol	0.0097	U	0.24	0.0097	mg/L		04/12/18 15:10	04/17/18 01:31	1
2,4,6-Trichlorophenol	0.0042	U	0.049	0.0042	mg/L		04/12/18 15:10	04/17/18 01:31	1
2,4,5-Trichlorophenol	0.0058	U	0.049	0.0058	mg/L		04/12/18 15:10	04/17/18 01:31	1
Nitrobenzene	0.0036	U	0.049	0.0036	mg/L		04/12/18 15:10	04/17/18 01:31	1
2-Methylphenol	0.0044	U	0.049	0.0044	mg/L		04/12/18 15:10	04/17/18 01:31	1
3 & 4 Methylphenol	0.0063	U	0.049	0.0063	mg/L		04/12/18 15:10	04/17/18 01:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*78*		*31 - 141*	*04/12/18 15:10*	*04/17/18 01:31*	*1*
2-Fluorobiphenyl	*69*		*38 - 130*	*04/12/18 15:10*	*04/17/18 01:31*	*1*
2-Fluorophenol (Surr)	*65*		*25 - 130*	*04/12/18 15:10*	*04/17/18 01:31*	*1*
Terphenyl-d14 (Surr)	*74*		*10 - 143*	*04/12/18 15:10*	*04/17/18 01:31*	*1*
Phenol-d5 (Surr)	*66*		*25 - 130*	*04/12/18 15:10*	*04/17/18 01:31*	*1*
Nitrobenzene-d5 (Surr)	*71*		*39 - 130*	*04/12/18 15:10*	*04/17/18 01:31*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	2.1	J	2.2	0.89	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Barium	130		1.1	0.18	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Cadmium	0.11	U	0.56	0.11	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Chromium	33	F1	1.1	0.23	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Silver	0.067	U	1.1	0.067	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Lead	13		1.1	0.38	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1
Selenium	1.1	U F1	2.8	1.1	mg/Kg	☼	04/11/18 06:50	04/11/18 21:10	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.20	U F1	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:53	1
Barium	1.0	U	1.0	1.0	mg/L		04/18/18 13:16	04/19/18 16:53	1
Cadmium	0.10	U	0.10	0.10	mg/L		04/18/18 13:16	04/19/18 16:53	1
Chromium	0.20	U	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:53	1
Lead	0.20	U	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:53	1
Selenium	0.50	U	0.50	0.50	mg/L		04/18/18 13:16	04/19/18 16:53	1
Silver	0.10	U F1 F2	0.10	0.10	mg/L		04/18/18 13:16	04/19/18 16:53	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.020	U	0.020	0.020	mg/L		04/13/18 09:27	04/16/18 09:24	1

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0090	U	0.023	0.0090	mg/Kg	☼	04/10/18 15:11	04/12/18 17:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ignitability	NB				mm/sec			04/12/18 07:57	1
Cyanide, Total	0.20	J	0.65	0.17	mg/Kg	☼	04/12/18 05:29	04/12/18 10:14	1
Sulfide	75	U	75	75	mg/Kg	☼	04/12/18 04:00	04/12/18 04:30	1
corrosivity by pH	5.8	HF			SU			04/19/18 13:18	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-01
Date Collected: 04/09/18 09:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-2
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 15:14	1
1,1,1-Trichloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 15:14	1
1,1,2,2-Tetrachloroethane	0.62	U	1.0	0.62	ug/L			04/11/18 15:14	1
1,1,2-Trichloroethane	0.33	U	1.0	0.33	ug/L			04/11/18 15:14	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			04/11/18 15:14	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			04/11/18 15:14	1
1,1-Dichloropropene	0.34	U	1.0	0.34	ug/L			04/11/18 15:14	1
1,2,3-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			04/11/18 15:14	1
1,2,4-Trimethylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 15:14	1
1,2-Dibromo-3-Chloropropane	1.1	U	5.0	1.1	ug/L			04/11/18 15:14	1
1,2-Dichloroethane	0.50	U	1.0	0.50	ug/L			04/11/18 15:14	1
1,2-Dichloroethene, Total	0.37	U	2.0	0.37	ug/L			04/11/18 15:14	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			04/11/18 15:14	1
1,3,5-Trimethylbenzene	0.31	U	1.0	0.31	ug/L			04/11/18 15:14	1
1,3-Dichloropropane	0.34	U	1.0	0.34	ug/L			04/11/18 15:14	1
2,2-Dichloropropane	0.37	U	1.0	0.37	ug/L			04/11/18 15:14	1
2-Chlorotoluene	0.27	U	1.0	0.27	ug/L			04/11/18 15:14	1
2-Hexanone	2.0	U	10	2.0	ug/L			04/11/18 15:14	1
4-Chlorotoluene	0.45	U	1.0	0.45	ug/L			04/11/18 15:14	1
Acetone	7.0	U	10	7.0	ug/L			04/11/18 15:14	1
Benzene	0.43	U	1.0	0.43	ug/L			04/11/18 15:14	1
Bromobenzene	0.50	U	1.0	0.50	ug/L			04/11/18 15:14	1
Bromochloromethane	0.45	U	1.0	0.45	ug/L			04/11/18 15:14	1
Bromoform	0.43	U	1.0	0.43	ug/L			04/11/18 15:14	1
Bromodichloromethane	0.44	U	1.0	0.44	ug/L			04/11/18 15:14	1
Bromomethane	2.5	U	5.0	2.5	ug/L			04/11/18 15:14	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			04/11/18 15:14	1
Carbon tetrachloride	0.33	U	1.0	0.33	ug/L			04/11/18 15:14	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			04/11/18 15:14	1
Chloroethane	2.5	U	5.0	2.5	ug/L			04/11/18 15:14	1
Chloroform	0.50	U	1.0	0.50	ug/L			04/11/18 15:14	1
Chloromethane	0.40	U	1.0	0.40	ug/L			04/11/18 15:14	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			04/11/18 15:14	1
cis-1,3-Dichloropropene	0.40	U	1.0	0.40	ug/L			04/11/18 15:14	1
Dibromochloromethane	0.32	U	1.0	0.32	ug/L			04/11/18 15:14	1
Dibromomethane	0.35	U	1.0	0.35	ug/L			04/11/18 15:14	1
Dichlorodifluoromethane	0.60	U	1.0	0.60	ug/L			04/11/18 15:14	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			04/11/18 15:14	1
Isopropylbenzene	0.35	U	1.0	0.35	ug/L			04/11/18 15:14	1
m-Xylene & p-Xylene	0.35	U	1.0	0.35	ug/L			04/11/18 15:14	1
Methyl tert-butyl ether	0.30	U	10	0.30	ug/L			04/11/18 15:14	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			04/11/18 15:14	1
4-Methyl-2-pentanone	2.1	U	10	2.1	ug/L			04/11/18 15:14	1
2-Butanone (MEK)	3.4	U	10	3.4	ug/L			04/11/18 15:14	1
1,2-Dibromoethane	0.44	U	1.0	0.44	ug/L			04/11/18 15:14	1
n-Butylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 15:14	1
N-Propylbenzene	0.38	U	1.0	0.38	ug/L			04/11/18 15:14	1
o-Xylene	0.23	U	1.0	0.23	ug/L			04/11/18 15:14	1
p-Isopropyltoluene	0.48	U	1.0	0.48	ug/L			04/11/18 15:14	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-01
Date Collected: 04/09/18 09:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-2
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
sec-Butylbenzene	0.42	U	1.0	0.42	ug/L			04/11/18 15:14	1
Styrene	0.27	U	1.0	0.27	ug/L			04/11/18 15:14	1
tert-Butylbenzene	0.45	U	1.0	0.45	ug/L			04/11/18 15:14	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			04/11/18 15:14	1
Toluene	0.48	U	1.0	0.48	ug/L			04/11/18 15:14	1
trans-1,2-Dichloroethene	0.37	U	1.0	0.37	ug/L			04/11/18 15:14	1
trans-1,3-Dichloropropene	0.42	U	1.0	0.42	ug/L			04/11/18 15:14	1
Trichloroethene	0.48	U	1.0	0.48	ug/L			04/11/18 15:14	1
Trichlorofluoromethane	0.42	U	1.0	0.42	ug/L			04/11/18 15:14	1
Vinyl acetate	0.81	U	2.0	0.81	ug/L			04/11/18 15:14	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			04/11/18 15:14	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			04/11/18 15:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*80 - 120*		*04/11/18 15:14*	*1*
1,2-Dichloroethane-d4 (Surr)	*89*		*73 - 131*		*04/11/18 15:14*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*04/11/18 15:14*	*1*
4-Bromofluorobenzene (Surr)	*95*		*80 - 120*		*04/11/18 15:14*	*1*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzaldehyde	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:03	1
Phenol	0.80	U	9.6	0.80	ug/L		04/12/18 15:10	04/16/18 00:03	1
Bis(2-chloroethyl)ether	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Chlorophenol	0.84	U	9.6	0.84	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Methylphenol	0.86	U	9.6	0.86	ug/L		04/12/18 15:10	04/16/18 00:03	1
bis (2-chloroisopropyl) ether	0.75	U	9.6	0.75	ug/L		04/12/18 15:10	04/16/18 00:03	1
Acetophenone	0.55	U	9.6	0.55	ug/L		04/12/18 15:10	04/16/18 00:03	1
3 & 4 Methylphenol	1.3	U	9.6	1.3	ug/L		04/12/18 15:10	04/16/18 00:03	1
N-Nitrosodi-n-propylamine	0.69	U	9.6	0.69	ug/L		04/12/18 15:10	04/16/18 00:03	1
Hexachloroethane	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:03	1
Nitrobenzene	0.70	U	9.6	0.70	ug/L		04/12/18 15:10	04/16/18 00:03	1
Isophorone	0.87	U	9.6	0.87	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Nitrophenol	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4-Dimethylphenol	3.8	U	9.6	3.8	ug/L		04/12/18 15:10	04/16/18 00:03	1
Bis(2-chloroethoxy)methane	0.90	U	9.6	0.90	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4-Dichlorophenol	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:03	1
Naphthalene	0.67	U	9.6	0.67	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Chloroaniline	2.1	U	19	2.1	ug/L		04/12/18 15:10	04/16/18 00:03	1
Hexachlorobutadiene	0.60	U	9.6	0.60	ug/L		04/12/18 15:10	04/16/18 00:03	1
Caprolactam	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Chloro-3-methylphenol	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Methylnaphthalene	0.75	U	9.6	0.75	ug/L		04/12/18 15:10	04/16/18 00:03	1
Hexachlorocyclopentadiene	2.4	U	9.6	2.4	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4,6-Trichlorophenol	0.82	U	9.6	0.82	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4,5-Trichlorophenol	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:03	1
1,1'-Biphenyl	0.56	U	9.6	0.56	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Chloronaphthalene	0.77	U	9.6	0.77	ug/L		04/12/18 15:10	04/16/18 00:03	1
2-Nitroaniline	1.3	U	48	1.3	ug/L		04/12/18 15:10	04/16/18 00:03	1
Dimethyl phthalate	0.95	U	9.6	0.95	ug/L		04/12/18 15:10	04/16/18 00:03	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-01
Date Collected: 04/09/18 09:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-2
Matrix: Water

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,6-Dinitrotoluene	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:03	1
Acenaphthylene	0.82	U	9.6	0.82	ug/L		04/12/18 15:10	04/16/18 00:03	1
3-Nitroaniline	4.8	U	48	4.8	ug/L		04/12/18 15:10	04/16/18 00:03	1
Acenaphthene	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4-Dinitrophenol	9.6	U	48	9.6	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Nitrophenol	1.8	U	48	1.8	ug/L		04/12/18 15:10	04/16/18 00:03	1
Dibenzofuran	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:03	1
2,4-Dinitrotoluene	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:03	1
Diethyl phthalate	0.85	U	9.6	0.85	ug/L		04/12/18 15:10	04/16/18 00:03	1
Fluorene	0.92	U	9.6	0.92	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Chlorophenyl phenyl ether	0.81	U	9.6	0.81	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Nitroaniline	4.8	U	48	4.8	ug/L		04/12/18 15:10	04/16/18 00:03	1
4,6-Dinitro-2-methylphenol	9.6	U	48	9.6	ug/L		04/12/18 15:10	04/16/18 00:03	1
N-Nitrosodiphenylamine	0.89	U	9.6	0.89	ug/L		04/12/18 15:10	04/16/18 00:03	1
4-Bromophenyl phenyl ether	0.74	U	9.6	0.74	ug/L		04/12/18 15:10	04/16/18 00:03	1
Hexachlorobenzene	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:03	1
Atrazine	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:03	1
Pentachlorophenol	1.9	U	48	1.9	ug/L		04/12/18 15:10	04/16/18 00:03	1
Phenanthrene	0.74	U	9.6	0.74	ug/L		04/12/18 15:10	04/16/18 00:03	1
Anthracene	0.66	U	9.6	0.66	ug/L		04/12/18 15:10	04/16/18 00:03	1
Carbazole	0.68	U	9.6	0.68	ug/L		04/12/18 15:10	04/16/18 00:03	1
Di-n-butyl phthalate	0.80	U	9.6	0.80	ug/L		04/12/18 15:10	04/16/18 00:03	1
Fluoranthene	0.71	U	9.6	0.71	ug/L		04/12/18 15:10	04/16/18 00:03	1
Pyrene	0.61	U	9.6	0.61	ug/L		04/12/18 15:10	04/16/18 00:03	1
Butyl benzyl phthalate	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:03	1
3,3'-Dichlorobenzidine	29	U	58	29	ug/L		04/12/18 15:10	04/16/18 00:03	1
Benzo[a]anthracene	0.53	U	9.6	0.53	ug/L		04/12/18 15:10	04/16/18 00:03	1
Chrysene	0.49	U	9.6	0.49	ug/L		04/12/18 15:10	04/16/18 00:03	1
Bis(2-ethylhexyl) phthalate	1.5	U	9.6	1.5	ug/L		04/12/18 15:10	04/16/18 00:03	1
Di-n-octyl phthalate	1.3	U	9.6	1.3	ug/L		04/12/18 15:10	04/16/18 00:03	1
Benzo[b]fluoranthene	2.5	U	9.6	2.5	ug/L		04/12/18 15:10	04/16/18 00:03	1
Benzo[k]fluoranthene	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:03	1
Benzo[a]pyrene	0.68	U	9.6	0.68	ug/L		04/12/18 15:10	04/16/18 00:03	1
Indeno[1,2,3-cd]pyrene	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:03	1
Dibenz(a,h)anthracene	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:03	1
Benzo[g,h,i]perylene	0.84	U	9.6	0.84	ug/L		04/12/18 15:10	04/16/18 00:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5 (Surr)	*79*		*32 - 118*	*04/12/18 15:10*	*04/16/18 00:03*	*1*
2-Fluorobiphenyl (Surr)	*87*		*32 - 113*	*04/12/18 15:10*	*04/16/18 00:03*	*1*
Terphenyl-d14 (Surr)	*101*		*10 - 126*	*04/12/18 15:10*	*04/16/18 00:03*	*1*
Phenol-d5 (Surr)	*73*		*27 - 110*	*04/12/18 15:10*	*04/16/18 00:03*	*1*
2-Fluorophenol (Surr)	*64*		*26 - 109*	*04/12/18 15:10*	*04/16/18 00:03*	*1*
2,4,6-Tribromophenol (Surr)	*105*		*39 - 124*	*04/12/18 15:10*	*04/16/18 00:03*	*1*

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	23		0.50	0.20	mg/L			04/12/18 20:38	1
Sulfate	120		5.0	2.0	mg/L			04/12/18 20:51	5

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-01
Date Collected: 04/09/18 09:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-2
Matrix: Water

Method: 2340B-2011 - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	140		3.3	3.3	mg/L			04/20/18 12:15	1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	90	J	200	24	ug/L		04/14/18 16:02	04/18/18 19:12	1
Antimony	5.3	U	20	5.3	ug/L		04/14/18 16:02	04/18/18 19:12	1
Arsenic	6.2	U	20	6.2	ug/L		04/14/18 16:02	04/18/18 19:12	1
Barium	130		10	1.7	ug/L		04/14/18 16:02	04/18/18 19:12	1
Beryllium	0.10	U	4.0	0.10	ug/L		04/14/18 16:02	04/18/18 19:12	1
Cadmium	1.0	U	5.0	1.0	ug/L		04/14/18 16:02	04/18/18 19:12	1
Calcium	25000		500	25	ug/L		04/14/18 16:02	04/18/18 19:12	1
Chromium	1.6	U	10	1.6	ug/L		04/14/18 16:02	04/18/18 19:12	1
Cobalt	3.9	J	10	1.0	ug/L		04/14/18 16:02	04/18/18 19:12	1
Copper	1.8	U	20	1.8	ug/L		04/14/18 16:02	04/18/18 19:12	1
Iron	28	J B	50	17	ug/L		04/14/18 16:02	04/18/18 19:12	1
Lead	3.9	U	10	3.9	ug/L		04/14/18 16:02	04/18/18 19:12	1
Magnesium	18000		500	33	ug/L		04/14/18 16:02	04/18/18 19:12	1
Manganese	320		10	1.0	ug/L		04/14/18 16:02	04/18/18 19:12	1
Nickel	2.1	U	40	2.1	ug/L		04/14/18 16:02	04/18/18 19:12	1
Potassium	4500		1000	17	ug/L		04/14/18 16:02	04/18/18 19:12	1
Selenium	9.9	U	20	9.9	ug/L		04/14/18 16:02	04/18/18 19:12	1
Silver	0.60	U	10	0.60	ug/L		04/14/18 16:02	04/18/18 19:12	1
Sodium	24000		1000	480	ug/L		04/14/18 16:02	04/18/18 19:12	1
Thallium	6.0	U	25	6.0	ug/L		04/14/18 16:02	04/18/18 19:12	1
Vanadium	1.0	U	10	1.0	ug/L		04/14/18 16:02	04/18/18 19:12	1
Zinc	7.0	U	20	7.0	ug/L		04/14/18 16:02	04/18/18 19:12	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.092	J	0.20	0.080	ug/L		04/11/18 09:42	04/13/18 08:23	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	12		5.0	5.0	mg/L			04/10/18 18:09	1
Bicarbonate Alkalinity as CaCO3	12		5.0	5.0	mg/L			04/10/18 18:09	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			04/10/18 18:09	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 18:09	1
Carbon Dioxide, Free	28		5.0	5.0	mg/L			04/10/18 18:09	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 18:09	1
Bicarbonate ion as HCO3	15		6.1	6.1	mg/L			04/10/18 18:09	1
Total Dissolved Solids	280		10	10	mg/L			04/11/18 12:30	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-02
Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 18:32	1
1,1,1-Trichloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 18:32	1
1,1,2,2-Tetrachloroethane	0.62	U	1.0	0.62	ug/L			04/11/18 18:32	1
1,1,2-Trichloroethane	0.33	U	1.0	0.33	ug/L			04/11/18 18:32	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			04/11/18 18:32	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			04/11/18 18:32	1
1,1-Dichloropropene	0.34	U	1.0	0.34	ug/L			04/11/18 18:32	1
1,2,3-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			04/11/18 18:32	1
1,2,4-Trimethylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 18:32	1
1,2-Dibromo-3-Chloropropane	1.1	U	5.0	1.1	ug/L			04/11/18 18:32	1
1,2-Dichloroethane	0.50	U	1.0	0.50	ug/L			04/11/18 18:32	1
1,2-Dichloroethene, Total	0.37	U	2.0	0.37	ug/L			04/11/18 18:32	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			04/11/18 18:32	1
1,3,5-Trimethylbenzene	0.31	U	1.0	0.31	ug/L			04/11/18 18:32	1
1,3-Dichloropropane	0.34	U	1.0	0.34	ug/L			04/11/18 18:32	1
2,2-Dichloropropane	0.37	U	1.0	0.37	ug/L			04/11/18 18:32	1
2-Chlorotoluene	0.27	U	1.0	0.27	ug/L			04/11/18 18:32	1
2-Hexanone	2.0	U	10	2.0	ug/L			04/11/18 18:32	1
4-Chlorotoluene	0.45	U	1.0	0.45	ug/L			04/11/18 18:32	1
Acetone	7.0	U	10	7.0	ug/L			04/11/18 18:32	1
Benzene	0.43	U	1.0	0.43	ug/L			04/11/18 18:32	1
Bromobenzene	0.50	U	1.0	0.50	ug/L			04/11/18 18:32	1
Bromochloromethane	0.45	U	1.0	0.45	ug/L			04/11/18 18:32	1
Bromoform	0.43	U	1.0	0.43	ug/L			04/11/18 18:32	1
Bromodichloromethane	0.44	U	1.0	0.44	ug/L			04/11/18 18:32	1
Bromomethane	2.5	U	5.0	2.5	ug/L			04/11/18 18:32	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			04/11/18 18:32	1
Carbon tetrachloride	0.33	U	1.0	0.33	ug/L			04/11/18 18:32	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			04/11/18 18:32	1
Chloroethane	2.5	U	5.0	2.5	ug/L			04/11/18 18:32	1
Chloroform	1.3		1.0	0.50	ug/L			04/11/18 18:32	1
Chloromethane	0.40	U	1.0	0.40	ug/L			04/11/18 18:32	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			04/11/18 18:32	1
cis-1,3-Dichloropropene	0.40	U	1.0	0.40	ug/L			04/11/18 18:32	1
Dibromochloromethane	0.32	U	1.0	0.32	ug/L			04/11/18 18:32	1
Dibromomethane	0.35	U	1.0	0.35	ug/L			04/11/18 18:32	1
Dichlorodifluoromethane	0.60	U	1.0	0.60	ug/L			04/11/18 18:32	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			04/11/18 18:32	1
Isopropylbenzene	0.35	U	1.0	0.35	ug/L			04/11/18 18:32	1
m-Xylene & p-Xylene	0.35	U	1.0	0.35	ug/L			04/11/18 18:32	1
Methyl tert-butyl ether	0.30	U	10	0.30	ug/L			04/11/18 18:32	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			04/11/18 18:32	1
4-Methyl-2-pentanone	2.1	U	10	2.1	ug/L			04/11/18 18:32	1
2-Butanone (MEK)	3.4	U	10	3.4	ug/L			04/11/18 18:32	1
1,2-Dibromoethane	0.44	U	1.0	0.44	ug/L			04/11/18 18:32	1
n-Butylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 18:32	1
N-Propylbenzene	0.38	U	1.0	0.38	ug/L			04/11/18 18:32	1
o-Xylene	0.23	U	1.0	0.23	ug/L			04/11/18 18:32	1
p-Isopropyltoluene	0.48	U	1.0	0.48	ug/L			04/11/18 18:32	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-02
Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
sec-Butylbenzene	0.42	U	1.0	0.42	ug/L			04/11/18 18:32	1
Styrene	0.27	U	1.0	0.27	ug/L			04/11/18 18:32	1
tert-Butylbenzene	0.45	U	1.0	0.45	ug/L			04/11/18 18:32	1
Tetrachloroethene	6.0		1.0	0.74	ug/L			04/11/18 18:32	1
Toluene	0.48	U	1.0	0.48	ug/L			04/11/18 18:32	1
trans-1,2-Dichloroethene	0.37	U	1.0	0.37	ug/L			04/11/18 18:32	1
trans-1,3-Dichloropropene	0.42	U	1.0	0.42	ug/L			04/11/18 18:32	1
Trichloroethene	0.48	U	1.0	0.48	ug/L			04/11/18 18:32	1
Trichlorofluoromethane	0.42	U	1.0	0.42	ug/L			04/11/18 18:32	1
Vinyl acetate	0.81	U	2.0	0.81	ug/L			04/11/18 18:32	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			04/11/18 18:32	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			04/11/18 18:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*80 - 120*		*04/11/18 18:32*	*1*
1,2-Dichloroethane-d4 (Surr)	*88*		*73 - 131*		*04/11/18 18:32*	*1*
Dibromofluoromethane (Surr)	*97*		*80 - 122*		*04/11/18 18:32*	*1*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*		*04/11/18 18:32*	*1*

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzaldehyde	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Phenol	0.80	U	9.6	0.80	ug/L		04/12/18 15:10	04/16/18 00:27	1
Bis(2-chloroethyl)ether	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Chlorophenol	0.83	U	9.6	0.83	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Methylphenol	0.85	U	9.6	0.85	ug/L		04/12/18 15:10	04/16/18 00:27	1
bis (2-chloroisopropyl) ether	0.75	U	9.6	0.75	ug/L		04/12/18 15:10	04/16/18 00:27	1
Acetophenone	0.55	U	9.6	0.55	ug/L		04/12/18 15:10	04/16/18 00:27	1
3 & 4 Methylphenol	1.2	U	9.6	1.2	ug/L		04/12/18 15:10	04/16/18 00:27	1
N-Nitrosodi-n-propylamine	0.69	U	9.6	0.69	ug/L		04/12/18 15:10	04/16/18 00:27	1
Hexachloroethane	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:27	1
Nitrobenzene	0.70	U	9.6	0.70	ug/L		04/12/18 15:10	04/16/18 00:27	1
Isophorone	0.86	U	9.6	0.86	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Nitrophenol	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4-Dimethylphenol	3.8	U	9.6	3.8	ug/L		04/12/18 15:10	04/16/18 00:27	1
Bis(2-chloroethoxy)methane	0.90	U	9.6	0.90	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4-Dichlorophenol	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Naphthalene	0.67	U	9.6	0.67	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Chloroaniline	2.1	U	19	2.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Hexachlorobutadiene	0.59	U	9.6	0.59	ug/L		04/12/18 15:10	04/16/18 00:27	1
Caprolactam	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Chloro-3-methylphenol	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Methylnaphthalene	0.75	U	9.6	0.75	ug/L		04/12/18 15:10	04/16/18 00:27	1
Hexachlorocyclopentadiene	2.4	U	9.6	2.4	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4,6-Trichlorophenol	0.81	U	9.6	0.81	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4,5-Trichlorophenol	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
1,1'-Biphenyl	0.56	U	9.6	0.56	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Chloronaphthalene	0.77	U	9.6	0.77	ug/L		04/12/18 15:10	04/16/18 00:27	1
2-Nitroaniline	1.2	U	48	1.2	ug/L		04/12/18 15:10	04/16/18 00:27	1
Dimethyl phthalate	0.95	U	9.6	0.95	ug/L		04/12/18 15:10	04/16/18 00:27	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-02
Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,6-Dinitrotoluene	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Acenaphthylene	0.81	U	9.6	0.81	ug/L		04/12/18 15:10	04/16/18 00:27	1
3-Nitroaniline	4.8	U	48	4.8	ug/L		04/12/18 15:10	04/16/18 00:27	1
Acenaphthene	0.73	U	9.6	0.73	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4-Dinitrophenol	9.6	U	48	9.6	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Nitrophenol	1.8	U	48	1.8	ug/L		04/12/18 15:10	04/16/18 00:27	1
Dibenzofuran	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:27	1
2,4-Dinitrotoluene	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Diethyl phthalate	0.84	U	9.6	0.84	ug/L		04/12/18 15:10	04/16/18 00:27	1
Fluorene	0.92	U	9.6	0.92	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Chlorophenyl phenyl ether	0.80	U	9.6	0.80	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Nitroaniline	4.8	U	48	4.8	ug/L		04/12/18 15:10	04/16/18 00:27	1
4,6-Dinitro-2-methylphenol	9.6	U	48	9.6	ug/L		04/12/18 15:10	04/16/18 00:27	1
N-Nitrosodiphenylamine	0.88	U	9.6	0.88	ug/L		04/12/18 15:10	04/16/18 00:27	1
4-Bromophenyl phenyl ether	0.74	U	9.6	0.74	ug/L		04/12/18 15:10	04/16/18 00:27	1
Hexachlorobenzene	0.76	U	9.6	0.76	ug/L		04/12/18 15:10	04/16/18 00:27	1
Atrazine	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Pentachlorophenol	1.9	U	48	1.9	ug/L		04/12/18 15:10	04/16/18 00:27	1
Phenanthrene	0.74	U	9.6	0.74	ug/L		04/12/18 15:10	04/16/18 00:27	1
Anthracene	0.66	U	9.6	0.66	ug/L		04/12/18 15:10	04/16/18 00:27	1
Carbazole	0.68	U	9.6	0.68	ug/L		04/12/18 15:10	04/16/18 00:27	1
Di-n-butyl phthalate	0.80	U	9.6	0.80	ug/L		04/12/18 15:10	04/16/18 00:27	1
Fluoranthene	0.71	U	9.6	0.71	ug/L		04/12/18 15:10	04/16/18 00:27	1
Pyrene	0.60	U	9.6	0.60	ug/L		04/12/18 15:10	04/16/18 00:27	1
Butyl benzyl phthalate	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
3,3'-Dichlorobenzidine	29	U	57	29	ug/L		04/12/18 15:10	04/16/18 00:27	1
Benzo[a]anthracene	0.53	U	9.6	0.53	ug/L		04/12/18 15:10	04/16/18 00:27	1
Chrysene	0.49	U	9.6	0.49	ug/L		04/12/18 15:10	04/16/18 00:27	1
Bis(2-ethylhexyl) phthalate	1.5	U	9.6	1.5	ug/L		04/12/18 15:10	04/16/18 00:27	1
Di-n-octyl phthalate	1.3	U	9.6	1.3	ug/L		04/12/18 15:10	04/16/18 00:27	1
Benzo[b]fluoranthene	2.5	U	9.6	2.5	ug/L		04/12/18 15:10	04/16/18 00:27	1
Benzo[k]fluoranthene	1.1	U	9.6	1.1	ug/L		04/12/18 15:10	04/16/18 00:27	1
Benzo[a]pyrene	0.68	U	9.6	0.68	ug/L		04/12/18 15:10	04/16/18 00:27	1
Indeno[1,2,3-cd]pyrene	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:27	1
Dibenz(a,h)anthracene	0.96	U	9.6	0.96	ug/L		04/12/18 15:10	04/16/18 00:27	1
Benzo[g,h,i]perylene	0.83	U	9.6	0.83	ug/L		04/12/18 15:10	04/16/18 00:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5 (Surr)	*79*		*32 - 118*	*04/12/18 15:10*	*04/16/18 00:27*	*1*
2-Fluorobiphenyl (Surr)	*78*		*32 - 113*	*04/12/18 15:10*	*04/16/18 00:27*	*1*
Terphenyl-d14 (Surr)	*49*		*10 - 126*	*04/12/18 15:10*	*04/16/18 00:27*	*1*
Phenol-d5 (Surr)	*68*		*27 - 110*	*04/12/18 15:10*	*04/16/18 00:27*	*1*
2-Fluorophenol (Surr)	*61*		*26 - 109*	*04/12/18 15:10*	*04/16/18 00:27*	*1*
2,4,6-Tribromophenol (Surr)	*91*		*39 - 124*	*04/12/18 15:10*	*04/16/18 00:27*	*1*

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	24		0.50	0.20	mg/L			04/12/18 21:04	1
Sulfate	160		5.0	2.0	mg/L			04/12/18 21:17	5

