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December 26, 2013

Mr. David Brownlee
Georgia Department of Natural Resources
2 Martin Luther King Jr. Drive S.E., Suite 1462
Atlanta, GA 30334-9000

Subject: **Transmittal of Semi-annual Groundwater Monitoring Report #11**
July 2013 through December 2013
General Chemical Corporation Site, HSI#10498,
East Point, GA

Dear Mr. Brownlee:

On behalf of General Chemical LLC (GCC), we are pleased to provide you with two paper copies and an electronic copy of the Semi-annual Groundwater Monitoring Report #11, July 2013 through December 2013 for the above referenced site.

If you have any questions regarding this report, please feel free to give me a call at (678) 202-9500.

Sincerely,
Geosyntec Consultants, Inc.

Brian D. Jacobson, P.E.
Senior Engineer

Prepared for

General Chemical LLC
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SEMI-ANNUAL GROUNDWATER MONITORING REPORT NO. 11 JULY THROUGH DECEMBER 2013

GENERAL CHEMICAL SITE
EAST POINT, GEORGIA
HSI#10498

Prepared by

Geosyntec consultants

engineers | scientists | innovators
1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

Project Number GR5060

December 2013

PROFESSIONAL ENGINEER CERTIFICATION

I certify that I am a qualified engineer who has received a baccalaureate or post-graduate degree in the natural science or engineering, and have sufficient training and experience in environmental assessment and corrective measures, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments. I further certify that this report was prepared by myself or by a subordinate working under my direction.

_____

Brian D. Jacobson, P.E.
Registered Professional Engineer
Georgia Registration #23332

Geosyntec consultants

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1. INTRODUCTION

1.1 Background

1.1.1 Site Location and Description

The General Chemical LCC (GCL) facility (Site) is located on Central Avenue in the City of East Point, Fulton County, Georgia (**Figure 1-1**). The approximate Site location corresponds to latitude of 33.67 and longitude of 84.44. The Site property is bounded by North Martin Street and the Charles A. Green Recreational Facilities on the north side, Randall and Bayard Streets on the east side, Central Avenue and an industrial (metal recycling) facility on the south side, and Central Avenue on the west side. The general area surrounding the GCL facility consists of industrial land uses bordered by some residential properties toward the north and northeast directions. Another industrial site is located on the adjacent property to the northwest of the GCL facility.

The Site, as shown in an aerial view on **Figure 1-1**, consists of a process building, a warehouse structure, and an office building. During operation, there were four Hi-Clay Alumina (HCA) storage cells (herein referred to as HCA cells) located on the Site. These cells were removed during the period of 2003 to 2005, and the area was returned to beneficial use in 2006.

1.1.2 Summary of Recent Regulatory Activities

Subsequent to the issue of the 2002 Corrective Action Plan (CAP), GCL voluntarily elected to remove the HCA material from the on-site cells.

Following excavation and removal of the HCA, a revised CAP was issued by GCL on 2 October 2006. A Georgia Environmental Protection Division (GaEPD) letter dated 16 January 2007 provided comments and a request for additional work followed by resubmission of the revised CAP.

GCL submitted a revised CAP incorporating GaEPD comments on 30 March 2007.

GaEPD completed review and issued a conditional approval of the revised CAP on 4 September 2007. Pursuant to the revised CAP, groundwater and surface water samples were collected for aluminum and sulfate analysis.

GCL submitted a voluntary remediation plan application (VRPA) in January 2013. The VRPA proposed: (i) delineation of the horizontal extent of sulfate contamination in groundwater; (ii) continued semi-annual sampling of monitoring wells screened in the partially weathered rock (PWR) and surface water sampling locations; (iii) conduct a storm water drain assessment and implement any necessary repairs to prevent groundwater from entering the storm drain system; and (iv) institutional controls on affected properties through the placement of unified environmental covenants.

In a letter dated 10 April 2013, GaEPD approved the VRPA. GaEPD issued comments on the VRPA on 12 April 2013.

1.2 Objectives and Scope

The objective of this report is to present the results for the semi-annual groundwater monitoring activities conducted at the GCL site in November 2013. This is the second semi-annual report submitted to GaEPD following approval of the VRPA in April 2013. However, this report is issued as "Semi-annual Groundwater Monitoring Report No.11" to avoid confusion with previous reports issued under the CAP. This report provides a summary of the activities performed and the results of the field and laboratory measurements that were obtained during this monitoring period.

This report presents the results of the following activities:

- Sampling of 6 on-site wells (**Figure 1-2**);
- Sampling of 3 off-site wells (**Figure 1-2**); and
- Sampling of surface water at one on-site and three off-site locations (**Figure 1-3**).

1.3 Overview

This semi-annual groundwater monitoring report summarizes the results of field sampling activities performed by Geosyntec in November 2013. The report is organized as follows:

- Section 2 presents a summary of site characterization information including site geology and hydrogeology, field investigations, nature and extent of environmental impact, and site-specific groundwater and contaminant transport conceptual modeling.

- Section 3 presents the results from sampling of monitoring wells and surface water from the Site.

- Section 4 discusses the sampling procedures used to obtain groundwater and stormwater samples from the Site

- Section 5 summarizes the results of quality assurance/quality control (QA/QC) evaluation of the data obtained during this monitoring period.

- Section 6 presents conclusions that are based on the data and provide recommendations for future activities.

- Data from this monitoring period are presented in the Appendices. Analytical laboratory reports for water samples are presented in **Appendix A**. Field Forms used during well sampling are presented in **Appendix B**.

- Addendum 1 is provided to report the results of the off-site delineation sampling.

2 SITE CHARACTERIZATION

2.1 Site Geology and Hydrogeology

This section presents an overview of the Site hydrogeologic conditions. Information on the Site hydrogeology was obtained during the Site investigation activities, conducted in May 1998 in support of the Compliance Status Report (CSR) [Geosyntec, 1999].

The occurrence and movement of groundwater in the Piedmont formation is generally within two hydrogeologic units. A shallow hydrogeologic unit typically occurs within the soils and saprolite (weathered residuum which mantles bedrock). A layer of partially weathered rock (PWR) typically forms a transition between the saprolite and the fractured bedrock. A deeper hydrogeologic unit generally occurs within the fractured bedrock.

Groundwater in the shallow hydrogeologic unit usually occurs under water table (i.e., unconfined) conditions. Groundwater flow is controlled by local topographic features, where recharge occurs in upland areas and discharge occurs in drainage features such as streams, rivers, or lakes. Recharge to the shallow hydrogeologic unit is primarily the result of infiltrating precipitation. Groundwater in the deeper water-bearing zone is associated with secondary porosity (fractures or open spaces) within the crystalline bedrock and flow is controlled by the distribution and degree of interconnection of these openings in the rock. The deeper hydrogeologic unit is fully saturated.

Based on the results of the field investigation, the shallow hydrogeologic unit is conceptualized as an unconfined, homogeneous, and isotropic deposit of sandy clay with a hydraulic conductivity of approximately 4×10^{-5} to 2×10^{-4} cm/s, a hydraulic gradient of approximately 0.003 to 0.03, and an effective porosity of about 20 percent. Groundwater is believed to generally flow at about 16.4 ft per year from west to east across the Site and advection is believed to be the dominant contaminant transport mechanism.

The GCL Site is in an area of relatively steep topography adjacent to a small intermittent stream that discharges to the South River. As can be seen on the aerial photograph of the Site presented in **Figure 1.2**, industrial operations at the Site have resulted in regrading and leveling of a significant portion of the Site (i.e., vegetated

areas east of the process buildings). Groundwater flow at the Site is generally west to east.

