Prepared for

Region Hovedstaden
Kongens Vænge 2
3400 Hillerød

REDUCTIVE STABILIZATION OF CCA METALS BENCH TEST REPORT

Former Collstrup Facility

Hillerød, Denmark

Prepared by

Geosyntec consultants

engineers | scientists | innovators
10211 Wincopin Circle, 4th Floor
Columbia, Maryland 21044

December 2015

Geosyntec consultants

TABLE OF CONTENTS

1. INTRODUCTION 1

1.1 Study Objectives 1
1.2 Report Organization 2

2. BACKGROUND 3

2.1 Site Description 3
2.2 Technology Description 3

3. FIELD SAMPLING OF STUDY MATERIALS 6

3.1 Soil Sampling 6
3.2 Groundwater Sampling 6

4. BENCH TEST METHODS 7

4.1 Batch Reactor/Microcosm Construction and Incubation 7
4.2 Treatments and Doses 7
4.3 Sampling and Analysis 8

5. RESULTS 9

5.1 Baseline Characterization 9
5.2 Abiotic Treatment 9
5.3 Biotic Treatment 15

6. CONCLUSIONS AND RECOMMENDATIONS 21

7. REFERENCES 22

LIST OF TABLES

Table 1: Baseline Characterization of Site Materials

Table 2: Geochemical Data for Reductive Sequestration Bench Tests

Table 3: Volatile Fatty Acids (VFAs) in Biotic Treatment of Reductive Sequestration Bench Tests

LIST OF FIGURES

Figure 1: Site Map with Hydrology and Extent of Contamination

Figure 2: Dissolved Metal Trends in Abiotic Treatment

Figure 3: Total Metal Trends in Abiotic Treatment

Figure 4: Dissolved Metal Trends in Biotic Treatment

Figure 5: Total Metal Trends in Biotic Treatment

LIST OF APPENDICES

Appendix A: COWI A/S Field Sampling Report

Appendix B: Analytical Reports

Appendix C: Collstrup CCA Bench-Scale Treatability Study Work Plan

1. INTRODUCTION

This report presents the results of a laboratory bench test evaluation of reductive stabilization (also known as reductive sequestration) for treating chromium, copper, and arsenic (i.e., chromated copper arsenate [CCA] metals] in soil and groundwater at the former Collstrup wood treatment facility in Hillerød, Denmark (Site). Geosyntec Consultants Inc. (Geosyntec) performed the treatability test and wrote this report as an innovation project that was jointly funded by Geosyntec and the Capital Region of Denmark (CRD). COWI A/S collected Site soil and groundwater samples used in the bench test; COWI also assisted in the development of the conceptual site model (CSM) of CCA contamination impacts at the Site. CRD is evaluating the feasibility of a variety of technologies for remediating the Site, and the results of this treatability test are intended to provide a basis for determining the feasibility of reductive stabilization as remedial option for the Site.

CCA is used to treat wood to protect it against insect and fungi damage (Buchireddy et al., 2009). It is a highly acidic (pH 1-2) solution of salts (CrO_3 and CuO) and arsenic acid (H_3AsO_4) that is pressure-injected into the wood (Nielsen, 2013). Collstrup was once one of Denmark's largest wood impregnation companies with 13 operating facilities across the country. Estimates indicate that CCA-treated waste wood in Denmark increased from 17,000 tons in 1992 to 100,000 in 2010 (Christensen et al., 2006). Many of the former wood treatment sites in Denmark are heavily contaminated with organic and inorganic chemicals used in wood treatment, and have been either abandoned or left as brownfield sites that presently have not been remediated (Nielsen, 2013).

The reductive stabilization technology evaluated in the treatability test described herein represents a state-of-the-practice method for in situ treatment of CCA metals (arsenic, chromium, and copper) and other heavy metals. In 2014 CRD contracted Geosyntec to perform a literature review of state-of-the-practice technologies for treating CCA contamination. That review determined that reductive stabilization already has been demonstrated in published bench- and field-scale studies in the United States and is sufficiently mature for testing at the Site (Geosyntec, 2014).

The bench test was performed in accordance with a bench test work plan (Work Plan) prepared by Geosyntec (Geosyntec, 2015). The overall goal of this bench test was to evaluate the performance of the technology for treating CCA metals in soil and groundwater under Site-specific conditions and to assess its suitability for pilot testing at the Site. This report provides a brief description of the Site background, scientific and technical merits of reductive sequestration technology, the treatability study methods, results, and conclusions.

1.1 Study Objectives

The bench tests were performed to evaluate the Site-specific performance of two different types of reducing agents and treatment processes: 1) Abiotic chemical reduction using calcium polysulfide and ferrous sulfate, and 2) biotic reduction using lactate and ferrous sulfate. The specific objectives of bench tests were:

- Measure the effectiveness of test amendments on treatment of CCA metals, and
- Identify the most effective treatment agent(s) for potential future pilot-scale tests.

1.2 Report Organization

The remainder of this report is organized into the following sections:

2. *Background*: This section provides a brief summary of the conditions, extent of onsite contamination, and CSM for the Site. The section also provides an overview of the reductive sequestration technology.

3. *Field Sampling*: This section summarizes the methods employed to collect Site soil and groundwater samples used in the bench tests. A memorandum prepared by COWI A/S, which performed the field sampling activities, is included as **Appendix A**.

4. *Bench Test Methods*: This section includes a brief description of construction and operation of test reactors, and collection and analysis of samples. Analytical reports are provided as **Appendix B**.

5. *Study Results*: The discussion in this section focuses on the analysis of test results for each of the two treatments and includes a description of concentration trends of CCA metals as well as their overall percent removal.

6. *Conclusions*: This section presents the overall conclusions that were drawn based on the test results for both abiotic and biotic treatments. In the discussion, the performance of the two treatments across the different CCA metals is compared to evaluate the feasibility of reductive sequestration.

7. *References*: Included here are citations of the Site-related documents and peer-reviewed literature used in preparation of this report.

2. BACKGROUND

The following sub-sections present a brief description of the Site conditions and the reductive sequestration technology.

2.1 Site Description

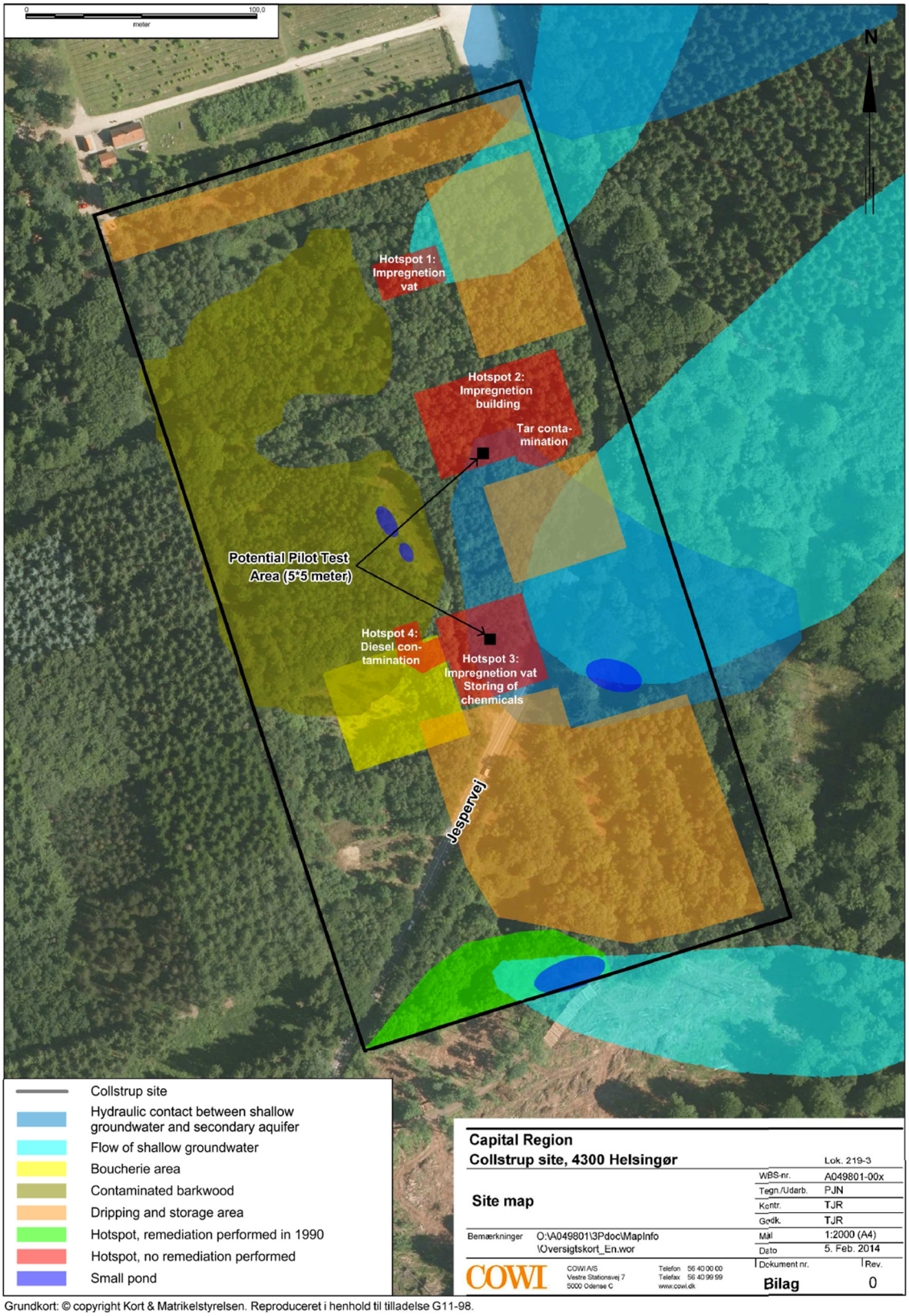
The Site is located in Hillerød, Denmark, adjacent to Esrum Lake. The Site is owned by the Danish EPA (Forest and Nature Agency) and is not currently in use. The property covers a 73,000 square meters (m^2) (7 hectares) area, is fenced to prevent public access, and is largely overgrown with vegetation and trees (**Figure 1**). From 1936 to 1976, the Site was used as a facility for processing and treatment of wood lumber. During certain periods in its operational history, wood at the Site was pressure-treated with CCA. The abundant use of CCA at the Site resulted in extensive impacts of arsenic (As), chromium (Cr), and copper (Cu) in soils and groundwater (Nielsen, 2013). As is the primary metal of concern, and an estimated 35 to 44 tons of As remain within waste bark/mulch on the ground surface, soil, and groundwater at the Site. The majority of As mass occurs in the soils above the water table, within 0.5 meters (m) below ground surface (bgs).

The shallow geology at the Site mainly consists of fluvial sediments with some clay inter-layering occurring from 0 to 5 m bgs. Rainwater infiltration has mobilized vertical spreading of CCA contamination, with significant concentrations of As occurring down to 4 m bgs. A perched water table occurs between 3 to 5 m bgs. A clay till layer that occurs between 5 to 20 m bgs is believed to serve as an aquitard or a partial barrier that limits vertical migration of CCA contamination (Nielsen et al., 2011; Danish EPA, 2011). A secondary aquifer (upper sand layer) occurs beneath the clay till at depths ranging from 20 to 40 m bgs; data indicate that contamination in this layer is relatively low.

2.2 Technology Description

Reductive stabilization consists of applying simple organic and/or inorganic chemicals to soil/groundwater to create strongly anaerobic conditions that reduce the redox states of CCA metals and precipitate (immobilize/stabilize) the reduced metals as metal-sulfides and metal-hydroxides. Abiotic reagents such as sulfide and polysulfide salts have been widely used to treat sites contaminated with metal contaminants (USEPA, 2011). In accordance with thermodynamic chemical equilibrium relationships, As(III) and Cu(II) in the presence of sulfides and polysulfides precipitate as metal-sulfide solids, thereby reducing the aqueous-phase concentration, metal mobility and bioavailability (Petersen and Hedquist, 2006; Zawislanski et al. 2010).

Microorganisms are known to directly or indirectly cause reductive transformation of metal species through redox reactions, including reduction of Cr(VI) to Cr(III) and As(V) to As(III) (Waybrant et al., 2002; USEPA, 2000). In situ biosequestration consists of amending the subsurface environment with simple, fermentable organic electron donors (lactate, methanol, etc.) and sulfate to stimulate microbial activity and create sulfate-reducing conditions leading to the formation of metal-sulfide and -polysulfide solids. Sulfate-reducing bacteria utilize sulfate as



Grundkort: © copyright Kort & Matrikelstyrelsen. Reproduceret i henhold til tilladelse G11-98.

Figure 1. Site Map with Hydrology and Extent of Contamination

the electron acceptor leading to the formation of sulfide species. Numerous studies have shown that under these conditions Cr(VI) and As(V) reductively precipitate to Cr(III) and $As_2S_3(s)$ respectively while Cu precipitates as CuS(s) (e.g., Blowes et al., 2000; Mulligan et al., 2001; Deflaun et al., 2009).

As noted in Section 1.1, this treatability test evaluated the treatment performance of two methods for precipitating/immobilizing CCA metals: 1) abiotic chemical reduction/sequestration (using calcium polysulfide and ferrous sulfate) and 2) biotic reduction/stabilization (using lactate and ferrous sulfate). Although the mechanisms for metal reduction differ slightly between the two methods, in general the reaction end product for the two methods is the same – reduced CCA metals precipitated as metal-sulfide and metal-hydroxide complexes.

3. FIELD SAMPLING OF STUDY MATERIALS

In March 2015, COWI A/S collected Site geologic core material and groundwater samples that were used to construct the bench test reactors. Based on historic and recent Site data on CCA metal concentrations along with vegetation and monitoring well conditions observed during a pre-sampling Site visit, Hotspot 1 area (**Figure 1**) was identified for the collection of Site materials. The following sub-sections briefly describe the investigation methods and procedures that were used to collect field samples. A memorandum prepared by COWI A/S also presents a summary of the field sampling approach and methodology (see **Appendix A**).

3.1 Soil Sampling

Composite samples of shallow surface and subsurface geologic material were collected using a hand auger from four locations in Hotspot 1 area (**Figure 1 in Appendix A**) up to depth of 0.3 m bgs. The samples were homogenized in the field and collected in Rilsan bags. The bags were stored on ice in the field prior to sample shipment.

3.2 Groundwater Sampling

Groundwater was collected at a depth of 0.5 – 1.8 m bgs from an existing onsite well in the Hotspot 1 area proximal to where the soils samples were collected. The groundwater was retrieved using low-flow/minimal drawdown purge methods with a submersible pump. After purging three well volumes, the groundwater for the treatability test was collected in clean and sterile HDPE bottles and stored on ice in the field prior to sample shipment. Subsequently, the samples of geologic material and groundwater were express-shipped under chain-of-custody to Geosyntec's laboratory in Knoxville, Tennessee, where the treatability tests were performed.

4. BENCH TEST METHODS

Details regarding the bench test design, treatment dosages, sampling schedule, and analyses were previously described in the Bench Test Work Plan (Geosyntec, 2015; **Appendix C**). The bench test was performed in accordance with the Work Plan, with a few exceptions described below. The sub-sections below summarize the laboratory methods utilized in implementing the bench tests.

4.1 Batch Reactor/Microcosm Construction and Incubation

Prior to initiation of the tests, identical control and treatment reactors were constructed using conical-bottom polypropylene / HDPE bottles comprising of 50 g of Site geologic material and 200 mL of Site groundwater. The untreated control reactors did not receive any amendments and served as the experimental controls against which the effects of the chemical and biological treatments were measured. After addition of amendments to start the tests, the reactors were capped and incubated under anaerobic conditions on a rotary shaker at room temperature (~22°C) for the duration of the period.

4.2 Treatments and Doses

The bench testing of in situ reductive stabilization involved two separate treatments; the abiotic treatment with calcium polysulfide and ferrous sulfate, and the biotic treatment with lactate and ferrous sulfate. The dosing concentrations of the amendments for the two treatments were determined based on the background concentration of the CCA metals determined during the baseline characterization. The dosing concentrations incorporated the stoichiometric requirements along with a safety factor for demand by non-target constituents in the Site materials.

Abiotic Reactors: Initially, each reactor in the abiotic treatment was amended with Calamet® (24-29% calcium polysulfide solution) and 1M ferrous sulfate solution to achieve a desired dose of 400 mg/L calcium polysulfide and 1 g/L ferrous sulfate, respectively. While reducing conditions were quickly reached with this dosage, the conditions did not achieve the target redox level for the sulfate-sulfide redox regime (i.e. oxidation reduction potential (ORP) < -100 mv). Consequently, a new set of treatment reactors were prepared for the study in which the reactors were titrated with the Calamet® solution amendments until the ORP exceeded -100 mv. The reactors were buffered using sodium bicarbonate and pH was adjusted to near neutral. The final dosage of calcium polysulfide and ferrous sulfate was about 1.68 g/L and 1 g/L, respectively.

Biotic Reactors: Each reactor was initially amended with 10 g/L sodium lactate and 1M ferrous sulfate solution to achieve a desired dose of 30 mg/L lactate and 2 g/L ferrous sulfate. The biotic reactors were titrated with 1M (84 g/L) sodium bicarbonate to adjust pH to near neutral, resulting in a final concentration of sodium bicarbonate of 0.046 M (3.86 g/L). Since the desired redox potential was not achieved during incubation, the lactate dose was sequentially increased to 180 mg/L. Additionally, in order to achieve the desired sulfate-reducing conditions, the reactors were bioaugmented on two separate events- once with sulfate-reducing bacteria isolated and enriched

from creek sediments and a second time with anaerobic digester sludge from a municipal wastewater treatment plant in Knoxville, Tennessee.

4.3 Sampling and Analysis

An initial baseline characterization of the Site geologic material and groundwater was conducted to establish background geochemical conditions and concentrations of CCA metals. During each sampling event, reactors from each treatment and control (as needed) were uncapped and sacrificed to collect geologic material and groundwater in laboratory provided bottles. Aqueous samples for dissolved metals analysis were filtered using a 0.45 micrometer (µm) syringe filter and preserved with nitric acid prior to analysis. The solids were analyzed for total metals (U.S. EPA method SW-846 3051/6020) whereas the aqueous samples were analyzed for dissolved metals (ICP-MS), volatile fatty acids (GC-MS), anions (U.S.EPA method 9056), hexavalent Cr (U.S.EPA method 7196) and geochemical parameters (temperature, pH, ORP, and dissolved oxygen). The sample analysis were performed externally by TestAmerica, Inc., a certified commercial laboratory that utilizes U.S.EPA approved standard analytical methods and QA/QC procedures. Volatile fatty acids analyses were performed internally by Geosyntec's SiREM laboratory in Guelph Ontario.

5. RESULTS

This section presents a summary and analysis of the analytical data provided in the TestAmerica and SiREM reports (**Appendix B**). The discussion of experimental results focuses primarily on the behavior of the CCA metals observed in the two treatments. **Figures 2** and **3** depict the CCA metal concentration trends in the abiotic treatment while **Figures 4** and **5** depict the CCA metal concentration trends in the biotic treatment.

5.1 Baseline Characterization

The baseline characterization of the Site soil and groundwater was conducted to establish the background concentrations of the CCA metals prior to initiation of the bench tests. These baseline concentrations served as the time zero data for the bench tests. Both filtered and unfiltered samples of the Site groundwater were analyzed for metals in order to evaluate the contribution of suspended solids to the CCA metal concentrations. The results of the baseline characterization are provided in **Table 1**. The groundwater results indicated that As was the dominant of the CCA metals, with its concentration being over an order of magnitude greater than that of Cu and over two orders of magnitude greater than that of Cr. Cr speciation in filtered samples indicated that total dissolved Cr comprised 30% Cr(VI) with the rest being Cr(III), presumably as soluble Cr(III)-inorganic or -organic complexes. For all analyzed metals, the difference between the dissolved and total metal concentration was < 20%, suggesting that the effect of suspended solids on metal concentrations was negligible. Therefore, the aqueous samples in the bench test were analyzed only for dissolved metals. The groundwater also contained appreciable amounts of nitrate and sulfate, indicating that baseline redox conditions in the groundwater were relatively oxidizing.

The total metal concentrations in soils include both the sorbed and the solid metal species. These results for Site soils showed that Cu was the dominant CCA metal in the soils followed by As and Cr. The soil samples were rich in Fe, with Fe concentrations being greater than three times that of Cu and As. Overall, CCA metal concentrations observed in the baseline characterization were consistent with those observed during other recent monitoring activities at the Site.

5.2 Abiotic Treatment

In the initial treatment, in which the test reactors were amended with 400 mg/L calcium polysulfide and 1 g/L ferrous sulfate, significant reductions in the aqueous concentrations of CCA metals were evident within 24 hours of the treatment as shown in the table below.

Dissolved Metals in Groundwater in Abiotic Treatment with 0.4 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate								
Sample ID	**Time (hours)**	**As (mg/L)**	**Cr (mg/L)**	**Cr(VI) (mg/L)**	**Cu (mg/L)**	**Fe (mg/L)**	**Nitrate (mg/L)**	**Sulfate (mg/L)**
Control Samples								
C-1-1*	24	34	5.18	0.014	36.5	135	1.57	13.3
C-2-1*	48	22.9	2.61	0.005	18.9	71	1.56	14.9

Dissolved Metals in Groundwater in Abiotic Treatment with 0.4 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate								
Sample ID	**Time (hours)**	**As (mg/L)**	**Cr (mg/L)**	**Cr(VI) (mg/L)**	**Cu (mg/L)**	**Fe (mg/L)**	**Nitrate (mg/L)**	**Sulfate (mg/L)**
Treatment Samples								
A-1-1	24	0.026	0.061	0	0.070	788	2.04	2730
A-1-2	24	0.222	0.061	0.037	0.188	840	2.09	2440
Average	**24**	**0.124**	**0.061**	**0.019**	**0.129**	**814**	**2.07**	**2585**
A-2-1	48	0.231	0.659	0.049	9.69	681	1.25	2870
A-2-2	48	0.094	0.644	0.036	7.44	745	1.2	2920
Average	**48**	**0.162**	**0.652**	**0.043**	**8.57**	**713**	**1.23**	**2895**

Total Metals in Solids in Abiotic Treatment with 1.68 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate					
Sample ID	**Time (days)**	**As (mg/Kg)**	**Cr (mg/Kg)**	**Cu (mg/Kg)**	**Fe (mg/Kg)**
Control Samples					
C-1-1*	24	243	47.2	354	1790
C-2-1*	48	138	31.1	237	1820
Treatment Samples					
A-1-1	24	494	67	640	3630
A-1-2	24	401	73.1	579	4550
Average	**24**	**448**	**70.1**	**610**	**4090**
A-2-1	48	387	67.7	525	3710
A-2-2	48	271	48.1	350	2630
Average	**48**	**329**	**57.9**	**438**	**3170**

Notes:

The blue text denotes a non-detect where the value is considered as 1/2 reporting limit

* Initial control for abiotic treatment with 400 mg/L calcium polysulfide and 1 g/L ferrous sulfate; 5x higher dilution used in comparison to treatment reactors for As and Cu analysis

As - arsenic; Cr - chromium; Cr(VI) - hexavalent Cr; Cu - copper; Fe - iron; mg/L - milligram per liter

However, the desired redox conditions were not achieved in these reactors (**Table 2**). Therefore, new test reactors were constructed where the dosage of calcium polysulfide was increased to 1.68 g/L upon titration of the reactors with the amendment. As can be seen in the table below, the aqueous concentrations of CCA metals in these new reactors declined rapidly to at or below detection levels within the first four hours of the treatment period (**Figure 2**). In comparison to the baseline concentrations and those observed in the controls, As concentrations decreased by over two orders of magnitude while Cr concentrations decreased by over an order of magnitude. Cr speciation analysis showed that Cr(VI) concentration reduced from baseline levels to at or below detection levels (0.01 mg/L) in both control and the treatment reactors. For the remainder of the 14-day test duration, the aqueous concentrations of the CCA metals stayed mostly at or below detection levels with only few sporadic instances of trace level detections.

Dissolved Metals in Groundwater in Abiotic Treatment with 1.68 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate								
Sample ID	**Time (hours)**	**As (mg/L)**	**Cr (mg/L)**	**Cr(VI) (mg/L)**	**Cu (mg/L)**	**Fe (mg/L)**	**Nitrate (mg/L)**	**Sulfate (mg/L)**
Control Samples								
Abiotic_Control_050615[#]	4	3.07	0.126	0.005	0.919	3.39	1.61	12.3
Abiotic Control_051315[#]	168	4.86	0.041	0.005	0.293	0.063	1.16	9.05
Treatment Samples								
Abiotic_4hr_050615	4	0.01	0.01	0.005	0.01	903	1.5	3120
Abiotic_4hr_Dup_050615	4	0.01	0.01	0.005	0.01	946	1.5	3090
Average	**4**	**0.01**	**0.01**	**0.005**	**0.01**	**925**	**1.5**	**3105**
Abiotic_8hr_050615	8	0.01	0.01	0.005	0.01	833	1.77	3040
Abiotic_8hr_Dup_050615	8	0.01	0.01	0.005	0.01	918	1.72	3150
Average	8	**0.01**	**0.01**	**0.005**	**0.01**	**876**	**1.75**	**3095**
Abiotic_24HR_05072015	24	0.21	0.01	0.005	0.087	813	1.62	3070
Abiotic_24HR_DUP_05072015	24	0.01	0.01	0.005	0.01	921	1.73	3240
Average	**24**	**0.11**	**0.01**	**0.005**	**0.049**	**867**	**1.68**	**3155**
Abiotic_48HR_050815	48	0.148	0.01	0.005	0.01	882	1.36	3170
Abiotic_48HR_DUP_050815	48	0.01	0.01	0.005	0.01	893	1.43	3140
Average	**48**	**0.079**	**0.01**	**0.005**	**0.01**	**888**	**1.40**	**3155**
Abiotic_Day 7_051315	168	0.027	0.001	5	0.008	828	1.09	3130
Abiotic_Day 7_Dup_051315	168	0.023	0.005	0.005	0.005	739	1.14	3150
Average	**168**	**0.025**	**0.003**	**2.503**	**0.007**	**784**	**1.12**	**3140**
Abiotic_Day 14_052015	336	0.027	0.01	5	0.026	821	1.87	3180
Abiotic_Day 14_Dup_052016	336	0.029	0.01	0.005	0.028	851	0.61	3150
Average	**168**	**0.028**	**0.01**	**2.503**	**0.027**	**836**	**1.24**	**3165**

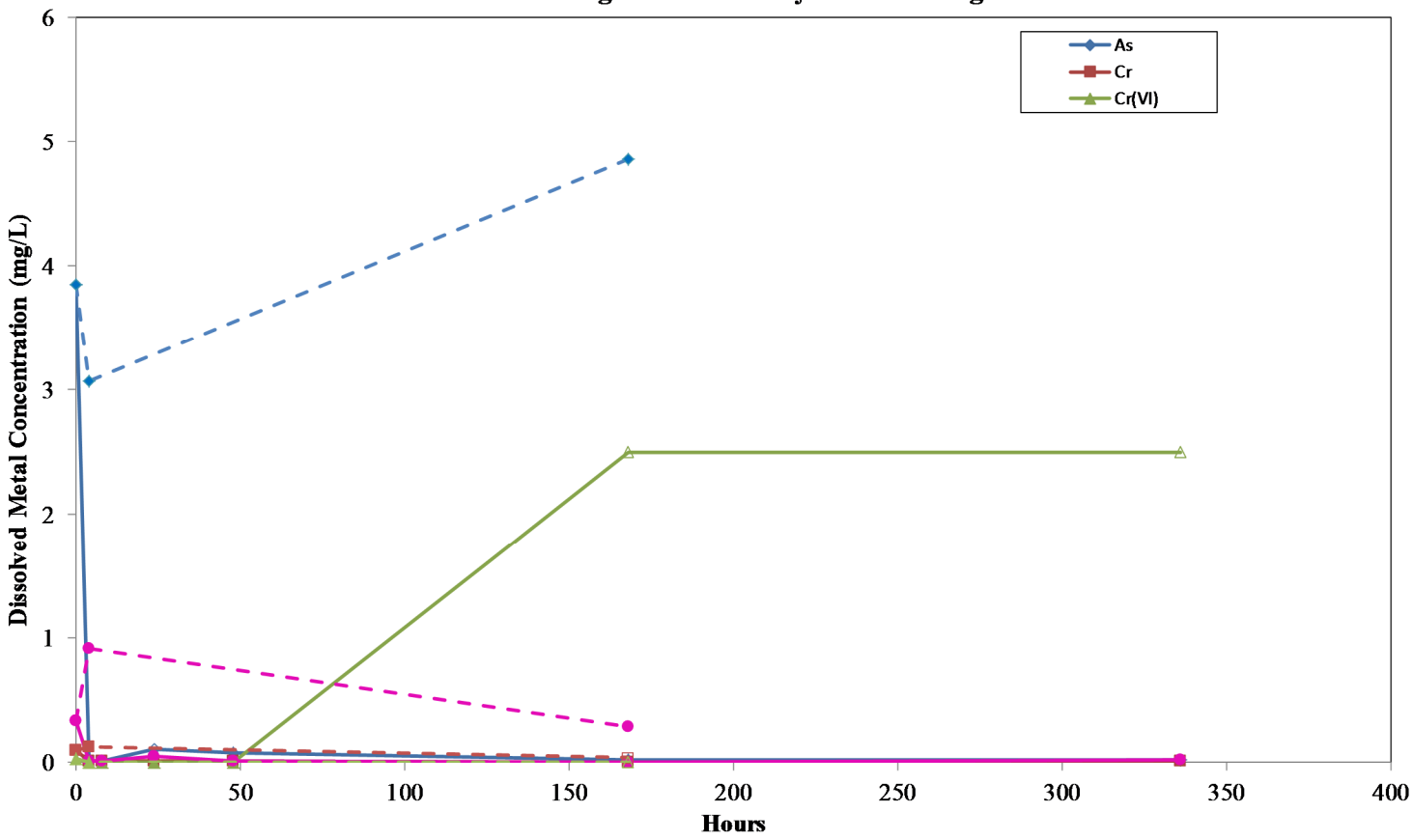
Notes:

The blue text denotes a non-detect where the value is considered as ½ reporting limit
[#]Reestablished control for abiotic treatment with 1.68 g/L calcium polysulfide and 1 g/L ferrous sulfate
As - arsenic; Cr - chromium; Cr(VI) - hexavalent Cr; Cu - copper; Fe - iron; mg/L - milligram per liter

As shown in the table below, total concentrations of CCA metals in the abiotic treatment solids increased in comparison to the total metal concentrations observed in the baseline characterization and in the control reactors (**Figure 3**). This increase in the solid-phase concentration of the CCA metals is indicative of CCA metal removal via reductive precipitation. Under anaerobic conditions in the presence of sulfide and polysulfide, aqueous As and Cu species are known to precipitate as metal sulfide (AsS, As_2S_3, CuS) solids while Cr(VI) is reduced to $Cr(OH)_3$ precipitates. The predominance of such conditions in the test reactors is indicated by the negative ORP and low DO values (**Table 2**). Based on the aqueous and solid phase concentrations of the CCA metals and the geochemical data (**Table 2**), it appears that such reductive sequestration processes were dominant in the abiotic treatment reactors. Overall, the

abiotic treatment achieved greater than 90% removal of CCA metals from the aqueous phase within the first four hours of the treatment period.[1]

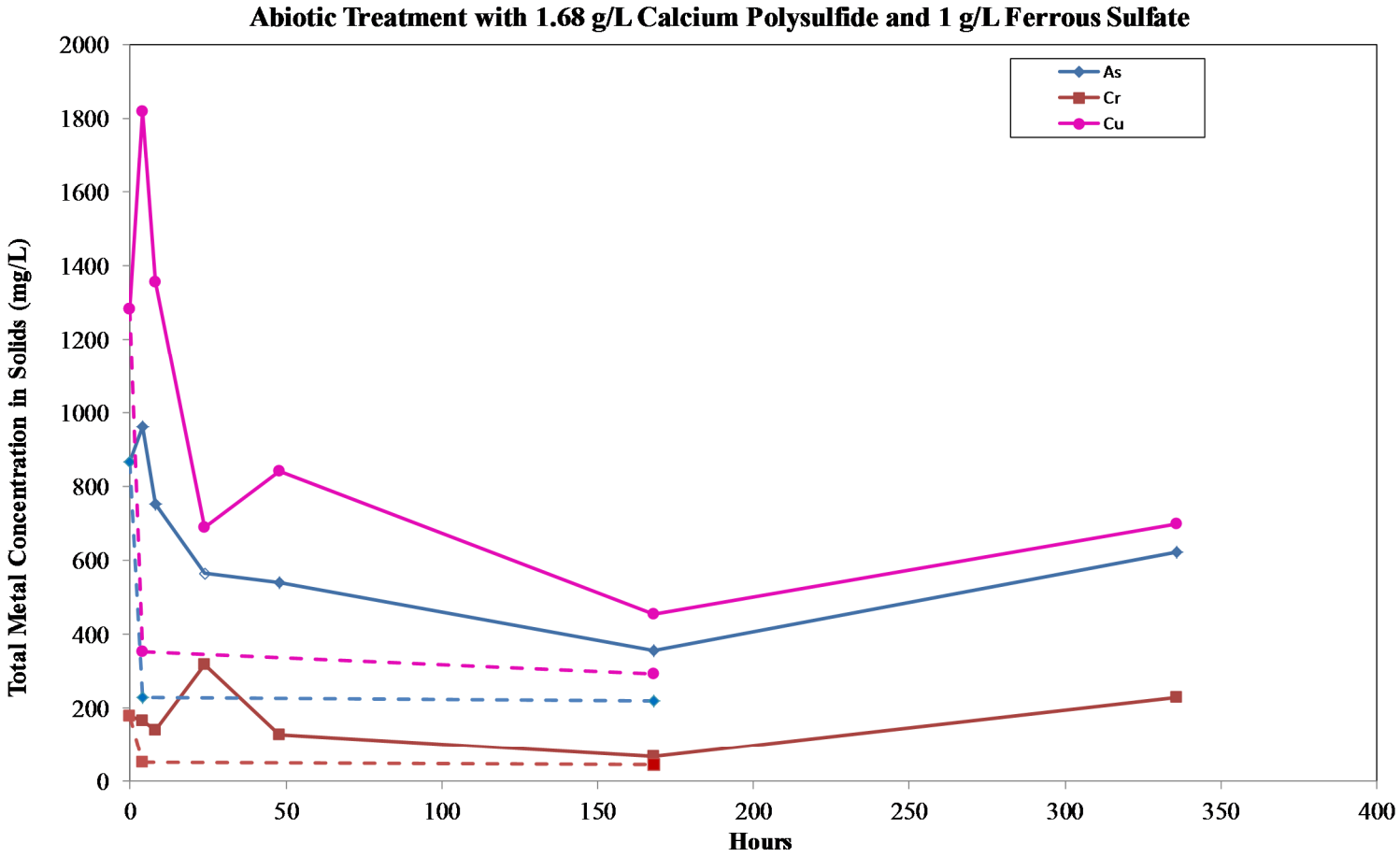
[1] It should be noted that, as indicated in Figure 2 and the table above (page 11), Cr(VI) reporting/detection limits used by the external laboratory (TestAmerica) for the treatment samples changed between early time (0 – 50 hours) and late time (> 100 hours) during the course of the test. Although it would have been ideal if the reporting/detection limits had remained constant throughout the course of the test, this was not possible due to TestAmerica's sample handling procedures and requirements for sample dilution. Regardless, the Cr(VI) concentrations in the treatment were non-detect after the four hour sample.



Notes:

Broken lines represent metal concentrations in the controls
Open symbols represent non-dectect values
Non-detect values were treated as 1/2 the reporting limit

Dissolved Metal Trends in Abiotic Treatment Former Collstrup Wood Treatment Facility, Hillerød, Denmark		
Geosyntec consultants		Figure 2
Maryland	November 2015	



Notes:

Broken lines represent metal concentrations in the controls

Total Metal Trends in Abiotic Treatment Former Collstrup Wood Treatment Facility, Hillerød, Denmark		
Geosyntec consultants		Figure 3
Maryland	November 2015	

Total Metals in Solids in Abiotic Treatment with 1.68 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate					
Sample ID	**Time (hours)**	**As (mg/Kg)**	**Cr (mg/Kg)**	**Cu (mg/Kg)**	**Fe (mg/Kg)**
Control Samples					
Abiotic_Control_050615[#]	4	229	51.5	354	1960
Abiotic Control_051315[#]	168	221	46	293	1620
Treatment Samples					
Abiotic_4hr_050615	4	1160	211	2290	8580
Abiotic_4hr_Dup_050615	4	769	120	1350	5220
Average	**4**	**965**	**166**	**1820**	**6900**
Abiotic_8hr_050615	8	276	48.9	364	3110
Abiotic_8hr_Dup_050615	8	1230	233	2350	8480
Average	8	**753**	**141**	**1357**	**5795**
Abiotic_24HR_05072015	24	344	62.5	634	3960
Abiotic_24HR_DUP_05072015	24	786	574	747	4070
Average	**24**	**565**	**318**	**691**	**4015**
Abiotic_48HR_050815	48	334	62.2	403	3550
Abiotic_48HR_DUP_050815	48	746	194	1280	5910
Average	**48**	**540**	**128.1**	**842**	**4730**
Abiotic_Day 7_051315	168	311	62.6	459	3110
Abiotic_Day 7_Dup_051315	168	400	73.3	451	3690
Average	**168**	**356**	**67.95**	**455**	**3400**
Abiotic_Day 14_052015	336	887	340	1000	6000
Abiotic_Day 14_Dup_052016	336	362	121	402	3380
Average	**336**	**625**	**231**	**701**	**4690**

Notes:

[#]Reestablished control for abiotic treatment with 1.68 g/L calcium polysulfide and 1 g/L ferrous sulfate
As - arsenic; Cr - chromium; Cr(VI) - hexavalent Cr; Cu - copper; Fe - iron; mg/L - milligram per liter

5.3 Biotic Treatment

In the biotic treatment reactors, the initial dose of 30 mg/L lactate and 2 g/L ferrous sulfate resulted in decreases in aqueous As and Cr concentrations to levels at or near the detection limits (0.002 mg/L) within 13 days of the treatment period (refer to the table below). In comparison to the control and baseline concentrations, average aqueous As concentrations decreased by over two orders of magnitude whereas average aqueous Cr concentrations decreased by over an order of magnitude. Cr(VI) concentrations were reduced to at or below detection limits and it remained at this level for the remainder of the treatment period. The initial treatment dose, however, did not influence Cu removal and did not result in sulfate-reducing conditions as evidenced by the geochemical data (**Table 2**) and the substantial presence of sulfate in the reactors. Consumption of lactate early in the treatment period appeared to correlate with decline in nitrate concentrations, suggesting that indigenous bacteria were utilizing nitrate as the preferential electron acceptor instead of sulfate. Therefore, the lactate dose was sequentially increased to 180

mg/L to stimulate native bacteria to create sulfate-reducing conditions conducive for metal sulfide precipitation, especially for removal of Cu and As. The VFAs analysis results (**Table 3**) show that even though excess donor was present in the reactors, the indigenous organisms were not able to utilize sulfate as the electron acceptor and reduce it to sulfide.

Dissolved Metals Biological Treatment with 180 mg/L Lactate, 2 g/L Ferrous Sulfate, and Bioaugmentation^								
Sample ID	**Time (days)**	**As (mg/L)**	**Cr (mg/L)**	**Cr(VI) (mg/L)**	**Cu (mg/L)**	**Fe (mg/L)**	**Nitrate (mg/L)**	**Sulfate (mg/L)**
Control Samples								
Biotic Control_050615	13	7.94	0.164	0.032	1.32	4.44	1.53	15.7
Control_073015	98	88	10.6	0.014	93.6	218	1.66	30.8
Control_091715	147	13.3	0.158	0.014	1.58	2.72	1.44	20.5
Treatment Samples								
Biotic Dup_050615	13	0.005	0.005	0.005	0.49	111	1.41	2350
Biotic_050615	13	0.012	0.005	0.005	3.48	3.18	1.46	2350
Average	**13**	**0.008**	**0.005**	**0.005**	**1.97**	**57.1**	**1.44**	**2350**
Biotic_051315	20	0.005	0.001	0.005	0.694	98.8	1.23	2810
Biotic_Dup_051315	20	0.005	0.001	0.005	0.273	204	1.14	2820
Average	**20**	**0.005**	**0.001**	**0.005**	**0.484**	**151**	**1.19**	**2815**
Biotic_071315	81	19	0.057	0.005	2.55	4.68	0.05	2370
Biotic_Dup_071315	81	15.4	0.013	0.005	1.68	0.27	0.05	2250
Average	**81**	**17.2**	**0.035**	**0.005**	**2.12**	**2.47**	**0.05**	**2310**
Biotic_072315	91	24.6	0.0231	0.005	2.61	0.281	0.05	2200
Biotic_Dup_072315	91	21.5	0.0203	0.005	2.2	0.233	0.05	2280
Average	**91**	**23.1**	**0.022**	**0.005**	**2.41**	**0.257**	**0.05**	**2240**
Biotic_081115	110	32.7	0.05	0.05	2.59	0.625	0.05	2410
Biotic_Dup_081115	110	27.6	0.05	0.005	3.39	0.625	0.05	2440
Average	**110**	**30.2**	**0.05**	**0.028**	**2.99**	**0.625**	**0.05**	**2425**
Biotic_091715	147	22.9	0.067	0.005	0.44	2.52	0.118	1750
Biotic_Dup_091715	147	16.1	0.024	0.005	0.06	0.333	0.117	1950
Average	**147**	**19.5**	**0.046**	**0.005**	**0.25**	**1.43**	**0.118**	**1850**
Biotic_100815[&]	168	46.8	4.28	0.005	35.4	322	0.198	1970
Biotic_Dup_100815[&]	168	13.8	0.83	0.005	6.43	52.7	0.5	1670
Average	**168**	**30.3**	**2.55**	**0.005**	**20.9**	**187**	**0.35**	**1820**

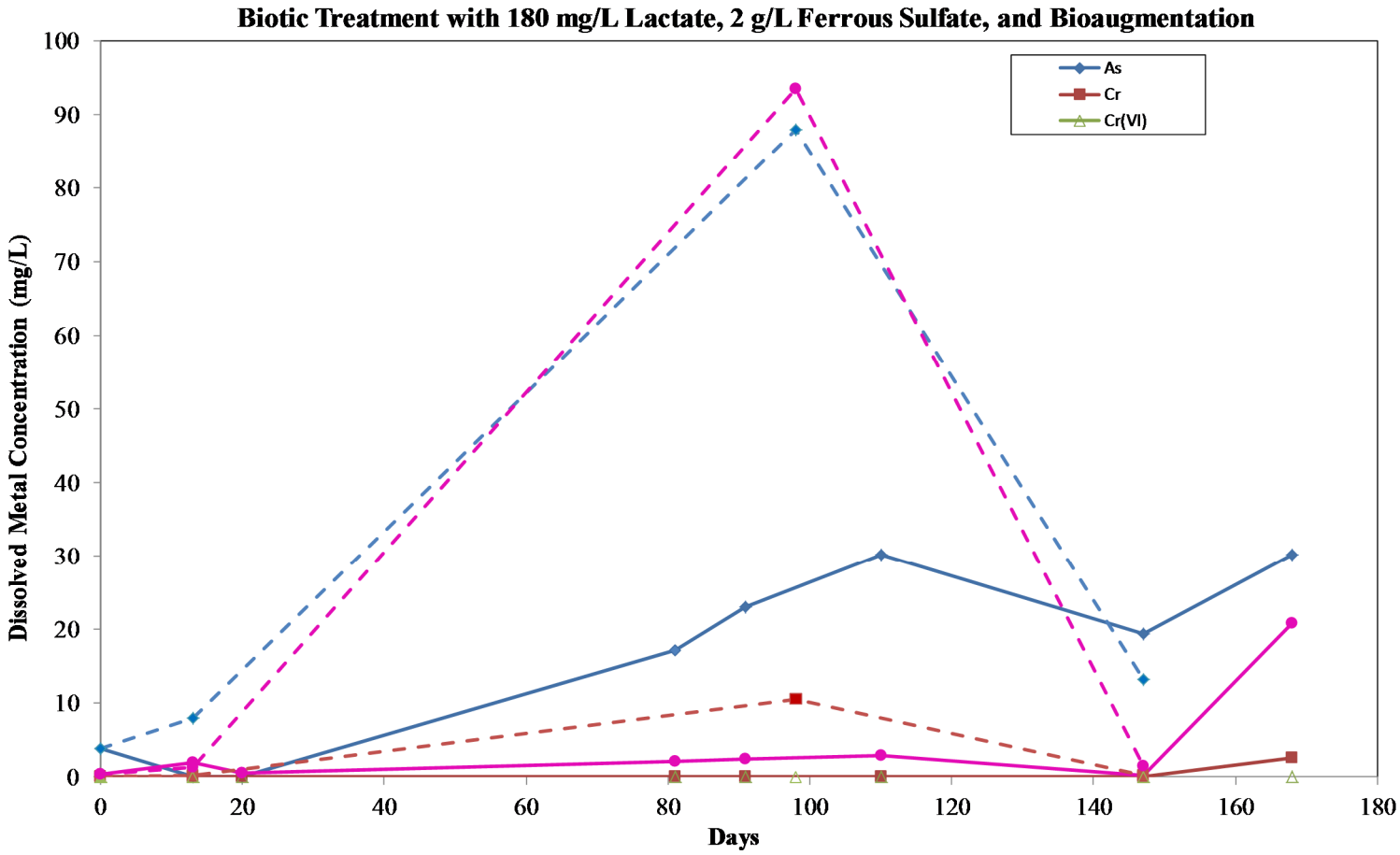
Notes:

The blue text denotes a non-detect where the value is considered as 1/2 reporting limit

^ Initially 30 mg/L of lactate added on 4/30/15; Additional 30 mg/L of lactate added on 5/13/15; 60 mg/L added on 6/4/15, and 60 mg/L added on 6/8/15.

[&]Samples were filtered by the external laboratory

As - arsenic; Cr - chromium; Cr(VI) - hexavalent Cr; Cu - copper; Fe - iron; mg/L - milligram per liter



Notes:

Broken lines represent metal concentrations in the controls
Open symbols represent non-dectect values
Non-detect values were treated as 1/2 the reporting limit

Dissolved Metal Trends in Biotic Treatment Former Collstrup Wood Treatment Facility, Hillerød, Denmark		
Geosyntec consultants		Figure
Maryland	November 2015	**4**

In order to establish sulfate-reducing conditions, the reactors were bioaugmented with enrichments of sulfate-reducing bacteria that were isolated from creek sediments. Since this bioaugmentation attempt also was not successful in achieving the desired redox conditions, the reactors subsequently were bioaugmented with anaerobic sludge from wastewater treatment plant. After the second bioaugmentation, the ORP in the bioaugmented reactors decreased to levels typical of sulfate reducing conditions (**Table 2**). However, the sulfate concentrations in the reactors remained fairly stable. One plausible explanation for the lack of sulfate reducing activity in the treatment reactors is the preferential use of nitrate and oxidized Fe species as electron acceptors by the native microorganisms. After 20 days in the treatment period, the increased lactate dose caused increases in aqueous concentration of CCA metals (Figure 4), suggesting the release of sorbed species from the Site matrix. This increase in As and Cu concentration may have inhibited the activity of sulfate-reducing bacteria. Studies have shown that aqueous Cu concentrations at levels similar to those observed in this study cause an inhibitory effect on the activity of sulfate- and nitrate-reducing bacteria (Sani et al., 2001; Utgikar, et al., 2001; Utgikar, et al., 2003; Ochoa-Herrera et al., 2011).

The total concentrations of CCA metals in the biotic treatment solids (refer to the table below) decreased overall during the treatment period in comparison to the total metal concentrations observed in the baseline characterization and control reactors. This decline in total metal concentrations combined with the increase in aqueous metal concentrations is indicative of the release of sorbed species (or solubilization of previously solid phases) from the solid matrix under the test conditions. It is possible that organic ligands (e.g., natural organic matter) in the municipal wastewater that was used for bioaugmentation also may have been a factor in the solubilization of CCA metals in the treatment.

Total Metals in Solids in Biological Treatment with 180 mg/L Lactate, 2 g/L Ferrous Sulfate, and Bioaugmentation^

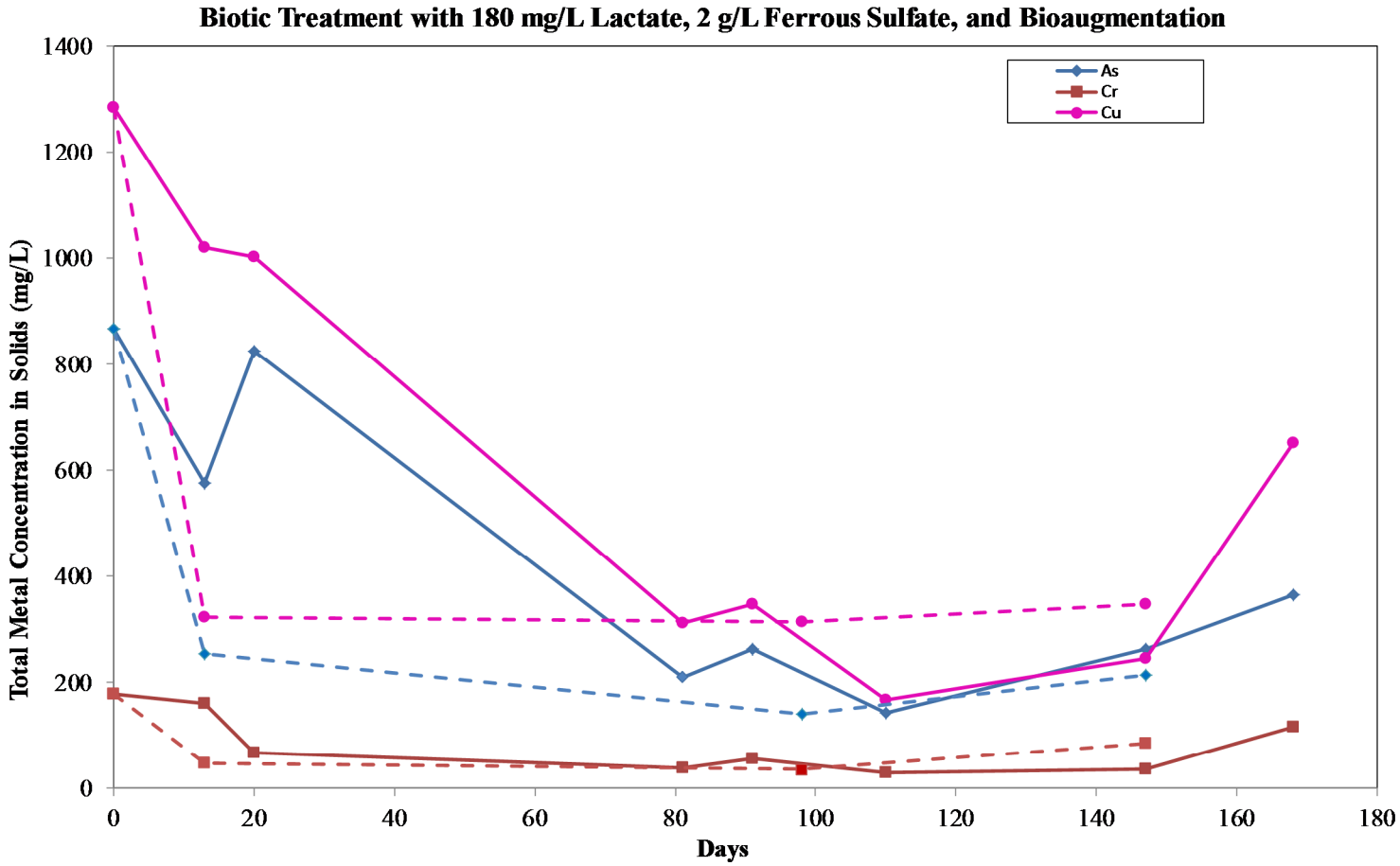
Sample ID	Time (days)	As (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)
Control Samples					
Biotic Control_050615	13	254	48.4	324	1450
Control_073015	98	142	36.2	314	1020
Control_091715	147	214	85.9	347	1650
Treatment Samples					
Biotic Dup_050615	13	725	152	1350	8240
Biotic_050615	13	430	172	690	4100
Average	**13**	**578**	**162**	**1020**	**6170**
Biotic_051315	20	249	45.6	305	5020
Biotic_Dup_051315	20	1400	88.9	1700	12600
Average	**20**	**825**	**67.3**	**1003**	**8810**
Biotic_071315	81	256	47	392	3180
Biotic_Dup_071315	81	166	30.6	233	2130
Average	**81**	**211**	**38.8**	**313**	**2655**
Biotic_072315	91	198	45.7	233	3210

Total Metals in Solids in Biological Treatment with 180 mg/L Lactate, 2 g/L Ferrous Sulfate, and Bioaugmentation^					
Sample ID	**Time (days)**	**As (mg/Kg)**	**Cr (mg/Kg)**	**Cu (mg/Kg)**	**Fe (mg/Kg)**
Biotic_Dup_072315	91	327	65.6	462	4470
Average	**91**	**263**	**55.7**	**348**	**3840**
Biotic_081115	110	150	30.3	171	1950
Biotic_Dup_081115	110	136	31.2	163	1990
Average	**110**	**143**	**30.8**	**167**	**1970**
Biotic_091715	147	156	28.2	163	2160
Biotic_Dup_091715	147	371	45.6	326	3240
Average	**147**	**264**	**36.9**	**245**	**2700**
Biotic_100815	168	330	182	1100	3380
Biotic_Dup_100815	168	400	53.1	202	2310
Average	**168**	**365**	**118**	**651**	**2845**

Notes:

^ Initially 30 mg/L of lactate added on 4/30/15; Additional 30 mg/L of lactate added on 5/13/15; 60 mg/L added on 6/4/15, and 60 mg/L added on 6/8/15.