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-02
Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Method: 2340B-2011 - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	170		3.3	3.3	mg/L			04/20/18 12:15	1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	2700		200	24	ug/L		04/14/18 16:02	04/18/18 19:06	1
Antimony	5.3	U	20	5.3	ug/L		04/14/18 16:02	04/18/18 19:06	1
Arsenic	6.2	U	20	6.2	ug/L		04/14/18 16:02	04/18/18 19:06	1
Barium	79		10	1.7	ug/L		04/14/18 16:02	04/18/18 19:06	1
Beryllium	0.17	J	4.0	0.10	ug/L		04/14/18 16:02	04/18/18 19:06	1
Cadmium	1.0	U	5.0	1.0	ug/L		04/14/18 16:02	04/18/18 19:06	1
Calcium	35000		500	25	ug/L		04/14/18 16:02	04/18/18 19:06	1
Chromium	8.1	J	10	1.6	ug/L		04/14/18 16:02	04/18/18 19:06	1
Cobalt	35		10	1.0	ug/L		04/14/18 16:02	04/18/18 19:06	1
Copper	9.7	J	20	1.8	ug/L		04/14/18 16:02	04/18/18 19:06	1
Iron	2400	B	50	17	ug/L		04/14/18 16:02	04/18/18 19:06	1
Lead	3.9	U	10	3.9	ug/L		04/14/18 16:02	04/18/18 19:06	1
Magnesium	20000		500	33	ug/L		04/14/18 16:02	04/18/18 19:06	1
Manganese	2900		10	1.0	ug/L		04/14/18 16:02	04/18/18 19:06	1
Nickel	4.1	J	40	2.1	ug/L		04/14/18 16:02	04/18/18 19:06	1
Potassium	6400		1000	17	ug/L		04/14/18 16:02	04/18/18 19:06	1
Selenium	9.9	U	20	9.9	ug/L		04/14/18 16:02	04/18/18 19:06	1
Silver	0.60	U	10	0.60	ug/L		04/14/18 16:02	04/18/18 19:06	1
Sodium	27000		1000	480	ug/L		04/14/18 16:02	04/18/18 19:06	1
Thallium	6.0	U	25	6.0	ug/L		04/14/18 16:02	04/18/18 19:06	1
Vanadium	7.7	J	10	1.0	ug/L		04/14/18 16:02	04/18/18 19:06	1
Zinc	11	J	20	7.0	ug/L		04/14/18 16:02	04/18/18 19:06	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.080	U	0.20	0.080	ug/L		04/11/18 09:42	04/13/18 08:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	21		5.0	5.0	mg/L			04/10/18 18:15	1
Bicarbonate Alkalinity as CaCO3	21		5.0	5.0	mg/L			04/10/18 18:15	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			04/10/18 18:15	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 18:15	1
Carbon Dioxide, Free	25		5.0	5.0	mg/L			04/10/18 18:15	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 18:15	1
Bicarbonate ion as HCO3	25		6.1	6.1	mg/L			04/10/18 18:15	1
Total Dissolved Solids	320		10	10	mg/L			04/11/18 12:30	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: Trip Blank
Date Collected: 04/09/18 00:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-4
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1,2-Tetrachloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 14:25	1
1,1,1-Trichloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 14:25	1
1,1,2,2-Tetrachloroethane	0.62	U	1.0	0.62	ug/L			04/11/18 14:25	1
1,1,2-Trichloroethane	0.33	U	1.0	0.33	ug/L			04/11/18 14:25	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			04/11/18 14:25	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			04/11/18 14:25	1
1,1-Dichloropropene	0.34	U	1.0	0.34	ug/L			04/11/18 14:25	1
1,2,3-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			04/11/18 14:25	1
1,2,4-Trimethylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 14:25	1
1,2-Dibromo-3-Chloropropane	1.1	U	5.0	1.1	ug/L			04/11/18 14:25	1
1,2-Dichloroethane	0.50	U	1.0	0.50	ug/L			04/11/18 14:25	1
1,2-Dichloroethene, Total	0.37	U	2.0	0.37	ug/L			04/11/18 14:25	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			04/11/18 14:25	1
1,3,5-Trimethylbenzene	0.31	U	1.0	0.31	ug/L			04/11/18 14:25	1
1,3-Dichloropropane	0.34	U	1.0	0.34	ug/L			04/11/18 14:25	1
2,2-Dichloropropane	0.37	U	1.0	0.37	ug/L			04/11/18 14:25	1
2-Chlorotoluene	0.27	U	1.0	0.27	ug/L			04/11/18 14:25	1
2-Hexanone	2.0	U	10	2.0	ug/L			04/11/18 14:25	1
4-Chlorotoluene	0.45	U	1.0	0.45	ug/L			04/11/18 14:25	1
Acetone	7.0	U	10	7.0	ug/L			04/11/18 14:25	1
Benzene	0.43	U	1.0	0.43	ug/L			04/11/18 14:25	1
Bromobenzene	0.50	U	1.0	0.50	ug/L			04/11/18 14:25	1
Bromochloromethane	0.45	U	1.0	0.45	ug/L			04/11/18 14:25	1
Bromoform	0.43	U	1.0	0.43	ug/L			04/11/18 14:25	1
Bromodichloromethane	0.44	U	1.0	0.44	ug/L			04/11/18 14:25	1
Bromomethane	2.5	U	5.0	2.5	ug/L			04/11/18 14:25	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			04/11/18 14:25	1
Carbon tetrachloride	0.33	U	1.0	0.33	ug/L			04/11/18 14:25	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			04/11/18 14:25	1
Chloroethane	2.5	U	5.0	2.5	ug/L			04/11/18 14:25	1
Chloroform	0.50	U	1.0	0.50	ug/L			04/11/18 14:25	1
Chloromethane	0.40	U	1.0	0.40	ug/L			04/11/18 14:25	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			04/11/18 14:25	1
cis-1,3-Dichloropropene	0.40	U	1.0	0.40	ug/L			04/11/18 14:25	1
Dibromochloromethane	0.32	U	1.0	0.32	ug/L			04/11/18 14:25	1
Dibromomethane	0.35	U	1.0	0.35	ug/L			04/11/18 14:25	1
Dichlorodifluoromethane	0.60	U	1.0	0.60	ug/L			04/11/18 14:25	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			04/11/18 14:25	1
Isopropylbenzene	0.35	U	1.0	0.35	ug/L			04/11/18 14:25	1
m-Xylene & p-Xylene	0.35	U	1.0	0.35	ug/L			04/11/18 14:25	1
Methyl tert-butyl ether	0.30	U	10	0.30	ug/L			04/11/18 14:25	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			04/11/18 14:25	1
4-Methyl-2-pentanone	2.1	U	10	2.1	ug/L			04/11/18 14:25	1
2-Butanone (MEK)	3.4	U	10	3.4	ug/L			04/11/18 14:25	1
1,2-Dibromoethane	0.44	U	1.0	0.44	ug/L			04/11/18 14:25	1
n-Butylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 14:25	1
N-Propylbenzene	0.38	U	1.0	0.38	ug/L			04/11/18 14:25	1
o-Xylene	0.23	U	1.0	0.23	ug/L			04/11/18 14:25	1
p-Isopropyltoluene	0.48	U	1.0	0.48	ug/L			04/11/18 14:25	1

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: Trip Blank
Date Collected: 04/09/18 00:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-4
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
sec-Butylbenzene	0.42	U	1.0	0.42	ug/L			04/11/18 14:25	1
Styrene	0.27	U	1.0	0.27	ug/L			04/11/18 14:25	1
tert-Butylbenzene	0.45	U	1.0	0.45	ug/L			04/11/18 14:25	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			04/11/18 14:25	1
Toluene	0.48	U	1.0	0.48	ug/L			04/11/18 14:25	1
trans-1,2-Dichloroethene	0.37	U	1.0	0.37	ug/L			04/11/18 14:25	1
trans-1,3-Dichloropropene	0.42	U	1.0	0.42	ug/L			04/11/18 14:25	1
Trichloroethene	0.48	U	1.0	0.48	ug/L			04/11/18 14:25	1
Trichlorofluoromethane	0.42	U	1.0	0.42	ug/L			04/11/18 14:25	1
Vinyl acetate	0.81	U	2.0	0.81	ug/L			04/11/18 14:25	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			04/11/18 14:25	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			04/11/18 14:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*80 - 120*		*04/11/18 14:25*	*1*
1,2-Dichloroethane-d4 (Surr)	*86*		*73 - 131*		*04/11/18 14:25*	*1*
Dibromofluoromethane (Surr)	*96*		*80 - 122*		*04/11/18 14:25*	*1*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*		*04/11/18 14:25*	*1*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: LB 680-519459/1-A
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	5.4	U	20	5.4	ug/L			04/11/18 15:49	20
4-Chlorotoluene	9.0	U	20	9.0	ug/L			04/11/18 15:49	20
Acetone	140	U	200	140	ug/L			04/11/18 15:49	20
1,2-Dibromo-3-Chloropropane	22	U	100	22	ug/L			04/11/18 15:49	20
Benzene	8.6	U	20	8.6	ug/L			04/11/18 15:49	20
Bromobenzene	10	U	20	10	ug/L			04/11/18 15:49	20
Bromochloromethane	9.0	U	20	9.0	ug/L			04/11/18 15:49	20
Bromoform	8.6	U	20	8.6	ug/L			04/11/18 15:49	20
1,1-Dichloroethane	7.6	U	20	7.6	ug/L			04/11/18 15:49	20
Bromodichloromethane	8.8	U	20	8.8	ug/L			04/11/18 15:49	20
1,2-Dichloroethane	10	U	20	10	ug/L			04/11/18 15:49	20
Bromomethane	50	U	100	50	ug/L			04/11/18 15:49	20
Carbon disulfide	20	U	40	20	ug/L			04/11/18 15:49	20
Carbon tetrachloride	6.6	U	20	6.6	ug/L			04/11/18 15:49	20
1,2-Dichloroethene, Total	7.4	U	40	7.4	ug/L			04/11/18 15:49	20
Chlorobenzene	5.2	U	20	5.2	ug/L			04/11/18 15:49	20
1,1-Dichloroethene	7.2	U	20	7.2	ug/L			04/11/18 15:49	20
Chloroethane	50	U	100	50	ug/L			04/11/18 15:49	20
1,2-Dichloropropane	13	U	20	13	ug/L			04/11/18 15:49	20
Chloroform	10	U	20	10	ug/L			04/11/18 15:49	20
1,3-Dichloropropane	6.8	U	20	6.8	ug/L			04/11/18 15:49	20
Chloromethane	8.0	U	20	8.0	ug/L			04/11/18 15:49	20
2,2-Dichloropropane	7.4	U	20	7.4	ug/L			04/11/18 15:49	20
cis-1,2-Dichloroethene	8.2	U	20	8.2	ug/L			04/11/18 15:49	20
1,1-Dichloropropene	6.8	U	20	6.8	ug/L			04/11/18 15:49	20
cis-1,3-Dichloropropene	8.0	U	20	8.0	ug/L			04/11/18 15:49	20
Dibromochloromethane	6.4	U	20	6.4	ug/L			04/11/18 15:49	20
Dibromomethane	7.0	U	20	7.0	ug/L			04/11/18 15:49	20
Dichlorodifluoromethane	12	U	20	12	ug/L			04/11/18 15:49	20
2-Hexanone	40	U	200	40	ug/L			04/11/18 15:49	20
Ethylbenzene	6.6	U	20	6.6	ug/L			04/11/18 15:49	20
Isopropylbenzene	7.0	U	20	7.0	ug/L			04/11/18 15:49	20
Methylene Chloride	50	U	100	50	ug/L			04/11/18 15:49	20
4-Methyl-2-pentanone	42	U	200	42	ug/L			04/11/18 15:49	20
Methyl tert-butyl ether	6.0	U	200	6.0	ug/L			04/11/18 15:49	20
2-Butanone (MEK)	68	U	200	68	ug/L			04/11/18 15:49	20
1,2-Dibromoethane	8.8	U	20	8.8	ug/L			04/11/18 15:49	20
1,1,1,2-Tetrachloroethane	7.4	U	20	7.4	ug/L			04/11/18 15:49	20
n-Butylbenzene	9.4	U	20	9.4	ug/L			04/11/18 15:49	20
1,1,2,2-Tetrachloroethane	12	U	20	12	ug/L			04/11/18 15:49	20
N-Propylbenzene	7.6	U	20	7.6	ug/L			04/11/18 15:49	20
p-Isopropyltoluene	9.6	U	20	9.6	ug/L			04/11/18 15:49	20
1,2,3-Trichlorobenzene	50	U	100	50	ug/L			04/11/18 15:49	20
sec-Butylbenzene	8.4	U	20	8.4	ug/L			04/11/18 15:49	20
1,1,1-Trichloroethane	7.4	U	20	7.4	ug/L			04/11/18 15:49	20
Styrene	5.4	U	20	5.4	ug/L			04/11/18 15:49	20
1,1,2-Trichloroethane	6.6	U	20	6.6	ug/L			04/11/18 15:49	20
tert-Butylbenzene	9.0	U	20	9.0	ug/L			04/11/18 15:49	20

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LB 680-519459/1-A
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	15	U	20	15	ug/L			04/11/18 15:49	20
Toluene	9.6	U	20	9.6	ug/L			04/11/18 15:49	20
1,2,4-Trimethylbenzene	9.4	U	20	9.4	ug/L			04/11/18 15:49	20
trans-1,2-Dichloroethene	7.4	U	20	7.4	ug/L			04/11/18 15:49	20
1,3,5-Trimethylbenzene	6.2	U	20	6.2	ug/L			04/11/18 15:49	20
trans-1,3-Dichloropropene	8.4	U	20	8.4	ug/L			04/11/18 15:49	20
Trichloroethene	9.6	U	20	9.6	ug/L			04/11/18 15:49	20
Trichlorofluoromethane	8.4	U	20	8.4	ug/L			04/11/18 15:49	20
o-Xylene	4.6	U	20	4.6	ug/L			04/11/18 15:49	20
Vinyl acetate	16	U	40	16	ug/L			04/11/18 15:49	20
m-Xylene & p-Xylene	7.0	U	20	7.0	ug/L			04/11/18 15:49	20
Vinyl chloride	10	U	20	10	ug/L			04/11/18 15:49	20
Xylenes, Total	4.6	U	20	4.6	ug/L			04/11/18 15:49	20

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*104*		*80 - 120*		*04/11/18 15:49*	*20*
1,2-Dichloroethane-d4 (Surr)	*97*		*73 - 131*		*04/11/18 15:49*	*20*
Dibromofluoromethane (Surr)	*98*		*80 - 122*		*04/11/18 15:49*	*20*
4-Bromofluorobenzene (Surr)	*111*		*80 - 120*		*04/11/18 15:49*	*20*

Lab Sample ID: MB 680-519398/9
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	0.27	U	1.0	0.27	ug/L			04/11/18 15:04	1
4-Chlorotoluene	0.45	U	1.0	0.45	ug/L			04/11/18 15:04	1
Acetone	7.0	U	10	7.0	ug/L			04/11/18 15:04	1
1,2-Dibromo-3-Chloropropane	1.1	U	5.0	1.1	ug/L			04/11/18 15:04	1
Benzene	0.43	U	1.0	0.43	ug/L			04/11/18 15:04	1
Bromobenzene	0.50	U	1.0	0.50	ug/L			04/11/18 15:04	1
Bromochloromethane	0.45	U	1.0	0.45	ug/L			04/11/18 15:04	1
Bromoform	0.43	U	1.0	0.43	ug/L			04/11/18 15:04	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			04/11/18 15:04	1
Bromodichloromethane	0.44	U	1.0	0.44	ug/L			04/11/18 15:04	1
1,2-Dichloroethane	0.50	U	1.0	0.50	ug/L			04/11/18 15:04	1
Bromomethane	2.5	U	5.0	2.5	ug/L			04/11/18 15:04	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			04/11/18 15:04	1
Carbon tetrachloride	0.33	U	1.0	0.33	ug/L			04/11/18 15:04	1
1,2-Dichloroethene, Total	0.37	U	2.0	0.37	ug/L			04/11/18 15:04	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			04/11/18 15:04	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			04/11/18 15:04	1
Chloroethane	2.5	U	5.0	2.5	ug/L			04/11/18 15:04	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			04/11/18 15:04	1
Chloroform	0.50	U	1.0	0.50	ug/L			04/11/18 15:04	1
1,3-Dichloropropane	0.34	U	1.0	0.34	ug/L			04/11/18 15:04	1
Chloromethane	0.40	U	1.0	0.40	ug/L			04/11/18 15:04	1
2,2-Dichloropropane	0.37	U	1.0	0.37	ug/L			04/11/18 15:04	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519398/9
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			04/11/18 15:04	1
1,1-Dichloropropene	0.34	U	1.0	0.34	ug/L			04/11/18 15:04	1
cis-1,3-Dichloropropene	0.40	U	1.0	0.40	ug/L			04/11/18 15:04	1
Dibromochloromethane	0.32	U	1.0	0.32	ug/L			04/11/18 15:04	1
Dibromomethane	0.35	U	1.0	0.35	ug/L			04/11/18 15:04	1
Dichlorodifluoromethane	0.60	U	1.0	0.60	ug/L			04/11/18 15:04	1
2-Hexanone	2.0	U	10	2.0	ug/L			04/11/18 15:04	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			04/11/18 15:04	1
Isopropylbenzene	0.35	U	1.0	0.35	ug/L			04/11/18 15:04	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			04/11/18 15:04	1
4-Methyl-2-pentanone	2.1	U	10	2.1	ug/L			04/11/18 15:04	1
Methyl tert-butyl ether	0.30	U	10	0.30	ug/L			04/11/18 15:04	1
2-Butanone (MEK)	3.4	U	10	3.4	ug/L			04/11/18 15:04	1
1,2-Dibromoethane	0.44	U	1.0	0.44	ug/L			04/11/18 15:04	1
1,1,1,2-Tetrachloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 15:04	1
n-Butylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 15:04	1
1,1,2,2-Tetrachloroethane	0.62	U	1.0	0.62	ug/L			04/11/18 15:04	1
N-Propylbenzene	0.38	U	1.0	0.38	ug/L			04/11/18 15:04	1
p-Isopropyltoluene	0.48	U	1.0	0.48	ug/L			04/11/18 15:04	1
1,2,3-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			04/11/18 15:04	1
sec-Butylbenzene	0.42	U	1.0	0.42	ug/L			04/11/18 15:04	1
1,1,1-Trichloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 15:04	1
Styrene	0.27	U	1.0	0.27	ug/L			04/11/18 15:04	1
1,1,2-Trichloroethane	0.33	U	1.0	0.33	ug/L			04/11/18 15:04	1
tert-Butylbenzene	0.45	U	1.0	0.45	ug/L			04/11/18 15:04	1
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			04/11/18 15:04	1
Toluene	0.48	U	1.0	0.48	ug/L			04/11/18 15:04	1
1,2,4-Trimethylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 15:04	1
trans-1,2-Dichloroethene	0.37	U	1.0	0.37	ug/L			04/11/18 15:04	1
1,3,5-Trimethylbenzene	0.31	U	1.0	0.31	ug/L			04/11/18 15:04	1
trans-1,3-Dichloropropene	0.42	U	1.0	0.42	ug/L			04/11/18 15:04	1
Trichloroethene	0.48	U	1.0	0.48	ug/L			04/11/18 15:04	1
Trichlorofluoromethane	0.42	U	1.0	0.42	ug/L			04/11/18 15:04	1
o-Xylene	0.23	U	1.0	0.23	ug/L			04/11/18 15:04	1
Vinyl acetate	0.81	U	2.0	0.81	ug/L			04/11/18 15:04	1
m-Xylene & p-Xylene	0.35	U	1.0	0.35	ug/L			04/11/18 15:04	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			04/11/18 15:04	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			04/11/18 15:04	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*105*		*80 - 120*		*04/11/18 15:04*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*73 - 131*		*04/11/18 15:04*	*1*
Dibromofluoromethane (Surr)	*99*		*80 - 122*		*04/11/18 15:04*	*1*
4-Bromofluorobenzene (Surr)	*111*		*80 - 120*		*04/11/18 15:04*	*1*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519398/4
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Chlorotoluene	50.0	49.4		ug/L		99	80 - 120
4-Chlorotoluene	50.0	52.7		ug/L		105	80 - 120
Acetone	250	197		ug/L		79	68 - 132
1,2-Dibromo-3-Chloropropane	50.0	47.4		ug/L		95	74 - 120
Benzene	50.0	50.6		ug/L		101	80 - 120
Bromobenzene	50.0	48.9		ug/L		98	71 - 124
Bromochloromethane	50.0	48.3		ug/L		97	80 - 120
Bromoform	50.0	51.5		ug/L		103	52 - 122
1,1-Dichloroethane	50.0	46.9		ug/L		94	80 - 120
Bromodichloromethane	50.0	52.0		ug/L		104	80 - 120
1,2-Dichloroethane	50.0	51.6		ug/L		103	72 - 128
Bromomethane	50.0	50.1		ug/L		100	43 - 146
Carbon disulfide	50.0	44.3		ug/L		89	77 - 129
Carbon tetrachloride	50.0	51.0		ug/L		102	67 - 125
1,2-Dichloroethene, Total	100	97.2		ug/L		97	80 - 120
Chlorobenzene	50.0	49.4		ug/L		99	80 - 120
1,1-Dichloroethene	50.0	46.9		ug/L		94	80 - 120
Chloroethane	50.0	46.4		ug/L		93	48 - 145
1,2-Dichloropropane	50.0	49.6		ug/L		99	80 - 120
Chloroform	50.0	49.5		ug/L		99	80 - 120
1,3-Dichloropropane	50.0	52.4		ug/L		105	80 - 120
Chloromethane	50.0	43.9		ug/L		88	76 - 149
2,2-Dichloropropane	50.0	51.8		ug/L		104	80 - 135
cis-1,2-Dichloroethene	50.0	49.6		ug/L		99	80 - 120
1,1-Dichloropropene	50.0	47.4		ug/L		95	80 - 120
cis-1,3-Dichloropropene	50.0	51.7		ug/L		103	80 - 129
Dibromochloromethane	50.0	56.4		ug/L		113	68 - 120
Dibromomethane	50.0	49.4		ug/L		99	80 - 120
Dichlorodifluoromethane	50.0	46.5		ug/L		93	70 - 137
2-Hexanone	250	253		ug/L		101	80 - 131
Ethylbenzene	50.0	50.7		ug/L		101	80 - 120
Isopropylbenzene	50.0	52.1		ug/L		104	79 - 126
Methylene Chloride	50.0	44.7		ug/L		89	80 - 120
4-Methyl-2-pentanone	250	246		ug/L		98	80 - 134
Methyl tert-butyl ether	50.0	47.0		ug/L		94	80 - 122
2-Butanone (MEK)	250	237		ug/L		95	79 - 125
1,2-Dibromoethane	50.0	52.9		ug/L		106	75 - 126
1,1,1,2-Tetrachloroethane	50.0	50.7		ug/L		101	73 - 124
n-Butylbenzene	50.0	58.0		ug/L		116	75 - 132
1,1,2,2-Tetrachloroethane	50.0	46.6		ug/L		93	76 - 126
N-Propylbenzene	50.0	49.4		ug/L		99	80 - 125
p-Isopropyltoluene	50.0	55.6		ug/L		111	80 - 120
1,2,3-Trichlorobenzene	50.0	55.3		ug/L		111	70 - 125
sec-Butylbenzene	50.0	52.5		ug/L		105	80 - 120
1,1,1-Trichloroethane	50.0	49.1		ug/L		98	80 - 120
Styrene	50.0	51.7		ug/L		103	80 - 126
1,1,2-Trichloroethane	50.0	53.0		ug/L		106	80 - 120
tert-Butylbenzene	50.0	51.0		ug/L		102	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519398/4
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Tetrachloroethene	50.0	53.0		ug/L		106	71 - 123
Toluene	50.0	53.4		ug/L		107	80 - 120
1,2,4-Trimethylbenzene	50.0	51.6		ug/L		103	80 - 120
trans-1,2-Dichloroethene	50.0	47.6		ug/L		95	80 - 120
1,3,5-Trimethylbenzene	50.0	53.2		ug/L		106	80 - 120
trans-1,3-Dichloropropene	50.0	55.6		ug/L		111	80 - 128
Trichloroethene	50.0	48.7		ug/L		97	80 - 120
Trichlorofluoromethane	50.0	50.3		ug/L		101	58 - 127
o-Xylene	50.0	51.8		ug/L		104	80 - 120
Vinyl acetate	100	99.5		ug/L		100	74 - 156
m-Xylene & p-Xylene	50.0	51.7		ug/L		103	80 - 120
Vinyl chloride	50.0	46.5		ug/L		93	80 - 129
Xylenes, Total	100	104		ug/L		104	80 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*91*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*100*		*73 - 131*
Dibromofluoromethane (Surr)	*99*		*80 - 122*
4-Bromofluorobenzene (Surr)	*106*		*80 - 120*

Lab Sample ID: LCSD 680-519398/5
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2-Chlorotoluene	50.0	48.6		ug/L		97	80 - 120	1	20
4-Chlorotoluene	50.0	51.8		ug/L		104	80 - 120	2	20
Acetone	250	194		ug/L		77	68 - 132	2	30
1,2-Dibromo-3-Chloropropane	50.0	47.1		ug/L		94	74 - 120	1	20
Benzene	50.0	47.4		ug/L		95	80 - 120	7	20
Bromobenzene	50.0	47.5		ug/L		95	71 - 124	3	20
Bromochloromethane	50.0	49.2		ug/L		98	80 - 120	2	20
Bromoform	50.0	47.1		ug/L		94	52 - 122	9	20
1,1-Dichloroethane	50.0	52.4		ug/L		105	80 - 120	11	20
Bromodichloromethane	50.0	50.4		ug/L		101	80 - 120	3	20
1,2-Dichloroethane	50.0	46.9		ug/L		94	72 - 128	10	50
Bromomethane	50.0	49.8		ug/L		100	43 - 146	1	20
Carbon disulfide	50.0	47.8		ug/L		96	77 - 129	8	20
Carbon tetrachloride	50.0	52.8		ug/L		106	67 - 125	4	20
1,2-Dichloroethene, Total	100	106		ug/L		106	80 - 120	9	20
Chlorobenzene	50.0	49.9		ug/L		100	80 - 120	1	20
1,1-Dichloroethene	50.0	47.8		ug/L		96	80 - 120	2	20
Chloroethane	50.0	46.2		ug/L		92	48 - 145	0	20
1,2-Dichloropropane	50.0	47.4		ug/L		95	80 - 120	5	20
Chloroform	50.0	51.0		ug/L		102	80 - 120	3	20
1,3-Dichloropropane	50.0	50.8		ug/L		102	80 - 120	3	20
Chloromethane	50.0	41.4		ug/L		83	76 - 149	6	30
2,2-Dichloropropane	50.0	54.5		ug/L		109	80 - 135	5	20

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519398/5
Matrix: Water
Analysis Batch: 519398

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene	50.0	53.1		ug/L		106	80 - 120	7	20
1,1-Dichloropropene	50.0	46.2		ug/L		92	80 - 120	2	20
cis-1,3-Dichloropropene	50.0	48.9		ug/L		98	80 - 129	5	20
Dibromochloromethane	50.0	53.8		ug/L		108	68 - 120	5	20
Dibromomethane	50.0	49.7		ug/L		99	80 - 120	0	20
Dichlorodifluoromethane	50.0	48.3		ug/L		97	70 - 137	4	40
2-Hexanone	250	235		ug/L		94	80 - 131	7	20
Ethylbenzene	50.0	51.0		ug/L		102	80 - 120	1	20
Isopropylbenzene	50.0	47.4		ug/L		95	79 - 126	9	20
Methylene Chloride	50.0	47.6		ug/L		95	80 - 120	6	20
4-Methyl-2-pentanone	250	197	*	ug/L		79	80 - 134	22	20
Methyl tert-butyl ether	50.0	51.3		ug/L		103	80 - 122	9	20
2-Butanone (MEK)	250	237		ug/L		95	79 - 125	0	20
1,2-Dibromoethane	50.0	50.3		ug/L		101	75 - 126	5	20
1,1,1,2-Tetrachloroethane	50.0	50.5		ug/L		101	73 - 124	0	20
n-Butylbenzene	50.0	51.1		ug/L		102	75 - 132	13	20
1,1,2,2-Tetrachloroethane	50.0	47.1		ug/L		94	76 - 126	1	20
N-Propylbenzene	50.0	51.9		ug/L		104	80 - 125	5	20
p-Isopropyltoluene	50.0	52.9		ug/L		106	80 - 120	5	20
1,2,3-Trichlorobenzene	50.0	52.8		ug/L		106	70 - 125	5	20
sec-Butylbenzene	50.0	54.6		ug/L		109	80 - 120	4	20
1,1,1-Trichloroethane	50.0	52.6		ug/L		105	80 - 120	7	20
Styrene	50.0	49.2		ug/L		98	80 - 126	5	20
1,1,2-Trichloroethane	50.0	51.7		ug/L		103	80 - 120	2	20
tert-Butylbenzene	50.0	50.2		ug/L		100	80 - 120	2	20
Tetrachloroethene	50.0	52.7		ug/L		105	71 - 123	1	20
Toluene	50.0	51.3		ug/L		103	80 - 120	4	20
1,2,4-Trimethylbenzene	50.0	52.6		ug/L		105	80 - 120	2	20
trans-1,2-Dichloroethene	50.0	52.7		ug/L		105	80 - 120	10	20
1,3,5-Trimethylbenzene	50.0	51.8		ug/L		104	80 - 120	3	20
trans-1,3-Dichloropropene	50.0	54.4		ug/L		109	80 - 128	2	30
Trichloroethene	50.0	49.1		ug/L		98	80 - 120	1	20
Trichlorofluoromethane	50.0	48.7		ug/L		97	58 - 127	3	20
o-Xylene	50.0	50.3		ug/L		101	80 - 120	3	30
Vinyl acetate	100	109		ug/L		109	74 - 156	9	20
m-Xylene & p-Xylene	50.0	50.5		ug/L		101	80 - 120	2	20
Vinyl chloride	50.0	44.2		ug/L		88	80 - 129	5	20
Xylenes, Total	100	101		ug/L		101	80 - 120	3	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*94*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*89*		*73 - 131*
Dibromofluoromethane (Surr)	*103*		*80 - 122*
4-Bromofluorobenzene (Surr)	*97*		*80 - 120*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519536/9
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	0.27	U	1.0	0.27	ug/L			04/11/18 12:22	1
4-Chlorotoluene	0.45	U	1.0	0.45	ug/L			04/11/18 12:22	1
Acetone	7.0	U	10	7.0	ug/L			04/11/18 12:22	1
1,2-Dibromo-3-Chloropropane	1.1	U	5.0	1.1	ug/L			04/11/18 12:22	1
Benzene	0.43	U	1.0	0.43	ug/L			04/11/18 12:22	1
Bromobenzene	0.50	U	1.0	0.50	ug/L			04/11/18 12:22	1
Bromochloromethane	0.45	U	1.0	0.45	ug/L			04/11/18 12:22	1
Bromoform	0.43	U	1.0	0.43	ug/L			04/11/18 12:22	1
1,1-Dichloroethane	0.38	U	1.0	0.38	ug/L			04/11/18 12:22	1
Bromodichloromethane	0.44	U	1.0	0.44	ug/L			04/11/18 12:22	1
1,2-Dichloroethane	0.50	U	1.0	0.50	ug/L			04/11/18 12:22	1
Bromomethane	2.5	U	5.0	2.5	ug/L			04/11/18 12:22	1
Carbon disulfide	1.0	U	2.0	1.0	ug/L			04/11/18 12:22	1
Carbon tetrachloride	0.33	U	1.0	0.33	ug/L			04/11/18 12:22	1
1,2-Dichloroethene, Total	0.37	U	2.0	0.37	ug/L			04/11/18 12:22	1
Chlorobenzene	0.26	U	1.0	0.26	ug/L			04/11/18 12:22	1
1,1-Dichloroethene	0.36	U	1.0	0.36	ug/L			04/11/18 12:22	1
Chloroethane	2.5	U	5.0	2.5	ug/L			04/11/18 12:22	1
1,2-Dichloropropane	0.67	U	1.0	0.67	ug/L			04/11/18 12:22	1
Chloroform	0.50	U	1.0	0.50	ug/L			04/11/18 12:22	1
1,3-Dichloropropane	0.34	U	1.0	0.34	ug/L			04/11/18 12:22	1
Chloromethane	0.40	U	1.0	0.40	ug/L			04/11/18 12:22	1
2,2-Dichloropropane	0.37	U	1.0	0.37	ug/L			04/11/18 12:22	1
cis-1,2-Dichloroethene	0.41	U	1.0	0.41	ug/L			04/11/18 12:22	1
1,1-Dichloropropene	0.34	U	1.0	0.34	ug/L			04/11/18 12:22	1
cis-1,3-Dichloropropene	0.40	U	1.0	0.40	ug/L			04/11/18 12:22	1
Dibromochloromethane	0.32	U	1.0	0.32	ug/L			04/11/18 12:22	1
Dibromomethane	0.35	U	1.0	0.35	ug/L			04/11/18 12:22	1
Dichlorodifluoromethane	0.60	U	1.0	0.60	ug/L			04/11/18 12:22	1
2-Hexanone	2.0	U	10	2.0	ug/L			04/11/18 12:22	1
Ethylbenzene	0.33	U	1.0	0.33	ug/L			04/11/18 12:22	1
Isopropylbenzene	0.35	U	1.0	0.35	ug/L			04/11/18 12:22	1
Methylene Chloride	2.5	U	5.0	2.5	ug/L			04/11/18 12:22	1
4-Methyl-2-pentanone	2.1	U	10	2.1	ug/L			04/11/18 12:22	1
Methyl tert-butyl ether	0.30	U	10	0.30	ug/L			04/11/18 12:22	1
2-Butanone (MEK)	3.4	U	10	3.4	ug/L			04/11/18 12:22	1
1,2-Dibromoethane	0.44	U	1.0	0.44	ug/L			04/11/18 12:22	1
1,1,1,2-Tetrachloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 12:22	1
n-Butylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 12:22	1
1,1,2,2-Tetrachloroethane	0.62	U	1.0	0.62	ug/L			04/11/18 12:22	1
N-Propylbenzene	0.38	U	1.0	0.38	ug/L			04/11/18 12:22	1
p-Isopropyltoluene	0.48	U	1.0	0.48	ug/L			04/11/18 12:22	1
1,2,3-Trichlorobenzene	2.5	U	5.0	2.5	ug/L			04/11/18 12:22	1
sec-Butylbenzene	0.42	U	1.0	0.42	ug/L			04/11/18 12:22	1
1,1,1-Trichloroethane	0.37	U	1.0	0.37	ug/L			04/11/18 12:22	1
Styrene	0.27	U	1.0	0.27	ug/L			04/11/18 12:22	1
1,1,2-Trichloroethane	0.33	U	1.0	0.33	ug/L			04/11/18 12:22	1
tert-Butylbenzene	0.45	U	1.0	0.45	ug/L			04/11/18 12:22	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519536/9
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tetrachloroethene	0.74	U	1.0	0.74	ug/L			04/11/18 12:22	1
Toluene	0.48	U	1.0	0.48	ug/L			04/11/18 12:22	1
1,2,4-Trimethylbenzene	0.47	U	1.0	0.47	ug/L			04/11/18 12:22	1
trans-1,2-Dichloroethene	0.37	U	1.0	0.37	ug/L			04/11/18 12:22	1
1,3,5-Trimethylbenzene	0.31	U	1.0	0.31	ug/L			04/11/18 12:22	1
trans-1,3-Dichloropropene	0.42	U	1.0	0.42	ug/L			04/11/18 12:22	1
Trichloroethene	0.48	U	1.0	0.48	ug/L			04/11/18 12:22	1
Trichlorofluoromethane	0.42	U	1.0	0.42	ug/L			04/11/18 12:22	1
o-Xylene	0.23	U	1.0	0.23	ug/L			04/11/18 12:22	1
Vinyl acetate	0.81	U	2.0	0.81	ug/L			04/11/18 12:22	1
m-Xylene & p-Xylene	0.35	U	1.0	0.35	ug/L			04/11/18 12:22	1
Vinyl chloride	0.50	U	1.0	0.50	ug/L			04/11/18 12:22	1
Xylenes, Total	0.23	U	1.0	0.23	ug/L			04/11/18 12:22	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*103*		*80 - 120*		*04/11/18 12:22*	*1*
1,2-Dichloroethane-d4 (Surr)	*83*		*73 - 131*		*04/11/18 12:22*	*1*
Dibromofluoromethane (Surr)	*94*		*80 - 122*		*04/11/18 12:22*	*1*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*		*04/11/18 12:22*	*1*