The lithology of the Site consists primarily of clayey fill material overlying saprolite as depicted on **Figure**s **2-1 through 2-3**, which illustrate hydrogeologic cross-sections that show the Site features and geology. The fill material, which varies in thickness, covers most of the Site and consists of sandy to gravelly red micaceous clay. The saprolite, encountered in all fourteen of the monitoring wells drilled at the Site, consists of highly weathered schist consisting of orange to red clay with kaolinite and mica. Foliation and other relict rock texture are still well preserved and were visible in samples, but the material comprises mostly clay and mica which is formed by the deep weathering of the feldspar minerals. Competent bedrock, as defined by auger refusal, was generally encountered between 20 to 60 feet below ground surface (bgs).

2.2 Summary of Previous Site Investigations

The aluminum concentrations observed in the Site soil during the course of the CSR investigation are within the range typically seen in Piedmont soils (i.e., 70,000 to 100,000 mg/kg). The samples, in which the aluminum concentrations were elevated, were limited to locations of accumulation of more strongly weathered material. Therefore, based on detected concentrations of aluminum in soil samples, industrial activities at the Site have not resulted in a significant increase in aluminum concentrations in the soil [Geosyntec, 1999].

The HCA was removed between 2003 and 2006. Sulfate concentrations vary according to the nature of the material analyzed and were related to the proximity to former HCA cells. In places where the undisturbed soils directly underlie former HCA cells, sulfate concentrations in these soils were typically higher than those of other undisturbed soils. Following removal of the HCA, underlying soils were sampled and analyzed for sulfate, and soils exhibiting sulfate concentrations over 10,300 mg/kg (95% Upper Confidence Limit for all samples was 3,143 mg/kg) were removed.

3. GROUNDWATER AND STORM DRAIN SAMPLING

This section presents the details of the sampling of six on-site wells, and three off-site groundwater wells and one on-site and three off-site stormwater storm drains.

3.1 Groundwater Potentiometric Conditions

Groundwater elevations were measured prior to sampling wells during the November sampling event. The measurements were performed on 12 November 2013. All monitoring wells were gauged except for GCW-05 which had instrumental difficulties due to the organic matter present in the well. The well was successfully gauged after pumping was completed but due to slow recharge, the groundwater level was much lower than was expected before pumping, and so the measurement was omitted from the analysis. The water level measurements from delineation soil borings and PZ-07 were included to provide water level detail offsite during this round of sampling. The groundwater sampling and water level measurements from the delineation borings are attached as Addendum 1 to this report. The results of the groundwater elevation measurements are provided in **Table 3-1**.

The potentiometric map for November 2013 readings is shown in **Figure 3-1**. This map shows the typical Piedmont pattern of flow following topography towards surface water features, which act as collectors and discharge points for the groundwater. Since there are no streams at the Site, the groundwater is flowing towards the local topographic low which is aligned parallel with North Martin Street and the storm drain system. The general potentiometric pattern is consistent with the overall drainage flow pattern to the east-southeast towards the South River.

Water level measurements were recorded in wells screened in saprolite and shallow competent rock. In preparing the potentiometric map from water level measurements, generally no distinction was made as to whether the wells were shallow or deep, in saprolite or bedrock. Such distinctions were not appropriate for two reasons: (i) the Piedmont is characterized by a single saturated zone consisting of saprolite and bedrock that are hydraulically connected; and (ii) the vertical components of the head gradient are similar or small compared to the horizontal components.

3.2 Groundwater Sampling

3.2.1 Introduction

Groundwater samples were collected on 12-13 November 2013. Groundwater samples were submitted for analysis for sulfate using EPA Method 9056A and aluminum using EPA Method 6010C. The pH was measured in the field using EPA Method 150.1. The groundwater sampling results are presented in **Table 3-2**. Laboratory results are presented in **Appendix A** and field forms are presented in **Appendix B**.

3.2.2 Groundwater Constituent Summary

Sulfate was detected at all monitoring wells during the November 2013 sampling event. The measured sulfate concentrations were lower in the off-site wells, 130 mg/l at EPW-01 at the northwestern boundary of the Site, and 15 mg/l at EPW-02 to the east of the Site. Sulfate concentration in off-site well EPW-03D was 28 mg/l. On-site well OW-1A at the western boundary was measured at 54 mg/l. The background monitoring well GCW-01D at the upgradient edge of the site had 250 mg/l of sulfate. The results indicate groundwater entering the site contains background concentrations of sulfate between 54 to 130 mg/l as measured at OW-1A and EPW-01. These values are also consistent with the upgradient storm drain sampling location SW-09 where sulfate has been measured at 92 mg/l. Sulfate concentrations along the northern property boundary at GCW-04D were 5,500 mg/l. Sulfate at the eastern boundary at GCW-02D and GCW-03D were 2,800 and 3,900 mg/l, respectively. The source area monitoring well (GCW-05) sulfate concentration was 1,100 mg/l.

Aluminum was detected at six of the nine monitoring wells during the November 2013 sampling event. The concentrations were low at the off-site wells, 14 mg/l at EPW-01 at the northwestern boundary of the Site and <0.1 at EPW-02 and EPW-03D, located to the east and northeast of the Site, respectively. On-site well OW-1A at the western boundary had 0.7 mg/l of aluminum. The background monitoring wells GCW- 01D at the upgradient edge of the site contained 7.4 mg/l. The results indicate groundwater entering the site contains background concentrations of aluminum between 0.7 to 14 as measured at OW-1A and EPW-01. These values are also consistent with the upgradient storm drain location SW-09 where aluminum has been measured between <0.1 to 4.87 mg/l. The aluminum concentration along the northern property boundary at GCW-04D was 592 mg/l. Aluminum concentrations at the eastern boundary at GCW-02D and

GCW-03D were 214 and 361 mg/l, respectively. The source area monitoring well (GCW-05) aluminum concentration was <0.1 mg/l.

The pH measurements were generally consistent across the site. The off-site wells EPW-01, -02, and -03 ranged from 4.1 to 5.8 standard units (s.u.). The upgradient wells GCW-01D and OW-1A were both 4.1 s.u. The northern and eastern wells were similar and ranged from 3.4 to 3.6 s.u. The pH for source area monitoring well (GCW-05) was measured at 6.6 s.u.

3.2.3 Comparison to Previous Results for Groundwater

Table 3-3 summarizes statistical trend analysis of both aluminum and sulfate data in groundwater. Mann-Kendall trend analysis was performed using available data for each monitoring well at a 95% confidence level. The procedure and methodologies employed in the analysis of the data are consistent with Georgia EPD and United States Environmental Protection Agency (EPA) recommended procedures. These methods meet the performance criteria specified in the rules of the Georgia EPD, Chapter 391-3-4-.14(19) and the technical standards described in the EPA "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance," dated March 2009.

Historical trend graphs for sulfate and pH are shown in **Figure 3-2**. Sulfate concentrations generally decreased or were stable in off-site and on-site wells in groundwater. The sulfate concentrations in monitoring wells GCW-01D, GCW-03D, GCW-04D, GCW-05, EPW-03D and OW-1A showed a statistically significant decreasing trend. In the previous semi-annual report, GCW-05 was showing no trend but is now showing a decreasing trend. Neither decreasing nor increasing trends were calculated for sulfate concentrations in monitoring wells GCW-02D, EPW-01 and EPW-02. Similarly, aluminum concentrations also decreased or were stable in groundwater. A statistically significant decreasing trend was calculated for aluminum in monitoring wells EPW-02 and OW-01A. Neither decreasing nor increasing trends were calculated for aluminum in the remainder of the wells. The pH measurements were generally stable. The pH measured at on-site wells was generally lower than the pH measured at the off-site wells except for the source area well which had a pH similar to background.

Several conditions not related to the site may slow the return of the site to background concentrations of site constituents, following removal of source materials. These include the following:

- The pH of the groundwater in upgradient wells (OW-1A and GCW-01D) is low. Measured pH values were both 4.1 s.u. The low pH condition of groundwater entering the site will slow a return to background conditions for pH and aluminum.