As - arsenic; Cr - chromium; Cr(VI) - hexavalent Cr; Cu - copper; Fe - iron; mg/L - milligram per liter



Notes:

Broken lines represent metal concentrations in the controls

Total Metal Trends in Biotic Treatment Former Collstrup Wood Treatment Facility, Hillerød, Denmark		
Geosyntec consultants		Figure 5
Maryland	November 2015	

6. CONCLUSIONS AND RECOMMENDATIONS

The main objective of the bench tests was to assess the effectiveness of chemical and biological treatments to achieve in situ reductive stabilization of CCA metals in the Site matrix. The abiotic treatment with calcium polysulfide and ferrous sulfate was very effective in rapidly removing the CCA metals from the aqueous phase. Within the first four hours of the abiotic treatment period, the aqueous concentration of CCA metals including Cr(VI) approached at or below the detection levels. The removal of CCA metals from the aqueous phase was attributable to the reductive precipitation of metal sulfide solids as evident by the increase in total metal concentrations in the solid phase. Overall, dissolved As concentrations decreased by over two orders of magnitude while Cr and Cu decreased by over an order of magnitude in the abiotic treatment. Based on the results of this bench test, the abiotic treatment appears to exhibit significant promise for the in situ reductive stabilization of CCA metals at Hotspot area 1 and is therefore recommended for pilot-scale testing.

The biotic treatment with lactate and ferrous sulfate achieved an initial significant decrease in dissolved As and Cr concentrations; however, sulfate-reducing conditions were not established in the reactors even after increasing the lactate dose by six-fold and bioaugmenting the reactor twice, once with enrichments of sulfate-reducing bacteria from creek sediments and the second time with anaerobic sludge from wastewater treatment plant. Later in the treatment period, the biotic treatment appeared to result in the release of sorbed CCA metal species from the solid matrix in the test reactors. The lack of sulfate-reducing activity in the biotic treatment reactors was likely attributable to the inhibition of native organisms by high dissolved metal concentrations (e.g., Cu) or the presence of organic ligands in the municipal wastewater used to bioaugment the reactors.

While not included in the limited scope (and budget) for this study, additional analysis of As speciation, Fe(II), and heavy metals (other than CCA metals), and solid phase measurements of acid volatile sulfides (AVS) and simultaneously extracted metals (SEM) would further enable elucidation of mechanisms underlying the CCA metal behavior observed in the biotic treatment reactors and allow for determination of inhibitory agents in the Site materials. Moreover, additional long-term bench tests are recommended to assess the in situ stability of the precipitated metal sulfide solids (those formed by either abiotic or biotic treatment) under varying redox conditions, including re-aeration of previously anoxic conditions.

7. REFERENCES

Blowes, D. W.; Ptacek, C. J. Benner, S. G.; McRae, C.W.T.; Bennet, T. A.; Puls, R. W. 2000. Treatment of inorganic contaminants using permeable reactive barriers. *J. Contam. Hydrol.,* 45, 123-137.

Buchireddy, P. R.; Bricka, R. M.; Gent, D. B. 2009. Electrokinetic remediation of wood preservative contaminated soil containing copper, chromium, and arsenic. *J. Hazard. Mater*., 162, 490-497.

Christensen, I. V.; Pedersen, A. J.; Ottosen, L. M.; Ribeiro, A. B. 2006. Electrodialytic remediation of CCA-treated waste wood in a 2 m^3 pilot plant. *Sci. Total. Environ.,* 364, 45-54.

Danish EPA, 2011. Investigation and risk assessment of Collstrop relative to Esrum Sø. Environmental Project No. 1358 2011; Technology development program for soil and groundwater.

DeFlaun, M.F.; Lanzon, J.; Lodato, M.; Henry, S.; Onscott, T.E.; Chan, E.; Otemuyiwa, B. 2009. Anaerobic Biostimulation for the In Situ Precipitation and Long-Term Sequestration of Metal Sulfides. U.S. Department of Defense, Strategic Environmental Research and Development Program Report ER-1373. http://www.serdp.org/Program-Areas/Environmental-Restoration/Contaminants-on-Ranges/Protecting-Groundwater-Resources/ER-1373/ER-1373.

Geosyntec (Geosyntec Consultants, Inc.) 2014. *A Whitepaper Review: In Situ Remediation and Stabilization of Chromium, Copper, and Arsenic in Soil and Groundwater*. Prepared for the Capital Region of Denmark. January.

Geosyntec 2015. *Collstrup CCA Bench-Scale Treatability Study Work Plan*. Prepared for the Capital Region of Denmark. January.

Mulligan, C. N.; Yong, R. N.; Gibbs, B. F. 2001. Remediation of technologies of metal-contaminated soils and groundwater: an evaluation. *Eng. Geol*., 60, 193-207.

Nielsen, S. S.; Petersen, L. R.; Jakobsen, R. 2011. Amendment of arsenic and chromium polluted soil from wood preservation by iron residues from water treatment. *Chemosphere*, 84*(4)*, 383-389.

Nielsen, S. S. 2013. Stabilization of arsenic and chromium polluted soils using water treatment residues. *Ph.D. Thesis*, Denmark Technical University, Lyngby, Denmark.

Ochoa-Herrera, V; Leon, G; Banihani, Q.; Field, J. A.; Sierra-Alvarez, R. 2011. Toxicity of copper(II) ions to biological wastewater treatment systems. *Sci. Total. Environ.,* 412-413, 380-385.

Petersen, S.; Hedquist, K. 2006. Treatability Test Report for Calcium Polysulfide in the 100-K Area.

Sani, R. K.; Peyton, B. M.; Brown, L. T. 2001. Copper-induced inhibition of growth of *desulfovibrio desulfuricans* G20: Assessment of its toxicity and correlation with those of zinc and lead. *Appl. Environ. Microbiol.* 67*(10)*, 4765-4772.

United States Department of Energy, DOE/RL-2006-17, 138 p. http://www.clu-in.org/download/techfocus/reduction/Polysulfide-chromium-DOE-RL-2006-17.pdf

USEPA (U.S. Environmental Protection Agency), 2000. In situ treatment of soil and groundwater contaminated with chromium. EPA/825/R-00/005, Office of Research and Development, USEPA, Washington, DC.

USEPA, 2011. Five Year Review: Coast Wood Preserving, Ukiah, California.

Utgikar, V. P.; Chen, B. Y.; Chaudhary, N.; Tabak, H. H.; Haines, J. R.; Govind, R. 2001. Acute toxicity of heavy metals to acetate-utilizing mixed cultures of sulfate-reducing bcateria: EC100 and EC50. *Environ. Toxicol. Chem.* 20*(12)*, 2662-2669.

Utgikar, V. P.; Tabak, H. H.; Haines, J. R.; Govind, R. 2003. Quantification of toxicity and inhibitory impact of copper and zinc on mixed cultures of sulfate-reducing bacteria. *Biotechnol. Bioeng.* 82*(3)*, 306-312.

Waybrant, K. R.; Ptacek,C. J.; Blowes, D. W. 2002. Treatment of mine drainage using permeable reactive barriers: column experiments. *Environ. Sci. Technol.,* 36*(6)*, 1349-1356.

Zawislanski, P.; Horst, J.; Gillow, J.; Liles, D. 2010. Challenges associated with arsenic remediation in media affected by multiple metals. Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds (Monterey, CA; May 2010).

TABLES

Table 1. Baseline Characterization of Site Materials
Former Collstrup Wood Treatment Facility
Hillerød, Denmark

Groundwater Analysis - Unfiltered

Client Sample ID	Total As (mg/L)	Total Cr (mg/L)	Total Cu (mg/L)	Total Fe (mg/L)
Baseline GW	4.44	0.093	0.326	1.08
Baseline GW-Dup	4.12	0.090	0.314	0.92
Average	**4.28**	**0.091**	**0.320**	**1**

Groundwater Analysis -Filtered

Client Sample ID	Dissolved As (mg/L)	Dissolved Cr (mg/L)	Dissolved Cr(VI) (mg/L)	Dissolved Cu (mg/L)	Dissolved Fe (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)
Baseline GW	3.84	0.1	0.032	0.329	1.17	1.29	5.73
Baseline GW-Dup	3.87	0.104	0.03	0.351	1.19	1.28	5.97
Average	**3.855**	**0.102**	**0.031**	**0.34**	**1.18**	**1.29**	**5.85**

Soil Analysis

Client Sample ID	As (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)
Baseline Soil	731	155	1120	4490
Baseline Soil-Dup	624	123	885	3350
Average	678	139	1003	3920
Dry weight basis considering 78% solids based on %solids in test samples	**869**	**178**	**1285**	**5026**

Notes:
As - arsenic
Cr - chromium; Cr(VI) - hexavalent Cr
Cu - copper
Fe - iron
mg/L - milligram per liter
mg/Kg - milligram per kilogram

Table 2. Geochemical Data for Reductive Sequestration Bench Tests
Former Collstrup Wood Treatment Facility
Hillerød, Denmark

Sample ID	Time (hours)	ORP (mV)	DO (mg/L)	pH	Temp (°C)
Controls for Abiotic Treatment					
C-1-1*	24	162.8	9.35	5.99	21.5
C-2-1*	48	154	NM	6.31	NM
Abiotic_Control_050615#	4	NM	NM	NM	NM
Abiotic Control_051315#	168	120	8.32	5.96	21.5
Abiotic Treatment with 400 mg/L Calcium Polysulfide and 1 g/L Ferrous Sulfate					
A-1-1	24	185.1	6.63	4.19	22
A-1-2	24	217.2	6.83	3.77	21.5
Average	**24**	**201.15**	**6.73**	**3.98**	**21.75**
A-2-1	48	258.3	3.4	3.75	23
A-2-2	48	248.6	3.5	3.59	22
Average	**48**	**253.45**	**3.45**	**3.67**	**22.5**
Abiotic Treatment with 1.68 g/L Calcium Polysulfide and 1 g/L Ferrous Sulfate					
Abiotic_4hr_050615	4	-120	0.21	6.11	22
Abiotic_4hr_Dup_050615	4	-130	0.13	6.08	22
Average	**4**	**-125**	**0.17**	**6.095**	**22**
Abiotic_8hr_050615	8	-120	0.21	8.8	23
Abiotic_8hr_Dup_050615	8	-125	0.2	8.83	22.5
Average	**8**	**-122.5**	**0.205**	**8.815**	**22.75**
Abiotic_24HR_05072015	24	-40	0.82	5.05	23
Abiotic_24HR_DUP_05072015	24	-87	0.88	5.89	22
Average	**24**	**-63.5**	**0.85**	**5.47**	**22.5**
Abiotic_48HR_050815	48	-90	0.86	5.62	22
Abiotic_48HR_DUP_050815	48	-123	0.56	6.14	21.5
Average	**48**	**-106.5**	**0.71**	**5.88**	**21.75**
Abiotic_Day 7_051315	168	-80.7	0.94	5.67	23
Abiotic_Day 7_Dup_051315	168	-40	0.92	5.7	22
Average	**168**	**-60.35**	**0.93**	**5.685**	**22.5**
Abiotic_Day 14_052015	336	-100	0.65	5.62	19
Abiotic_Day 14_Dup_052015	336	-98.4	0.73	5.73	19.5
Average	**336**	**-99.2**	**0.69**	**5.675**	**19.25**
Sample ID	**Time (days)**	**ORP (mV)**	**DO (mg/L)**	**pH**	**Temp (°C)**
Controls for Biological Treatment					
Biotic Control_050615	13	NM	NM	NM	NM
Biotic Control_072315	98	69.4	8.32	6.44	NM
Biotic Control_091715	147	120	7.4	6.44	NM
Biological Treatment with 180 mg/L Lactate, 2 g/L Ferrous Sulfate, and Bioaugmentation^					
Biotic Dup_050615	13	54.3	0.87	5.58	NM
Biotic_050615	13	-25.7	0.77	5.81	NM
Average	**13**	**14.3**	**0.82**	**5.695**	**NM**
Biotic_051315	20	-8.4	0.86	5.96	22
Biotic_Dup_051315	20	-35	0.62	5.74	21.5
Average	**20**	**-21.7**	**0.74**	**5.85**	**21.75**
Biotic_071315	81	-54.3	0.16	7.22	NM
Biotic_Dup_071315	81	-70	0.23	7.38	NM
Average	**81**	**-62.15**	**0.195**	**7.3**	**NM**
Biotic_072315	91	-103.9	0.56	7.12	NM
Biotic_Dup_072315	91	-118.2	0.44	7.06	NM
Average	**91**	**-111.05**	**0.5**	**7.09**	**NM**
Biotic_081115	110	-75.3	0.99	7.22	20
Biotic_Dup_081115	110	-88.5	0.8	7.15	20
Average	**110**	**-81.9**	**0.895**	**7.185**	**20**
Biotic_091715	147	-200	0.9	7.5	NM
Biotic_Dup_091715	147	-152.3	0.97	7.25	NM
Average	**147**	**-176.15**	**0.935**	**7.375**	**NM**
Biotic_100815	168	-230	0.57	7.05	NM
Biotic_Dup_100815	168	-257.7	0.94	7.45	NM
Average	**168**	**-243.85**	**0.755**	**7.25**	**NM**

Notes:

NM = not measured

* Initial control for abiotic treatment with 400 mg/L calcium polysulfide and 1 g/L ferrous sulfate

Reestablished control for abiotic treatment with 1.68 g/L calcium polysulfide and 1 g/L ferrous sulfate

^ Initially 30 mg/L of lactate added on 4/30/15; Additional 30 mg/L of lactate added on 5/13/15; 60 mg/L added on 6/4/15, and 60mg/L added on 6/8/15.

DO - dissolved oxygen; mg/L - milligram per liter; mv - millivolts

Table 3. Volatile Fatty Acids (VFAs) in Biotic Treatment of Reductive Sequestration Bench Tests

Former Collstrup Wood Treatment Facility
Hillerød, Denmark

Sample ID	Time (days)	Lactate (mg/L)	Acetate (mg/L)	Propionate (mg/L)	Formate mg/L)	Butyrate (mg/L)	Pyruvate (mg/L)
Controls for Biological Treatment							
Biotic Control-050615	13	<0.39	<0.54	<0.31	<0.22	<0.41	<0.69
Control_073015	98	1450	<11	<6.2	7.7	<8.2	<14
Control_091715	147	<7.8	<11	<6.2	<4.4	<8.2	<14
Biological Treatment with 180 mg/L Lactate, 2 g/L Ferrous Sulfate, and Bioaugmentation^							
Biotic-050615	13	<0.39	2.6	<0.31	4.2	<0.41	<0.69
Biotic-Dup-050615	13	<0.39	2.4	<0.31	9.1	<0.41	<0.69
Average	**13**	**<0.39**	**2.5**	**<0.31**	**6.6**	**<0.41**	**<0.69**
Biotic-051315	20	<0.39	2.5	<0.31	11	<0.41	<0.69
Biotic-Dup-051315	20	<0.39	2.8	<0.31	8.0	<0.41	<0.69
Average	**20**	**<0.39**	**2.6**	**<0.31**	**9.6**	**<0.41**	**<0.69**
Biotic_072315	91	105	1912	<6.2	9.4	<8.2	<14
Biotic_Dup_072315	91	95	1913	<6.2	9.9	<8.2	<14
Average	**91**	**100**	**1912**	**<6.2**	**9.7**	**<8.2**	**<14**
Biotic_081115	110	93	2072	<6.2	31	<8.2	<14
Biotic_Dup_081115	110	85	2476	20	14	<8.2	<14
Average	**110**	**89**	**2274**	**13**	**22**	**<8.2**	**<14**
Biotic_091715	147	162	815	<6.2	<4.4	<8.2	<14
Biotic Dup_091715	147	<7.8	1483	438	<4.4	<8.2	<14
Average	**147**	**85**	**1149**	**222**	**<4.4**	**<8.2**	**<14**

Notes:
^ Initially 30 mg/L of lactate added on 4/30/15; Additional 30 mg/L of lactate added on 5/13/15; 60 mg/L added on 6/4/15, and 60mg/L added on 6/8/15.
mg/L - milligram per liter

APPENDIX A

GEOSYNTEC CONSULTANTS

PROCEDURE FOR SAMPLING COLLSTRUP SITE, DENMARK

ADDRESS COWI A/S
Parallelvej 2
2800 Kongens Lyngby
Denmark

TEL +45 56 40 00 00
FAX +45 56 40 99 99
WWW cowi.com

CONTENTS

1	Aim	1
2	Preparation	2
3	Groundwater Sampling	2
4	Soil Sampling	2
5	Storage	2
6	Sampling Locations	2

APPENDICES

Appendix A Field Data

Appendix B Sampling Locations

1 Aim

The aim of this memorandum is to describe the method for sampling of shallow groundwater and soil at the Collstrup Site in Hillerød, Denmark. Details about preparation, storage and location of sampling is included.

PROJECT NO.
DOCUMENT NO. 1
VERSION 1
DATE OF ISSUE March 20, 2015
PREPARED Bente H. Hansen
CHECKED
APPROVED

2 Preparation

Generally, pre-cleaned HDPE equipment was used. However, when use of metal materials, the equipment was carefully acid-washed and pre-cleaned.

3 Groundwater Sampling

The water level, depth and dimensions of the well was measured, see Appendix A. The sampling location is described in Section 6.

Prior to collection, the well was purged corresponding to three well volumes. For the sampling, a new, pre-cleaned submersible pump was used along with new PE tubing.

Each sample consisting of five liters was pumped directly into a HDPE bottle and sealed. The bottle was marked according to the order of the sampling, i.e. no. 1 being the first extracted sample. A total of 20 liters was sampled. Despite observation of particular matter in the extracted water, the samples were not filtered.

4 Soil Sampling

Shallow soil samples from four different locations were collected, see location in Section 6. A hand auger was used for the sampling and the approximate sampling depth was 0.3 m. The top soil, plant material and rocks were discarded and samples were homogenized in a bucket. The prepared composite sample was transferred to Rilsan bags containing approximately 1 kg each. A total of 5 kg was sampled. In one sampling spot, discoloration of soil was observed in form of copper colored clods.

5 Storage

Soil and groundwater samples were kept in coolers to keep cold and to prevent exposure to daylight. Immediately after the sampling, the samples were express shipped to the Geosyntec Laboratory in Knoxville, USA.

6 Sampling Locations

Prior to sampling, the previous investigations performed was examined to point out hotspot areas suitable for sampling. Then, the site was inspected. Based on knowledge of concentrations, observed vegetation conditions and well conditions, hotspot 1 was appointed as suitable. The sampling locations for groundwater and soil are illustrated in Figure 1 and Appendix B.

Figure 1. *Sampling locations. The four front markers point out soil sampling spots while the marker in the back is where the shallow well is located.*

Appendix A Field Data

Vandprøvetagning-Almindelig

COWI

Sagsnavn: COLLSTRUP - GEOLOGICAL MATERIAL FOR TREATABILITY STUDIES
Sagsnr.: PROJECT # MEM 1223/01/01

BOTTOM OF BORING

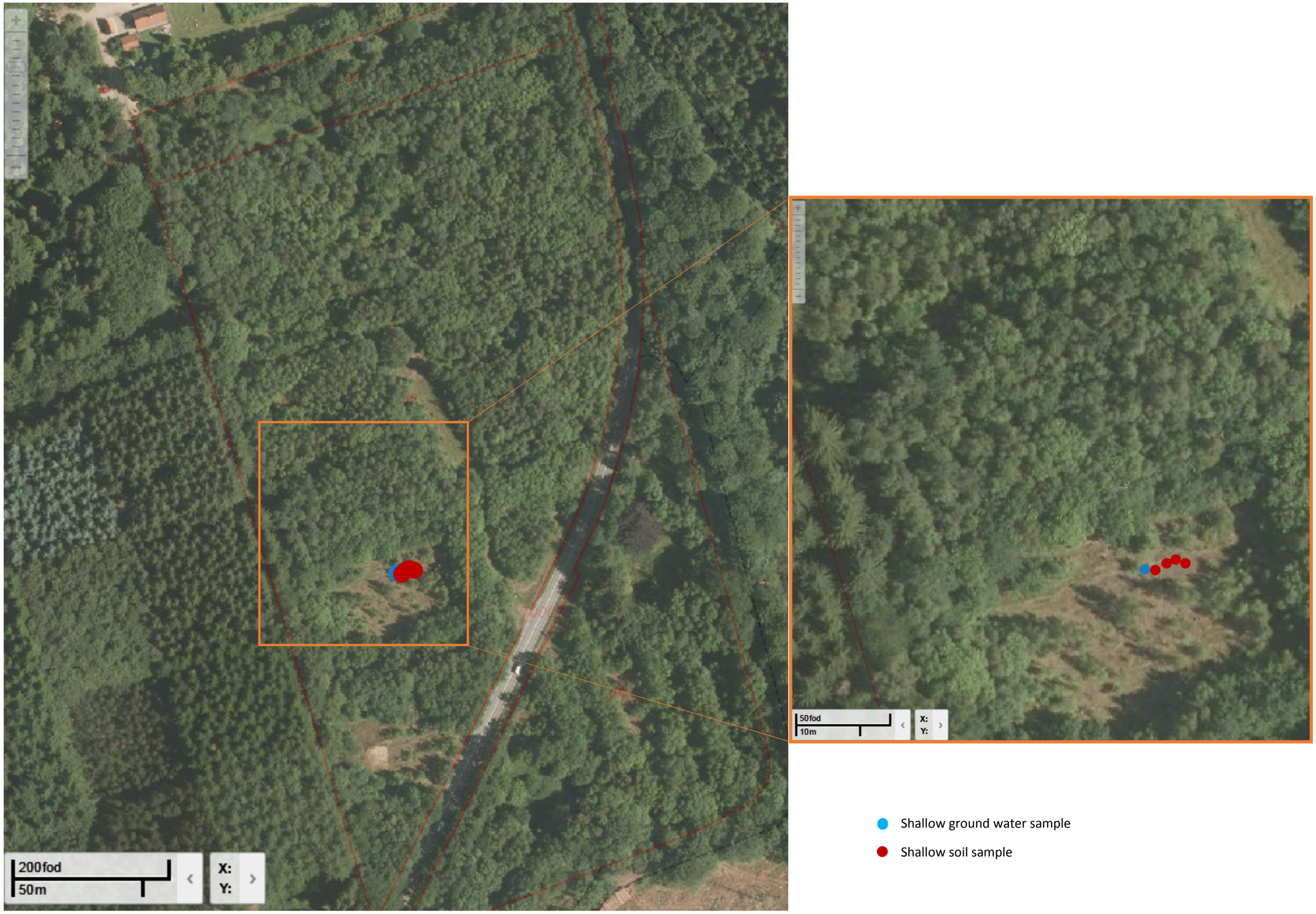
GW TABLE

PREPUMPING

COMMENT

Boring	Dato	Dimension (mm)	Vandspejl (m u. MP)	Bund af boring (m u. MP)	Pejl sidst anvendt i	Pumpe sidst anvendt i	Renpumning (l)	Bemærkninger	Init
T.A. 1 B1	MARCH 16 2015	45	0.515	1.805	–	–	6	TEST AREA 1	BEHD

Appendix B Sampling Locations



- Shallow ground water sample
- Shallow soil sample

APPENDIX B

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-75398-1
Client Project/Site: Baseline Characterization

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
4/6/2015 3:37:13 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 14
Chronicle 16
Method Summary 18
Certification Summary 19
Chain of Custody 20
Receipt Checklists 22

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-75398-1	Baseline GW	Water	03/26/15 15:00	03/28/15 08:30
490-75398-2	Baseline GW-DUP	Water	03/26/15 15:00	03/28/15 08:30
490-75398-3	Baseline Soil	Soil	03/26/15 15:15	03/28/15 08:30
490-75398-4	Baseline Soil-DUP	Soil	03/26/15 15:15	03/28/15 08:30

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Job ID: 490-75398-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-75398-1

Comments
No additional comments.

Receipt
The samples were received on 3/28/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6° C.

Except:

Method 7196A, Filtration: The following samples were received outside of holding time: Baseline GW (490-75398-1), Baseline GW-DUP (490-75398-2).

HPLC/IC
Method 9056: The following samples were received with insufficient holding time remaining for analysis. Baseline GW (490-75398-1), Baseline GW-DUP (490-75398-2).

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

Metals
Method 6020: The method blank for batch 237790 contained Iron above the reporting limit (RL). Associated samples were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

Metals

Qualifier	Qualifier Description
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.
F1	MS and/or MSD Recovery exceeds the control limits
F2	MS/MSD RPD exceeds control limits
B	Compound was found in the blank and sample.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Client Sample ID: Baseline GW
Date Collected: 03/26/15 15:00
Date Received: 03/28/15 08:30

Lab Sample ID: 490-75398-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.29	H	0.100		mg/L			04/01/15 00:19	1
Sulfate	5.73		1.00		mg/L			04/01/15 00:19	1

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4.44		0.0200		mg/L		03/31/15 10:17	04/02/15 18:00	10
Chromium	0.0928		0.00200		mg/L		03/31/15 10:17	04/01/15 23:50	1
Copper	0.326		0.00200		mg/L		03/31/15 10:17	04/01/15 23:50	1
Iron	1.08		0.0250		mg/L		03/31/15 10:17	04/01/15 23:50	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.84		0.00400		mg/L		04/01/15 15:24	04/02/15 15:37	1
Chromium	0.100		0.00400		mg/L		04/01/15 15:24	04/02/15 15:37	1
Copper	0.329		0.00400		mg/L		04/01/15 15:24	04/02/15 15:37	1
Iron	1.17		0.0500		mg/L		04/01/15 15:24	04/02/15 15:37	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0320	H	0.0100		mg/L			04/02/15 10:30	1

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Client Sample ID: Baseline GW-DUP

Lab Sample ID: 490-75398-2

Date Collected: 03/26/15 15:00

Matrix: Water

Date Received: 03/28/15 08:30

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.28	H	0.100		mg/L			04/01/15 00:40	1
Sulfate	5.97		1.00		mg/L			04/01/15 00:40	1

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4.12		0.0200		mg/L		03/31/15 10:17	04/02/15 18:05	10
Chromium	0.0897		0.00200		mg/L		03/31/15 10:17	04/01/15 23:55	1
Copper	0.314		0.00200		mg/L		03/31/15 10:17	04/01/15 23:55	1
Iron	0.920		0.0250		mg/L		03/31/15 10:17	04/01/15 23:55	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.87		0.00400		mg/L		04/01/15 15:24	04/02/15 15:52	1
Chromium	0.104		0.00400		mg/L		04/01/15 15:24	04/02/15 15:52	1
Copper	0.351		0.00400		mg/L		04/01/15 15:24	04/02/15 15:52	1
Iron	1.19		0.0500		mg/L		04/01/15 15:24	04/02/15 15:52	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0300	H	0.0100		mg/L			04/02/15 10:30	1

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Client Sample ID: Baseline Soil
Date Collected: 03/26/15 15:15
Date Received: 03/28/15 08:30

Lab Sample ID: 490-75398-3
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	731		2.43		mg/Kg		03/31/15 12:00	04/03/15 17:25	5
Chromium	155		2.43		mg/Kg		03/31/15 12:00	04/03/15 17:25	5
Copper	1120		2.43		mg/Kg		03/31/15 12:00	04/03/15 17:25	5
Iron	4490	B	24.3		mg/Kg		03/31/15 12:00	04/03/15 17:25	5

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Client Sample ID: Baseline Soil-DUP
Date Collected: 03/26/15 15:15
Date Received: 03/28/15 08:30

Lab Sample ID: 490-75398-4
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	624		2.41		mg/Kg		03/31/15 12:00	04/03/15 17:30	5
Chromium	123		2.41		mg/Kg		03/31/15 12:00	04/03/15 17:30	5
Copper	885		2.41		mg/Kg		03/31/15 12:00	04/03/15 17:30	5
Iron	3350	B	24.1		mg/Kg		03/31/15 12:00	04/03/15 17:30	5

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-237979/5
Matrix: Water
Analysis Batch: 237979

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			03/31/15 16:57	1

Lab Sample ID: LCS 490-237979/6
Matrix: Water
Analysis Batch: 237979

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	95.55		mg/L		96	80 - 120

Lab Sample ID: LCSD 490-237979/7
Matrix: Water
Analysis Batch: 237979

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
Sulfate	100	95.25		mg/L		95	80 - 120	0	20

Lab Sample ID: 490-75366-G-4 MS
Matrix: Water
Analysis Batch: 237979

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	4.94		100	108.4		mg/L		103	80 - 120

Lab Sample ID: 490-75366-G-4 MSD
Matrix: Water
Analysis Batch: 237979

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	4.94		100	113.0		mg/L		108	80 - 120	4	20

Lab Sample ID: MB 490-237980/5
Matrix: Water
Analysis Batch: 237980

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			03/31/15 16:57	1

Lab Sample ID: LCS 490-237980/6
Matrix: Water
Analysis Batch: 237980

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.27		mg/L		103	80 - 120

Lab Sample ID: LCSD 490-237980/7
Matrix: Water
Analysis Batch: 237980

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
Nitrate as N	10.0	10.22		mg/L		102	80 - 120	0	20

Lab Sample ID: 490-75366-G-4 MS
Matrix: Water
Analysis Batch: 237980

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	1.53		10.0	12.24		mg/L		107	80 - 120

Lab Sample ID: 490-75366-G-4 MSD
Matrix: Water
Analysis Batch: 237980

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	1.53		10.0	12.74		mg/L		112	80 - 120	4	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-237727/1-A
Matrix: Water
Analysis Batch: 238381

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 237727

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		03/31/15 10:17	04/01/15 22:07	1
Chromium	ND		0.00200		mg/L		03/31/15 10:17	04/01/15 22:07	1
Copper	ND		0.00200		mg/L		03/31/15 10:17	04/01/15 22:07	1
Iron	ND		0.0250		mg/L		03/31/15 10:17	04/01/15 22:07	1

Lab Sample ID: LCS 490-237727/2-A
Matrix: Water
Analysis Batch: 238381

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 237727

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.08930		mg/L		89	80 - 120
Chromium	0.100	0.09565		mg/L		96	80 - 120
Copper	0.100	0.09297		mg/L		93	80 - 120
Iron	1.00	0.9753		mg/L		98	80 - 120

Lab Sample ID: LCSD 490-237727/3-A
Matrix: Water
Analysis Batch: 238381

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 237727

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.08521		mg/L		85	80 - 120	5	20
Chromium	0.100	0.09091		mg/L		91	80 - 120	5	20
Copper	0.100	0.08813		mg/L		88	80 - 120	5	20
Iron	1.00	0.9334		mg/L		93	80 - 120	4	20

Lab Sample ID: 490-75330-A-1-B MS
Matrix: Water
Analysis Batch: 238381

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 237727

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND	F2 F1	0.100	ND		mg/L		124	75 - 125
Chromium	6.03	F2	0.100	6.965	4	mg/L		938	75 - 125
Copper	ND	F2 F1	0.100	ND	F1	mg/L		157	75 - 125
Iron	2530		1.00	2734	4	mg/L		20300	75 - 125

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-75330-A-1-C MSD
Matrix: Water
Analysis Batch: 238381

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 237727

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND	F2 F1	0.100	ND	F1 F2	mg/L		72	75 - 125	30	20
Chromium	6.03	F2	0.100	5.379	4 F2	mg/L		-648	75 - 125	26	20
Copper	ND	F2 F1	0.100	ND	F2	mg/L		104	75 - 125	41	20
Iron	2530		1.00	2255	4	mg/L		-2760	75 - 125	19	20
								0			

Lab Sample ID: MB 490-237790/1-A
Matrix: Solid
Analysis Batch: 238894

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 237790

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.486		mg/Kg		03/31/15 12:00	04/03/15 17:15	1
Chromium	ND		0.486		mg/Kg		03/31/15 12:00	04/03/15 17:15	1
Copper	ND		0.486		mg/Kg		03/31/15 12:00	04/03/15 17:15	1
Iron	10.81		4.86		mg/Kg		03/31/15 12:00	04/03/15 17:15	1

Lab Sample ID: LCS 490-237790/2-A
Matrix: Solid
Analysis Batch: 238894

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 237790

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	9.51	10.11		mg/Kg		106	80 - 120
Chromium	38.0	42.05		mg/Kg		111	80 - 120
Copper	47.5	50.19		mg/Kg		106	80 - 120
Iron	190	222.2		mg/Kg		117	80 - 120

Lab Sample ID: MB 490-238215/1-B
Matrix: Water
Analysis Batch: 238662

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 238223

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		04/01/15 15:24	04/02/15 15:21	1
Chromium	ND		0.00200		mg/L		04/01/15 15:24	04/02/15 15:21	1
Copper	ND		0.00200		mg/L		04/01/15 15:24	04/02/15 15:21	1
Iron	ND		0.0250		mg/L		04/01/15 15:24	04/02/15 15:21	1

Lab Sample ID: LCS 490-238215/2-B
Matrix: Water
Analysis Batch: 238662

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 238223

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09382		mg/L		94	80 - 120
Chromium	0.100	0.09579		mg/L		96	80 - 120
Copper	0.100	0.09185		mg/L		92	80 - 120
Iron	1.00	0.9222		mg/L		92	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 490-238215/3-B
Matrix: Water
Analysis Batch: 238662

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 238223

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			0.100	0.09530		mg/L		95	80 - 120	2	20
Chromium			0.100	0.09641		mg/L		96	80 - 120	1	20
Copper			0.100	0.09512		mg/L		95	80 - 120	3	20
Iron			1.00	0.9654		mg/L		97	80 - 120	5	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-238471/9
Matrix: Water
Analysis Batch: 238471

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			04/02/15 10:30	1

Lab Sample ID: LCS 490-238471/10
Matrix: Water
Analysis Batch: 238471

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.1020		mg/L		102	85 - 115		

Lab Sample ID: 490-75622-H-1 MS
Matrix: Water
Analysis Batch: 238471

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.1000		mg/L		100	85 - 115		

Lab Sample ID: 490-75622-H-1 MSD
Matrix: Water
Analysis Batch: 238471

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.1010		mg/L		101	85 - 115	1	20

Lab Sample ID: 490-75622-H-1 DU
Matrix: Water
Analysis Batch: 238471

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND			ND		mg/L				NC	20

HPLC/IC

Analysis Batch: 237979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75366-G-4 MS	Matrix Spike	Total/NA	Water	9056	
490-75366-G-4 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-75398-1	Baseline GW	Total/NA	Water	9056	
490-75398-2	Baseline GW-DUP	Total/NA	Water	9056	
LCS 490-237979/6	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-237979/7	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-237979/5	Method Blank	Total/NA	Water	9056	

Analysis Batch: 237980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75366-G-4 MS	Matrix Spike	Total/NA	Water	9056	
490-75366-G-4 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-75398-1	Baseline GW	Total/NA	Water	9056	
490-75398-2	Baseline GW-DUP	Total/NA	Water	9056	
LCS 490-237980/6	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-237980/7	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-237980/5	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 237727

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75330-A-1-B MS	Matrix Spike	Total/NA	Water	3010A	
490-75330-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	3010A	
490-75398-1	Baseline GW	Total/NA	Water	3010A	
490-75398-2	Baseline GW-DUP	Total/NA	Water	3010A	
LCS 490-237727/2-A	Lab Control Sample	Total/NA	Water	3010A	
LCSD 490-237727/3-A	Lab Control Sample Dup	Total/NA	Water	3010A	
MB 490-237727/1-A	Method Blank	Total/NA	Water	3010A	

Prep Batch: 237790

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-3	Baseline Soil	Total/NA	Soil	3051A	
490-75398-4	Baseline Soil-DUP	Total/NA	Soil	3051A	
LCS 490-237790/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-237790/1-A	Method Blank	Total/NA	Solid	3051A	

Filtration Batch: 238215

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-1	Baseline GW	Dissolved	Water	Filtration	
490-75398-2	Baseline GW-DUP	Dissolved	Water	Filtration	
LCS 490-238215/2-B	Lab Control Sample	Dissolved	Water	Filtration	
LCSD 490-238215/3-B	Lab Control Sample Dup	Dissolved	Water	Filtration	
MB 490-238215/1-B	Method Blank	Dissolved	Water	Filtration	

Prep Batch: 238223

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-1	Baseline GW	Dissolved	Water	3005A	238215
490-75398-2	Baseline GW-DUP	Dissolved	Water	3005A	238215
LCS 490-238215/2-B	Lab Control Sample	Dissolved	Water	3005A	238215

Metals (Continued)

Prep Batch: 238223 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 490-238215/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	238215
MB 490-238215/1-B	Method Blank	Dissolved	Water	3005A	238215

Analysis Batch: 238381

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75330-A-1-B MS	Matrix Spike	Total/NA	Water	6020	237727
490-75330-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	6020	237727
490-75398-1	Baseline GW	Total/NA	Water	6020	237727
490-75398-2	Baseline GW-DUP	Total/NA	Water	6020	237727
LCS 490-237727/2-A	Lab Control Sample	Total/NA	Water	6020	237727
LCSD 490-237727/3-A	Lab Control Sample Dup	Total/NA	Water	6020	237727
MB 490-237727/1-A	Method Blank	Total/NA	Water	6020	237727

Analysis Batch: 238662

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-1	Baseline GW	Dissolved	Water	6020	238223
490-75398-1	Baseline GW	Total/NA	Water	6020	237727
490-75398-2	Baseline GW-DUP	Dissolved	Water	6020	238223
490-75398-2	Baseline GW-DUP	Total/NA	Water	6020	237727
LCS 490-238215/2-B	Lab Control Sample	Dissolved	Water	6020	238223
LCSD 490-238215/3-B	Lab Control Sample Dup	Dissolved	Water	6020	238223
MB 490-238215/1-B	Method Blank	Dissolved	Water	6020	238223

Analysis Batch: 238894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-3	Baseline Soil	Total/NA	Soil	6020	237790
490-75398-4	Baseline Soil-DUP	Total/NA	Soil	6020	237790
LCS 490-237790/2-A	Lab Control Sample	Total/NA	Solid	6020	237790
MB 490-237790/1-A	Method Blank	Total/NA	Solid	6020	237790

General Chemistry

Analysis Batch: 238471

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-1	Baseline GW	Dissolved	Water	7196A	238475
490-75398-2	Baseline GW-DUP	Dissolved	Water	7196A	238475
490-75622-H-1 DU	Duplicate	Total/NA	Water	7196A	
490-75622-H-1 MS	Matrix Spike	Total/NA	Water	7196A	
490-75622-H-1 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
LCS 490-238471/10	Lab Control Sample	Total/NA	Water	7196A	
MB 490-238471/9	Method Blank	Total/NA	Water	7196A	

Filtration Batch: 238475

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-75398-1	Baseline GW	Dissolved	Water	Filtration	
490-75398-2	Baseline GW-DUP	Dissolved	Water	Filtration	

Client Sample ID: Baseline GW

Lab Sample ID: 490-75398-1

Date Collected: 03/26/15 15:00

Matrix: Water

Date Received: 03/28/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		237979	04/01/15 00:19	CLN	TAL NSH
Total/NA	Analysis	9056		1	10 mL		237980	04/01/15 00:19	CLN	TAL NSH
Dissolved	Prep	3005A			25 mL	50 mL	238223	04/01/15 15:24	TSC	TAL NSH
Dissolved	Filtration	Filtration			25 mL	25 mL	238215	04/01/15 15:24	TSC	TAL NSH
Dissolved	Analysis	6020		1	25 mL	50 mL	238662	04/02/15 15:37	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	237727	03/31/15 10:17	TSC	TAL NSH
Total/NA	Analysis	6020		1	50 mL	50 mL	238381	04/01/15 23:50	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	237727	03/31/15 10:17	TSC	TAL NSH
Total/NA	Analysis	6020		10	50 mL	50 mL	238662	04/02/15 18:00	JBD	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	238471	04/02/15 10:30	BMC	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	238475	04/02/15 10:30	BMC	TAL NSH

Client Sample ID: Baseline GW-DUP

Lab Sample ID: 490-75398-2

Date Collected: 03/26/15 15:00

Matrix: Water

Date Received: 03/28/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		237979	04/01/15 00:40	CLN	TAL NSH
Total/NA	Analysis	9056		1	10 mL		237980	04/01/15 00:40	CLN	TAL NSH
Dissolved	Prep	3005A			25 mL	50 mL	238223	04/01/15 15:24	TSC	TAL NSH
Dissolved	Filtration	Filtration			25 mL	25 mL	238215	04/01/15 15:24	TSC	TAL NSH
Dissolved	Analysis	6020		1	25 mL	50 mL	238662	04/02/15 15:52	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	237727	03/31/15 10:17	TSC	TAL NSH
Total/NA	Analysis	6020		1	50 mL	50 mL	238381	04/01/15 23:55	JBD	TAL NSH
Total/NA	Prep	3010A			50 mL	50 mL	237727	03/31/15 10:17	TSC	TAL NSH
Total/NA	Analysis	6020		10	50 mL	50 mL	238662	04/02/15 18:05	JBD	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	238471	04/02/15 10:30	BMC	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	238475	04/02/15 10:30	BMC	TAL NSH

Client Sample ID: Baseline Soil

Lab Sample ID: 490-75398-3

Date Collected: 03/26/15 15:15

Matrix: Soil

Date Received: 03/28/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.515 g	100 mL	237790	03/31/15 12:00	TDP	TAL NSH
Total/NA	Analysis	6020		5	0.515 g	100 mL	238894	04/03/15 17:25	JBD	TAL NSH

Client Sample ID: Baseline Soil-DUP

Lab Sample ID: 490-75398-4

Date Collected: 03/26/15 15:15

Matrix: Soil

Date Received: 03/28/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.519 g	100 mL	237790	03/31/15 12:00	TDP	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Client Sample ID: Baseline Soil-DUP

Lab Sample ID: 490-75398-4

Date Collected: 03/26/15 15:15

Matrix: Soil

Date Received: 03/28/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	6020		5	0.519 g	100 mL	238894	04/03/15 17:30	JBD	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Baseline Characterization

TestAmerica Job ID: 490-75398-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-15 *
Arkansas DEQ	State Program	6	88-0737	04-25-15
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	04-30-15 *
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-15 *
South Carolina (DW)	State Program	4	84009 (002)	02-23-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-75398 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 3/28/2015 @ 0830

1. Tracking # 5325 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 18290455

2. Temperature of rep. sample or temp blank when opened: 5.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 1 (Front)

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) GK

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES..NO...NA

12. Did all container labels and tags agree with custody papers? YES..NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) mdm

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) mdm

17. Were custody papers properly filled out (ink, signed, etc)? YES..NO...NA

18. Did you sign the custody papers in the appropriate place? YES..NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES..NO...NA mdm 3.28.15

I certify that I entered this project into LIMS and answered questions 17-20 (intial) mdm

I certify that I attached a label with the unique LIMS number to each container (intial) mdm

21. Were there Non-Conformance issues at login? YES..NO Was a PIPE generated? YES..NO..#_____

#20 Limited volume. mdm

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
75398

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

4/6/2015

Client Information	Sampler: LC Chen Li	Lab PM: Baker, Heather	Carrier	COC No: 490-36875-12512.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:
Address: 10220 Old Columbia Road Suite A	Due Date Requested:			
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Baseline Characterization	Project #: 49008518			
Site:	SSOW#:			

Analysis Requested

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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	6020 - Ag, Cr, Cu, Fe Dissolved	Total Number of containers	Special Instructions/Note:
Preservation Code:					X	X	N	N	N	N	X	
1 Baseline GW	3/26/15	1500	G	Water	X		X	X	X	X		~~HNO3~~ preserved LC
2 Baseline GW - Dup	3/26/15	1500	G	Water	X		X	X	X	X		
3 Baseline Soil	3/26/15	1515	G	Solid	X				X			unpreserved
4 Baseline Soil - Dup	3/26/15	1515	G	Solid	X				X			unpreserved

Preservation Codes:	
A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)
Other:	

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	Company	Received by	Date/Time	Company
Chen Li	3/26/15 1530	Geosyntec	[illegible]	3.26.15 @ 0830	TAN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 5.4c

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-75398-1

Login Number: 75398

List Source: TestAmerica Nashville

List Number: 1

Creator: McBride, Mike

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	5.6
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	False	
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.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	False	
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.	True	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-77315-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/12/2015 12:32:48 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 18
QC Association 23
Chronicle 26
Method Summary 30
Certification Summary 31
Chain of Custody 32
Receipt Checklists 35

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-77315-1	A-1-1	Water	04/24/15 15:35	04/28/15 08:50
490-77315-2	A-1-2	Water	04/24/15 15:30	04/28/15 08:50
490-77315-3	C-1-1	Water	04/24/15 15:25	04/28/15 08:50
490-77315-4	A-1-1	Soil	04/24/15 15:35	04/28/15 08:50
490-77315-5	A-1-2	Soil	04/24/15 15:30	04/28/15 08:50
490-77315-6	C-1-1	Soil	04/24/15 15:25	04/28/15 08:50
490-77315-7	A-2-1	Water	04/27/15 16:00	04/28/15 08:50
490-77315-8	A-2-2	Water	04/27/15 16:10	04/28/15 08:50
490-77315-9	C-2-1	Water	04/27/15 15:30	04/28/15 08:50
490-77315-10	A-2-1	Soil	04/27/15 16:00	04/28/15 08:50
490-77315-11	A-2-2	Soil	04/27/15 16:10	04/28/15 08:50
490-77315-12	C-2-1	Soil	04/27/15 15:30	04/28/15 08:50

Job ID: 490-77315-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-77315-1

Comments
No additional comments.

Receipt
The samples were received on 4/28/2015 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.6º C and 4.7º C.

Except:

Limited sample volume was provided for the following samples: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3), A-2-1 (490-77315-7), A-2-2 (490-77315-8) and C-2-1 (490-77315-9).

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: A-1-1 (490-77315-1), A-1-2 (490-77315-2), A-2-1 (490-77315-7) and A-2-2 (490-77315-8). Elevated reporting limits (RLs) are provided.

Method 9056: The following samples were received and analyzed outside of the analytical holding time: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3).

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

Metals
Method 6020: The method blank for 244768 contained Iron above the reporting limit (RL). Associated samples were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The following samples were received outside of holding time: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3), A-2-1 (490-77315-7), A-2-2 (490-77315-8) and C-2-1 (490-77315-9).