Lab Sample ID: LCS 680-519536/5
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Chlorotoluene	50.0	51.5		ug/L		103	80 - 120
4-Chlorotoluene	50.0	51.9		ug/L		104	80 - 120
Acetone	250	248		ug/L		99	68 - 132
1,2-Dibromo-3-Chloropropane	50.0	56.3		ug/L		113	74 - 120
Benzene	50.0	50.7		ug/L		101	80 - 120
Bromobenzene	50.0	54.1		ug/L		108	71 - 124
Bromochloromethane	50.0	51.3		ug/L		103	80 - 120
Bromoform	50.0	54.4		ug/L		109	52 - 122
1,1-Dichloroethane	50.0	49.4		ug/L		99	80 - 120
Bromodichloromethane	50.0	51.0		ug/L		102	80 - 120
1,2-Dichloroethane	50.0	47.2		ug/L		94	72 - 128
Bromomethane	50.0	41.8		ug/L		84	43 - 146
Carbon disulfide	50.0	46.9		ug/L		94	77 - 129
Carbon tetrachloride	50.0	50.7		ug/L		101	67 - 125
1,2-Dichloroethene, Total	100	101		ug/L		101	80 - 120
Chlorobenzene	50.0	53.0		ug/L		106	80 - 120
1,1-Dichloroethene	50.0	50.3		ug/L		101	80 - 120
Chloroethane	50.0	49.1		ug/L		98	48 - 145
1,2-Dichloropropane	50.0	51.1		ug/L		102	80 - 120
Chloroform	50.0	49.3		ug/L		99	80 - 120
1,3-Dichloropropane	50.0	51.2		ug/L		102	80 - 120
Chloromethane	50.0	44.8		ug/L		90	76 - 149
2,2-Dichloropropane	50.0	52.1		ug/L		104	80 - 135

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519536/5
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
cis-1,2-Dichloroethene	50.0	50.8		ug/L		102	80 - 120
1,1-Dichloropropene	50.0	49.0		ug/L		98	80 - 120
cis-1,3-Dichloropropene	50.0	53.4		ug/L		107	80 - 129
Dibromochloromethane	50.0	53.3		ug/L		107	68 - 120
Dibromomethane	50.0	50.8		ug/L		102	80 - 120
Dichlorodifluoromethane	50.0	41.7		ug/L		83	70 - 137
2-Hexanone	250	260		ug/L		104	80 - 131
Ethylbenzene	50.0	52.2		ug/L		104	80 - 120
Isopropylbenzene	50.0	52.9		ug/L		106	79 - 126
Methylene Chloride	50.0	52.6		ug/L		105	80 - 120
4-Methyl-2-pentanone	250	258		ug/L		103	80 - 134
Methyl tert-butyl ether	50.0	50.4		ug/L		101	80 - 122
2-Butanone (MEK)	250	277		ug/L		111	79 - 125
1,2-Dibromoethane	50.0	51.3		ug/L		103	75 - 126
1,1,1,2-Tetrachloroethane	50.0	54.3		ug/L		109	73 - 124
n-Butylbenzene	50.0	51.5		ug/L		103	75 - 132
1,1,2,2-Tetrachloroethane	50.0	53.8		ug/L		108	76 - 126
N-Propylbenzene	50.0	52.3		ug/L		105	80 - 125
p-Isopropyltoluene	50.0	52.2		ug/L		104	80 - 120
1,2,3-Trichlorobenzene	50.0	53.2		ug/L		106	70 - 125
sec-Butylbenzene	50.0	53.2		ug/L		106	80 - 120
1,1,1-Trichloroethane	50.0	49.2		ug/L		98	80 - 120
Styrene	50.0	54.1		ug/L		108	80 - 126
1,1,2-Trichloroethane	50.0	51.2		ug/L		102	80 - 120
tert-Butylbenzene	50.0	53.8		ug/L		108	80 - 120
Tetrachloroethene	50.0	52.5		ug/L		105	71 - 123
Toluene	50.0	51.9		ug/L		104	80 - 120
1,2,4-Trimethylbenzene	50.0	52.8		ug/L		106	80 - 120
trans-1,2-Dichloroethene	50.0	49.9		ug/L		100	80 - 120
1,3,5-Trimethylbenzene	50.0	53.1		ug/L		106	80 - 120
trans-1,3-Dichloropropene	50.0	52.2		ug/L		104	80 - 128
Trichloroethene	50.0	52.5		ug/L		105	80 - 120
Trichlorofluoromethane	50.0	45.4		ug/L		91	58 - 127
o-Xylene	50.0	52.1		ug/L		104	80 - 120
Vinyl acetate	100	109		ug/L		109	74 - 156
m-Xylene & p-Xylene	50.0	52.4		ug/L		105	80 - 120
Vinyl chloride	50.0	46.2		ug/L		92	80 - 129
Xylenes, Total	100	105		ug/L		105	80 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*104*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*93*		*73 - 131*
Dibromofluoromethane (Surr)	*103*		*80 - 122*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519536/6
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2-Chlorotoluene	50.0	46.4		ug/L		93	80 - 120	10	20
4-Chlorotoluene	50.0	46.6		ug/L		93	80 - 120	11	20
Acetone	250	220		ug/L		88	68 - 132	12	30
1,2-Dibromo-3-Chloropropane	50.0	48.5		ug/L		97	74 - 120	15	20
Benzene	50.0	45.7		ug/L		91	80 - 120	10	20
Bromobenzene	50.0	48.2		ug/L		96	71 - 124	12	20
Bromochloromethane	50.0	46.9		ug/L		94	80 - 120	9	20
Bromoform	50.0	48.2		ug/L		96	52 - 122	12	20
1,1-Dichloroethane	50.0	45.0		ug/L		90	80 - 120	9	20
Bromodichloromethane	50.0	46.3		ug/L		93	80 - 120	10	20
1,2-Dichloroethane	50.0	42.7		ug/L		85	72 - 128	10	50
Bromomethane	50.0	40.8		ug/L		82	43 - 146	2	20
Carbon disulfide	50.0	41.8		ug/L		84	77 - 129	11	20
Carbon tetrachloride	50.0	44.0		ug/L		88	67 - 125	14	20
1,2-Dichloroethene, Total	100	90.4		ug/L		90	80 - 120	11	20
Chlorobenzene	50.0	48.1		ug/L		96	80 - 120	10	20
1,1-Dichloroethene	50.0	44.1		ug/L		88	80 - 120	13	20
Chloroethane	50.0	44.8		ug/L		90	48 - 145	9	20
1,2-Dichloropropane	50.0	46.3		ug/L		93	80 - 120	10	20
Chloroform	50.0	44.8		ug/L		90	80 - 120	10	20
1,3-Dichloropropane	50.0	46.7		ug/L		93	80 - 120	9	20
Chloromethane	50.0	39.8		ug/L		80	76 - 149	12	30
2,2-Dichloropropane	50.0	46.4		ug/L		93	80 - 135	12	20
cis-1,2-Dichloroethene	50.0	45.3		ug/L		91	80 - 120	11	20
1,1-Dichloropropene	50.0	43.4		ug/L		87	80 - 120	12	20
cis-1,3-Dichloropropene	50.0	48.1		ug/L		96	80 - 129	10	20
Dibromochloromethane	50.0	48.2		ug/L		96	68 - 120	10	20
Dibromomethane	50.0	46.6		ug/L		93	80 - 120	9	20
Dichlorodifluoromethane	50.0	35.2		ug/L		70	70 - 137	17	40
2-Hexanone	250	227		ug/L		91	80 - 131	13	20
Ethylbenzene	50.0	46.0		ug/L		92	80 - 120	12	20
Isopropylbenzene	50.0	46.9		ug/L		94	79 - 126	12	20
Methylene Chloride	50.0	47.9		ug/L		96	80 - 120	9	20
4-Methyl-2-pentanone	250	226		ug/L		91	80 - 134	13	20
Methyl tert-butyl ether	50.0	45.3		ug/L		91	80 - 122	11	20
2-Butanone (MEK)	250	245		ug/L		98	79 - 125	12	20
1,2-Dibromoethane	50.0	46.3		ug/L		93	75 - 126	10	20
1,1,1,2-Tetrachloroethane	50.0	48.7		ug/L		97	73 - 124	11	20
n-Butylbenzene	50.0	45.5		ug/L		91	75 - 132	12	20
1,1,2,2-Tetrachloroethane	50.0	47.3		ug/L		95	76 - 126	13	20
N-Propylbenzene	50.0	46.4		ug/L		93	80 - 125	12	20
p-Isopropyltoluene	50.0	45.7		ug/L		91	80 - 120	13	20
1,2,3-Trichlorobenzene	50.0	49.8		ug/L		100	70 - 125	7	20
sec-Butylbenzene	50.0	46.3		ug/L		93	80 - 120	14	20
1,1,1-Trichloroethane	50.0	42.8		ug/L		86	80 - 120	14	20
Styrene	50.0	48.7		ug/L		97	80 - 126	10	20
1,1,2-Trichloroethane	50.0	46.5		ug/L		93	80 - 120	9	20
tert-Butylbenzene	50.0	46.5		ug/L		93	80 - 120	14	20

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519536/6
Matrix: Water
Analysis Batch: 519536

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Tetrachloroethene			50.0	47.2		ug/L		94	71 - 123	11	20
Toluene			50.0	46.8		ug/L		94	80 - 120	10	20
1,2,4-Trimethylbenzene			50.0	47.1		ug/L		94	80 - 120	11	20
trans-1,2-Dichloroethene			50.0	45.1		ug/L		90	80 - 120	10	20
1,3,5-Trimethylbenzene			50.0	47.2		ug/L		94	80 - 120	12	20
trans-1,3-Dichloropropene			50.0	47.5		ug/L		95	80 - 128	9	30
Trichloroethene			50.0	47.3		ug/L		95	80 - 120	10	20
Trichlorofluoromethane			50.0	39.5		ug/L		79	58 - 127	14	20
o-Xylene			50.0	46.3		ug/L		93	80 - 120	12	30
Vinyl acetate			100	102		ug/L		102	74 - 156	7	20
m-Xylene & p-Xylene			50.0	47.3		ug/L		95	80 - 120	10	20
Vinyl chloride			50.0	40.2		ug/L		80	80 - 129	14	20
Xylenes, Total			100	93.6		ug/L		94	80 - 120	11	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*92*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*84*		*73 - 131*
Dibromofluoromethane (Surr)	*94*		*80 - 122*
4-Bromofluorobenzene (Surr)	*90*		*80 - 120*

Lab Sample ID: MB 680-519580/11
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorotoluene	2.0	U	5.0	2.0	ug/Kg			04/11/18 14:56	1
4-Chlorotoluene	1.7	U	5.0	1.7	ug/Kg			04/11/18 14:56	1
Acetone	11	U	50	11	ug/Kg			04/11/18 14:56	1
1,2-Dibromo-3-Chloropropane	4.4	U	10	4.4	ug/Kg			04/11/18 14:56	1
Benzene	0.73	U	5.0	0.73	ug/Kg			04/11/18 14:56	1
Bromobenzene	1.7	U	5.0	1.7	ug/Kg			04/11/18 14:56	1
Bromochloromethane	3.3	U	5.0	3.3	ug/Kg			04/11/18 14:56	1
Bromoform	1.5	U	5.0	1.5	ug/Kg			04/11/18 14:56	1
1,1-Dichloroethane	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1
Bromodichloromethane	0.97	U	5.0	0.97	ug/Kg			04/11/18 14:56	1
1,2-Dichloroethane	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1
Bromomethane	1.5	U	5.0	1.5	ug/Kg			04/11/18 14:56	1
Carbon disulfide	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1
Carbon tetrachloride	0.83	U	5.0	0.83	ug/Kg			04/11/18 14:56	1
1,2-Dichloroethene, Total	0.63	U	10	0.63	ug/Kg			04/11/18 14:56	1
Chlorobenzene	0.96	U	5.0	0.96	ug/Kg			04/11/18 14:56	1
1,1-Dichloroethene	1.5	U	5.0	1.5	ug/Kg			04/11/18 14:56	1
Chloroethane	2.7	U	5.0	2.7	ug/Kg			04/11/18 14:56	1
1,2-Dichloropropane	0.86	U	5.0	0.86	ug/Kg			04/11/18 14:56	1
Chloroform	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1
1,3-Dichloropropane	1.8	U	5.0	1.8	ug/Kg			04/11/18 14:56	1
Chloromethane	1.0	U	5.0	1.0	ug/Kg			04/11/18 14:56	1
2,2-Dichloropropane	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519580/11
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	1.4	U	5.0	1.4	ug/Kg			04/11/18 14:56	1
1,1-Dichloropropene	0.95	U	5.0	0.95	ug/Kg			04/11/18 14:56	1
cis-1,3-Dichloropropene	0.83	U	5.0	0.83	ug/Kg			04/11/18 14:56	1
Dibromochloromethane	1.7	U	5.0	1.7	ug/Kg			04/11/18 14:56	1
Dibromomethane	1.7	U	5.0	1.7	ug/Kg			04/11/18 14:56	1
Dichlorodifluoromethane	0.94	U	5.0	0.94	ug/Kg			04/11/18 14:56	1
2-Hexanone	3.3	U	25	3.3	ug/Kg			04/11/18 14:56	1
Ethylbenzene	1.3	U	5.0	1.3	ug/Kg			04/11/18 14:56	1
Isopropylbenzene	1.9	U	5.0	1.9	ug/Kg			04/11/18 14:56	1
Methylene Chloride	0.98	U	5.0	0.98	ug/Kg			04/11/18 14:56	1
4-Methyl-2-pentanone	4.2	U	25	4.2	ug/Kg			04/11/18 14:56	1
Methyl tert-butyl ether	1.0	U	5.0	1.0	ug/Kg			04/11/18 14:56	1
2-Butanone (MEK)	2.4	U	25	2.4	ug/Kg			04/11/18 14:56	1
1,2-Dibromoethane	1.5	U	5.0	1.5	ug/Kg			04/11/18 14:56	1
1,1,1,2-Tetrachloroethane	2.4	U	5.0	2.4	ug/Kg			04/11/18 14:56	1
n-Butylbenzene	2.4	U	5.0	2.4	ug/Kg			04/11/18 14:56	1
1,1,2,2-Tetrachloroethane	1.6	U	5.0	1.6	ug/Kg			04/11/18 14:56	1
N-Propylbenzene	2.7	U	5.0	2.7	ug/Kg			04/11/18 14:56	1
p-Isopropyltoluene	2.2	U	5.0	2.2	ug/Kg			04/11/18 14:56	1
1,2,3-Trichlorobenzene	1.6	U	5.0	1.6	ug/Kg			04/11/18 14:56	1
sec-Butylbenzene	2.1	U	5.0	2.1	ug/Kg			04/11/18 14:56	1
1,1,1-Trichloroethane	0.59	U	5.0	0.59	ug/Kg			04/11/18 14:56	1
Styrene	0.93	U	5.0	0.93	ug/Kg			04/11/18 14:56	1
1,1,2-Trichloroethane	1.3	U	5.0	1.3	ug/Kg			04/11/18 14:56	1
tert-Butylbenzene	1.8	U	5.0	1.8	ug/Kg			04/11/18 14:56	1
Tetrachloroethene	1.9	U	5.0	1.9	ug/Kg			04/11/18 14:56	1
Toluene	0.84	U	5.0	0.84	ug/Kg			04/11/18 14:56	1
1,2,4-Trimethylbenzene	1.4	U	5.0	1.4	ug/Kg			04/11/18 14:56	1
trans-1,2-Dichloroethene	0.63	U	5.0	0.63	ug/Kg			04/11/18 14:56	1
1,3,5-Trimethylbenzene	1.7	U	5.0	1.7	ug/Kg			04/11/18 14:56	1
trans-1,3-Dichloropropene	0.87	U	5.0	0.87	ug/Kg			04/11/18 14:56	1
Trichloroethene	1.3	U	5.0	1.3	ug/Kg			04/11/18 14:56	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/Kg			04/11/18 14:56	1
o-Xylene	1.1	U	5.0	1.1	ug/Kg			04/11/18 14:56	1
Vinyl acetate	2.5	U	10	2.5	ug/Kg			04/11/18 14:56	1
m-Xylene & p-Xylene	2.6	U	5.0	2.6	ug/Kg			04/11/18 14:56	1
Vinyl chloride	1.5	U	5.0	1.5	ug/Kg			04/11/18 14:56	1
Xylenes, Total	1.1	U	10	1.1	ug/Kg			04/11/18 14:56	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*94*		*70 - 130*		*04/11/18 14:56*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*70 - 130*		*04/11/18 14:56*	*1*
Dibromofluoromethane (Surr)	*99*		*70 - 130*		*04/11/18 14:56*	*1*
4-Bromofluorobenzene (Surr)	*99*		*70 - 130*		*04/11/18 14:56*	*1*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519580/4
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Chlorotoluene	50.0	47.8		ug/Kg		96	70 - 130
4-Chlorotoluene	50.0	47.4		ug/Kg		95	70 - 130
Acetone	250	223		ug/Kg		89	40 - 160
1,2-Dibromo-3-Chloropropane	50.0	48.7		ug/Kg		97	40 - 160
Benzene	50.0	47.7		ug/Kg		95	70 - 130
Bromobenzene	50.0	48.9		ug/Kg		98	70 - 130
Bromochloromethane	50.0	46.7		ug/Kg		93	70 - 130
Bromoform	50.0	49.1		ug/Kg		98	70 - 130
1,1-Dichloroethane	50.0	47.3		ug/Kg		95	70 - 130
Bromodichloromethane	50.0	46.5		ug/Kg		93	70 - 130
1,2-Dichloroethane	50.0	46.7		ug/Kg		93	70 - 130
Bromomethane	50.0	43.8		ug/Kg		88	40 - 160
Carbon disulfide	50.0	44.0		ug/Kg		88	40 - 160
Carbon tetrachloride	50.0	46.6		ug/Kg		93	70 - 130
1,2-Dichloroethene, Total	100	92.6		ug/Kg		93	70 - 130
Chlorobenzene	50.0	47.7		ug/Kg		95	70 - 130
1,1-Dichloroethene	50.0	42.6		ug/Kg		85	70 - 130
Chloroethane	50.0	44.2		ug/Kg		88	40 - 160
1,2-Dichloropropane	50.0	47.9		ug/Kg		96	70 - 130
Chloroform	50.0	45.5		ug/Kg		91	70 - 130
1,3-Dichloropropane	50.0	49.2		ug/Kg		98	70 - 130
Chloromethane	50.0	50.4		ug/Kg		101	40 - 160
2,2-Dichloropropane	50.0	46.4		ug/Kg		93	70 - 130
cis-1,2-Dichloroethene	50.0	48.2		ug/Kg		96	70 - 130
1,1-Dichloropropene	50.0	47.0		ug/Kg		94	70 - 130
cis-1,3-Dichloropropene	50.0	46.2		ug/Kg		92	70 - 130
Dibromochloromethane	50.0	48.3		ug/Kg		97	70 - 130
Dibromomethane	50.0	47.4		ug/Kg		95	70 - 130
Dichlorodifluoromethane	50.0	53.1		ug/Kg		106	40 - 160
2-Hexanone	250	263		ug/Kg		105	40 - 160
Ethylbenzene	50.0	48.4		ug/Kg		97	70 - 130
Isopropylbenzene	50.0	47.3		ug/Kg		95	70 - 130
Methylene Chloride	50.0	43.4		ug/Kg		87	70 - 130
4-Methyl-2-pentanone	250	265		ug/Kg		106	40 - 160
Methyl tert-butyl ether	50.0	46.0		ug/Kg		92	70 - 130
2-Butanone (MEK)	250	236		ug/Kg		94	40 - 160
1,2-Dibromoethane	50.0	49.4		ug/Kg		99	70 - 130
1,1,1,2-Tetrachloroethane	50.0	48.9		ug/Kg		98	70 - 130
n-Butylbenzene	50.0	46.7		ug/Kg		93	70 - 130
1,1,2,2-Tetrachloroethane	50.0	46.7		ug/Kg		93	70 - 130
N-Propylbenzene	50.0	47.4		ug/Kg		95	70 - 130
p-Isopropyltoluene	50.0	47.4		ug/Kg		95	70 - 130
1,2,3-Trichlorobenzene	50.0	48.7		ug/Kg		97	70 - 130
sec-Butylbenzene	50.0	47.7		ug/Kg		95	70 - 130
1,1,1-Trichloroethane	50.0	46.3		ug/Kg		93	70 - 130
Styrene	50.0	50.8		ug/Kg		102	70 - 130
1,1,2-Trichloroethane	50.0	47.3		ug/Kg		95	70 - 130
tert-Butylbenzene	50.0	48.1		ug/Kg		96	70 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519580/4
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Tetrachloroethene	50.0	48.7		ug/Kg		97	70 - 130
Toluene	50.0	49.3		ug/Kg		99	70 - 130
1,2,4-Trimethylbenzene	50.0	49.2		ug/Kg		98	70 - 130
trans-1,2-Dichloroethene	50.0	44.4		ug/Kg		89	70 - 130
1,3,5-Trimethylbenzene	50.0	48.6		ug/Kg		97	70 - 130
trans-1,3-Dichloropropene	50.0	48.6		ug/Kg		97	70 - 130
Trichloroethene	50.0	47.7		ug/Kg		95	70 - 130
Trichlorofluoromethane	50.0	40.7		ug/Kg		81	40 - 160
o-Xylene	50.0	47.3		ug/Kg		95	70 - 130
Vinyl acetate	100	99.8		ug/Kg		100	70 - 130
m-Xylene & p-Xylene	50.0	47.8		ug/Kg		96	70 - 130
Vinyl chloride	50.0	50.3		ug/Kg		101	70 - 130
Xylenes, Total	100	95.1		ug/Kg		95	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*95*		*70 - 130*
1,2-Dichloroethane-d4 (Surr)	*90*		*70 - 130*
Dibromofluoromethane (Surr)	*93*		*70 - 130*
4-Bromofluorobenzene (Surr)	*93*		*70 - 130*

Lab Sample ID: LCSD 680-519580/5
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2-Chlorotoluene	50.0	45.6		ug/Kg		91	70 - 130	5	20
4-Chlorotoluene	50.0	45.9		ug/Kg		92	70 - 130	3	20
Acetone	250	225		ug/Kg		90	40 - 160	1	20
1,2-Dibromo-3-Chloropropane	50.0	47.4		ug/Kg		95	40 - 160	3	20
Benzene	50.0	46.3		ug/Kg		93	70 - 130	3	20
Bromobenzene	50.0	46.4		ug/Kg		93	70 - 130	5	20
Bromochloromethane	50.0	45.5		ug/Kg		91	70 - 130	3	20
Bromoform	50.0	47.8		ug/Kg		96	70 - 130	3	20
1,1-Dichloroethane	50.0	46.2		ug/Kg		92	70 - 130	2	20
Bromodichloromethane	50.0	44.6		ug/Kg		89	70 - 130	4	20
1,2-Dichloroethane	50.0	46.0		ug/Kg		92	70 - 130	2	20
Bromomethane	50.0	43.5		ug/Kg		87	40 - 160	1	20
Carbon disulfide	50.0	42.7		ug/Kg		85	40 - 160	3	20
Carbon tetrachloride	50.0	45.7		ug/Kg		91	70 - 130	2	20
1,2-Dichloroethene, Total	100	89.3		ug/Kg		89	70 - 130	4	20
Chlorobenzene	50.0	45.7		ug/Kg		91	70 - 130	4	20
1,1-Dichloroethene	50.0	41.9		ug/Kg		84	70 - 130	2	20
Chloroethane	50.0	45.2		ug/Kg		90	40 - 160	2	20
1,2-Dichloropropane	50.0	46.5		ug/Kg		93	70 - 130	3	20
Chloroform	50.0	44.1		ug/Kg		88	70 - 130	3	20
1,3-Dichloropropane	50.0	47.9		ug/Kg		96	70 - 130	3	20
Chloromethane	50.0	48.7		ug/Kg		97	40 - 160	3	20
2,2-Dichloropropane	50.0	45.0		ug/Kg		90	70 - 130	3	20

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519580/5
Matrix: Solid
Analysis Batch: 519580

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene			50.0	46.1		ug/Kg		92	70 - 130	5	20
1,1-Dichloropropene			50.0	45.5		ug/Kg		91	70 - 130	3	20
cis-1,3-Dichloropropene			50.0	44.3		ug/Kg		89	70 - 130	4	20
Dibromochloromethane			50.0	47.3		ug/Kg		95	70 - 130	2	20
Dibromomethane			50.0	46.4		ug/Kg		93	70 - 130	2	20
Dichlorodifluoromethane			50.0	53.2		ug/Kg		106	40 - 160	0	20
2-Hexanone			250	258		ug/Kg		103	40 - 160	2	20
Ethylbenzene			50.0	46.8		ug/Kg		94	70 - 130	3	20
Isopropylbenzene			50.0	46.1		ug/Kg		92	70 - 130	3	20
Methylene Chloride			50.0	41.8		ug/Kg		84	70 - 130	4	20
4-Methyl-2-pentanone			250	260		ug/Kg		104	40 - 160	2	20
Methyl tert-butyl ether			50.0	44.3		ug/Kg		89	70 - 130	4	20
2-Butanone (MEK)			250	239		ug/Kg		95	40 - 160	1	20
1,2-Dibromoethane			50.0	47.8		ug/Kg		96	70 - 130	3	20
1,1,1,2-Tetrachloroethane			50.0	46.3		ug/Kg		93	70 - 130	6	20
n-Butylbenzene			50.0	44.7		ug/Kg		89	70 - 130	4	20
1,1,2,2-Tetrachloroethane			50.0	45.9		ug/Kg		92	70 - 130	2	20
N-Propylbenzene			50.0	45.8		ug/Kg		92	70 - 130	3	20
p-Isopropyltoluene			50.0	45.1		ug/Kg		90	70 - 130	5	20
1,2,3-Trichlorobenzene			50.0	45.6		ug/Kg		91	70 - 130	7	20
sec-Butylbenzene			50.0	45.8		ug/Kg		92	70 - 130	4	20
1,1,1-Trichloroethane			50.0	44.6		ug/Kg		89	70 - 130	4	20
Styrene			50.0	48.5		ug/Kg		97	70 - 130	5	20
1,1,2-Trichloroethane			50.0	46.2		ug/Kg		92	70 - 130	2	20
tert-Butylbenzene			50.0	46.5		ug/Kg		93	70 - 130	3	20
Tetrachloroethene			50.0	46.5		ug/Kg		93	70 - 130	5	20
Toluene			50.0	48.2		ug/Kg		96	70 - 130	2	20
1,2,4-Trimethylbenzene			50.0	47.1		ug/Kg		94	70 - 130	4	20
trans-1,2-Dichloroethene			50.0	43.3		ug/Kg		87	70 - 130	3	20
1,3,5-Trimethylbenzene			50.0	46.5		ug/Kg		93	70 - 130	4	20
trans-1,3-Dichloropropene			50.0	47.2		ug/Kg		94	70 - 130	3	20
Trichloroethene			50.0	46.7		ug/Kg		93	70 - 130	2	20
Trichlorofluoromethane			50.0	44.2		ug/Kg		88	40 - 160	8	20
o-Xylene			50.0	45.7		ug/Kg		91	70 - 130	4	20
Vinyl acetate			100	93.3		ug/Kg		93	70 - 130	7	20
m-Xylene & p-Xylene			50.0	45.9		ug/Kg		92	70 - 130	4	20
Vinyl chloride			50.0	48.5		ug/Kg		97	70 - 130	4	20
Xylenes, Total			100	91.6		ug/Kg		92	70 - 130	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*91*		*70 - 130*
1,2-Dichloroethane-d4 (Surr)	*87*		*70 - 130*
Dibromofluoromethane (Surr)	*90*		*70 - 130*
4-Bromofluorobenzene (Surr)	*88*		*70 - 130*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519861/9
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.00046	U	0.0010	0.00046	mg/L			04/13/18 11:51	1
Hexachlorobutadiene	0.0025	U	0.0050	0.0025	mg/L			04/13/18 11:51	1
Benzene	0.00043	U	0.0010	0.00043	mg/L			04/13/18 11:51	1
1,2-Dichloroethane	0.00050	U	0.0010	0.00050	mg/L			04/13/18 11:51	1
Carbon tetrachloride	0.00033	U	0.0010	0.00033	mg/L			04/13/18 11:51	1
Chlorobenzene	0.00026	U	0.0010	0.00026	mg/L			04/13/18 11:51	1
1,1-Dichloroethene	0.00036	U	0.0010	0.00036	mg/L			04/13/18 11:51	1
Chloroform	0.00050	U	0.0010	0.00050	mg/L			04/13/18 11:51	1
2-Butanone	0.0034	U	0.010	0.0034	mg/L			04/13/18 11:51	1
Tetrachloroethene	0.00075	U	0.0010	0.00075	mg/L			04/13/18 11:51	1
Trichloroethene	0.00048	U	0.0010	0.00048	mg/L			04/13/18 11:51	1
Vinyl chloride	0.00050	U	0.0010	0.00050	mg/L			04/13/18 11:51	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*80 - 120*		*04/13/18 11:51*	*1*
1,2-Dichloroethane-d4 (Surr)	*86*		*73 - 131*		*04/13/18 11:51*	*1*
Dibromofluoromethane (Surr)	*95*		*80 - 122*		*04/13/18 11:51*	*1*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*		*04/13/18 11:51*	*1*