- The pH of rainwater at the site was measured at less than 5 during the HCA removal, therefore infiltrating rainfall will not have a significant effect in terms of raising the groundwater pH in the short-term.

- The area surrounding the site has a number of other sources of sulfate in groundwater resulting from previous operations. Potential sulfate sources include a former battery cracking plant, a former fertilizer manufacturer, two off-site HCA disposal areas operated by others, and a former agricultural chemical manufacturer.

It is encouraging that no significant impacts have been detected at downgradient wells EPW-02 or EPW-03D. The sulfate concentrations at EPW-02 appear stable and are similar to regional background conditions of 46 to 130 mg/l as observed at well EPW-01. EPW-03D is located approximately 200 feet from the site boundary. Sulfate concentrations at EPW-03D are similar to the regional background, and trends are decreasing. The pH trend at the EPW-03D is stable and typical for the Piedmont with measurements generally around 5.5. The decreasing sulfate concentrations and stable pH indicate impacts from the site, if they ever existed, are minimal and decreasing with time. The concentration of constituents of concern from both on-site and off-site sources appear to have attenuated to background levels prior to reaching EPW-02 or EPW-03D.

The removal of the HCA source material appears to be resulting in the site returning to background conditions over time. The sulfate concentrations are in decline at downgradient wells. However, it will take time for residuals to mix with infiltration and incoming groundwater and for geochemical conditions to stabilize.

3.3 Storm Drain Sampling

3.3.1 Introduction

Storm drain water samples were collected from one on-site and three off-site storm drains in November 2013. Surface water flows in the storm drain system in the following sequence: SW-09, SW-06, SW-02, SW-07 from upstream to downstream. The purpose of the storm drain sampling program was to evaluate potential impacts to the storm drain system as requested by GaEPD. Stormwater samples were submitted for analysis for sulfate using EPA Method 9056A and aluminum using EPA Method 6010C. The pH was measured in the field using EPA Method 150.1. The stormwater sampling locations are shown on **Figure 1-3**. The stormwater sampling results are presented in **Table 3-4**. Laboratory results are presented in **Appendix A** and field forms are presented in **Appendix B**.

3.3.2 Storm Drain Constituent Summary

Sulfate was detected at storm drain monitoring locations, including the location upgradient from the site, during the April 2013 sampling event. The upgradient (SW-09) sulfate concentration was measured at 92 mg/L which is consistent with background levels measured in groundwater wells at the site. A sample was collected cross gradient (SW-06) at a location in the Charles A. Green Recreational Facilities. Sulfate was measured at 2,200 mg/l. At the downgradient and on-site location (SW-02), sulfate was measured at 1,500 mg/l. The discharge of the storm drain to surface water was sampled at SW-07. The sulfate concentration was measured at 540 mg/l.

Aluminum was detected at storm drain water monitoring locations during the November 2013 sampling event. The upgradient (SW-09) aluminum concentration was non-detect. The sample for aluminum collected cross gradient (SW-06) was measured at 197 mg/l. At the downgradient and on-site location (SW-02) aluminum was measured at 112 mg/l. The discharge of the storm drain to surface water was sampled at SW-07. The aluminum concentrations was measured at 40.8 mg/l.

3.3.3 Comparison to Previous Results for Storm Drains

Table 3-5 summarizes statistical trend analysis of both aluminum and sulfate data in storm drains. Mann-Kendall trend analysis was performed using available data for each monitoring well at a 95% confidence level. The procedure and methodologies employed

in the analysis of the data are consistent with Georgia EPD and United States Environmental Protection Agency (EPA) recommended procedures. These methods meet the performance criteria specified in the rules of the Georgia EPD, Chapter 391-3-4-.14(19) and the technical standards described in the EPA "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance," dated March 2009.

Historical trend graphs for sulfate, aluminum and pH are shown in **Figure 3-3**. Sulfate concentrations were generally stable or increasing. However, the increase in sulfate and aluminum may be the result of an uncharacteristically high result from the November sampling event. Aluminum concentrations did not vary in a consistent direction showing both minor increases and decreases between sampling events. The pH measurements were relatively stable showing minor changes between sampling events at the same location.

Several conditions not related to the site may slow the return of the site to background concentrations of site constituents, following removal of source materials. These include the following:

- The pH of rainwater at the site was measured at less than 5 during the HCA removal, therefore infiltrating rainfall will not have a significant effect in terms of raising the stormwater pH.

- The area surrounding the site has a number of other sources of sulfate in groundwater resulting from previous operations. Potential sulfate sources include a former battery cracking plant, a former fertilizer manufacturer, two off-site HCA disposal areas operated by others, and a former agricultural chemical manufacturer.

4. SAMPLE COLLECTION PROCEDURES

4.1 Summary

In November 2013, samples were collected from 9 monitoring wells. Samples from monitoring wells were collected using dedicated tubing and low-flow purging techniques. Samples were placed in 250 ml polyethylene containers. The containers for aluminum were acidified with approximately 2 ml of nitric acid. Sulfate samples were preserved by refrigeration. The sampling containers and preservatives were provided by Analytical Services, Inc. located in Norcross, Georgia. The containers were labeled and stored on ice in a cooler until time for shipment to the laboratory. The samples were packed in ice in a cooler and shipped by overnight courier or hand delivered to the laboratory. Chain-of-custody documents were completed and included with each shipment.

4.2 Monitoring Well Sampling Procedure

Monitoring wells were sampled using peristaltic pumps. Peristaltic pumps were used since the depth to water was less than 29 ft bgs, which is the maximum practical lift a peristaltic pump can achieve. The advantages of peristaltic pumps are that they produce low rates of flow with minimal surging and can be decontaminated more thoroughly when compared to bailers or other types of pumps by simply replacing the tubing in the pump head. The pump-head tubing is silicone, while the down-hole tubing is polyethylene.

Low flow purging is conducted by purging groundwater from the well at a low, constant rate for an extended period of time with the pump intake set directly opposite the well screen. This method creates a localized flow system in the well directly between the screen and pump intake, eliminating the need to remove large volumes of casing storage while ensuring that the sample collected is representative of the surrounding ground water. For this project, a purge rate of approximately 500 mL/min was extracted until the turbidity was stable at less than 20 NTUs or until other field parameters were stable. Additionally, a purge volume of at least five gallons was removed, when possible, to represent at least three pore volumes of the screened zone of the well.

To ensure that the samples collected are representative of the ground water in the formation, field parameters are measured throughout the purging process. Temperature (^{o}C), conductivity (mS/cm), pH (s.u.), redox potential (mV), and turbidity (NTU) are measured using a Horiba U-52 or equivalent water quality meter. Measurements were taken in an enclosed flow-through cell to minimize the effects of contact with air.

After the field parameters have stabilized, the flow-through cell was disconnected and the sample is collected directly from the pump discharge tubing without adjusting the flow rate. This method ensures that the sample is representative of the ground water surrounding the respective location.

4.3 Groundwater Sampling Decontamination Procedure

Down well tubing was dedicated to each monitoring well by securing to the well cap and placing the tubing completely in the well when not in use. Pump-head tubing for the peristaltic pump was discarded after each use.

4.4 Storm Drain Sampling Procedure

Storm drain water was sampled using peristaltic pumps or by hand. The pump-head tubing is silicone, while the down-hole tubing is polyethylene.

Storm drain water sampling was performed at the upgradient (SW-09), on-site (SW-02) and crossgradient (SW-06) locations by lowering tubing into storm drain manholes and placing the end of the tube near the outlet for the manhole. This ensured water from multiple inlets was mixed prior to sample collection. The downgradient (SW-07) sample was collected by hand at the outlet to the storm drain at the discharge to the stream.