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance 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
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1
Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	2.04		0.100		mg/L			04/28/15 16:39	1
Sulfate	2730		10.0		mg/L			04/29/15 13:39	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0258		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Chromium	0.0606		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Copper	0.0696		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Iron	788		1.25		mg/L		04/29/15 15:13	05/04/15 12:03	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/05/15 14:37	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-2
Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-2
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	2.09		0.100		mg/L			04/28/15 17:19	1
Sulfate	2440		10.0		mg/L			04/29/15 13:59	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.222		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Chromium	0.0613		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Copper	0.188		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Iron	840		1.25		mg/L		04/29/15 15:13	05/04/15 12:08	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0370	H	0.0100		mg/L			05/05/15 14:38	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-1-1
Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.57		0.100		mg/L			04/28/15 17:59	1
Sulfate	13.3		1.00		mg/L			04/28/15 17:59	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	34.0		0.0833		mg/L		05/01/15 09:45	05/04/15 15:07	25
Chromium	5.18		0.0167		mg/L		05/01/15 09:45	05/04/15 12:54	5
Copper	36.5		0.0833		mg/L		05/01/15 09:45	05/04/15 15:07	25
Iron	135		0.208		mg/L		05/01/15 09:45	05/04/15 12:54	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0140	H	0.0100		mg/L			05/05/15 14:40	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1
Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-4
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	361		2.46		mg/Kg		04/29/15 17:51	04/30/15 13:47	5
Chromium	49.0		0.491		mg/Kg		04/29/15 17:51	04/30/15 13:11	1
Copper	468		2.46		mg/Kg		04/29/15 17:51	04/30/15 13:47	5
Iron	2650	B	4.91		mg/Kg		04/29/15 17:51	04/30/15 13:11	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-2
Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-5
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	270		0.489		mg/Kg		04/29/15 17:51	04/30/15 13:17	1
Chromium	49.3		0.489		mg/Kg		04/29/15 17:51	04/30/15 13:17	1
Copper	390		2.45		mg/Kg		04/29/15 17:51	04/30/15 17:59	5
Iron	3070	B	4.89		mg/Kg		04/29/15 17:51	04/30/15 13:17	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-1-1
Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-6
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	177		0.483		mg/Kg		04/29/15 17:51	04/30/15 13:22	1
Chromium	34.5		0.483		mg/Kg		04/29/15 17:51	04/30/15 13:22	1
Copper	259		0.483		mg/Kg		04/29/15 17:51	04/30/15 13:22	1
Iron	1310	B	4.83		mg/Kg		04/29/15 17:51	04/30/15 13:22	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-1
Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-7
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.25		0.100		mg/L			04/28/15 18:19	1
Sulfate	2870		10.0		mg/L			04/29/15 14:19	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.231		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Chromium	0.659		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Copper	9.69		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Iron	681		1.25		mg/L		04/29/15 15:13	05/04/15 12:13	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0490	H	0.0100		mg/L			05/05/15 14:41	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2
Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-8
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.20		0.100		mg/L			04/28/15 18:59	1
Sulfate	2920		10.0		mg/L			04/29/15 14:40	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0935		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Chromium	0.644		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Copper	7.44		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Iron	745		1.25		mg/L		04/29/15 15:13	05/04/15 12:18	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0360	H	0.0100		mg/L			05/05/15 14:43	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-2-1

Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-9

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.56		0.100		mg/L			04/28/15 19:40	1
Sulfate	14.9		1.00		mg/L			04/28/15 19:40	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	22.9		0.0833		mg/L		05/01/15 09:45	05/04/15 15:12	25
Chromium	2.61		0.0167		mg/L		05/01/15 09:45	05/04/15 13:09	5
Copper	18.9		0.0833		mg/L		05/01/15 09:45	05/04/15 15:12	25
Iron	71.0		0.208		mg/L		05/01/15 09:45	05/04/15 13:09	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/05/15 14:45	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-1
Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-10
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	313		0.488		mg/Kg		04/29/15 17:51	04/30/15 13:27	1
Chromium	54.9		0.488		mg/Kg		04/29/15 17:51	04/30/15 13:27	1
Copper	425		2.44		mg/Kg		04/29/15 17:51	04/30/15 18:04	5
Iron	3010	B	4.88		mg/Kg		04/29/15 17:51	04/30/15 13:27	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2
Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-11
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	209		0.492		mg/Kg		04/29/15 17:51	04/30/15 13:32	1
Chromium	37.1		0.492		mg/Kg		04/29/15 17:51	04/30/15 13:32	1
Copper	270		0.492		mg/Kg		04/29/15 17:51	04/30/15 13:32	1
Iron	2030	B	4.92		mg/Kg		04/29/15 17:51	04/30/15 13:32	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-2-1
Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-12
Matrix: Soil

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	113		0.495		mg/Kg		04/29/15 17:51	04/30/15 13:37	1
Chromium	25.4		0.495		mg/Kg		04/29/15 17:51	04/30/15 13:37	1
Copper	194		0.495		mg/Kg		04/29/15 17:51	04/30/15 13:37	1
Iron	1490	B	4.95		mg/Kg		04/29/15 17:51	04/30/15 13:37	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-244564/6
Matrix: Water
Analysis Batch: 244564

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			04/28/15 14:45	1

Lab Sample ID: LCS 490-244564/7
Matrix: Water
Analysis Batch: 244564

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	108.8		mg/L		109	80 - 120

Lab Sample ID: LCSD 490-244564/8
Matrix: Water
Analysis Batch: 244564

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
Sulfate	100	109.3		mg/L		109	80 - 120	0	20

Lab Sample ID: 490-77105-B-1 MS
Matrix: Water
Analysis Batch: 244564

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	54.6	F1	100	180.6	F1	mg/L		126	80 - 120

Lab Sample ID: 490-77105-B-1 MSD
Matrix: Water
Analysis Batch: 244564

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	54.6	F1	100	179.5	F1	mg/L		125	80 - 120	1	20

Lab Sample ID: MB 490-244565/6
Matrix: Water
Analysis Batch: 244565

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			04/28/15 14:45	1

Lab Sample ID: LCS 490-244565/7
Matrix: Water
Analysis Batch: 244565

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.51		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-244565/8
Matrix: Water
Analysis Batch: 244565

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
Nitrate as N	10.0	10.40		mg/L		104	80 - 120	1	20

QC Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Lab Sample ID: 490-77105-B-1 MS
Matrix: Water
Analysis Batch: 244565

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Nitrate as N	2.62	F1	10.0	15.77	F1	mg/L		131	80 - 120		

Lab Sample ID: 490-77105-B-1 MSD
Matrix: Water
Analysis Batch: 244565

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	2.62	F1	10.0	15.81	F1	mg/L		132	80 - 120	0	20

Lab Sample ID: MB 490-244639/6
Matrix: Water
Analysis Batch: 244639

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			04/29/15 12:39	1

Lab Sample ID: LCS 490-244639/7
Matrix: Water
Analysis Batch: 244639

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Sulfate			100	105.5		mg/L		106	80 - 120		

Lab Sample ID: LCSD 490-244639/8
Matrix: Water
Analysis Batch: 244639

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
Sulfate			100	104.8		mg/L		105	80 - 120	1	20

Lab Sample ID: 490-77399-C-1 MS
Matrix: Water
Analysis Batch: 244639

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Sulfate	5.91		100	105.9		mg/L		100	80 - 120		

Lab Sample ID: 490-77399-C-1 MSD
Matrix: Water
Analysis Batch: 244639

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	5.91		100	106.2		mg/L		100	80 - 120	0	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-244768/1-A
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 244768

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Chromium	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Copper	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Iron	6.046		4.84		mg/Kg		04/29/15 17:51	04/30/15 12:05	1

Lab Sample ID: LCS 490-244768/2-A
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.5	17.69		mg/Kg		91	80 - 120
Chromium	19.5	19.59		mg/Kg		100	80 - 120
Copper	19.5	18.23		mg/Kg		93	80 - 120
Iron	195	188.1		mg/Kg		96	80 - 120

Lab Sample ID: 490-77268-E-1-C MS
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.41		20.1	21.06		mg/Kg		78	75 - 125
Chromium	22.0		20.1	43.35		mg/Kg		107	75 - 125
Copper	14.9	F1	20.1	29.08	F1	mg/Kg		71	75 - 125
Iron	15700	B	201	16210	4	mg/Kg		236	75 - 125

Lab Sample ID: 490-77268-E-1-D MSD
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.41		19.5	21.58		mg/Kg		83	75 - 125	2	20
Chromium	22.0		19.5	38.44		mg/Kg		84	75 - 125	12	20
Copper	14.9	F1	19.5	30.68		mg/Kg		81	75 - 125	5	20
Iron	15700	B	195	15300	4	mg/Kg		-224	75 - 125	6	20

Lab Sample ID: MB 490-244711/1-A
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 244711

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Chromium	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Copper	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Iron	ND		0.0250		mg/L		04/29/15 15:13	05/01/15 15:21	1

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 490-244711/2-A
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 244711

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09464		mg/L		95	80 - 120
Chromium	0.100	0.09636		mg/L		96	80 - 120
Copper	0.100	0.09476		mg/L		95	80 - 120
Iron	1.00	0.9751		mg/L		98	80 - 120

Lab Sample ID: 490-77278-G-11-B MS
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 244711

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.09313		mg/L		92	75 - 125
Chromium	ND		0.100	0.09260		mg/L		93	75 - 125
Copper	ND		0.100	0.08796		mg/L		88	75 - 125
Iron	28.5		1.00	29.49	4	mg/L		98	75 - 125

Lab Sample ID: 490-77278-G-11-C MSD
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 244711

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.09389		mg/L		93	75 - 125	1	20
Chromium	ND		0.100	0.09436		mg/L		94	75 - 125	2	20
Copper	ND		0.100	0.08964		mg/L		90	75 - 125	2	20
Iron	28.5		1.00	29.79	4	mg/L		128	75 - 125	1	20

Lab Sample ID: MB 490-245145/1-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 245146

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Chromium	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Copper	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Iron	ND		0.0250		mg/L		05/01/15 09:45	05/04/15 12:39	1

Lab Sample ID: LCS 490-245145/2-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 245146

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1011		mg/L		101	80 - 120
Chromium	0.100	0.1051		mg/L		105	80 - 120
Copper	0.100	0.09973		mg/L		100	80 - 120
Iron	1.00	1.022		mg/L		102	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 490-245145/3-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 245146

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			0.100	0.1008		mg/L		101	80 - 120	0	20
Chromium			0.100	0.1041		mg/L		104	80 - 120	1	20
Copper			0.100	0.09798		mg/L		98	80 - 120	2	20
Iron			1.00	0.9954		mg/L		100	80 - 120	3	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-246812/4
Matrix: Water
Analysis Batch: 246812

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/05/15 11:10	1

Lab Sample ID: LCS 490-246812/3
Matrix: Water
Analysis Batch: 246812

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.1040		mg/L		104	85 - 115		

Lab Sample ID: 490-77738-F-1 MS
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.1060		mg/L		97	85 - 115		

Lab Sample ID: 490-77738-F-1 MSD
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.1060		mg/L		97	85 - 115	0	20

Lab Sample ID: 490-77738-F-1 DU
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND			ND		mg/L				NC	20

HPLC/IC

Analysis Batch: 244564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77105-B-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77105-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-77315-3	C-1-1	Total/NA	Water	9056	
490-77315-9	C-2-1	Total/NA	Water	9056	
LCS 490-244564/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244564/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244564/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 244565

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77105-B-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77105-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-77315-1	A-1-1	Total/NA	Water	9056	
490-77315-2	A-1-2	Total/NA	Water	9056	
490-77315-3	C-1-1	Total/NA	Water	9056	
490-77315-7	A-2-1	Total/NA	Water	9056	
490-77315-8	A-2-2	Total/NA	Water	9056	
490-77315-9	C-2-1	Total/NA	Water	9056	
LCS 490-244565/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244565/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244565/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 244639

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Total/NA	Water	9056	
490-77315-2	A-1-2	Total/NA	Water	9056	
490-77315-7	A-2-1	Total/NA	Water	9056	
490-77315-8	A-2-2	Total/NA	Water	9056	
490-77399-C-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77399-C-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-244639/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244639/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244639/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 244711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77278-G-11-B MS	Matrix Spike	Dissolved	Water	3005A	
490-77278-G-11-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-77315-1	A-1-1	Dissolved	Water	3005A	
490-77315-2	A-1-2	Dissolved	Water	3005A	
490-77315-7	A-2-1	Dissolved	Water	3005A	
490-77315-8	A-2-2	Dissolved	Water	3005A	
LCS 490-244711/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-244711/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 244768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-C MS	Matrix Spike	Total/NA	Solid	3051A	

Metals (Continued)

Prep Batch: 244768 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
490-77315-4	A-1-1	Total/NA	Soil	3051A	
490-77315-5	A-1-2	Total/NA	Soil	3051A	
490-77315-6	C-1-1	Total/NA	Soil	3051A	
490-77315-10	A-2-1	Total/NA	Soil	3051A	
490-77315-11	A-2-2	Total/NA	Soil	3051A	
490-77315-12	C-2-1	Total/NA	Soil	3051A	
LCS 490-244768/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-244768/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 245008

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-C MS	Matrix Spike	Total/NA	Solid	6020	244768
490-77268-E-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	244768
490-77315-4	A-1-1	Total/NA	Soil	6020	244768
490-77315-4	A-1-1	Total/NA	Soil	6020	244768
490-77315-5	A-1-2	Total/NA	Soil	6020	244768
490-77315-6	C-1-1	Total/NA	Soil	6020	244768
490-77315-10	A-2-1	Total/NA	Soil	6020	244768
490-77315-11	A-2-2	Total/NA	Soil	6020	244768
490-77315-12	C-2-1	Total/NA	Soil	6020	244768
LCS 490-244768/2-A	Lab Control Sample	Total/NA	Solid	6020	244768
MB 490-244768/1-A	Method Blank	Total/NA	Solid	6020	244768

Analysis Batch: 245086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-5	A-1-2	Total/NA	Soil	6020	244768
490-77315-10	A-2-1	Total/NA	Soil	6020	244768

Filtration Batch: 245145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-3	C-1-1	Dissolved	Water	Filtration	
490-77315-9	C-2-1	Dissolved	Water	Filtration	
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	Filtration	
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	Filtration	
MB 490-245145/1-B	Method Blank	Dissolved	Water	Filtration	

Prep Batch: 245146

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-3	C-1-1	Dissolved	Water	3005A	245145
490-77315-9	C-2-1	Dissolved	Water	3005A	245145
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	3005A	245145
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	245145
MB 490-245145/1-B	Method Blank	Dissolved	Water	3005A	245145

Analysis Batch: 245540

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77278-G-11-B MS	Matrix Spike	Dissolved	Water	6020	244711
490-77278-G-11-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	244711
490-77315-1	A-1-1	Dissolved	Water	6020	244711
490-77315-2	A-1-2	Dissolved	Water	6020	244711

Metals (Continued)

Analysis Batch: 245540 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-7	A-2-1	Dissolved	Water	6020	244711
490-77315-8	A-2-2	Dissolved	Water	6020	244711
LCS 490-244711/2-A	Lab Control Sample	Total Recoverable	Water	6020	244711
MB 490-244711/1-A	Method Blank	Total Recoverable	Water	6020	244711

Analysis Batch: 245763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	6020	244711
490-77315-2	A-1-2	Dissolved	Water	6020	244711
490-77315-3	C-1-1	Dissolved	Water	6020	245146
490-77315-3	C-1-1	Dissolved	Water	6020	245146
490-77315-7	A-2-1	Dissolved	Water	6020	244711
490-77315-8	A-2-2	Dissolved	Water	6020	244711
490-77315-9	C-2-1	Dissolved	Water	6020	245146
490-77315-9	C-2-1	Dissolved	Water	6020	245146
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	6020	245146
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	6020	245146
MB 490-245145/1-B	Method Blank	Dissolved	Water	6020	245146

General Chemistry

Filtration Batch: 245963

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	Filtration	
490-77315-2	A-1-2	Dissolved	Water	Filtration	
490-77315-3	C-1-1	Dissolved	Water	Filtration	
490-77315-7	A-2-1	Dissolved	Water	Filtration	
490-77315-8	A-2-2	Dissolved	Water	Filtration	
490-77315-9	C-2-1	Dissolved	Water	Filtration	

Analysis Batch: 246812

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	7196A	245963
490-77315-2	A-1-2	Dissolved	Water	7196A	245963
490-77315-3	C-1-1	Dissolved	Water	7196A	245963
490-77315-7	A-2-1	Dissolved	Water	7196A	245963
490-77315-8	A-2-2	Dissolved	Water	7196A	245963
490-77315-9	C-2-1	Dissolved	Water	7196A	245963
490-77738-F-1 DU	Duplicate	Total/NA	Water	7196A	
490-77738-F-1 MS	Matrix Spike	Total/NA	Water	7196A	
490-77738-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
LCS 490-246812/3	Lab Control Sample	Total/NA	Water	7196A	
MB 490-246812/4	Method Blank	Total/NA	Water	7196A	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1

Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-1

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	9056		1	10 mL		244565	04/28/15 16:39	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 13:39	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:02	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:03	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:37	BLM	TAL NSH

Client Sample ID: A-1-2

Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-2

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	9056		1	10 mL		244565	04/28/15 17:19	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 13:59	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:07	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:08	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:38	BLM	TAL NSH

Client Sample ID: C-1-1

Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-3

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	9056		1	10 mL		244564	04/28/15 17:59	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		244565	04/28/15 17:59	JHS	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		5	30 mL	50 mL	245763	05/04/15 12:54	JBD	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		25	30 mL	50 mL	245763	05/04/15 15:07	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:40	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1
Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-4
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.509 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.509 g	100 mL	245008	04/30/15 13:11	CME	TAL NSH
Total/NA	Prep	3051A			0.509 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.509 g	100 mL	245008	04/30/15 13:47	CME	TAL NSH

Client Sample ID: A-1-2
Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-5
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.511 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.511 g	100 mL	245008	04/30/15 13:17	CME	TAL NSH
Total/NA	Prep	3051A			0.511 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.511 g	100 mL	245086	04/30/15 17:59	JBD	TAL NSH

Client Sample ID: C-1-1
Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-6
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.518 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.518 g	100 mL	245008	04/30/15 13:22	CME	TAL NSH

Client Sample ID: A-2-1
Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-7
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	9056		1	10 mL		244565	04/28/15 18:19	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 14:19	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:23	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:13	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:41	BLM	TAL NSH

Client Sample ID: A-2-2
Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-8
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	9056		1	10 mL		244565	04/28/15 18:59	JHS	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 14:40	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:28	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:18	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:43	BLM	TAL NSH

Client Sample ID: C-2-1

Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-9
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	9056		1	10 mL		244564	04/28/15 19:40	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		244565	04/28/15 19:40	JHS	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		5	30 mL	50 mL	245763	05/04/15 13:09	JBD	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		25	30 mL	50 mL	245763	05/04/15 15:12	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:45	BLM	TAL NSH

Client Sample ID: A-2-1

Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-10
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.512 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.512 g	100 mL	245008	04/30/15 13:27	CME	TAL NSH
Total/NA	Prep	3051A			0.512 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.512 g	100 mL	245086	04/30/15 18:04	JBD	TAL NSH

Client Sample ID: A-2-2

Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-11
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	245008	04/30/15 13:32	CME	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-2-1

Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-12

Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.505 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.505 g	100 mL	245008	04/30/15 13:37	CME	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-77315 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 4/28/2015 @ 8:50

1. Tracking # 9652 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 17610176

2. Temperature of rep. sample or temp blank when opened: 4.7 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? AJH 4/28/15 (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AJH

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES).NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES).NO...NA

12. Did all container labels and tags agree with custody papers? (YES).NO...NA

13a. Were VOA vials received? YES..(NO).NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES...NO..(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDW

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES).NO...NA

16. Was residual chlorine present? YES...NO..(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDW

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? YES..(NO)..NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDW

I certify that I attached a label with the unique LIMS number to each container (intial) MDW

21. Were there Non-Conformance issues at login? (YES)..NO Was a NCM generated? (YES)..NO...#_____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

Atlanta
Loc: 490
77315

Cooler Received/Opened On: 4/28/2015 @0850

1. Tracking # 9641 (last 4 digits, FedEx)

Courier: Fed-Ex IR Gun ID: 14740456

2. Temperature of rep. sample or temp blank when opened: 3.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AF

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES...NO...(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) mdm

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) mdm

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO...NA mdm 4.28.15

I certify that I entered this project into LIMS and answered questions 17-20 (intial) mdm

I certify that I attached a label with the unique LIMS number to each container (intial) mdm

21. Were there Non-Conformance issues at login? (YES)..NO Was a NCM generated? (YES)..NO...#_____

#20) Very limited volume for all samples. mdm

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

TestAmerica
THE LEADER IN ENVI

Loc: 490
77315

5/12/2015

Client Information	Sampler: LC Chen Li	Lab PM: Baker, Heather	Carrier Tracking No(s):	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:

Address: 10220 Old Columbia Road Suite A	Due Date Requested:	Analysis Requested
City: Columbia	TAT Requested (days):	
State, Zip: MD, 21046		
Phone:	PO #: Purchase Order Requested	
Email: awadhawan@geosyntec.com	WO #:	
Project Name: Treatability Study	Project #: 49008518	
Site:	SSOW#:	

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
				Preservation Code:				N	N	N		
1	A-1-1	4/24/15	1535	G	Water	Y		X	X	X	2	filtered, Nitric preserved
2	A-1-2	4/24/15	1530	G	Water	Y		X	X	X	2	filtered, Nitric preserved
3	C-1-1	4/24/15	1525	G	Water	N		X	X	X	1	not filtered.
4	A-1-1	4/24/15	1535	G	~~Water~~ S	N				X	1	
5	A-1-2	4/24/15	1530	G	~~Water~~ S	N				X	1	
6	C-1-1	4/24/15	1525	G	~~Water~~ S	N				X	1	
7	A-2-1	4/27/15	1600	G	Water	Y		X	X	X	2	filtered & HNO3 preserved
8	A-2-2	"	1610	"	Water	Y		X	X	X	2	filtered & HNO3 preserved
9	C-2-1	"	1530	"	Water	N		X	X	X	1	not filtered
10	A-2-1	"	1600	"	~~Water~~ S	N				X	1	
11/12	A-2-2/C-2-1	↓	1610/1530	↓	~~Water~~ S	Y/N				X	1	

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: 4/27/15 1630	Company: Geosyntec	Received by:	Date/Time: 4-27-15 1650	Company: TA
Relinquished by:	Date/Time: 16:50 4/27/15	Company	Received by:	Date/Time: 4.28.15 @ 0850	Company: TAN
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: 3.6/4.7

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-77315-1

Login Number: 77315
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	3.6/4.7
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	False	Limited volume received.
Sample Preservation Verified.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-77315-1
Client Project/Site: Treatability Study
Revision: 1

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/28/2015 3:17:12 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 6
Client Sample Results 7
QC Sample Results 19
QC Association 25
Chronicle 29
Method Summary 33
Certification Summary 34
Chain of Custody 35
Receipt Checklists 38

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-77315-1	A-1-1	Water	04/24/15 15:35	04/28/15 08:50
490-77315-2	A-1-2	Water	04/24/15 15:30	04/28/15 08:50
490-77315-3	C-1-1	Water	04/24/15 15:25	04/28/15 08:50
490-77315-4	A-1-1	Soil	04/24/15 15:35	04/28/15 08:50
490-77315-5	A-1-2	Soil	04/24/15 15:30	04/28/15 08:50
490-77315-6	C-1-1	Soil	04/24/15 15:25	04/28/15 08:50
490-77315-7	A-2-1	Water	04/27/15 16:00	04/28/15 08:50
490-77315-8	A-2-2	Water	04/27/15 16:10	04/28/15 08:50
490-77315-9	C-2-1	Water	04/27/15 15:30	04/28/15 08:50
490-77315-10	A-2-1	Soil	04/27/15 16:00	04/28/15 08:50
490-77315-11	A-2-2	Soil	04/27/15 16:10	04/28/15 08:50
490-77315-12	C-2-1	Soil	04/27/15 15:30	04/28/15 08:50

Job ID: 490-77315-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-77315-1

This report was revised on 5/28/15 to dry weight correct the solid samples. This report replaces the report generated on 5/12/15 at 12:32.

Comments
No additional comments.

Receipt
The samples were received on 4/28/2015 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.6º C and 4.7º C.

Except:

Limited sample volume was provided for the following samples: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3), A-2-1 (490-77315-7), A-2-2 (490-77315-8) and C-2-1 (490-77315-9).

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: A-1-1 (490-77315-1), A-1-2 (490-77315-2), A-2-1 (490-77315-7) and A-2-2 (490-77315-8). Elevated reporting limits (RLs) are provided.

Method 9056: The following samples were received and analyzed outside of the analytical holding time: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3).

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

Metals
Method 6020: The method blank for 244768 contained Iron above the reporting limit (RL). Associated samples were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The following samples were received outside of holding time: A-1-1 (490-77315-1), A-1-2 (490-77315-2), C-1-1 (490-77315-3), A-2-1 (490-77315-7), A-2-2 (490-77315-8) and C-2-1 (490-77315-9).

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

Job ID: 490-77315-2

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-77315-2

Comments
No additional comments.

Receipt
The samples were received on 4/28/2015 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 3.6º C and 4.7º C.

Job ID: 490-77315-2 (Continued)

Laboratory: TestAmerica Nashville (Continued)

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance 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
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1
Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	2.04		0.100		mg/L			04/28/15 16:39	1
Sulfate	2730		10.0		mg/L			04/29/15 13:39	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0258		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Chromium	0.0606		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Copper	0.0696		0.0100		mg/L		04/29/15 15:13	05/01/15 16:02	5
Iron	788		1.25		mg/L		04/29/15 15:13	05/04/15 12:03	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/05/15 14:37	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-2

Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-2

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	2.09		0.100		mg/L			04/28/15 17:19	1
Sulfate	2440		10.0		mg/L			04/29/15 13:59	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.222		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Chromium	0.0613		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Copper	0.188		0.0100		mg/L		04/29/15 15:13	05/01/15 16:07	5
Iron	840		1.25		mg/L		04/29/15 15:13	05/04/15 12:08	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0370	H	0.0100		mg/L			05/05/15 14:38	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-1-1
Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.57		0.100		mg/L			04/28/15 17:59	1
Sulfate	13.3		1.00		mg/L			04/28/15 17:59	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	34.0		0.0833		mg/L		05/01/15 09:45	05/04/15 15:07	25
Chromium	5.18		0.0167		mg/L		05/01/15 09:45	05/04/15 12:54	5
Copper	36.5		0.0833		mg/L		05/01/15 09:45	05/04/15 15:07	25
Iron	135		0.208		mg/L		05/01/15 09:45	05/04/15 12:54	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0140	H	0.0100		mg/L			05/05/15 14:40	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1
Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-4
Matrix: Soil
Percent Solids: 73.1

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	494		3.36		mg/Kg	☼	04/29/15 17:51	04/30/15 13:47	5
Chromium	67.0		0.672		mg/Kg	☼	04/29/15 17:51	04/30/15 13:11	1
Copper	640		3.36		mg/Kg	☼	04/29/15 17:51	04/30/15 13:47	5
Iron	3630	B	6.72		mg/Kg	☼	04/29/15 17:51	04/30/15 13:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	27		0.10		%			05/27/15 15:13	1
Percent Solids	73		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-2

Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-5

Matrix: Soil
Percent Solids: 67.4

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	401		0.726		mg/Kg	☼	04/29/15 17:51	04/30/15 13:17	1
Chromium	73.1		0.726		mg/Kg	☼	04/29/15 17:51	04/30/15 13:17	1
Copper	579		3.63		mg/Kg	☼	04/29/15 17:51	04/30/15 17:59	5
Iron	4550	B	7.26		mg/Kg	☼	04/29/15 17:51	04/30/15 13:17	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	33		0.10		%			05/27/15 15:13	1
Percent Solids	67		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-1-1
Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-6
Matrix: Soil
Percent Solids: 73.1

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	243		0.661		mg/Kg	☼	04/29/15 17:51	04/30/15 13:22	1
Chromium	47.2		0.661		mg/Kg	☼	04/29/15 17:51	04/30/15 13:22	1
Copper	354		0.661		mg/Kg	☼	04/29/15 17:51	04/30/15 13:22	1
Iron	1790	B	6.61		mg/Kg	☼	04/29/15 17:51	04/30/15 13:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	27		0.10		%			05/27/15 15:13	1
Percent Solids	73		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-1
Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-7
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.25		0.100		mg/L			04/28/15 18:19	1
Sulfate	2870		10.0		mg/L			04/29/15 14:19	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.231		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Chromium	0.659		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Copper	9.69		0.0100		mg/L		04/29/15 15:13	05/01/15 16:23	5
Iron	681		1.25		mg/L		04/29/15 15:13	05/04/15 12:13	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0490	H	0.0100		mg/L			05/05/15 14:41	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2
Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-8
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.20		0.100		mg/L			04/28/15 18:59	1
Sulfate	2920		10.0		mg/L			04/29/15 14:40	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0935		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Chromium	0.644		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Copper	7.44		0.0100		mg/L		04/29/15 15:13	05/01/15 16:28	5
Iron	745		1.25		mg/L		04/29/15 15:13	05/04/15 12:18	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0360	H	0.0100		mg/L			05/05/15 14:43	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-2-1
Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-9
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.56		0.100		mg/L			04/28/15 19:40	1
Sulfate	14.9		1.00		mg/L			04/28/15 19:40	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	22.9		0.0833		mg/L		05/01/15 09:45	05/04/15 15:12	25
Chromium	2.61		0.0167		mg/L		05/01/15 09:45	05/04/15 13:09	5
Copper	18.9		0.0833		mg/L		05/01/15 09:45	05/04/15 15:12	25
Iron	71.0		0.208		mg/L		05/01/15 09:45	05/04/15 13:09	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/05/15 14:45	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-1
Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-10
Matrix: Soil
Percent Solids: 81.0

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	387		0.602		mg/Kg	☼	04/29/15 17:51	04/30/15 13:27	1
Chromium	67.7		0.602		mg/Kg	☼	04/29/15 17:51	04/30/15 13:27	1
Copper	525		3.01		mg/Kg	☼	04/29/15 17:51	04/30/15 18:04	5
Iron	3710	B	6.02		mg/Kg	☼	04/29/15 17:51	04/30/15 13:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		0.10		%			05/27/15 15:13	1
Percent Solids	81		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2
Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-11
Matrix: Soil
Percent Solids: 77.2

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	271		0.637		mg/Kg	☼	04/29/15 17:51	04/30/15 13:32	1
Chromium	48.1		0.637		mg/Kg	☼	04/29/15 17:51	04/30/15 13:32	1
Copper	350		0.637		mg/Kg	☼	04/29/15 17:51	04/30/15 13:32	1
Iron	2630	B	6.37		mg/Kg	☼	04/29/15 17:51	04/30/15 13:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			05/27/15 15:13	1
Percent Solids	77		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: C-2-1
Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-12
Matrix: Soil
Percent Solids: 81.6

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	138		0.606		mg/Kg	☼	04/29/15 17:51	04/30/15 13:37	1
Chromium	31.1		0.606		mg/Kg	☼	04/29/15 17:51	04/30/15 13:37	1
Copper	237		0.606		mg/Kg	☼	04/29/15 17:51	04/30/15 13:37	1
Iron	1820	B	6.06		mg/Kg	☼	04/29/15 17:51	04/30/15 13:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	18		0.10		%			05/27/15 15:13	1
Percent Solids	82		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-244564/6
Matrix: Water
Analysis Batch: 244564

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			04/28/15 14:45	1

Lab Sample ID: LCS 490-244564/7
Matrix: Water
Analysis Batch: 244564

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	108.8		mg/L		109	80 - 120

Lab Sample ID: LCSD 490-244564/8
Matrix: Water
Analysis Batch: 244564

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
Sulfate	100	109.3		mg/L		109	80 - 120	0	20

Lab Sample ID: 490-77105-B-1 MS
Matrix: Water
Analysis Batch: 244564

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	54.6	F1	100	180.6	F1	mg/L		126	80 - 120

Lab Sample ID: 490-77105-B-1 MSD
Matrix: Water
Analysis Batch: 244564

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	54.6	F1	100	179.5	F1	mg/L		125	80 - 120	1	20

Lab Sample ID: MB 490-244565/6
Matrix: Water
Analysis Batch: 244565

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			04/28/15 14:45	1

Lab Sample ID: LCS 490-244565/7
Matrix: Water
Analysis Batch: 244565

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.51		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-244565/8
Matrix: Water
Analysis Batch: 244565

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
Nitrate as N	10.0	10.40		mg/L		104	80 - 120	1	20

QC Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Lab Sample ID: 490-77105-B-1 MS
Matrix: Water
Analysis Batch: 244565

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Nitrate as N	2.62	F1	10.0	15.77	F1	mg/L		131	80 - 120		

Lab Sample ID: 490-77105-B-1 MSD
Matrix: Water
Analysis Batch: 244565

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	2.62	F1	10.0	15.81	F1	mg/L		132	80 - 120	0	20

Lab Sample ID: MB 490-244639/6
Matrix: Water
Analysis Batch: 244639

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			04/29/15 12:39	1

Lab Sample ID: LCS 490-244639/7
Matrix: Water
Analysis Batch: 244639

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Sulfate			100	105.5		mg/L		106	80 - 120		

Lab Sample ID: LCSD 490-244639/8
Matrix: Water
Analysis Batch: 244639

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
Sulfate			100	104.8		mg/L		105	80 - 120	1	20

Lab Sample ID: 490-77399-C-1 MS
Matrix: Water
Analysis Batch: 244639

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Sulfate	5.91		100	105.9		mg/L		100	80 - 120		

Lab Sample ID: 490-77399-C-1 MSD
Matrix: Water
Analysis Batch: 244639

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	5.91		100	106.2		mg/L		100	80 - 120	0	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-244768/1-A
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 244768

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Chromium	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Copper	ND		0.484		mg/Kg		04/29/15 17:51	04/30/15 12:05	1
Iron	6.046		4.84		mg/Kg		04/29/15 17:51	04/30/15 12:05	1

Lab Sample ID: LCS 490-244768/2-A
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.5	17.69		mg/Kg		91	80 - 120
Chromium	19.5	19.59		mg/Kg		100	80 - 120
Copper	19.5	18.23		mg/Kg		93	80 - 120
Iron	195	188.1		mg/Kg		96	80 - 120

Lab Sample ID: 490-77268-E-1-C MS
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.92		22.0	23.08		mg/Kg	☼	78	75 - 125
Chromium	24.1		22.0	47.50		mg/Kg	☼	106	75 - 125
Copper	16.3	F1	22.0	31.86	F1	mg/Kg	☼	71	75 - 125
Iron	17200	B	220	17760	4	mg/Kg	☼	236	75 - 125

Lab Sample ID: 490-77268-E-1-D MSD
Matrix: Solid
Analysis Batch: 245008

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 244768

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.92		21.4	23.64		mg/Kg	☼	83	75 - 125	2	20
Chromium	24.1		21.4	42.11		mg/Kg	☼	84	75 - 125	12	20
Copper	16.3	F1	21.4	33.62		mg/Kg	☼	81	75 - 125	5	20
Iron	17200	B	214	16760	4	mg/Kg	☼	-224	75 - 125	6	20

Lab Sample ID: MB 490-244711/1-A
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 244711

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Chromium	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Copper	ND		0.00200		mg/L		04/29/15 15:13	05/01/15 15:21	1
Iron	ND		0.0250		mg/L		04/29/15 15:13	05/01/15 15:21	1

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 490-244711/2-A
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 244711

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09464		mg/L		95	80 - 120
Chromium	0.100	0.09636		mg/L		96	80 - 120
Copper	0.100	0.09476		mg/L		95	80 - 120
Iron	1.00	0.9751		mg/L		98	80 - 120

Lab Sample ID: 490-77278-G-11-B MS
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 244711

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.09313		mg/L		92	75 - 125
Chromium	ND		0.100	0.09260		mg/L		93	75 - 125
Copper	ND		0.100	0.08796		mg/L		88	75 - 125
Iron	28.5		1.00	29.49	4	mg/L		98	75 - 125

Lab Sample ID: 490-77278-G-11-C MSD
Matrix: Water
Analysis Batch: 245540

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 244711

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.09389		mg/L		93	75 - 125	1	20
Chromium	ND		0.100	0.09436		mg/L		94	75 - 125	2	20
Copper	ND		0.100	0.08964		mg/L		90	75 - 125	2	20
Iron	28.5		1.00	29.79	4	mg/L		128	75 - 125	1	20

Lab Sample ID: MB 490-245145/1-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 245146

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Chromium	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Copper	ND		0.00200		mg/L		05/01/15 09:45	05/04/15 12:39	1
Iron	ND		0.0250		mg/L		05/01/15 09:45	05/04/15 12:39	1

Lab Sample ID: LCS 490-245145/2-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 245146

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1011		mg/L		101	80 - 120
Chromium	0.100	0.1051		mg/L		105	80 - 120
Copper	0.100	0.09973		mg/L		100	80 - 120
Iron	1.00	1.022		mg/L		102	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 490-245145/3-B
Matrix: Water
Analysis Batch: 245763

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 245146

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.1008		mg/L		101	80 - 120	0	20
Chromium	0.100	0.1041		mg/L		104	80 - 120	1	20
Copper	0.100	0.09798		mg/L		98	80 - 120	2	20
Iron	1.00	0.9954		mg/L		100	80 - 120	3	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-246812/4
Matrix: Water
Analysis Batch: 246812

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/05/15 11:10	1

Lab Sample ID: LCS 490-246812/3
Matrix: Water
Analysis Batch: 246812

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1040		mg/L		104	85 - 115

Lab Sample ID: 490-77738-F-1 MS
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND		0.100	0.1060		mg/L		97	85 - 115

Lab Sample ID: 490-77738-F-1 MSD
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.1060		mg/L		97	85 - 115	0	20

Lab Sample ID: 490-77738-F-1 DU
Matrix: Water
Analysis Batch: 246812

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hex	ND		ND		mg/L		NC	20

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-4 DU
Matrix: Soil
Analysis Batch: 251326

Client Sample ID: A-1-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	27			27		%				0	20
Percent Solids	73			73		%				0	20

HPLC/IC

Analysis Batch: 244564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77105-B-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77105-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-77315-3	C-1-1	Total/NA	Water	9056	
490-77315-9	C-2-1	Total/NA	Water	9056	
LCS 490-244564/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244564/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244564/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 244565

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77105-B-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77105-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
490-77315-1	A-1-1	Total/NA	Water	9056	
490-77315-2	A-1-2	Total/NA	Water	9056	
490-77315-3	C-1-1	Total/NA	Water	9056	
490-77315-7	A-2-1	Total/NA	Water	9056	
490-77315-8	A-2-2	Total/NA	Water	9056	
490-77315-9	C-2-1	Total/NA	Water	9056	
LCS 490-244565/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244565/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244565/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 244639

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Total/NA	Water	9056	
490-77315-2	A-1-2	Total/NA	Water	9056	
490-77315-7	A-2-1	Total/NA	Water	9056	
490-77315-8	A-2-2	Total/NA	Water	9056	
490-77399-C-1 MS	Matrix Spike	Total/NA	Water	9056	
490-77399-C-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-244639/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-244639/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-244639/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 244711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77278-G-11-B MS	Matrix Spike	Dissolved	Water	3005A	
490-77278-G-11-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-77315-1	A-1-1	Dissolved	Water	3005A	
490-77315-2	A-1-2	Dissolved	Water	3005A	
490-77315-7	A-2-1	Dissolved	Water	3005A	
490-77315-8	A-2-2	Dissolved	Water	3005A	
LCS 490-244711/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-244711/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 244768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-C MS	Matrix Spike	Total/NA	Solid	3051A	

Metals (Continued)

Prep Batch: 244768 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
490-77315-4	A-1-1	Total/NA	Soil	3051A	
490-77315-5	A-1-2	Total/NA	Soil	3051A	
490-77315-6	C-1-1	Total/NA	Soil	3051A	
490-77315-10	A-2-1	Total/NA	Soil	3051A	
490-77315-11	A-2-2	Total/NA	Soil	3051A	
490-77315-12	C-2-1	Total/NA	Soil	3051A	
LCS 490-244768/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-244768/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 245008

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77268-E-1-C MS	Matrix Spike	Total/NA	Solid	6020	244768
490-77268-E-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	244768
490-77315-4	A-1-1	Total/NA	Soil	6020	244768
490-77315-4	A-1-1	Total/NA	Soil	6020	244768
490-77315-5	A-1-2	Total/NA	Soil	6020	244768
490-77315-6	C-1-1	Total/NA	Soil	6020	244768
490-77315-10	A-2-1	Total/NA	Soil	6020	244768
490-77315-11	A-2-2	Total/NA	Soil	6020	244768
490-77315-12	C-2-1	Total/NA	Soil	6020	244768
LCS 490-244768/2-A	Lab Control Sample	Total/NA	Solid	6020	244768
MB 490-244768/1-A	Method Blank	Total/NA	Solid	6020	244768

Analysis Batch: 245086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-5	A-1-2	Total/NA	Soil	6020	244768
490-77315-10	A-2-1	Total/NA	Soil	6020	244768

Filtration Batch: 245145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-3	C-1-1	Dissolved	Water	Filtration	
490-77315-9	C-2-1	Dissolved	Water	Filtration	
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	Filtration	
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	Filtration	
MB 490-245145/1-B	Method Blank	Dissolved	Water	Filtration	

Prep Batch: 245146

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-3	C-1-1	Dissolved	Water	3005A	245145
490-77315-9	C-2-1	Dissolved	Water	3005A	245145
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	3005A	245145
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	245145
MB 490-245145/1-B	Method Blank	Dissolved	Water	3005A	245145

Analysis Batch: 245540

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77278-G-11-B MS	Matrix Spike	Dissolved	Water	6020	244711
490-77278-G-11-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	244711
490-77315-1	A-1-1	Dissolved	Water	6020	244711
490-77315-2	A-1-2	Dissolved	Water	6020	244711

Metals (Continued)

Analysis Batch: 245540 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-7	A-2-1	Dissolved	Water	6020	244711
490-77315-8	A-2-2	Dissolved	Water	6020	244711
LCS 490-244711/2-A	Lab Control Sample	Total Recoverable	Water	6020	244711
MB 490-244711/1-A	Method Blank	Total Recoverable	Water	6020	244711

Analysis Batch: 245763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	6020	244711
490-77315-2	A-1-2	Dissolved	Water	6020	244711
490-77315-3	C-1-1	Dissolved	Water	6020	245146
490-77315-3	C-1-1	Dissolved	Water	6020	245146
490-77315-7	A-2-1	Dissolved	Water	6020	244711
490-77315-8	A-2-2	Dissolved	Water	6020	244711
490-77315-9	C-2-1	Dissolved	Water	6020	245146
490-77315-9	C-2-1	Dissolved	Water	6020	245146
LCS 490-245145/2-B	Lab Control Sample	Dissolved	Water	6020	245146
LCSD 490-245145/3-B	Lab Control Sample Dup	Dissolved	Water	6020	245146
MB 490-245145/1-B	Method Blank	Dissolved	Water	6020	245146

General Chemistry

Filtration Batch: 245963

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	Filtration	
490-77315-2	A-1-2	Dissolved	Water	Filtration	
490-77315-3	C-1-1	Dissolved	Water	Filtration	
490-77315-7	A-2-1	Dissolved	Water	Filtration	
490-77315-8	A-2-2	Dissolved	Water	Filtration	
490-77315-9	C-2-1	Dissolved	Water	Filtration	

Analysis Batch: 246812

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-1	A-1-1	Dissolved	Water	7196A	245963
490-77315-2	A-1-2	Dissolved	Water	7196A	245963
490-77315-3	C-1-1	Dissolved	Water	7196A	245963
490-77315-7	A-2-1	Dissolved	Water	7196A	245963
490-77315-8	A-2-2	Dissolved	Water	7196A	245963
490-77315-9	C-2-1	Dissolved	Water	7196A	245963
490-77738-F-1 DU	Duplicate	Total/NA	Water	7196A	
490-77738-F-1 MS	Matrix Spike	Total/NA	Water	7196A	
490-77738-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
LCS 490-246812/3	Lab Control Sample	Total/NA	Water	7196A	
MB 490-246812/4	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-4	A-1-1	Total/NA	Soil	Moisture	
490-77315-4 DU	A-1-1	Total/NA	Soil	Moisture	
490-77315-5	A-1-2	Total/NA	Soil	Moisture	
490-77315-6	C-1-1	Total/NA	Soil	Moisture	

General Chemistry (Continued)

Analysis Batch: 251326 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-10	A-2-1	Total/NA	Soil	Moisture	
490-77315-11	A-2-2	Total/NA	Soil	Moisture	
490-77315-12	C-2-1	Total/NA	Soil	Moisture	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1

Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-1

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	9056		1	10 mL		244565	04/28/15 16:39	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 13:39	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:02	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:03	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:37	BLM	TAL NSH

Client Sample ID: A-1-2

Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-2

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	9056		1	10 mL		244565	04/28/15 17:19	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 13:59	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:07	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:08	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:38	BLM	TAL NSH

Client Sample ID: C-1-1

Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-3

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	9056		1	10 mL		244564	04/28/15 17:59	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		244565	04/28/15 17:59	JHS	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		5	30 mL	50 mL	245763	05/04/15 12:54	JBD	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		25	30 mL	50 mL	245763	05/04/15 15:07	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:40	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-1-1

Date Collected: 04/24/15 15:35
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-4

Matrix: Soil
Percent Solids: 73.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.509 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.509 g	100 mL	245008	04/30/15 13:11	CME	TAL NSH
Total/NA	Prep	3051A			0.509 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.509 g	100 mL	245008	04/30/15 13:47	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: A-1-2

Date Collected: 04/24/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-5

Matrix: Soil
Percent Solids: 67.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.511 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.511 g	100 mL	245008	04/30/15 13:17	CME	TAL NSH
Total/NA	Prep	3051A			0.511 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.511 g	100 mL	245086	04/30/15 17:59	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: C-1-1

Date Collected: 04/24/15 15:25
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-6

Matrix: Soil
Percent Solids: 73.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.518 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.518 g	100 mL	245008	04/30/15 13:22	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: A-2-1

Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-7

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	9056		1	10 mL		244565	04/28/15 18:19	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 14:19	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:23	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:13	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:41	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2

Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-8

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	9056		1	10 mL		244565	04/28/15 18:59	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		244639	04/29/15 14:40	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	245540	05/01/15 16:28	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	244711	04/29/15 15:13	TSC	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	245763	05/04/15 12:18	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:43	BLM	TAL NSH

Client Sample ID: C-2-1

Date Collected: 04/27/15 15:30
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-9

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	9056		1	10 mL		244564	04/28/15 19:40	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		244565	04/28/15 19:40	JHS	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		5	30 mL	50 mL	245763	05/04/15 13:09	JBD	TAL NSH
Dissolved	Prep	3005A			30 mL	50 mL	245146	05/01/15 09:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	245145	05/01/15 09:45	TSC	TAL NSH
Dissolved	Analysis	6020		25	30 mL	50 mL	245763	05/04/15 15:12	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	245963	05/05/15 13:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	246812	05/05/15 14:45	BLM	TAL NSH

Client Sample ID: A-2-1

Date Collected: 04/27/15 16:00
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-10

Matrix: Soil
Percent Solids: 81.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.512 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.512 g	100 mL	245008	04/30/15 13:27	CME	TAL NSH
Total/NA	Prep	3051A			0.512 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		5	0.512 g	100 mL	245086	04/30/15 18:04	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: A-2-2

Date Collected: 04/27/15 16:10
Date Received: 04/28/15 08:50

Lab Sample ID: 490-77315-11

Matrix: Soil
Percent Solids: 77.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	245008	04/30/15 13:32	CME	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Client Sample ID: A-2-2

Lab Sample ID: 490-77315-11

Date Collected: 04/27/15 16:10

Matrix: Soil

Date Received: 04/28/15 08:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: C-2-1

Lab Sample ID: 490-77315-12

Date Collected: 04/27/15 15:30

Matrix: Soil

Date Received: 04/28/15 08:50

Percent Solids: 81.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.505 g	100 mL	244768	04/29/15 17:51	RDF	TAL NSH
Total/NA	Analysis	6020		1	0.505 g	100 mL	245008	04/30/15 13:37	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77315-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-77315 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 4/28/2015 @ 8:50

1. Tracking # 9652 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 17610176

2. Temperature of rep. sample or temp blank when opened: 4.7 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? AJH 4/28/15 (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AJH

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA

12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES...NO...(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDW

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)...NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDW

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? YES...(NO)...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDW

I certify that I attached a label with the unique LIMS number to each container (intial) MDW

21. Were there Non-Conformance issues at login? (YES)...NO Was a NCM generated? (YES)...NO...#_____

BIS = Broken in shipment

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

Atlanta
Loc: 490
77315

Cooler Received/Opened On: 4/28/2015 @0850

1. Tracking # 9641 (last 4 digits, FedEx)

Courier: Fed-Ex IR Gun ID: 14740456

2. Temperature of rep. sample or temp blank when opened: 3.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AF

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES...NO...(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) mdm

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) mdm

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO..NA mdm 4.28.15

I certify that I entered this project into LIMS and answered questions 17-20 (intial) mdm

I certify that I attached a label with the unique LIMS number to each container (intial) mdm

21. Were there Non-Conformance issues at login? (YES)..NO Was a NCM generated? (YES)..NO...#_____

#20) Very limited volume for all samples. mdm

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

5/28/2015

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

TestAmerica
THE LEADER IN ENVI

Loc: 490
77315

5/28/2015

Client Information	Sampler: LC Chen Li	Lab PM: Baker, Heather	Carrier Tracking No(s):	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-230-0037	E-Mail: heather.baker@testamericainc.com		Page: Page 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:
Address: 10220 Old Columbia Road Suite A	Due Date Requested:			
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
				Preservation Code:				N	N	N		
1	A-1-1	4/24/15	1535	G	Water	Y		X	X	X	2	filtered, Nitric preserved
2	A-1-2	4/24/15	1530	G	Water	Y		X	X	X	2	filtered, Nitric preserved
3	C-1-1	4/24/15	1525	G	Water	N		X	X	X	1	not filtered.
4	A-1-1	4/24/15	1535	G	~~Water~~ S	N				X	1	
5	A-1-2	4/24/15	1530	G	~~Water~~ S	N				X	1	
6	C-1-1	4/24/15	1525	G	~~Water~~ S	N				X	1	
7	A-2-1	4/27/15	1600	G	Water	Y		X	X	X	2	filtered & HNO3 preserved
8	A-2-2	"	1610	"	Water	Y		X	X	X	2	filtered & HNO3 preserved
9	C-2-1	"	1530	"	Water	N		X	X	X	1	not filtered
10	A-2-1	"	1600	"	~~Water~~ S	N				X	1	
11/12	A-2-2/C-2-1	↓	1610/1530	↓	~~Water~~ S	Y/N				X	1	

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:	Company	Received by:	Date/Time:	Company
Chen Li	~~4/24/15~~ 4/27/15 1630	Geosyntec	D Carlson	4-27-15 1650	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	16:50 4/27/15			4.28.15 @ 0850	TAN
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:
		3.6/4.7

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-77315-1

Login Number: 77315
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	3.6/4.7
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	False	Limited volume received.
Sample Preservation Verified.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-77930-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/28/2015 2:34:59 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 22
QC Association 27
Chronicle 31
Method Summary 36
Certification Summary 37
Chain of Custody 38
Receipt Checklists 42

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-77930-1	Biotic_050615	Water	05/06/15 08:50	05/07/15 08:30
490-77930-2	Biotic_050615	Solid	05/06/15 08:50	05/07/15 08:30
490-77930-3	Biotic Dup_050615	Water	05/06/15 10:15	05/07/15 08:30
490-77930-4	Biotic Dup_050615	Solid	05/06/15 10:15	05/07/15 08:30
490-77930-5	Biotic Control_050615	Water	05/06/15 10:25	05/07/15 08:30
490-77930-6	Biotic Control_050615	Solid	05/06/15 10:25	05/07/15 08:30
490-77930-7	Abiotic_4hr_050615	Water	05/06/15 11:40	05/07/15 08:30
490-77930-8	Abiotic_4hr_050615	Solid	05/06/15 11:40	05/07/15 08:30
490-77930-9	Abiotic_4hr_Dup_050615	Water	05/06/15 12:05	05/07/15 08:30
490-77930-10	Abiotic_4hr_Dup_050615	Solid	05/06/15 12:05	05/07/15 08:30
490-77930-11	Abiotic_Control_050615	Water	05/06/15 12:00	05/07/15 08:30
490-77930-12	Abiotic_Control_050615	Solid	05/06/15 12:00	05/07/15 08:30
490-77930-13	Abiotic_8hr_050615	Water	05/06/15 15:30	05/07/15 08:30
490-77930-14	Abiotic_8hr_050615	Solid	05/06/15 15:30	05/07/15 08:30
490-77930-15	Abiotic_8hr_Dup_050615	Water	05/06/15 15:35	05/07/15 08:30
490-77930-16	Abiotic_8hr_Dup_050615	Solid	05/06/15 15:35	05/07/15 08:30

Job ID: 490-77930-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-77930-1

Comments
No additional comments.