Lab Sample ID: LCS 680-519861/4
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	0.0500	0.0486		mg/L		97	80 - 120
Hexachlorobutadiene	0.0500	0.0515		mg/L		103	71 - 131
Benzene	0.0500	0.0496		mg/L		99	80 - 120
1,2-Dichloroethane	0.0500	0.0461		mg/L		92	72 - 128
Carbon tetrachloride	0.0500	0.0504		mg/L		101	67 - 125
Chlorobenzene	0.0500	0.0511		mg/L		102	80 - 120
1,1-Dichloroethene	0.0500	0.0509		mg/L		102	80 - 120
Chloroform	0.0500	0.0483		mg/L		97	80 - 120
2-Butanone	0.250	0.259		mg/L		104	79 - 125
Tetrachloroethene	0.0500	0.0513		mg/L		103	71 - 123
Trichloroethene	0.0500	0.0514		mg/L		103	80 - 120
Vinyl chloride	0.0500	0.0507		mg/L		101	80 - 129

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Toluene-d8 (Surr)	*99*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*92*		*73 - 131*
Dibromofluoromethane (Surr)	*101*		*80 - 122*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519861/5
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dichlorobenzene	0.0500	0.0508		mg/L		102	80 - 120	4	20
Hexachlorobutadiene	0.0500	0.0536		mg/L		107	71 - 131	4	20
Benzene	0.0500	0.0504		mg/L		101	80 - 120	2	20
1,2-Dichloroethane	0.0500	0.0477		mg/L		95	72 - 128	3	50
Carbon tetrachloride	0.0500	0.0507		mg/L		101	67 - 125	1	20
Chlorobenzene	0.0500	0.0522		mg/L		104	80 - 120	2	20
1,1-Dichloroethene	0.0500	0.0504		mg/L		101	80 - 120	1	20
Chloroform	0.0500	0.0485		mg/L		97	80 - 120	0	20
2-Butanone	0.250	0.274		mg/L		110	79 - 125	6	20
Tetrachloroethene	0.0500	0.0514		mg/L		103	71 - 123	0	20
Trichloroethene	0.0500	0.0520		mg/L		104	80 - 120	1	20
Vinyl chloride	0.0500	0.0500		mg/L		100	80 - 129	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*100*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*94*		*73 - 131*
Dibromofluoromethane (Surr)	*104*		*80 - 122*
4-Bromofluorobenzene (Surr)	*99*		*80 - 120*

Lab Sample ID: LB 680-519599/1-A
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0092	U	0.020	0.0092	mg/L			04/13/18 14:17	20
Hexachlorobutadiene	0.050	U	0.10	0.050	mg/L			04/13/18 14:17	20
Benzene	0.0086	U	0.020	0.0086	mg/L			04/13/18 14:17	20
1,2-Dichloroethane	0.010	U	0.020	0.010	mg/L			04/13/18 14:17	20
Carbon tetrachloride	0.0066	U	0.020	0.0066	mg/L			04/13/18 14:17	20
Chlorobenzene	0.0052	U	0.020	0.0052	mg/L			04/13/18 14:17	20
1,1-Dichloroethene	0.0072	U	0.020	0.0072	mg/L			04/13/18 14:17	20
Chloroform	0.010	U	0.020	0.010	mg/L			04/13/18 14:17	20
2-Butanone	0.068	U	0.20	0.068	mg/L			04/13/18 14:17	20
Tetrachloroethene	0.015	U	0.020	0.015	mg/L			04/13/18 14:17	20
Trichloroethene	0.0096	U	0.020	0.0096	mg/L			04/13/18 14:17	20
Vinyl chloride	0.010	U	0.020	0.010	mg/L			04/13/18 14:17	20

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*101*		*80 - 120*		*04/13/18 14:17*	*20*
1,2-Dichloroethane-d4 (Surr)	*94*		*73 - 131*		*04/13/18 14:17*	*20*
Dibromofluoromethane (Surr)	*101*		*80 - 122*		*04/13/18 14:17*	*20*
4-Bromofluorobenzene (Surr)	*94*		*80 - 120*		*04/13/18 14:17*	*20*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: SB04
Prep Type: TCLP

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	0.0092	U	1.00	0.951		mg/L		95	80 - 120
Hexachlorobutadiene	0.050	U	1.00	0.954		mg/L		95	71 - 131
Benzene	0.0086	U	1.00	1.02		mg/L		102	80 - 120
1,2-Dichloroethane	0.010	U	1.00	0.984		mg/L		98	72 - 128
Carbon tetrachloride	0.0066	U	1.00	1.01		mg/L		101	67 - 125
Chlorobenzene	0.0052	U	1.00	1.02		mg/L		102	80 - 120
1,1-Dichloroethene	0.0072	U	1.00	1.01		mg/L		101	80 - 120
Chloroform	0.010	U	1.00	0.990		mg/L		99	80 - 120
2-Butanone	0.068	U	5.00	5.83		mg/L		117	79 - 125
Tetrachloroethene	0.015	U	1.00	1.05		mg/L		105	71 - 123
Trichloroethene	0.0096	U	1.00	1.04		mg/L		104	80 - 120
Vinyl chloride	0.010	U	1.00	0.929		mg/L		93	80 - 129

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Toluene-d8 (Surr)	*100*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*97*		*73 - 131*
Dibromofluoromethane (Surr)	*106*		*80 - 122*
4-Bromofluorobenzene (Surr)	*93*		*80 - 120*

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 519861

Client Sample ID: SB04
Prep Type: TCLP

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dichlorobenzene	0.0092	U	1.00	0.974		mg/L		97	80 - 120	2	20
Hexachlorobutadiene	0.050	U	1.00	1.04		mg/L		104	71 - 131	8	20
Benzene	0.0086	U	1.00	1.01		mg/L		101	80 - 120	1	20
1,2-Dichloroethane	0.010	U	1.00	0.951		mg/L		95	72 - 128	3	50
Carbon tetrachloride	0.0066	U	1.00	1.02		mg/L		102	67 - 125	1	20
Chlorobenzene	0.0052	U	1.00	1.04		mg/L		104	80 - 120	2	20
1,1-Dichloroethene	0.0072	U	1.00	1.00		mg/L		100	80 - 120	1	20
Chloroform	0.010	U	1.00	0.972		mg/L		97	80 - 120	2	20
2-Butanone	0.068	U	5.00	5.31		mg/L		106	79 - 125	9	20
Tetrachloroethene	0.015	U	1.00	1.05		mg/L		105	71 - 123	0	20
Trichloroethene	0.0096	U	1.00	1.05		mg/L		105	80 - 120	1	20
Vinyl chloride	0.010	U	1.00	0.963		mg/L		96	80 - 129	4	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Toluene-d8 (Surr)	*102*		*80 - 120*
1,2-Dichloroethane-d4 (Surr)	*92*		*73 - 131*
Dibromofluoromethane (Surr)	*102*		*80 - 122*
4-Bromofluorobenzene (Surr)	*96*		*80 - 120*

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 680-519522/7-A
Matrix: Solid
Analysis Batch: 519763

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519522

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorophenol	39	U	320	39	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2-Nitrophenol	40	U	320	40	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4-Dimethylphenol	43	U	320	43	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4-Dichlorophenol	34	U	320	34	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2-Methylphenol	26	U	320	26	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
3 & 4 Methylphenol	42	U	320	42	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Chloroaniline	51	U	640	51	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Chloro-3-methylphenol	34	U	320	34	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2-Methylnaphthalene	37	U	320	37	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4,6-Trichlorophenol	28	U	320	28	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4,5-Trichlorophenol	34	U	320	34	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Acetophenone	27	U	320	27	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
1,1'-Biphenyl	1700	U	1700	1700	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2-Chloronaphthalene	34	U	320	34	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2-Nitroaniline	44	U	1700	44	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Acenaphthylene	35	U	320	35	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
3-Nitroaniline	45	U	1700	45	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Bis(2-chloroethoxy)methane	38	U	320	38	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Acenaphthene	40	U	320	40	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Bis(2-chloroethyl)ether	44	U	320	44	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4-Dinitrophenol	810	U	1700	810	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,4-Dinitrotoluene	48	U	320	48	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Dibenzofuran	32	U	320	32	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Diethyl phthalate	36	U	320	36	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Chlorophenyl phenyl ether	43	U	320	43	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Dimethyl phthalate	33	U	320	33	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Nitroaniline	48	U	1700	48	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4,6-Dinitro-2-methylphenol	170	U	1700	170	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Fluorene	35	U	320	35	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Bromophenyl phenyl ether	35	U	320	35	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Hexachlorobenzene	38	U	320	38	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Hexachlorobutadiene	35	U	320	35	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Hexachlorocyclopentadiene	40	U	320	40	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Hexachloroethane	27	U	320	27	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Anthracene	24	U	320	24	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Isophorone	32	U	320	32	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Naphthalene	29	U	320	29	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Di-n-butyl phthalate	29	U	320	29	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Nitrobenzene	25	U	320	25	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Fluoranthene	31	U	320	31	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
N-Nitrosodiphenylamine	32	U	320	32	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
N-Nitrosodi-n-propylamine	31	U	320	31	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Pentachlorophenol	320	U	1700	320	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
3,3'-Dichlorobenzidine	27	U	640	27	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Phenanthrene	26	U	320	26	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzo[a]anthracene	26	U	320	26	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Phenol	33	U	320	33	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Chrysene	20	U	320	20	ug/Kg		04/11/18 08:30	04/12/18 15:33	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519522/7-A
Matrix: Solid
Analysis Batch: 519763

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519522

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pyrene	26	U	320	26	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Bis(2-ethylhexyl) phthalate	28	U	320	28	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Butyl benzyl phthalate	25	U	320	25	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Di-n-octyl phthalate	28	U	320	28	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzo[b]fluoranthene	37	U	320	37	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzo[k]fluoranthene	63	U	320	63	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzo[a]pyrene	51	U	320	51	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Indeno[1,2,3-cd]pyrene	27	U	320	27	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Dibenz(a,h)anthracene	38	U	320	38	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzo[g,h,i]perylene	21	U	320	21	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
bis (2-chloroisopropyl) ether	29	U	320	29	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Carbazole	29	U	320	29	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
2,6-Dinitrotoluene	41	U	320	41	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
4-Nitrophenol	320	U	1700	320	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Atrazine	22	U	320	22	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Benzaldehyde	56	U	320	56	ug/Kg		04/11/18 08:30	04/12/18 15:33	1
Caprolactam	64	U	320	64	ug/Kg		04/11/18 08:30	04/12/18 15:33	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5 (Surr)	*83*		*37 - 115*	*04/11/18 08:30*	*04/12/18 15:33*	*1*
2-Fluorobiphenyl (Surr)	*84*		*41 - 116*	*04/11/18 08:30*	*04/12/18 15:33*	*1*
Terphenyl-d14 (Surr)	*100*		*46 - 126*	*04/11/18 08:30*	*04/12/18 15:33*	*1*
Phenol-d5 (Surr)	*88*		*38 - 122*	*04/11/18 08:30*	*04/12/18 15:33*	*1*
2-Fluorophenol (Surr)	*88*		*39 - 114*	*04/11/18 08:30*	*04/12/18 15:33*	*1*
2,4,6-Tribromophenol (Surr)	*98*		*45 - 129*	*04/11/18 08:30*	*04/12/18 15:33*	*1*

Lab Sample ID: LCS 680-519522/8-A
Matrix: Solid
Analysis Batch: 519763

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519522

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Chlorophenol	6350	5170		ug/Kg		81	47 - 130
2-Nitrophenol	6350	5210		ug/Kg		82	43 - 130
2,4-Dimethylphenol	6350	5120		ug/Kg		81	43 - 130
2,4-Dichlorophenol	6350	5500		ug/Kg		87	48 - 130
2-Methylphenol	6350	4820		ug/Kg		76	46 - 130
3 & 4 Methylphenol	6350	5340		ug/Kg		84	46 - 130
4-Chloroaniline	6350	3830		ug/Kg		60	10 - 130
4-Chloro-3-methylphenol	6350	5700		ug/Kg		90	51 - 130
2-Methylnaphthalene	6350	4790		ug/Kg		75	48 - 130
2,4,6-Trichlorophenol	6350	5330		ug/Kg		84	50 - 130
2,4,5-Trichlorophenol	6350	5150		ug/Kg		81	51 - 130
Acetophenone	6350	5050		ug/Kg		80	44 - 130
1,1'-Biphenyl	6350	5000		ug/Kg		79	48 - 130
2-Chloronaphthalene	6350	4950		ug/Kg		78	48 - 130
2-Nitroaniline	6350	5940		ug/Kg		93	44 - 130
Acenaphthylene	6350	5070		ug/Kg		80	45 - 130
3-Nitroaniline	6350	4690		ug/Kg		74	21 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519522/8-A
Matrix: Solid
Analysis Batch: 519763

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519522

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bis(2-chloroethoxy)methane	6350	5230		ug/Kg		82	47 - 130
Acenaphthene	6350	4440		ug/Kg		70	47 - 130
Bis(2-chloroethyl)ether	6350	5120		ug/Kg		81	37 - 130
2,4-Dinitrophenol	12700	2960		ug/Kg		23	10 - 130
2,4-Dinitrotoluene	6350	5220		ug/Kg		82	49 - 111
Dibenzofuran	6350	4880		ug/Kg		77	49 - 130
Diethyl phthalate	6350	5170		ug/Kg		81	49 - 130
4-Chlorophenyl phenyl ether	6350	4740		ug/Kg		75	49 - 130
Dimethyl phthalate	6350	5090		ug/Kg		80	50 - 130
4-Nitroaniline	6350	5350		ug/Kg		84	41 - 130
4,6-Dinitro-2-methylphenol	12700	5730		ug/Kg		45	23 - 130
Fluorene	6350	4960		ug/Kg		78	52 - 130
4-Bromophenyl phenyl ether	6350	5260		ug/Kg		83	53 - 130
Hexachlorobenzene	6350	5260		ug/Kg		83	53 - 130
Hexachlorobutadiene	6350	4530		ug/Kg		71	48 - 130
Hexachlorocyclopentadiene	6350	4780		ug/Kg		75	28 - 130
Hexachloroethane	6350	4700		ug/Kg		74	42 - 130
Anthracene	6350	5190		ug/Kg		82	50 - 130
Isophorone	6350	5340		ug/Kg		84	48 - 130
Naphthalene	6350	4890		ug/Kg		77	47 - 130
Di-n-butyl phthalate	6350	5530		ug/Kg		87	52 - 130
Nitrobenzene	6350	5420		ug/Kg		85	45 - 130
Fluoranthene	6350	5130		ug/Kg		81	51 - 130
N-Nitrosodiphenylamine	6350	5340		ug/Kg		84	50 - 130
N-Nitrosodi-n-propylamine	6350	4910		ug/Kg		77	38 - 130
Pentachlorophenol	12700	7040		ug/Kg		55	41 - 130
3,3'-Dichlorobenzidine	6350	4050		ug/Kg		64	16 - 130
Phenanthrene	6350	5130		ug/Kg		81	52 - 130
Benzo[a]anthracene	6350	5530		ug/Kg		87	50 - 130
Phenol	6350	5270		ug/Kg		83	47 - 130
Chrysene	6350	5530		ug/Kg		87	47 - 130
Pyrene	6350	5570		ug/Kg		88	50 - 130
Bis(2-ethylhexyl) phthalate	6350	6120		ug/Kg		96	48 - 130
Butyl benzyl phthalate	6350	5840		ug/Kg		92	53 - 134
Di-n-octyl phthalate	6350	5970		ug/Kg		94	46 - 130
Benzo[b]fluoranthene	6350	5570		ug/Kg		88	48 - 130
Benzo[k]fluoranthene	6350	4870		ug/Kg		77	48 - 108
Benzo[a]pyrene	6350	5410		ug/Kg		85	47 - 131
Indeno[1,2,3-cd]pyrene	6350	5670		ug/Kg		89	41 - 130
Dibenz(a,h)anthracene	6350	5320		ug/Kg		84	44 - 130
Benzo[g,h,i]perylene	6350	5460		ug/Kg		86	42 - 130
bis (2-chloroisopropyl) ether	6350	4370		ug/Kg		69	38 - 130
Carbazole	6350	5320		ug/Kg		84	51 - 130
2,6-Dinitrotoluene	6350	5090		ug/Kg		80	49 - 130
4-Nitrophenol	12700	11000		ug/Kg		87	40 - 130
Atrazine	6350	5280		ug/Kg		83	47 - 130
Benzaldehyde	6350	1310		ug/Kg		21	10 - 130
Caprolactam	6350	6650		ug/Kg		105	44 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519522/8-A
Matrix: Solid
Analysis Batch: 519763

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519522

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Nitrobenzene-d5 (Surr)	85		37 - 115
2-Fluorobiphenyl (Surr)	77		41 - 116
Terphenyl-d14 (Surr)	94		46 - 126
Phenol-d5 (Surr)	82		38 - 122
2-Fluorophenol (Surr)	88		39 - 114
2,4,6-Tribromophenol (Surr)	78		45 - 129

Lab Sample ID: MB 680-519670/16-A
Matrix: Solid
Analysis Batch: 520185

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519670

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.00054	U	0.010	0.00054	mg/L		04/12/18 15:10	04/16/18 19:41	1
Pyridine	0.0023	U	0.050	0.0023	mg/L		04/12/18 15:10	04/16/18 19:41	1
2-Methylphenol	0.89	U	10	0.89	ug/L		04/12/18 15:10	04/16/18 19:41	1
3 & 4 Methylphenol	1.3	U	10	1.3	ug/L		04/12/18 15:10	04/16/18 19:41	1
2,4,6-Trichlorophenol	0.85	U	10	0.85	ug/L		04/12/18 15:10	04/16/18 19:41	1
2,4,5-Trichlorophenol	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/16/18 19:41	1
2,4-Dinitrotoluene	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/16/18 19:41	1
Hexachlorobenzene	0.79	U	10	0.79	ug/L		04/12/18 15:10	04/16/18 19:41	1
Hexachlorobutadiene	0.62	U	10	0.62	ug/L		04/12/18 15:10	04/16/18 19:41	1
Hexachloroethane	0.76	U	10	0.76	ug/L		04/12/18 15:10	04/16/18 19:41	1
Nitrobenzene	0.73	U	10	0.73	ug/L		04/12/18 15:10	04/16/18 19:41	1
Pentachlorophenol	2.0	U	50	2.0	ug/L		04/12/18 15:10	04/16/18 19:41	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Nitrobenzene-d5 (Surr)	65		32 - 118	04/12/18 15:10	04/16/18 19:41	1
2-Fluorobiphenyl	68		32 - 113	04/12/18 15:10	04/16/18 19:41	1
Terphenyl-d14 (Surr)	91		10 - 126	04/12/18 15:10	04/16/18 19:41	1
Phenol-d5 (Surr)	63		27 - 110	04/12/18 15:10	04/16/18 19:41	1
2-Fluorophenol (Surr)	61		26 - 109	04/12/18 15:10	04/16/18 19:41	1
2,4,6-Tribromophenol (Surr)	80		39 - 124	04/12/18 15:10	04/16/18 19:41	1

Lab Sample ID: LCS 680-519670/20-A
Matrix: Solid
Analysis Batch: 520185

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519670

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,4-Dichlorobenzene	0.100	0.0608		mg/L		61	31 - 130
Pyridine	0.200	0.115		mg/L		57	10 - 130
2-Methylphenol	100	67.1		ug/L		67	40 - 130
3 & 4 Methylphenol	100	77.4		ug/L		77	42 - 130
2,4,6-Trichlorophenol	100	84.7		ug/L		85	47 - 130
2,4,5-Trichlorophenol	100	77.9		ug/L		78	48 - 130
2,4-Dinitrotoluene	100	85.1		ug/L		85	52 - 130
Hexachlorobenzene	100	79.0		ug/L		79	43 - 130
Hexachlorobutadiene	100	64.8		ug/L		65	27 - 130
Hexachloroethane	100	64.3		ug/L		64	29 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519670/20-A
Matrix: Solid
Analysis Batch: 520185

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519670

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrobenzene	100	73.0		ug/L		73	43 - 130
Pentachlorophenol	200	170		ug/L		85	33 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Nitrobenzene-d5 (Surr)	*72*		*32 - 118*
2-Fluorobiphenyl	*70*		*32 - 113*
Terphenyl-d14 (Surr)	*94*		*10 - 126*
Phenol-d5 (Surr)	*67*		*27 - 110*
2-Fluorophenol (Surr)	*65*		*26 - 109*
2,4,6-Tribromophenol (Surr)	*82*		*39 - 124*

Lab Sample ID: MB 680-519677/8-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519677

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Chlorophenol	0.87	U	10	0.87	ug/L		04/12/18 15:10	04/15/18 16:48	1
2-Nitrophenol	0.76	U	10	0.76	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4-Dimethylphenol	4.0	U	10	4.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4-Dichlorophenol	1.1	U	10	1.1	ug/L		04/12/18 15:10	04/15/18 16:48	1
2-Methylphenol	0.89	U	10	0.89	ug/L		04/12/18 15:10	04/15/18 16:48	1
3 & 4 Methylphenol	1.3	U	10	1.3	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Chloroaniline	2.2	U	20	2.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Chloro-3-methylphenol	1.0	U	10	1.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
2-Methylnaphthalene	0.78	U	10	0.78	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4,6-Trichlorophenol	0.85	U	10	0.85	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4,5-Trichlorophenol	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
Acetophenone	0.57	U	10	0.57	ug/L		04/12/18 15:10	04/15/18 16:48	1
1,1'-Biphenyl	0.58	U	10	0.58	ug/L		04/12/18 15:10	04/15/18 16:48	1
2-Chloronaphthalene	0.80	U	10	0.80	ug/L		04/12/18 15:10	04/15/18 16:48	1
2-Nitroaniline	1.3	U	50	1.3	ug/L		04/12/18 15:10	04/15/18 16:48	1
Acenaphthylene	0.85	U	10	0.85	ug/L		04/12/18 15:10	04/15/18 16:48	1
3-Nitroaniline	5.0	U	50	5.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
Bis(2-chloroethoxy)methane	0.94	U	10	0.94	ug/L		04/12/18 15:10	04/15/18 16:48	1
Acenaphthene	0.76	U	10	0.76	ug/L		04/12/18 15:10	04/15/18 16:48	1
Bis(2-chloroethyl)ether	1.1	U	10	1.1	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4-Dinitrophenol	10	U	50	10	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,4-Dinitrotoluene	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
Dibenzofuran	0.79	U	10	0.79	ug/L		04/12/18 15:10	04/15/18 16:48	1
Diethyl phthalate	0.88	U	10	0.88	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Chlorophenyl phenyl ether	0.84	U	10	0.84	ug/L		04/12/18 15:10	04/15/18 16:48	1
Dimethyl phthalate	0.99	U	10	0.99	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Nitroaniline	5.0	U	50	5.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
4,6-Dinitro-2-methylphenol	10	U	50	10	ug/L		04/12/18 15:10	04/15/18 16:48	1
Fluorene	0.96	U	10	0.96	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Bromophenyl phenyl ether	0.77	U	10	0.77	ug/L		04/12/18 15:10	04/15/18 16:48	1
Hexachlorobenzene	0.79	U	10	0.79	ug/L		04/12/18 15:10	04/15/18 16:48	1
Hexachlorobutadiene	0.62	U	10	0.62	ug/L		04/12/18 15:10	04/15/18 16:48	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 680-519677/8-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519677

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hexachlorocyclopentadiene	2.5	U	10	2.5	ug/L		04/12/18 15:10	04/15/18 16:48	1
Hexachloroethane	0.76	U	10	0.76	ug/L		04/12/18 15:10	04/15/18 16:48	1
Anthracene	0.69	U	10	0.69	ug/L		04/12/18 15:10	04/15/18 16:48	1
Isophorone	0.90	U	10	0.90	ug/L		04/12/18 15:10	04/15/18 16:48	1
Naphthalene	0.70	U	10	0.70	ug/L		04/12/18 15:10	04/15/18 16:48	1
Di-n-butyl phthalate	0.83	U	10	0.83	ug/L		04/12/18 15:10	04/15/18 16:48	1
Nitrobenzene	0.73	U	10	0.73	ug/L		04/12/18 15:10	04/15/18 16:48	1
Fluoranthene	0.74	U	10	0.74	ug/L		04/12/18 15:10	04/15/18 16:48	1
N-Nitrosodiphenylamine	0.92	U	10	0.92	ug/L		04/12/18 15:10	04/15/18 16:48	1
N-Nitrosodi-n-propylamine	0.72	U	10	0.72	ug/L		04/12/18 15:10	04/15/18 16:48	1
Pentachlorophenol	2.0	U	50	2.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
3,3'-Dichlorobenzidine	30	U	60	30	ug/L		04/12/18 15:10	04/15/18 16:48	1
Phenanthrene	0.77	U	10	0.77	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzo[a]anthracene	0.55	U	10	0.55	ug/L		04/12/18 15:10	04/15/18 16:48	1
Phenol	0.83	U	10	0.83	ug/L		04/12/18 15:10	04/15/18 16:48	1
Chrysene	0.51	U	10	0.51	ug/L		04/12/18 15:10	04/15/18 16:48	1
Pyrene	0.63	U	10	0.63	ug/L		04/12/18 15:10	04/15/18 16:48	1
Bis(2-ethylhexyl) phthalate	1.6	U	10	1.6	ug/L		04/12/18 15:10	04/15/18 16:48	1
Butyl benzyl phthalate	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
Di-n-octyl phthalate	1.4	U	10	1.4	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzo[b]fluoranthene	2.6	U	10	2.6	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzo[k]fluoranthene	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzo[a]pyrene	0.71	U	10	0.71	ug/L		04/12/18 15:10	04/15/18 16:48	1
Indeno[1,2,3-cd]pyrene	1.0	U	10	1.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
Dibenz(a,h)anthracene	1.0	U	10	1.0	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzo[g,h,i]perylene	0.87	U	10	0.87	ug/L		04/12/18 15:10	04/15/18 16:48	1
bis (2-chloroisopropyl) ether	0.78	U	10	0.78	ug/L		04/12/18 15:10	04/15/18 16:48	1
Carbazole	0.71	U	10	0.71	ug/L		04/12/18 15:10	04/15/18 16:48	1
2,6-Dinitrotoluene	1.1	U	10	1.1	ug/L		04/12/18 15:10	04/15/18 16:48	1
4-Nitrophenol	1.9	U	50	1.9	ug/L		04/12/18 15:10	04/15/18 16:48	1
Atrazine	1.2	U	10	1.2	ug/L		04/12/18 15:10	04/15/18 16:48	1
Benzaldehyde	1.1	U	10	1.1	ug/L		04/12/18 15:10	04/15/18 16:48	1
Caprolactam	0.79	U	10	0.79	ug/L		04/12/18 15:10	04/15/18 16:48	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Nitrobenzene-d5 (Surr)	*76*		*32 - 118*	*04/12/18 15:10*	*04/15/18 16:48*	*1*
2-Fluorobiphenyl (Surr)	*70*		*32 - 113*	*04/12/18 15:10*	*04/15/18 16:48*	*1*
Terphenyl-d14 (Surr)	*75*		*10 - 126*	*04/12/18 15:10*	*04/15/18 16:48*	*1*
Phenol-d5 (Surr)	*68*		*27 - 110*	*04/12/18 15:10*	*04/15/18 16:48*	*1*
2-Fluorophenol (Surr)	*67*		*26 - 109*	*04/12/18 15:10*	*04/15/18 16:48*	*1*
2,4,6-Tribromophenol (Surr)	*81*		*39 - 124*	*04/12/18 15:10*	*04/15/18 16:48*	*1*

Lab Sample ID: LCS 680-519677/9-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519677

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Chlorophenol	100	64.4		ug/L		64	39 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519677/9-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519677