For peristaltic pump samples, a purge rate of approximately 500 mL/min was maintained until the turbidity was stable at less than 20 NTUs or until other field parameters were stable. To ensure that the samples collected are representative of the storm drain water, field parameters are measured throughout the purging process. Temperature (^{o}C), conductivity (mS/cm), pH (s.u.), redox potential (mV), and turbidity (NTU) are measured using a Horiba U-52 or equivalent water quality meter. Measurements were taken in an enclosed flow-through cell to minimize the effects of contact with air.

After the field parameters have stabilized, the flow-through cell was disconnected and the sample is collected directly from the pump discharge tubing without adjusting the flow rate. This method ensures that the sample is representative of the storm drain water surrounding the respective location.

For hand samples, a location near the center of the flow and free of surface debris was selected. The sample was collected from beneath the surface by inserting the container opening down into the water then inverting underwater. The field parameters were measured by inserting the water quality instrument in the flow at the sampling location.

4.5 Storm Drain Sampling Decontamination Procedure

Drop tubing and pump-head tubing for the peristaltic pump were discarded after each use.

5. QUALITY ASSURANCE/QUALITY CONTROL

The field and analytical data from this reported semi-annual groundwater monitoring period was reviewed by Mr. Brian Jacobson with Geosyntec. The data review included evaluation of the field and laboratory quality assurance/quality control (QA/QC) parameters in order to assess the integrity of the data obtained for this project including: documentation, holding times, laboratory control samples, and laboratory matrix spike analyses. The documentation and results of the QA/QC analyses are found in the laboratory reports provided in **Appendix A**. Evaluation of these parameters was used to assess the precision, accuracy, representativeness, comparability, and completeness of the data.

Based on the review of the field and laboratory data, the data obtained from this field investigation are considered to be of acceptable quality and are fully usable with the qualifications as designated by the data validation process. Details of the QA/QC review of the data are presented in the following sections.

5.1 Documentation

Field sampling forms and chain-of-custody forms were evaluated for completeness. Field records were considered to be usable and to provide a reasonable record of field activities and samples collected. This review indicated that field sampling and custody transfer procedures were adequately documented and the integrity of the samples was not compromised.

5.2 Holding Times

All samples were processed and analyzed by the laboratory using the correct analytical methods and within the prescribed holding times.

5.3 Reporting Limits

The laboratory reporting limits for sulfate by Method 9056A varied from 5 to 1000 mg/l depending on the required dilution to measure a result. The laboratory reporting limits for aluminum by Method 6010C varied between 0.1 mg/l and 2 mg/l. The required quantitation limits for this project were met for all data, except in cases where sample dilution was required because of high concentrations of target analytes or matrix interference.

5.4 Accuracy

The accuracy of the data was evaluated by examining the percent recovery (%R) of matrix spikes and matrix spike duplicate (MS and MSD), and laboratory control samples (LCS). A post digestion spike was also performed for aluminum analysis to evaluate possible matrix effects of the digestate. The %Rs met the laboratory-specific QC limits for the laboratory QC LCS samples. The MS samples for sulfate and aluminum were outside the %R limits for MS and MSD samples as well as for the post digestion spike. The low recoveries were due to the low spike concentration in relation to the actual sample concentration of aluminum and sulfate (sample concentration much greater than the spiked amount). The data were judged acceptable for use based on the acceptable %R for the LCS samples.

5.5 Representativeness

Representativeness was evaluated to assess the degree to which sample results represent the actual concentrations of constituents in groundwater. Representativeness was evaluated qualitatively by reviewing sampling procedures and laboratory analytical procedures. Based on this review, the samples yielded results that provided a good qualitative representation of constituent concentrations in groundwater.

A qualitative evaluation of representativeness was also performed by examining the analysis of laboratory method blanks. Constituents were not detected above the reporting limit in any of the method blanks. This evaluation further demonstrates that the analytical data are representative of actual conditions.

5.6 Comparability

The current field and laboratory methods were compared to methods used during past monitoring periods in order to evaluate the comparability of data obtained during the current monitoring period to data previously obtained. The recommended reporting limits were used for all constituents. The data presented in this report are consistent with the data presented in previous reports.

5.7 Completeness

Completeness was measured by determining the percentage of usable data obtained from samples for this project. The project sample results were found to be 100 percent complete and usable without qualification.

6. CONCLUSIONS

6.1 Groundwater

The results of the six years of data collection indicate concentrations of constituents of concern are generally showing significant decreasing trends for on-site monitoring wells. The HCA source material has been removed for over eight years. While many factors can influence concentrations at any given point in time, (e.g., time since removal of the source, hydrogeologic conditions, and precipitation patterns) it is encouraging to see that concentrations of monitored constituents in the latest round of sampling indicate a decrease and that the general trend is decreasing. Groundwater levels (elevations) have been generally stable since 2008.

Sulfate concentrations show a statistically significant decreasing trend in four of five on-site groundwater wells. The decreasing trends are consistent with source removal followed by natural attenuation of the remaining pore water.

Aluminum concentrations did not vary in a consistent direction between sampling events. Total aluminum concentration is pH dependent and since Piedmont soils contain high levels of naturally occurring aluminum, this phenomenon is not unexpected. Additionally, aluminum hydroxide can migrate as a colloid in groundwater. As shown in **Figure 6-1**, on-site wells consistently had aluminum concentrations above solubility limits indicating solid colloidal aluminum was likely being measured in the groundwater samples. Elimination of the colloidal aluminum would result in at least an order of magnitude reduction in total aluminum measured. For example, as shown on **Figure 6-1**, the measured total aluminum concentration was 29 mg/l, whereas the maximum soluble concentration at pH 4.0 is 0.6 mg/l, a 98 percent decrease from the reported value. The natural filtering of the aluminum floc particles by the soil as the water migrates off site may explain the rapid reduction in observed aluminum concentrations with increasing distance from the former source area.

The pH measurements were generally stable or increasing between the sampling events. While this is encouraging, we believe that local precipitation which has been measured with a pH less than 5 standard units will limit recovery of groundwater pH. The depressed pH will continue to allow naturally occurring aluminum to be mobilized from site soils. However, the aluminum does not appear to migrate off site.

6.2 Storm Drains

Fifteen sampling events have been performed for storm drains. Storm drain water and groundwater are related due to leaks in the storm drains that allow the infiltration/exfiltration of stormwater and groundwater depending on the relative water levels. The stormwater constituent concentrations and pH will vary slowly due to the low groundwater flow velocity across the site (previously estimated at 16.4 ft. per year). The potential presence of off-site sources may slow the return of the stormwater to background conditions. Factors that may slow a return to background include the following:

- The pH of the groundwater in upgradient wells (OW-1A and GCW-01D) is low. Measured pH values were 4.1 s.u in both wells. The low pH values of groundwater entering the site will slow a return to background conditions of stormwater mixed with groundwater exiting the site. The pH of stormwater in the cross-gradient sampling location was measured at 3.7 s.u. This water mixes with on-site stormwater lowering the pH.

- The pH of rainwater at the site was measured at less than 5 during the HCA removal, therefore infiltrated rainfall and stormwater will not have a significant effect in terms of raising the stormwater pH in the short-term.

- The area surrounding the site has a number of other sources of sulfate in groundwater resulting from previous operations. These sites may be contributing the elevated sulfate concentrations noted at SW-06 that were measured at 2,100 mg/l. Potential sulfate sources include a former battery cracking plant, a former fertilizer manufacturer, two off-site HCA disposal areas operated by others, and a former agricultural chemical manufacturer.

The sulfate concentrations at the upgradient monitoring point (SW-09) were lower than on-site (SW-02) or cross-gradient (SW-06) monitoring points. Downgradient (SW-07) sulfate concentration at the exit to the storm drain and the start of open channel flow was measured at 540 mg/l which is above the site background concentration of 46 to 51 mg/l.