Receipt
The samples were received on 5/7/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.0º C.

Except:

Method 7196A: The following samples were received outside of holding time: Biotic_050615 (490-77930-1), Biotic Dup_050615 (490-77930-3) and Biotic Control_050615 (490-77930-5).

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: Biotic_050615 (490-77930-1), Biotic Dup_050615 (490-77930-3), Abiotic_4hr_050615 (490-77930-7), Abiotic_4hr_Dup_050615 (490-77930-9), Abiotic_8hr_050615 (490-77930-13) and Abiotic_8hr_Dup_050615 (490-77930-15). Elevated reporting limits (RLs) are provided.

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

Metals
Method 6010B: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with 247303.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 490-246616 and analytical batch 490-247930 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier	Qualifier Description
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.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic_050615
Date Collected: 05/06/15 08:50
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.46**		0.100		mg/L			05/07/15 13:46	1
Sulfate	**2350**		5.00		mg/L			05/08/15 18:49	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0115**		0.0100		mg/L		05/11/15 11:25	05/12/15 22:39	5
Chromium	ND		0.0100		mg/L		05/11/15 11:25	05/12/15 22:39	5
Copper	**3.48**		0.0100		mg/L		05/11/15 11:25	05/12/15 22:39	5
Iron	**3.18**		0.125		mg/L		05/11/15 11:25	05/12/15 22:39	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H F1	0.0100		mg/L			05/07/15 10:55	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic_050615
Date Collected: 05/06/15 08:50
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-2
Matrix: Solid
Percent Solids: 78.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	430	F2	0.622		mg/Kg	☼	05/07/15 14:49	05/08/15 19:48	1
Chromium	172		0.622		mg/Kg	☼	05/07/15 14:49	05/08/15 19:48	1
Copper	690		3.11		mg/Kg	☼	05/07/15 14:49	05/12/15 21:38	5
Iron	4100		6.22		mg/Kg	☼	05/07/15 14:49	05/08/15 19:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			05/27/15 15:13	1
Percent Solids	79		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic Dup_050615
Date Collected: 05/06/15 10:15
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.41**		0.100		mg/L			05/07/15 14:26	1
Sulfate	**2350**		5.00		mg/L			05/08/15 19:09	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0100		mg/L		05/11/15 11:25	05/12/15 22:44	5
Chromium	ND		0.0100		mg/L		05/11/15 11:25	05/12/15 22:44	5
Copper	**0.491**		0.0100		mg/L		05/11/15 11:25	05/12/15 22:44	5
Iron	**111**		0.125		mg/L		05/11/15 11:25	05/12/15 22:44	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/07/15 10:57	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic Dup_050615
Date Collected: 05/06/15 10:15
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-4
Matrix: Solid
Percent Solids: 76.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	725		6.53		mg/Kg	☼	05/07/15 14:49	05/12/15 22:03	10
Chromium	152		0.653		mg/Kg	☼	05/07/15 14:49	05/08/15 20:13	1
Copper	1350		6.53		mg/Kg	☼	05/07/15 14:49	05/12/15 22:03	10
Iron	8240		6.53		mg/Kg	☼	05/07/15 14:49	05/08/15 20:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			05/27/15 15:13	1
Percent Solids	77		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic Control_050615
Date Collected: 05/06/15 10:25
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-5
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.53		0.100		mg/L			05/07/15 15:06	1
Sulfate	15.7		1.00		mg/L			05/08/15 19:29	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	7.94		0.0100		mg/L		05/11/15 11:25	05/12/15 22:49	5
Chromium	0.164		0.0100		mg/L		05/11/15 11:25	05/12/15 22:49	5
Copper	1.32		0.0100		mg/L		05/11/15 11:25	05/12/15 22:49	5
Iron	4.44		0.125		mg/L		05/11/15 11:25	05/12/15 22:49	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0320	H	0.0100		mg/L			05/07/15 10:58	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Biotic Control_050615
Date Collected: 05/06/15 10:25
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-6
Matrix: Solid
Percent Solids: 76.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	254		0.638		mg/Kg	☼	05/07/15 14:49	05/08/15 20:18	1
Chromium	48.4		0.638		mg/Kg	☼	05/07/15 14:49	05/08/15 20:18	1
Copper	324		0.638		mg/Kg	☼	05/07/15 14:49	05/08/15 20:18	1
Iron	1450		6.38		mg/Kg	☼	05/07/15 14:49	05/08/15 20:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			05/27/15 15:13	1
Percent Solids	77		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_4hr_050615
Date Collected: 05/06/15 11:40
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-7
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.50**		0.100		mg/L			05/07/15 15:26	1
Sulfate	**3120**		10.0		mg/L			05/08/15 20:29	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/12/15 23:56	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/12/15 23:56	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/12/15 23:56	10
Iron	**903**		2.50		mg/L		05/11/15 11:25	05/12/15 22:54	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 11:00	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_4hr_050615
Date Collected: 05/06/15 11:40
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-8
Matrix: Solid
Percent Solids: 75.7

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1160		6.38		mg/Kg	☼	05/07/15 14:49	05/12/15 22:13	10
Chromium	211		0.638		mg/Kg	☼	05/07/15 14:49	05/08/15 20:49	1
Copper	2290		6.38		mg/Kg	☼	05/07/15 14:49	05/12/15 22:13	10
Iron	8580		6.38		mg/Kg	☼	05/07/15 14:49	05/08/15 20:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	24		0.10		%			05/27/15 15:13	1
Percent Solids	76		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_4hr_Dup_050615
Date Collected: 05/06/15 12:05
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-9
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.50**		0.100		mg/L			05/07/15 16:06	1
Sulfate	**3090**		10.0		mg/L			05/08/15 20:49	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:01	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:01	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:01	10
Iron	**946**		2.50		mg/L		05/11/15 11:25	05/12/15 22:59	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 11:03	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_4hr_Dup_050615
Date Collected: 05/06/15 12:05
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-10
Matrix: Solid
Percent Solids: 76.6

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	769		6.49		mg/Kg	☼	05/07/15 14:49	05/12/15 22:19	10
Chromium	120		0.649		mg/Kg	☼	05/07/15 14:49	05/08/15 20:54	1
Copper	1350		6.49		mg/Kg	☼	05/07/15 14:49	05/12/15 22:19	10
Iron	5220		6.49		mg/Kg	☼	05/07/15 14:49	05/08/15 20:54	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			05/27/15 15:13	1
Percent Solids	77		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_Control_050615
Date Collected: 05/06/15 12:00
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-11
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.61	F1	0.100		mg/L			05/07/15 16:46	1
Sulfate	12.3		1.00		mg/L			05/08/15 21:09	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.07		0.0100		mg/L		05/13/15 14:44	05/15/15 14:29	5
Chromium	0.126		0.0100		mg/L		05/13/15 14:44	05/15/15 14:29	5
Copper	0.919		0.0100		mg/L		05/13/15 14:44	05/15/15 14:29	5
Iron	3.39		0.125		mg/L		05/13/15 14:44	05/15/15 14:29	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 11:05	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_Control_050615
Lab Sample ID: 490-77930-12
Date Collected: 05/06/15 12:00
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 77.5

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	229		0.628		mg/Kg	☼	05/07/15 14:49	05/08/15 20:24	1
Chromium	51.5		0.628		mg/Kg	☼	05/07/15 14:49	05/08/15 20:24	1
Copper	354		0.628		mg/Kg	☼	05/07/15 14:49	05/08/15 20:24	1
Iron	1960		6.28		mg/Kg	☼	05/07/15 14:49	05/08/15 20:24	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			05/27/15 15:13	1
Percent Solids	77		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_8hr_050615
Date Collected: 05/06/15 15:30
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-13
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.77**		0.100		mg/L			05/07/15 18:27	1
Sulfate	**3040**		10.0		mg/L			05/08/15 21:29	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:06	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:06	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:06	10
Iron	**833**		2.50		mg/L		05/11/15 11:25	05/12/15 23:05	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 11:06	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_8hr_050615
Date Collected: 05/06/15 15:30
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-14
Matrix: Solid
Percent Solids: 77.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	276		0.612		mg/Kg	☼	05/07/15 14:49	05/08/15 20:39	1
Chromium	48.9		0.612		mg/Kg	☼	05/07/15 14:49	05/08/15 20:39	1
Copper	364		0.612		mg/Kg	☼	05/07/15 14:49	05/08/15 20:39	1
Iron	3110		6.12		mg/Kg	☼	05/07/15 14:49	05/08/15 20:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_8hr_Dup_050615
Date Collected: 05/06/15 15:35
Date Received: 05/07/15 08:30

Lab Sample ID: 490-77930-15
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.72**		0.100		mg/L			05/07/15 19:07	1
Sulfate	**3150**		10.0		mg/L			05/08/15 21:49	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:11	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:11	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:11	10
Iron	**918**		2.50		mg/L		05/11/15 11:25	05/12/15 23:10	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 11:08	1

Client Sample ID: Abiotic_8hr_Dup_050615

Lab Sample ID: 490-77930-16

Date Collected: 05/06/15 15:35
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 68.5

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1230		7.19		mg/Kg	☼	05/07/15 14:49	05/12/15 22:08	10
Chromium	233		0.719		mg/Kg	☼	05/07/15 14:49	05/08/15 20:44	1
Copper	2350		7.19		mg/Kg	☼	05/07/15 14:49	05/12/15 22:08	10
Iron	8480		7.19		mg/Kg	☼	05/07/15 14:49	05/08/15 20:44	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	32		0.10		%			05/27/15 15:13	1
Percent Solids	68		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-246697/6
Matrix: Water
Analysis Batch: 246697

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			05/07/15 12:46	1

Lab Sample ID: LCS 490-246697/7
Matrix: Water
Analysis Batch: 246697

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.40		mg/L		104	80 - 120

Lab Sample ID: LCSD 490-246697/8
Matrix: Water
Analysis Batch: 246697

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
Nitrate as N	10.0	10.54		mg/L		105	80 - 120	1	20

Lab Sample ID: 490-77930-11 MS
Matrix: Water
Analysis Batch: 246697

Client Sample ID: Abiotic_Control_050615
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	1.61	F1	10.0	13.24		mg/L		116	80 - 120

Lab Sample ID: 490-77930-11 MSD
Matrix: Water
Analysis Batch: 246697

Client Sample ID: Abiotic_Control_050615
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	1.61	F1	10.0	14.98	F1	mg/L		134	80 - 120	12	20

Lab Sample ID: MB 490-247021/6
Matrix: Water
Analysis Batch: 247021

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/08/15 14:03	1

Lab Sample ID: LCS 490-247021/7
Matrix: Water
Analysis Batch: 247021

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	105.4		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-247021/8
Matrix: Water
Analysis Batch: 247021

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
Sulfate	100	106.0		mg/L		106	80 - 120	1	20

Lab Sample ID: 490-78075-J-4 MS
Matrix: Water
Analysis Batch: 247021

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	9.23		100	111.8		mg/L		103	80 - 120

Lab Sample ID: 490-78075-J-4 MSD
Matrix: Water
Analysis Batch: 247021

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	9.23		100	109.8		mg/L		101	80 - 120	2	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-246589/1-A
Matrix: Solid
Analysis Batch: 247265

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 246589

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.498		mg/Kg		05/07/15 14:49	05/08/15 19:38	1
Chromium	ND		0.498		mg/Kg		05/07/15 14:49	05/08/15 19:38	1
Copper	ND		0.498		mg/Kg		05/07/15 14:49	05/08/15 19:38	1
Iron	ND		4.98		mg/Kg		05/07/15 14:49	05/08/15 19:38	1

Lab Sample ID: LCS 490-246589/2-A
Matrix: Solid
Analysis Batch: 247265

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 246589

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.8	17.30		mg/Kg		87	80 - 120
Chromium	19.8	18.13		mg/Kg		91	80 - 120
Copper	19.8	16.90		mg/Kg		85	80 - 120
Iron	198	183.0		mg/Kg		92	80 - 120

Lab Sample ID: 490-77930-2 MS
Matrix: Solid
Analysis Batch: 247265

Client Sample ID: Biotic_050615
Prep Type: Total/NA
Prep Batch: 246589

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	430	F2	25.5	424.2	4	mg/Kg	☼	-21	75 - 125
Chromium	172		25.5	85.27	4	mg/Kg	☼	-340	75 - 125
Iron	4100		255	4835	4	mg/Kg	☼	290	75 - 125

Lab Sample ID: 490-77930-2 MS
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Biotic_050615
Prep Type: Total/NA
Prep Batch: 246589

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	690		25.5	746.6	4	mg/Kg	☼	223	75 - 125

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-77930-2 MSD
Matrix: Solid
Analysis Batch: 247265

Client Sample ID: Biotic_050615
Prep Type: Total/NA
Prep Batch: 246589

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	430	F2	25.0	337.2	4 F2	mg/Kg	☼	-370	75 - 125	23	20
Chromium	172		25.0	81.39	4	mg/Kg	☼	-362	75 - 125	5	20
Iron	4100		250	4690	4	mg/Kg	☼	237	75 - 125	3	20

Lab Sample ID: 490-77930-2 MSD
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Biotic_050615
Prep Type: Total/NA
Prep Batch: 246589

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	690		25.0	648.6	4	mg/Kg	☼	-165	75 - 125	14	20

Lab Sample ID: MB 490-247303/1-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Chromium	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Copper	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Iron	ND		0.0250		mg/L		05/11/15 11:25	05/12/15 10:47	1

Lab Sample ID: LCS 490-247303/2-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1065		mg/L		107	80 - 120
Chromium	0.100	0.1078		mg/L		108	80 - 120
Copper	0.100	0.1019		mg/L		102	80 - 120
Iron	1.00	1.015		mg/L		102	80 - 120

Lab Sample ID: LCSD 490-247303/3-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.1052		mg/L		105	80 - 120	1	20
Chromium	0.100	0.1064		mg/L		106	80 - 120	1	20
Copper	0.100	0.1000		mg/L		100	80 - 120	2	20
Iron	1.00	1.023		mg/L		102	80 - 120	1	20

Lab Sample ID: MB 490-248030/1-B
Matrix: Water
Analysis Batch: 248708

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 248032

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/13/15 14:44	05/15/15 13:02	1
Chromium	ND		0.00200		mg/L		05/13/15 14:44	05/15/15 13:02	1
Copper	ND		0.00200		mg/L		05/13/15 14:44	05/15/15 13:02	1

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-248030/1-B
Matrix: Water
Analysis Batch: 248708

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 248032

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		0.0250		mg/L		05/13/15 14:44	05/15/15 13:02	1

Lab Sample ID: LCS 490-248030/2-B
Matrix: Water
Analysis Batch: 248708

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 248032

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1015		mg/L		102	80 - 120
Chromium	0.100	0.1007		mg/L		101	80 - 120
Copper	0.100	0.09814		mg/L		98	80 - 120
Iron	1.00	1.025		mg/L		103	80 - 120

Lab Sample ID: 490-78209-G-1-E MS
Matrix: Water
Analysis Batch: 248708

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 248032

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.00293		0.100	0.1040		mg/L		101	75 - 125
Chromium	ND		0.100	0.1014		mg/L		101	75 - 125
Copper	ND		0.100	0.1008		mg/L		100	75 - 125
Iron	ND		1.00	1.035		mg/L		102	75 - 125

Lab Sample ID: 490-78209-G-1-F MSD
Matrix: Water
Analysis Batch: 248708

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 248032

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.00293		0.100	0.1045		mg/L		102	75 - 125	0	20
Chromium	ND		0.100	0.1007		mg/L		100	75 - 125	1	20
Copper	ND		0.100	0.1007		mg/L		99	75 - 125	0	20
Iron	ND		1.00	1.035		mg/L		102	75 - 125	0	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-247930/1
Matrix: Water
Analysis Batch: 247930

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/07/15 10:55	1

Lab Sample ID: LCS 490-247930/2
Matrix: Water
Analysis Batch: 247930

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1020		mg/L		102	85 - 115

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 490-77930-1 MS
Matrix: Water
Analysis Batch: 247930

Client Sample ID: Biotic_050615
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND	H F1	0.100	0.07600	F1	mg/L		68	85 - 115

Lab Sample ID: 490-77930-1 MSD
Matrix: Water
Analysis Batch: 247930

Client Sample ID: Biotic_050615
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	H F1	0.100	0.07500	F1	mg/L		67	85 - 115	1	20

Lab Sample ID: 490-77930-1 DU
Matrix: Water
Analysis Batch: 247930

Client Sample ID: Biotic_050615
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hex	ND	H F1	ND		mg/L		NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-A-4 DU
Matrix: Solid
Analysis Batch: 251326

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	27		27		%		0	20
Percent Solids	73		73		%		0	20

HPLC/IC

Analysis Batch: 246697

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Total/NA	Water	9056	
490-77930-3	Biotic Dup_050615	Total/NA	Water	9056	
490-77930-5	Biotic Control_050615	Total/NA	Water	9056	
490-77930-7	Abiotic_4hr_050615	Total/NA	Water	9056	
490-77930-9	Abiotic_4hr_Dup_050615	Total/NA	Water	9056	
490-77930-11	Abiotic_Control_050615	Total/NA	Water	9056	
490-77930-11 MS	Abiotic_Control_050615	Total/NA	Water	9056	
490-77930-11 MSD	Abiotic_Control_050615	Total/NA	Water	9056	
490-77930-13	Abiotic_8hr_050615	Total/NA	Water	9056	
490-77930-15	Abiotic_8hr_Dup_050615	Total/NA	Water	9056	
LCS 490-246697/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-246697/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-246697/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 247021

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Total/NA	Water	9056	
490-77930-3	Biotic Dup_050615	Total/NA	Water	9056	
490-77930-5	Biotic Control_050615	Total/NA	Water	9056	
490-77930-7	Abiotic_4hr_050615	Total/NA	Water	9056	
490-77930-9	Abiotic_4hr_Dup_050615	Total/NA	Water	9056	
490-77930-11	Abiotic_Control_050615	Total/NA	Water	9056	
490-77930-13	Abiotic_8hr_050615	Total/NA	Water	9056	
490-77930-15	Abiotic_8hr_Dup_050615	Total/NA	Water	9056	
490-78075-J-4 MS	Matrix Spike	Total/NA	Water	9056	
490-78075-J-4 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-247021/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-247021/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-247021/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 246589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-2	Biotic_050615	Total/NA	Solid	3051A	
490-77930-2 MS	Biotic_050615	Total/NA	Solid	3051A	
490-77930-2 MSD	Biotic_050615	Total/NA	Solid	3051A	
490-77930-4	Biotic Dup_050615	Total/NA	Solid	3051A	
490-77930-6	Biotic Control_050615	Total/NA	Solid	3051A	
490-77930-8	Abiotic_4hr_050615	Total/NA	Solid	3051A	
490-77930-10	Abiotic_4hr_Dup_050615	Total/NA	Solid	3051A	
490-77930-12	Abiotic_Control_050615	Total/NA	Solid	3051A	
490-77930-14	Abiotic_8hr_050615	Total/NA	Solid	3051A	
490-77930-16	Abiotic_8hr_Dup_050615	Total/NA	Solid	3051A	
LCS 490-246589/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-246589/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 247265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-2	Biotic_050615	Total/NA	Solid	6020	246589

Metals (Continued)

Analysis Batch: 247265 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-2 MS	Biotic_050615	Total/NA	Solid	6020	246589
490-77930-2 MSD	Biotic_050615	Total/NA	Solid	6020	246589
490-77930-4	Biotic Dup_050615	Total/NA	Solid	6020	246589
490-77930-6	Biotic Control_050615	Total/NA	Solid	6020	246589
490-77930-8	Abiotic_4hr_050615	Total/NA	Solid	6020	246589
490-77930-10	Abiotic_4hr_Dup_050615	Total/NA	Solid	6020	246589
490-77930-12	Abiotic_Control_050615	Total/NA	Solid	6020	246589
490-77930-14	Abiotic_8hr_050615	Total/NA	Solid	6020	246589
490-77930-16	Abiotic_8hr_Dup_050615	Total/NA	Solid	6020	246589
LCS 490-246589/2-A	Lab Control Sample	Total/NA	Solid	6020	246589
MB 490-246589/1-A	Method Blank	Total/NA	Solid	6020	246589

Prep Batch: 247303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Dissolved	Water	3005A	
490-77930-3	Biotic Dup_050615	Dissolved	Water	3005A	
490-77930-5	Biotic Control_050615	Dissolved	Water	3005A	
490-77930-7	Abiotic_4hr_050615	Dissolved	Water	3005A	
490-77930-9	Abiotic_4hr_Dup_050615	Dissolved	Water	3005A	
490-77930-13	Abiotic_8hr_050615	Dissolved	Water	3005A	
490-77930-15	Abiotic_8hr_Dup_050615	Dissolved	Water	3005A	
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 247656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	6020	247303
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	6020	247303
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	6020	247303

Analysis Batch: 247865

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Dissolved	Water	6020	247303
490-77930-2	Biotic_050615	Total/NA	Solid	6020	246589
490-77930-2 MS	Biotic_050615	Total/NA	Solid	6020	246589
490-77930-2 MSD	Biotic_050615	Total/NA	Solid	6020	246589
490-77930-3	Biotic Dup_050615	Dissolved	Water	6020	247303
490-77930-4	Biotic Dup_050615	Total/NA	Solid	6020	246589
490-77930-5	Biotic Control_050615	Dissolved	Water	6020	247303
490-77930-7	Abiotic_4hr_050615	Dissolved	Water	6020	247303
490-77930-7	Abiotic_4hr_050615	Dissolved	Water	6020	247303
490-77930-8	Abiotic_4hr_050615	Total/NA	Solid	6020	246589
490-77930-9	Abiotic_4hr_Dup_050615	Dissolved	Water	6020	247303
490-77930-9	Abiotic_4hr_Dup_050615	Dissolved	Water	6020	247303
490-77930-10	Abiotic_4hr_Dup_050615	Total/NA	Solid	6020	246589
490-77930-13	Abiotic_8hr_050615	Dissolved	Water	6020	247303
490-77930-13	Abiotic_8hr_050615	Dissolved	Water	6020	247303
490-77930-15	Abiotic_8hr_Dup_050615	Dissolved	Water	6020	247303
490-77930-15	Abiotic_8hr_Dup_050615	Dissolved	Water	6020	247303
490-77930-16	Abiotic_8hr_Dup_050615	Total/NA	Solid	6020	246589

Filtration Batch: 248030

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-11	Abiotic_Control_050615	Dissolved	Water	Filtration	
490-78209-G-1-E MS	Matrix Spike	Dissolved	Water	Filtration	
490-78209-G-1-F MSD	Matrix Spike Duplicate	Dissolved	Water	Filtration	
LCS 490-248030/2-B	Lab Control Sample	Dissolved	Water	Filtration	
MB 490-248030/1-B	Method Blank	Dissolved	Water	Filtration	

Prep Batch: 248032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-11	Abiotic_Control_050615	Dissolved	Water	3005A	248030
490-78209-G-1-E MS	Matrix Spike	Dissolved	Water	3005A	248030
490-78209-G-1-F MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	248030
LCS 490-248030/2-B	Lab Control Sample	Dissolved	Water	3005A	248030
MB 490-248030/1-B	Method Blank	Dissolved	Water	3005A	248030

Analysis Batch: 248708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-11	Abiotic_Control_050615	Dissolved	Water	6020	248032
490-78209-G-1-E MS	Matrix Spike	Dissolved	Water	6020	248032
490-78209-G-1-F MSD	Matrix Spike Duplicate	Dissolved	Water	6020	248032
LCS 490-248030/2-B	Lab Control Sample	Dissolved	Water	6020	248032
MB 490-248030/1-B	Method Blank	Dissolved	Water	6020	248032

General Chemistry

Filtration Batch: 246616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Dissolved	Water	Filtration	
490-77930-1 DU	Biotic_050615	Dissolved	Water	Filtration	
490-77930-1 MS	Biotic_050615	Dissolved	Water	Filtration	
490-77930-1 MSD	Biotic_050615	Dissolved	Water	Filtration	
490-77930-3	Biotic Dup_050615	Dissolved	Water	Filtration	
490-77930-5	Biotic Control_050615	Dissolved	Water	Filtration	
490-77930-7	Abiotic_4hr_050615	Dissolved	Water	Filtration	
490-77930-9	Abiotic_4hr_Dup_050615	Dissolved	Water	Filtration	
490-77930-11	Abiotic_Control_050615	Dissolved	Water	Filtration	
490-77930-13	Abiotic_8hr_050615	Dissolved	Water	Filtration	
490-77930-15	Abiotic_8hr_Dup_050615	Dissolved	Water	Filtration	

Analysis Batch: 247930

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77930-1	Biotic_050615	Dissolved	Water	7196A	246616
490-77930-1 DU	Biotic_050615	Dissolved	Water	7196A	246616
490-77930-1 MS	Biotic_050615	Dissolved	Water	7196A	246616
490-77930-1 MSD	Biotic_050615	Dissolved	Water	7196A	246616
490-77930-3	Biotic Dup_050615	Dissolved	Water	7196A	246616
490-77930-5	Biotic Control_050615	Dissolved	Water	7196A	246616
490-77930-7	Abiotic_4hr_050615	Dissolved	Water	7196A	246616
490-77930-9	Abiotic_4hr_Dup_050615	Dissolved	Water	7196A	246616
490-77930-11	Abiotic_Control_050615	Dissolved	Water	7196A	246616
490-77930-13	Abiotic_8hr_050615	Dissolved	Water	7196A	246616
490-77930-15	Abiotic_8hr_Dup_050615	Dissolved	Water	7196A	246616
LCS 490-247930/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-247930/1	Method Blank	Total/NA	Water	7196A	

QC Association Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-A-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-77930-2	Biotic_050615	Total/NA	Solid	Moisture	
490-77930-4	Biotic Dup_050615	Total/NA	Solid	Moisture	
490-77930-6	Biotic Control_050615	Total/NA	Solid	Moisture	
490-77930-8	Abiotic_4hr_050615	Total/NA	Solid	Moisture	
490-77930-10	Abiotic_4hr_Dup_050615	Total/NA	Solid	Moisture	
490-77930-12	Abiotic_Control_050615	Total/NA	Solid	Moisture	
490-77930-14	Abiotic_8hr_050615	Total/NA	Solid	Moisture	
490-77930-16	Abiotic_8hr_Dup_050615	Total/NA	Solid	Moisture	

Client Sample ID: Biotic_050615

Lab Sample ID: 490-77930-1
Date Collected: 05/06/15 08:50
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 13:46	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		247021	05/08/15 18:49	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	247865	05/12/15 22:39	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 10:55	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Biotic_050615

Lab Sample ID: 490-77930-2
Date Collected: 05/06/15 08:50
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 78.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.510 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.510 g	100 mL	247265	05/08/15 19:48	CME	TAL NSH
Total/NA	Prep	3051A			0.510 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.510 g	100 mL	247865	05/12/15 21:38	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Biotic Dup_050615

Lab Sample ID: 490-77930-3
Date Collected: 05/06/15 10:15
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 14:26	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		247021	05/08/15 19:09	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	247865	05/12/15 22:44	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 10:57	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Biotic Dup_050615

Lab Sample ID: 490-77930-4
Date Collected: 05/06/15 10:15
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 76.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.498 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.498 g	100 mL	247265	05/08/15 20:13	CME	TAL NSH
Total/NA	Prep	3051A			0.498 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		10	0.498 g	100 mL	247865	05/12/15 22:03	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Biotic Control_050615

Lab Sample ID: 490-77930-5
Date Collected: 05/06/15 10:25
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 15:06	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		247021	05/08/15 19:29	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	247865	05/12/15 22:49	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 10:58	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Biotic Control_050615

Lab Sample ID: 490-77930-6
Date Collected: 05/06/15 10:25
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 76.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.509 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.509 g	100 mL	247265	05/08/15 20:18	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_4hr_050615

Lab Sample ID: 490-77930-7
Date Collected: 05/06/15 11:40
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 15:26	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247021	05/08/15 20:29	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 22:54	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/12/15 23:56	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 11:00	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Abiotic_4hr_050615

Lab Sample ID: 490-77930-8
Date Collected: 05/06/15 11:40
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 75.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.518 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.518 g	100 mL	247265	05/08/15 20:49	CME	TAL NSH
Total/NA	Prep	3051A			0.518 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		10	0.518 g	100 mL	247865	05/12/15 22:13	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_4hr_Dup_050615

Lab Sample ID: 490-77930-9

Date Collected: 05/06/15 12:05

Matrix: Water

Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 16:06	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247021	05/08/15 20:49	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 22:59	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:01	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 11:03	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Abiotic_4hr_Dup_050615

Lab Sample ID: 490-77930-10

Date Collected: 05/06/15 12:05

Matrix: Solid

Date Received: 05/07/15 08:30

Percent Solids: 76.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.503 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.503 g	100 mL	247265	05/08/15 20:54	CME	TAL NSH
Total/NA	Prep	3051A			0.503 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		10	0.503 g	100 mL	247865	05/12/15 22:19	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_Control_050615

Lab Sample ID: 490-77930-11

Date Collected: 05/06/15 12:00

Matrix: Water

Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 16:46	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		247021	05/08/15 21:09	JHS	TAL NSH
Dissolved	Prep	3005A			25 mL	25 mL	248032	05/13/15 14:44	TSC	TAL NSH
Dissolved	Filtration	Filtration			25 mL	25 mL	248030	05/13/15 14:44	TSC	TAL NSH
Dissolved	Analysis	6020		5	25 mL	25 mL	248708	05/15/15 14:29	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 11:05	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Abiotic_Control_050615

Lab Sample ID: 490-77930-12

Date Collected: 05/06/15 12:00

Matrix: Solid

Date Received: 05/07/15 08:30

Percent Solids: 77.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.514 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.514 g	100 mL	247265	05/08/15 20:24	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Client Sample ID: Abiotic_8hr_050615

Lab Sample ID: 490-77930-13
Date Collected: 05/06/15 15:30
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 18:27	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247021	05/08/15 21:29	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:05	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:06	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 11:06	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Abiotic_8hr_050615

Lab Sample ID: 490-77930-14
Date Collected: 05/06/15 15:30
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 77.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.524 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.524 g	100 mL	247265	05/08/15 20:39	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_8hr_Dup_050615

Lab Sample ID: 490-77930-15
Date Collected: 05/06/15 15:35
Matrix: Water
Date Received: 05/07/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		246697	05/07/15 19:07	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247021	05/08/15 21:49	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:10	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:11	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247930	05/07/15 11:08	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	246616	05/07/15 16:38	BLM	TAL NSH

Client Sample ID: Abiotic_8hr_Dup_050615

Lab Sample ID: 490-77930-16
Date Collected: 05/06/15 15:35
Matrix: Solid
Date Received: 05/07/15 08:30
Percent Solids: 68.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	247265	05/08/15 20:44	CME	TAL NSH
Total/NA	Prep	3051A			0.508 g	100 mL	246589	05/07/15 14:49	ZLN	TAL NSH
Total/NA	Analysis	6020		10	0.508 g	100 mL	247865	05/12/15 22:08	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-77930-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-77930 Chain of Custody

Cooler Received/Opened On 5/7/2015 @ 8:30

1. Tracking # 2750 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 17610176

2. Temperature of rep. sample or temp blank when opened: 1.0 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO..(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) ADH

7. Were custody seals on containers: YES (NO) and Intact YES...NO..(NA)

Were these signed and dated correctly? YES...NO..(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES,(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES...NO,(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO..(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDM

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..(NO)..NA MDM 5-7-15

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDM

I certify that I attached a label with the unique LIMS number to each container (intial) MDM

21. Were there Non-Conformance issues at login? (YES),(NO) MDM 5.7.15 Was a NCM generated? YES,(NO)..# MDM 5.7.15

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
77930

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

5/28/2015

Client Information	Sampler: Linxi Chen	Lab PM: Baker, Heather	Carri	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page ~~1 of 7~~ 1 of 3
Company: Geosyntec Consultants, Inc.		Analysis Requested		Job #:
Address: 10220 Old Columbia Road Suite A	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 - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			Other:
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
Site: TEL	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe																Total Number of containers	Special Instructions/Note:
				Preservation Code:				N	N	N																	
-1	Biotic - 050615	05/06/15	0850	G	Water	Y			X	X																1	filtered & HNO3 preserved
+	Biotic - 050615		↓		Water	N		X																		1	
2	Biotic - 050615		↓		S ~~Water~~	N				X																1	
3	Biotic Dup - 050615		1015		Water	Y			X	X																1	HNO3 preserved.
+	Biotic Dup - 050615		↓		Water	N		X																		1	
4	Biotic Dup - 050615		↓		S ~~Water~~	N				X																1	
5	Biotic Control 050615		1025		Water	Y			X	X																1	HNO3 preserved
+	Biotic Control - 050615		↓		Water	N		X																		1	
6	Biotic control - 050615		↓		S ~~Water~~	N				X																1	
7	Abiotic - 4HR - 050615		1140		Water	Y			X	X																1	HNO3 preserved
+	Abiotic - 4HR - 050615		1140		Water	N		X																		1	

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:	Company	Received by:	Date/Time:	Company
Linxi Chen	05/06/15 1600	Geosyntec	[illegible]	05-06-15 1600	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[illegible]	5-7-15 @ 0830	TAN
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: 1.0c

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
77930

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Linxi Chen	Lab PM: Baker, Heather	Carrier:	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page ~~1 of 7~~ 2 of 3
Company: Geosyntec Consultants, Inc.				Job #:
Address: 10220 Old Columbia Road Suite A	Due Date Requested:			
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
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 - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
				Preservation Code:				N	N	N		
8	Abiotic_4HR_050615	05/06/15	1140	G	~~S~~ Water	N				X	1	
9	Abiotic_4HR_Dup_050615		1205		Water	Y			X	X	1	HNO_3 preserved
	Abiotic_4HR_Dup_050615				Water	N		X			1	
10	Abiotic_4HR_Dup_050615				~~S~~ Water	N				X	1	
11	Abiotic_Control_050615		1200		Water	N		X	X	X	1	
12	Abiotic_control_050615		1200		~~S~~ Water	N				X	1	
13	Abiotic_8HR_050615		1530		Water	Y			X	X	1	HNO_3 preserved
	Abiotic_8HR_050615				Water	N		X			1	
14	Abiotic_8HR_050615				~~S~~ Water	N				X	1	
15	Abiotic_8HR_Dup_050615		1535		Water	Y			X	X	1	HNO_3 preserved.
	Abiotic_8HR_Dup_050615		1535		~~Water~~ Blk Water	N		X			1	

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:	Company	Received by:	Date/Time:	Company
Linxi Chen	05/06/15 1600	Geosyntec	Dan Roy	05-06-15 1600	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[illegible]	5.7.15 @ 0830	TAN
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: 1.0

5/28/2015

77930

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Chen Li	Lab PM: Baker, Heather	Carrier Tracking No(s):	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 805-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page ~~2 of 2~~ 3 of 3
Company: Geosyntec Consultants, Inc.				Job #:

Address: 10220 Old Columbia Road Suite A	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Columbia	TAT Requested (days):		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 - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: MD, 21046			
Phone:	PO #: Purchase Order Requested		
Email: awadhawan@geosyntec.com	WO #:		Other:
Project Name: Treatability Study	Project #: 49008518		
Site: TEL	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N		
-16 Abiotic_8HR_Dup_050615	05/06/15	1535	G	S ~~Water~~	N				X		
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							

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: Chen Li	Date/Time: 05/06/15 1600	Company: Geosyntec	Received by: [signature]	Date/Time: 05-06-15 1600	Company: TA
Relinquished by:	Date/Time:	Company	Received by: [signature]	Date/Time: 5715@0830	Company: TAN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 1.2

5/28/2015

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-77930-1

Login Number: 77930
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	1.0
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	False	Limited volume received.
Sample Preservation Verified.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-78056-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/28/2015 2:53:35 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 14
Chronicle 16
Method Summary 17
Certification Summary 18
Chain of Custody 19
Receipt Checklists 21

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-78056-1	Abiotic_24HR_05072015	Water	05/07/15 08:00	05/08/15 09:00
490-78056-2	Abiotic_24HR_05072015	Solid	05/07/15 08:00	05/08/15 09:00
490-78056-3	Abiotic_24HR_DUP_05072015	Water	05/07/15 08:05	05/08/15 09:00
490-78056-4	Abiotic_24HR_DUP_05072015	Solid	05/07/15 08:05	05/08/15 09:00

Job ID: 490-78056-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-78056-1

Comments
No additional comments.

Receipt
The samples were received on 5/8/2015 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5º C.

Except:

Method 7196A: The following samples were received outside of holding time: Abiotic_24HR_05072015 (490-78056-1) and Abiotic_24HR_DUP_05072015 (490-78056-3).

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

Metals
Method 6020: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with batch 247303.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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

Definitions/Glossary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
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.
E	Result exceeded calibration range.

Metals

Qualifier	Qualifier Description
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.
F1	MS and/or MSD Recovery is outside acceptance limits.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Client Sample ID: Abiotic_24HR_05072015

Date Collected: 05/07/15 08:00
Date Received: 05/08/15 09:00

Lab Sample ID: 490-78056-1

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.62**		0.100		mg/L			05/08/15 15:48	1
Sulfate	**3070**		10.0		mg/L			05/09/15 15:24	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.210**		0.0200		mg/L		05/11/15 11:25	05/13/15 00:16	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:16	10
Copper	**0.0871**		0.0200		mg/L		05/11/15 11:25	05/13/15 00:16	10
Iron	**813**		2.50		mg/L		05/11/15 11:25	05/12/15 23:15	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/08/15 15:31	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Client Sample ID: Abiotic_24HR_05072015
Date Collected: 05/07/15 08:00
Date Received: 05/08/15 09:00

Lab Sample ID: 490-78056-2
Matrix: Solid
Percent Solids: 79.6

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	344		3.12		mg/Kg	☼	05/12/15 13:51	05/13/15 01:33	5
Chromium	62.5		3.12		mg/Kg	☼	05/12/15 13:51	05/13/15 01:33	5
Copper	634		3.12		mg/Kg	☼	05/12/15 13:51	05/13/15 01:33	5
Iron	3960		31.2		mg/Kg	☼	05/12/15 13:51	05/13/15 01:33	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	20		0.10		%			05/27/15 15:13	1
Percent Solids	80		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Client Sample ID: Abiotic_24HR_DUP_05072015 — **Lab Sample ID: 490-78056-3**
Date Collected: 05/07/15 08:05 — **Matrix: Water**
Date Received: 05/08/15 09:00

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.73**		0.100		mg/L			05/08/15 16:28	1
Sulfate	**3240**		10.0		mg/L			05/09/15 15:44	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:21	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:21	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:21	10
Iron	**921**		2.50		mg/L		05/11/15 11:25	05/12/15 23:20	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/08/15 15:33	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Client Sample ID: Abiotic_24HR_DUP_05072015 — **Lab Sample ID: 490-78056-4**
Date Collected: 05/07/15 08:05 — **Matrix: Solid**
Date Received: 05/08/15 09:00 — **Percent Solids: 78.0**

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	786		3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:38	5
Chromium	574		3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:38	5
Copper	747		3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:38	5
Iron	4070		32.2		mg/Kg	☼	05/12/15 13:51	05/13/15 01:38	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-247022/6
Matrix: Water
Analysis Batch: 247022

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			05/08/15 14:03	1

Lab Sample ID: LCS 490-247022/7
Matrix: Water
Analysis Batch: 247022

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.25		mg/L		102	80 - 120

Lab Sample ID: LCSD 490-247022/8
Matrix: Water
Analysis Batch: 247022

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
Nitrate as N	10.0	10.20		mg/L		102	80 - 120	0	20

Lab Sample ID: 490-78075-J-4 MS
Matrix: Water
Analysis Batch: 247022

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	9.970		mg/L		100	80 - 120

Lab Sample ID: 490-78075-J-4 MSD
Matrix: Water
Analysis Batch: 247022

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	9.989		mg/L		100	80 - 120	0	20

Lab Sample ID: MB 490-247094/6
Matrix: Water
Analysis Batch: 247094

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/09/15 11:32	1

Lab Sample ID: LCS 490-247094/7
Matrix: Water
Analysis Batch: 247094

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	108.4		mg/L		108	80 - 120

Lab Sample ID: LCSD 490-247094/8
Matrix: Water
Analysis Batch: 247094

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
Sulfate	100	106.7		mg/L		107	80 - 120	2	20

Lab Sample ID: 490-78158-A-1 MS
Matrix: Water
Analysis Batch: 247094

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	2290	E	100	1965	E 4	mg/L		-330	80 - 120

Lab Sample ID: 490-78158-A-1 MSD
Matrix: Water
Analysis Batch: 247094

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	2290	E	100	1984	E 4	mg/L		-311	80 - 120	1	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-247657/1-A
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 247657

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Chromium	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Copper	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Iron	ND		5.00		mg/Kg		05/12/15 13:51	05/13/15 00:52	1

Lab Sample ID: LCS 490-247657/2-A
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.5	18.21		mg/Kg		93	80 - 120
Chromium	19.5	19.71		mg/Kg		101	80 - 120
Copper	19.5	19.57		mg/Kg		100	80 - 120
Iron	195	205.7		mg/Kg		106	80 - 120

Lab Sample ID: 490-78158-A-2-B MS
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	334		25.2	443.8	4	mg/Kg	☼	436	75 - 125
Chromium	62.2	F1	25.2	104.1	F1	mg/Kg	☼	167	75 - 125
Copper	403		25.2	717.3	4	mg/Kg	☼	1251	75 - 125
Iron	3550		252	4718	4	mg/Kg	☼	466	75 - 125

Lab Sample ID: 490-78158-A-2-C MSD
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	334		25.7	456.9	4	mg/Kg	☼	478	75 - 125	3	20
Chromium	62.2	F1	25.7	110.9	F1	mg/Kg	☼	190	75 - 125	6	20
Copper	403		25.7	634.9	4	mg/Kg	☼	905	75 - 125	12	20
Iron	3550		257	4473	4	mg/Kg	☼	361	75 - 125	5	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-247303/1-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Chromium	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Copper	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Iron	ND		0.0250		mg/L		05/11/15 11:25	05/12/15 10:47	1

Lab Sample ID: LCS 490-247303/2-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1065		mg/L		107	80 - 120
Chromium	0.100	0.1078		mg/L		108	80 - 120
Copper	0.100	0.1019		mg/L		102	80 - 120
Iron	1.00	1.015		mg/L		102	80 - 120

Lab Sample ID: LCSD 490-247303/3-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.1052		mg/L		105	80 - 120	1	20
Chromium	0.100	0.1064		mg/L		106	80 - 120	1	20
Copper	0.100	0.1000		mg/L		100	80 - 120	2	20
Iron	1.00	1.023		mg/L		102	80 - 120	1	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-247899/1
Matrix: Water
Analysis Batch: 247899

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/08/15 11:20	1

Lab Sample ID: LCS 490-247899/2
Matrix: Water
Analysis Batch: 247899

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1070		mg/L		107	85 - 115

Lab Sample ID: 490-78056-1 MS
Matrix: Water
Analysis Batch: 247899

Client Sample ID: Abiotic_24HR_05072015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND	H	0.100	0.09900		mg/L		90	85 - 115

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 490-78056-1 MSD
Matrix: Water
Analysis Batch: 247899

Client Sample ID: Abiotic_24HR_05072015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	H	0.100	0.09900		mg/L		90	85 - 115	0	20

Lab Sample ID: 490-78056-1 DU
Matrix: Water
Analysis Batch: 247899

Client Sample ID: Abiotic_24HR_05072015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hex	ND	H	ND		mg/L		NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-A-4 DU
Matrix: Solid
Analysis Batch: 251326

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	27		27		%		0	20
Percent Solids	73		73		%		0	20

HPLC/IC

Analysis Batch: 247022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-1	Abiotic_24HR_05072015	Total/NA	Water	9056	
490-78056-3	Abiotic_24HR_DUP_05072015	Total/NA	Water	9056	
490-78075-J-4 MS	Matrix Spike	Total/NA	Water	9056	
490-78075-J-4 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-247022/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-247022/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-247022/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 247094

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-1	Abiotic_24HR_05072015	Total/NA	Water	9056	
490-78056-3	Abiotic_24HR_DUP_05072015	Total/NA	Water	9056	
490-78158-A-1 MS	Matrix Spike	Total/NA	Water	9056	
490-78158-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-247094/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-247094/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-247094/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 247303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-1	Abiotic_24HR_05072015	Dissolved	Water	3005A	
490-78056-3	Abiotic_24HR_DUP_05072015	Dissolved	Water	3005A	
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 247656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	6020	247303
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	6020	247303
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	6020	247303

Prep Batch: 247657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-2	Abiotic_24HR_05072015	Total/NA	Solid	3051A	
490-78056-4	Abiotic_24HR_DUP_05072015	Total/NA	Solid	3051A	
490-78158-A-2-B MS	Matrix Spike	Total/NA	Solid	3051A	
490-78158-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
LCS 490-247657/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-247657/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 247865

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-1	Abiotic_24HR_05072015	Dissolved	Water	6020	247303
490-78056-1	Abiotic_24HR_05072015	Dissolved	Water	6020	247303
490-78056-2	Abiotic_24HR_05072015	Total/NA	Solid	6020	247657
490-78056-3	Abiotic_24HR_DUP_05072015	Dissolved	Water	6020	247303
490-78056-3	Abiotic_24HR_DUP_05072015	Dissolved	Water	6020	247303

Metals (Continued)

Analysis Batch: 247865 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-4	Abiotic_24HR_DUP_05072015	Total/NA	Solid	6020	247657
490-78158-A-2-B MS	Matrix Spike	Total/NA	Solid	6020	247657
490-78158-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	247657
LCS 490-247657/2-A	Lab Control Sample	Total/NA	Solid	6020	247657
MB 490-247657/1-A	Method Blank	Total/NA	Solid	6020	247657

General Chemistry

Analysis Batch: 247899

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78056-1	Abiotic_24HR_05072015	Dissolved	Water	7196A	
490-78056-1 DU	Abiotic_24HR_05072015	Dissolved	Water	7196A	
490-78056-1 MS	Abiotic_24HR_05072015	Dissolved	Water	7196A	
490-78056-1 MSD	Abiotic_24HR_05072015	Dissolved	Water	7196A	
490-78056-3	Abiotic_24HR_DUP_05072015	Dissolved	Water	7196A	
LCS 490-247899/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-247899/1	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-A-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-78056-2	Abiotic_24HR_05072015	Total/NA	Solid	Moisture	
490-78056-4	Abiotic_24HR_DUP_05072015	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Client Sample ID: Abiotic_24HR_05072015
Lab Sample ID: 490-78056-1
Date Collected: 05/07/15 08:00
Matrix: Water
Date Received: 05/08/15 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		247022	05/08/15 15:48	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247094	05/09/15 15:24	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:15	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:16	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247899	05/08/15 15:31	BLM	TAL NSH

Client Sample ID: Abiotic_24HR_05072015
Lab Sample ID: 490-78056-2
Date Collected: 05/07/15 08:00
Matrix: Solid
Date Received: 05/08/15 09:00
Percent Solids: 79.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.504 g	100 mL	247657	05/12/15 13:51	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.504 g	100 mL	247865	05/13/15 01:33	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_24HR_DUP_05072015
Lab Sample ID: 490-78056-3
Date Collected: 05/07/15 08:05
Matrix: Water
Date Received: 05/08/15 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		247022	05/08/15 16:28	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247094	05/09/15 15:44	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:20	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:21	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247899	05/08/15 15:33	BLM	TAL NSH

Client Sample ID: Abiotic_24HR_DUP_05072015
Lab Sample ID: 490-78056-4
Date Collected: 05/07/15 08:05
Matrix: Solid
Date Received: 05/08/15 09:00
Percent Solids: 78.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.498 g	100 mL	247657	05/12/15 13:51	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.498 g	100 mL	247865	05/13/15 01:38	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Laboratory References:
TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78056-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-78056 Chain of Custody

Cooler Received/Opened On 5/8/2015 @ 900

1. Tracking # 2761 (last 4 digits, FedEx)

Courier: Fed-ex IR Gun ID 17960358

2. Temperature of rep. sample or temp blank when opened: 1.5 Degrees Celsius

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: Front

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) EZA

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) ADH

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) ADH

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) ADH

I certify that I attached a label with the unique LIMS number to each container (intial) ADH

21. Were there Non-Conformance issues at login? YES...NO Was a PIPE generated? YES...NO...#_____

ADH 5/8/15 ADH 5/8/15

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 6/24/09

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Linxi Chen	Lab PM: Baker, Heather	Carrier Tracking No(s):	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page 1 ~~of 7~~ 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:
Address: 10220 Old Columbia Road Suite A	Due Date Requested:			
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
Site: TEL	SSOW#:			

Analysis Requested

Loc: 490
78056

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N		
Abiotic_24HR_050715	05/07/15	0800	G	Water	Y			X	X		HNO_3 preserved
Abiotic-24HR-050715		0800		Water	N		X				
Abiotic_24HR_050715		0800		~~Water~~ S	N				X		
Abiotic_24HR_Dup_050715		0805		Water	Y			X	X		HNO_3 preserved
Abiotic-24HR-Dup-050715				Water	N		X				
Abiotic-24HR-Dup-050715				~~Water~~ S	N				X		
				Water							
				Water							
				Water							
				Water							
				Water							

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:	Company	Received by:	Date/Time:	Company
Chen Linxi 5/7	05/7/15 1330	Geosyntec		05-07-15 1330	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
				05/08/15 900	TAL
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: 1.5

5/28/2015

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-78056-1

Login Number: 78056
List Number: 1
Creator: Huskey, Adam

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	False	
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.	False	Limited volume received.
Sample Preservation Verified.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-78158-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/28/2015 2:59:48 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 14
Chronicle 16
Method Summary 17
Certification Summary 18
Chain of Custody 19
Receipt Checklists 21

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-78158-1	Abiotic_48HR_050815	Water	05/08/15 08:15	05/09/15 08:30
490-78158-2	Abiotic_48HR_050815	Solid	05/08/15 08:15	05/09/15 08:30
490-78158-3	Abiotic_48HR_DUP_050815	Water	05/08/15 08:25	05/09/15 08:30
490-78158-4	Abiotic_48HR_DUP_050815	Solid	05/08/15 08:25	05/09/15 08:30

Job ID: 490-78158-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-78158-1

Comments
No additional comments.

Receipt
The samples were received on 5/9/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.6º C.

Except:

Method 7196A: The following samples were received outside of holding time: Abiotic_48HR_050815 (490-78158-1) and Abiotic_48HR_DUP_050815 (490-78158-3).