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Nitrophenol	100	71.2		ug/L		71	43 - 130
2,4-Dimethylphenol	100	68.9		ug/L		69	37 - 130
2,4-Dichlorophenol	100	71.5		ug/L		71	44 - 130
2-Methylphenol	100	69.8		ug/L		70	40 - 130
3 & 4 Methylphenol	100	69.8		ug/L		70	42 - 130
4-Chloroaniline	100	54.1		ug/L		54	42 - 130
4-Chloro-3-methylphenol	100	74.4		ug/L		74	47 - 130
2-Methylnaphthalene	100	66.3		ug/L		66	40 - 130
2,4,6-Trichlorophenol	100	79.1		ug/L		79	47 - 130
2,4,5-Trichlorophenol	100	79.7		ug/L		80	48 - 130
Acetophenone	100	71.5		ug/L		72	44 - 130
1,1'-Biphenyl	100	73.6		ug/L		74	45 - 130
2-Chloronaphthalene	100	73.9		ug/L		74	44 - 130
2-Nitroaniline	100	82.1		ug/L		82	51 - 130
Acenaphthylene	100	74.2		ug/L		74	48 - 130
3-Nitroaniline	100	75.7		ug/L		76	53 - 130
Bis(2-chloroethoxy)methane	100	71.8		ug/L		72	47 - 130
Acenaphthene	100	79.3		ug/L		79	48 - 130
Bis(2-chloroethyl)ether	100	66.0		ug/L		66	32 - 130
2,4-Dinitrophenol	200	168		ug/L		84	31 - 130
2,4-Dinitrotoluene	100	85.4		ug/L		85	52 - 130
Dibenzofuran	100	77.8		ug/L		78	50 - 130
Diethyl phthalate	100	88.8		ug/L		89	53 - 130
4-Chlorophenyl phenyl ether	100	79.2		ug/L		79	45 - 130
Dimethyl phthalate	100	81.0		ug/L		81	53 - 130
4-Nitroaniline	100	76.5		ug/L		76	49 - 130
4,6-Dinitro-2-methylphenol	200	200		ug/L		100	42 - 130
Fluorene	100	82.3		ug/L		82	50 - 130
4-Bromophenyl phenyl ether	100	82.5		ug/L		83	47 - 130
Hexachlorobenzene	100	81.3		ug/L		81	43 - 130
Hexachlorobutadiene	100	58.3		ug/L		58	27 - 130
Hexachlorocyclopentadiene	100	47.1		ug/L		47	11 - 130
Hexachloroethane	100	54.5		ug/L		55	29 - 130
Anthracene	100	85.2		ug/L		85	49 - 130
Isophorone	100	70.6		ug/L		71	47 - 130
Naphthalene	100	66.0		ug/L		66	39 - 130
Di-n-butyl phthalate	100	92.2		ug/L		92	51 - 130
Nitrobenzene	100	68.6		ug/L		69	43 - 130
Fluoranthene	100	84.9		ug/L		85	47 - 130
N-Nitrosodiphenylamine	100	85.0		ug/L		85	50 - 130
N-Nitrosodi-n-propylamine	100	71.8		ug/L		72	42 - 130
Pentachlorophenol	200	175		ug/L		87	33 - 130
3,3'-Dichlorobenzidine	100	85.4		ug/L		85	46 - 130
Phenanthrene	100	83.2		ug/L		83	51 - 130
Benzo[a]anthracene	100	82.3		ug/L		82	44 - 130
Phenol	100	63.6		ug/L		64	35 - 130
Chrysene	100	83.3		ug/L		83	47 - 130
Pyrene	100	82.1		ug/L		82	52 - 130

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-519677/9-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519677

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bis(2-ethylhexyl) phthalate	100	88.1		ug/L		88	45 - 130
Butyl benzyl phthalate	100	84.3		ug/L		84	50 - 130
Di-n-octyl phthalate	100	96.1		ug/L		96	42 - 130
Benzo[b]fluoranthene	100	82.2		ug/L		82	43 - 130
Benzo[k]fluoranthene	100	79.2		ug/L		79	40 - 130
Benzo[a]pyrene	100	80.8		ug/L		81	44 - 130
Indeno[1,2,3-cd]pyrene	100	91.8		ug/L		92	31 - 130
Dibenz(a,h)anthracene	100	83.0		ug/L		83	41 - 130
Benzo[g,h,i]perylene	100	82.4		ug/L		82	41 - 130
bis (2-chloroisopropyl) ether	100	70.7		ug/L		71	26 - 130
Carbazole	100	88.1		ug/L		88	54 - 130
2,6-Dinitrotoluene	100	81.3		ug/L		81	52 - 130
4-Nitrophenol	200	159		ug/L		80	44 - 130
Atrazine	100	81.0		ug/L		81	39 - 130
Benzaldehyde	100	47.8		ug/L		48	14 - 130
Caprolactam	100	82.9		ug/L		83	26 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Nitrobenzene-d5 (Surr)	*69*		*32 - 118*
2-Fluorobiphenyl (Surr)	*75*		*32 - 113*
Terphenyl-d14 (Surr)	*76*		*10 - 126*
Phenol-d5 (Surr)	*63*		*27 - 110*
2-Fluorophenol (Surr)	*58*		*26 - 109*
2,4,6-Tribromophenol (Surr)	*79*		*39 - 124*

Lab Sample ID: LCSD 680-519677/10-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 519677

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2-Chlorophenol	100	72.3		ug/L		72	39 - 130	12	50
2-Nitrophenol	100	74.6		ug/L		75	43 - 130	5	50
2,4-Dimethylphenol	100	71.1		ug/L		71	37 - 130	3	50
2,4-Dichlorophenol	100	75.5		ug/L		75	44 - 130	5	50
2-Methylphenol	100	74.8		ug/L		75	40 - 130	7	50
3 & 4 Methylphenol	100	75.6		ug/L		76	42 - 130	8	50
4-Chloroaniline	100	61.2		ug/L		61	42 - 130	12	50
4-Chloro-3-methylphenol	100	77.8		ug/L		78	47 - 130	5	50
2-Methylnaphthalene	100	72.3		ug/L		72	40 - 130	9	50
2,4,6-Trichlorophenol	100	82.4		ug/L		82	47 - 130	4	50
2,4,5-Trichlorophenol	100	83.3		ug/L		83	48 - 130	4	50
Acetophenone	100	76.2		ug/L		76	44 - 130	6	50
1,1'-Biphenyl	100	77.8		ug/L		78	45 - 130	5	50
2-Chloronaphthalene	100	77.6		ug/L		78	44 - 130	5	50
2-Nitroaniline	100	84.7		ug/L		85	51 - 130	3	50
Acenaphthylene	100	80.4		ug/L		80	48 - 130	8	50
3-Nitroaniline	100	83.6		ug/L		84	53 - 130	10	50
Bis(2-chloroethoxy)methane	100	75.2		ug/L		75	47 - 130	5	50

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519677/10-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 519677

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenaphthene	100	85.1		ug/L		85	48 - 130	7	50
Bis(2-chloroethyl)ether	100	72.7		ug/L		73	32 - 130	10	50
2,4-Dinitrophenol	200	180		ug/L		90	31 - 130	7	50
2,4-Dinitrotoluene	100	85.4		ug/L		85	52 - 130	0	50
Dibenzofuran	100	79.7		ug/L		80	50 - 130	2	50
Diethyl phthalate	100	85.8		ug/L		86	53 - 130	3	50
4-Chlorophenyl phenyl ether	100	80.4		ug/L		80	45 - 130	1	50
Dimethyl phthalate	100	83.3		ug/L		83	53 - 130	3	50
4-Nitroaniline	100	75.6		ug/L		76	49 - 130	1	50
4,6-Dinitro-2-methylphenol	200	175		ug/L		87	42 - 130	13	50
Fluorene	100	82.1		ug/L		82	50 - 130	0	50
4-Bromophenyl phenyl ether	100	77.5		ug/L		77	47 - 130	6	50
Hexachlorobenzene	100	79.4		ug/L		79	43 - 130	2	50
Hexachlorobutadiene	100	67.0		ug/L		67	27 - 130	14	50
Hexachlorocyclopentadiene	100	49.8		ug/L		50	11 - 130	6	50
Hexachloroethane	100	66.6		ug/L		67	29 - 130	20	50
Anthracene	100	83.3		ug/L		83	49 - 130	2	50
Isophorone	100	76.0		ug/L		76	47 - 130	7	50
Naphthalene	100	71.5		ug/L		71	39 - 130	8	50
Di-n-butyl phthalate	100	82.3		ug/L		82	51 - 130	11	50
Nitrobenzene	100	73.9		ug/L		74	43 - 130	8	50
Fluoranthene	100	79.4		ug/L		79	47 - 130	7	50
N-Nitrosodiphenylamine	100	76.2		ug/L		76	50 - 130	11	50
N-Nitrosodi-n-propylamine	100	77.2		ug/L		77	42 - 130	7	50
Pentachlorophenol	200	172		ug/L		86	33 - 130	2	50
3,3'-Dichlorobenzidine	100	85.5		ug/L		85	46 - 130	0	50
Phenanthrene	100	81.9		ug/L		82	51 - 130	2	50
Benzo[a]anthracene	100	85.0		ug/L		85	44 - 130	3	50
Phenol	100	73.1		ug/L		73	35 - 130	14	50
Chrysene	100	83.7		ug/L		84	47 - 130	0	50
Pyrene	100	74.5		ug/L		75	52 - 130	10	50
Bis(2-ethylhexyl) phthalate	100	85.4		ug/L		85	45 - 130	3	50
Butyl benzyl phthalate	100	83.0		ug/L		83	50 - 130	2	50
Di-n-octyl phthalate	100	87.8		ug/L		88	42 - 130	9	50
Benzo[b]fluoranthene	100	85.5		ug/L		85	43 - 130	4	50
Benzo[k]fluoranthene	100	82.9		ug/L		83	40 - 130	5	50
Benzo[a]pyrene	100	84.3		ug/L		84	44 - 130	4	50
Indeno[1,2,3-cd]pyrene	100	86.3		ug/L		86	31 - 130	6	50
Dibenz(a,h)anthracene	100	85.7		ug/L		86	41 - 130	3	50
Benzo[g,h,i]perylene	100	85.2		ug/L		85	41 - 130	3	50
bis (2-chloroisopropyl) ether	100	76.1		ug/L		76	26 - 130	7	50
Carbazole	100	85.3		ug/L		85	54 - 130	3	50
2,6-Dinitrotoluene	100	85.2		ug/L		85	52 - 130	5	50
4-Nitrophenol	200	162		ug/L		81	44 - 130	2	50
Atrazine	100	75.9		ug/L		76	39 - 130	6	50
Benzaldehyde	100	52.1		ug/L		52	14 - 130	9	50
Caprolactam	100	63.3		ug/L		63	26 - 130	27	50

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-519677/10-A
Matrix: Water
Analysis Batch: 520049

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 519677

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Nitrobenzene-d5 (Surr)	75		32 - 118
2-Fluorobiphenyl (Surr)	76		32 - 113
Terphenyl-d14 (Surr)	69		10 - 126
Phenol-d5 (Surr)	70		27 - 110
2-Fluorophenol (Surr)	66		26 - 109
2,4,6-Tribromophenol (Surr)	82		39 - 124

Lab Sample ID: LB 680-519572/1-B
Matrix: Solid
Analysis Batch: 520185

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 519670

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0026	U	0.048	0.0026	mg/L		04/12/18 15:10	04/16/18 20:04	1
Pyridine	0.012	U	0.24	0.012	mg/L		04/12/18 15:10	04/16/18 20:04	1
2-Methylphenol	0.0043	U	0.048	0.0043	mg/L		04/12/18 15:10	04/16/18 20:04	1
3 & 4 Methylphenol	0.0062	U	0.048	0.0062	mg/L		04/12/18 15:10	04/16/18 20:04	1
2,4,6-Trichlorophenol	0.0041	U	0.048	0.0041	mg/L		04/12/18 15:10	04/16/18 20:04	1
2,4,5-Trichlorophenol	0.0058	U	0.048	0.0058	mg/L		04/12/18 15:10	04/16/18 20:04	1
2,4-Dinitrotoluene	0.0058	U	0.048	0.0058	mg/L		04/12/18 15:10	04/16/18 20:04	1
Hexachlorobenzene	0.0038	U	0.048	0.0038	mg/L		04/12/18 15:10	04/16/18 20:04	1
Hexachlorobutadiene	0.0030	U	0.048	0.0030	mg/L		04/12/18 15:10	04/16/18 20:04	1
Hexachloroethane	0.0037	U	0.048	0.0037	mg/L		04/12/18 15:10	04/16/18 20:04	1
Nitrobenzene	0.0036	U	0.048	0.0036	mg/L		04/12/18 15:10	04/16/18 20:04	1
Pentachlorophenol	0.0096	U	0.24	0.0096	mg/L		04/12/18 15:10	04/16/18 20:04	1

Surrogate	LB %Recovery	LB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Nitrobenzene-d5 (Surr)	161	X	39 - 130	04/12/18 15:10	04/16/18 20:04	1
2-Fluorobiphenyl	144	X	38 - 130	04/12/18 15:10	04/16/18 20:04	1
Terphenyl-d14 (Surr)	166	X	10 - 143	04/12/18 15:10	04/16/18 20:04	1
Phenol-d5 (Surr)	156	X	25 - 130	04/12/18 15:10	04/16/18 20:04	1
2-Fluorophenol (Surr)	152	X	25 - 130	04/12/18 15:10	04/16/18 20:04	1
2,4,6-Tribromophenol (Surr)	173	X	31 - 141	04/12/18 15:10	04/16/18 20:04	1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 680-519736/88
Matrix: Water
Analysis Batch: 519736

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.50	0.20	mg/L			04/12/18 19:59	1
Sulfate	0.40	U	1.0	0.40	mg/L			04/12/18 19:59	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 680-519736/89
Matrix: Water
Analysis Batch: 519736

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.94		mg/L		99	90 - 110
Sulfate	10.0	9.78		mg/L		98	90 - 110

Lab Sample ID: LCSD 680-519736/90
Matrix: Water
Analysis Batch: 519736

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10.0	9.96		mg/L		100	90 - 110	0	15
Sulfate	10.0	9.86		mg/L		99	90 - 110	1	15

Method: 2340B-2011 - Total Hardness (as CaCO3) by calculation

Lab Sample ID: MB 680-520877/1
Matrix: Water
Analysis Batch: 520877

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	3.3	U	3.3	3.3	mg/L			04/20/18 12:15	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 680-519520/1-A
Matrix: Solid
Analysis Batch: 519787

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519520

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.73	U	1.8	0.73	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Barium	0.15	U	0.92	0.15	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Cadmium	0.092	U	0.46	0.092	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Chromium	0.19	U	0.92	0.19	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Lead	0.31	U	0.92	0.31	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Selenium	0.89	U	2.3	0.89	mg/Kg		04/11/18 06:50	04/11/18 21:00	1
Silver	0.055	U	0.92	0.055	mg/Kg		04/11/18 06:50	04/11/18 21:00	1

Lab Sample ID: LCS 680-519520/2-A
Matrix: Solid
Analysis Batch: 519787

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519520

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	9.35	9.14		mg/Kg		98	80 - 120
Barium	9.35	9.22		mg/Kg		99	80 - 120
Cadmium	4.67	4.70		mg/Kg		101	80 - 120
Chromium	9.35	9.76		mg/Kg		104	80 - 120
Lead	46.7	44.6		mg/Kg		96	80 - 120
Selenium	9.35	8.25		mg/Kg		88	80 - 120
Silver	4.67	4.70		mg/Kg		101	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 519787

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519520

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	2.1	J	11.0	12.3		mg/Kg	☼	94	75 - 125
Barium	130		11.0	144	4	mg/Kg	☼	148	75 - 125
Cadmium	0.11	U	5.49	4.93		mg/Kg	☼	90	75 - 125
Chromium	33	F1	11.0	35.1	F1	mg/Kg	☼	21	75 - 125
Lead	13		54.9	63.7		mg/Kg	☼	92	75 - 125
Selenium	1.1	U F1	11.0	9.57		mg/Kg	☼	87	75 - 125
Silver	0.067	U	5.49	4.76		mg/Kg	☼	87	75 - 125

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 519787

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519520

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	2.1	J	11.0	12.5		mg/Kg	☼	95	75 - 125	1	20
Barium	130		11.0	137	4	mg/Kg	☼	91	75 - 125	5	20
Cadmium	0.11	U	5.49	5.04		mg/Kg	☼	92	75 - 125	2	20
Chromium	33	F1	11.0	32.1	F1	mg/Kg	☼	-7	75 - 125	9	20
Lead	13		54.9	60.5		mg/Kg	☼	86	75 - 125	5	20
Selenium	1.1	U F1	11.0	8.11	F1	mg/Kg	☼	74	75 - 125	17	20
Silver	0.067	U	5.49	4.94		mg/Kg	☼	90	75 - 125	4	20

Lab Sample ID: MB 680-520055/1-A
Matrix: Water
Analysis Batch: 520707

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 520055

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	24	U	200	24	ug/L		04/14/18 16:02	04/18/18 17:03	1
Antimony	5.3	U	20	5.3	ug/L		04/14/18 16:02	04/18/18 17:03	1
Arsenic	6.2	U	20	6.2	ug/L		04/14/18 16:02	04/18/18 17:03	1
Barium	1.7	U	10	1.7	ug/L		04/14/18 16:02	04/18/18 17:03	1
Beryllium	0.10	U	4.0	0.10	ug/L		04/14/18 16:02	04/18/18 17:03	1
Cadmium	1.0	U	5.0	1.0	ug/L		04/14/18 16:02	04/18/18 17:03	1
Calcium	25	U	500	25	ug/L		04/14/18 16:02	04/18/18 17:03	1
Chromium	1.6	U	10	1.6	ug/L		04/14/18 16:02	04/18/18 17:03	1
Cobalt	1.0	U	10	1.0	ug/L		04/14/18 16:02	04/18/18 17:03	1
Copper	1.8	U	20	1.8	ug/L		04/14/18 16:02	04/18/18 17:03	1
Iron	24.2	J	50	17	ug/L		04/14/18 16:02	04/18/18 17:03	1
Lead	3.9	U	10	3.9	ug/L		04/14/18 16:02	04/18/18 17:03	1
Magnesium	33	U	500	33	ug/L		04/14/18 16:02	04/18/18 17:03	1
Manganese	1.0	U	10	1.0	ug/L		04/14/18 16:02	04/18/18 17:03	1
Nickel	2.1	U	40	2.1	ug/L		04/14/18 16:02	04/18/18 17:03	1
Potassium	17	U	1000	17	ug/L		04/14/18 16:02	04/18/18 17:03	1
Selenium	9.9	U	20	9.9	ug/L		04/14/18 16:02	04/18/18 17:03	1
Silver	0.60	U	10	0.60	ug/L		04/14/18 16:02	04/18/18 17:03	1
Sodium	480	U	1000	480	ug/L		04/14/18 16:02	04/18/18 17:03	1
Thallium	6.0	U	25	6.0	ug/L		04/14/18 16:02	04/18/18 17:03	1
Vanadium	1.0	U	10	1.0	ug/L		04/14/18 16:02	04/18/18 17:03	1
Zinc	7.0	U	20	7.0	ug/L		04/14/18 16:02	04/18/18 17:03	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 680-520055/2-A
Matrix: Water
Analysis Batch: 520707

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 520055

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5000	5060		ug/L		101	80 - 120
Antimony	50.0	45.2		ug/L		90	80 - 120
Arsenic	100	102		ug/L		102	80 - 120
Barium	100	103		ug/L		103	80 - 120
Beryllium	50.0	52.0		ug/L		104	80 - 120
Cadmium	50.0	51.9		ug/L		104	80 - 120
Calcium	5000	5170		ug/L		103	80 - 120
Chromium	100	105		ug/L		105	80 - 120
Cobalt	50.0	52.4		ug/L		105	80 - 120
Copper	100	105		ug/L		105	80 - 120
Iron	5000	5100		ug/L		102	80 - 120
Lead	500	510		ug/L		102	80 - 120
Magnesium	5000	5120		ug/L		102	80 - 120
Manganese	500	535		ug/L		107	80 - 120
Nickel	100	105		ug/L		105	80 - 120
Potassium	8000	8280		ug/L		104	80 - 120
Selenium	100	98.1		ug/L		98	80 - 120
Silver	50.0	50.7		ug/L		101	80 - 120
Sodium	5000	5180		ug/L		104	80 - 120
Thallium	40.0	42.8		ug/L		107	80 - 120
Vanadium	100	105		ug/L		105	80 - 120
Zinc	100	103		ug/L		103	80 - 120

Lab Sample ID: MB 680-520523/1-A
Matrix: Solid
Analysis Batch: 520874

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 520523

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.020	U	0.020	0.020	mg/L		04/18/18 13:16	04/19/18 16:38	1
Barium	0.10	U	0.10	0.10	mg/L		04/18/18 13:16	04/19/18 16:38	1
Cadmium	0.010	U	0.010	0.010	mg/L		04/18/18 13:16	04/19/18 16:38	1
Chromium	0.020	U	0.020	0.020	mg/L		04/18/18 13:16	04/19/18 16:38	1
Lead	0.020	U	0.020	0.020	mg/L		04/18/18 13:16	04/19/18 16:38	1
Selenium	0.050	U	0.050	0.050	mg/L		04/18/18 13:16	04/19/18 16:38	1
Silver	0.010	U	0.010	0.010	mg/L		04/18/18 13:16	04/19/18 16:38	1

Lab Sample ID: LCS 680-520523/2-A
Matrix: Solid
Analysis Batch: 520874

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 520523

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	2.00	2.12		mg/L		106	80 - 120
Barium	2.00	2.01		mg/L		100	80 - 120
Cadmium	1.00	1.00		mg/L		100	80 - 120
Chromium	2.00	2.04		mg/L		102	80 - 120
Lead	10.0	9.79		mg/L		98	80 - 120
Selenium	2.00	1.95		mg/L		97	80 - 120
Silver	1.00	1.02		mg/L		102	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LB 680-519572/1-D
Matrix: Solid
Analysis Batch: 520874

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 520523

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.20	U	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:48	1
Barium	1.0	U	1.0	1.0	mg/L		04/18/18 13:16	04/19/18 16:48	1
Cadmium	0.10	U	0.10	0.10	mg/L		04/18/18 13:16	04/19/18 16:48	1
Chromium	0.20	U	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:48	1
Lead	0.20	U	0.20	0.20	mg/L		04/18/18 13:16	04/19/18 16:48	1
Selenium	0.50	U	0.50	0.50	mg/L		04/18/18 13:16	04/19/18 16:48	1
Silver	0.10	U	0.10	0.10	mg/L		04/18/18 13:16	04/19/18 16:48	1

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 520874

Client Sample ID: SB04
Prep Type: TCLP
Prep Batch: 520523

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.20	U F1	1.60	0.895	F1	mg/L		56	75 - 125
Barium	1.0	U	1.60	1.74		mg/L		109	75 - 125
Cadmium	0.10	U	1.60	1.48		mg/L		93	75 - 125
Chromium	0.20	U	1.60	1.51		mg/L		94	75 - 125
Lead	0.20	U	1.60	1.48		mg/L		93	75 - 125
Selenium	0.50	U	1.60	1.24		mg/L		78	75 - 125
Silver	0.10	U F1 F2	1.60	0.486	F1	mg/L		30	75 - 125

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 520874

Client Sample ID: SB04
Prep Type: TCLP
Prep Batch: 520523

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.20	U F1	1.60	0.852	F1	mg/L		53	75 - 125	5	20
Barium	1.0	U	1.60	1.76		mg/L		110	75 - 125	1	20
Cadmium	0.10	U	1.60	1.49		mg/L		93	75 - 125	1	20
Chromium	0.20	U	1.60	1.52		mg/L		95	75 - 125	1	20
Lead	0.20	U	1.60	1.47		mg/L		92	75 - 125	1	20
Selenium	0.50	U	1.60	1.34		mg/L		83	75 - 125	7	20
Silver	0.10	U F1 F2	1.60	0.603	F1 F2	mg/L		38	75 - 125	22	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 680-519560/13-A
Matrix: Water
Analysis Batch: 519944

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519560

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.080	U	0.20	0.080	ug/L		04/11/18 09:42	04/13/18 07:53	1

Lab Sample ID: LCS 680-519560/14-A
Matrix: Water
Analysis Batch: 519944

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519560

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	2.50	2.60		ug/L		104	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Lab Sample ID: MB 680-519887/1-A
Matrix: Solid
Analysis Batch: 520140

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519887

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.00020	U	0.00020	0.00020	mg/L		04/13/18 09:27	04/16/18 09:14	1

Lab Sample ID: LCS 680-519887/2-A
Matrix: Solid
Analysis Batch: 520140

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519887

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.250	0.252		mg/L		101	80 - 120

Lab Sample ID: LB 680-519572/1-C
Matrix: Solid
Analysis Batch: 520140

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 519887

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.020	U	0.020	0.020	mg/L		04/13/18 09:27	04/16/18 09:21	1

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 520140

Client Sample ID: SB04
Prep Type: TCLP
Prep Batch: 519887

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.020	U	0.0830	0.0833		mg/L		100	80 - 120

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 520140

Client Sample ID: SB04
Prep Type: TCLP
Prep Batch: 519887

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.020	U	0.0830	0.0802		mg/L		97	80 - 120	4	20

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 680-519479/1-A
Matrix: Solid
Analysis Batch: 519903

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519479

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0075	U	0.019	0.0075	mg/Kg		04/10/18 15:11	04/12/18 17:45	1

Lab Sample ID: LCS 680-519479/2-A
Matrix: Solid
Analysis Batch: 519903

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519479

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.236	0.238		mg/Kg		101	80 - 120

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 519903

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519479

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0090	U	0.123	0.136		mg/Kg	☼	110	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 519903

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519479

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0090	U	0.117	0.118		mg/Kg	☼	101	80 - 120	14	20

Method: 1030 - Ignitability, Solids

Lab Sample ID: MB 680-519733/1
Matrix: Solid
Analysis Batch: 519733

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ignitability	NB				mm/sec			04/12/18 07:57	1

Lab Sample ID: LCS 680-519733/2
Matrix: Solid
Analysis Batch: 519733

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ignitability	3.18	3.178		mm/sec		100	75 - 125

Lab Sample ID: LCSD 680-519733/12
Matrix: Solid
Analysis Batch: 519733

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ignitability	3.12	3.118		mm/sec		100	75 - 125	2	10

Method: 2320B-2011 - Alkalinity, Total

Lab Sample ID: MB 680-519530/7
Matrix: Water
Analysis Batch: 519530

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Carbon Dioxide, Free	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			04/10/18 17:40	1
Bicarbonate ion as HCO3	6.1	U	6.1	6.1	mg/L			04/10/18 17:40	1

Lab Sample ID: LCS 680-519530/8
Matrix: Water
Analysis Batch: 519530

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	250	250		mg/L		100	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 2320B-2011 - Alkalinity, Total (Continued)

Lab Sample ID: LCSD 680-519530/16
Matrix: Water
Analysis Batch: 519530

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity	250	253		mg/L		101	80 - 120	1	30

Method: 2540C-2011 - Total Dissolved Solids (Dried at 180 °C)

Lab Sample ID: MB 680-519801/1
Matrix: Water
Analysis Batch: 519801

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5.0	U	5.0	5.0	mg/L			04/11/18 12:30	1

Lab Sample ID: LCS 680-519801/2
Matrix: Water
Analysis Batch: 519801

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	68.8	71.0		mg/L		103	80 - 120

Lab Sample ID: LCSD 680-519801/3
Matrix: Water
Analysis Batch: 519801

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	68.8	74.0		mg/L		108	80 - 120	4	25

Lab Sample ID: MB 680-519837/1
Matrix: Water
Analysis Batch: 519837

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	5.0	U	5.0	5.0	mg/L			04/12/18 15:54	1

Lab Sample ID: LCS 680-519837/2
Matrix: Water
Analysis Batch: 519837

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	68.8	77.0		mg/L		112	80 - 120

Lab Sample ID: LCSD 680-519837/3
Matrix: Water
Analysis Batch: 519837

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	68.8	73.0		mg/L		106	80 - 120	5	25

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 680-519714/1-A
Matrix: Solid
Analysis Batch: 519778

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519714

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.13	U	0.50	0.13	mg/Kg		04/12/18 05:29	04/12/18 10:56	1

Lab Sample ID: LCS 680-519714/2-A
Matrix: Solid
Analysis Batch: 519778

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519714

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	4.85	4.81		mg/Kg		99	75 - 125

Lab Sample ID: 680-150889-1 MS
Matrix: Solid
Analysis Batch: 519778

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519714

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.20	J	6.34	6.85		mg/Kg	☼	105	75 - 125

Lab Sample ID: 680-150889-1 MSD
Matrix: Solid
Analysis Batch: 519778

Client Sample ID: SB04
Prep Type: Total/NA
Prep Batch: 519714

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cyanide, Total	0.20	J	6.41	6.60		mg/Kg	☼	100	75 - 125	4	30

Method: 9034 - Sulfide, Acid Soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 680-519708/1-A
Matrix: Solid
Analysis Batch: 519710

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 519708

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	60	U	60	60	mg/Kg		04/12/18 04:00	04/12/18 04:30	1

Lab Sample ID: LCS 680-519708/2-A
Matrix: Solid
Analysis Batch: 519710

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 519708

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	1250	1180		mg/Kg		94	50 - 150

Lab Sample ID: LCSD 680-519708/3-A
Matrix: Solid
Analysis Batch: 519710

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 519708

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfide	1250	1170		mg/Kg		93	50 - 150	1	50

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method: 9045D - Corrosivity as pH

Lab Sample ID: LCS 680-520696/1
Matrix: Solid
Analysis Batch: 520696

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
corrosivity by pH	7.00	7.1		SU		101	79 - 126

Lab Sample ID: 680-150889-1 DU
Matrix: Solid
Analysis Batch: 520696

Client Sample ID: SB04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
corrosivity by pH	5.8	HF	5.6		SU		4	40

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

GC/MS VOA

Analysis Batch: 519398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 680-519459/1-A	Method Blank	Total/NA	Water	8260B	519459
MB 680-519398/9	Method Blank	Total/NA	Water	8260B	
LCS 680-519398/4	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-519398/5	Lab Control Sample Dup	Total/NA	Water	8260B	

Leach Batch: 519459

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 680-519459/1-A	Method Blank	Total/NA	Water	1311	

Analysis Batch: 519536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	8260B	
680-150889-3	MW-02	Total/NA	Water	8260B	
680-150889-4	Trip Blank	Total/NA	Water	8260B	
MB 680-519536/9	Method Blank	Total/NA	Water	8260B	
LCS 680-519536/5	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-519536/6	Lab Control Sample Dup	Total/NA	Water	8260B	

Prep Batch: 519552

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	5035	

Analysis Batch: 519580

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	8260B	519552
MB 680-519580/11	Method Blank	Total/NA	Solid	8260B	
LCS 680-519580/4	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 680-519580/5	Lab Control Sample Dup	Total/NA	Solid	8260B	

Leach Batch: 519599

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	1311	
LB 680-519599/1-A	Method Blank	TCLP	Solid	1311	
680-150889-1 MS	SB04	TCLP	Solid	1311	
680-150889-1 MSD	SB04	TCLP	Solid	1311	

Analysis Batch: 519861

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	8260B	519599
LB 680-519599/1-A	Method Blank	TCLP	Solid	8260B	519599
MB 680-519861/9	Method Blank	Total/NA	Solid	8260B	
LCS 680-519861/4	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 680-519861/5	Lab Control Sample Dup	Total/NA	Solid	8260B	
680-150889-1 MS	SB04	TCLP	Solid	8260B	519599
680-150889-1 MSD	SB04	TCLP	Solid	8260B	519599

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

GC/MS Semi VOA

Prep Batch: 519522

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	3546	
MB 680-519522/7-A	Method Blank	Total/NA	Solid	3546	
LCS 680-519522/8-A	Lab Control Sample	Total/NA	Solid	3546	

Leach Batch: 519572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	1311	
LB 680-519572/1-B	Method Blank	TCLP	Solid	1311	

Prep Batch: 519670

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	3520C	519572
LB 680-519572/1-B	Method Blank	TCLP	Solid	3520C	519572
MB 680-519670/16-A	Method Blank	Total/NA	Solid	3520C	
LCS 680-519670/20-A	Lab Control Sample	Total/NA	Solid	3520C	

Prep Batch: 519677

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	3520C	
680-150889-3	MW-02	Total/NA	Water	3520C	
MB 680-519677/8-A	Method Blank	Total/NA	Water	3520C	
LCS 680-519677/9-A	Lab Control Sample	Total/NA	Water	3520C	
LCSD 680-519677/10-A	Lab Control Sample Dup	Total/NA	Water	3520C	

Analysis Batch: 519763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-519522/7-A	Method Blank	Total/NA	Solid	8270D	519522
LCS 680-519522/8-A	Lab Control Sample	Total/NA	Solid	8270D	519522

Analysis Batch: 520045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	8270D	519522