The on-site (SW-02) concentrations were lower than the upstream cross-gradient (SW-06) location indicating limited impact, if any, from on-site contributions. Since the on-

site source has been removed and potential off-site sources likely remain the relative contribution from the Site would be expected to continue to decrease with time. As presented in **Figure 3-3**, the time trend analysis shows a continued impact from the upstream SW-06, which is consistent with source removal on site and active potential impacts by a residual plume.

7. REFERENCES

Geosyntec (1999), "*Compliance Status Report*", General Chemical Corporation, East Point, Georgia", prepared by Geosyntec Consultants, February 1999

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Geosyntec (2006), "*Site restoration Report, General Chemical Corporation, East Point, Georgia"*, prepared by Geosyntec Consultants, February 2006

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TABLES

Table 3-1
Well Construction Data and Groundwater Elevations
April 2013
General Chemical Site
East Point, Georgia

Location	Well Casing Elevation	Adjacent Soil Elevation	Screen Interval (ft bgs)	Depth to Water (ft)	Groundwater Elevation (ft msl)
				Apr-13	Apr-13
GCW-01S	1023.6	1024.0	15-25	10.6	1013.0
GCW-01M	1023.8	1024.1	34-44	10.6	1013.2
GCW-01D	1023.9	1024.2	58-68	9.9	1014.0
GCW-02S	983.6	983.9	16-26	4.2	979.4
GCW-02D	983.4	983.8	34-44	3.7	979.8
GCW-02V	984.7	985.0	85.5-95.5	3.6	981.1
GCW-03S	981.3	981.6	11-21	4.5	976.7
GCW-03D	981.2	981.6	28-38	4.1	977.1
GCW-04S	996.6	997.0	13-23	8.3	988.3
GCW-04M	997.0	997.4	30-40	8.6	988.4
GCW-04D	996.8	997.1	50-60	8.3	988.4
GCW-04V	996.7	997.0	114-124	10.2	986.5
GCW-05	995.1	994.9	80-90	4.1	991.0
EPW-01	1017.5	1017.7	24.51(1)	14.9	1002.6
EPW-02	980.0	980.3	19.41(1)	10.1	969.8
EPW-03S	984.5	984.8	12-22	9.5	975.0
EPW-03M	984.3	984.6	29-39	9.3	975.0
EPW-03D	984.6	984.9	46-56	9.2	975.4
OW-1A(2)	1030.6	1027.9	23.5-33.5(3)	12.9	1017.7
PZ-1	996.1	996.1	9-19	7.8	988.3
PZ-7	997.9	997.9	9-19	9.6	988.2

Notes:
(1): Screen length is unknown. Total depth of the well is
(2): Well OW-1A has a casing extending above ground surface 2.7 ft.
(3): Screen interval measured 7 November 2012.
NA: Not available

Table 3-2
Groundwater Sampling Results
April 2013
General Chemical Site
East Point, Georgia

Location	pH (-) EPA 150.1	Sulfate (mg/l) EPA 9056A	Aluminum (mg/l) EPA6010C
GCW-01D	4.0	280	6.11
GCW-02D	3.4	2,500	214
GCW-03D	3.3	3,600	331
GCW-04D	3.5	5,000	593
GCW-05	6.6	1,500	0.382
EPW-01	5.3	46	8.44
EPW-02	6.5	57	<0.1
EPW-03D	5.9	28	<0.1
OW-1A	4.2	51	0.829
Duplicates	--	270[1]	5.94[1]

Notes:
[1]: Duplicate was taken from GCW-01D

Table 3-3
Summary of Statistical Trend Analysis
In Groundwater Samples
General Chemical Site
East Point, Georgia

Well ID	Parameter	Mann-Kendall Trend Analysis at 95% Confidence Level
GCW-01D	Alumimum	No Trend
GCW-02D		No Trend
GCW-03D		No Trend
GCW-04D		No Trend
GCW-05		No Trend
EPW-01		No Trend
EPW-02		Decreasing
EPW-03D		No Trend
OW-1A		Decreasing
GCW-01D	Sulfate	Decreasing
GCW-02D		No Trend
GCW-03D		Decreasing
GCW-04D		Decreasing
GCW-05		No Trend
EPW-01		No Trend
EPW-02		No Trend
EPW-03D		Decreasing
OW-1A		Decreasing

Table 3-4
Storm Drain Sampling Results
April 2013
General Chemical Site
East Point, Georgia

Location	Description	pH (-) EPA 150.1	Sulfate (mg/l) EPA 9056A	Aluminum (mg/l) EPA6010C
SW-02	On-site	4.1	990	99.4
SW-06	Cross-Gradient	4.3	1700	158
SW-07	Downgradient	4.4	510	38.9
SW-09	Upgradient	6.3	17	4.87
Duplicate	Duplicate SW-02	--	1100	98.9

Note:
Duplicate sample was taken from SW-02

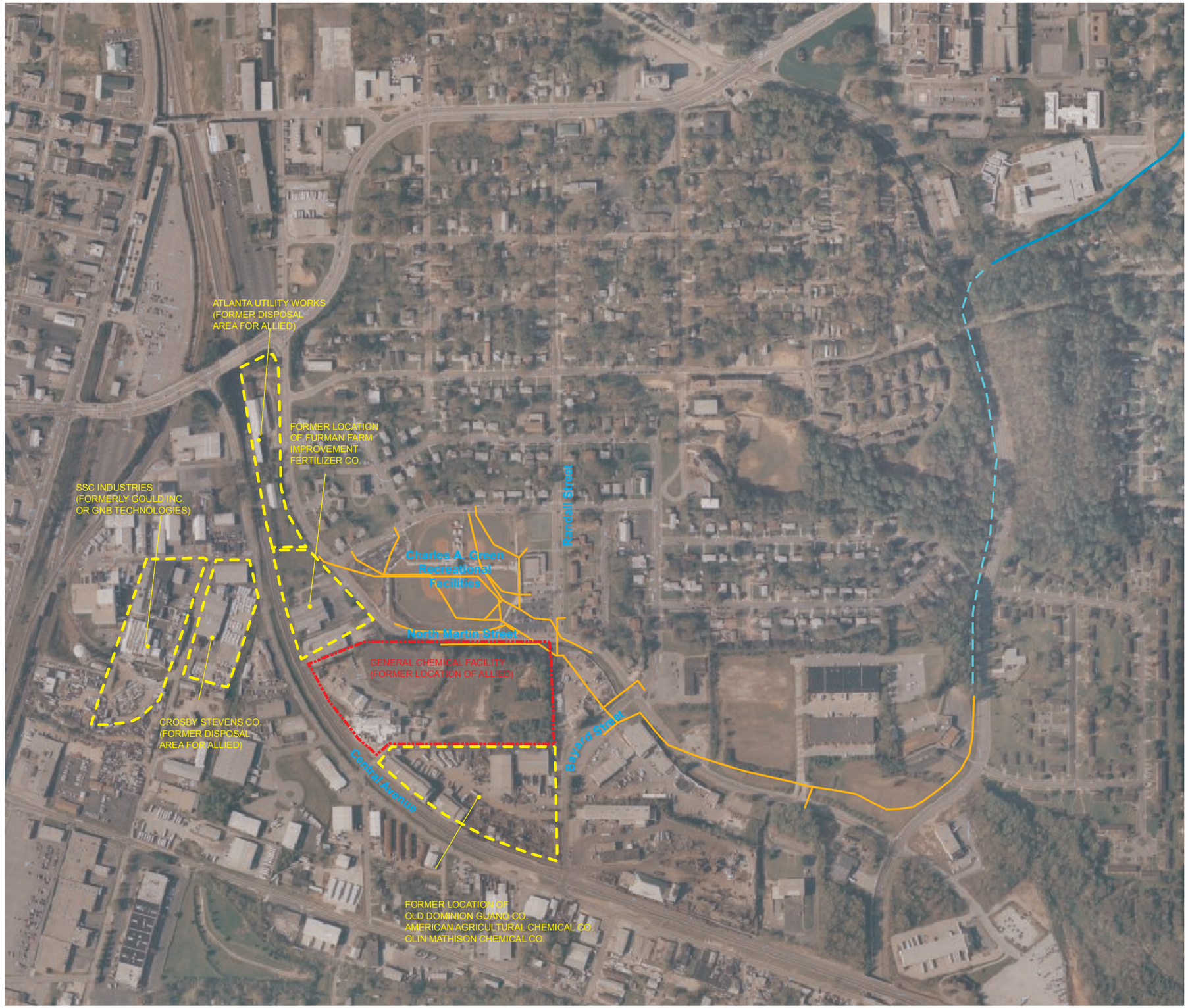
Table 3-5
Summary of Statistical Trend Analysis
In Storm Drain Samples
General Chemical Site
East Point, Georgia