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

Metals
Method 6020: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with 247303.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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

Definitions/Glossary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
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.
E	Result exceeded calibration range.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance 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.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Client Sample ID: Abiotic_48HR_050815
Date Collected: 05/08/15 08:15
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.36**		0.100		mg/L			05/09/15 13:24	1
Sulfate	**3170**		10.0		mg/L			05/09/15 14:24	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.148**		0.0200		mg/L		05/11/15 11:25	05/13/15 00:26	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:26	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:26	10
Iron	**882**		2.50		mg/L		05/11/15 11:25	05/12/15 23:25	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/09/15 11:45	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Client Sample ID: Abiotic_48HR_050815
Date Collected: 05/08/15 08:15
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-2
Matrix: Solid
Percent Solids: 78.3

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	334		3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:02	5
Chromium	62.2	F1	3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:02	5
Copper	403		3.22		mg/Kg	☼	05/12/15 13:51	05/13/15 01:02	5
Iron	3550		32.2		mg/Kg	☼	05/12/15 13:51	05/13/15 01:02	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Client Sample ID: Abiotic_48HR_DUP_050815
Date Collected: 05/08/15 08:25
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.43**		0.100		mg/L			05/09/15 14:44	1
Sulfate	**3140**		10.0		mg/L			05/09/15 15:04	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:31	10
Chromium	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:31	10
Copper	ND		0.0200		mg/L		05/11/15 11:25	05/13/15 00:31	10
Iron	**893**		2.50		mg/L		05/11/15 11:25	05/12/15 23:40	100

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/09/15 11:47	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Client Sample ID: Abiotic_48HR_DUP_050815
Date Collected: 05/08/15 08:25
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-4
Matrix: Solid
Percent Solids: 78.1

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	746		3.09		mg/Kg	☼	05/12/15 13:51	05/13/15 01:28	5
Chromium	194		3.09		mg/Kg	☼	05/12/15 13:51	05/13/15 01:28	5
Copper	1280		3.09		mg/Kg	☼	05/12/15 13:51	05/13/15 01:28	5
Iron	5910		30.9		mg/Kg	☼	05/12/15 13:51	05/13/15 01:28	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-247094/6
Matrix: Water
Analysis Batch: 247094

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/09/15 11:32	1

Lab Sample ID: LCS 490-247094/7
Matrix: Water
Analysis Batch: 247094

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	108.4		mg/L		108	80 - 120

Lab Sample ID: LCSD 490-247094/8
Matrix: Water
Analysis Batch: 247094

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
Sulfate	100	106.7		mg/L		107	80 - 120	2	20

Lab Sample ID: 490-78158-A-1 MS
Matrix: Water
Analysis Batch: 247094

Client Sample ID: 490-78158-A-1 MS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	2290	E	100	1965	E 4	mg/L		-330	80 - 120

Lab Sample ID: 490-78158-A-1 MSD
Matrix: Water
Analysis Batch: 247094

Client Sample ID: 490-78158-A-1 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	2290	E	100	1984	E 4	mg/L		-311	80 - 120	1	20

Lab Sample ID: MB 490-247095/6
Matrix: Water
Analysis Batch: 247095

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			05/09/15 11:32	1

Lab Sample ID: LCS 490-247095/7
Matrix: Water
Analysis Batch: 247095

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.51		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-247095/8
Matrix: Water
Analysis Batch: 247095

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
Nitrate as N	10.0	10.37		mg/L		104	80 - 120	1	20

Lab Sample ID: 490-78158-A-1 MS
Matrix: Water
Analysis Batch: 247095

Client Sample ID: Abiotic_48HR_050815
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	1.36		10.0	11.94		mg/L		106	80 - 120

Lab Sample ID: 490-78158-A-1 MSD
Matrix: Water
Analysis Batch: 247095

Client Sample ID: Abiotic_48HR_050815
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	1.36		10.0	11.90		mg/L		105	80 - 120	0	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-247657/1-A
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 247657

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Chromium	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Copper	ND		0.500		mg/Kg		05/12/15 13:51	05/13/15 00:52	1
Iron	ND		5.00		mg/Kg		05/12/15 13:51	05/13/15 00:52	1

Lab Sample ID: LCS 490-247657/2-A
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.5	18.21		mg/Kg		93	80 - 120
Chromium	19.5	19.71		mg/Kg		101	80 - 120
Copper	19.5	19.57		mg/Kg		100	80 - 120
Iron	195	205.7		mg/Kg		106	80 - 120

Lab Sample ID: 490-78158-2 MS
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Abiotic_48HR_050815
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	334		25.2	443.8	4	mg/Kg	☼	436	75 - 125
Chromium	62.2	F1	25.2	104.1	F1	mg/Kg	☼	167	75 - 125
Copper	403		25.2	717.3	4	mg/Kg	☼	1251	75 - 125
Iron	3550		252	4718	4	mg/Kg	☼	466	75 - 125

Lab Sample ID: 490-78158-2 MSD
Matrix: Solid
Analysis Batch: 247865

Client Sample ID: Abiotic_48HR_050815
Prep Type: Total/NA
Prep Batch: 247657

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	334		25.7	456.9	4	mg/Kg	☼	478	75 - 125	3	20
Chromium	62.2	F1	25.7	110.9	F1	mg/Kg	☼	190	75 - 125	6	20
Copper	403		25.7	634.9	4	mg/Kg	☼	905	75 - 125	12	20
Iron	3550		257	4473	4	mg/Kg	☼	361	75 - 125	5	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-247303/1-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Chromium	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Copper	ND		0.00200		mg/L		05/11/15 11:25	05/12/15 10:47	1
Iron	ND		0.0250		mg/L		05/11/15 11:25	05/12/15 10:47	1

Lab Sample ID: LCS 490-247303/2-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			0.100	0.1065		mg/L		107	80 - 120		
Chromium			0.100	0.1078		mg/L		108	80 - 120		
Copper			0.100	0.1019		mg/L		102	80 - 120		
Iron			1.00	1.015		mg/L		102	80 - 120		

Lab Sample ID: LCSD 490-247303/3-A
Matrix: Water
Analysis Batch: 247656

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 247303

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			0.100	0.1052		mg/L		105	80 - 120	1	20
Chromium			0.100	0.1064		mg/L		106	80 - 120	1	20
Copper			0.100	0.1000		mg/L		100	80 - 120	2	20
Iron			1.00	1.023		mg/L		102	80 - 120	1	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: 490-78156-A-3 MS
Matrix: Water
Analysis Batch: 247958

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.09100		mg/L		91	85 - 115		

Lab Sample ID: 490-78156-A-3 MSD
Matrix: Water
Analysis Batch: 247958

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.09100		mg/L		91	85 - 115	0	20

Lab Sample ID: 490-78156-A-3 DU
Matrix: Water
Analysis Batch: 247958

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND		ND		mg/L				NC	20

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: MB 490-247950/1-A
Matrix: Water
Analysis Batch: 247958

Client Sample ID: Method Blank
Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/09/15 11:44	1

Lab Sample ID: LCS 490-247950/2-A
Matrix: Water
Analysis Batch: 247958

Client Sample ID: Lab Control Sample
Prep Type: Dissolved

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.1090		mg/L		109	85 - 115		

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-A-4 DU
Matrix: Solid
Analysis Batch: 251326

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	27			27		%				0	20
Percent Solids	73			73		%				0	20

HPLC/IC

Analysis Batch: 247094

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-1	Abiotic_48HR_050815	Total/NA	Water	9056	
490-78158-3	Abiotic_48HR_DUP_050815	Total/NA	Water	9056	
490-78158-A-1 MS	490-78158-A-1 MS	Total/NA	Water	9056	
490-78158-A-1 MSD	490-78158-A-1 MSD	Total/NA	Water	9056	
LCS 490-247094/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-247094/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-247094/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 247095

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-1	Abiotic_48HR_050815	Total/NA	Water	9056	
490-78158-3	Abiotic_48HR_DUP_050815	Total/NA	Water	9056	
490-78158-A-1 MS	Abiotic_48HR_050815	Total/NA	Water	9056	
490-78158-A-1 MSD	Abiotic_48HR_050815	Total/NA	Water	9056	
LCS 490-247095/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-247095/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-247095/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 247303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-1	Abiotic_48HR_050815	Dissolved	Water	3005A	
490-78158-3	Abiotic_48HR_DUP_050815	Dissolved	Water	3005A	
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 247656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 490-247303/2-A	Lab Control Sample	Total Recoverable	Water	6020	247303
LCSD 490-247303/3-A	Lab Control Sample Dup	Total Recoverable	Water	6020	247303
MB 490-247303/1-A	Method Blank	Total Recoverable	Water	6020	247303

Prep Batch: 247657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-2	Abiotic_48HR_050815	Total/NA	Solid	3051A	
490-78158-2 MS	Abiotic_48HR_050815	Total/NA	Solid	3051A	
490-78158-2 MSD	Abiotic_48HR_050815	Total/NA	Solid	3051A	
490-78158-4	Abiotic_48HR_DUP_050815	Total/NA	Solid	3051A	
LCS 490-247657/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-247657/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 247865

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-1	Abiotic_48HR_050815	Dissolved	Water	6020	247303
490-78158-1	Abiotic_48HR_050815	Dissolved	Water	6020	247303
490-78158-2	Abiotic_48HR_050815	Total/NA	Solid	6020	247657
490-78158-2 MS	Abiotic_48HR_050815	Total/NA	Solid	6020	247657
490-78158-2 MSD	Abiotic_48HR_050815	Total/NA	Solid	6020	247657

Metals (Continued)

Analysis Batch: 247865 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-3	Abiotic_48HR_DUP_050815	Dissolved	Water	6020	247303
490-78158-3	Abiotic_48HR_DUP_050815	Dissolved	Water	6020	247303
490-78158-4	Abiotic_48HR_DUP_050815	Total/NA	Solid	6020	247657
LCS 490-247657/2-A	Lab Control Sample	Total/NA	Solid	6020	247657
MB 490-247657/1-A	Method Blank	Total/NA	Solid	6020	247657

General Chemistry

Filtration Batch: 247950

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78158-1	Abiotic_48HR_050815	Dissolved	Water	Filtration	
490-78158-3	Abiotic_48HR_DUP_050815	Dissolved	Water	Filtration	
LCS 490-247950/2-A	Lab Control Sample	Dissolved	Water	Filtration	
MB 490-247950/1-A	Method Blank	Dissolved	Water	Filtration	

Analysis Batch: 247958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78156-A-3 DU	Duplicate	Total/NA	Water	7196A	
490-78156-A-3 MS	Matrix Spike	Total/NA	Water	7196A	
490-78156-A-3 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
490-78158-1	Abiotic_48HR_050815	Dissolved	Water	7196A	247950
490-78158-3	Abiotic_48HR_DUP_050815	Dissolved	Water	7196A	247950
LCS 490-247950/2-A	Lab Control Sample	Dissolved	Water	7196A	247950
MB 490-247950/1-A	Method Blank	Dissolved	Water	7196A	247950

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-A-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-78158-2	Abiotic_48HR_050815	Total/NA	Solid	Moisture	
490-78158-4	Abiotic_48HR_DUP_050815	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Client Sample ID: Abiotic_48HR_050815
Date Collected: 05/08/15 08:15
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-1
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	9056		1	10 mL		247095	05/09/15 13:24	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247094	05/09/15 14:24	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:25	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:26	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247958	05/09/15 11:45	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	247950	05/09/15 11:45	BLM	TAL NSH

Client Sample ID: Abiotic_48HR_050815
Date Collected: 05/08/15 08:15
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-2
Matrix: Solid
Percent Solids: 78.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.496 g	100 mL	247657	05/12/15 13:51	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.496 g	100 mL	247865	05/13/15 01:02	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_48HR_DUP_050815
Date Collected: 05/08/15 08:25
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-3
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	9056		1	10 mL		247095	05/09/15 14:44	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		247094	05/09/15 15:04	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	247865	05/12/15 23:40	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	247303	05/11/15 11:25	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	247865	05/13/15 00:31	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	247958	05/09/15 11:47	BLM	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	247950	05/09/15 11:47	BLM	TAL NSH

Client Sample ID: Abiotic_48HR_DUP_050815
Date Collected: 05/08/15 08:25
Date Received: 05/09/15 08:30

Lab Sample ID: 490-78158-4
Matrix: Solid
Percent Solids: 78.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.518 g	100 mL	247657	05/12/15 13:51	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.518 g	100 mL	247865	05/13/15 01:28	CME	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Laboratory References:
TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78158-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-78158 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 5/9/2015 @ 0830

1. Tracking # 2820 (last 4 digits, FedEx)

Courier: Fed-ex IR Gun ID 97310166

2. Temperature of rep. sample or temp blank when opened: 2.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO..(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) _____

7. Were custody seals on containers: YES (NO) and Intact YES...NO..(NA)

Were these signed and dated correctly? YES...NO..(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES..(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES...NO..(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) mbm

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO..(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) mbm

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO...NA mbm 5.9.15

I certify that I entered this project into LIMS and answered questions 17-20 (intial) mbm

I certify that I attached a label with the unique LIMS number to each container (intial) mbm

21. Were there Non-Conformance issues at login? YES..(NO) Was a NCM generated? YES..(NO)..#_____

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
78158

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

5/28/2015

Client Information	Sampler: Lixi Chen	Lab PM: Baker, Heather	Carrie	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0087	E-Mail: heather.baker@testamericainc.com		Page: Page ~~1 of 7~~ 1 of 1
Company: Geosyntec Consultants, Inc.				Job #:

Address: 10220 Old Columbia Road Suite A	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Columbia	TAT Requested (days):		A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2SO3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - ph 4-5 L - EDA Z - other (specify) Other:
State, Zip: MD, 21046			
Phone:	PO #: Purchase Order Requested		
Email: awadhawan@geosyntec.com	WO #:		
Project Name: Treatability Study	Project #: 49008518		
Site: TEL	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N		
Abiotic - 48 HR - 050815	05/08/15	0815	G	Water	Y			X	X	1	HNO3 preserved
Abiotic - 48 HR - 050815	↓	↓	↓	Water	N		X			1	
Abiotic - 48 HR - 050815	↓	↓	↓	~~Water~~ S	N				X	1	
Abiotic - 48 HR - Dup - 050815	↓	0825	↓	Water	Y			X	X	1	HNO3 preserved
Abiotic - 48 HR - Dup - 050815	↓	↓	↓	Water	N		X			1	
Abiotic - 48 HR - Dup - 050815	↓	↓	↓	~~Water~~ S	N				X	1	
				Water							
				Water							
				Water							
				Water							
				Water							

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:	Company	Received by:	Date/Time:	Company
Chen Li	05/08/15 0830	Geosyntec	[signature]	05-08-15 1200	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
			[signature]	5.9.15 @ 0830	TAN
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: 2.6c

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-78158-1

Login Number: 78158
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	2.6
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	False	Refer to Job Narrative for details.
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.	False	Limited volume received.
Sample Preservation Verified.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-78405-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
5/29/2015 11:15:57 AM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 16
QC Association 21
Chronicle 24
Method Summary 27
Certification Summary 28
Chain of Custody 29
Receipt Checklists 32

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-78405-1	Abiotic_Day 7_051315	Water	05/13/15 08:35	05/14/15 08:30
490-78405-2	Abiotic_Day 7_051315	Solid	05/13/15 08:35	05/14/15 08:30
490-78405-3	Abiotic_Day 7_Dup_051315	Water	05/13/15 08:45	05/14/15 08:30
490-78405-4	Abiotic_Day 7_Dup_051315	Solid	05/13/15 08:45	05/14/15 08:30
490-78405-5	Abiotic Control_051315	Water	05/13/15 12:00	05/14/15 08:30
490-78405-6	Abiotic Control_051315	Solid	05/13/15 12:00	05/14/15 08:30
490-78405-7	Biotic_051315	Water	05/13/15 12:15	05/14/15 08:30
490-78405-8	Biotic_051315	Solid	05/13/15 12:15	05/14/15 08:30
490-78405-9	Biotic_Dup_051315	Water	05/13/15 12:25	05/14/15 08:30
490-78405-10	Biotic_Dup_051315	Solid	05/13/15 12:25	05/14/15 08:30

Job ID: 490-78405-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-78405-1

Comments
No additional comments.

Receipt
The samples were received on 5/14/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.6º C.

Receipt Exceptions

Method 7196A: The following samples were received outside of holding time: Abiotic_Day 7_051315 (490-78405-1) and Abiotic_Day 7_Dup_051315 (490-78405-3).

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

Metals
Method 6020: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with batch 249411.

Method 6020: The solid samples were not homgeneous based on field duplicate and matrix spike/matrix spike duplicate (MS/MSD) results.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 490-248611 and analytical batch 490-248616 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 7196A: The following sample was received with insufficient holding time remaining to analyze the sample within the 24 hour holding time: Abiotic Control_051315 (490-78405-5).

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

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

Qualifiers

Metals

Qualifier	Qualifier Description
F2	MS/MSD RPD exceeds control limits
F1	MS and/or MSD Recovery is outside acceptance 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.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic_Day 7_051315
Date Collected: 05/13/15 08:35
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.09		0.100		mg/L			05/14/15 13:48	1
Sulfate	3130		10.0		mg/L			05/14/15 14:07	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0271		0.00200		mg/L		05/14/15 16:06	05/22/15 12:51	1
Chromium	ND		0.00200		mg/L		05/14/15 16:06	05/22/15 12:51	1
Copper	0.00835		0.00200		mg/L		05/14/15 16:06	05/22/15 12:51	1
Iron	828		0.250		mg/L		05/14/15 16:06	05/22/15 12:20	10

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H F1	10.0		mg/L			05/14/15 10:58	1000

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic_Day 7_051315
Date Collected: 05/13/15 08:35
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-2
Matrix: Solid
Percent Solids: 79.3

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	311	F2	0.605		mg/Kg	☼	05/14/15 11:13	05/18/15 21:23	1
Chromium	62.6	F1 F2	0.605		mg/Kg	☼	05/14/15 11:13	05/18/15 21:23	1
Copper	459	F2	0.605		mg/Kg	☼	05/14/15 11:13	05/18/15 21:23	1
Iron	3110		6.05		mg/Kg	☼	05/14/15 11:13	05/18/15 21:23	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			05/27/15 15:13	1
Percent Solids	79		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic_Day 7_Dup_051315
Date Collected: 05/13/15 08:45
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.14**		0.100		mg/L			05/14/15 14:26	1
Sulfate	**3150**		10.0		mg/L			05/14/15 14:45	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0227**		0.0100		mg/L		05/14/15 16:06	05/22/15 12:10	5
Chromium	ND		0.0100		mg/L		05/14/15 16:06	05/22/15 12:10	5
Copper	ND		0.0100		mg/L		05/14/15 16:06	05/22/15 12:10	5
Iron	**739**		1.25		mg/L		05/14/15 16:06	05/22/15 12:15	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/14/15 11:00	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic_Day 7_Dup_051315
Date Collected: 05/13/15 08:45
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-4
Matrix: Solid
Percent Solids: 78.6

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	400		0.624		mg/Kg	☼	05/14/15 11:13	05/18/15 21:51	1
Chromium	73.3		0.624		mg/Kg	☼	05/14/15 11:13	05/18/15 21:51	1
Copper	451		0.624		mg/Kg	☼	05/14/15 11:13	05/18/15 21:51	1
Iron	3690		6.24		mg/Kg	☼	05/14/15 11:13	05/18/15 21:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			05/27/15 15:13	1
Percent Solids	79		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic Control_051315

Lab Sample ID: 490-78405-5

Date Collected: 05/13/15 12:00

Matrix: Water

Date Received: 05/14/15 08:30

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.16**		0.100		mg/L			05/14/15 15:04	1
Sulfate	**9.05**		1.00		mg/L			05/14/15 15:04	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**4.86**		0.0100		mg/L		05/19/15 10:45	05/22/15 11:04	5
Chromium	**0.0407**		0.0100		mg/L		05/19/15 10:45	05/22/15 11:04	5
Copper	**0.293**		0.0100		mg/L		05/19/15 10:45	05/22/15 11:04	5
Iron	ND		0.125		mg/L		05/19/15 10:45	05/22/15 11:04	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/14/15 11:08	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Abiotic Control_051315
Date Collected: 05/13/15 12:00
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-6
Matrix: Solid
Percent Solids: 77.8

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	221		0.646		mg/Kg	☼	05/14/15 11:13	05/18/15 21:57	1
Chromium	46.0		0.646		mg/Kg	☼	05/14/15 11:13	05/18/15 21:57	1
Copper	293		0.646		mg/Kg	☼	05/14/15 11:13	05/18/15 21:57	1
Iron	1620		6.46		mg/Kg	☼	05/14/15 11:13	05/18/15 21:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Biotic_051315
Date Collected: 05/13/15 12:15
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-7
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.23		0.100		mg/L			05/14/15 16:01	1
Sulfate	2810		10.0		mg/L			05/14/15 16:20	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00493		0.00200		mg/L		05/14/15 16:06	05/22/15 12:05	1
Chromium	ND		0.00200		mg/L		05/14/15 16:06	05/22/15 12:05	1
Copper	0.694		0.00200		mg/L		05/14/15 16:06	05/22/15 12:05	1
Iron	98.8		0.0250		mg/L		05/14/15 16:06	05/22/15 12:05	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/14/15 11:02	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Biotic_051315
Date Collected: 05/13/15 12:15
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-8
Matrix: Solid
Percent Solids: 77.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	249		0.612		mg/Kg	☼	05/14/15 11:13	05/18/15 22:02	1
Chromium	45.6		0.612		mg/Kg	☼	05/14/15 11:13	05/18/15 22:02	1
Copper	305		0.612		mg/Kg	☼	05/14/15 11:13	05/18/15 22:02	1
Iron	5020		6.12		mg/Kg	☼	05/14/15 11:13	05/18/15 22:02	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			05/27/15 15:13	1
Percent Solids	78		0.10		%			05/27/15 15:13	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Biotic_Dup_051315
Date Collected: 05/13/15 12:25
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-9
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.14		0.100		mg/L			05/14/15 16:39	1
Sulfate	2820		10.0		mg/L			05/14/15 16:59	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0100		mg/L		05/14/15 16:06	05/22/15 12:00	5
Chromium	ND		0.0100		mg/L		05/14/15 16:06	05/22/15 12:00	5
Copper	0.273		0.0100		mg/L		05/14/15 16:06	05/22/15 12:00	5
Iron	204		0.125		mg/L		05/14/15 16:06	05/22/15 12:00	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/14/15 11:03	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Biotic_Dup_051315
Date Collected: 05/13/15 12:25
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-10
Matrix: Solid
Percent Solids: 79.3

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1400		6.20		mg/Kg	☼	05/14/15 11:13	05/19/15 10:36	10
Chromium	88.9		0.620		mg/Kg	☼	05/14/15 11:13	05/18/15 22:19	1
Copper	1700		6.20		mg/Kg	☼	05/14/15 11:13	05/19/15 10:36	10
Iron	12600		6.20		mg/Kg	☼	05/14/15 11:13	05/18/15 22:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			05/27/15 15:13	1
Percent Solids	79		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-248546/6
Matrix: Water
Analysis Batch: 248546

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/14/15 12:50	1

Lab Sample ID: LCS 490-248546/7
Matrix: Water
Analysis Batch: 248546

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	94.67		mg/L		95	80 - 120

Lab Sample ID: LCSD 490-248546/8
Matrix: Water
Analysis Batch: 248546

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
Sulfate	100	95.07		mg/L		95	80 - 120	0	20

Lab Sample ID: 490-78405-5 MS
Matrix: Water
Analysis Batch: 248546

Client Sample ID: Abiotic Control_051315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	9.05		100	100.9		mg/L		92	80 - 120

Lab Sample ID: 490-78405-5 MSD
Matrix: Water
Analysis Batch: 248546

Client Sample ID: Abiotic Control_051315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	9.05		100	100.6		mg/L		92	80 - 120	0	20

Lab Sample ID: MB 490-248547/6
Matrix: Water
Analysis Batch: 248547

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			05/14/15 12:50	1

Lab Sample ID: LCS 490-248547/7
Matrix: Water
Analysis Batch: 248547

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.110		mg/L		91	80 - 120

Lab Sample ID: LCSD 490-248547/8
Matrix: Water
Analysis Batch: 248547

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
Nitrate as N	10.0	9.099		mg/L		91	80 - 120	0	20

Lab Sample ID: 490-78405-5 MS
Matrix: Water
Analysis Batch: 248547

Client Sample ID: Abiotic Control_051315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	1.16		10.0	9.947		mg/L		88	80 - 120

Lab Sample ID: 490-78405-5 MSD
Matrix: Water
Analysis Batch: 248547

Client Sample ID: Abiotic Control_051315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	1.16		10.0	9.994		mg/L		88	80 - 120	0	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-248268/1-A
Matrix: Solid
Analysis Batch: 249316

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 248268

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.487		mg/Kg		05/14/15 11:13	05/18/15 21:12	1
Chromium	ND		0.487		mg/Kg		05/14/15 11:13	05/18/15 21:12	1
Copper	ND		0.487		mg/Kg		05/14/15 11:13	05/18/15 21:12	1
Iron	ND		4.87		mg/Kg		05/14/15 11:13	05/18/15 21:12	1

Lab Sample ID: LCS 490-248268/2-A
Matrix: Solid
Analysis Batch: 249316

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 248268

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.7	17.09		mg/Kg		87	80 - 120
Chromium	19.7	18.27		mg/Kg		93	80 - 120
Copper	19.7	17.56		mg/Kg		89	80 - 120
Iron	197	194.9		mg/Kg		99	80 - 120

Lab Sample ID: 490-78405-2 MS
Matrix: Solid
Analysis Batch: 249316

Client Sample ID: Abiotic_Day 7_051315
Prep Type: Total/NA
Prep Batch: 248268

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	311	F2	24.7	565.9	4	mg/Kg	☼	1032	75 - 125
Chromium	62.6	F1 F2	24.7	428.4	F1	mg/Kg	☼	1482	75 - 125
Copper	459	F2	24.7	651.7	4	mg/Kg	☼	781	75 - 125
Iron	3110		247	3919	4	mg/Kg	☼	330	75 - 125

Lab Sample ID: 490-78405-2 MSD
Matrix: Solid
Analysis Batch: 249316

Client Sample ID: Abiotic_Day 7_051315
Prep Type: Total/NA
Prep Batch: 248268

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	311	F2	25.3	395.2	4 F2	mg/Kg	☼	332	75 - 125	36	20
Chromium	62.6	F1 F2	25.3	119.0	F1 F2	mg/Kg	☼	223	75 - 125	113	20
Copper	459	F2	25.3	385.4	4 F2	mg/Kg	☼	-291	75 - 125	51	20
Iron	3110		253	3492	4	mg/Kg	☼	153	75 - 125	12	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-248409/1-A
Matrix: Water
Analysis Batch: 249687

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 248409

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/14/15 16:06	05/19/15 17:34	1
Chromium	ND		0.00200		mg/L		05/14/15 16:06	05/19/15 17:34	1
Copper	ND		0.00200		mg/L		05/14/15 16:06	05/19/15 17:34	1
Iron	ND		0.0250		mg/L		05/14/15 16:06	05/19/15 17:34	1

Lab Sample ID: LCS 490-248409/2-A
Matrix: Water
Analysis Batch: 249687

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 248409

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1003		mg/L		100	80 - 120
Chromium	0.100	0.1024		mg/L		102	80 - 120
Copper	0.100	0.09527		mg/L		95	80 - 120
Iron	1.00	1.092		mg/L		109	80 - 120

Lab Sample ID: 490-78368-A-1-B MS
Matrix: Water
Analysis Batch: 249687

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 248409

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.1009		mg/L		101	75 - 125
Chromium	ND		0.100	0.1029		mg/L		103	75 - 125
Copper	ND		0.100	0.09580		mg/L		95	75 - 125
Iron	ND		1.00	1.095		mg/L		108	75 - 125

Lab Sample ID: 490-78368-A-1-C MSD
Matrix: Water
Analysis Batch: 249687

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 248409

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.09822		mg/L		98	75 - 125	3	20
Chromium	ND		0.100	0.1005		mg/L		101	75 - 125	2	20
Copper	ND		0.100	0.09528		mg/L		94	75 - 125	1	20
Iron	ND		1.00	1.066		mg/L		105	75 - 125	3	20

Lab Sample ID: MB 490-249403/1-B
Matrix: Water
Analysis Batch: 250589

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 249411

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/19/15 10:45	05/22/15 10:49	1
Chromium	ND		0.00200		mg/L		05/19/15 10:45	05/22/15 10:49	1
Copper	ND		0.00200		mg/L		05/19/15 10:45	05/22/15 10:49	1
Iron	ND		0.0250		mg/L		05/19/15 10:45	05/22/15 10:49	1

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 490-249403/2-B
Matrix: Water
Analysis Batch: 250589

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 249411

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1015		mg/L		102	80 - 120
Chromium	0.100	0.1020		mg/L		102	80 - 120
Copper	0.100	0.09980		mg/L		100	80 - 120
Iron	1.00	1.077		mg/L		108	80 - 120

Lab Sample ID: LCSD 490-249403/3-B
Matrix: Water
Analysis Batch: 250589

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 249411

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.09757		mg/L		98	80 - 120	4	20
Chromium	0.100	0.09796		mg/L		98	80 - 120	4	20
Copper	0.100	0.09913		mg/L		99	80 - 120	1	20
Iron	1.00	1.058		mg/L		106	80 - 120	2	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-248616/1
Matrix: Water
Analysis Batch: 248616

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/14/15 10:52	1

Lab Sample ID: LCS 490-248616/2
Matrix: Water
Analysis Batch: 248616

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1030		mg/L		103	85 - 115

Lab Sample ID: 490-78405-1 MS
Matrix: Water
Analysis Batch: 248616

Client Sample ID: Abiotic_Day 7_051315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND	H F1	100	79.00	F1	mg/L		79	85 - 115

Lab Sample ID: 490-78405-1 MSD
Matrix: Water
Analysis Batch: 248616

Client Sample ID: Abiotic_Day 7_051315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	H F1	100	79.00	F1	mg/L		79	85 - 115	0	20

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 490-78405-1 DU
Matrix: Water
Analysis Batch: 248616

Client Sample ID: Abiotic_Day 7_051315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND	H F1		ND		mg/L				NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-A-4 DU
Matrix: Solid
Analysis Batch: 251326

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	27			27		%				0	20
Percent Solids	73			73		%				0	20

HPLC/IC

Analysis Batch: 248546

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-1	Abiotic_Day 7_051315	Total/NA	Water	9056	
490-78405-3	Abiotic_Day 7_Dup_051315	Total/NA	Water	9056	
490-78405-5	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-5 MS	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-5 MSD	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-7	Biotic_051315	Total/NA	Water	9056	
490-78405-9	Biotic_Dup_051315	Total/NA	Water	9056	
LCS 490-248546/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-248546/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-248546/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 248547

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-1	Abiotic_Day 7_051315	Total/NA	Water	9056	
490-78405-3	Abiotic_Day 7_Dup_051315	Total/NA	Water	9056	
490-78405-5	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-5 MS	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-5 MSD	Abiotic Control_051315	Total/NA	Water	9056	
490-78405-7	Biotic_051315	Total/NA	Water	9056	
490-78405-9	Biotic_Dup_051315	Total/NA	Water	9056	
LCS 490-248547/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-248547/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-248547/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 248268

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-2	Abiotic_Day 7_051315	Total/NA	Solid	3051A	
490-78405-2 MS	Abiotic_Day 7_051315	Total/NA	Solid	3051A	
490-78405-2 MSD	Abiotic_Day 7_051315	Total/NA	Solid	3051A	
490-78405-4	Abiotic_Day 7_Dup_051315	Total/NA	Solid	3051A	
490-78405-6	Abiotic Control_051315	Total/NA	Solid	3051A	
490-78405-8	Biotic_051315	Total/NA	Solid	3051A	
490-78405-10	Biotic_Dup_051315	Total/NA	Solid	3051A	
LCS 490-248268/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-248268/1-A	Method Blank	Total/NA	Solid	3051A	

Prep Batch: 248409

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78368-A-1-B MS	Matrix Spike	Dissolved	Water	3005A	
490-78368-A-1-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-78405-1	Abiotic_Day 7_051315	Dissolved	Water	3005A	
490-78405-3	Abiotic_Day 7_Dup_051315	Dissolved	Water	3005A	
490-78405-7	Biotic_051315	Dissolved	Water	3005A	
490-78405-9	Biotic_Dup_051315	Dissolved	Water	3005A	
LCS 490-248409/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-248409/1-A	Method Blank	Total Recoverable	Water	3005A	

Metals (Continued)

Analysis Batch: 249316

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-2	Abiotic_Day 7_051315	Total/NA	Solid	6020	248268
490-78405-2 MS	Abiotic_Day 7_051315	Total/NA	Solid	6020	248268
490-78405-2 MSD	Abiotic_Day 7_051315	Total/NA	Solid	6020	248268
490-78405-4	Abiotic_Day 7_Dup_051315	Total/NA	Solid	6020	248268
490-78405-6	Abiotic Control_051315	Total/NA	Solid	6020	248268
490-78405-8	Biotic_051315	Total/NA	Solid	6020	248268
490-78405-10	Biotic_Dup_051315	Total/NA	Solid	6020	248268
LCS 490-248268/2-A	Lab Control Sample	Total/NA	Solid	6020	248268
MB 490-248268/1-A	Method Blank	Total/NA	Solid	6020	248268

Filtration Batch: 249403

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-5	Abiotic Control_051315	Dissolved	Water	Filtration	
LCS 490-249403/2-B	Lab Control Sample	Dissolved	Water	Filtration	
LCSD 490-249403/3-B	Lab Control Sample Dup	Dissolved	Water	Filtration	
MB 490-249403/1-B	Method Blank	Dissolved	Water	Filtration	

Prep Batch: 249411

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-5	Abiotic Control_051315	Dissolved	Water	3005A	249403
LCS 490-249403/2-B	Lab Control Sample	Dissolved	Water	3005A	249403
LCSD 490-249403/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	249403
MB 490-249403/1-B	Method Blank	Dissolved	Water	3005A	249403

Analysis Batch: 249440

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-10	Biotic_Dup_051315	Total/NA	Solid	6020	248268

Analysis Batch: 249687

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78368-A-1-B MS	Matrix Spike	Dissolved	Water	6020	248409
490-78368-A-1-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	248409
LCS 490-248409/2-A	Lab Control Sample	Total Recoverable	Water	6020	248409
MB 490-248409/1-A	Method Blank	Total Recoverable	Water	6020	248409

Analysis Batch: 250589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-1	Abiotic_Day 7_051315	Dissolved	Water	6020	248409
490-78405-1	Abiotic_Day 7_051315	Dissolved	Water	6020	248409
490-78405-3	Abiotic_Day 7_Dup_051315	Dissolved	Water	6020	248409
490-78405-3	Abiotic_Day 7_Dup_051315	Dissolved	Water	6020	248409
490-78405-5	Abiotic Control_051315	Dissolved	Water	6020	249411
490-78405-7	Biotic_051315	Dissolved	Water	6020	248409
490-78405-9	Biotic_Dup_051315	Dissolved	Water	6020	248409
LCS 490-249403/2-B	Lab Control Sample	Dissolved	Water	6020	249411
LCSD 490-249403/3-B	Lab Control Sample Dup	Dissolved	Water	6020	249411
MB 490-249403/1-B	Method Blank	Dissolved	Water	6020	249411

General Chemistry

Filtration Batch: 248611

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-1	Abiotic_Day 7_051315	Dissolved	Water	Filtration	
490-78405-1 DU	Abiotic_Day 7_051315	Dissolved	Water	Filtration	
490-78405-1 MS	Abiotic_Day 7_051315	Dissolved	Water	Filtration	
490-78405-1 MSD	Abiotic_Day 7_051315	Dissolved	Water	Filtration	
490-78405-3	Abiotic_Day 7_Dup_051315	Dissolved	Water	Filtration	
490-78405-5	Abiotic Control_051315	Dissolved	Water	Filtration	
490-78405-7	Biotic_051315	Dissolved	Water	Filtration	
490-78405-9	Biotic_Dup_051315	Dissolved	Water	Filtration	

Analysis Batch: 248616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78405-1	Abiotic_Day 7_051315	Dissolved	Water	7196A	248611
490-78405-1 DU	Abiotic_Day 7_051315	Dissolved	Water	7196A	248611
490-78405-1 MS	Abiotic_Day 7_051315	Dissolved	Water	7196A	248611
490-78405-1 MSD	Abiotic_Day 7_051315	Dissolved	Water	7196A	248611
490-78405-3	Abiotic_Day 7_Dup_051315	Dissolved	Water	7196A	248611
490-78405-5	Abiotic Control_051315	Dissolved	Water	7196A	248611
490-78405-7	Biotic_051315	Dissolved	Water	7196A	248611
490-78405-9	Biotic_Dup_051315	Dissolved	Water	7196A	248611
LCS 490-248616/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-248616/1	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-A-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-78405-2	Abiotic_Day 7_051315	Total/NA	Solid	Moisture	
490-78405-4	Abiotic_Day 7_Dup_051315	Total/NA	Solid	Moisture	
490-78405-6	Abiotic Control_051315	Total/NA	Solid	Moisture	
490-78405-8	Biotic_051315	Total/NA	Solid	Moisture	
490-78405-10	Biotic_Dup_051315	Total/NA	Solid	Moisture	

Client Sample ID: Abiotic_Day 7_051315

Lab Sample ID: 490-78405-1
Matrix: Water
Date Collected: 05/13/15 08:35
Date Received: 05/14/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		248547	05/14/15 13:48	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		248546	05/14/15 14:07	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	250589	05/22/15 12:20	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	250589	05/22/15 12:51	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	248611	05/14/15 10:41	BLM	TAL NSH
Dissolved	Analysis	7196A		1000	10 mL	10 mL	248616	05/14/15 10:58	BLM	TAL NSH

Client Sample ID: Abiotic_Day 7_051315

Lab Sample ID: 490-78405-2
Matrix: Solid
Date Collected: 05/13/15 08:35
Date Received: 05/14/15 08:30
Percent Solids: 79.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.521 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.521 g	100 mL	249316	05/18/15 21:23	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_Day 7_Dup_051315

Lab Sample ID: 490-78405-3
Matrix: Water
Date Collected: 05/13/15 08:45
Date Received: 05/14/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		248547	05/14/15 14:26	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		248546	05/14/15 14:45	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	250589	05/22/15 12:10	JBD	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	250589	05/22/15 12:15	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	248611	05/14/15 10:41	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	248616	05/14/15 11:00	BLM	TAL NSH

Client Sample ID: Abiotic_Day 7_Dup_051315

Lab Sample ID: 490-78405-4
Matrix: Solid
Date Collected: 05/13/15 08:45
Date Received: 05/14/15 08:30
Percent Solids: 78.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.510 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.510 g	100 mL	249316	05/18/15 21:51	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic Control_051315

Lab Sample ID: 490-78405-5
Date Collected: 05/13/15 12:00
Matrix: Water
Date Received: 05/14/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		248546	05/14/15 15:04	CLN	TAL NSH
Total/NA	Analysis	9056		1	10 mL		248547	05/14/15 15:04	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	249411	05/19/15 10:45	TSC	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	249403	05/19/15 10:45	TSC	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	250589	05/22/15 11:04	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	248611	05/14/15 10:41	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	248616	05/14/15 11:08	BLM	TAL NSH

Client Sample ID: Abiotic Control_051315

Lab Sample ID: 490-78405-6
Date Collected: 05/13/15 12:00
Matrix: Solid
Date Received: 05/14/15 08:30
Percent Solids: 77.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.497 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.497 g	100 mL	249316	05/18/15 21:57	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Biotic_051315

Lab Sample ID: 490-78405-7
Date Collected: 05/13/15 12:15
Matrix: Water
Date Received: 05/14/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		248547	05/14/15 16:01	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		248546	05/14/15 16:20	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	250589	05/22/15 12:05	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	248611	05/14/15 10:41	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	248616	05/14/15 11:02	BLM	TAL NSH

Client Sample ID: Biotic_051315

Lab Sample ID: 490-78405-8
Date Collected: 05/13/15 12:15
Matrix: Solid
Date Received: 05/14/15 08:30
Percent Solids: 77.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.524 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.524 g	100 mL	249316	05/18/15 22:02	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Client Sample ID: Biotic_Dup_051315
Date Collected: 05/13/15 12:25
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-9
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	9056		1	10 mL		248547	05/14/15 16:39	CLN	TAL NSH
Total/NA	Analysis	9056		10	10 mL		248546	05/14/15 16:59	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	248409	05/14/15 16:06	RDF	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	250589	05/22/15 12:00	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	248611	05/14/15 10:41	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	248616	05/14/15 11:03	BLM	TAL NSH

Client Sample ID: Biotic_Dup_051315
Date Collected: 05/13/15 12:25
Date Received: 05/14/15 08:30

Lab Sample ID: 490-78405-10
Matrix: Solid
Percent Solids: 79.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	249316	05/18/15 22:19	JBD	TAL NSH
Total/NA	Prep	3051A			0.508 g	100 mL	248268	05/14/15 11:13	ZLN	TAL NSH
Total/NA	Analysis	6020		10	0.508 g	100 mL	249440	05/19/15 10:36	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-78405-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-78405 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 5/14/2015 @ 0830

1. Tracking # 2809 (last 4 digits, FedEx)

Courier: Fed-ex IR Gun ID 17960357

2. Temperature of rep. sample or temp blank when opened: 3.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) _____

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MBM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MBM

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MBM

I certify that I attached a label with the unique LIMS number to each container (intial) MBM

21. Were there Non-Conformance issues at login? YES NO MBM 5.19.15 Was a NCM generated? YES...NO...#_____

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
78405

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

5/29/2015

Client Information	Sampler: Linxi Chen	Lab PM: Baker, Heather	Carrier Tra	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page ~~1 of 7~~ 1 of 2
Company: Geosyntec Consultants, Inc.		Analysis Requested		Job #:
Address: 10220 Old Columbia Road Suite A	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 - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			Other:
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
Site: TEL	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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
				Preservation Code:		X	X	N	N	N	X	
-1	Abiotic_Day 7_051315	05/13/15	0835	G	Water	Y			X	X	1	HNO_3 preserved
1	Abiotic - Day 7_ 051315		↓		Water	N	~~N~~	X			1	
2	Abiotic- Day 7_ 051315				~~Water~~ S	N	~~N~~			X	1	
3	Abiotic-Day 7- Dup - 051315		0845		Water	Y			X	X	1	HNO_3 preserved
4	Abiotic- Day 7- Dup - 051315				Water	N		X			1	
4	Abiotic- Day 7- Dup- 051315		↓		~~Water~~ S	N				X	1	
5	Abiotic Control - 051315		1200		Water	N		X	X	X	1	
6	Abiotic Control - 051315		↓		~~Water~~ S	N				X	1	
7	Biotic - 051315		1215		Water	Y			X	X	1	HNO_3 preserved
4	Biotic 051315		↑		Water	Y		X			1	
8	Biotic - 051315	↓	↓	↓	~~Water~~ S	N				X	1	

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:	Company	Received by:	Date/Time:	Company
Chen Li	5/13/15 1300	Geosyntec		05-13-15 1426	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
				5.14.15 @0830	TAN
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: 3.6c

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Phone (615) 726-0177 Fax (615) 726-3404

Chain of Custody Record

Loc: 490
78405

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

5/29/2015

Client Information	Sampler: Linxi Chen	Lab PM: Baker, Heather	Car	COC No: 490-36874-12511.1
Client Contact: Amar Wadhawan	Phone: 865-330-0037	E-Mail: heather.baker@testamericainc.com		Page: Page 1 of 2 ~~1 of 2~~
Company: Geosyntec Consultants, Inc.				Job #:
Address: 10220 Old Columbia Road Suite A	Due Date Requested:			
City: Columbia	TAT Requested (days):			
State, Zip: MD, 21046				
Phone:	PO #: Purchase Order Requested			
Email: awadhawan@geosyntec.com	WO #:			
Project Name: Treatability Study	Project #: 49008518			
Site: TEL	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

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)	9056 - Nitrate, Sulfate	7196A - Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	N	N	X	
9 Biotic_Dup_051315	05/13/15	1225	G	Water	Y			X	X	1	HNO3 preserved
4 Biotic_Dup_051315	↓	↓	↓	Water	N		X			1	
10 Biotic_Dup_051315	↓	↓	↓	~~S~~ Water	N				X	1	
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							
				Water							

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:	Company	Received by:	Date/Time:	Company
1	Chen Li	5/13/15 1300	Geosyntec	[signature]	05-13-15 1420	TA
2	Relinquished by:	Date/Time:	Company	Received by: [signature]	5.14.15 @ 0830	TAN
3	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: 3.6c

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-78405-1
SDG Number:

Login Number: 78405
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	3.6
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	False	Limited volume received.
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.	True	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-78877-1
TestAmerica Sample Delivery Group: TEL
Client Project/Site: CCA Treatability

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
6/9/2015 3:59:57 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 16
Chronicle 19
Method Summary 21
Certification Summary 22
Chain of Custody 23
Receipt Checklists 25

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-78877-1	Abiotic_Day 14_052015	Water	05/20/15 10:30	05/21/15 08:30
490-78877-2	Abiotic_Day 14_052015	Solid	05/20/15 10:30	05/21/15 08:30
490-78877-3	Abiotic_Day 14_Dup_052015	Water	05/20/15 10:40	05/21/15 08:30
490-78877-4	Abiotic_Day 14_Dup_052015	Solid	05/20/15 10:40	05/21/15 08:30

Job ID: 490-78877-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-78877-1

Comments
No additional comments.

Receipt
The samples were received on 5/21/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.1º C.

HPLC/IC
Method 9056: The following sample was diluted due to the nature of the sample matrix: Abiotic_Day 14_052015 (490-78877-1). Elevated reporting limits (RL) are provided.

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

Metals
Method 6020: The following samples were diluted due to the abundance of non-target analytes: Abiotic_Day 14_052015 (490-78877-1) and Abiotic_Day 14_Dup_052015 (490-78877-3). Elevated reporting limits (RLs) are provided.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The following sample was diluted due to the nature of the sample matrix: Abiotic_Day 14_052015 (490-78877-1). Elevated reporting limits (RLs) are provided.

Method 7196A: The following samples were received with less than one shift (8 hours) remaining on a test with a holding time of 48 hours or less. As such, the laboratory had insufficient time remaining to perform the analysis within holding time: Abiotic_Day 14_052015 (490-78877-1) and Abiotic_Day 14_Dup_052015 (490-78877-3).

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
F1	MS and/or MSD Recovery is outside acceptance limits.