Analysis Batch: 520049

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-519677/8-A	Method Blank	Total/NA	Water	8270D	519677
LCS 680-519677/9-A	Lab Control Sample	Total/NA	Water	8270D	519677
LCSD 680-519677/10-A	Lab Control Sample Dup	Total/NA	Water	8270D	519677

Analysis Batch: 520052

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	8270D	519677
680-150889-3	MW-02	Total/NA	Water	8270D	519677

Analysis Batch: 520185

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	8270D	519670
LB 680-519572/1-B	Method Blank	TCLP	Solid	8270D	519670
MB 680-519670/16-A	Method Blank	Total/NA	Solid	8270D	519670
LCS 680-519670/20-A	Lab Control Sample	Total/NA	Solid	8270D	519670

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

HPLC/IC

Analysis Batch: 519736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	9056A	
680-150889-2	MW-01	Total/NA	Water	9056A	
680-150889-3	MW-02	Total/NA	Water	9056A	
680-150889-3	MW-02	Total/NA	Water	9056A	
MB 680-519736/88	Method Blank	Total/NA	Water	9056A	
LCS 680-519736/89	Lab Control Sample	Total/NA	Water	9056A	
LCSD 680-519736/90	Lab Control Sample Dup	Total/NA	Water	9056A	

Metals

Prep Batch: 519479

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	7471B	
MB 680-519479/1-A	Method Blank	Total/NA	Solid	7471B	
LCS 680-519479/2-A	Lab Control Sample	Total/NA	Solid	7471B	
680-150889-1 MS	SB04	Total/NA	Solid	7471B	
680-150889-1 MSD	SB04	Total/NA	Solid	7471B	

Prep Batch: 519520

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	3050B	
MB 680-519520/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 680-519520/2-A	Lab Control Sample	Total/NA	Solid	3050B	
680-150889-1 MS	SB04	Total/NA	Solid	3050B	
680-150889-1 MSD	SB04	Total/NA	Solid	3050B	

Prep Batch: 519560

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	7470A	
680-150889-3	MW-02	Total/NA	Water	7470A	
MB 680-519560/13-A	Method Blank	Total/NA	Water	7470A	
LCS 680-519560/14-A	Lab Control Sample	Total/NA	Water	7470A	

Leach Batch: 519572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	1311	
LB 680-519572/1-C	Method Blank	TCLP	Solid	1311	
LB 680-519572/1-D	Method Blank	TCLP	Solid	1311	
680-150889-1 MS	SB04	TCLP	Solid	1311	
680-150889-1 MSD	SB04	TCLP	Solid	1311	

Analysis Batch: 519787

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	6010C	519520
MB 680-519520/1-A	Method Blank	Total/NA	Solid	6010C	519520
LCS 680-519520/2-A	Lab Control Sample	Total/NA	Solid	6010C	519520
680-150889-1 MS	SB04	Total/NA	Solid	6010C	519520
680-150889-1 MSD	SB04	Total/NA	Solid	6010C	519520

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Metals (Continued)

Prep Batch: 519887

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	7470A	519572
LB 680-519572/1-C	Method Blank	TCLP	Solid	7470A	519572
MB 680-519887/1-A	Method Blank	Total/NA	Solid	7470A	
LCS 680-519887/2-A	Lab Control Sample	Total/NA	Solid	7470A	
680-150889-1 MS	SB04	TCLP	Solid	7470A	519572
680-150889-1 MSD	SB04	TCLP	Solid	7470A	519572

Analysis Batch: 519903

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	7471B	519479
MB 680-519479/1-A	Method Blank	Total/NA	Solid	7471B	519479
LCS 680-519479/2-A	Lab Control Sample	Total/NA	Solid	7471B	519479
680-150889-1 MS	SB04	Total/NA	Solid	7471B	519479
680-150889-1 MSD	SB04	Total/NA	Solid	7471B	519479

Analysis Batch: 519944

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	7470A	519560
680-150889-3	MW-02	Total/NA	Water	7470A	519560
MB 680-519560/13-A	Method Blank	Total/NA	Water	7470A	519560
LCS 680-519560/14-A	Lab Control Sample	Total/NA	Water	7470A	519560

Prep Batch: 520055

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	3010A	
680-150889-3	MW-02	Total/NA	Water	3010A	
MB 680-520055/1-A	Method Blank	Total/NA	Water	3010A	
LCS 680-520055/2-A	Lab Control Sample	Total/NA	Water	3010A	

Analysis Batch: 520140

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	7470A	519887
LB 680-519572/1-C	Method Blank	TCLP	Solid	7470A	519887
MB 680-519887/1-A	Method Blank	Total/NA	Solid	7470A	519887
LCS 680-519887/2-A	Lab Control Sample	Total/NA	Solid	7470A	519887
680-150889-1 MS	SB04	TCLP	Solid	7470A	519887
680-150889-1 MSD	SB04	TCLP	Solid	7470A	519887

Prep Batch: 520523

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	3010A	519572
LB 680-519572/1-D	Method Blank	TCLP	Solid	3010A	519572
MB 680-520523/1-A	Method Blank	Total/NA	Solid	3010A	
LCS 680-520523/2-A	Lab Control Sample	Total/NA	Solid	3010A	
680-150889-1 MS	SB04	TCLP	Solid	3010A	519572
680-150889-1 MSD	SB04	TCLP	Solid	3010A	519572

Analysis Batch: 520707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	6010C	520055
680-150889-3	MW-02	Total/NA	Water	6010C	520055

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Metals (Continued)

Analysis Batch: 520707 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-520055/1-A	Method Blank	Total/NA	Water	6010C	520055
LCS 680-520055/2-A	Lab Control Sample	Total/NA	Water	6010C	520055

Analysis Batch: 520874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	TCLP	Solid	6010C	520523
LB 680-519572/1-D	Method Blank	TCLP	Solid	6010C	520523
MB 680-520523/1-A	Method Blank	Total/NA	Solid	6010C	520523
LCS 680-520523/2-A	Lab Control Sample	Total/NA	Solid	6010C	520523
680-150889-1 MS	SB04	TCLP	Solid	6010C	520523
680-150889-1 MSD	SB04	TCLP	Solid	6010C	520523

Analysis Batch: 520877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	2340B-2011	
680-150889-3	MW-02	Total/NA	Water	2340B-2011	
MB 680-520877/1	Method Blank	Total/NA	Water	2340B-2011	

General Chemistry

Analysis Batch: 519530

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	2320B-2011	
680-150889-3	MW-02	Total/NA	Water	2320B-2011	
MB 680-519530/7	Method Blank	Total/NA	Water	2320B-2011	
LCS 680-519530/8	Lab Control Sample	Total/NA	Water	2320B-2011	
LCSD 680-519530/16	Lab Control Sample Dup	Total/NA	Water	2320B-2011	

Analysis Batch: 519542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	Moisture	

Prep Batch: 519708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	9030B	
MB 680-519708/1-A	Method Blank	Total/NA	Solid	9030B	
LCS 680-519708/2-A	Lab Control Sample	Total/NA	Solid	9030B	
LCSD 680-519708/3-A	Lab Control Sample Dup	Total/NA	Solid	9030B	

Analysis Batch: 519710

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	9034	519708
MB 680-519708/1-A	Method Blank	Total/NA	Solid	9034	519708
LCS 680-519708/2-A	Lab Control Sample	Total/NA	Solid	9034	519708
LCSD 680-519708/3-A	Lab Control Sample Dup	Total/NA	Solid	9034	519708

Prep Batch: 519714

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	9012B	
MB 680-519714/1-A	Method Blank	Total/NA	Solid	9012B	

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

General Chemistry (Continued)

Prep Batch: 519714 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 680-519714/2-A	Lab Control Sample	Total/NA	Solid	9012B	
680-150889-1 MS	SB04	Total/NA	Solid	9012B	
680-150889-1 MSD	SB04	Total/NA	Solid	9012B	

Analysis Batch: 519733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	1030	
MB 680-519733/1	Method Blank	Total/NA	Solid	1030	
LCS 680-519733/2	Lab Control Sample	Total/NA	Solid	1030	
LCSD 680-519733/12	Lab Control Sample Dup	Total/NA	Solid	1030	

Analysis Batch: 519778

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	9012B	519714
MB 680-519714/1-A	Method Blank	Total/NA	Solid	9012B	519714
LCS 680-519714/2-A	Lab Control Sample	Total/NA	Solid	9012B	519714
680-150889-1 MS	SB04	Total/NA	Solid	9012B	519714
680-150889-1 MSD	SB04	Total/NA	Solid	9012B	519714

Analysis Batch: 519801

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-2	MW-01	Total/NA	Water	2540C-2011	
680-150889-3	MW-02	Total/NA	Water	2540C-2011	
MB 680-519801/1	Method Blank	Total/NA	Water	2540C-2011	
LCS 680-519801/2	Lab Control Sample	Total/NA	Water	2540C-2011	
LCSD 680-519801/3	Lab Control Sample Dup	Total/NA	Water	2540C-2011	

Analysis Batch: 519837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-519837/1	Method Blank	Total/NA	Water	2540C-2011	
LCS 680-519837/2	Lab Control Sample	Total/NA	Water	2540C-2011	
LCSD 680-519837/3	Lab Control Sample Dup	Total/NA	Water	2540C-2011	

Analysis Batch: 520696

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-150889-1	SB04	Total/NA	Solid	9045D	
LCS 680-520696/1	Lab Control Sample	Total/NA	Solid	9045D	
680-150889-1 DU	SB04	Total/NA	Solid	9045D	

Lab Chronicle

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			20.05 g	400 mL	519599	04/11/18 16:45	EAB	TAL SAV
TCLP	Analysis	8260B		20	5 mL	5 mL	519861	04/13/18 14:41	JLK	TAL SAV
	Instrument ID: CMSP2									
TCLP	Leach	1311			100.13 g	2000 mL	519572	04/11/18 16:50	EAB	TAL SAV
TCLP	Prep	3520C			205.7 mL	1 mL	519670	04/12/18 15:10	CMJ	TAL SAV
TCLP	Analysis	8270D		1			520185	04/17/18 01:31	KNW	TAL SAV
	Instrument ID: CMSN									
TCLP	Leach	1311			100.13 g	2000 mL	519572	04/11/18 16:50	EAB	TAL SAV
TCLP	Prep	3010A			5 mL	50 mL	520523	04/18/18 13:16	AJR	TAL SAV
TCLP	Analysis	6010C		1			520874	04/19/18 16:53	BCB	TAL SAV
	Instrument ID: ICPF									
TCLP	Leach	1311			100.13 g	2000 mL	519572	04/11/18 16:50	EAB	TAL SAV
TCLP	Prep	7470A			0.5 mL	50 mL	519887	04/13/18 09:27	NVF	TAL SAV
TCLP	Analysis	7470A		1			520140	04/16/18 09:24	NVF	TAL SAV
	Instrument ID: LEEMAN2									
Total/NA	Analysis	1030		1			519733	04/12/18 07:57	CFJ	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Analysis	9045D		1	19.91 g	20 mL	520696	04/19/18 13:18	CFJ	TAL SAV
	Instrument ID: GEpHM2									
Total/NA	Analysis	Moisture		1			519542	04/11/18 09:25	EAB	TAL SAV
	Instrument ID: NOEQUIP									

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			6.514 g	5 mL	519552	04/11/18 09:15	FES	TAL SAV
Total/NA	Analysis	8260B		1	5 g	5 g	519580	04/11/18 18:08	JLK	TAL SAV
	Instrument ID: CMSAB									
Total/NA	Prep	3546			15.51 g	1 mL	519522	04/11/18 08:30	JAM	TAL SAV
Total/NA	Analysis	8270D		1			520045	04/15/18 21:02	DBM	TAL SAV
	Instrument ID: CMSN									
Total/NA	Prep	3050B			1.17 g	100 mL	519520	04/11/18 06:50	CDD	TAL SAV
Total/NA	Analysis	6010C		1			519787	04/11/18 21:10	BCB	TAL SAV
	Instrument ID: ICPF									
Total/NA	Prep	7471B			0.58 g	50 mL	519479	04/10/18 15:11	NVF	TAL SAV
Total/NA	Analysis	7471B		1			519903	04/12/18 17:59	NVF	TAL SAV
	Instrument ID: LEEMAN2									
Total/NA	Prep	9012B			1.01 g	50 mL	519714	04/12/18 05:29	DAM	TAL SAV
Total/NA	Analysis	9012B		1			519778	04/12/18 10:14	DAM	TAL SAV
	Instrument ID: LACHAT1									
Total/NA	Prep	9030B			1.05 g	6 mL	519708	04/12/18 04:00	DAM	TAL SAV

Lab Chronicle

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: SB04
Date Collected: 04/09/18 14:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-1
Matrix: Solid
Percent Solids: 76.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9034		1	6 mL	6 mL	519710	04/12/18 04:30	DAM	TAL SAV
	Instrument ID: NOEQUIP									

Client Sample ID: MW-01
Date Collected: 04/09/18 09:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	519536	04/11/18 15:14	Y1S	TAL SAV
	Instrument ID: CMSP2									
Total/NA	Prep	3520C			1039.4 mL	1 mL	519677	04/12/18 15:10	CMJ	TAL SAV
Total/NA	Analysis	8270D		1			520052	04/16/18 00:03	KNW	TAL SAV
	Instrument ID: CMST									
Total/NA	Analysis	9056A		1	5 mL	5 mL	519736	04/12/18 20:38	CJM	TAL SAV
	Instrument ID: CICK									
Total/NA	Analysis	9056A		5	5 mL	5 mL	519736	04/12/18 20:51	CJM	TAL SAV
	Instrument ID: CICK									
Total/NA	Analysis	2340B-2011		1			520877	04/20/18 12:15	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Prep	3010A			50 mL	50 mL	520055	04/14/18 16:02	AJR	TAL SAV
Total/NA	Analysis	6010C		1			520707	04/18/18 19:12	BCB	TAL SAV
	Instrument ID: ICPF									
Total/NA	Prep	7470A			50 mL	50 mL	519560	04/11/18 09:42	NVF	TAL SAV
Total/NA	Analysis	7470A		1			519944	04/13/18 08:23	NVF	TAL SAV
	Instrument ID: LEEMAN2									
Total/NA	Analysis	2320B-2011		1			519530	04/10/18 18:09	BTD	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540C-2011		1	50 mL	100 mL	519801	04/11/18 12:30	BTD	TAL SAV
	Instrument ID: NOEQUIP									

Client Sample ID: MW-02
Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	519536	04/11/18 18:32	Y1S	TAL SAV
	Instrument ID: CMSP2									
Total/NA	Prep	3520C			1043.9 mL	1 mL	519677	04/12/18 15:10	CMJ	TAL SAV
Total/NA	Analysis	8270D		1			520052	04/16/18 00:27	KNW	TAL SAV
	Instrument ID: CMST									
Total/NA	Analysis	9056A		1	5 mL	5 mL	519736	04/12/18 21:04	CJM	TAL SAV
	Instrument ID: CICK									

Lab Chronicle

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Client Sample ID: MW-02

Date Collected: 04/09/18 09:55
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	5 mL	5 mL	519736	04/12/18 21:17	CJM	TAL SAV
	Instrument ID: CICK									
Total/NA	Analysis	2340B-2011		1			520877	04/20/18 12:15	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Prep	3010A			50 mL	50 mL	520055	04/14/18 16:02	AJR	TAL SAV
Total/NA	Analysis	6010C		1			520707	04/18/18 19:06	BCB	TAL SAV
	Instrument ID: ICPF									
Total/NA	Prep	7470A			50 mL	50 mL	519560	04/11/18 09:42	NVF	TAL SAV
Total/NA	Analysis	7470A		1			519944	04/13/18 08:33	NVF	TAL SAV
	Instrument ID: LEEMAN2									
Total/NA	Analysis	2320B-2011		1			519530	04/10/18 18:15	BTD	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540C-2011		1	50 mL	100 mL	519801	04/11/18 12:30	BTD	TAL SAV
	Instrument ID: NOEQUIP									

Client Sample ID: Trip Blank

Date Collected: 04/09/18 00:00
Date Received: 04/10/18 08:00

Lab Sample ID: 680-150889-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	5 mL	5 mL	519536	04/11/18 14:25	Y1S	TAL SAV
	Instrument ID: CMSP2									

Laboratory References:
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Accreditation/Certification Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Laboratory: TestAmerica Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Georgia	State Program	4	803	06-30-18

Method Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-150889-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL SAV
8270D	Semivolatile Organic Compounds (GC/MS)	SW846	TAL SAV
9056A	Anions, Ion Chromatography	SW846	TAL SAV
2340B-2011	Total Hardness (as CaCO3) by calculation	SM	TAL SAV
6010C	Metals (ICP)	SW846	TAL SAV
7470A	Mercury (CVAA)	SW846	TAL SAV
7471B	Mercury (CVAA)	SW846	TAL SAV
1030	Ignitability, Solids	SW846	TAL SAV
2320B-2011	Alkalinity, Total	SM	TAL SAV
2540C-2011	Total Dissolved Solids (Dried at 180 °C)	SM	TAL SAV
9012B	Cyanide, Total andor Amenable	SW846	TAL SAV
9034	Sulfide, Acid Soluble and Insoluble (Titrimetric)	SW846	TAL SAV
9045D	Corrosivity as pH	SW846	TAL SAV
Moisture	Percent Moisture	EPA	TAL SAV
1311	TCLP Extraction	SW846	TAL SAV
3010A	Preparation, Total Metals	SW846	TAL SAV
3050B	Preparation, Metals	SW846	TAL SAV
3520C	Liquid-Liquid Extraction (Continuous)	SW846	TAL SAV
3546	Microwave Extraction	SW846	TAL SAV
5030B	Purge and Trap	SW846	TAL SAV
5035	Closed System Purge and Trap	SW846	TAL SAV
7470A	Preparation, Mercury	SW846	TAL SAV
7471B	Preparation, Mercury	SW846	TAL SAV
9012B	Cyanide, Total and/or Amenable, Distillation	SW846	TAL SAV
9030B	Sulfide, Distillation (Acid Soluble and Insoluble)	SW846	TAL SAV

Protocol References:

EPA = US Environmental Protection Agency
SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Phone (912) 354-7858 Fax (912) 352-0165

Chain of Custody Record

681-Adams

TestAmerica

Client Information	Sampler:	Lab PM: Conner, Keaton	Carrier Tracking No(s):	COC No: 680-92602-36878.1
Client Contact: Dr. Brian Meyer	Phone:	E-Mail: keaton.conner@testamericainc.com		Page: Page 1 of 2
Company: Georgia State University				Job #:
Address: Dept of GeoSciences 24 Peachtree Center Avenue Suite 340	Due Date Requested:			
City: Atlanta	TAT Requested (days):			
State, Zip: GA, 30303				
Phone: 404-391-3339(Tel)	PO #: Purchase Order not required			
Email: bmeyer2@gsu.edu	WO #:			
Project Name: Monitoring Well Installation	Project #: 68019780			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Special Instructions/Note:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Moisture - Moisture	8260B - VOCs	6010C, 7471B	8270D - SVOCs	8260B - TCLP Volatiles	6010C, 7470A	1030, 9012B, 9034, 9045D	8270D - TCLP Semivolatiles	9056A_ORGFM_28D - Chloride & Sulfate	2320B - Alkalinity	6010C, 7470A, SM2340B	8260B - VOCs	2540C - Total Dissolved Solids	Total Number of containers
			Preservation Code:				N	N	N	N	N	N	N	N	N	N	D	A	N	
SB04	4/9/18	1400	G	Solid				1	1	1										3
SB04	4/9/18	1410	G	Solid							3	1	1	1						6
				Solid																
MW-01				Water						2					1	1	1	3	1	9
MW-02				Water						2					1	1	1	3	1	9
				Water																
				Water																
				Water																

680-150889 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:	
Relinquished by:		Date/Time: 4/9/18 17:20	Company GSU	Received by:	Date/Time: 4/9/18	Company 17:20	
Relinquished by:	4/9/18	Date/Time: 17:25	Company TA	Received by:	Date/Time:	Company	
Relinquished by:		Date/Time:	Company	Received by:	Date/Time: 04/10/18 08:00	Company TA	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 1.6/1.1°C (CF) 1.7/1.2°C

Ver: 08/04/2016

Login Sample Receipt Checklist

Client: Georgia State University

Job Number: 680-150889-1

Login Number: 150889
List Number: 1
Creator: Edwards, Jessica R

List Source: TestAmerica Savannah

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	No date or time on COC or containers.
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	False	No date or time on COC or sample containers
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

TestAmerica Job ID: 680-159059-1
Client Project/Site: Monitoring Well Installation

For:
Georgia State University
Dept of GeoSciences
24 Peachtree Center Avenue
Suite 340
Atlanta, Georgia 30303

Attn: Dr. Brian Meyer

Authorized for release by:
10/22/2018 4:05:23 PM

Keaton Conner, Project Manager I
(813)885-7427
keaton.conner@testamericainc.com

Definitions/Glossary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Sample Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-159059-1	RW - 01	Water	10/07/18 14:00	10/10/18 09:40

Case Narrative

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Job ID: 680-159059-1

Laboratory: TestAmerica Savannah

Narrative

CASE NARRATIVE
Client: Georgia State University
Project: Monitoring Well Installation

Report Number: 680-159059-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In the event of interference or analytes present at high concentrations, samples may be diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

RECEIPT
The samples were received on 10/10/2018; the samples arrived in good condition and properly preserved. The temperature of the coolers at receipt was 21.6° C.

RECEIPT EXCEPTIONS
The following sample was received at the laboratory outside the required temperature criteria: RW - 01 (680-159059-1). The client was contacted regarding this issue, and the laboratory was instructed to proceed with analysis.

METALS (ICP)
Sample RW - 01 (680-159059-1) was analyzed for Metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 10/13/2018 and analyzed on 10/22/2018.

Aluminum, Calcium and Silver were detected in method blank MB 680-543244/1-A at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

ALKALINITY
Sample RW - 01 (680-159059-1) was analyzed for alkalinity in accordance with SM 2320B. The samples were analyzed on 10/15/2018.

TOTAL DISSOLVED SOLIDS
Sample RW - 01 (680-159059-1) was analyzed for total dissolved solids in accordance with SM 2540C. The samples were analyzed on 10/11/2018.

9056 ANIONS
Sample RW - 01 (680-159059-1) was analyzed for 9056 Anions in accordance with SW 846 9056. The samples were analyzed on 10/21/2018.

TOTAL HARDNESS (AS CACO3) BY CALCULATION
Sample RW - 01 (680-159059-1) was analyzed for total hardness (as CaCO3) by calculation in accordance with SM 2340B. The samples were analyzed on 10/22/2018.

Client Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Client Sample ID: RW - 01
Date Collected: 10/07/18 14:00
Date Received: 10/10/18 09:40

Lab Sample ID: 680-159059-1
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.41	J	0.50	0.20	mg/L			10/21/18 00:40	1
Sulfate	0.40	U	1.0	0.40	mg/L			10/21/18 00:40	1

Method: 2340B-2011 - Total Hardness (as CaCO3) by calculation

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	3.3	U	3.3	3.3	mg/L			10/22/18 15:22	1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	68	J B	200	24	ug/L		10/13/18 10:15	10/22/18 14:46	1
Antimony	12	J	20	5.3	ug/L		10/13/18 10:15	10/22/18 14:46	1
Arsenic	6.2	U	20	6.2	ug/L		10/13/18 10:15	10/22/18 14:46	1
Barium	130		10	1.7	ug/L		10/13/18 10:15	10/22/18 14:46	1
Beryllium	0.10	U	4.0	0.10	ug/L		10/13/18 10:15	10/22/18 14:46	1
Cadmium	1.0	U	5.0	1.0	ug/L		10/13/18 10:15	10/22/18 14:46	1
Calcium	610	B	500	25	ug/L		10/13/18 10:15	10/22/18 14:46	1
Chromium	1.6	U	10	1.6	ug/L		10/13/18 10:15	10/22/18 14:46	1
Cobalt	1.0	U	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:46	1
Copper	7.8	J	20	1.8	ug/L		10/13/18 10:15	10/22/18 14:46	1
Iron	48	J	50	17	ug/L		10/13/18 10:15	10/22/18 14:46	1
Lead	3.9	U	10	3.9	ug/L		10/13/18 10:15	10/22/18 14:46	1
Magnesium	130	J	500	33	ug/L		10/13/18 10:15	10/22/18 14:46	1
Manganese	6.1	J	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:46	1
Nickel	2.1	U	40	2.1	ug/L		10/13/18 10:15	10/22/18 14:46	1
Potassium	660	J	1000	17	ug/L		10/13/18 10:15	10/22/18 14:46	1
Selenium	9.9	U	20	9.9	ug/L		10/13/18 10:15	10/22/18 14:46	1
Silver	0.85	J B	10	0.60	ug/L		10/13/18 10:15	10/22/18 14:46	1
Sodium	490	J	1000	480	ug/L		10/13/18 10:15	10/22/18 14:46	1
Thallium	6.0	U	25	6.0	ug/L		10/13/18 10:15	10/22/18 14:46	1
Vanadium	1.0	U	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:46	1
Zinc	71		20	7.0	ug/L		10/13/18 10:15	10/22/18 14:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Carbon Dioxide, Free	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:51	1
Bicarbonate ion as HCO3	6.1	U	6.1	6.1	mg/L			10/15/18 11:51	1
Total Dissolved Solids	5.0	U	5.0	5.0	mg/L			10/11/18 07:03	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 680-544217/65
Matrix: Water
Analysis Batch: 544217

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.20	U	0.50	0.20	mg/L			10/20/18 19:56	1
Sulfate	0.40	U	1.0	0.40	mg/L			10/20/18 19:56	1

Lab Sample ID: LCS 680-544217/66
Matrix: Water
Analysis Batch: 544217

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.98		mg/L		100	90 - 110
Sulfate	10.0	9.99		mg/L		100	90 - 110

Lab Sample ID: LCSD 680-544217/67
Matrix: Water
Analysis Batch: 544217

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	10.0	9.92		mg/L		99	90 - 110	1	15
Sulfate	10.0	9.71		mg/L		97	90 - 110	3	15

Lab Sample ID: 680-159059-1 DU
Matrix: Water
Analysis Batch: 544217

Client Sample ID: RW - 01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	0.41	J	0.403	J	mg/L		3	15
Sulfate	0.40	U	0.40	U	mg/L		NC	15

Method: 2340B-2011 - Total Hardness (as CaCO3) by calculation

Lab Sample ID: MB 680-544401/1
Matrix: Water
Analysis Batch: 544401

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	3.3	U	3.3	3.3	mg/L			10/22/18 15:22	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 680-543244/1-A
Matrix: Water
Analysis Batch: 544400

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 543244

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	25.0	J	200	24	ug/L		10/13/18 10:15	10/22/18 14:38	1
Antimony	5.3	U	20	5.3	ug/L		10/13/18 10:15	10/22/18 14:38	1
Arsenic	6.2	U	20	6.2	ug/L		10/13/18 10:15	10/22/18 14:38	1
Barium	1.7	U	10	1.7	ug/L		10/13/18 10:15	10/22/18 14:38	1
Beryllium	0.10	U	4.0	0.10	ug/L		10/13/18 10:15	10/22/18 14:38	1
Cadmium	1.0	U	5.0	1.0	ug/L		10/13/18 10:15	10/22/18 14:38	1

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 680-543244/1-A
Matrix: Water
Analysis Batch: 544400

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 543244

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	26.1	J	500	25	ug/L		10/13/18 10:15	10/22/18 14:38	1
Chromium	1.6	U	10	1.6	ug/L		10/13/18 10:15	10/22/18 14:38	1
Cobalt	1.0	U	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:38	1
Copper	1.8	U	20	1.8	ug/L		10/13/18 10:15	10/22/18 14:38	1
Iron	17	U	50	17	ug/L		10/13/18 10:15	10/22/18 14:38	1
Lead	3.9	U	10	3.9	ug/L		10/13/18 10:15	10/22/18 14:38	1
Magnesium	33	U	500	33	ug/L		10/13/18 10:15	10/22/18 14:38	1
Manganese	1.0	U	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:38	1
Nickel	2.1	U	40	2.1	ug/L		10/13/18 10:15	10/22/18 14:38	1
Potassium	17	U	1000	17	ug/L		10/13/18 10:15	10/22/18 14:38	1
Selenium	9.9	U	20	9.9	ug/L		10/13/18 10:15	10/22/18 14:38	1
Silver	0.605	J	10	0.60	ug/L		10/13/18 10:15	10/22/18 14:38	1
Sodium	480	U	1000	480	ug/L		10/13/18 10:15	10/22/18 14:38	1
Thallium	6.0	U	25	6.0	ug/L		10/13/18 10:15	10/22/18 14:38	1
Vanadium	1.0	U	10	1.0	ug/L		10/13/18 10:15	10/22/18 14:38	1
Zinc	7.0	U	20	7.0	ug/L		10/13/18 10:15	10/22/18 14:38	1

Lab Sample ID: LCS 680-543244/2-A
Matrix: Water
Analysis Batch: 544400

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 543244

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5000	5040		ug/L		101	80 - 120
Antimony	50.0	50.4		ug/L		101	80 - 120
Arsenic	100	107		ug/L		107	80 - 120
Barium	100	102		ug/L		102	80 - 120
Beryllium	50.0	52.1		ug/L		104	80 - 120
Cadmium	50.0	51.5		ug/L		103	80 - 120
Calcium	5000	5100		ug/L		102	80 - 120
Chromium	100	104		ug/L		104	80 - 120
Cobalt	50.0	51.4		ug/L		103	80 - 120
Copper	100	104		ug/L		104	80 - 120
Iron	5000	5030		ug/L		101	80 - 120
Lead	500	507		ug/L		101	80 - 120
Magnesium	5000	5040		ug/L		101	80 - 120
Manganese	500	525		ug/L		105	80 - 120
Nickel	100	103		ug/L		103	80 - 120
Potassium	8000	7440		ug/L		93	80 - 120
Selenium	100	101		ug/L		101	80 - 120
Silver	50.0	52.3		ug/L		105	80 - 120
Sodium	5000	5090		ug/L		102	80 - 120
Thallium	40.0	38.8		ug/L		97	80 - 120
Vanadium	100	101		ug/L		101	80 - 120
Zinc	100	104		ug/L		104	80 - 120

QC Sample Results

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Method: 2320B-2011 - Alkalinity, Total

Lab Sample ID: MB 680-543500/8
Matrix: Water
Analysis Batch: 543500

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Bicarbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Carbonate Alkalinity as CaCO3	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Hydroxide Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Carbon Dioxide, Free	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Phenolphthalein Alkalinity	5.0	U	5.0	5.0	mg/L			10/15/18 11:33	1
Bicarbonate ion as HCO3	6.1	U	6.1	6.1	mg/L			10/15/18 11:33	1

Lab Sample ID: LCS 680-543500/9
Matrix: Water
Analysis Batch: 543500

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	250	250		mg/L		100	80 - 120

Lab Sample ID: LCSD 680-543500/35
Matrix: Water
Analysis Batch: 543500

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity	250	267		mg/L		107	80 - 120	6	30

Method: 2540C-2011 - Total Dissolved Solids (Dried at 180 °C)

Lab Sample ID: MB 680-542992/1
Matrix: Water
Analysis Batch: 542992

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	10	U	10	10	mg/L			10/11/18 07:03	1

Lab Sample ID: LCS 680-542992/2
Matrix: Water
Analysis Batch: 542992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	55.0	63.0		mg/L		114	80 - 120

Lab Sample ID: LCSD 680-542992/3
Matrix: Water
Analysis Batch: 542992

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Dissolved Solids	55.0	58.0		mg/L		105	80 - 120	8	25