Sample Location	Parameter	Mann-Kendall Trend Analysis at 95% Confidence Level
SW-02	Alumimum	Increasing
SW-06		Increasing
SW-07		No Trend
SW-09		Increasing
SW-02	Sulfate	No Trend
SW-06		Increasing
SW-07		No Trend
SW-09		No Trend

FIGURES

SITE VICINITY MAP

GENERAL CHEMICAL
EAST POINT, GEORGIA



LEGEND

- Storm Drain
- Approximate Property Line
- Approximate Property Line General Chemical Facility
- South River
- Unnamed Tributary

N
W E
S

500 250 0 500 1,000
Feet

Geosyntec consultants

ATLANTA, GEORGIA

DATE:	06/14/13	SCALE:	1" = 500'
PROJECT NO.	GR5060	FIGURE NO.	1-1
DOCUMENT NO.		FILE NO.	Figure 1.2.mxd

N:\genchem\GR3712_CAP\GCC Data and Info

Legend

Monitoring Well

Approximate Property Boundary

Geosyntec consultants
Kennesaw, GA

JUNE 2013

MONITORING WELLS LOCATION MAP

General Chemical, East Point, GA

Figure
1-2

N:\geneham\gis\MXDs, dvifiu, 01-14-2011, GB3712

Legend

Surface Water Sample Location

Approximate Property Boundary

Geosyntec consultants
Kennesaw, GA

JUNE 2013

STORM DRAIN SAMPLE LOCATION MAP

General Chemical, Atlanta, GA

Figure
1-3

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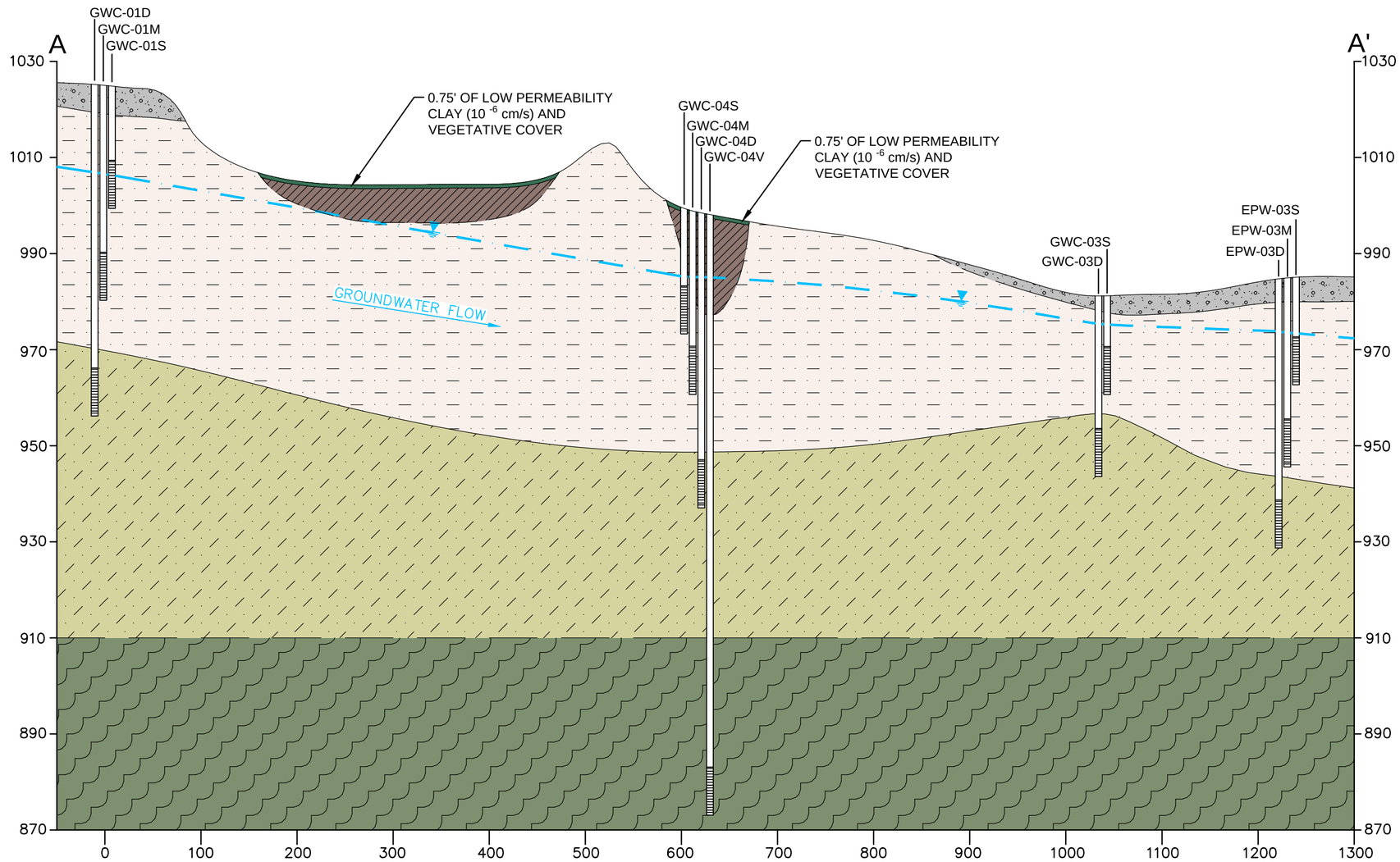
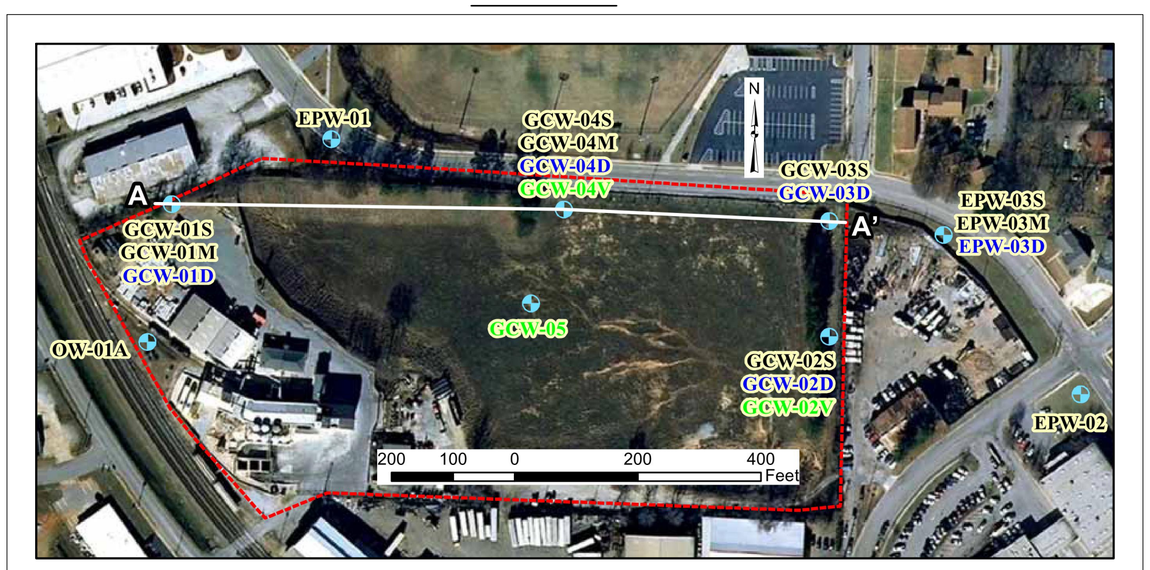
GEOLOGIC AND HYDROGEOLOGIC CROSS SECTION ALONG A-A'