Metals

Qualifier	Qualifier Description
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.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Client Sample ID: Abiotic_Day 14_052015
Date Collected: 05/20/15 10:30
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	**1.87**		0.100		mg/L			05/21/15 22:56	1
Nitrate as N	**1.65**	**H**	0.100		mg/L			06/05/15 12:51	1
Sulfate	**3180**		10.0		mg/L			05/26/15 18:18	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0274**		0.0200		mg/L		05/28/15 09:55	05/28/15 18:57	10
Chromium	ND		0.0200		mg/L		05/28/15 09:55	05/28/15 18:57	10
Copper	**0.0264**		0.0200		mg/L		05/28/15 09:55	05/28/15 18:57	10
Iron	**821**		0.250		mg/L		05/28/15 09:55	05/28/15 18:57	10

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	10.0		mg/L			05/21/15 10:35	1000

Client Sample ID: Abiotic_Day 14_052015

Date Collected: 05/20/15 10:30
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-2

Matrix: Solid
Percent Solids: 81.2

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	887		3.07		mg/Kg	☼	05/22/15 13:05	05/26/15 13:57	5
Chromium	340		0.613		mg/Kg	☼	05/22/15 13:05	05/22/15 19:27	1
Copper	1000		3.07		mg/Kg	☼	05/22/15 13:05	05/26/15 13:57	5
Iron	6000		6.13		mg/Kg	☼	05/22/15 13:05	05/22/15 19:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		0.10		%			05/27/15 15:13	1
Percent Solids	81		0.10		%			05/27/15 15:13	1

Client Sample ID: Abiotic_Day 14_Dup_052015

Lab Sample ID: 490-78877-3

Date Collected: 05/20/15 10:40
Matrix: Water
Date Received: 05/21/15 08:30

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.609		0.100		mg/L			05/21/15 23:56	1
Nitrate as N	0.973	H	0.100		mg/L			06/05/15 13:11	1
Sulfate	3150		10.0		mg/L			05/22/15 00:36	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0287		0.0200		mg/L		05/28/15 09:55	05/28/15 19:14	10
Chromium	ND		0.0200		mg/L		05/28/15 09:55	05/28/15 19:14	10
Copper	0.0277		0.0200		mg/L		05/28/15 09:55	05/28/15 19:14	10
Iron	851		0.250		mg/L		05/28/15 09:55	05/28/15 19:14	10

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			05/21/15 10:38	1

Client Sample ID: Abiotic_Day 14_Dup_052015

Date Collected: 05/20/15 10:40
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-4

Matrix: Solid
Percent Solids: 79.2

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	362		0.621		mg/Kg	☼	05/22/15 13:05	05/22/15 19:33	1
Chromium	121		0.621		mg/Kg	☼	05/22/15 13:05	05/22/15 19:33	1
Copper	402		0.621		mg/Kg	☼	05/22/15 13:05	05/22/15 19:33	1
Iron	3380		6.21		mg/Kg	☼	05/22/15 13:05	05/22/15 19:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			05/27/15 15:13	1
Percent Solids	79		0.10		%			05/27/15 15:13	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-250584/3
Matrix: Water
Analysis Batch: 250584

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/21/15 21:56	1

Lab Sample ID: LCS 490-250584/4
Matrix: Water
Analysis Batch: 250584

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	104.6		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-250584/5
Matrix: Water
Analysis Batch: 250584

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
Sulfate	100	104.9		mg/L		105	80 - 120	0	20

Lab Sample ID: 490-78888-H-17 MS
Matrix: Water
Analysis Batch: 250584

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	3.96		100	105.9		mg/L		102	80 - 120

Lab Sample ID: 490-78888-H-17 MSD
Matrix: Water
Analysis Batch: 250584

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	3.96		100	107.6		mg/L		104	80 - 120	2	20

Lab Sample ID: MB 490-250585/3
Matrix: Water
Analysis Batch: 250585

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			05/21/15 21:56	1

Lab Sample ID: LCS 490-250585/4
Matrix: Water
Analysis Batch: 250585

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.26		mg/L		103	80 - 120

Lab Sample ID: LCSD 490-250585/5
Matrix: Water
Analysis Batch: 250585

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
Nitrate as N	10.0	10.24		mg/L		102	80 - 120	0	20

Lab Sample ID: 490-78888-H-17 MS
Matrix: Water
Analysis Batch: 250585

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	9.880		mg/L		99	80 - 120

Lab Sample ID: 490-78888-H-17 MSD
Matrix: Water
Analysis Batch: 250585

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	9.883		mg/L		99	80 - 120	0	20

Lab Sample ID: MB 490-251275/6
Matrix: Water
Analysis Batch: 251275

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			05/26/15 15:08	1

Lab Sample ID: LCS 490-251275/7
Matrix: Water
Analysis Batch: 251275

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	93.22		mg/L		93	80 - 120

Lab Sample ID: LCSD 490-251275/8
Matrix: Water
Analysis Batch: 251275

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
Sulfate	100	92.67		mg/L		93	80 - 120	1	20

Lab Sample ID: 490-79111-F-6 MS
Matrix: Water
Analysis Batch: 251275

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	ND		100	95.58		mg/L		96	80 - 120

Lab Sample ID: 490-79111-F-6 MSD
Matrix: Water
Analysis Batch: 251275

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	ND		100	108.2		mg/L		108	80 - 120	12	20

Lab Sample ID: MB 490-253938/12
Matrix: Water
Analysis Batch: 253938

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			06/05/15 13:51	1

Method: 9056 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 490-253938/13
Matrix: Water
Analysis Batch: 253938

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	10.55		mg/L		105	80 - 120

Lab Sample ID: LCSD 490-253938/14
Matrix: Water
Analysis Batch: 253938

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
Nitrate as N	10.0	10.47		mg/L		105	80 - 120	1	20

Lab Sample ID: 490-79747-K-2 MS
Matrix: Water
Analysis Batch: 253938

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND	F1	10.0	12.21	F1	mg/L		122	80 - 120

Lab Sample ID: 490-79747-K-2 MSD
Matrix: Water
Analysis Batch: 253938

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND	F1	10.0	12.10	F1	mg/L		121	80 - 120	1	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-250579/1-A
Matrix: Solid
Analysis Batch: 250980

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 250579

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.501		mg/Kg		05/22/15 13:05	05/22/15 18:15	1
Chromium	ND		0.501		mg/Kg		05/22/15 13:05	05/22/15 18:15	1
Copper	ND		0.501		mg/Kg		05/22/15 13:05	05/22/15 18:15	1
Iron	ND		5.01		mg/Kg		05/22/15 13:05	05/22/15 18:15	1

Lab Sample ID: LCS 490-250579/2-A
Matrix: Solid
Analysis Batch: 250980

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 250579

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.0	16.00		mg/Kg		84	80 - 120
Chromium	19.0	18.34		mg/Kg		96	80 - 120
Copper	19.0	17.02		mg/Kg		89	80 - 120
Iron	190	188.4		mg/Kg		99	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 490-250579/3-A
Matrix: Solid
Analysis Batch: 250980

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 250579

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			19.8	16.39		mg/Kg		83	80 - 120	2	20
Chromium			19.8	18.88		mg/Kg		95	80 - 120	3	20
Copper			19.8	17.48		mg/Kg		88	80 - 120	3	20
Iron			198	190.9		mg/Kg		96	80 - 120	1	20

Lab Sample ID: 490-78597-B-1-B MS
Matrix: Solid
Analysis Batch: 250980

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 250579

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		19.8	ND		mg/Kg		NC	75 - 125
Chromium	239		19.8	268.8	4	mg/Kg		149	75 - 125
Copper	ND		19.8	ND		mg/Kg		NC	75 - 125
Iron	64500		198	65510	4	mg/Kg		493	75 - 125

Lab Sample ID: 490-78597-B-1-C MSD
Matrix: Solid
Analysis Batch: 250980

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 250579

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		20.0	ND		mg/Kg		105	75 - 125	NC	20
Chromium	239		20.0	262.6	4	mg/Kg		116	75 - 125	2	20
Copper	ND		20.0	ND		mg/Kg		118	75 - 125	6	20
Iron	64500		200	63360	4	mg/Kg		-590	75 - 125	3	20

Lab Sample ID: MB 490-251658/1-A
Matrix: Water
Analysis Batch: 251984

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 251658

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		05/28/15 09:55	05/28/15 18:13	1
Chromium	ND		0.00200		mg/L		05/28/15 09:55	05/28/15 18:13	1
Copper	ND		0.00200		mg/L		05/28/15 09:55	05/28/15 18:13	1
Iron	ND		0.0250		mg/L		05/28/15 09:55	05/28/15 18:13	1

Lab Sample ID: LCS 490-251658/2-A
Matrix: Water
Analysis Batch: 251984

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 251658

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic			0.100	0.09901		mg/L		99	80 - 120
Chromium			0.100	0.1016		mg/L		102	80 - 120
Copper			0.100	0.09932		mg/L		99	80 - 120
Iron			1.00	1.022		mg/L		102	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-79125-D-13-B MS
Matrix: Water
Analysis Batch: 251984

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 251658

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.00698		0.100	0.1009		mg/L		94	75 - 125
Chromium	ND		0.100	0.1036		mg/L		104	75 - 125
Copper	ND		0.100	0.09670		mg/L		97	75 - 125
Iron	15.0		1.00	15.99	4	mg/L		96	75 - 125

Lab Sample ID: 490-79125-D-13-C MSD
Matrix: Water
Analysis Batch: 251984

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 251658

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.00698		0.100	0.1009		mg/L		94	75 - 125	0	20
Chromium	ND		0.100	0.1032		mg/L		103	75 - 125	0	20
Copper	ND		0.100	0.09625		mg/L		96	75 - 125	0	20
Iron	15.0		1.00	15.84	4	mg/L		81	75 - 125	1	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-251724/1
Matrix: Water
Analysis Batch: 251724

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			05/21/15 10:35	1

Lab Sample ID: LCS 490-251724/2
Matrix: Water
Analysis Batch: 251724

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1050		mg/L		105	85 - 115

Lab Sample ID: 490-78877-1 MS
Matrix: Water
Analysis Batch: 251724

Client Sample ID: Abiotic_Day 14_052015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND	H	200	178.0		mg/L		89	85 - 115

Lab Sample ID: 490-78877-1 MSD
Matrix: Water
Analysis Batch: 251724

Client Sample ID: Abiotic_Day 14_052015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	H	200	174.0		mg/L		87	85 - 115	2	20

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 490-78877-1 DU
Matrix: Water
Analysis Batch: 251724

Client Sample ID: Abiotic_Day 14_052015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND	H		ND		mg/L				NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-77315-A-4 DU
Matrix: Solid
Analysis Batch: 251326

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	27			27		%				0	20
Percent Solids	73			73		%				0	20

HPLC/IC

Analysis Batch: 250584

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-3	Abiotic_Day 14_Dup_052015	Total/NA	Water	9056	
490-78888-H-17 MS	Matrix Spike	Total/NA	Water	9056	
490-78888-H-17 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-250584/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-250584/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-250584/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 250585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Total/NA	Water	9056	
490-78877-3	Abiotic_Day 14_Dup_052015	Total/NA	Water	9056	
490-78888-H-17 MS	Matrix Spike	Total/NA	Water	9056	
490-78888-H-17 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-250585/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-250585/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-250585/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 251275

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Total/NA	Water	9056	
490-79111-F-6 MS	Matrix Spike	Total/NA	Water	9056	
490-79111-F-6 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-251275/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-251275/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-251275/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 253938

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Total/NA	Water	9056	
490-78877-3	Abiotic_Day 14_Dup_052015	Total/NA	Water	9056	
490-79747-K-2 MS	Matrix Spike	Total/NA	Water	9056	
490-79747-K-2 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-253938/13	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-253938/14	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-253938/12	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 250579

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78597-B-1-B MS	Matrix Spike	Total/NA	Solid	3051A	
490-78597-B-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
490-78877-2	Abiotic_Day 14_052015	Total/NA	Solid	3051A	
490-78877-4	Abiotic_Day 14_Dup_052015	Total/NA	Solid	3051A	
LCS 490-250579/2-A	Lab Control Sample	Total/NA	Solid	3051A	
LCSD 490-250579/3-A	Lab Control Sample Dup	Total/NA	Solid	3051A	
MB 490-250579/1-A	Method Blank	Total/NA	Solid	3051A	

Metals (Continued)

Analysis Batch: 250980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78597-B-1-B MS	Matrix Spike	Total/NA	Solid	6020	250579
490-78597-B-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	250579
490-78877-2	Abiotic_Day 14_052015	Total/NA	Solid	6020	250579
490-78877-4	Abiotic_Day 14_Dup_052015	Total/NA	Solid	6020	250579
LCS 490-250579/2-A	Lab Control Sample	Total/NA	Solid	6020	250579
LCSD 490-250579/3-A	Lab Control Sample Dup	Total/NA	Solid	6020	250579
MB 490-250579/1-A	Method Blank	Total/NA	Solid	6020	250579

Analysis Batch: 251264

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-2	Abiotic_Day 14_052015	Total/NA	Solid	6020	250579

Prep Batch: 251658

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Dissolved	Water	3005A	
490-78877-3	Abiotic_Day 14_Dup_052015	Dissolved	Water	3005A	
490-79125-D-13-B MS	Matrix Spike	Dissolved	Water	3005A	
490-79125-D-13-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-251658/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-251658/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 251984

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Dissolved	Water	6020	251658
490-78877-3	Abiotic_Day 14_Dup_052015	Dissolved	Water	6020	251658
490-79125-D-13-B MS	Matrix Spike	Dissolved	Water	6020	251658
490-79125-D-13-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	251658
LCS 490-251658/2-A	Lab Control Sample	Total Recoverable	Water	6020	251658
MB 490-251658/1-A	Method Blank	Total Recoverable	Water	6020	251658

General Chemistry

Analysis Batch: 251326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-77315-A-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-78877-2	Abiotic_Day 14_052015	Total/NA	Solid	Moisture	
490-78877-4	Abiotic_Day 14_Dup_052015	Total/NA	Solid	Moisture	

Analysis Batch: 251724

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Dissolved	Water	7196A	251733
490-78877-1 DU	Abiotic_Day 14_052015	Dissolved	Water	7196A	251733
490-78877-1 MS	Abiotic_Day 14_052015	Dissolved	Water	7196A	251733
490-78877-1 MSD	Abiotic_Day 14_052015	Dissolved	Water	7196A	251733
490-78877-3	Abiotic_Day 14_Dup_052015	Dissolved	Water	7196A	251733
LCS 490-251724/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-251724/1	Method Blank	Total/NA	Water	7196A	

General Chemistry (Continued)

Filtration Batch: 251733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-78877-1	Abiotic_Day 14_052015	Dissolved	Water	Filtration	
490-78877-1 DU	Abiotic_Day 14_052015	Dissolved	Water	Filtration	
490-78877-1 MS	Abiotic_Day 14_052015	Dissolved	Water	Filtration	
490-78877-1 MSD	Abiotic_Day 14_052015	Dissolved	Water	Filtration	
490-78877-3	Abiotic_Day 14_Dup_052015	Dissolved	Water	Filtration	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Client Sample ID: Abiotic_Day 14_052015
Date Collected: 05/20/15 10:30
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-1
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	9056		10	10 mL		251275	05/26/15 18:18	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		250585	05/21/15 22:56	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		253938	06/05/15 12:51	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	251658	05/28/15 09:55	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	251984	05/28/15 18:57	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	251733	05/21/15 10:31	BLM	TAL NSH
Dissolved	Analysis	7196A		1000	10 mL	10 mL	251724	05/21/15 10:35	BLM	TAL NSH

Client Sample ID: Abiotic_Day 14_052015
Date Collected: 05/20/15 10:30
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-2
Matrix: Solid
Percent Solids: 81.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.502 g	100 mL	250579	05/22/15 13:05	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.502 g	100 mL	250980	05/22/15 19:27	JBD	TAL NSH
Total/NA	Prep	3051A			0.502 g	100 mL	250579	05/22/15 13:05	ZLN	TAL NSH
Total/NA	Analysis	6020		5	0.502 g	100 mL	251264	05/26/15 13:57	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Client Sample ID: Abiotic_Day 14_Dup_052015
Date Collected: 05/20/15 10:40
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-3
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	9056		1	10 mL		250585	05/21/15 23:56	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		250584	05/22/15 00:36	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		253938	06/05/15 13:11	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	251658	05/28/15 09:55	TSC	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	251984	05/28/15 19:14	JBD	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	251733	05/21/15 10:31	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	251724	05/21/15 10:38	BLM	TAL NSH

Client Sample ID: Abiotic_Day 14_Dup_052015
Date Collected: 05/20/15 10:40
Date Received: 05/21/15 08:30

Lab Sample ID: 490-78877-4
Matrix: Solid
Percent Solids: 79.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	250579	05/22/15 13:05	ZLN	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	250980	05/22/15 19:33	JBD	TAL NSH
Total/NA	Analysis	Moisture		1			251326	05/27/15 15:13	MAA	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: CCA Treatability

TestAmerica Job ID: 490-78877-1
SDG: TEL

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15 *
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	05-31-15 *
Kentucky (UST)	State Program	4	19	06-30-15 *
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15 *
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15 *
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15 *
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15 *
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-15 *
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15 *
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-78877 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 5/21/2015 @ 0830

1. Tracking # 2831 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 94660220

2. Temperature of rep. sample or temp blank when opened: 4.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: (1) Front

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) MDM

7. Were custody seals on containers: YES (NO) and Intact YES...NO..(NA)

Were these signed and dated correctly? YES...NO..(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES..(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES...NO..(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO..(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDM

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDM

I certify that I attached a label with the unique LIMS number to each container (intial) MDM

21. Were there Non-Conformance issues at login? YES..(NO) Was a NCM generated? YES..(NO)..#_____

BIS = Broken in shipment

TestAmerica ~~Knoxville~~ NASHVILLE
5815 Middlebrook Pike
Knoxville, TN 37921
Phone 865 291-3000 (Main)
Phone 865-291-3031 (Receiving)

Chain of Custody Record

Loc: 490
78877

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

6/9/2015

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	COC Record 1 of 1
Company Name: Geosyntec Consultants	Tel/Mobile:	Lab Contact: Heather Darby	Carrier: FedEx	COC No: 04963
Address: 2240 Sutherland Ave, Ste 107	Analysis Turnaround Time		Lab Use Only:
City/State/Zip: Knoxville / TN / 37919	Calendar (C) or Work Days (W) _____		Custody Seals Intact? Y N NA
Phone: 513-503-0658	TAT if different from Below _____		Number of Packages: _____
Project Name/Number: CCA Treatability	☐ 2 weeks		Temperature: _____ deg C
Site: TEL	☐ 1 week		Shipper: __FedEx __UPS __Other:
P O #	☐ 2 days		Tracking Number:
Sampled by: Linxi Chen	☐ 1 day		Recorded by: _____ Date: _____

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Field Filtered Sample	Analysis: 9056 - Nitrate, Sulfate	Analysis: 7196A - Cr(6)	Analysis: 6020 - As, Cr, Cu, Fe	Sample Specific Notes:
Abiotic_Day 14_052015	05/20/15	1030	G	W	1	Y		X	X	HNO_3 preserved - 1
↓	↓	↓	↓	W	1	N	X			2
↓	↓	↓	↓	S	1	N			X	3
Abiotic_Day 14_Dup_052015	05/20/15	1040	G	W	1	Y		X	X	HNO_3 preserved
↓	↓	↓	↓	W	1	N	X			↓
↓	↓	↓	↓	S	1	N			X	4

Preservation Used: 1= Ice, 2= HCl; 3= H_2SO_4; 4=HNO_3; 5=NaOH; 6= $Na_2S_2O_3$ Other 4

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

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

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:
Chen Li	Geosyntec	5/20/15 1445		05-20-15 1420
Relinquished by:	Company:	Date/Time:	Received by: TAN	Date/Time: 5.21.15 @ 0830 4.1c
Relinquished by:	Company:	Date/Time:	Received by:	Date/Time:

RETURN WHITE COPY TO LAB WITH SAMPLES
KEEP YELLOW COPY FOR YOUR RECORDS

TAL-0046-140 (0208)

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-78877-1
SDG Number: TEL

Login Number: 78877
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	4.1
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
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 Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-82623-1
TestAmerica Sample Delivery Group: TEL
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Roxanne L Connor

Authorized for release by:
7/24/2015 12:29:04 PM
Roxanne Connor, Senior Project Manager
(615)301-5761
roxanne.connor@testamericainc.com

Designee for

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 12
QC Association 17
Chronicle 19
Method Summary 21
Certification Summary 22
Chain of Custody 23
Receipt Checklists 25

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-82623-1	Biotic_071315	Water	07/13/15 14:00	07/14/15 09:30
490-82623-2	Biotic_071315	Solid	07/13/15 14:00	07/14/15 09:30
490-82623-3	Biotic Dup_071315	Water	07/13/15 14:15	07/14/15 09:30
490-82623-4	Biotic Dup_071315	Solid	07/13/15 14:15	07/14/15 09:30

Job ID: 490-82623-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-82623-1

Comments
No additional comments.

Receipt
The samples were received on 7/14/2015 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.6º C.

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

Metals
Method(s) 6020: The method blank for 265025 contained copper above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method(s) 7196A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 490-264921 and analytical batch 490-264922 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
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.
E	Result exceeded calibration range.

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
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.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample ID: Biotic_071315

Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-1

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/14/15 14:50	1
Sulfate	**2370**		10.0		mg/L			07/14/15 15:48	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**19.0**		0.100		mg/L		07/15/15 13:54	07/23/15 15:27	50
Chromium	**0.0565**		0.00200		mg/L		07/15/15 13:54	07/21/15 17:23	1
Copper	**2.55**		0.00200		mg/L		07/15/15 13:54	07/21/15 17:23	1
Iron	**4.68**		0.250		mg/L		07/15/15 13:54	07/23/15 15:21	10

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	F1	0.0100		mg/L			07/14/15 12:12	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Client Sample ID: Biotic_071315
Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-2
Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	23		0.10		%			07/14/15 11:58	1
Percent Solids	77		0.10		%			07/14/15 11:58	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Client Sample ID: Biotic_071315
Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-2
Matrix: Solid
Percent Solids: 77.2

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	256		0.640		mg/Kg	☼	07/15/15 13:41	07/16/15 19:15	1
Chromium	47.0		0.640		mg/Kg	☼	07/15/15 13:41	07/16/15 19:15	1
Copper	392	B	0.640		mg/Kg	☼	07/15/15 13:41	07/16/15 19:15	1
Iron	3180		6.40		mg/Kg	☼	07/15/15 13:41	07/16/15 19:15	1

Client Sample ID: Biotic Dup_071315

Date Collected: 07/13/15 14:15
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-3

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/14/15 16:07	1
Sulfate	**2250**		10.0		mg/L			07/14/15 16:26	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**15.4**		0.100		mg/L		07/15/15 13:54	07/23/15 15:04	50
Chromium	**0.0127**		0.00200		mg/L		07/15/15 13:54	07/21/15 17:17	1
Copper	**1.68**		0.00200		mg/L		07/15/15 13:54	07/21/15 17:17	1
Iron	**0.269**		0.250		mg/L		07/15/15 13:54	07/23/15 14:59	10

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/14/15 12:15	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Client Sample ID: Biotic Dup_071315
Date Collected: 07/13/15 14:15
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-4
Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	21		0.10		%			07/14/15 11:58	1
Percent Solids	79		0.10		%			07/14/15 11:58	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Client Sample ID: Biotic Dup_071315
Date Collected: 07/13/15 14:15
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-4
Matrix: Solid
Percent Solids: 79.2

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	166		0.614		mg/Kg	☼	07/15/15 13:41	07/16/15 19:40	1
Chromium	30.6		0.614		mg/Kg	☼	07/15/15 13:41	07/16/15 19:40	1
Copper	233	B	0.614		mg/Kg	☼	07/15/15 13:41	07/16/15 19:40	1
Iron	2130		6.14		mg/Kg	☼	07/15/15 13:41	07/16/15 19:40	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-264815/6
Matrix: Water
Analysis Batch: 264815

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			07/14/15 13:53	1

Lab Sample ID: LCS 490-264815/7
Matrix: Water
Analysis Batch: 264815

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	91.46		mg/L		91	80 - 120

Lab Sample ID: LCSD 490-264815/8
Matrix: Water
Analysis Batch: 264815

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
Sulfate	100	91.79		mg/L		92	80 - 120	0	20

Lab Sample ID: 490-82623-A-1 MS
Matrix: Water
Analysis Batch: 264815

Client Sample ID: 490-82623-A-1 MS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	2950	E	100	2469	E 4	mg/L		-478	80 - 120

Lab Sample ID: 490-82623-A-1 MSD
Matrix: Water
Analysis Batch: 264815

Client Sample ID: 490-82623-A-1 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	2950	E	100	2470	E 4	mg/L		-477	80 - 120	0	20

Lab Sample ID: MB 490-264816/6
Matrix: Water
Analysis Batch: 264816

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/14/15 13:53	1

Lab Sample ID: LCS 490-264816/7
Matrix: Water
Analysis Batch: 264816

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.708		mg/L		97	80 - 120

Lab Sample ID: LCSD 490-264816/8
Matrix: Water
Analysis Batch: 264816

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
Nitrate as N	10.0	9.760		mg/L		98	80 - 120	1	20

Lab Sample ID: 490-82623-1 MS
Matrix: Water
Analysis Batch: 264816

Client Sample ID: Biotic_071315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	8.681		mg/L		87	80 - 120

Lab Sample ID: 490-82623-1 MSD
Matrix: Water
Analysis Batch: 264816

Client Sample ID: Biotic_071315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	8.577		mg/L		86	80 - 120	1	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-265025/1-A
Matrix: Solid
Analysis Batch: 265706

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265025

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.504		mg/Kg		07/15/15 13:41	07/16/15 19:04	1
Chromium	ND		0.504		mg/Kg		07/15/15 13:41	07/16/15 19:04	1
Copper	1.277		0.504		mg/Kg		07/15/15 13:41	07/16/15 19:04	1
Iron	ND		5.04		mg/Kg		07/15/15 13:41	07/16/15 19:04	1

Lab Sample ID: LCS 490-265025/2-A
Matrix: Solid
Analysis Batch: 265706

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265025

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.8	17.25		mg/Kg		87	80 - 120
Chromium	19.8	20.24		mg/Kg		102	80 - 120
Copper	19.8	19.82		mg/Kg		100	80 - 120
Iron	198	205.7		mg/Kg		104	80 - 120

Lab Sample ID: 490-82623-2 MS
Matrix: Solid
Analysis Batch: 265706

Client Sample ID: Biotic_071315
Prep Type: Total/NA
Prep Batch: 265025

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	256		25.7	262.6	4	mg/Kg	☼	27	75 - 125
Chromium	47.0		25.7	72.69		mg/Kg	☼	100	75 - 125
Copper	392	B	25.7	394.6	4	mg/Kg	☼	10	75 - 125
Iron	3180		257	3236	4	mg/Kg	☼	23	75 - 125

Lab Sample ID: 490-82623-2 MSD
Matrix: Solid
Analysis Batch: 265706

Client Sample ID: Biotic_071315
Prep Type: Total/NA
Prep Batch: 265025

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	256		25.4	284.6	4	mg/Kg	☼	114	75 - 125	8	20
Chromium	47.0		25.4	72.98		mg/Kg	☼	102	75 - 125	0	20
Copper	392	B	25.4	423.8	4	mg/Kg	☼	125	75 - 125	7	20
Iron	3180		254	3554	4	mg/Kg	☼	149	75 - 125	9	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-265030/1-A
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.00200		mg/L		07/15/15 13:54	07/21/15 16:32	1
Copper	ND		0.00200		mg/L		07/15/15 13:54	07/21/15 16:32	1

Lab Sample ID: MB 490-265030/1-A
Matrix: Water
Analysis Batch: 267599

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		07/15/15 13:54	07/23/15 14:15	1
Iron	ND		0.0250		mg/L		07/15/15 13:54	07/23/15 14:15	1

Lab Sample ID: LCS 490-265030/2-A
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.100	0.09454		mg/L		95	80 - 120
Copper	0.100	0.08993		mg/L		90	80 - 120

Lab Sample ID: LCS 490-265030/2-A
Matrix: Water
Analysis Batch: 267599

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09876		mg/L		99	80 - 120
Iron	1.00	1.062		mg/L		106	80 - 120

Lab Sample ID: LCSD 490-265030/3-A
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	0.100	0.09591		mg/L		96	80 - 120	1	20
Copper	0.100	0.09099		mg/L		91	80 - 120	1	20

Lab Sample ID: LCSD 490-265030/3-A
Matrix: Water
Analysis Batch: 267599

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 265030

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.09940		mg/L		99	80 - 120	1	20
Iron	1.00	1.082		mg/L		108	80 - 120	2	20

Lab Sample ID: 490-82699-A-2-B MS
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 265030

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		0.100	0.08930		mg/L		89	75 - 125

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-82699-A-2-B MS
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 265030

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Copper	ND		0.100	0.09335		mg/L		93	75 - 125		

Lab Sample ID: 490-82699-A-2-B MS
Matrix: Water
Analysis Batch: 267599

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 265030

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic	0.0588		0.100	0.1507		mg/L		92	75 - 125		
Iron	9.61		1.00	10.66	4	mg/L		105	75 - 125		

Lab Sample ID: 490-82699-A-2-C MSD
Matrix: Water
Analysis Batch: 266935

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 265030

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		0.100	0.08705		mg/L		87	75 - 125	3	20
Copper	ND		0.100	0.09354		mg/L		94	75 - 125	0	20

Lab Sample ID: 490-82699-A-2-C MSD
Matrix: Water
Analysis Batch: 267599

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 265030

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.0588		0.100	0.1507		mg/L		92	75 - 125	0	20
Iron	9.61		1.00	10.64	4	mg/L		103	75 - 125	0	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-264922/1
Matrix: Water
Analysis Batch: 264922

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/14/15 12:12	1

Lab Sample ID: LCS 490-264922/2
Matrix: Water
Analysis Batch: 264922

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.09500		mg/L		95	85 - 115		

Lab Sample ID: 490-82623-1 MS
Matrix: Water
Analysis Batch: 264922

Client Sample ID: Biotic_071315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND	F1	0.100	0.03700	F1	mg/L		28	85 - 115		

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 490-82623-1 MSD
Matrix: Water
Analysis Batch: 264922

Client Sample ID: Biotic_071315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	F1	0.100	0.03700	F1	mg/L		28	85 - 115	0	20

Lab Sample ID: 490-82623-1 DU
Matrix: Water
Analysis Batch: 264922

Client Sample ID: Biotic_071315
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND	F1		ND		mg/L				NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-82537-A-1 DU
Matrix: Solid
Analysis Batch: 264594

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	9.5			8.5		%				11	20
Percent Solids	91			91		%				1	20

HPLC/IC

Analysis Batch: 264815

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Total/NA	Water	9056	
490-82623-3	Biotic Dup_071315	Total/NA	Water	9056	
490-82623-A-1 MS	490-82623-A-1 MS	Total/NA	Water	9056	
490-82623-A-1 MSD	490-82623-A-1 MSD	Total/NA	Water	9056	
LCS 490-264815/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-264815/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-264815/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 264816

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Total/NA	Water	9056	
490-82623-1 MS	Biotic_071315	Total/NA	Water	9056	
490-82623-1 MSD	Biotic_071315	Total/NA	Water	9056	
490-82623-3	Biotic Dup_071315	Total/NA	Water	9056	
LCS 490-264816/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-264816/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-264816/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 265025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-2	Biotic_071315	Total/NA	Solid	3051A	
490-82623-2 MS	Biotic_071315	Total/NA	Solid	3051A	
490-82623-2 MSD	Biotic_071315	Total/NA	Solid	3051A	
490-82623-4	Biotic Dup_071315	Total/NA	Solid	3051A	
LCS 490-265025/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-265025/1-A	Method Blank	Total/NA	Solid	3051A	

Prep Batch: 265030

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Dissolved	Water	3005A	
490-82623-3	Biotic Dup_071315	Dissolved	Water	3005A	
490-82699-A-2-B MS	Matrix Spike	Dissolved	Water	3005A	
490-82699-A-2-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-265030/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 490-265030/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	
MB 490-265030/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 265706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-2	Biotic_071315	Total/NA	Solid	6020	265025
490-82623-2 MS	Biotic_071315	Total/NA	Solid	6020	265025
490-82623-2 MSD	Biotic_071315	Total/NA	Solid	6020	265025
490-82623-4	Biotic Dup_071315	Total/NA	Solid	6020	265025
LCS 490-265025/2-A	Lab Control Sample	Total/NA	Solid	6020	265025
MB 490-265025/1-A	Method Blank	Total/NA	Solid	6020	265025

Metals (Continued)

Analysis Batch: 266935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Dissolved	Water	6020	265030
490-82623-3	Biotic Dup_071315	Dissolved	Water	6020	265030
490-82699-A-2-B MS	Matrix Spike	Dissolved	Water	6020	265030
490-82699-A-2-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	265030
LCS 490-265030/2-A	Lab Control Sample	Total Recoverable	Water	6020	265030
LCSD 490-265030/3-A	Lab Control Sample Dup	Total Recoverable	Water	6020	265030
MB 490-265030/1-A	Method Blank	Total Recoverable	Water	6020	265030

Analysis Batch: 267599

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Dissolved	Water	6020	265030
490-82623-1	Biotic_071315	Dissolved	Water	6020	265030
490-82623-3	Biotic Dup_071315	Dissolved	Water	6020	265030
490-82623-3	Biotic Dup_071315	Dissolved	Water	6020	265030
490-82699-A-2-B MS	Matrix Spike	Dissolved	Water	6020	265030
490-82699-A-2-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	265030
LCS 490-265030/2-A	Lab Control Sample	Total Recoverable	Water	6020	265030
LCSD 490-265030/3-A	Lab Control Sample Dup	Total Recoverable	Water	6020	265030
MB 490-265030/1-A	Method Blank	Total Recoverable	Water	6020	265030

General Chemistry

Analysis Batch: 264594

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82537-A-1 DU	Duplicate	Total/NA	Solid	Moisture	
490-82623-2	Biotic_071315	Total/NA	Solid	Moisture	
490-82623-4	Biotic Dup_071315	Total/NA	Solid	Moisture	

Filtration Batch: 264921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Dissolved	Water	Filtration	
490-82623-1 DU	Biotic_071315	Dissolved	Water	Filtration	
490-82623-1 MS	Biotic_071315	Dissolved	Water	Filtration	
490-82623-1 MSD	Biotic_071315	Dissolved	Water	Filtration	
490-82623-3	Biotic Dup_071315	Dissolved	Water	Filtration	

Analysis Batch: 264922

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-82623-1	Biotic_071315	Dissolved	Water	7196A	264921
490-82623-1 DU	Biotic_071315	Dissolved	Water	7196A	264921
490-82623-1 MS	Biotic_071315	Dissolved	Water	7196A	264921
490-82623-1 MSD	Biotic_071315	Dissolved	Water	7196A	264921
490-82623-3	Biotic Dup_071315	Dissolved	Water	7196A	264921
LCS 490-264922/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-264922/1	Method Blank	Total/NA	Water	7196A	

Client Sample ID: Biotic_071315
Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-1
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	9056		1	10 mL		264816	07/14/15 14:50	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		264815	07/14/15 15:48	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	266935	07/21/15 17:23	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	267599	07/23/15 15:21	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	267599	07/23/15 15:27	CME	TAL NSH
Dissolved	Filtration	Filtration			10 mL	1.0 mL	264921	07/14/15 11:09	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	264922	07/14/15 12:12	BLM	TAL NSH

Client Sample ID: Biotic_071315
Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			264594	07/14/15 11:58	MAA	TAL NSH

Client Sample ID: Biotic_071315
Date Collected: 07/13/15 14:00
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-2
Matrix: Solid
Percent Solids: 77.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.506 g	100 mL	265025	07/15/15 13:41	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.506 g	100 mL	265706	07/16/15 19:15	CME	TAL NSH

Client Sample ID: Biotic Dup_071315
Date Collected: 07/13/15 14:15
Date Received: 07/14/15 09:30

Lab Sample ID: 490-82623-3
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	9056		1	10 mL		264816	07/14/15 16:07	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		264815	07/14/15 16:26	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	266935	07/21/15 17:17	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		10	50 mL	50 mL	267599	07/23/15 14:59	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	265030	07/15/15 13:54	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	267599	07/23/15 15:04	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	264922	07/14/15 12:15	BLM	TAL NSH
Dissolved	Filtration	Filtration			10 mL	1.0 mL	264921	07/15/15 11:33	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Client Sample ID: Biotic Dup_071315 — **Lab Sample ID: 490-82623-4**
Date Collected: 07/13/15 14:15 — **Matrix: Solid**
Date Received: 07/14/15 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			264594	07/14/15 11:58	MAA	TAL NSH

Client Sample ID: Biotic Dup_071315 — **Lab Sample ID: 490-82623-4**
Date Collected: 07/13/15 14:15 — **Matrix: Solid**
Date Received: 07/14/15 09:30 — **Percent Solids: 79.2**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.514 g	100 mL	265025	07/15/15 13:41	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.514 g	100 mL	265706	07/16/15 19:40	CME	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-82623-1
SDG: TEL

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15 *
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	09-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15 *
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-15 *
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-82623 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 7/14/2015 @ 0930

1. Tracking # 5062 (last 4 digits, FedEx)

Courier: Fed-ex IR Gun ID 17960357

2. Temperature of rep. sample or temp blank when opened: 2.6 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)

4. Were custody seals on outside of cooler? (YES) ..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES) ..NO...NA

6. Were custody papers inside cooler? (YES) ..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) _____

7. Were custody seals on containers: YES (NO) and Intact YES...NO..(NA)

Were these signed and dated correctly? YES...NO..(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) (Ice-pack) Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES) ..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES) ..NO...NA

12. Did all container labels and tags agree with custody papers? (YES) ..NO...NA

13a. Were VOA vials received? YES..(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES...NO..(NA) If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES) ..NO...NA

16. Was residual chlorine present? YES..(NO)..(NA) mm 7.14.15

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDM

17. Were custody papers properly filled out (ink, signed, etc)? (YES) ..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES) ..NO...NA

19. Were correct containers used for the analysis requested? (YES) ..NO...NA

20. Was sufficient amount of sample sent in each container? (YES) ..NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDM

I certify that I attached a label with the unique LIMS number to each container (intial) MDM

21. Were there Non-Conformance issues at login? YES (NO) Was a NCM generated? YES ..NO..#_____

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive

Nashville, TN 37204
phone 615.726.0177 fax

Chain of Custody Record

Loc: 490
82623

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

7/24/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Baker, Heather	Site Contact: Linxi Chen	Date: 7/13/15	COC No: 1
Amar Wadhawan	Email: heather.baker@testamerica.com	Lab Contact: Linxi Chen	Carrier: Fedex	___1___ of ___1___ COCs
Geosyntec Consultants	Analysis Turnaround Time			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Columbia Phone (410) 910-7619	TAT if different from Below _____			Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Sample Specific Notes:
Biotic_071315	07/13/15	1400	G	W	1	Y			X	X	HNO3 preserved -1
Biotic_071315	↓	↓	G	W	1	N		X			↓
Biotic_071315	↓	↓	G	S	1	N				X	2
Biotic Dup_071315	↓	1415	G	W	1	Y			X	X	HNO3 preserved -3
Biotic Dup_071315	↓	↓	G	W	1	N		X			↓
Biotic Dup_071315	↓	↓	G	S	1	N				X	4

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by: Chen Li 1520	Company: Geosyntec	Date/Time: 7/13/15 1520	Received by:	Company: TA KNOX	Date/Time: 7-13-15 15:47
Relinquished by:	Company: TA KNOX	Date/Time: 7-13-15 16:00	Received by:	Company: TAN	Date/Time: 7-14-15 @ 0930 2.6c
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-82623-1
SDG Number: TEL

Login Number: 82623
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	2.6
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
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.	True	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-83497-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
8/9/2015 10:36:18 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 12
QC Association 20
Chronicle 24
Method Summary 26
Certification Summary 27
Chain of Custody 28
Receipt Checklists 32

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-83497-1	Biotic_072315	Water	07/23/15 12:35	07/24/15 08:40
490-83497-2	Biotic_072315	Solid	07/23/15 12:35	07/24/15 08:40
490-83497-3	Biotic Dup_072315	Water	07/23/15 12:45	07/24/15 08:40
490-83497-4	Biotic Dup_072315	Solid	07/23/15 12:45	07/24/15 08:40
490-83497-6	Control_072315	Solid	07/23/15 12:25	07/24/15 08:40
490-83988-1	Control_073015	Water	07/30/15 14:45	07/31/15 08:30

Case Narrative

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Job ID: 490-83497-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-83497-1

Comments
No additional comments.

Receipt
The samples were received on 7/24/2015 8:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1º C.

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

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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

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

Job ID: 490-83988-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-83988-1

Comments
No additional comments.

Receipt
The samples were received on 7/31/2015 8:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1º C.

HPLC/IC
Method 9056: The following sample was analyzed outside of the analytical holding time: Control_073015 (490-83988-1).

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

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
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.
E	Result exceeded calibration range.
H	Sample was prepped or analyzed beyond the specified holding time

Metals

Qualifier	Qualifier Description
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.
F2	MS/MSD RPD exceeds control limits

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Biotic_072315
Date Collected: 07/23/15 12:35
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/25/15 01:29	1
Sulfate	**2200**		5.00		mg/L			07/25/15 02:29	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**24.6**		0.200		mg/L		07/24/15 14:43	07/29/15 15:41	100
Chromium	**0.0231**		0.0100		mg/L		07/24/15 14:43	07/29/15 15:31	5
Copper	**2.61**		0.200		mg/L		07/24/15 14:43	07/30/15 16:30	100
Iron	**0.281**		0.0250		mg/L		07/24/15 14:43	07/29/15 13:46	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/24/15 10:44	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Biotic_072315
Date Collected: 07/23/15 12:35
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-2
Matrix: Solid

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	198	F2	0.625		mg/Kg	☼	07/27/15 10:20	07/29/15 17:57	1
Chromium	45.7		0.625		mg/Kg	☼	07/27/15 10:20	07/29/15 17:57	1
Copper	233		0.625		mg/Kg	☼	07/27/15 10:20	07/31/15 16:57	1
Iron	3210	F2	6.25		mg/Kg	☼	07/27/15 10:20	07/30/15 17:20	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			07/24/15 10:20	1
Percent Solids	78		0.10		%			07/24/15 10:20	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Biotic Dup_072315
Date Collected: 07/23/15 12:45
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-3
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/25/15 02:49	1
Sulfate	**2280**		5.00		mg/L			07/25/15 03:09	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**21.5**		0.200		mg/L		07/24/15 14:43	07/29/15 15:46	100
Chromium	**0.0203**		0.0100		mg/L		07/24/15 14:43	07/29/15 15:36	5
Copper	**2.20**		0.200		mg/L		07/24/15 14:43	07/30/15 16:36	100
Iron	**0.233**		0.0250		mg/L		07/24/15 14:43	07/29/15 13:51	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/24/15 10:46	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Biotic Dup_072315
Date Collected: 07/23/15 12:45
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-4
Matrix: Solid

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	327		0.611		mg/Kg	☼	07/27/15 10:20	07/29/15 18:23	1
Chromium	65.6		0.611		mg/Kg	☼	07/27/15 10:20	07/29/15 18:23	1
Copper	462		3.05		mg/Kg	☼	07/27/15 10:20	07/31/15 17:25	5
Iron	4470		6.11		mg/Kg	☼	07/27/15 10:20	07/30/15 17:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			07/24/15 10:20	1
Percent Solids	78		0.10		%			07/24/15 10:20	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Control_072315

Lab Sample ID: 490-83497-6

Date Collected: 07/23/15 12:25

Matrix: Solid

Date Received: 07/24/15 08:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	142		0.608		mg/Kg	☼	07/27/15 10:20	07/29/15 18:28	1
Chromium	36.2		0.608		mg/Kg	☼	07/27/15 10:20	07/29/15 18:28	1
Copper	314		0.608		mg/Kg	☼	07/27/15 10:20	07/31/15 17:30	1
Iron	1020		6.08		mg/Kg	☼	07/27/15 10:20	07/30/15 17:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	18		0.10		%			07/24/15 10:20	1
Percent Solids	82		0.10		%			07/24/15 10:20	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Control_073015
Date Collected: 07/30/15 14:45
Date Received: 07/31/15 08:30

Lab Sample ID: 490-83988-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.66	H	0.100		mg/L			08/06/15 20:55	1
Sulfate	30.8		5.00		mg/L			08/06/15 21:55	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	88.0		0.200		mg/L		08/05/15 09:09	08/07/15 10:45	100
Chromium	10.6		0.200		mg/L		08/05/15 09:09	08/07/15 10:45	100
Copper	93.6		0.200		mg/L		08/05/15 09:09	08/07/15 10:45	100
Iron	218		0.125		mg/L		08/05/15 09:09	08/06/15 00:28	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0140		0.0100		mg/L			07/31/15 10:15	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-267866/3
Matrix: Water
Analysis Batch: 267866

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			07/25/15 00:49	1

Lab Sample ID: LCS 490-267866/4
Matrix: Water
Analysis Batch: 267866

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	98.41		mg/L		98	80 - 120

Lab Sample ID: 490-83497-B-1 MS
Matrix: Water
Analysis Batch: 267866

Client Sample ID: 490-83497-B-1 MS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	1270	E	100	2089	E 4	mg/L		821	80 - 120

Lab Sample ID: 490-83497-B-1 MSD
Matrix: Water
Analysis Batch: 267866

Client Sample ID: 490-83497-B-1 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	1270	E	100	2097	E 4	mg/L		829	80 - 120	0	20

Lab Sample ID: MB 490-267867/3
Matrix: Water
Analysis Batch: 267867

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			07/25/15 00:49	1

Lab Sample ID: LCS 490-267867/4
Matrix: Water
Analysis Batch: 267867

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.597		mg/L		96	80 - 120

Lab Sample ID: 490-83497-B-1 MS
Matrix: Water
Analysis Batch: 267867

Client Sample ID: Biotic_072315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	9.561		mg/L		95	80 - 120

Lab Sample ID: 490-83497-B-1 MSD
Matrix: Water
Analysis Batch: 267867

Client Sample ID: Biotic_072315
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	9.860		mg/L		98	80 - 120	3	20

Lab Sample ID: MB 490-271466/6
Matrix: Water
Analysis Batch: 271466

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			08/06/15 19:55	1

Lab Sample ID: LCS 490-271466/7
Matrix: Water
Analysis Batch: 271466

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	103.6		mg/L		104	80 - 120

Lab Sample ID: LCSD 490-271466/8
Matrix: Water
Analysis Batch: 271466

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
Sulfate	100	103.7		mg/L		104	80 - 120	0	20

Lab Sample ID: 490-83988-A-1 MS
Matrix: Water
Analysis Batch: 271466

Client Sample ID: 490-83988-A-1 MS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	17.4		100	115.3		mg/L		98	80 - 120

Lab Sample ID: 490-83988-A-1 MSD
Matrix: Water
Analysis Batch: 271466

Client Sample ID: 490-83988-A-1 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	17.4		100	114.8		mg/L		97	80 - 120	0	20

Lab Sample ID: MB 490-271467/6
Matrix: Water
Analysis Batch: 271467

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			08/06/15 19:55	1

Lab Sample ID: LCS 490-271467/7
Matrix: Water
Analysis Batch: 271467

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.983		mg/L		100	80 - 120

Lab Sample ID: LCSD 490-271467/8
Matrix: Water
Analysis Batch: 271467

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
Nitrate as N	10.0	10.33		mg/L		103	80 - 120	3	20

Method: 9056 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 490-83988-1 MS
Matrix: Water
Analysis Batch: 271467

Client Sample ID: Control_073015
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	1.66	H	10.0	11.49		mg/L		98	80 - 120

Lab Sample ID: 490-83988-1 MSD
Matrix: Water
Analysis Batch: 271467

Client Sample ID: Control_073015
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	1.66	H	10.0	11.17		mg/L		95	80 - 120	3	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-268315/1-A
Matrix: Solid
Analysis Batch: 269296

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268315

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.500		mg/Kg		07/27/15 10:20	07/29/15 17:47	1
Chromium	ND		0.500		mg/Kg		07/27/15 10:20	07/29/15 17:47	1

Lab Sample ID: MB 490-268315/1-A
Matrix: Solid
Analysis Batch: 269578

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268315

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		5.00		mg/Kg		07/27/15 10:20	07/30/15 17:09	1

Lab Sample ID: MB 490-268315/1-A
Matrix: Solid
Analysis Batch: 270256

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 268315

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		0.500		mg/Kg		07/27/15 10:20	07/31/15 16:46	1

Lab Sample ID: LCS 490-268315/2-A
Matrix: Solid
Analysis Batch: 269296

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.9	18.35		mg/Kg		92	80 - 120
Chromium	19.9	17.71		mg/Kg		89	80 - 120

Lab Sample ID: LCS 490-268315/2-A
Matrix: Solid
Analysis Batch: 269578

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	199	212.2		mg/Kg		106	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 490-268315/2-A
Matrix: Solid
Analysis Batch: 270256

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	19.9	19.16		mg/Kg		96	80 - 120

Lab Sample ID: 490-83497-2 MS
Matrix: Solid
Analysis Batch: 269296

Client Sample ID: Biotic_072315
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	198	F2	25.0	221.8	4	mg/Kg	☼	95	75 - 125
Chromium	45.7		25.0	69.87		mg/Kg	☼	97	75 - 125

Lab Sample ID: 490-83497-2 MS
Matrix: Solid
Analysis Batch: 269578

Client Sample ID: Biotic_072315
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	3210	F2	250	3595	4	mg/Kg	☼	152	75 - 125

Lab Sample ID: 490-83497-2 MS
Matrix: Solid
Analysis Batch: 270256

Client Sample ID: Biotic_072315
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	233		25.0	284.1	4	mg/Kg	☼	203	75 - 125

Lab Sample ID: 490-83497-2 MSD
Matrix: Solid
Analysis Batch: 269296

Client Sample ID: Biotic_072315
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	198	F2	24.8	275.7	4 F2	mg/Kg	☼	313	75 - 125	22	20
Chromium	45.7		24.8	73.86		mg/Kg	☼	113	75 - 125	6	20

Lab Sample ID: 490-83497-2 MSD
Matrix: Solid
Analysis Batch: 270256

Client Sample ID: Biotic_072315
Prep Type: Total/NA
Prep Batch: 268315

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	233		24.8	337.0	4	mg/Kg	☼	417	75 - 125	17	20

Lab Sample ID: MB 490-267805/1-A
Matrix: Water
Analysis Batch: 269196

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 267805

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		07/24/15 14:43	07/29/15 12:39	1
Chromium	ND		0.00200		mg/L		07/24/15 14:43	07/29/15 12:39	1
Copper	ND		0.00200		mg/L		07/24/15 14:43	07/29/15 12:39	1
Iron	ND		0.0250		mg/L		07/24/15 14:43	07/29/15 12:39	1

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-267805/1-A
Matrix: Water
Analysis Batch: 269578

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 267805

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		0.00200		mg/L		07/24/15 14:43	07/30/15 15:46	1

Lab Sample ID: LCS 490-267805/2-A
Matrix: Water
Analysis Batch: 269196

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 267805

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.1079		mg/L		108	80 - 120
Chromium	0.100	0.09275		mg/L		93	80 - 120
Copper	0.100	0.09437		mg/L		94	80 - 120
Iron	1.00	0.9999		mg/L		100	80 - 120

Lab Sample ID: LCS 490-267805/2-A
Matrix: Water
Analysis Batch: 269578

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 267805

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	0.100	0.09592		mg/L		96	80 - 120

Lab Sample ID: MB 490-270526/1-A
Matrix: Water
Analysis Batch: 271145

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 270526

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		08/04/15 10:51	08/05/15 23:02	1
Chromium	ND		0.00200		mg/L		08/04/15 10:51	08/05/15 23:02	1
Copper	ND		0.00200		mg/L		08/04/15 10:51	08/05/15 23:02	1
Iron	ND		0.0250		mg/L		08/04/15 10:51	08/05/15 23:02	1

Lab Sample ID: LCS 490-270526/2-A
Matrix: Water
Analysis Batch: 271145

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 270526

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09438		mg/L		94	80 - 120
Chromium	0.100	0.09583		mg/L		96	80 - 120
Copper	0.100	0.09148		mg/L		91	80 - 120
Iron	1.00	0.9768		mg/L		98	80 - 120

Lab Sample ID: 490-83431-A-5-B MS
Matrix: Water
Analysis Batch: 269196

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 267805

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.1021		mg/L		101	75 - 125
Chromium	ND		0.100	0.09032		mg/L		90	75 - 125
Copper	ND		0.100	0.08896		mg/L		89	75 - 125
Iron	9.91		1.00	10.04	4	mg/L		13	75 - 125

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-83431-A-5-B MS
Matrix: Water
Analysis Batch: 269578

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 267805

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	ND		0.100	0.08986		mg/L		89	75 - 125

Lab Sample ID: 490-83431-A-5-C MSD
Matrix: Water
Analysis Batch: 269196

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 267805

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.1037		mg/L		103	75 - 125	2	20
Chromium	ND		0.100	0.09120		mg/L		91	75 - 125	1	20
Copper	ND		0.100	0.08646		mg/L		86	75 - 125	3	20
Iron	9.91		1.00	10.20	4	mg/L		29	75 - 125	2	20

Lab Sample ID: 490-83431-A-5-C MSD
Matrix: Water
Analysis Batch: 269578

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 267805

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	ND		0.100	0.08769		mg/L		87	75 - 125	2	20

Lab Sample ID: 490-84150-A-6-B MS
Matrix: Water
Analysis Batch: 271145

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 270526

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.152		0.100	0.2591		mg/L		107	75 - 125
Chromium	ND		0.100	0.09622		mg/L		95	75 - 125
Copper	ND		0.100	0.08747		mg/L		87	75 - 125
Iron	ND		1.00	0.9817		mg/L		98	75 - 125

Lab Sample ID: 490-84150-A-6-C MSD
Matrix: Water
Analysis Batch: 271145

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 270526

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.152		0.100	0.2507		mg/L		98	75 - 125	3	20
Chromium	ND		0.100	0.09294		mg/L		92	75 - 125	3	20
Copper	ND		0.100	0.08631		mg/L		86	75 - 125	1	20
Iron	ND		1.00	0.9438		mg/L		94	75 - 125	4	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-270945/1
Matrix: Water
Analysis Batch: 270945

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/31/15 10:15	1

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: LCS 490-270945/2
Matrix: Water
Analysis Batch: 270945

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1040		mg/L		104	85 - 115

Lab Sample ID: MB 490-270949/1
Matrix: Water
Analysis Batch: 270949

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			07/24/15 10:44	1

Lab Sample ID: LCS 490-270949/2
Matrix: Water
Analysis Batch: 270949

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.1000		mg/L		100	85 - 115

Lab Sample ID: 490-83538-B-1 MS
Matrix: Water
Analysis Batch: 270949

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND		1000	1000		mg/L		100	85 - 115

Lab Sample ID: 490-83538-B-1 MSD
Matrix: Water
Analysis Batch: 270949

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		1000	1000		mg/L		100	85 - 115	0	20

Lab Sample ID: 490-83538-A-1 DU
Matrix: Water
Analysis Batch: 270949

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hex	ND		ND		mg/L		NC	20

Lab Sample ID: 490-83988-1 MS
Matrix: Water
Analysis Batch: 270945

Client Sample ID: Control_073015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.0140		0.100	0.1100		mg/L		96	85 - 115

Lab Sample ID: 490-83988-1 MSD
Matrix: Water
Analysis Batch: 270945

Client Sample ID: Control_073015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	0.0140		0.100	0.1100		mg/L		96	85 - 115	0	20

Lab Sample ID: 490-83988-1 DU
Matrix: Water
Analysis Batch: 270945

Client Sample ID: Control_073015
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	0.0140			0.01400		mg/L				0	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-83468-E-1 DU
Matrix: Solid
Analysis Batch: 267648

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	6.1			6.2		%				2	20
Percent Solids	94			94		%				0.1	20