QC Association Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

HPLC/IC

Analysis Batch: 544217

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	9056A	
MB 680-544217/65	Method Blank	Total/NA	Water	9056A	
LCS 680-544217/66	Lab Control Sample	Total/NA	Water	9056A	
LCSD 680-544217/67	Lab Control Sample Dup	Total/NA	Water	9056A	
680-159059-1 DU	RW - 01	Total/NA	Water	9056A	

Metals

Prep Batch: 543244

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	3010A	
MB 680-543244/1-A	Method Blank	Total/NA	Water	3010A	
LCS 680-543244/2-A	Lab Control Sample	Total/NA	Water	3010A	

Analysis Batch: 544400

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	6010C	543244
MB 680-543244/1-A	Method Blank	Total/NA	Water	6010C	543244
LCS 680-543244/2-A	Lab Control Sample	Total/NA	Water	6010C	543244

Analysis Batch: 544401

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	2340B-2011	
MB 680-544401/1	Method Blank	Total/NA	Water	2340B-2011	

General Chemistry

Analysis Batch: 542992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	2540C-2011	
MB 680-542992/1	Method Blank	Total/NA	Water	2540C-2011	
LCS 680-542992/2	Lab Control Sample	Total/NA	Water	2540C-2011	
LCSD 680-542992/3	Lab Control Sample Dup	Total/NA	Water	2540C-2011	

Analysis Batch: 543500

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-159059-1	RW - 01	Total/NA	Water	2320B-2011	
MB 680-543500/8	Method Blank	Total/NA	Water	2320B-2011	
LCS 680-543500/9	Lab Control Sample	Total/NA	Water	2320B-2011	
LCSD 680-543500/35	Lab Control Sample Dup	Total/NA	Water	2320B-2011	

Lab Chronicle

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Client Sample ID: RW - 01
Date Collected: 10/07/18 14:00
Date Received: 10/10/18 09:40

Lab Sample ID: 680-159059-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1	5 mL	5 mL	544217	10/21/18 00:40	UI	TAL SAV
	Instrument ID: CICK									
Total/NA	Analysis	2340B-2011		1			544401	10/22/18 15:22	BCB	TAL SAV
	Instrument ID: NOEQUIP									
Total/NA	Prep	3010A			50 mL	50 mL	543244	10/13/18 10:15	AJR	TAL SAV
Total/NA	Analysis	6010C		1			544400	10/22/18 14:46	BCB	TAL SAV
	Instrument ID: ICPE									
Total/NA	Analysis	2320B-2011		1			543500	10/15/18 11:51	BTD	TAL SAV
	Instrument ID: MANTECH									
Total/NA	Analysis	2540C-2011		1	200 mL	200 mL	542992	10/11/18 07:03	BTD	TAL SAV
	Instrument ID: NOEQUIP									

Laboratory References:
TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Accreditation/Certification Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Laboratory: TestAmerica Savannah

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Georgia	State Program	4	N/A	06-30-19

Method Summary

Client: Georgia State University
Project/Site: Monitoring Well Installation

TestAmerica Job ID: 680-159059-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL SAV
2340B-2011	Total Hardness (as CaCO3) by calculation	SM	TAL SAV
6010C	Metals (ICP)	SW846	TAL SAV
2320B-2011	Alkalinity, Total	SM	TAL SAV
2540C-2011	Total Dissolved Solids (Dried at 180 °C)	SM	TAL SAV
3010A	Preparation, Total Metals	SW846	TAL SAV

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Phone (912) 354-7858 Fax (912) 352-0165

681-Atlanta

Chain of Custody Record

681-Atlanta

TestAmerica

Client Information	Sampler:	Lab PM: Conner, Keaton	Carrier Tracking No(s):	COC No: 680-97206-38696.1
Client Contact: Dr. Brian Meyer	Phone:	E-Mail: keaton.conner@testamericainc.com		Page: Page 1 of 1
Company: Georgia State University		Analysis Requested		Job #:
Address: Dept of GeoSciences 24 Peachtree Center Avenue Suite 340	Due Date Requested:			Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify), Other:
City: Atlanta	TAT Requested (days):			
State, Zip: GA, 30303				
Phone: 404-391-3339(Tel)	PO #: Purchase Order not required			
Email: bmeyer2@gsu.edu	WO #:			
Project Name: Monitoring Well Installation	Project #: 68019780			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9056A_ORGFM_28D - Chloride & Sulfate	2320B - Alkalinity	6010C, SM2340B	2540C - Total Dissolved Solids	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D	N		
RW-01	10/7/18	14:00	C	Water			1	1	1	1	4	

680-159059 Chain of Custody

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:			
Relinquished by:	Date/Time: 10/8/18 14:00	Company: GSU	Received by:	Date/Time: 10-10-18 0940	Company: FASAV
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 21.0 / 21.6

Ver: 08/04/2016

Login Sample Receipt Checklist

Client: Georgia State University

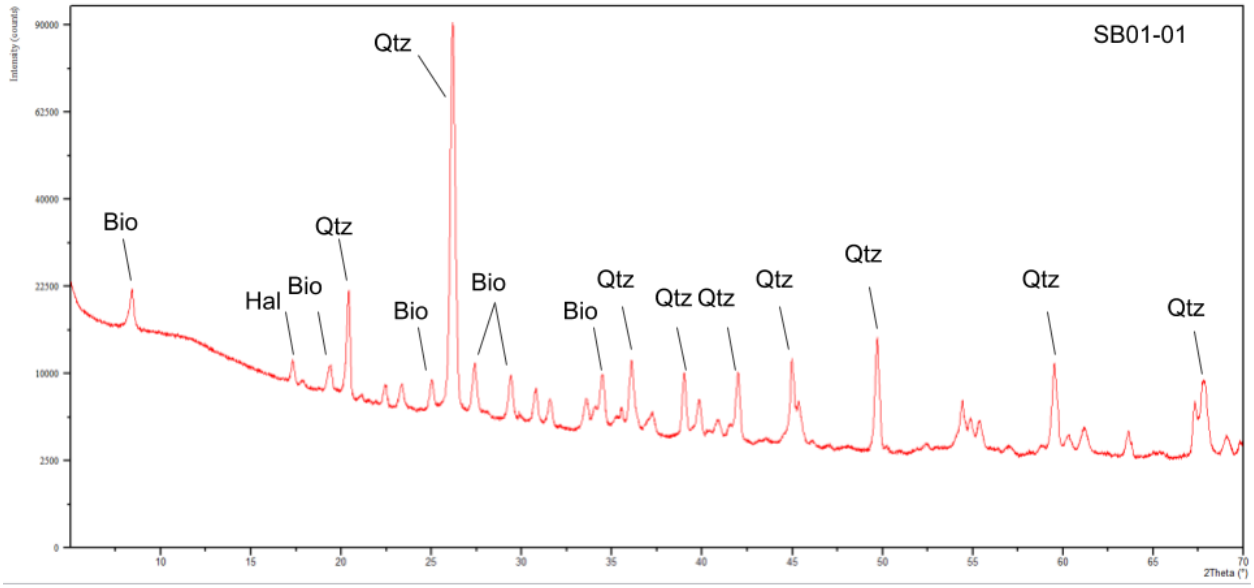
Job Number: 680-159059-1

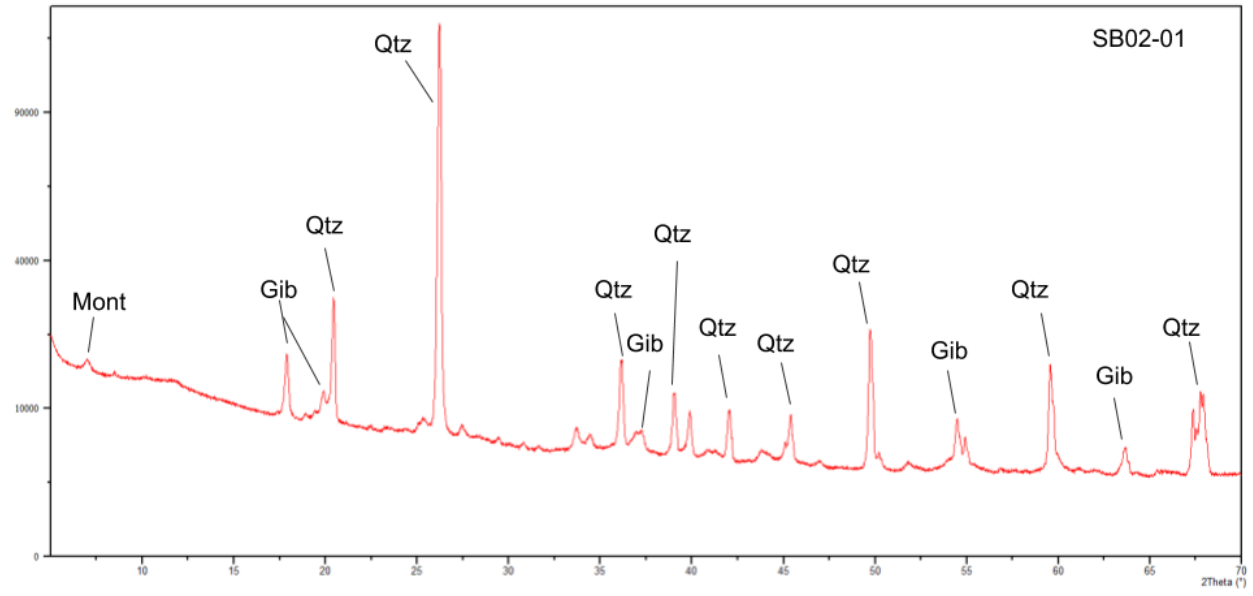
Login Number: 159059
List Number: 1
Creator: Nobles, Terry G

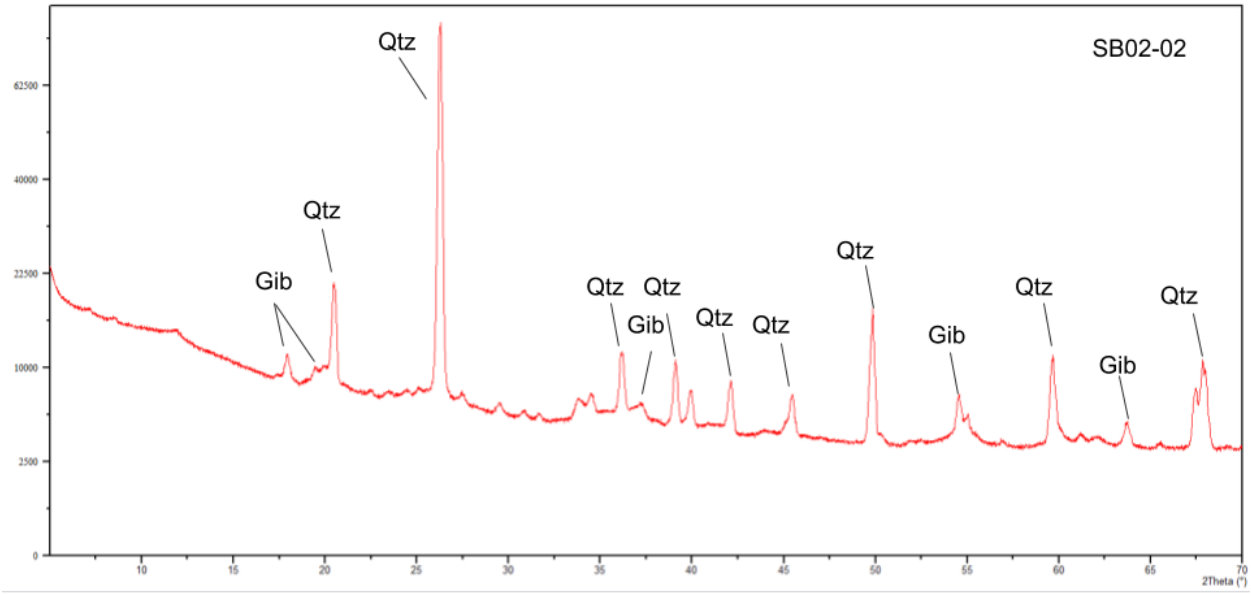
List Source: TestAmerica Savannah

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix C: X-Ray Diffraction Patterns



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Qtz
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Gib
Qtz
Qtz
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Qtz
62500
40000
22500
10000
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10
15
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25
30
35
40
45
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55
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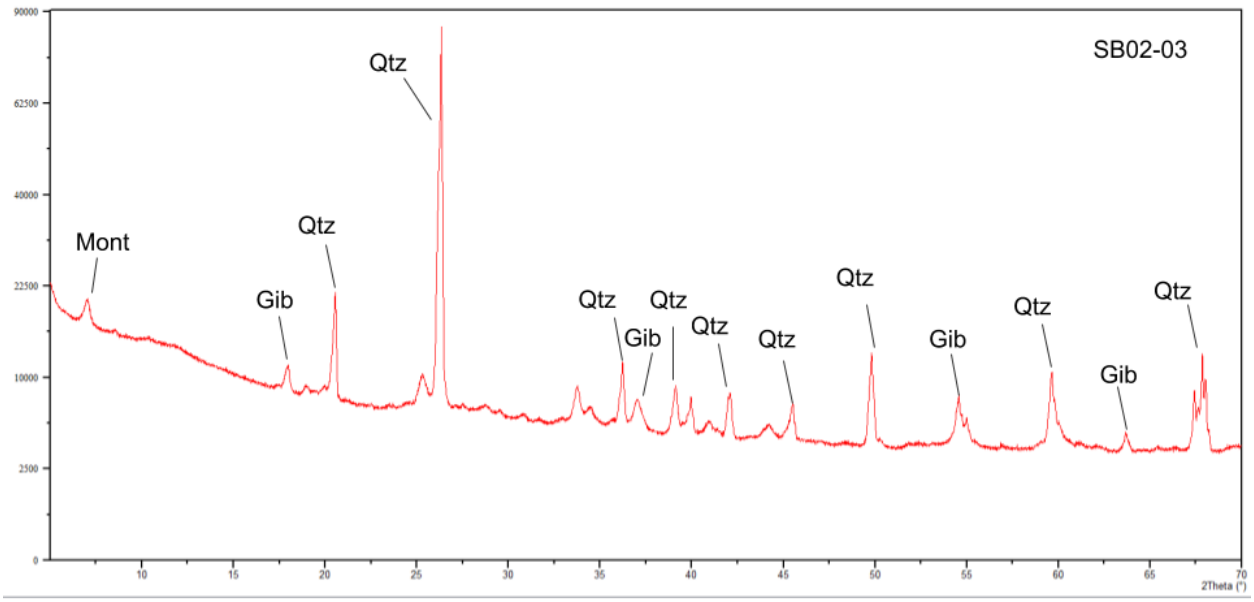
65
70
2Theta (°)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Qtz
Gib
Qtz
Qtz
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62500
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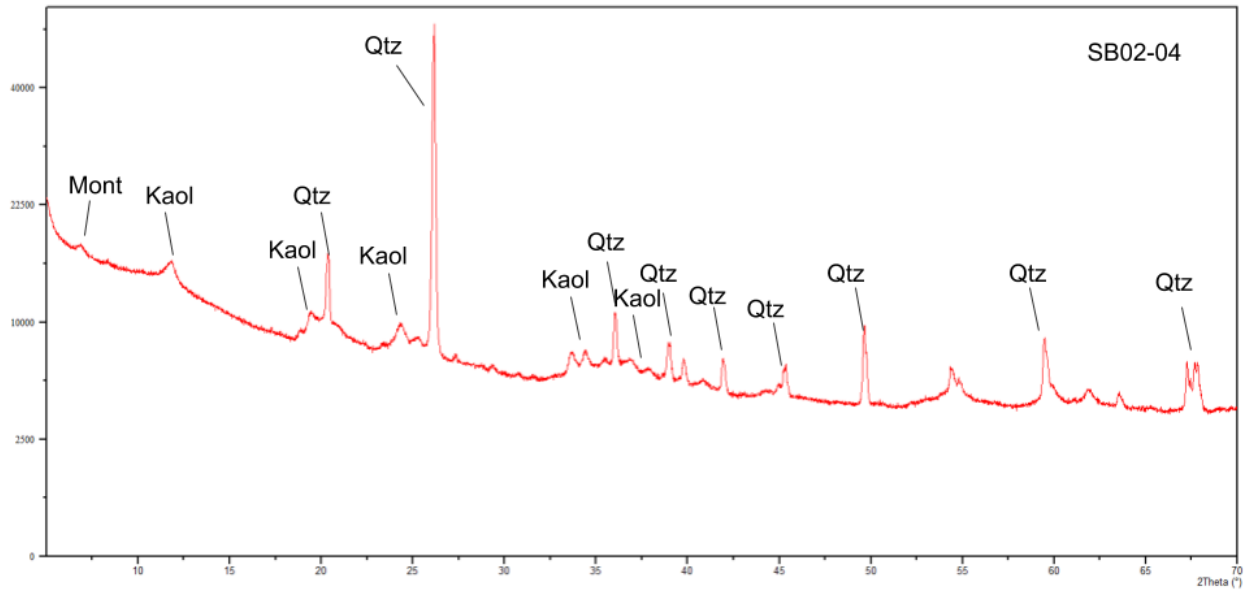
2Theta (°)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Kaol
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Kaol
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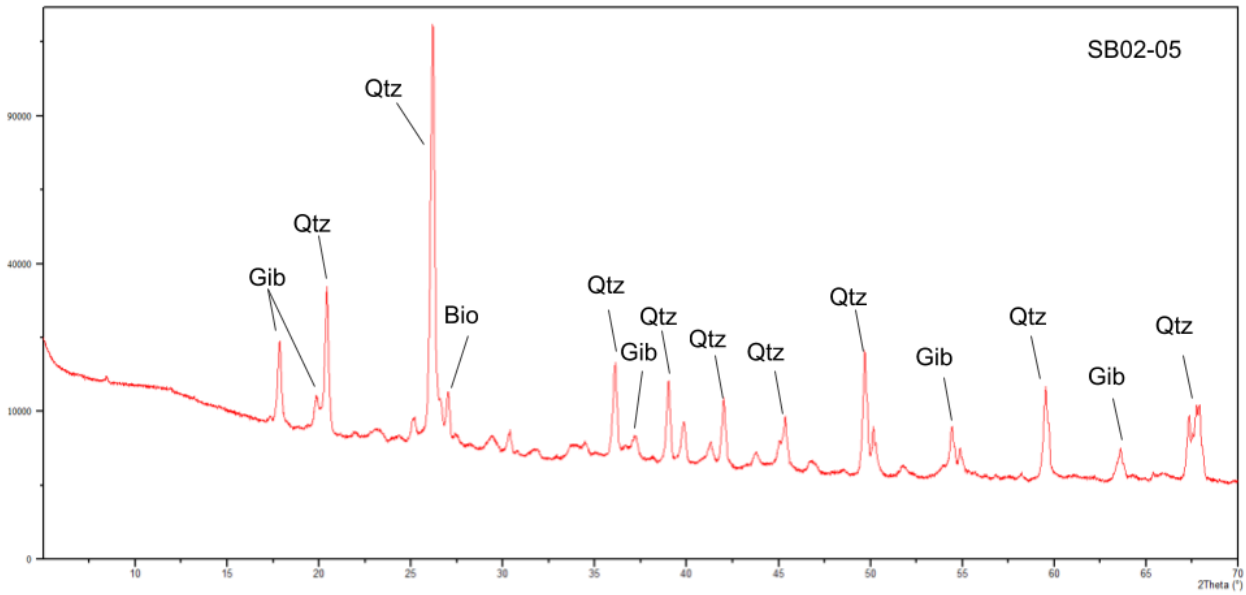
70
2Theta (°)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Gib
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Qtz
Gib
Qtz
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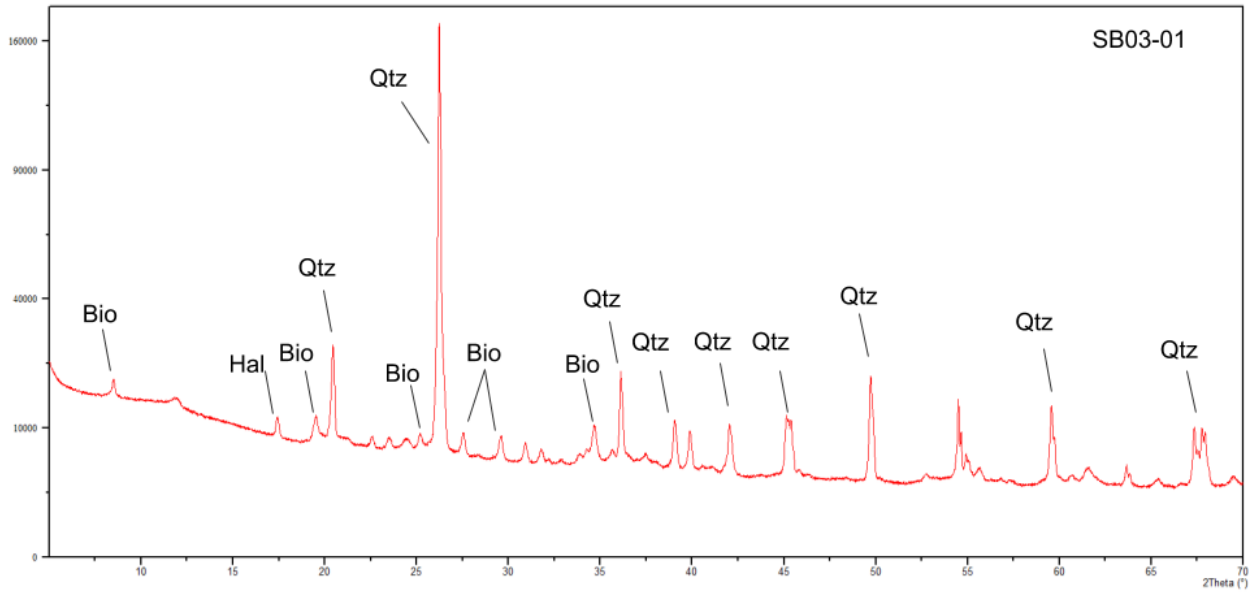
60
65
70
2Theta (°)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Qtz
Bio
Hal
Bio
Bio
Bio
Bio
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
160000
90000
40000
10000
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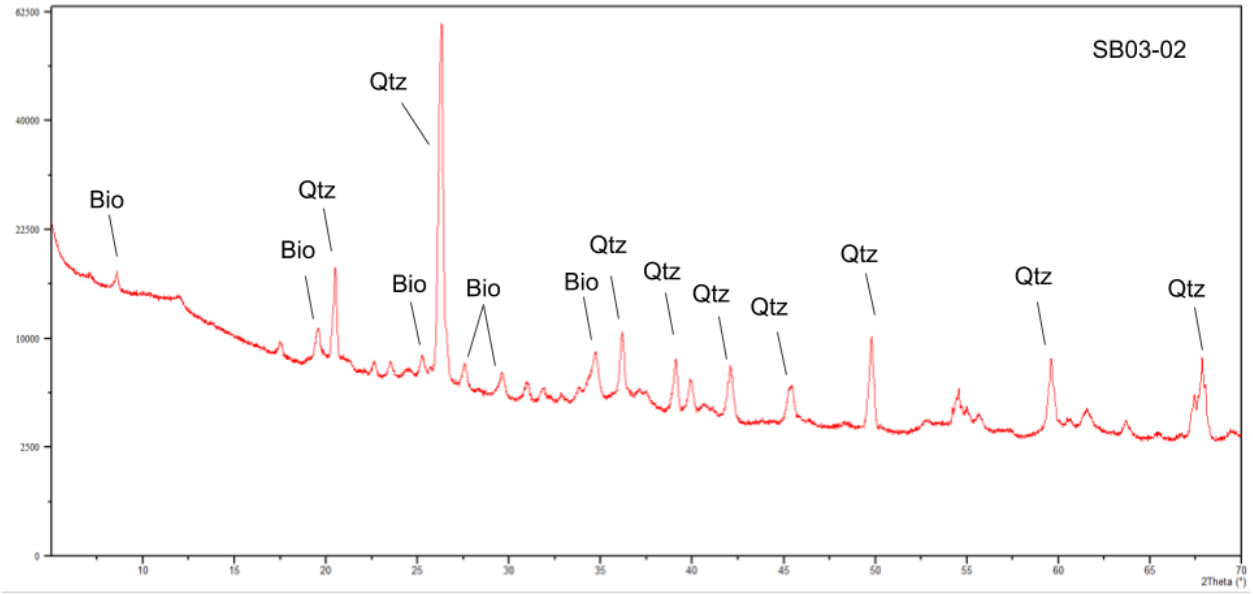
2Theta (°)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Qtz
Qtz
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Qtz
Qtz
62500
40000
22500
10000
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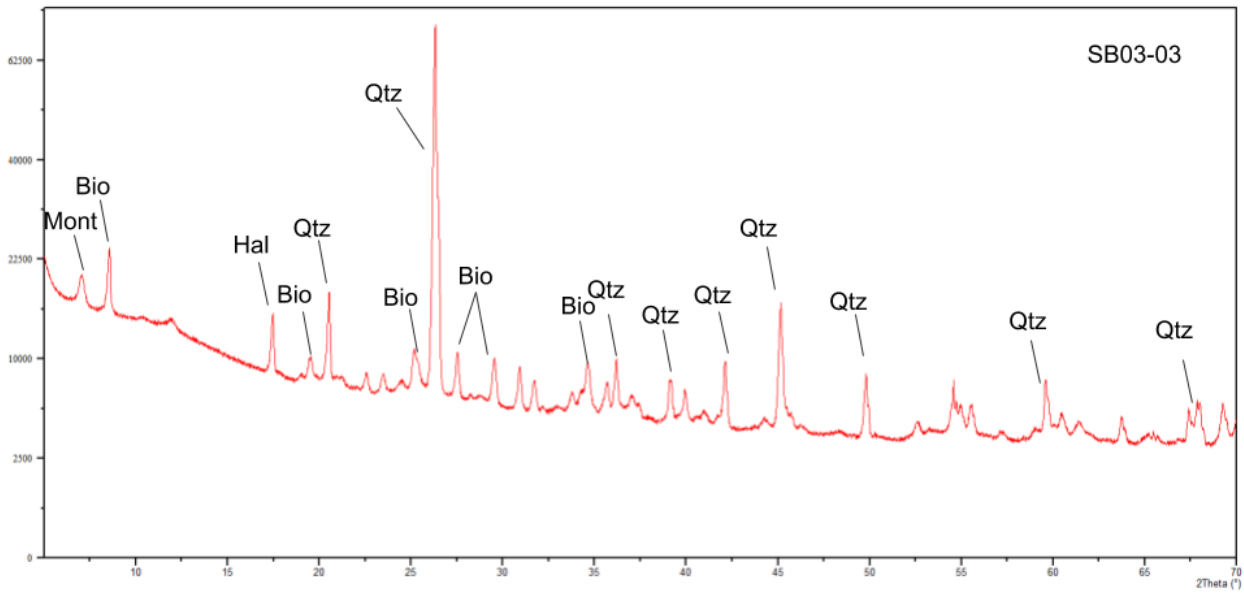
65
70
2Theta (°)


SB03-03
Qtz
Bio
Mont
Hal
Qtz
Bio
Bio
Bio
Bio
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
62500
40000
22500
10000
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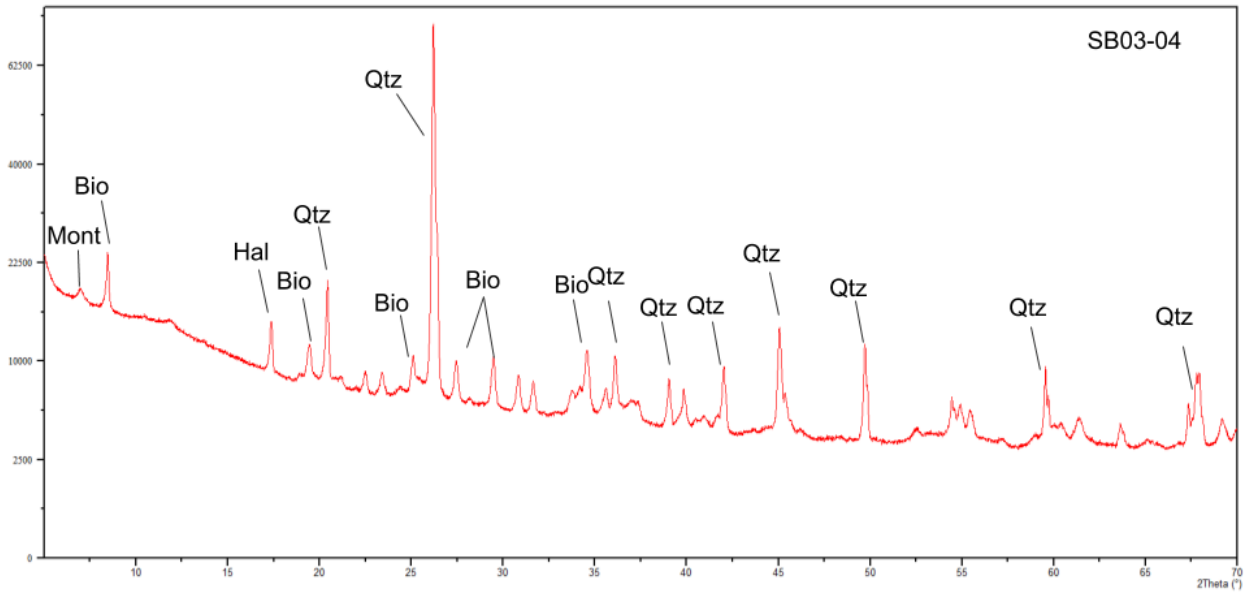
55
60
65
70
2Theta (°)