HPLC/IC

Analysis Batch: 267866

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-1	Biotic_072315	Total/NA	Water	9056	
490-83497-3	Biotic Dup_072315	Total/NA	Water	9056	
490-83497-B-1 MS	490-83497-B-1 MS	Total/NA	Water	9056	
490-83497-B-1 MSD	490-83497-B-1 MSD	Total/NA	Water	9056	
LCS 490-267866/4	Lab Control Sample	Total/NA	Water	9056	
MB 490-267866/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 267867

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-1	Biotic_072315	Total/NA	Water	9056	
490-83497-3	Biotic Dup_072315	Total/NA	Water	9056	
490-83497-B-1 MS	Biotic_072315	Total/NA	Water	9056	
490-83497-B-1 MSD	Biotic_072315	Total/NA	Water	9056	
LCS 490-267867/4	Lab Control Sample	Total/NA	Water	9056	
MB 490-267867/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 271466

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Total/NA	Water	9056	
490-83988-A-1 MS	490-83988-A-1 MS	Total/NA	Water	9056	
490-83988-A-1 MSD	490-83988-A-1 MSD	Total/NA	Water	9056	
LCS 490-271466/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-271466/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-271466/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 271467

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Total/NA	Water	9056	
490-83988-1 MS	Control_073015	Total/NA	Water	9056	
490-83988-1 MSD	Control_073015	Total/NA	Water	9056	
LCS 490-271467/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-271467/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-271467/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 267805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83431-A-5-B MS	Matrix Spike	Dissolved	Water	3005A	
490-83431-A-5-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-83497-1	Biotic_072315	Dissolved	Water	3005A	
490-83497-3	Biotic Dup_072315	Dissolved	Water	3005A	
LCS 490-267805/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-267805/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 268315

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-2	Biotic_072315	Total/NA	Solid	3051A	
490-83497-2 MS	Biotic_072315	Total/NA	Solid	3051A	
490-83497-2 MSD	Biotic_072315	Total/NA	Solid	3051A	

Metals (Continued)

Prep Batch: 268315 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-4	Biotic Dup_072315	Total/NA	Solid	3051A	
490-83497-6	Control_072315	Total/NA	Solid	3051A	
LCS 490-268315/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-268315/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 269196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83431-A-5-B MS	Matrix Spike	Dissolved	Water	6020	267805
490-83431-A-5-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	267805
490-83497-1	Biotic_072315	Dissolved	Water	6020	267805
490-83497-1	Biotic_072315	Dissolved	Water	6020	267805
490-83497-1	Biotic_072315	Dissolved	Water	6020	267805
490-83497-3	Biotic Dup_072315	Dissolved	Water	6020	267805
490-83497-3	Biotic Dup_072315	Dissolved	Water	6020	267805
490-83497-3	Biotic Dup_072315	Dissolved	Water	6020	267805
LCS 490-267805/2-A	Lab Control Sample	Total Recoverable	Water	6020	267805
MB 490-267805/1-A	Method Blank	Total Recoverable	Water	6020	267805

Analysis Batch: 269296

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-2	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-2 MS	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-2 MSD	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-4	Biotic Dup_072315	Total/NA	Solid	6020	268315
490-83497-6	Control_072315	Total/NA	Solid	6020	268315
LCS 490-268315/2-A	Lab Control Sample	Total/NA	Solid	6020	268315
MB 490-268315/1-A	Method Blank	Total/NA	Solid	6020	268315

Analysis Batch: 269578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83431-A-5-B MS	Matrix Spike	Dissolved	Water	6020	267805
490-83431-A-5-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	267805
490-83497-1	Biotic_072315	Dissolved	Water	6020	267805
490-83497-2	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-2 MS	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-3	Biotic Dup_072315	Dissolved	Water	6020	267805
490-83497-4	Biotic Dup_072315	Total/NA	Solid	6020	268315
490-83497-6	Control_072315	Total/NA	Solid	6020	268315
LCS 490-267805/2-A	Lab Control Sample	Total Recoverable	Water	6020	267805
LCS 490-268315/2-A	Lab Control Sample	Total/NA	Solid	6020	268315
MB 490-267805/1-A	Method Blank	Total Recoverable	Water	6020	267805
MB 490-268315/1-A	Method Blank	Total/NA	Solid	6020	268315

Analysis Batch: 270256

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-2	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-2 MS	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-2 MSD	Biotic_072315	Total/NA	Solid	6020	268315
490-83497-4	Biotic Dup_072315	Total/NA	Solid	6020	268315
490-83497-6	Control_072315	Total/NA	Solid	6020	268315
LCS 490-268315/2-A	Lab Control Sample	Total/NA	Solid	6020	268315

Metals (Continued)

Analysis Batch: 270256 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 490-268315/1-A	Method Blank	Total/NA	Solid	6020	268315

Prep Batch: 270526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	3005A	270785
490-84150-A-6-B MS	Matrix Spike	Dissolved	Water	3005A	
490-84150-A-6-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-270526/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-270526/1-A	Method Blank	Total Recoverable	Water	3005A	

Filtration Batch: 270785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	Filtration	

Analysis Batch: 271145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	6020	270526
490-84150-A-6-B MS	Matrix Spike	Dissolved	Water	6020	270526
490-84150-A-6-C MSD	Matrix Spike Duplicate	Dissolved	Water	6020	270526
LCS 490-270526/2-A	Lab Control Sample	Total Recoverable	Water	6020	270526
MB 490-270526/1-A	Method Blank	Total Recoverable	Water	6020	270526

Analysis Batch: 271729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	6020	270526

General Chemistry

Analysis Batch: 267648

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83468-E-1 DU	Duplicate	Total/NA	Solid	Moisture	
490-83497-2	Biotic_072315	Total/NA	Solid	Moisture	
490-83497-4	Biotic Dup_072315	Total/NA	Solid	Moisture	
490-83497-6	Control_072315	Total/NA	Solid	Moisture	

Analysis Batch: 270945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	7196A	270946
490-83988-1 DU	Control_073015	Dissolved	Water	7196A	270946
490-83988-1 MS	Control_073015	Dissolved	Water	7196A	270946
490-83988-1 MSD	Control_073015	Dissolved	Water	7196A	270946
LCS 490-270945/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-270945/1	Method Blank	Total/NA	Water	7196A	

Filtration Batch: 270946

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83988-1	Control_073015	Dissolved	Water	Filtration	
490-83988-1 DU	Control_073015	Dissolved	Water	Filtration	
490-83988-1 MS	Control_073015	Dissolved	Water	Filtration	
490-83988-1 MSD	Control_073015	Dissolved	Water	Filtration	

General Chemistry (Continued)

Analysis Batch: 270949

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-1	Biotic_072315	Dissolved	Water	7196A	270950
490-83497-3	Biotic Dup_072315	Dissolved	Water	7196A	270950
490-83538-A-1 DU	Duplicate	Total/NA	Water	7196A	
490-83538-B-1 MS	Matrix Spike	Total/NA	Water	7196A	
490-83538-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
LCS 490-270949/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-270949/1	Method Blank	Total/NA	Water	7196A	

Filtration Batch: 270950

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-83497-1	Biotic_072315	Dissolved	Water	Filtration	
490-83497-3	Biotic Dup_072315	Dissolved	Water	Filtration	

Client Sample ID: Biotic_072315
Date Collected: 07/23/15 12:35
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-1
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	9056		1	10 mL		267867	07/25/15 01:29	CLN	TAL NSH
Total/NA	Analysis	9056		5	10 mL		267866	07/25/15 02:29	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	269578	07/30/15 16:30	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	269196	07/29/15 13:46	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	269196	07/29/15 15:31	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	269196	07/29/15 15:41	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	270949	07/24/15 10:44	BLM	TAL NSH
Dissolved	Filtration	Filtration			10 mL	1.0 mL	270950	08/05/15 13:42	BLM	TAL NSH

Client Sample ID: Biotic_072315
Date Collected: 07/23/15 12:35
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.511 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.511 g	100 mL	269578	07/30/15 17:20	CME	TAL NSH
Total/NA	Prep	3051A			0.511 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.511 g	100 mL	270256	07/31/15 16:57	CME	TAL NSH
Total/NA	Prep	3051A			0.511 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.511 g	100 mL	269296	07/29/15 17:57	CME	TAL NSH
Total/NA	Analysis	Moisture		1			267648	07/24/15 10:20	MAA	TAL NSH

Client Sample ID: Biotic Dup_072315
Date Collected: 07/23/15 12:45
Date Received: 07/24/15 08:40

Lab Sample ID: 490-83497-3
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	9056		1	10 mL		267867	07/25/15 02:49	CLN	TAL NSH
Total/NA	Analysis	9056		5	10 mL		267866	07/25/15 03:09	CLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	269578	07/30/15 16:36	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	269196	07/29/15 13:51	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	269196	07/29/15 15:36	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	267805	07/24/15 14:43	ZLN	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	269196	07/29/15 15:46	CME	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	270949	07/24/15 10:46	BLM	TAL NSH
Dissolved	Filtration	Filtration			10 mL	1.0 mL	270950	08/05/15 13:42	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Client Sample ID: Biotic Dup_072315

Lab Sample ID: 490-83497-4

Date Collected: 07/23/15 12:45

Matrix: Solid

Date Received: 07/24/15 08:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.523 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.523 g	100 mL	269578	07/30/15 17:48	CME	TAL NSH
Total/NA	Prep	3051A			0.523 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		5	0.523 g	100 mL	270256	07/31/15 17:25	CME	TAL NSH
Total/NA	Prep	3051A			0.523 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.523 g	100 mL	269296	07/29/15 18:23	CME	TAL NSH
Total/NA	Analysis	Moisture		1			267648	07/24/15 10:20	MAA	TAL NSH

Client Sample ID: Control_072315

Lab Sample ID: 490-83497-6

Date Collected: 07/23/15 12:25

Matrix: Solid

Date Received: 07/24/15 08:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.502 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.502 g	100 mL	269578	07/30/15 17:59	CME	TAL NSH
Total/NA	Prep	3051A			0.502 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.502 g	100 mL	270256	07/31/15 17:30	CME	TAL NSH
Total/NA	Prep	3051A			0.502 g	100 mL	268315	07/27/15 10:20	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.502 g	100 mL	269296	07/29/15 18:28	CME	TAL NSH
Total/NA	Analysis	Moisture		1			267648	07/24/15 10:20	MAA	TAL NSH

Client Sample ID: Control_073015

Lab Sample ID: 490-83988-1

Date Collected: 07/30/15 14:45

Matrix: Water

Date Received: 07/31/15 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056		1	10 mL		271467	08/06/15 20:55	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		271466	08/06/15 21:55	JHS	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	270785	08/05/15 09:06	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	270526	08/05/15 09:09	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	271145	08/06/15 00:28	CME	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	270785	08/05/15 09:06	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	270526	08/05/15 09:09	ZLN	TAL NSH
Dissolved	Analysis	6020		100	50 mL	50 mL	271729	08/07/15 10:45	CME	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	270946	07/31/15 10:04	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	270945	07/31/15 10:15	BLM	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-83497-1

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-16
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	09-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-15 *
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15 *
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15 *
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-15 *
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15 *
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-83497 Chain of Custody

Cooler Received/Opened On 7/24/2015 @ 0840

1. Tracking # 2599 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 12080142

2. Temperature of rep. sample or temp blank when opened: 3.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO..(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: one front

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) DA

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) (Ice-pack) Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES..(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES..(NO)..NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) DA

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) DA

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) DA

I certify that I attached a label with the unique LIMS number to each container (intial) DA

21. Were there Non-Conformance issues at login? YES..(NO) Was a NCM generated? YES..(NO)..#_____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

TestAmerica Nashville
2960 Foster Creighton Drive

Nashville, TN 37204
phone 615.726.0177 fax

Loc: 490
83497

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

8/9/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	Date: 7/23/15	COC No: 1
Amar Wadhawan	Email:AWadhawan@Geosyntec.com	Lab Contact: Heather Baker	Carrier: Fedex	1 of 1 COCs
Geosyntec Consultants	**Analysis Turnaround Time**			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
Columbia Phone (410) 910-7619	TAT if different from Below _____			Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Sample Specific Notes:
1	Biotic_072315	7/23/2015	1235	G	W	1	Y			X	X	HNO3 preserved
	Biotic_072315	7/23/2015	1235	G	W	1	N		X			
2	Biotic_072315	7/23/2015	1235	G	S	1	N				X	
3	Biotic Dup_072315	7/23/2015	1245	G	W	1	Y			X	X	HNO3 preserved
	Biotic Dup_072315	7/23/2015	1245	G	W	1	N		X			
4	Biotic Dup_072315	7/23/2015	1245	G	S	1	N				X	
5	Control_072315	7/23/2015	1225	G	W	1	N			X	X	HNO3 preserved
	Control_072315	7/23/2015	1225	G	W	1	N		X			
6	Control_072315	7/23/2015	1225	G	S	1	N				X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd:_____ Corr'd:_____		Therm ID No.:_____
Relinquished by: Linxi Chen	Company: Geosyntec Consultants	Date/Time: 7/23/15 1315	Received by:	Company: TA	Date/Time: 07-23-15 1455
Relinquished by:	Company:	Date/Time:	Received by:	Company: TAN	Date/Time: 7-24-15 0840
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Temp. 3.1

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-83988 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 7/31/2015 @ 0830

1. Tracking # 6702 (last 4 digits, FedEx)

Courier: Fed-ex IR Gun ID 17960357

2. Temperature of rep. sample or temp blank when opened: 3.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 1 Front / 1 Back

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) _____

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MDM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MDM

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MDM

I certify that I attached a label with the unique LIMS number to each container (intial) MDM

21. Were there Non-Conformance issues at login? YES...NO Was a NCM generated? YES...NO...#_____

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive

Nashville, TN 37204
phone 615.726.0177 fax

Chain of Custody Record

Loc: 490
83988

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

8/9/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	Date: 7/30/15	COC No: 1
Amar Wadhawan	Email:AWadhawan@Geosyntec.com	Lab Contact: Heather Baker	Carrier: Fedex	___1___ of ___1__ COCs
Geosyntec Consultants	**Analysis Turnaround Time**			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
Columbia Phone (410) 910-7619	TAT if different from Below _____			Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Sample Specific Notes:
Control_073015	7/30/2015	1445	G	W	1	N			X	X	
Control_073015	7/30/2015	1445	G	S	1	N				X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ | Therm ID No.:_____

Relinquished by: ~~Linxi Chen~~	Company: Geosyntec Consultants	Date/Time: 07/30/15 1615	Received by:	Company: TA	Date/Time: 7/30/15 1615
Relinquished by:	Company: TA	Date/Time: 7/30/15 1619	Received by:	Company: TAN	Date/Time: 7.31.15 @ 0830 3/c
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-83497-1

Login Number: 83497
List Number: 1
Creator: Armstrong, Daniel

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	3.1C
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
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	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-84899-1
TestAmerica Sample Delivery Group: TEL
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
8/26/2015 2:28:41 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 15
Chronicle 17
Method Summary 19
Certification Summary 20
Chain of Custody 21
Receipt Checklists 23

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-84899-1	Biotic_081115	Water	08/11/15 11:30	08/12/15 09:45
490-84899-2	Biotic_081115	Solid	08/11/15 11:30	08/12/15 09:45
490-84899-3	Biotic Dup_081115	Water	08/11/15 11:45	08/12/15 09:45
490-84899-4	Biotic Dup_081115	Solid	08/11/15 11:45	08/12/15 09:45

Job ID: 490-84899-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-84899-1

Comments
No additional comments.

Receipt
The samples were received on 8/12/2015 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.5º C.

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: Biotic_081115 (490-84899-1) and Biotic Dup_081115 (490-84899-3). Elevated reporting limits (RLs) are provided.

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

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method 7196A: The following samples with a holding time of 24 hours, were received with less than one 8 hour shift remaining of holding time: Biotic_081115 (490-84899-1) and Biotic Dup_081115 (490-84899-3). Because of this, the samples were unable to be analyzed within holding time.

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
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.
E	Result exceeded calibration range.

Metals

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance 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.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample ID: Biotic_081115

Date Collected: 08/11/15 11:30
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-1

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			08/12/15 13:57	1
Sulfate	**2410**		5.00		mg/L			08/12/15 14:55	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**32.7**		0.100		mg/L		08/17/15 09:46	08/19/15 22:26	50
Chromium	ND		0.100		mg/L		08/17/15 09:46	08/19/15 22:26	50
Copper	**2.59**		0.0100		mg/L		08/17/15 09:46	08/19/15 00:40	5
Iron	ND		1.25		mg/L		08/17/15 09:46	08/19/15 22:26	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.100		mg/L			08/12/15 12:52	10

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Client Sample ID: Biotic_081115
Date Collected: 08/11/15 11:30
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-2
Matrix: Solid
Percent Solids: 77.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	150		0.641		mg/Kg	☼	08/13/15 08:51	08/13/15 13:42	1
Chromium	30.3		0.641		mg/Kg	☼	08/13/15 08:51	08/13/15 13:42	1
Copper	171		0.641		mg/Kg	☼	08/13/15 08:51	08/13/15 13:42	1
Iron	1950		6.41		mg/Kg	☼	08/13/15 08:51	08/13/15 13:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	22		0.10		%			08/12/15 08:59	1
Percent Solids	78		0.10		%			08/12/15 08:59	1

Client Sample ID: Biotic Dup_081115

Date Collected: 08/11/15 11:45
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-3

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			08/12/15 15:33	1
Sulfate	**2440**		5.00		mg/L			08/12/15 15:52	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**27.6**		0.100		mg/L		08/17/15 09:46	08/19/15 22:32	50
Chromium	ND		0.100		mg/L		08/17/15 09:46	08/19/15 22:32	50
Copper	**3.39**		0.0100		mg/L		08/17/15 09:46	08/19/15 00:46	5
Iron	ND		1.25		mg/L		08/17/15 09:46	08/19/15 22:32	50

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			08/12/15 12:54	1

Client Sample ID: Biotic Dup_081115

Date Collected: 08/11/15 11:45
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-4

Matrix: Solid
Percent Solids: 80.5

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	136		0.625		mg/Kg	☼	08/13/15 08:51	08/13/15 13:59	1
Chromium	31.2		0.625		mg/Kg	☼	08/13/15 08:51	08/13/15 13:59	1
Copper	163		0.625		mg/Kg	☼	08/13/15 08:51	08/13/15 13:59	1
Iron	1990		6.25		mg/Kg	☼	08/13/15 08:51	08/13/15 13:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	20		0.10		%			08/12/15 08:59	1
Percent Solids	80		0.10		%			08/12/15 08:59	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-272759/3
Matrix: Water
Analysis Batch: 272759

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			08/12/15 13:00	1

Lab Sample ID: LCS 490-272759/4
Matrix: Water
Analysis Batch: 272759

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	91.28		mg/L		91	80 - 120

Lab Sample ID: LCSD 490-272759/5
Matrix: Water
Analysis Batch: 272759

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
Sulfate	100	91.69		mg/L		92	80 - 120	0	20

Lab Sample ID: 490-84899-B-1 MS
Matrix: Water
Analysis Batch: 272759

Client Sample ID: 490-84899-B-1 MS
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	2790	E	100	2376	E 4	mg/L		-415	80 - 120

Lab Sample ID: 490-84899-B-1 MSD
Matrix: Water
Analysis Batch: 272759

Client Sample ID: 490-84899-B-1 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	2790	E	100	2366	E 4	mg/L		-425	80 - 120	0	20

Lab Sample ID: MB 490-272760/3
Matrix: Water
Analysis Batch: 272760

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			08/12/15 13:00	1

Lab Sample ID: LCS 490-272760/4
Matrix: Water
Analysis Batch: 272760

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.669		mg/L		97	80 - 120

Lab Sample ID: LCSD 490-272760/5
Matrix: Water
Analysis Batch: 272760

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
Nitrate as N	10.0	9.671		mg/L		97	80 - 120	0	20

Lab Sample ID: 490-84899-1 MS
Matrix: Water
Analysis Batch: 272760

Client Sample ID: Biotic_081115
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	8.961		mg/L		90	80 - 120

Lab Sample ID: 490-84899-1 MSD
Matrix: Water
Analysis Batch: 272760

Client Sample ID: Biotic_081115
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	10.17		mg/L		102	80 - 120	13	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-272842/1-A
Matrix: Solid
Analysis Batch: 273149

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 272842

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.498		mg/Kg		08/13/15 08:51	08/13/15 12:56	1
Chromium	ND		0.498		mg/Kg		08/13/15 08:51	08/13/15 12:56	1
Copper	ND		0.498		mg/Kg		08/13/15 08:51	08/13/15 12:56	1
Iron	ND		4.98		mg/Kg		08/13/15 08:51	08/13/15 12:56	1

Lab Sample ID: LCS 490-272842/2-A
Matrix: Solid
Analysis Batch: 273149

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 272842

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.8	19.52		mg/Kg		99	80 - 120
Chromium	19.8	20.55		mg/Kg		104	80 - 120
Copper	19.8	19.19		mg/Kg		97	80 - 120
Iron	198	199.8		mg/Kg		101	80 - 120

Lab Sample ID: 490-84794-L-1-C MS
Matrix: Solid
Analysis Batch: 273149

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 272842

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	1.12	F1	24.1	17.79	F1	mg/Kg	☼	69	75 - 125
Chromium	10.3		24.1	35.08		mg/Kg	☼	103	75 - 125
Copper	21.0		24.1	41.96		mg/Kg	☼	87	75 - 125
Iron	7510		241	9020	4	mg/Kg	☼	627	75 - 125

Lab Sample ID: 490-84794-L-1-D MSD
Matrix: Solid
Analysis Batch: 273149

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 272842

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	1.12	F1	23.5	17.83	F1	mg/Kg	☼	71	75 - 125	0	20
Chromium	10.3		23.5	34.09		mg/Kg	☼	101	75 - 125	3	20
Copper	21.0		23.5	39.87		mg/Kg	☼	80	75 - 125	5	20
Iron	7510		235	8500	4	mg/Kg	☼	421	75 - 125	6	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-273688/1-A
Matrix: Water
Analysis Batch: 274373

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 273688

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		08/17/15 09:46	08/18/15 23:31	1
Copper	ND		0.00200		mg/L		08/17/15 09:46	08/18/15 23:31	1

Lab Sample ID: MB 490-273688/1-A
Matrix: Water
Analysis Batch: 274758

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 273688

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.00200		mg/L		08/17/15 09:46	08/19/15 21:46	1
Iron	ND		0.0250		mg/L		08/17/15 09:46	08/19/15 21:46	1

Lab Sample ID: LCS 490-273688/2-A
Matrix: Water
Analysis Batch: 274373

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 273688

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09431		mg/L		94	80 - 120
Copper	0.100	0.1041		mg/L		104	80 - 120

Lab Sample ID: LCS 490-273688/2-A
Matrix: Water
Analysis Batch: 274758

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 273688

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.100	0.1008		mg/L		101	80 - 120
Iron	1.00	1.083		mg/L		108	80 - 120

Lab Sample ID: 490-84907-A-1-D MS
Matrix: Water
Analysis Batch: 274373

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 273688

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.09608		mg/L		96	75 - 125
Copper	ND		0.100	0.1064		mg/L		106	75 - 125

Lab Sample ID: 490-84907-A-1-D MS
Matrix: Water
Analysis Batch: 274758

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 273688

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		0.100	0.1022		mg/L		102	75 - 125
Iron	ND		1.00	1.113		mg/L		111	75 - 125

Lab Sample ID: 490-84907-A-1-E MSD
Matrix: Water
Analysis Batch: 274373

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 273688

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.09665		mg/L		97	75 - 125	1	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 490-84907-A-1-E MSD
Matrix: Water
Analysis Batch: 274373

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 273688

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	ND		0.100	0.1057		mg/L		106	75 - 125	1	20

Lab Sample ID: 490-84907-A-1-E MSD
Matrix: Water
Analysis Batch: 274758

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 273688

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		0.100	0.1035		mg/L		104	75 - 125	1	20
Iron	ND		1.00	1.120		mg/L		112	75 - 125	1	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-272893/11
Matrix: Water
Analysis Batch: 272893

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			08/12/15 10:13	1

Lab Sample ID: LCS 490-272893/12
Matrix: Water
Analysis Batch: 272893

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	0.100	0.09800		mg/L		98	85 - 115

Lab Sample ID: 490-84899-1 MS
Matrix: Water
Analysis Batch: 272893

Client Sample ID: Biotic_081115
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hex	ND	H	1.00	0.9200		mg/L		92	85 - 115

Lab Sample ID: 490-84899-1 MSD
Matrix: Water
Analysis Batch: 272893

Client Sample ID: Biotic_081115
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND	H	1.00	0.9200		mg/L		92	85 - 115	0	20

Lab Sample ID: 490-84899-1 DU
Matrix: Water
Analysis Batch: 272893

Client Sample ID: Biotic_081115
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hex	ND	H	ND		mg/L		NC	20

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Method: Moisture - Percent Moisture

Lab Sample ID: 490-84899-2 DU
Matrix: Solid
Analysis Batch: 272556

Client Sample ID: Biotic_081115
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	22			21		%				7	20
Percent Solids	78			79		%				2	20

HPLC/IC

Analysis Batch: 272759

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Total/NA	Water	9056	
490-84899-3	Biotic Dup_081115	Total/NA	Water	9056	
490-84899-B-1 MS	490-84899-B-1 MS	Total/NA	Water	9056	
490-84899-B-1 MSD	490-84899-B-1 MSD	Total/NA	Water	9056	
LCS 490-272759/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-272759/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-272759/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 272760

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Total/NA	Water	9056	
490-84899-1 MS	Biotic_081115	Total/NA	Water	9056	
490-84899-1 MSD	Biotic_081115	Total/NA	Water	9056	
490-84899-3	Biotic Dup_081115	Total/NA	Water	9056	
LCS 490-272760/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-272760/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-272760/3	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 272842

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84794-L-1-C MS	Matrix Spike	Total/NA	Solid	3051A	
490-84794-L-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
490-84899-2	Biotic_081115	Total/NA	Solid	3051A	
490-84899-4	Biotic Dup_081115	Total/NA	Solid	3051A	
LCS 490-272842/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-272842/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 273149

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84794-L-1-C MS	Matrix Spike	Total/NA	Solid	6020	272842
490-84794-L-1-D MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	272842
490-84899-2	Biotic_081115	Total/NA	Solid	6020	272842
490-84899-4	Biotic Dup_081115	Total/NA	Solid	6020	272842
LCS 490-272842/2-A	Lab Control Sample	Total/NA	Solid	6020	272842
MB 490-272842/1-A	Method Blank	Total/NA	Solid	6020	272842

Prep Batch: 273688

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Dissolved	Water	3005A	
490-84899-3	Biotic Dup_081115	Dissolved	Water	3005A	
490-84907-A-1-D MS	Matrix Spike	Dissolved	Water	3005A	
490-84907-A-1-E MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-273688/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-273688/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 274373

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Dissolved	Water	6020	273688

Metals (Continued)

Analysis Batch: 274373 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-3	Biotic Dup_081115	Dissolved	Water	6020	273688
490-84907-A-1-D MS	Matrix Spike	Dissolved	Water	6020	273688
490-84907-A-1-E MSD	Matrix Spike Duplicate	Dissolved	Water	6020	273688
LCS 490-273688/2-A	Lab Control Sample	Total Recoverable	Water	6020	273688
MB 490-273688/1-A	Method Blank	Total Recoverable	Water	6020	273688

Analysis Batch: 274758

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Dissolved	Water	6020	273688
490-84899-3	Biotic Dup_081115	Dissolved	Water	6020	273688
490-84907-A-1-D MS	Matrix Spike	Dissolved	Water	6020	273688
490-84907-A-1-E MSD	Matrix Spike Duplicate	Dissolved	Water	6020	273688
LCS 490-273688/2-A	Lab Control Sample	Total Recoverable	Water	6020	273688
MB 490-273688/1-A	Method Blank	Total Recoverable	Water	6020	273688

General Chemistry

Analysis Batch: 272556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-2	Biotic_081115	Total/NA	Solid	Moisture	
490-84899-2 DU	Biotic_081115	Total/NA	Solid	Moisture	
490-84899-4	Biotic Dup_081115	Total/NA	Solid	Moisture	

Analysis Batch: 272893

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Dissolved	Water	7196A	272905
490-84899-1 DU	Biotic_081115	Dissolved	Water	7196A	272905
490-84899-1 MS	Biotic_081115	Dissolved	Water	7196A	272905
490-84899-1 MSD	Biotic_081115	Dissolved	Water	7196A	272905
490-84899-3	Biotic Dup_081115	Dissolved	Water	7196A	272905
LCS 490-272893/12	Lab Control Sample	Total/NA	Water	7196A	
MB 490-272893/11	Method Blank	Total/NA	Water	7196A	

Filtration Batch: 272905

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84899-1	Biotic_081115	Dissolved	Water	Filtration	
490-84899-1 DU	Biotic_081115	Dissolved	Water	Filtration	
490-84899-1 MS	Biotic_081115	Dissolved	Water	Filtration	
490-84899-1 MSD	Biotic_081115	Dissolved	Water	Filtration	
490-84899-3	Biotic Dup_081115	Dissolved	Water	Filtration	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Client Sample ID: Biotic_081115
Date Collected: 08/11/15 11:30
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-1
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	9056		1	10 mL		272760	08/12/15 13:57	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		272759	08/12/15 14:55	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	273688	08/17/15 09:46	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	274373	08/19/15 00:40	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	273688	08/17/15 09:46	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	274758	08/19/15 22:26	KKK	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	272905	08/12/15 12:30	BLM	TAL NSH
Dissolved	Analysis	7196A		10	10 mL	10 mL	272893	08/12/15 12:52	BLM	TAL NSH

Client Sample ID: Biotic_081115
Date Collected: 08/11/15 11:30
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			272556	08/12/15 08:59	MAA	TAL NSH

Client Sample ID: Biotic_081115
Date Collected: 08/11/15 11:30
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-2
Matrix: Solid
Percent Solids: 77.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.501 g	100 mL	272842	08/13/15 08:51	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.501 g	100 mL	273149	08/13/15 13:42	LEG	TAL NSH

Client Sample ID: Biotic Dup_081115
Date Collected: 08/11/15 11:45
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-3
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	9056		1	10 mL		272760	08/12/15 15:33	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		272759	08/12/15 15:52	JHS	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	273688	08/17/15 09:46	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	274373	08/19/15 00:46	CME	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	273688	08/17/15 09:46	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	274758	08/19/15 22:32	KKK	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	272905	08/12/15 12:30	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	272893	08/12/15 12:54	BLM	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Client Sample ID: Biotic Dup_081115
Date Collected: 08/11/15 11:45
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			272556	08/12/15 08:59	MAA	TAL NSH

Client Sample ID: Biotic Dup_081115
Date Collected: 08/11/15 11:45
Date Received: 08/12/15 09:45

Lab Sample ID: 490-84899-4
Matrix: Solid
Percent Solids: 80.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.497 g	100 mL	272842	08/13/15 08:51	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.497 g	100 mL	273149	08/13/15 13:59	LEG	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-84899-1
SDG: TEL

Laboratory: TestAmerica Nashville

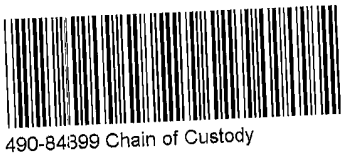
All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-16
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	09-30-15
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-15 *
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (Do Not Use - DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-16
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-16
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-16
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-16
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM


490-84399 Chain of Custody

Cooler Received/Opened On 8/12/2015 @ 9:45

1. Tracking # 5102 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 17610176

2. Temperature of rep. sample or temp blank when opened: 1.5 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO..(NA)

4. Were custody seals on outside of cooler? (YES)..NO...NA

If yes, how many and where: Back

5. Were the seals intact, signed, and dated correctly? (YES)..NO...NA

6. Were custody papers inside cooler? (YES)..NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) AJH

7. Were custody seals on containers: YES (NO) and Intact YES...NO..(NA)

Were these signed and dated correctly? YES...NO..(NA)

8. Packing mat'l used? (Bubblewrap) Plastic bag Peanuts Vermiculite Foam Insert Paper Other (None)

9. Cooling process: (Ice) Ice-pack (Ice (direct contact)) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)..NO...NA

12. Did all container labels and tags agree with custody papers? (YES)..NO...NA

13a. Were VOA vials received? YES..(NO)..NA

b. Was there any observable headspace present in any VOA vial? YES...NO..(NA)

14. Was there a Trip Blank in this cooler? YES..(NO)..NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) DA

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)..NO...NA

16. Was residual chlorine present? YES...NO..(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) DA

17. Were custody papers properly filled out (ink, signed, etc)? (YES)..NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)..NO...NA

19. Were correct containers used for the analysis requested? (YES)..NO...NA

20. Was sufficient amount of sample sent in each container? (YES)..NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) DA

I certify that I attached a label with the unique LIMS number to each container (intial) DA

21. Were there Non-Conformance issues at login? YES..(NO) Was a NCM generated? YES..(NO)..# 490-193488

DA 8-12-15

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

8/26/2015

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
phone 615.726.0177 fax

Loc: 490
84899

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

8/26/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	Date: 8/11/15	COC No: 1
Amar Wadhawan	Email:AWadhawan@Geosyntec.com	Lab Contact: Heather Baker	Carrier: Fedex	1 of 1 COCs
Geosyntec Consultants	**Analysis Turnaround Time**			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
Columbia Phone (410) 910-7619	TAT if different from Below _____			Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Sample Specific Notes:
1	Biotic_081115	8/11/2015	1130	G	W	1	Y			X	X	HNO3 preserved
	Biotic_081115	8/11/2015	1130	G	W	1	N		X			
2	Biotic_081115	8/11/2015	1130	G	S	1	N				X	
3	Biotic Dup_081115	8/11/2015	1145	G	W	1	Y			X	X	HNO3 preserved
	Biotic Dup_081115	8/11/2015	1145	G	W	1	N		X			
4	Biotic Dup_081115	8/11/2015	1145	G	S	1	N				X	
												HNO3 preserved

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by: Linxi Chen	Company: Geosyntec Consultants	Date/Time: 8/11/15 1300	Received by:	Company: TA	Date/Time: 08-11-15 1330
Relinquished by:	Company:	Date/Time:	Received by:	Company: TAN	Date/Time: 8-12-15 0945
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Temp. 1.5

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-84899-1
SDG Number: TEL

Login Number: 84899
List Number: 1
Creator: Armstrong, Daniel

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	1.5C
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
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	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-87569-1
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
10/8/2015 3:54:06 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 12
QC Association 16
Chronicle 18
Method Summary 21
Certification Summary 22
Chain of Custody 23
Receipt Checklists 25

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-87569-1	Biotic_091715	Water	09/17/15 14:30	09/18/15 09:10
490-87569-2	Biotic_091715	Solid	09/17/15 14:30	09/18/15 09:10
490-87569-3	Biotic Dup_091715	Water	09/17/15 15:00	09/18/15 09:10
490-87569-4	Biotic Dup_091715	Solid	09/17/15 15:00	09/18/15 09:10
490-87569-5	Control_091715	Water	09/17/15 14:00	09/18/15 09:10
490-87569-6	Control_091715	Solid	09/17/15 14:00	09/18/15 09:10

Case Narrative

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Job ID: 490-87569-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-87569-1

Comments
No additional comments.

Receipt
The samples were received on 9/18/2015 9:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2º C.

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: Biotic_091715 (490-87569-1) and Biotic Dup_091715 (490-87569-3). Elevated reporting limits (RLs) are provided.

Method 9056: Reanalysis of the following samples was performed outside of the analytical holding time due to a clogged auto sampler line : Biotic_091715 (490-87569-1), Biotic Dup_091715 (490-87569-3) and Control_091715 (490-87569-5). Due to this circumstance, the initial data was not usable.

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

Metals
Method 6020: The method blank for preparation batch 490-283984 and analytical batch 490-284290 contained Iron above the reporting limit (RL). There was insufficient sample to perform a re-extraction and/or re-analysis; therefore, the data have been reported.

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

Field Service / Mobile Lab
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F2	MS/MSD RPD exceeds control limits
F1	MS and/or MSD Recovery is outside acceptance 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.

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Biotic_091715
Date Collected: 09/17/15 14:30
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-1
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.118	H	0.100		mg/L			09/19/15 18:59	1
Sulfate	1750		5.00		mg/L			09/19/15 19:19	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	22.9		0.0400		mg/L		09/24/15 08:37	09/25/15 12:45	20
Chromium	0.0665		0.00200		mg/L		09/24/15 08:37	09/24/15 18:40	1
Copper	0.440		0.0100		mg/L		09/24/15 08:37	09/25/15 12:40	5
Iron	2.52	B	0.0250		mg/L		09/24/15 08:37	09/24/15 18:40	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			09/18/15 12:52	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Biotic_091715
Date Collected: 09/17/15 14:30
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-2
Matrix: Solid
Percent Solids: 85.4

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	156	F2	0.576		mg/Kg	☼	09/18/15 13:21	09/18/15 23:13	1
Chromium	28.2	F1 F2	0.576		mg/Kg	☼	09/18/15 13:21	09/18/15 23:13	1
Copper	163		0.576		mg/Kg	☼	09/18/15 13:21	09/18/15 23:13	1
Iron	2160		5.76		mg/Kg	☼	09/18/15 13:21	09/18/15 23:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	15		0.10		%			09/18/15 11:35	1
Percent Solids	85		0.10		%			09/18/15 11:35	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Biotic Dup_091715

Lab Sample ID: 490-87569-3

Date Collected: 09/17/15 15:00

Matrix: Water

Date Received: 09/18/15 09:10

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.117	H	0.100		mg/L			09/19/15 19:39	1
Sulfate	1950		5.00		mg/L			09/19/15 19:59	5

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	16.1		0.0400		mg/L		09/24/15 08:37	09/25/15 12:55	20
Chromium	0.0244		0.00200		mg/L		09/24/15 08:37	09/24/15 18:45	1
Copper	0.0591		0.00200		mg/L		09/24/15 08:37	09/24/15 18:45	1
Iron	0.333	B	0.0250		mg/L		09/24/15 08:37	09/24/15 18:45	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			09/18/15 12:52	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Biotic Dup_091715
Date Collected: 09/17/15 15:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-4
Matrix: Solid
Percent Solids: 80.7

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	371		0.596		mg/Kg	☼	09/18/15 13:21	09/18/15 23:38	1
Chromium	45.6		0.596		mg/Kg	☼	09/18/15 13:21	09/18/15 23:38	1
Copper	326		0.596		mg/Kg	☼	09/18/15 13:21	09/18/15 23:38	1
Iron	3240		5.96		mg/Kg	☼	09/18/15 13:21	09/18/15 23:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		0.10		%			09/18/15 11:35	1
Percent Solids	81		0.10		%			09/18/15 11:35	1

Client Sample Results

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Control_091715
Date Collected: 09/17/15 14:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-5
Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	1.44	H	0.100		mg/L			09/19/15 20:20	1
Sulfate	20.5		1.00		mg/L			09/19/15 20:20	1

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	13.3		0.0400		mg/L		09/24/15 08:37	09/25/15 13:06	20
Chromium	0.158		0.00200		mg/L		09/24/15 08:37	09/24/15 18:50	1
Copper	1.58		0.0100		mg/L		09/24/15 08:37	09/25/15 13:01	5
Iron	2.72	B	0.0250		mg/L		09/24/15 08:37	09/24/15 18:50	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	0.0140		0.0100		mg/L			09/18/15 12:52	1

Client Sample ID: Control_091715
Date Collected: 09/17/15 14:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-6
Matrix: Solid
Percent Solids: 81.4

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	214		0.607		mg/Kg	☼	09/18/15 13:21	09/18/15 23:43	1
Chromium	85.9		0.607		mg/Kg	☼	09/18/15 13:21	09/18/15 23:43	1
Copper	347		0.607		mg/Kg	☼	09/18/15 13:21	09/18/15 23:43	1
Iron	1650		6.07		mg/Kg	☼	09/18/15 13:21	09/18/15 23:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		0.10		%			09/18/15 11:35	1
Percent Solids	81		0.10		%			09/18/15 11:35	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-283015/6
Matrix: Water
Analysis Batch: 283015

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			09/19/15 17:59	1

Lab Sample ID: LCS 490-283015/7
Matrix: Water
Analysis Batch: 283015

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	102.6		mg/L		103	80 - 120

Lab Sample ID: LCSD 490-283015/8
Matrix: Water
Analysis Batch: 283015

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
Sulfate	100	102.5		mg/L		102	80 - 120	0	20

Lab Sample ID: 490-87601-F-1 MS
Matrix: Water
Analysis Batch: 283015

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	11.7		100	97.83		mg/L		86	80 - 120

Lab Sample ID: 490-87601-F-1 MSD
Matrix: Water
Analysis Batch: 283015

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	11.7		100	92.88		mg/L		81	80 - 120	5	20

Lab Sample ID: MB 490-283016/6
Matrix: Water
Analysis Batch: 283016

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			09/19/15 17:59	1

Lab Sample ID: LCS 490-283016/7
Matrix: Water
Analysis Batch: 283016

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.862		mg/L		99	80 - 120

Lab Sample ID: LCSD 490-283016/8
Matrix: Water
Analysis Batch: 283016

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
Nitrate as N	10.0	9.877		mg/L		99	80 - 120	0	20

Lab Sample ID: 490-87601-F-1 MS
Matrix: Water
Analysis Batch: 283016

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	0.242		10.0	9.329		mg/L		91	80 - 120

Lab Sample ID: 490-87601-F-1 MSD
Matrix: Water
Analysis Batch: 283016

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	0.242		10.0	8.834		mg/L		86	80 - 120	5	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-282741/1-A
Matrix: Solid
Analysis Batch: 283108

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 282741

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.494		mg/Kg		09/18/15 13:21	09/18/15 23:02	1
Chromium	ND		0.494		mg/Kg		09/18/15 13:21	09/18/15 23:02	1
Copper	ND		0.494		mg/Kg		09/18/15 13:21	09/18/15 23:02	1
Iron	ND		4.94		mg/Kg		09/18/15 13:21	09/18/15 23:02	1

Lab Sample ID: LCS 490-282741/2-A
Matrix: Solid
Analysis Batch: 283108

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 282741

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	20.0	19.45		mg/Kg		97	80 - 120
Chromium	20.0	19.93		mg/Kg		100	80 - 120
Copper	20.0	18.85		mg/Kg		94	80 - 120
Iron	200	197.4		mg/Kg		99	80 - 120

Lab Sample ID: 490-87569-2 MS
Matrix: Solid
Analysis Batch: 283108

Client Sample ID: Biotic_091715
Prep Type: Total/NA
Prep Batch: 282741

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	156	F2	23.1	254.1	4	mg/Kg	☼	423	75 - 125
Chromium	28.2	F1 F2	23.1	68.78	F1	mg/Kg	☼	176	75 - 125
Copper	163		23.1	196.4	4	mg/Kg	☼	147	75 - 125
Iron	2160		231	2158	4	mg/Kg	☼	-0.4	75 - 125

Lab Sample ID: 490-87569-2 MSD
Matrix: Solid
Analysis Batch: 283108

Client Sample ID: Biotic_091715
Prep Type: Total/NA
Prep Batch: 282741

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	156	F2	23.2	183.1	4 F2	mg/Kg	☼	115	75 - 125	32	20
Chromium	28.2	F1 F2	23.2	54.87	F2	mg/Kg	☼	115	75 - 125	22	20
Copper	163		23.2	203.5	4	mg/Kg	☼	176	75 - 125	4	20
Iron	2160		232	2394	4	mg/Kg	☼	101	75 - 125	10	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-283984/1-A
Matrix: Water
Analysis Batch: 284290

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 283984

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		09/23/15 17:40	09/24/15 14:12	1
Chromium	ND		0.00200		mg/L		09/23/15 17:40	09/24/15 14:12	1
Copper	ND		0.00200		mg/L		09/23/15 17:40	09/24/15 14:12	1
Iron	0.03968		0.0250		mg/L		09/23/15 17:40	09/24/15 14:12	1

Lab Sample ID: LCS 490-283984/2-A
Matrix: Water
Analysis Batch: 284290

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 283984

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.09964		mg/L		100	80 - 120
Chromium	0.100	0.1001		mg/L		100	80 - 120
Copper	0.100	0.09085		mg/L		91	80 - 120
Iron	1.00	1.025		mg/L		103	80 - 120

Lab Sample ID: 490-84862-D-17-C MS
Matrix: Water
Analysis Batch: 284290

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 283984

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.1038		mg/L		104	75 - 125
Chromium	ND		0.100	0.1043		mg/L		104	75 - 125
Copper	ND		0.100	0.09579		mg/L		96	75 - 125
Iron	ND		1.00	1.066		mg/L		107	75 - 125

Lab Sample ID: 490-84862-D-17-D MSD
Matrix: Water
Analysis Batch: 284290

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 283984

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.1071		mg/L		107	75 - 125	3	20
Chromium	ND		0.100	0.1088		mg/L		109	75 - 125	4	20
Copper	ND		0.100	0.09912		mg/L		99	75 - 125	3	20
Iron	ND		1.00	1.116		mg/L		112	75 - 125	5	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-283492/1
Matrix: Water
Analysis Batch: 283492

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			09/18/15 12:52	1

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: LCS 490-283492/2
Matrix: Water
Analysis Batch: 283492

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.09500		mg/L		95	85 - 115		

Lab Sample ID: 490-87569-1 MS
Matrix: Water
Analysis Batch: 283492

Client Sample ID: Biotic_091715
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.1000		mg/L		100	85 - 115		

Lab Sample ID: 490-87569-1 MSD
Matrix: Water
Analysis Batch: 283492

Client Sample ID: Biotic_091715
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.09900		mg/L		99	85 - 115	1	20

Lab Sample ID: 490-87569-1 DU
Matrix: Water
Analysis Batch: 283492

Client Sample ID: Biotic_091715
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND			ND		mg/L				NC	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-87544-B-3 DU
Matrix: Solid
Analysis Batch: 282704

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	18			15		%				17	20
Percent Solids	82			85		%				3	20

HPLC/IC

Analysis Batch: 283015

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Total/NA	Water	9056	
490-87569-3	Biotic Dup_091715	Total/NA	Water	9056	
490-87569-5	Control_091715	Total/NA	Water	9056	
490-87601-F-1 MS	Matrix Spike	Total/NA	Water	9056	
490-87601-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-283015/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-283015/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-283015/6	Method Blank	Total/NA	Water	9056	

Analysis Batch: 283016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Total/NA	Water	9056	
490-87569-3	Biotic Dup_091715	Total/NA	Water	9056	
490-87569-5	Control_091715	Total/NA	Water	9056	
490-87601-F-1 MS	Matrix Spike	Total/NA	Water	9056	
490-87601-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-283016/7	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-283016/8	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-283016/6	Method Blank	Total/NA	Water	9056	

Metals

Prep Batch: 282741

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-2	Biotic_091715	Total/NA	Solid	3051A	
490-87569-2 MS	Biotic_091715	Total/NA	Solid	3051A	
490-87569-2 MSD	Biotic_091715	Total/NA	Solid	3051A	
490-87569-4	Biotic Dup_091715	Total/NA	Solid	3051A	
490-87569-6	Control_091715	Total/NA	Solid	3051A	
LCS 490-282741/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-282741/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 283108

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-2	Biotic_091715	Total/NA	Solid	6020	282741
490-87569-2 MS	Biotic_091715	Total/NA	Solid	6020	282741
490-87569-2 MSD	Biotic_091715	Total/NA	Solid	6020	282741
490-87569-4	Biotic Dup_091715	Total/NA	Solid	6020	282741
490-87569-6	Control_091715	Total/NA	Solid	6020	282741
LCS 490-282741/2-A	Lab Control Sample	Total/NA	Solid	6020	282741
MB 490-282741/1-A	Method Blank	Total/NA	Solid	6020	282741

Prep Batch: 283984

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84862-D-17-C MS	Matrix Spike	Dissolved	Water	3005A	
490-84862-D-17-D MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
490-87569-1	Biotic_091715	Dissolved	Water	3005A	284035
490-87569-3	Biotic Dup_091715	Dissolved	Water	3005A	284035
490-87569-5	Control_091715	Dissolved	Water	3005A	284035
LCS 490-283984/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Metals (Continued)

Prep Batch: 283984 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 490-283984/1-A	Method Blank	Total Recoverable	Water	3005A	

Filtration Batch: 284035

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Dissolved	Water	Filtration	
490-87569-3	Biotic Dup_091715	Dissolved	Water	Filtration	
490-87569-5	Control_091715	Dissolved	Water	Filtration	

Analysis Batch: 284290

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-84862-D-17-C MS	Matrix Spike	Dissolved	Water	6020	283984
490-84862-D-17-D MSD	Matrix Spike Duplicate	Dissolved	Water	6020	283984
LCS 490-283984/2-A	Lab Control Sample	Total Recoverable	Water	6020	283984
MB 490-283984/1-A	Method Blank	Total Recoverable	Water	6020	283984

Analysis Batch: 284468

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Dissolved	Water	6020	283984
490-87569-3	Biotic Dup_091715	Dissolved	Water	6020	283984
490-87569-5	Control_091715	Dissolved	Water	6020	283984

Analysis Batch: 284943

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Dissolved	Water	6020	283984
490-87569-1	Biotic_091715	Dissolved	Water	6020	283984
490-87569-3	Biotic Dup_091715	Dissolved	Water	6020	283984
490-87569-5	Control_091715	Dissolved	Water	6020	283984
490-87569-5	Control_091715	Dissolved	Water	6020	283984

General Chemistry

Analysis Batch: 282704

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87544-B-3 DU	Duplicate	Total/NA	Solid	Moisture	
490-87569-2	Biotic_091715	Total/NA	Solid	Moisture	
490-87569-4	Biotic Dup_091715	Total/NA	Solid	Moisture	
490-87569-6	Control_091715	Total/NA	Solid	Moisture	

Analysis Batch: 283492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-87569-1	Biotic_091715	Dissolved	Water	7196A	
490-87569-1 DU	Biotic_091715	Dissolved	Water	7196A	
490-87569-1 MS	Biotic_091715	Dissolved	Water	7196A	
490-87569-1 MSD	Biotic_091715	Dissolved	Water	7196A	
490-87569-3	Biotic Dup_091715	Dissolved	Water	7196A	
490-87569-5	Control_091715	Dissolved	Water	7196A	
LCS 490-283492/2	Lab Control Sample	Total/NA	Water	7196A	
MB 490-283492/1	Method Blank	Total/NA	Water	7196A	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Client Sample ID: Biotic_091715
Date Collected: 09/17/15 14:30
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-1
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	9056		1	10 mL		283016	09/19/15 18:59	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		283015	09/19/15 19:19	JHS	TAL NSH
Dissolved	Filtration	Filtration			30 mL	30 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			30 mL	30 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		1	30 mL	30 mL	284468	09/24/15 18:40	KKK	TAL NSH
Dissolved	Filtration	Filtration			30 mL	30 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			30 mL	30 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		5	30 mL	30 mL	284943	09/25/15 12:40	KKK	TAL NSH
Dissolved	Filtration	Filtration			30 mL	30 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			30 mL	30 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		20	30 mL	30 mL	284943	09/25/15 12:45	KKK	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	283492	09/18/15 12:52	BLM	TAL NSH

Client Sample ID: Biotic_091715
Date Collected: 09/17/15 14:30
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			282704	09/18/15 11:35	MNM	TAL NSH

Client Sample ID: Biotic_091715
Date Collected: 09/17/15 14:30
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-2
Matrix: Solid
Percent Solids: 85.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.508 g	100 mL	282741	09/18/15 13:21	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.508 g	100 mL	283108	09/18/15 23:13	CME	TAL NSH

Client Sample ID: Biotic Dup_091715
Date Collected: 09/17/15 15:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-3
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	9056		1	10 mL		283016	09/19/15 19:39	JHS	TAL NSH
Total/NA	Analysis	9056		5	10 mL		283015	09/19/15 19:59	JHS	TAL NSH
Dissolved	Filtration	Filtration			45 mL	45 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			45 mL	45 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		1	45 mL	45 mL	284468	09/24/15 18:45	KKK	TAL NSH
Dissolved	Filtration	Filtration			45 mL	45 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			45 mL	45 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		20	45 mL	45 mL	284943	09/25/15 12:55	KKK	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	283492	09/18/15 12:52	BLM	TAL NSH

Client Sample ID: Biotic Dup_091715
Date Collected: 09/17/15 15:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			282704	09/18/15 11:35	MNM	TAL NSH

Client Sample ID: Biotic Dup_091715
Date Collected: 09/17/15 15:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-4
Matrix: Solid
Percent Solids: 80.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.520 g	100 mL	282741	09/18/15 13:21	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.520 g	100 mL	283108	09/18/15 23:38	CME	TAL NSH

Client Sample ID: Control_091715
Date Collected: 09/17/15 14:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-5
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	9056		1	10 mL		283015	09/19/15 20:20	JHS	TAL NSH
Total/NA	Analysis	9056		1	10 mL		283016	09/19/15 20:20	JHS	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		1	50 mL	50 mL	284468	09/24/15 18:50	KKK	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	284943	09/25/15 13:01	KKK	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	284035	09/24/15 08:35	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	283984	09/24/15 08:37	RDF	TAL NSH
Dissolved	Analysis	6020		20	50 mL	50 mL	284943	09/25/15 13:06	KKK	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	283492	09/18/15 12:52	BLM	TAL NSH

Client Sample ID: Control_091715
Date Collected: 09/17/15 14:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			282704	09/18/15 11:35	MNM	TAL NSH

Client Sample ID: Control_091715
Date Collected: 09/17/15 14:00
Date Received: 09/18/15 09:10

Lab Sample ID: 490-87569-6
Matrix: Solid
Percent Solids: 81.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.506 g	100 mL	282741	09/18/15 13:21	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.506 g	100 mL	283108	09/18/15 23:43	CME	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-87569-1

Laboratory: TestAmerica Nashville

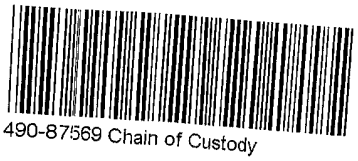
All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15 *
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15 *
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-16
New Hampshire	NELAP	1	2963	10-09-16
New Jersey	NELAP	2	TN965	10-30-15 *
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-16
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (Do Not Use - DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-16
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-16
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-16
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-16
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM



Cooler Received/Opened On: 9/18/2015 @0910

1. Tracking # 0680 (last 4 digits, FedEx)

Courier: Fed-Ex IR Gun ID: 14740456

2. Temperature of rep. sample or temp blank when opened: 3.2 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES..NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? YES..NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) ⊕

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES..NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES..NO...NA

12. Did all container labels and tags agree with custody papers? YES..NO...NA

13a. Were VOA vials received? YES..NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) ✓

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO..NA

b. Did the bottle labels indicate that the correct preservatives were used YES..NO...NA

16. Was residual chlorine present? YES..NO..NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) ✓

17. Were custody papers properly filled out (ink, signed, etc)? YES..NO...NA

18. Did you sign the custody papers in the appropriate place? YES..NO...NA

19. Were correct containers used for the analysis requested? YES..NO...NA

20. Was sufficient amount of sample sent in each container? YES..NO..NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) ✓

I certify that I attached a label with the unique LIMS number to each container (intial) ✓

21. Were there Non-Conformance issues at login? YES..NO Was a NCM generated? YES..NO...# 199882 199883

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 11/28/12

TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
phone 615.726.0177 fax

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

10/8/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	Date: 9/17/15	COC No: 1
Amar Wadhawan	Email:AWadhawan@Geosyntec.com	Lab Contact: Heather Baker	Carrier: Fedex	1 of 1 COCs
Geosyntec Consultants	Analysis Turnaround Time			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS		Loc: 490	For Lab Use Only:
Columbia Phone (410) 910-7619	TAT if different from Below ______		87569	Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Lab No.	Sample Specific Notes:
Biotic_091715	9/17/2015	1430	G	W	1	Y			X	X	01	HNO3 preserved
Biotic_091715	9/17/2015	1430	G	W	1	N		X			✓	
Biotic_091715	9/17/2015	1430	G	S	1	N				X	02	
Biotic Dup_091715	9/17/2015	1500	G	W	1	Y			X	X	03	HNO3 preserved
Biotic Dup_091715	9/17/2015	1500	G	W	1	N		X			✓	
Biotic Dup_091715	9/17/2015	1500	G	S	1	N				X	04	
Control_091715	9/17/2015	1400	G	W	1	N		X	X	X	05	
Control_091715	9/17/2015	1400	G	S	1	N				X	06	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other______

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for______ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd.______ Corr'd.______ Therm ID No.:______

Relinquished by: Linxi Chen	Company: Geosyntec Consultants	Date/Time: 9/17/15 1600	Received by: [signature]	Company: TA KNOX	Date/Time: 9-17-15 16:24
Relinquished by: [signature]	Company: TA KNOX	Date/Time: 9-17-15 1630	Received by: [signature] TAN 3.2	Company: TAN	Date/Time: 09/18/15 0910
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-87569-1

Login Number: 87569
List Number: 1
Creator: Gambill, Shane

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
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	3.2
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	False	Insufficient volume received for requested analysis.
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.	True	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

TestAmerica Job ID: 490-89123-1
TestAmerica Sample Delivery Group: TEL
Client Project/Site: Treatability Study

For:
Geosyntec Consultants, Inc.
10220 Old Columbia Road
Suite A
Columbia, Maryland 21046

Attn: Amar Wadhawan

Heather Baker

Authorized for release by:
10/29/2015 4:17:13 PM

Heather Baker, Project Manager I
(615)301-5043
heather.baker@testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Sample Summary 3
Case Narrative 4
Definitions 5
Client Sample Results 6
QC Sample Results 10
QC Association 14
Chronicle 16
Method Summary 18
Certification Summary 19
Chain of Custody 20
Receipt Checklists 22

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
490-89123-1	Biotic_100815	Water	10/08/15 14:00	10/09/15 09:50
490-89123-2	Biotic_100815	Soil	10/08/15 14:00	10/09/15 09:50
490-89123-3	Biotic Dup_100815	Water	10/08/15 14:30	10/09/15 09:50
490-89123-4	Biotic Dup_100815	Soil	10/08/15 14:30	10/09/15 09:50

Job ID: 490-89123-1

Laboratory: TestAmerica Nashville

Narrative

Job Narrative
490-89123-1

Comments
No additional comments.

Receipt
The samples were received on 10/9/2015 9:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.0º C.

HPLC/IC
Method 9056: The following samples were diluted due to the nature of the sample matrix: Biotic_100815 (490-89123-1) and Biotic Dup_100815 (490-89123-3). Elevated reporting limits (RLs) are provided.

Method 9056: Reanalysis of the following samples was performed outside of the analytical holding time due to a failing continuing calibration verification (CCV) as well as a failing laboratory control sample duplicate (LCSD): Biotic_100815 (490-89123-1) and Biotic Dup_100815 (490-89123-3). See batch 490-288498.

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

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

General Chemistry
Method 7196A, SM 3500 CR D: The following sample was received with less than one shift (8 hours) remaining on a test with a holding time of 48 hours or less. As such, the laboratory had insufficient time remaining to perform the analysis within holding time: Biotic_100815 (490-89123-1).

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

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

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

Metals

Qualifier	Qualifier Description
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.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Client Sample ID: Biotic_100815

Date Collected: 10/08/15 14:00
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-1

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.194	H	0.100		mg/L			10/11/15 04:01	1
Sulfate	1970		10.0		mg/L			10/11/15 04:19	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	46.8		0.100		mg/L		10/13/15 09:15	10/16/15 15:53	50
Chromium	4.28		0.0100		mg/L		10/13/15 09:15	10/15/15 23:08	5
Copper	35.4		0.100		mg/L		10/13/15 09:15	10/16/15 15:53	50
Iron	322		0.125		mg/L		10/13/15 09:15	10/15/15 23:08	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND	H	0.0100		mg/L			10/09/15 13:15	1

Client Sample ID: Biotic_100815

Date Collected: 10/08/15 14:00
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-2

Matrix: Soil
Percent Solids: 79.9

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	330		3.14		mg/Kg	☼	10/19/15 14:00	10/23/15 19:42	5
Chromium	182		3.14		mg/Kg	☼	10/19/15 14:00	10/23/15 19:42	5
Copper	1100		3.14		mg/Kg	☼	10/19/15 14:00	10/23/15 19:42	5
Iron	3380		6.29		mg/Kg	☼	10/19/15 14:00	10/24/15 16:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	20		0.10		%			10/09/15 13:05	1
Percent Solids	80		0.10		%			10/09/15 13:05	1

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Client Sample ID: Biotic Dup_100815

Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-3

Matrix: Water

Method: 9056 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND	H	1.00		mg/L			10/11/15 04:37	10
Sulfate	**1670**		10.0		mg/L			10/11/15 04:37	10

Method: 6020 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**13.8**		0.100		mg/L		10/13/15 09:15	10/16/15 16:09	50
Chromium	**0.825**		0.0100		mg/L		10/13/15 09:15	10/15/15 23:24	5
Copper	**6.43**		0.100		mg/L		10/13/15 09:15	10/16/15 18:55	50
Iron	**52.7**		0.125		mg/L		10/13/15 09:15	10/15/15 23:24	5

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			10/09/15 13:20	1

Client Sample ID: Biotic Dup_100815

Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-4

Matrix: Soil
Percent Solids: 81.3

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	400		2.99		mg/Kg	☼	10/19/15 14:00	10/23/15 19:47	5
Chromium	53.1		2.99		mg/Kg	☼	10/19/15 14:00	10/23/15 19:47	5
Copper	202		2.99		mg/Kg	☼	10/19/15 14:00	10/23/15 19:47	5
Iron	2310		5.97		mg/Kg	☼	10/19/15 14:00	10/24/15 17:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		0.10		%			10/09/15 13:05	1
Percent Solids	81		0.10		%			10/09/15 13:05	1

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 490-288867/3
Matrix: Water
Analysis Batch: 288867

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.00		mg/L			10/11/15 03:07	1

Lab Sample ID: LCS 490-288867/4
Matrix: Water
Analysis Batch: 288867

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	98.64		mg/L		99	80 - 120

Lab Sample ID: LCSD 490-288867/5
Matrix: Water
Analysis Batch: 288867

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
Sulfate	100	98.90		mg/L		99	80 - 120	0	20

Lab Sample ID: 490-89148-E-10 MS
Matrix: Water
Analysis Batch: 288867

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	4.24		100	92.26		mg/L		88	80 - 120

Lab Sample ID: 490-89148-E-10 MSD
Matrix: Water
Analysis Batch: 288867

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	4.24		100	100.8		mg/L		97	80 - 120	9	20

Lab Sample ID: MB 490-288868/3
Matrix: Water
Analysis Batch: 288868

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.100		mg/L			10/11/15 03:07	1

Lab Sample ID: LCS 490-288868/4
Matrix: Water
Analysis Batch: 288868

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	10.0	9.734		mg/L		97	80 - 120

Lab Sample ID: LCSD 490-288868/5
Matrix: Water
Analysis Batch: 288868

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
Nitrate as N	10.0	9.732		mg/L		97	80 - 120	0	20

Lab Sample ID: 490-89148-E-10 MS
Matrix: Water
Analysis Batch: 288868

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	ND		10.0	8.506		mg/L		85	80 - 120

Lab Sample ID: 490-89148-E-10 MSD
Matrix: Water
Analysis Batch: 288868

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	ND		10.0	9.444		mg/L		94	80 - 120	10	20

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 490-291020/1-A
Matrix: Solid
Analysis Batch: 292575

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 291020

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.498		mg/Kg		10/19/15 14:00	10/23/15 18:39	1
Chromium	ND		0.498		mg/Kg		10/19/15 14:00	10/23/15 18:39	1
Copper	ND		0.498		mg/Kg		10/19/15 14:00	10/23/15 18:39	1
Iron	ND		4.98		mg/Kg		10/19/15 14:00	10/23/15 18:39	1

Lab Sample ID: LCS 490-291020/2-A
Matrix: Solid
Analysis Batch: 292575

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 291020

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	19.8	17.16		mg/Kg		86	80 - 120
Chromium	19.8	18.73		mg/Kg		94	80 - 120
Copper	19.8	18.43		mg/Kg		93	80 - 120
Iron	198	184.4		mg/Kg		93	80 - 120

Lab Sample ID: 490-89919-A-1-B MS
Matrix: Solid
Analysis Batch: 292575

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 291020

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		19.1	21.21		mg/Kg		111	75 - 125
Chromium	110		19.1	193.5	4	mg/Kg		436	75 - 125
Copper	ND		19.1	21.15		mg/Kg		111	75 - 125
Iron	31400		191	48820	4	mg/Kg		9121	75 - 125

Lab Sample ID: 490-89919-A-1-C MSD
Matrix: Solid
Analysis Batch: 292575

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 291020

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		19.4	18.79		mg/Kg		97	75 - 125	12	20
Chromium	110		19.4	165.3	4	mg/Kg		285	75 - 125	16	20
Copper	ND		19.4	21.10		mg/Kg		109	75 - 125	0	20
Iron	31400		194	42360	4	mg/Kg		5652	75 - 125	14	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 490-289188/1-A
Matrix: Water
Analysis Batch: 290398

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 289188

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.00200		mg/L		10/13/15 09:15	10/15/15 22:18	1
Chromium	ND		0.00200		mg/L		10/13/15 09:15	10/15/15 22:18	1
Copper	ND		0.00200		mg/L		10/13/15 09:15	10/15/15 22:18	1
Iron	ND		0.0250		mg/L		10/13/15 09:15	10/15/15 22:18	1

Lab Sample ID: LCS 490-289188/2-A
Matrix: Water
Analysis Batch: 290398

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 289188

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.08878		mg/L		89	80 - 120
Chromium	0.100	0.09495		mg/L		95	80 - 120
Copper	0.100	0.08881		mg/L		89	80 - 120
Iron	1.00	0.9421		mg/L		94	80 - 120

Lab Sample ID: 490-89354-A-3-C MS
Matrix: Water
Analysis Batch: 290398

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 289188

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		0.100	0.08971		mg/L		88	75 - 125
Chromium	ND		0.100	0.09396		mg/L		94	75 - 125
Copper	ND		0.100	0.08447		mg/L		84	75 - 125
Iron	1.66		1.00	2.546		mg/L		89	75 - 125

Lab Sample ID: 490-89354-A-3-D MSD
Matrix: Water
Analysis Batch: 290398

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved
Prep Batch: 289188

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		0.100	0.09298		mg/L		92	75 - 125	4	20
Chromium	ND		0.100	0.09641		mg/L		96	75 - 125	3	20
Copper	ND		0.100	0.08684		mg/L		87	75 - 125	3	20
Iron	1.66		1.00	2.630		mg/L		98	75 - 125	3	20

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 490-289612/12
Matrix: Water
Analysis Batch: 289612

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hex	ND		0.0100		mg/L			10/09/15 11:40	1

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: LCS 490-289612/13
Matrix: Water
Analysis Batch: 289612

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

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex			0.100	0.1030		mg/L		103	85 - 115		

Lab Sample ID: 490-89118-G-5 MS
Matrix: Water
Analysis Batch: 289612

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.1030		mg/L		103	85 - 115		

Lab Sample ID: 490-89118-G-5 MSD
Matrix: Water
Analysis Batch: 289612

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.1030		mg/L		103	85 - 115	0	20

Lab Sample ID: 490-89118-G-5 DU
Matrix: Water
Analysis Batch: 289612

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Chromium, hex	ND			ND		mg/L				NC	20

Lab Sample ID: 490-89118-B-6 MS
Matrix: Water
Analysis Batch: 289612

Client Sample ID: Matrix Spike
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chromium, hex	ND		0.100	0.1010		mg/L		101	85 - 115		

Lab Sample ID: 490-89118-B-6 MSD
Matrix: Water
Analysis Batch: 289612

Client Sample ID: Matrix Spike Duplicate
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium, hex	ND		0.100	0.1000		mg/L		100	85 - 115	1	20

Method: Moisture - Percent Moisture

Lab Sample ID: 490-89120-B-4 DU
Matrix: Solid
Analysis Batch: 288374

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	21			22		%				0.9	20
Percent Solids	79			78		%				0.2	20

HPLC/IC

Analysis Batch: 288867

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Total/NA	Water	9056	
490-89123-3	Biotic Dup_100815	Total/NA	Water	9056	
490-89148-E-10 MS	Matrix Spike	Total/NA	Water	9056	
490-89148-E-10 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-288867/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-288867/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-288867/3	Method Blank	Total/NA	Water	9056	

Analysis Batch: 288868

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Total/NA	Water	9056	
490-89123-3	Biotic Dup_100815	Total/NA	Water	9056	
490-89148-E-10 MS	Matrix Spike	Total/NA	Water	9056	
490-89148-E-10 MSD	Matrix Spike Duplicate	Total/NA	Water	9056	
LCS 490-288868/4	Lab Control Sample	Total/NA	Water	9056	
LCSD 490-288868/5	Lab Control Sample Dup	Total/NA	Water	9056	
MB 490-288868/3	Method Blank	Total/NA	Water	9056	

Metals

Filtration Batch: 289186

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Dissolved	Water	Filtration	
490-89123-3	Biotic Dup_100815	Dissolved	Water	Filtration	

Prep Batch: 289188

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Dissolved	Water	3005A	289186
490-89123-3	Biotic Dup_100815	Dissolved	Water	3005A	289186
490-89354-A-3-C MS	Matrix Spike	Dissolved	Water	3005A	
490-89354-A-3-D MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	
LCS 490-289188/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 490-289188/1-A	Method Blank	Total Recoverable	Water	3005A	

Analysis Batch: 290398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Dissolved	Water	6020	289188
490-89123-3	Biotic Dup_100815	Dissolved	Water	6020	289188
490-89354-A-3-C MS	Matrix Spike	Dissolved	Water	6020	289188
490-89354-A-3-D MSD	Matrix Spike Duplicate	Dissolved	Water	6020	289188
LCS 490-289188/2-A	Lab Control Sample	Total Recoverable	Water	6020	289188
MB 490-289188/1-A	Method Blank	Total Recoverable	Water	6020	289188

Analysis Batch: 290561

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Dissolved	Water	6020	289188
490-89123-3	Biotic Dup_100815	Dissolved	Water	6020	289188

Metals (Continued)

Analysis Batch: 290972

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-3	Biotic Dup_100815	Dissolved	Water	6020	289188

Prep Batch: 291020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-2	Biotic_100815	Total/NA	Soil	3051A	
490-89123-4	Biotic Dup_100815	Total/NA	Soil	3051A	
490-89919-A-1-B MS	Matrix Spike	Total/NA	Solid	3051A	
490-89919-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	3051A	
LCS 490-291020/2-A	Lab Control Sample	Total/NA	Solid	3051A	
MB 490-291020/1-A	Method Blank	Total/NA	Solid	3051A	

Analysis Batch: 292575

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-2	Biotic_100815	Total/NA	Soil	6020	291020
490-89123-4	Biotic Dup_100815	Total/NA	Soil	6020	291020
490-89919-A-1-B MS	Matrix Spike	Total/NA	Solid	6020	291020
490-89919-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	6020	291020
LCS 490-291020/2-A	Lab Control Sample	Total/NA	Solid	6020	291020
MB 490-291020/1-A	Method Blank	Total/NA	Solid	6020	291020

Analysis Batch: 292807

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-2	Biotic_100815	Total/NA	Soil	6020	291020
490-89123-4	Biotic Dup_100815	Total/NA	Soil	6020	291020

General Chemistry

Analysis Batch: 288374

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89120-B-4 DU	Duplicate	Total/NA	Solid	Moisture	
490-89123-2	Biotic_100815	Total/NA	Soil	Moisture	
490-89123-4	Biotic Dup_100815	Total/NA	Soil	Moisture	

Analysis Batch: 289612

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89118-B-6 MS	Matrix Spike	Dissolved	Water	7196A	
490-89118-B-6 MSD	Matrix Spike Duplicate	Dissolved	Water	7196A	
490-89118-G-5 DU	Duplicate	Total/NA	Water	7196A	
490-89118-G-5 MS	Matrix Spike	Total/NA	Water	7196A	
490-89118-G-5 MSD	Matrix Spike Duplicate	Total/NA	Water	7196A	
490-89123-1	Biotic_100815	Dissolved	Water	7196A	289613
490-89123-3	Biotic Dup_100815	Dissolved	Water	7196A	289613
LCS 490-289612/13	Lab Control Sample	Total/NA	Water	7196A	
MB 490-289612/12	Method Blank	Total/NA	Water	7196A	

Filtration Batch: 289613

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-89123-1	Biotic_100815	Dissolved	Water	Filtration	
490-89123-3	Biotic Dup_100815	Dissolved	Water	Filtration	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Client Sample ID: Biotic_100815
Date Collected: 10/08/15 14:00
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-1
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	9056		1	10 mL		288868	10/11/15 04:01	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		288867	10/11/15 04:19	JHS	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	289186	10/13/15 09:08	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	289188	10/13/15 09:15	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	290398	10/15/15 23:08	KKK	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	289186	10/13/15 09:08	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	289188	10/13/15 09:15	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	290561	10/16/15 15:53	KKK	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	289613	10/09/15 12:58	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	289612	10/09/15 13:15	BLM	TAL NSH

Client Sample ID: Biotic_100815
Date Collected: 10/08/15 14:00
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-2
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			288374	10/09/15 13:05	MNM	TAL NSH

Client Sample ID: Biotic_100815
Date Collected: 10/08/15 14:00
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-2
Matrix: Soil
Percent Solids: 79.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.498 g	100 mL	291020	10/19/15 14:00	KMS	TAL NSH
Total/NA	Analysis	6020		5	0.498 g	100 mL	292575	10/23/15 19:42	KKK	TAL NSH
Total/NA	Prep	3051A			0.498 g	100 mL	291020	10/19/15 14:00	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.498 g	100 mL	292807	10/24/15 16:59	KKK	TAL NSH

Client Sample ID: Biotic Dup_100815
Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-3
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	9056		10	10 mL		288867	10/11/15 04:37	JHS	TAL NSH
Total/NA	Analysis	9056		10	10 mL		288868	10/11/15 04:37	JHS	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	289186	10/13/15 09:08	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	289188	10/13/15 09:15	ZLN	TAL NSH
Dissolved	Analysis	6020		5	50 mL	50 mL	290398	10/15/15 23:24	KKK	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	289186	10/13/15 09:08	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	289188	10/13/15 09:15	ZLN	TAL NSH
Dissolved	Analysis	6020		50	50 mL	50 mL	290561	10/16/15 16:09	KKK	TAL NSH
Dissolved	Filtration	Filtration			50 mL	50 mL	289186	10/13/15 09:08	ZLN	TAL NSH
Dissolved	Prep	3005A			50 mL	50 mL	289188	10/13/15 09:15	ZLN	TAL NSH

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Client Sample ID: Biotic Dup_100815
Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Analysis	6020		50	50 mL	50 mL	290972	10/16/15 18:55	KKK	TAL NSH
Dissolved	Filtration	Filtration			1.0 mL	1.0 mL	289613	10/09/15 12:58	BLM	TAL NSH
Dissolved	Analysis	7196A		1	10 mL	10 mL	289612	10/09/15 13:20	BLM	TAL NSH

Client Sample ID: Biotic Dup_100815
Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-4
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			288374	10/09/15 13:05	MNM	TAL NSH

Client Sample ID: Biotic Dup_100815
Date Collected: 10/08/15 14:30
Date Received: 10/09/15 09:50

Lab Sample ID: 490-89123-4
Matrix: Soil
Percent Solids: 81.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			0.515 g	100 mL	291020	10/19/15 14:00	KMS	TAL NSH
Total/NA	Analysis	6020		5	0.515 g	100 mL	292575	10/23/15 19:47	KKK	TAL NSH
Total/NA	Prep	3051A			0.515 g	100 mL	291020	10/19/15 14:00	KMS	TAL NSH
Total/NA	Analysis	6020		1	0.515 g	100 mL	292807	10/24/15 17:04	KKK	TAL NSH

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Method	Method Description	Protocol	Laboratory
9056	Anions, Ion Chromatography	SW846	TAL NSH
6020	Metals (ICP/MS)	SW846	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL NSH
Moisture	Percent Moisture	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Treatability Study

TestAmerica Job ID: 490-89123-1
SDG: TEL

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	07-24-16
Arizona	State Program	9	AZ0473	05-05-16
Arkansas DEQ	State Program	6	88-0737	04-25-16
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-16
Georgia	State Program	4	N/A	06-30-16
Illinois	NELAP	5	200010	12-09-15 *
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	10-31-15 *
Kentucky (UST)	State Program	4	19	06-30-16
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-16
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-16
Minnesota	NELAP	5	047-999-345	12-31-16
Mississippi	State Program	4	N/A	06-30-16
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-16
New Hampshire	NELAP	1	2963	10-09-16
New Jersey	NELAP	2	TN965	10-30-15 *
New York	NELAP	2	11342	03-31-16
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15 *
Ohio VAP	State Program	5	CL0033	07-10-17
Oklahoma	State Program	6	9412	08-31-16
Oregon	NELAP	10	TN200001	04-27-16
Pennsylvania	NELAP	3	68-00585	06-30-16
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-16
South Carolina (Do Not Use - DW)	State Program	4	84009 (002)	12-16-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-16
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-16
Virginia	NELAP	3	460152	06-14-16
Washington	State Program	10	C789	07-19-16
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-16
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

490-89123 Chain of Custody

COOLER RECEIPT FORM

Cooler Received/Opened On 10/9/2015 @ 0950

1. Tracking # 2189 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 17960353

2. Temperature of rep. sample or temp blank when opened: 3.0 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: IFront

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) LEV

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) MBM

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES..NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) MBM

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) MBM

I certify that I attached a label with the unique LIMS number to each container (intial) MBM

21. Were there Non-Conformance issues at login? YES...NO Was a NCM generated? YES...NO...#_____

BIS = Broken in shipment

TestAmerica Nashville
2960 Foster Creighton Drive

Nashville, TN 37204
phone 615.726.0177 fax

Chain of Custody Record

Loc: 490
89123

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

10/29/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Amar Wadhawan	Site Contact: Linxi Chen	Date: 10/8/15	COC No: 1
Amar Wadhawan	Email:AWadhawan@Geosyntec.com	Lab Contact: Heather Baker	Carrier: Fedex	1 of 1 COCs
Geosyntec Consultants	**Analysis Turnaround Time**			Sampler: LC
10220 Old Columbia Road Suite A	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
Columbia Phone (410) 910-7619	TAT if different from Below _____			Walk-in Client:
MD, 21046 FAX	☐ 2 weeks			Lab Sampling:
Project Name: Treatability Study	☐ 1 week			
Site:TEL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	9056-Nitrate, Sulfate	7196A -Hexavalent Chromium	6020 - As, Cr, Cu, Fe	Sample Specific Notes:
Biotic_100815	10/8/2015	1400	G	W	1	N		X	X	X	
Biotic_100815	10/8/2015	1400	G	S	1	N				X	
Biotic Dup_100815	10/8/2015	1430	G	W	1	N		X	X	X	
Biotic Dup_100815	10/8/2015	1430	G	S	1	N				X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by: Linxi Chen	Company: Geosyntec Consultants	Date/Time: 10/08/15 1530	Received by:	Company: TA	Date/Time: 10/8/15 1530
Relinquished by:	Company: TA	Date/Time: 10/8/15 1625	Received by:	Company: TAN	Date/Time: 10.9.15 @ 0950 3.0°C
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 490-89123-1
SDG Number: TEL

Login Number: 89123
List Number: 1
Creator: McBride, Mike

List Source: TestAmerica Nashville

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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	3.0
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?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	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.	N/A	
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	

SiREM
Leading Science · Lasting Solutions

130 Research Lane, Ste 2
Guelph ON N1G 5G3
(519) 822-2265

Analytical Results

Client: Geosyntec Consultants
Client Project Number:
Date Samples Received: May 14, 2015
Date Samples Analyzed: May 27, 2015

SiREM File Reference: S-3581

Client Sample ID	SiREM Reference ID	Client Sample Date	Sample dilution factor	Lactate	Acetate	Propionate	Formate	Butyrate	Pyruvate
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biotic-050615	15-0529	6-May-15	50	<0.39	2.6	<0.31	4.2	<0.41	<0.69
Biotic-Dup-050615	15-0530	6-May-15	50	<0.39	2.4	<0.31	9.1	<0.41	<0.69
Biotic Control-050615	15-0531	6-May-15	50	<0.39	<0.54	<0.31	<0.22	<0.41	<0.69
Biotic-051315	15-0532	13-May-15	50	<0.39	2.5	<0.31	11	<0.41	<0.69
Biotic-Dup-051315	15-0533	13-May-15	50	<0.39	2.8	<0.31	8.0	<0.41	<0.69
			QL	0.39	0.54	0.31	0.22	0.41	0.69

Comments:

Method: Ion Chromatography
QL = Quantitation limit
J = associated value is estimated; compound positively detected at concentration below the QL
< = compound analysed for but not detected, associated value is QL. Sample QL is corrected for dilution.

Analyst:

Michael Healey, B.Sc.
Laboratory Technician

Results approved:

Jeff Roberts, M.Sc.
Laboratory Manager

Date:

28-May-15

SiREM
Leading Science · Lasting Solutions

130 Research Lane, Ste 2
Guelph ON N1G 5G3
(519) 822-2265

Analytical Results

Client: Geosyntec
Client Project Number: CCA Treatability
Date Samples Received: August 11, 2015
Date Samples Analyzed: August 13, 2015 and August 17, 2015

SiREM File Reference: S-3662

Client Sample ID	SiREM Reference ID	Client Sample Date	Sample dilution factor	Lactate	Acetate	Propionate	Formate	Butyrate	Pyruvate
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biotic_072315	15-0909	23-Jul-15	1000	105	1912	<6.2	9.4	<8.2	<14
Biotic_Dup_072315	15-0910	23-Jul-15	1000	95	1913	<6.2	9.9	<8.2	<14
Control_073015	15-0911	30-Jul-15	1000	1450	<11	<6.2	7.7	<8.2	<14
Biotic_081115	15-0912	11-Aug-15	1000	93	2072	<6.2	31	<8.2	<14
Biotic_Dup_081115	15-0913	11-Aug-15	1000	85	2476	20	14	<8.2	<14
			QL	0.39	0.54	0.31	0.22	0.41	0.69

Comments:

Method: Ion Chromatography
QL = Quantitation limit
J = associated value is estimated; compound positively detected at concentration below the QL
< = compound analysed for but not detected, associated value is QL. Sample QL is corrected for dilution.

Analyst:

Michael Healey, B.Sc.
Laboratory Technician

Results approved:

Jeff Roberts, M.Sc.
Laboratory Manager

Date:

19-Aug-15

130 Research Lane, Ste 2
Guelph ON N1G 5G3
(519) 822-2265

Analytical Results

Client: Geosyntec
Client Project Number: MEM1223.01.02
Date Samples Received: September 23, 2015
Date Samples Analyzed: September 24, 2015

SiREM File Reference: S-3701

Client Sample ID	SiREM Reference ID	Client Sample Date	Sample dilution factor	Lactate mg/L	Acetate mg/L	Propionate mg/L	Formate mg/L	Butyrate mg/L	Pyruvate mg/L
Biotic_091715	15-1120	17-Sep-15	1000	162	815	<6.2	<4.4	<8.2	<14
Biotic Dup_091715	15-1121	17-Sep-15	1000	<7.8	1483	438	<4.4	<8.2	<14
Control_091715	15-1122	17-Sep-15	1000	<7.8	<11	<6.2	<4.4	<8.2	<14
			QL	7.8	11	6.2	4.4	8.2	14

Comments:

Method: Ion Chromatography
QL = Quantitation limit
J = associated value is estimated; compound positively detected at concentration below the QL
< = compound analysed for but not detected, associated value is QL. Sample QL is corrected for dilution.

Analyst:

Alicia Quintanilla, M.Env.Sc.
Laboratory Assistant

Results approved:

Sandra Dworatzek , M.Sc.
Senior Laboratory Manager

Date:

28-Sep-15

APPENDIX C

Geosyntec consultants

engineers | scientists | innovators

Collstrup CCA Bench-Scale Treatability Study Work Plan

Prepared for:

Capital Region of Denmank
Kongens Vænge 2
3400 Hillerød

Prepared by:

Geosyntec Consultants, Inc.
10220 Old Columbia Road, Suite A
Columbia, Maryland 21046

January 2015

Collstrup CCA Bench-Scale Treatability Study Work Plan

TABLE OF CONTENT

1 INTRODUCTION 1

2 PROJECT BACKGROUND 1

3 IN SITU BIOSEQUESTRATION TECHNOLOGY 1

4 BENCH-SCALE BIOTREATBILITY TESTS 2

4.1 Field Sampling 2

4.2 Experimental Design 3

4.3 Sampling and Analysis 3

5 DATA ANALYSIS AND REPORTING 3

6 PROJECT SCHEDULE AND BUDGET 4

LIST OF FIGURES

Figure 1. Site map with information about contamination and groundwater flow

Figure 2. Schematic showing potential application of in situ biosequestration for remediation of CCA contaminated sites

LIST OF TABLES

Table 1. Design of CCA bench-scale treatability study

1 INTRODUCTION

The Capital Region of Denmark (Capital Region) and Geosyntec Consultants, Inc. (Geosyntec) are collaborating to conduct a bench-scale treatability study to assess the efficacy of biosequestration as remedial approach for treatment of soil and groundwater contaminated with Chromated Copper Arsenate (CCA). The technology represents a state-of-the-practice method for in situ treatment of CCA metals (arsenic, chromium, and copper) and other heavy metals. The technology has already been demonstrated in published bench- and field-scale studies at sites in the United States, and therefore is sufficiently mature for testing by the Capital Region. The overall goal of this bench-scale study is to test the technology under site-specific conditions and aid in the pilot-scale test design for treatment of CCA in soil and groundwater at the former Collstrup wood treatment facility in Hillerød, Denmark (Site). The Capital Region intends that the technology implemented in the pilot-scale tests will be suitable for full-scale remediation not only at the Site but also at other Collstrup wood treatment facilities elsewhere in Denmark. This work plan provides a brief description of the Site background, scientific and technical merits of biosequestration technology, the treatability study design, sampling and analysis, data analysis and reporting, and project schedule and budget.

2 PROJECT BACKGROUND

The Site is located in Hillerød, Denmark, adjacent to Esrum Lake. The Site is owned by the Danish EPA (Forest and Nature Agency) and it is not currently in use. The property covers a 73,000 m^2 (7 ha) area, is fenced to prevent public access, and is largely overgrown with vegetation and trees (see **Figure 1**). From 1936 to 1976, the Site was used as a facility for processing and treatment of wood lumber. During certain points in its operational history, wood was pressure-treated with CCA. The abundant use of CCA at the Site resulted in extensive impacts of Arsenic (As), Chromium (Cr), and Copper (Cu) in soils and groundwater. As is the primary metal of concern, and an estimated 35 to 44 tons of As remain within waste bark/mulch on the ground surface, soil, and groundwater at the Site. The majority of As mass occurs in the soils above the water table, within 0.5 meters below ground surface (m bgs).

The shallow geology at the Site mainly consists of fluvial sediments with some clay inter-layering occurring from 0 to 5 m bgs. Rainwater infiltration has mobilized vertical spreading of CCA contamination, with significant concentrations of As occurring down to 4 m bgs. A perched water table occurs between 3 to 5 m bgs. A clay till layer that occurs between 5 to 20 m bgs is believed to serve as a partial barrier to limit vertical migration of CCA contamination. A secondary aquifer (upper sand layer) occurs beneath the clay till at depths ranging from 20 to 40 m bgs; contamination in that layer is relatively low.

3 IN SITU BIOSEQUESTRATION TECHNOLOGY

In this treatability study, the biosequestration technology is being tested for in situ remediation of CCA metals at wood treatment facilities in the Capital Region. Microorganisms are known to directly or indirectly cause transformation of metal species through redox reactions. In situ biosequestration consists of amending the subsurface environment with organic electron donors (lactate, methanol, etc.) and sulfate to stimulate microbial activity and create sulfate-reducing conditions leading to the formation of sulfide and polysulfide species (**Figure 2**). The sulfate-reducing bacteria utilize sulfate as the electron acceptor leading to the formation of sulfide species.

Scientific studies have shown that under these conditions Cr(VI) and As(V) reductively precipitate to Cr(III) and As_2S_3(s) respectively while Cu precipitates as CuS(s).

Many remedial approaches exist to individually treat As, Cr, and Cu, but only a limited number are applicable to treat all three simultaneously. Moreover, the selection of any such in situ remedial technology depends on several factors such as site-specific hydrogeology and biogeochemical conditions, contamination matrix and area, remediation time-frame and objectives, performance goals, technology maturity, and costs. Based on these criteria, an evaluation of several technologies for consideration for in situ remediation of CCA metals suggested that in situ biosequestration using electron donors and sulfate was the most efficient, cost-effective, and environmentally sustainable remedial approach. Increasingly, in situ redox manipulation is being used to treat Cr and As contamination problems in soil and groundwater. Although this approach does not remove Cr and As from the target treatment zone, it does immobilize and sequester these metals under anaerobic conditions, for indefinite timeframes, even after conditions have transitioned to aerobic. In situ biosequestration, therefore, presents an innovative and cost-effective alternative to conventional approaches such as solidification/stabilization or electrokinetic extraction for remediating CCA contaminated sites.

4 BENCH-SCALE BIOTREATBILITY TESTS

Bench-scale tests will be performed to test and optimize the site-specific performance of two different types of reducing agents/treatment processes: 1) biological reduction using lactate and ferrous sulfate, and for comparison, 2) chemical reduction using calcium polysulfide and ferrous sulfate. The bench-scale tests will measure the rates at which CCA metals are treated and reagents are consumed, and the results will be used to (1) identify the most effective treatment agents for potential future pilot-scale test, and (2) support the pilot-scale test design (e.g., treatment rates, residence time, etc.).

4.1 Field Sampling

COWI will perform collection of geologic material and groundwater at the Site, under subcontract to Geosyntec. Composite samples of shallow subsurface geologic material will be collected using a hand auger or other standard shallow soil sampling technique from either hotspot 1 or hotspot 2 (**Figure 1**) up to depth of 0.5 m bgs. The samples will be homogenized in the field and will be stored in clean plastic or glass jars (or equivalent) on ice. The Site groundwater will be collected at a depth of 3 - 5 m bgs from existing onsite wells nearby the sampling location(s) of geologic material. The groundwater will be retrieved following the standard groundwater sampling procedures such as bailers or submersible pumps and will be collected in clean and sterile 4-L plastic carboys (or equivalent) and stored on ice. Geosyntec understands that subsurface characterization of Site geologic material and groundwater has been recently conducted as part of ongoing pilot test evaluations. The exact sampling depths for collection of Site materials for this treatability study will be determined upon review of the characterization data so as to target zones of maximum contamination. Upon collection, the Site materials will be express-shipped under chain-of-custody to Geosyntec's Knoxville Laboratory in Tennessee.

4.2 Experimental Design

Table 1 provides a summary of the treatments, sampling frequency, and analytical parameters for this bench-scale treatability study. An initial baseline characterization of the Site geologic material and groundwater will be conducted to establish background geochemical conditions and concentrations of CCA metals. All controls and treatments will be performed in duplicates. The untreated control will not receive any amendments and will serve as the experimental control against which the effects of the biotreatment and chemical treatments will be measured. In the biotreatment test, the reactors will be amended with lactate and ferrous sulfate to stimulate the activity of the sulfate reducing bacteria and cause precipitation metal sulfide species. In the chemical treatment test, the reactors will be amended with calcium polysulfide and ferrous sulfate to cause metal sulfide formation due to abiotic processes. The dosing concentration of the amendments for the different treatments will be determined based on the background concentration of the CCA metals determined during the baseline characterization. The dosing concentrations will incorporate the stoichiometric requirements along with a safety factor for demand by non-target constituents in the Site materials.

Identical batch reactors will be constructed prior to initiation of the tests and used for the treatments as per **Table 1**. Each reactor will comprise of 25-50 g of Site geologic material with 200 - 250 ml of Site groundwater. After addition of amendments to start the tests, the reactors will be sealed and incubated under anaerobic conditions on a rotary shaker at room temperature (~22°C) for a period of 3 – 5 months. The experimental design is not final and may be optimized in light of additional information obtained from recent Site characterization studies or during baseline characterization.

4.3 Sampling and Analysis

The frequency of sample collection and analysis is summarized in **Table 1**. During sampling events, two reactors from each treatment and two controls (as needed) will be opened and sacrificed to collect geologic material and groundwater. The solids will be analyzed for total metals whereas the groundwater will be analyzed for dissolved metals, volatile fatty acids, anions, and geochemical parameters (temperature, pH, oxidation reduction potential, and dissolved oxygen). While this list of analytical parameters is fairly extensive, analysis of additional parameters such as acid volatile sulfides (AVS), simultaneously extracted metals (SEM) and Cr, As speciation may be performed on select samples to gain additional information. Also, the sampling frequency and analysis may be optimized as needed during the study to gain required information while saving costs. The sample analysis will be performed by a certified commercial laboratory using USEPA accepted standard analytical methods.

5 DATA ANALYSIS AND REPORTING

During the course of the treatability tests, periodic samples will be collected and analyzed for temporal trends in CCA metal concentrations together with other appropriate test-specific parameters, such as volatile fatty acids, anions, pH, ORP, temperature, and dissolved oxygen. Data will be tabulated and visualized in time-series scatter plots. These graphs will be used to evaluate: (i) changes in concentrations of total and dissolved metals; (ii) rates of metal sulfide precipitation; and (iii) requirements for treatment specific amendments. In addition, data analysis will be performed to assess potential inhibitory factors, if observed. The treatability study data will also be

evaluated to identify potential technical challenges that may be associated with field applications of the tested treatments. Upon completion of the treatability study, Geosyntec will prepare a report that will present the study methodology, all data generated during the study, necessary tables and graphs, and an assessment of the performance of each treatment.

6 PROJECT SCHEDULE AND BUDGET

The bench-scale tests are expected to take between 3 and 5 months from the date the Site materials are received by Geosyntec. The total cost of the project is $35,000, of which $20,000 will be funded from the Capital Region (Geosyntec will fund $15,000 of the budget using company resources). Majority of the project budget pertains to experimental set-up, sampling, and analyses associated with the bench-scale tests. Geosyntec will be responsible for project management, data interpretation, and report preparation.

FIGURES

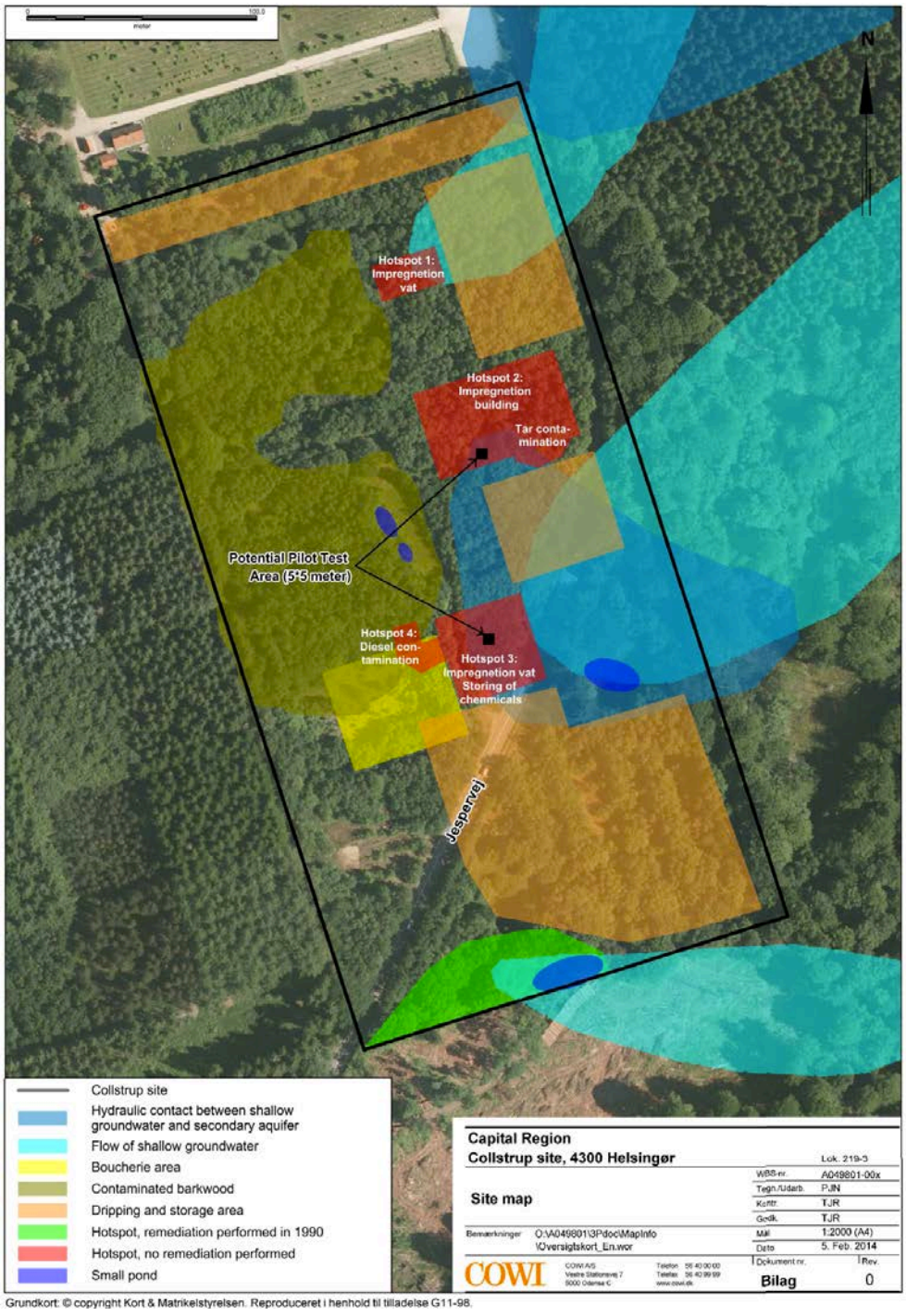


Figure 1. Site map with information about contamination and groundwater flow

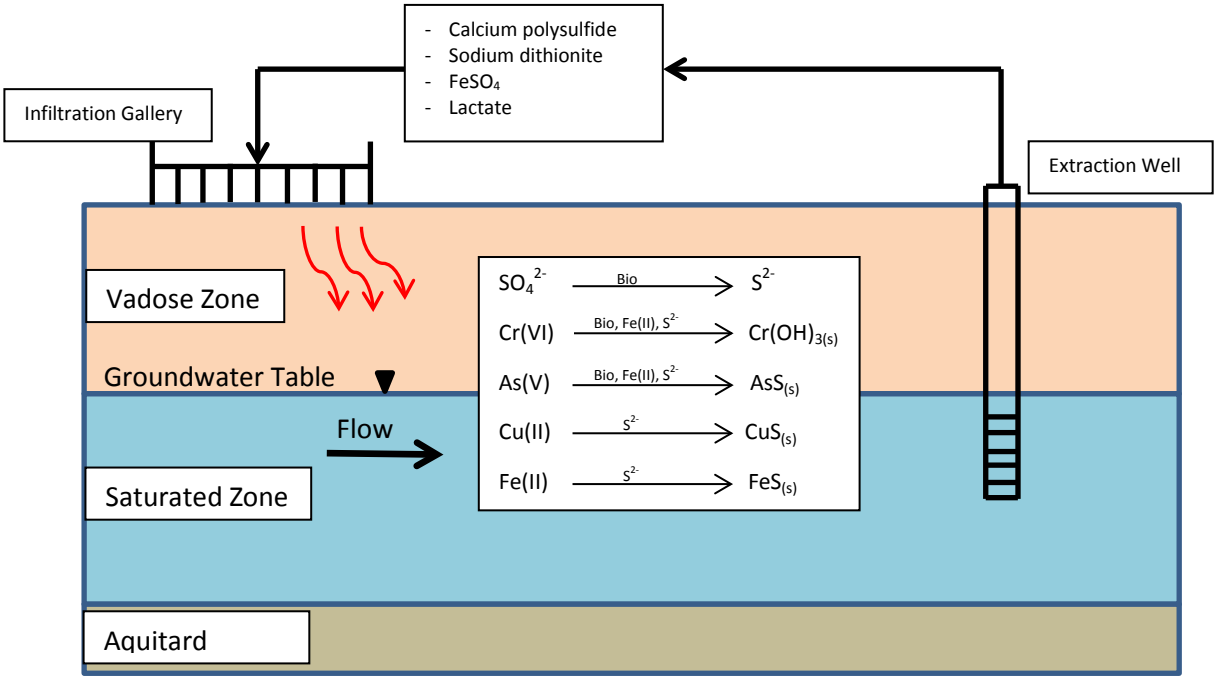


Figure 2. Schematic showing potential application of in situ biosequestration for remediation of CCA contaminated sites.

TABLES

TABLE 1
DESIGN OF CCA BENCH-SCALE TREATABILITY STUDY
Capital Region Of Denmark

Phase	# of Reactors per Sampling Event	Matrix	Sampling Frequency	# of Samples	Parameters (# Samples per Parameter)				
					Total Metals[1]	Dissolved Metals[1]	NVFAs[2]	Anions [3]	Geochemical analysis[4]
Baseline Characterization	0	Soil	One time	2	2	0	0	0	0
		Groundwater		2	2	2	0	2	2
Untreated Control	2	Soil	Three times	6	6	0	0	0	0
		Groundwater		6	0	6	6	6	6
Biotreatment (Lactate + Sulfate)	2	Soil	Seven Times	14	14	0	0	0	0
		Groundwater		14	0	14	14	14	14
Chemical Treatment (Calcium Polysulfide + Ferrous Sulfate)	2	Soil	Seven Times	14	14	0	0	0	0
		Groundwater		14	0	14	0	14	14
Total (Nos. of Reactor = 34)				**72**	**38**	**36**	**20**	**36**	**36**

Notes:
NVFAs: Non-Volatile Fatty Acid
(1) Arsenic, Chromium, Copper, and Iron.
(2) Lactate, Acetate, Propionate, Formate, Butyrate, and Pyruvate.
(3) Nitrate and Sulfate.
(4) Temperature, Redox, pH, and Dissolved Oxygen.