SB03-04
Qtz
Bio
Mont
Hal
Qtz
Bio
Bio
Bio
Bio
Qtz
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Qtz
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Qtz
Qtz
62500
40000
22500
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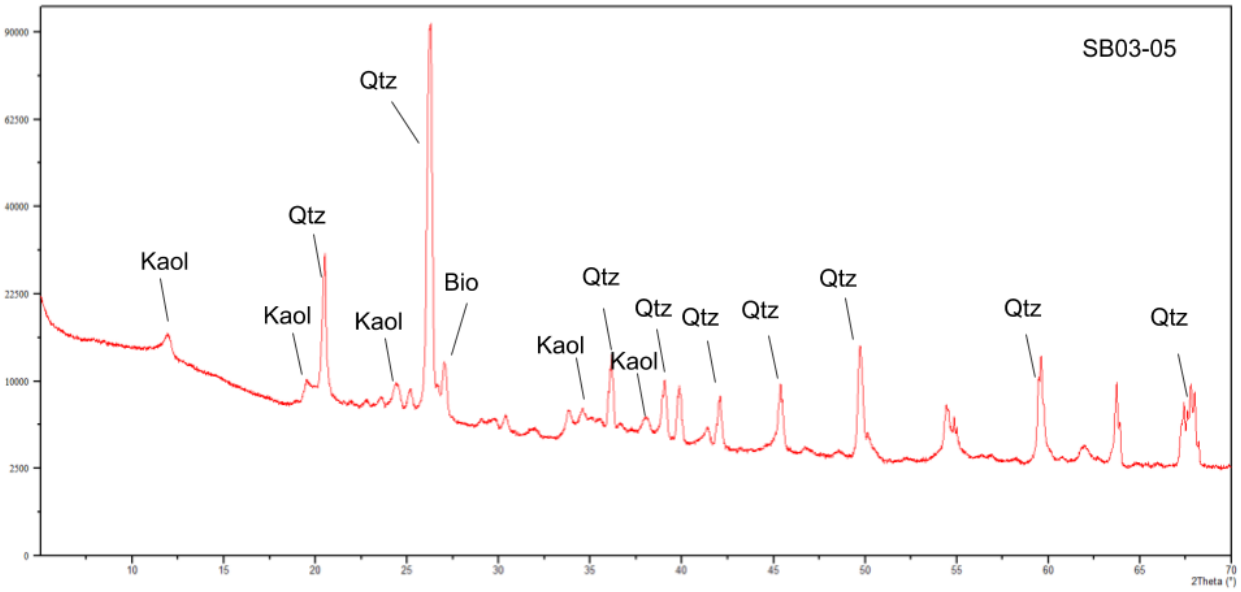
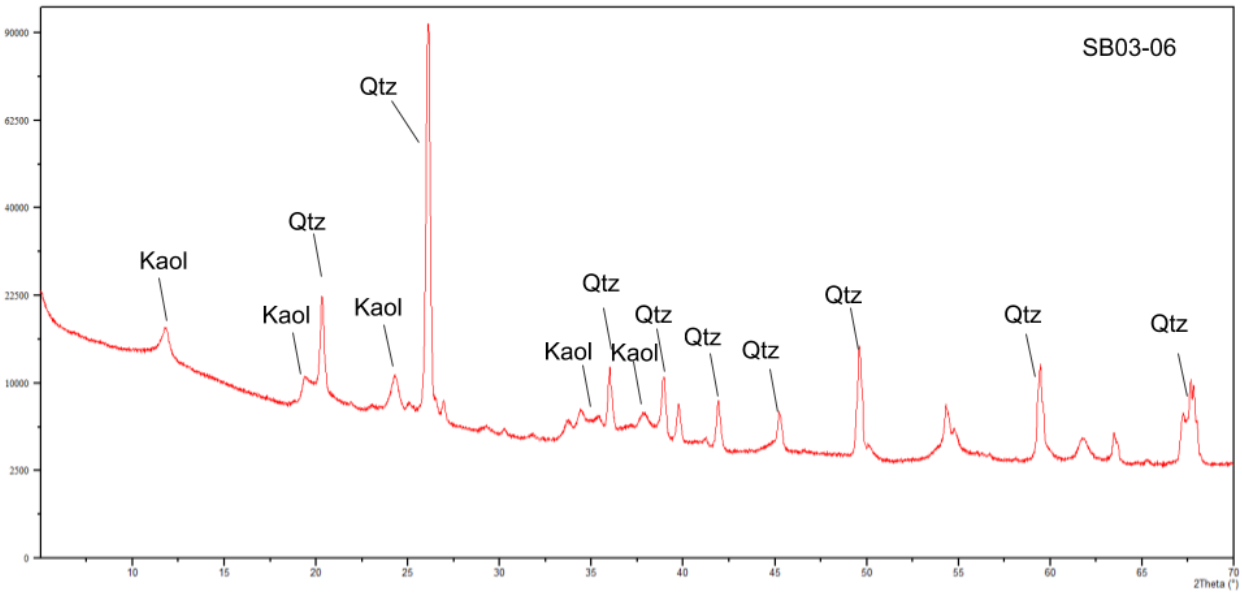
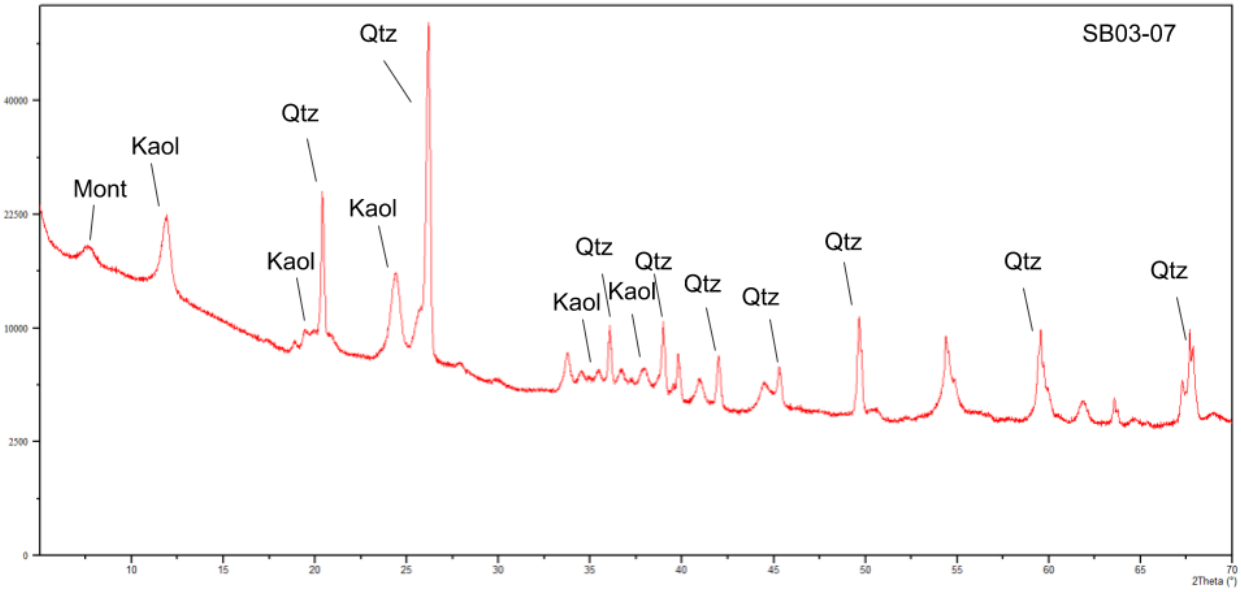
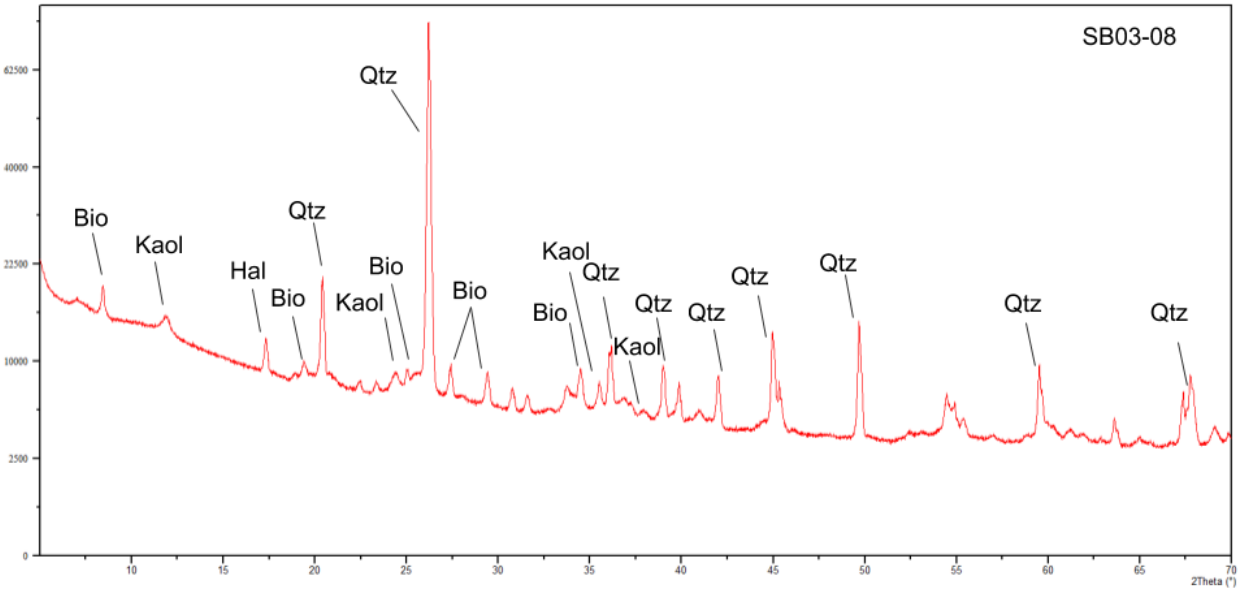
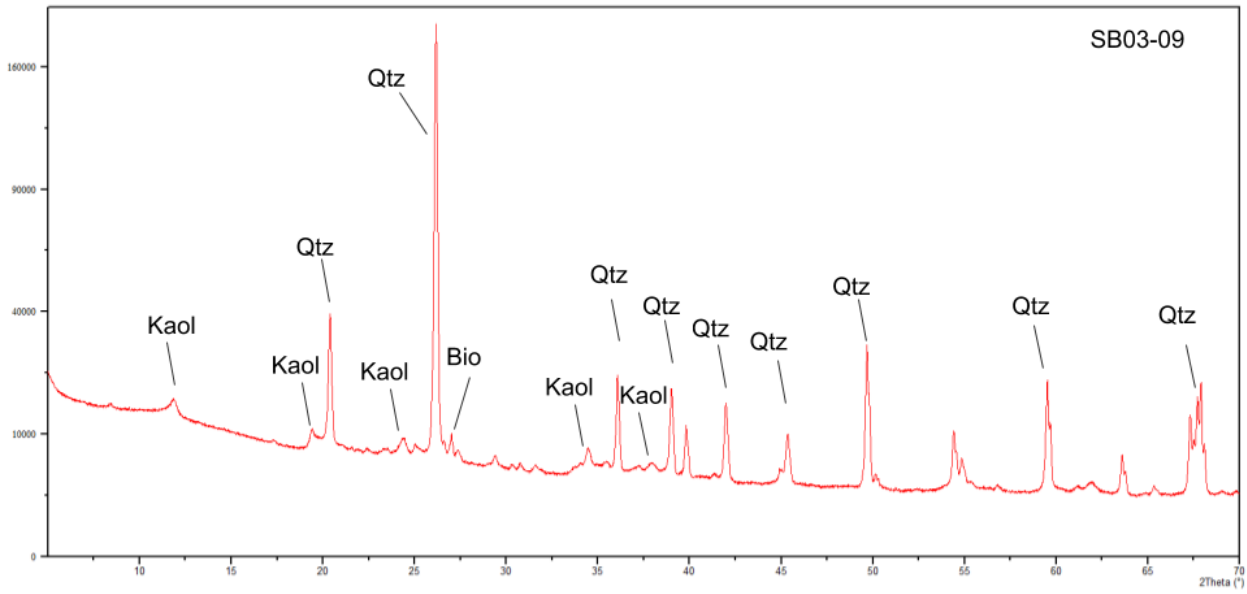
70
2Theta (°)

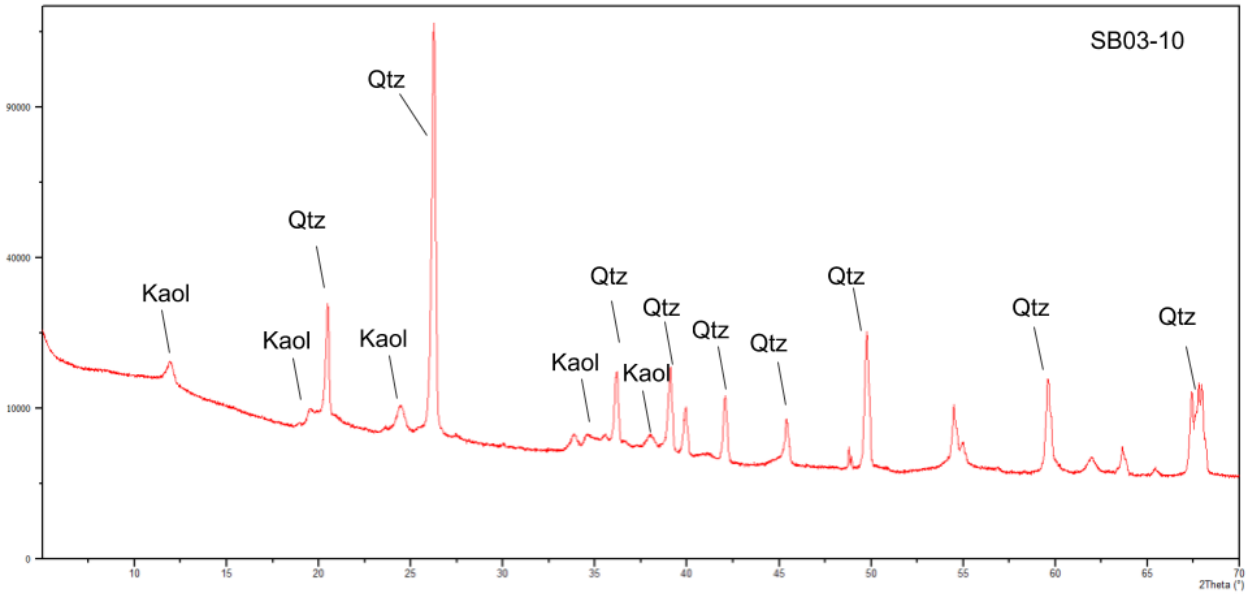

SB03-05
Qtz
Qtz
Kaol
Kaol
Kaol
Bio
Qtz
Qtz
Qtz
Qtz
Kaol
Kaol
Qtz
Qtz
90000
62500
40000
22500
10000
2500
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

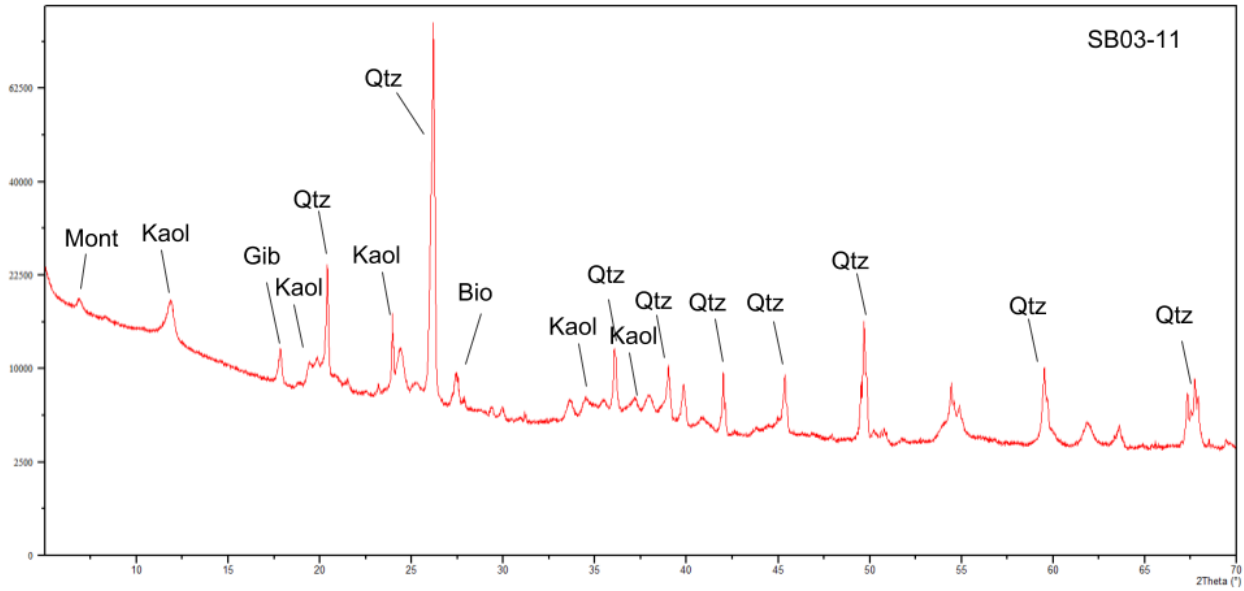

SB03-06
Qtz
Qtz
Kaol
Kaol
Kaol
Qtz
Qtz
Qtz
Qtz
Kaol
Kaol
Qtz
Qtz
Qtz
90000
62500
40000
22500
10000
2500
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

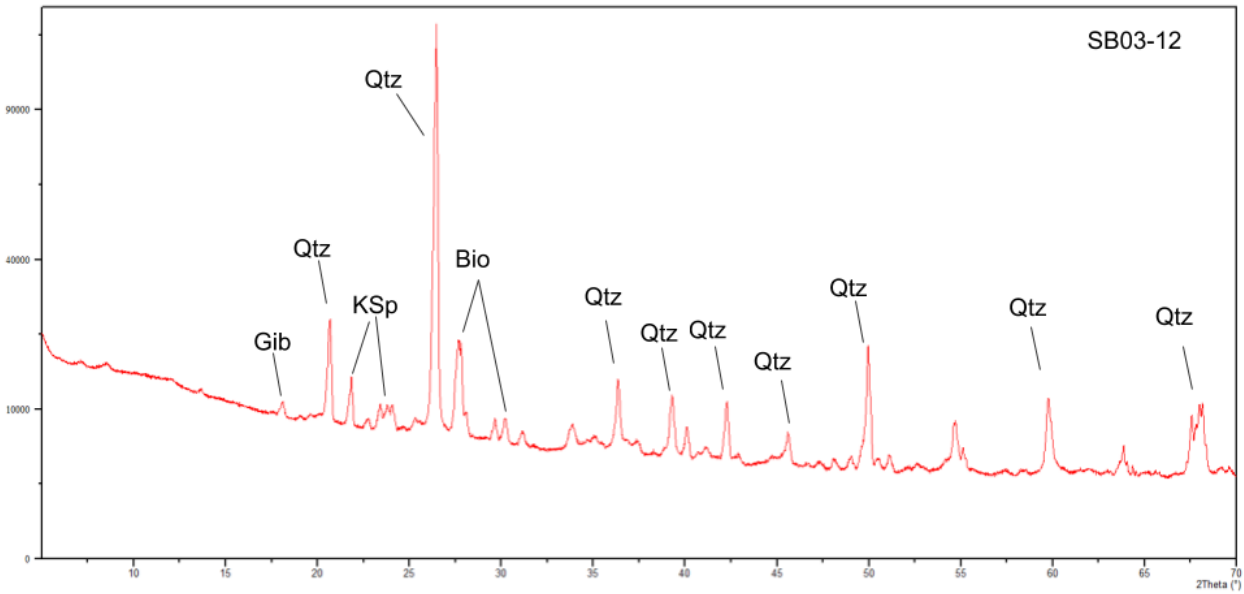

SB03-07
Qtz
Qtz
Kaol
Mont
Kaol
Kaol
Qtz
Kaol
Qtz
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
40000
22500
10000
2500
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

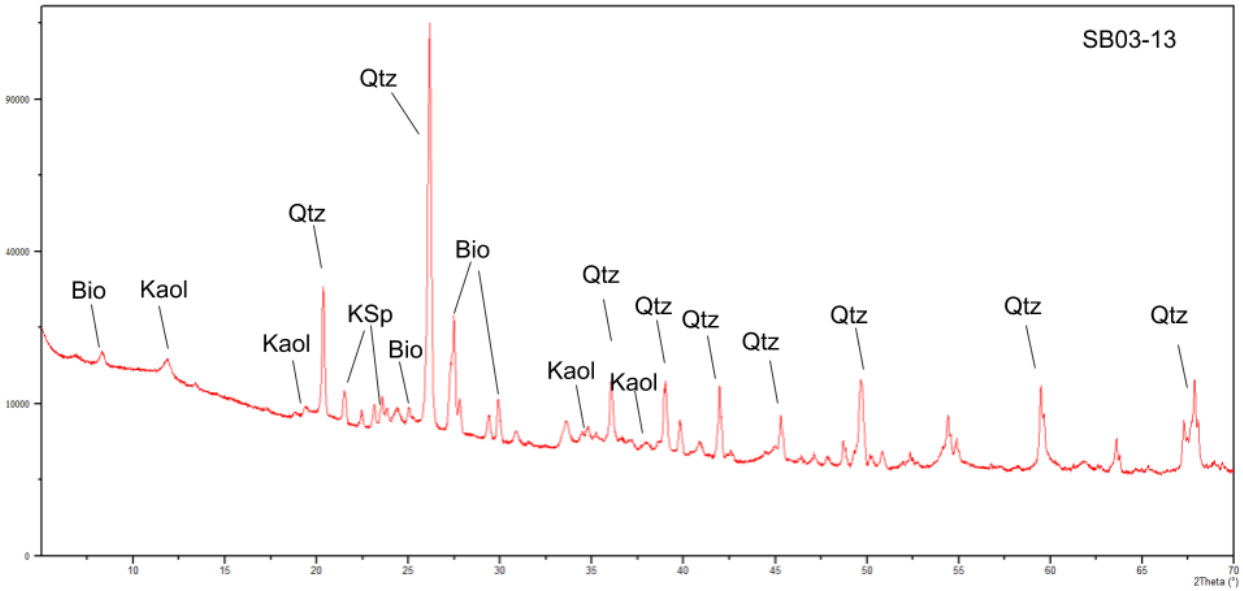

SB03-08
Qtz
Bio
Kaol
Qtz
Hal
Bio
Bio
Kaol
Bio
Bio
Kaol
Qtz
Bio
Qtz
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
62500
40000
22500
10000
2500
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)


SB03-09
Qtz
Qtz
Kaol
Kaol
Kaol
Bio
Kaol
Qtz
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
160000
90000
40000
10000
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

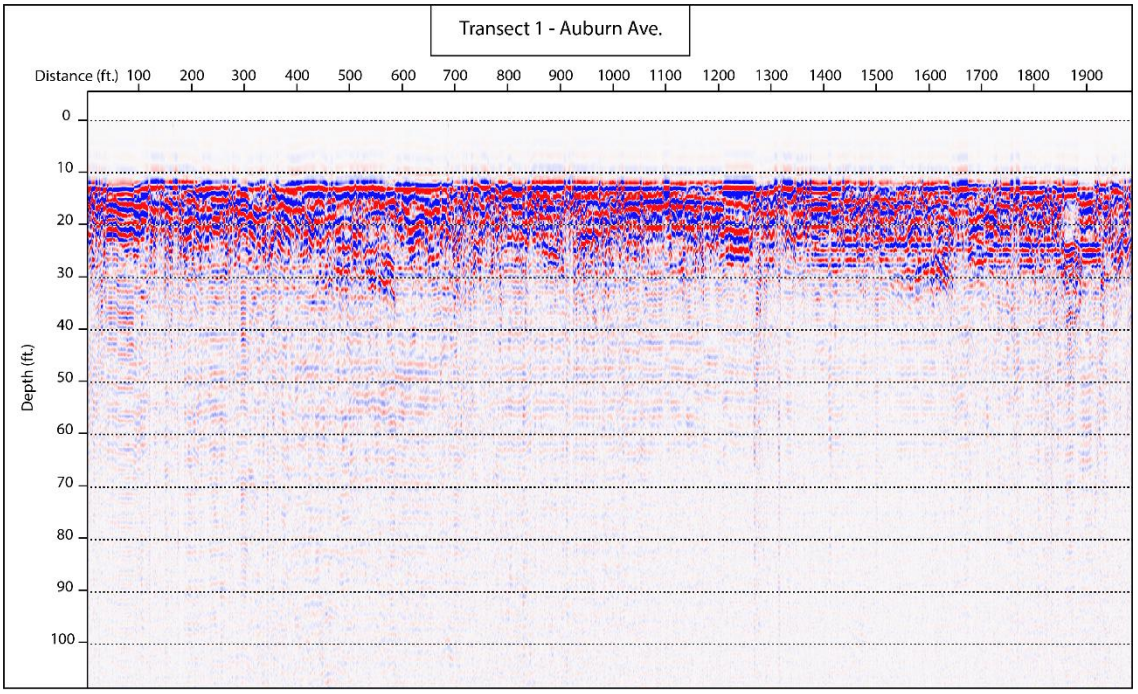

SB03-10
Qtz
Qtz
Kaol
Kaol
Kaol
Kaol
Qtz
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
90000
40000
10000
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

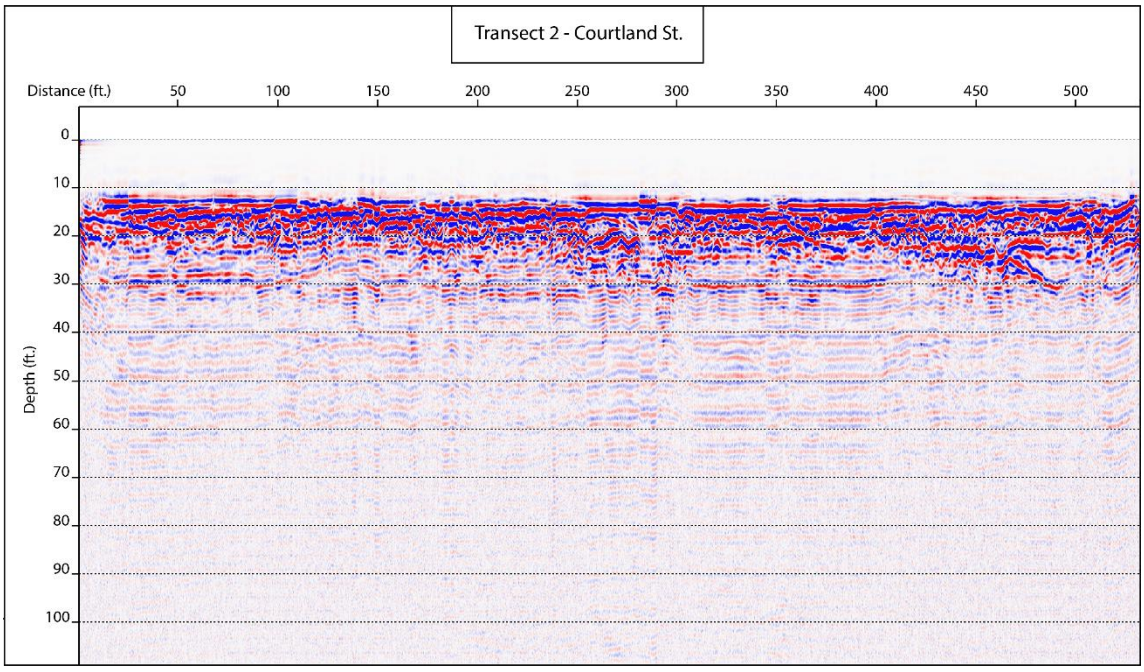

SB03-11
Qtz
Mont
Kaol
Gib
Kaol
Qtz
Kaol
Bio
Kaol
Qtz
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
62500
40000
22500
10000
2500
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

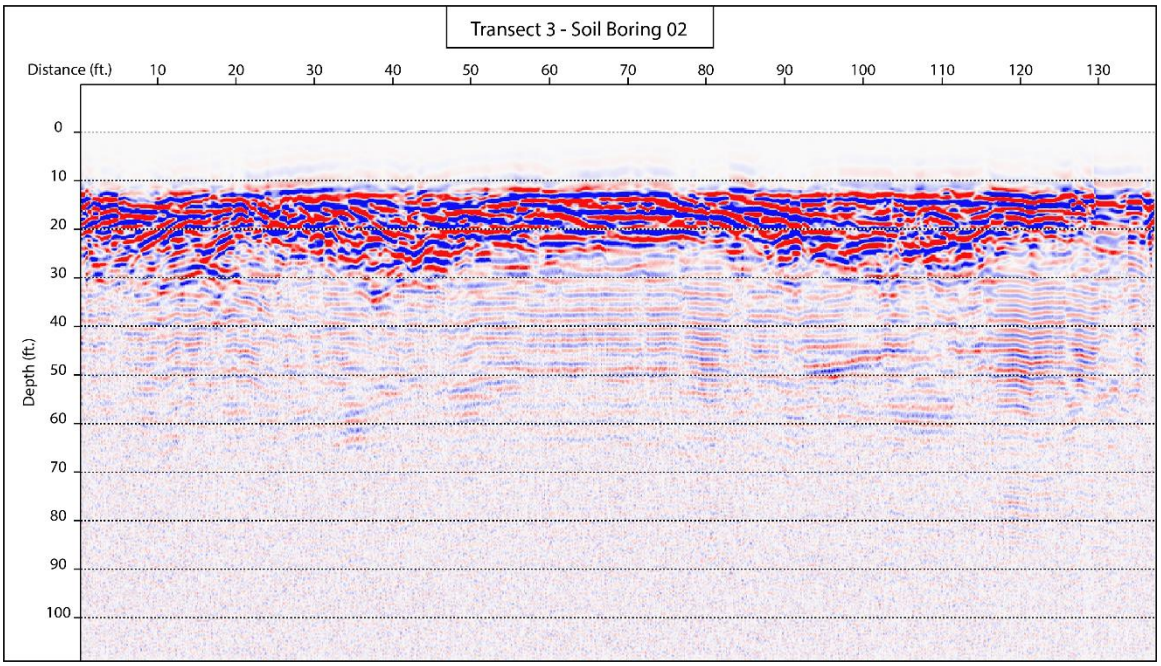

SB03-12
Qtz
Qtz
Gib
KSp
Bio
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
90000
40000
10000
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

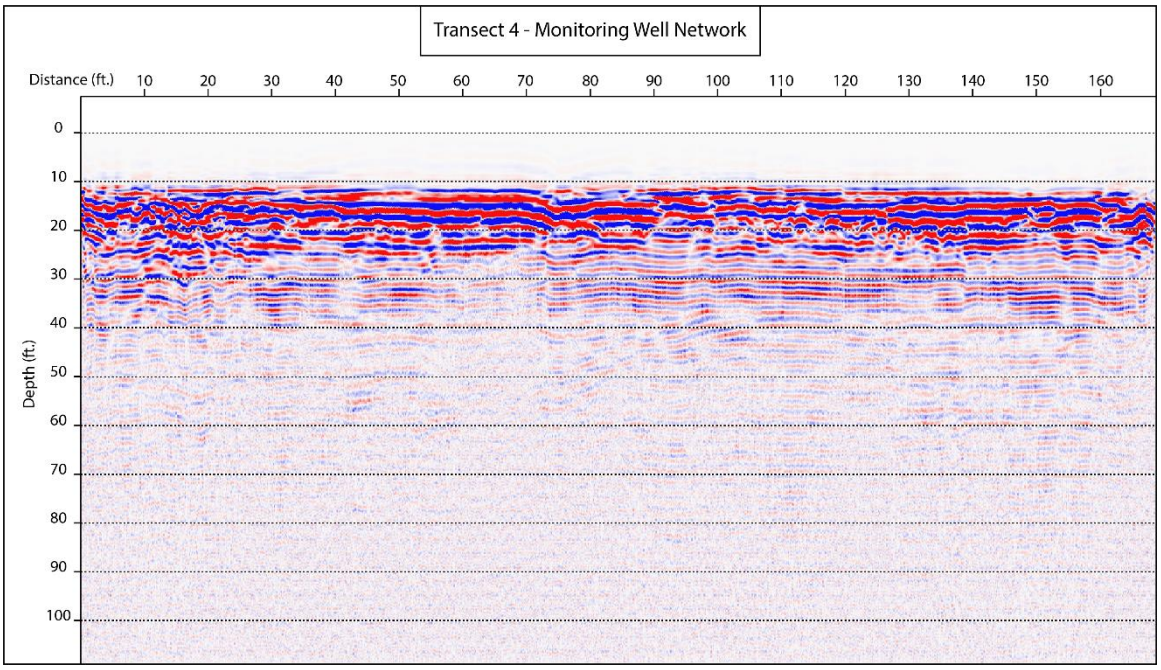

SB03-13
Qtz
Qtz
Bio
Bio
Kaol
Kaol
KSp
Bio
Qtz
Kaol
Kaol
Qtz
Qtz
Qtz
Qtz
Qtz
Qtz
90000
40000
10000
0
10
15
20
25
30
35
40
45
50
55
60
65
70
2Theta (°)

Appendix D: GPR Profiles






Transect 3 - Soil Boring 02
Distance (ft.)
10
20
30
40
50
60
70
80
90
100
110
120
130
Depth (ft.)
0
10
20
30
40
50
60
70
80
90
100


Transect 4 - Monitoring Well Network
Distance (ft.)
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
Depth (ft.)
0
10
20
30
40
50
60
70
80
90
100