KEY MAP



LEGEND

- 0.75' THICK LOW PERMEABILITY CLAY (10 $^{-6}$ cm/s) AND VEGETATIVE COVER
- GRAVELLEY CLAY, FILL
- CLAY, FILL AFTER EXCAVATION
- SILTY SAND, RELICT SCHISTOCITY, MICACEOUS (SAPROLITE)
- PARTRIALLY WEATHERED SCHIST
- BEDROCK (SCHIST)
- LITHOLOGIC CONTACT, DASHED WHERE INFERRED
- MONITORING WELL SCREEN ZONE WITH WATER ELEVATION (FEET MSL), NOVEMBER, 2012

0 100' 200'

HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 5X

Geosyntec consultants

DATE:	JUN-13	SCALE:	AS SHOWN
PROJECT NO.	GR5060/12	FILE NO.	5060F001
DOCUMENT NO.	GA 130020	FIGURE NO.	2-1

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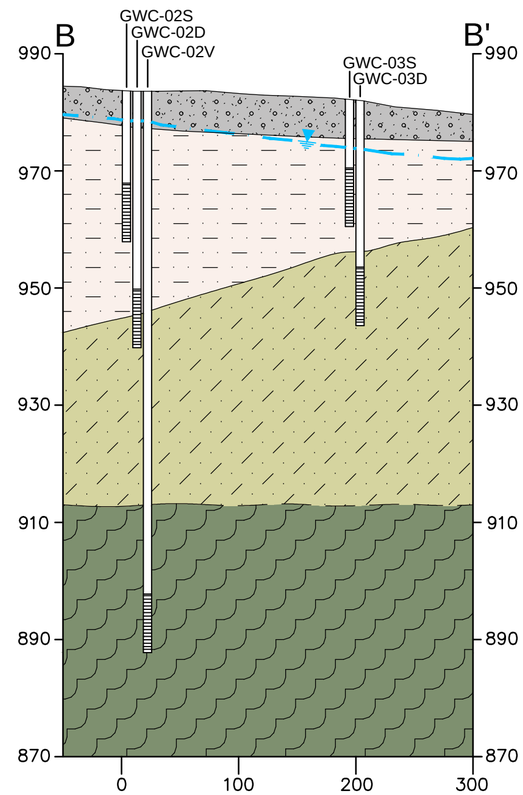
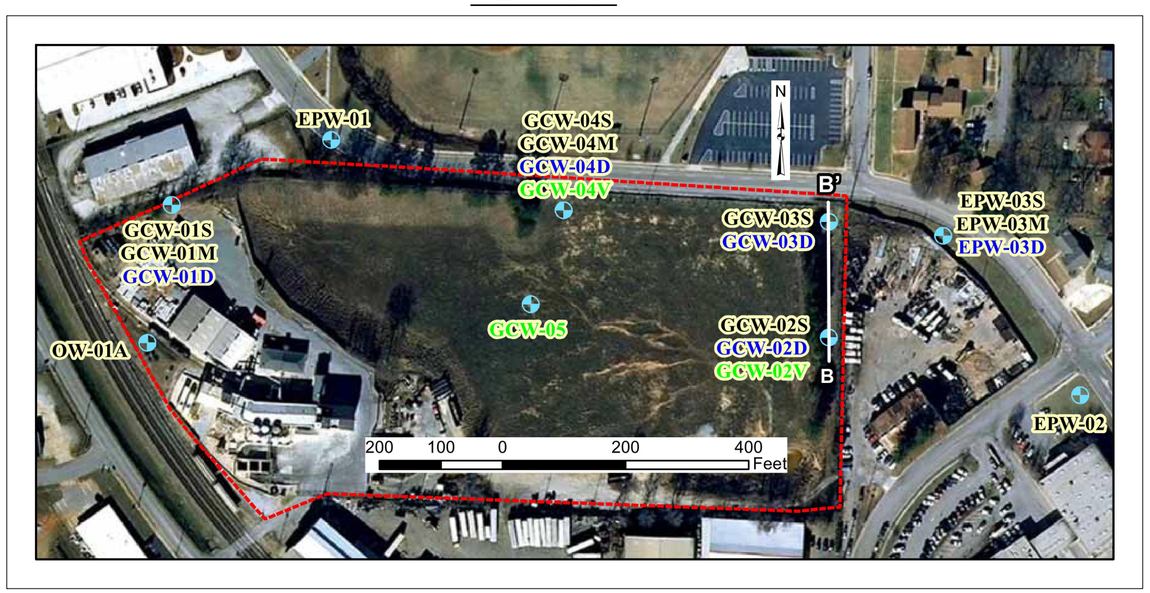
GEOLOGIC AND HYDROGEOLOGIC CROSS SECTION ALONG B-B'



KEY MAP



LEGEND

- GRAVELLEY CLAY, FILL
- SILTY SAND, RELICT SCHISTOCITY, MICACEOUS (SAPROLITE)
- PARTRIALLY WEATHERED SCHIST
- BEDROCK (SCHIST)
- LITHOLOGIC CONTACT, DASHED WHERE INFERRED
- MONITORING WELL SCREEN ZONE WITH WATER ELEVATION (FEET MSL), NOVEMBER, 2012

0 100' 200'

HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 5X

Geosyntec consultants

DATE:	JUN–13	SCALE:	AS SHOWN
PROJECT NO.	GR5060/12	FILE NO.	5060F001
DOCUMENT NO.	GA 130020	FIGURE NO.	2-2

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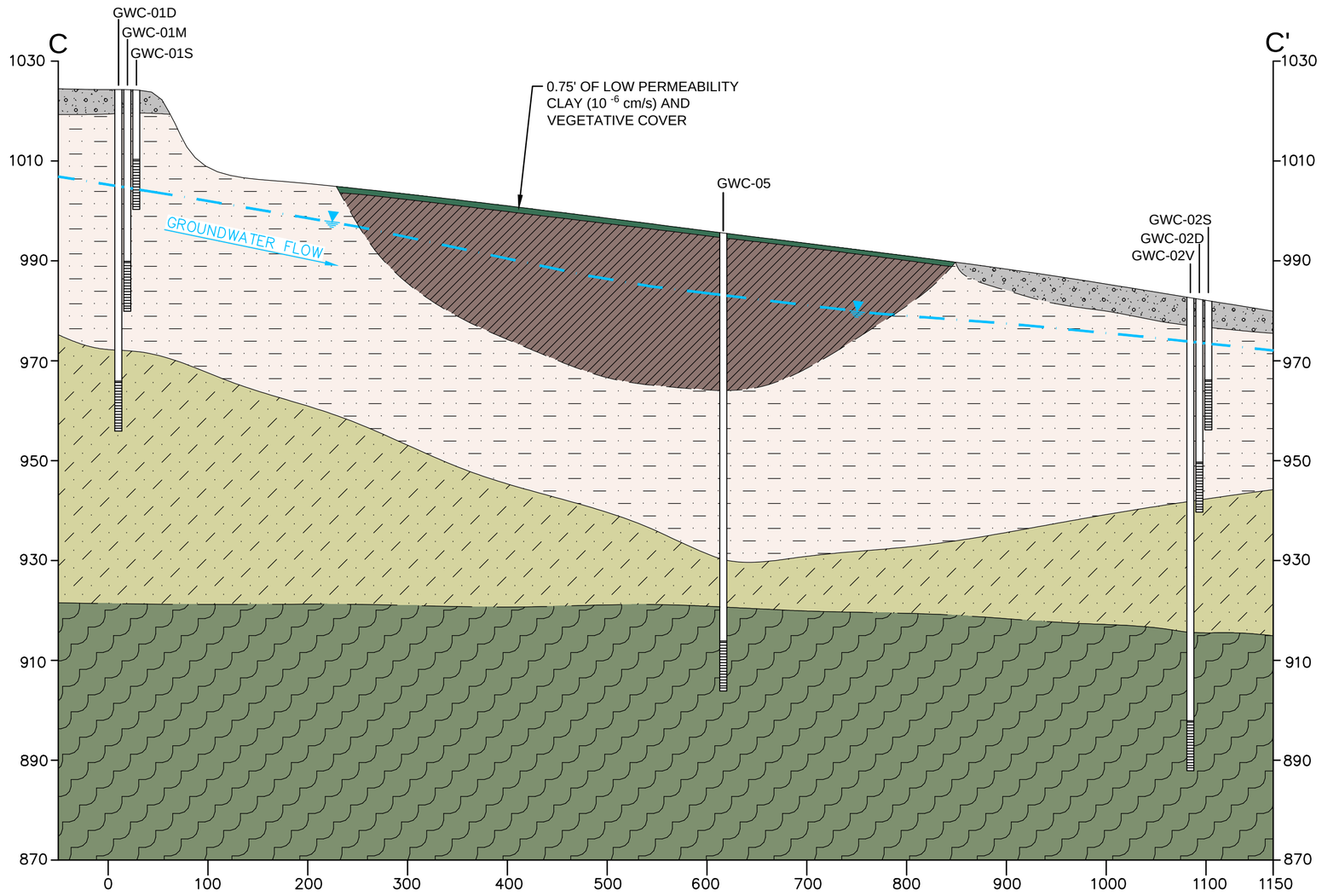
GEOLOGIC AND HYDROGEOLOGIC CROSS SECTION ALONG C-C'



KEY MAP

LEGEND

- 0.75' THICK LOW PERMEABILITY CLAY (10 $^{-6}$ cm/s) AND VEGETATIVE COVER
- GRAVELLEY CLAY, FILL
- CLAY, FILL AFTER EXCAVATION
- SILTY SAND, RELICT SCHISTOCITY, MICACEOUS (SAPROLITE)
- PARTRIALLY WEATHERED SCHIST
- BEDROCK (SCHIST)
- LITHOLOGIC CONTACT, DASHED WHERE INFERRED
- MONITORING WELL SCREEN ZONE WITH WATER ELEVATION (FEET MSL), NOVEMBER, 2012

0 100' 200'

HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 5X

Geosyntec consultants

DATE:	JUN-13	SCALE:	AS SHOWN
PROJECT NO.	GR5060/12	FILE NO.	5060F001
DOCUMENT NO.	GA 130020	FIGURE NO.	2-3

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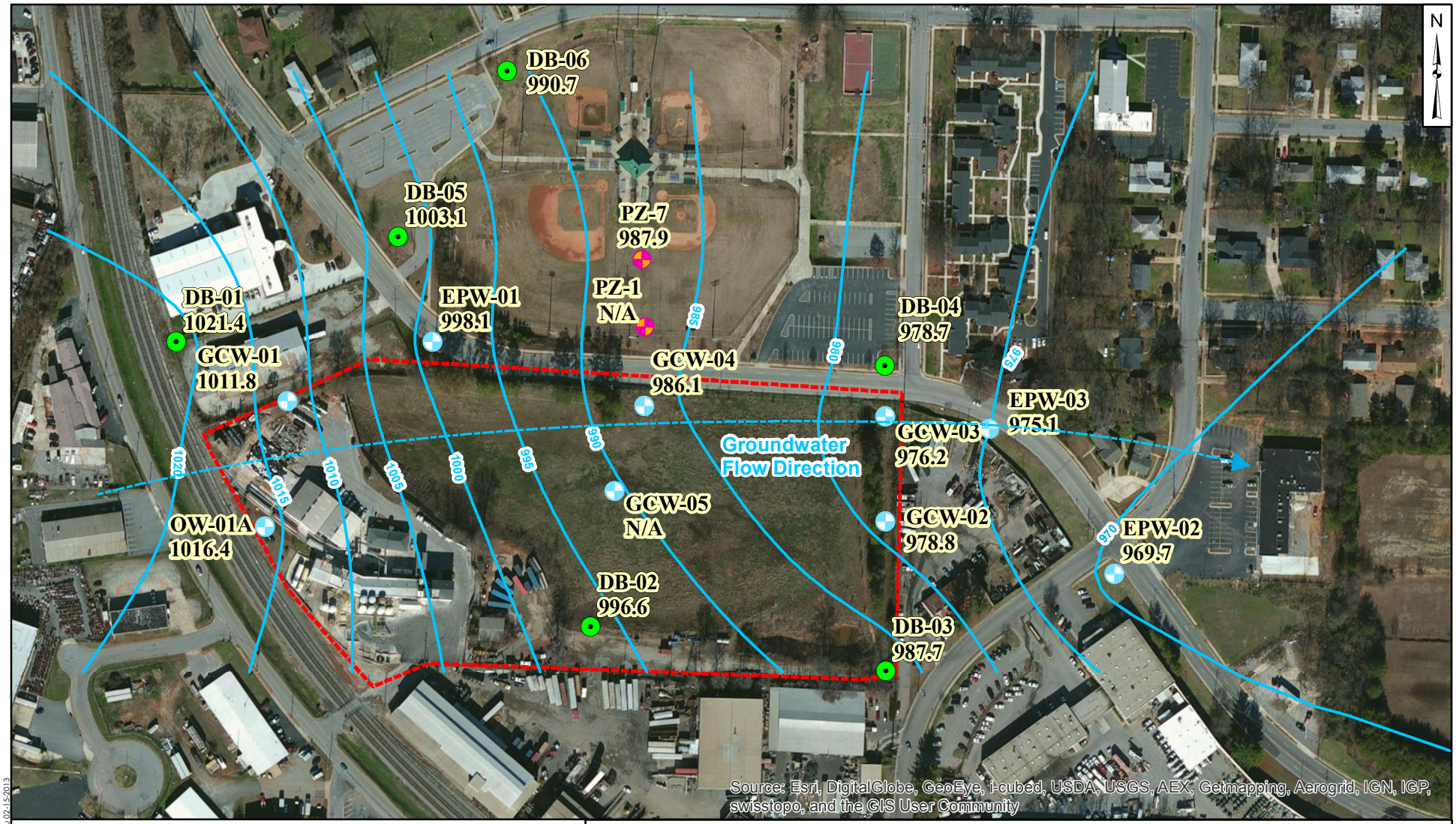


Legend

- Delineation Boring
- Piezometer (Elevation in ft MSL)
- Monitoring Well (Elevation in ft MSL)
- November 13, 2013 Groundwater Contours
- Approximate Property Boundary

200 100 0 200 400 Feet

Geosyntec consultants

Kennesaw, GA

December 2013

POTENTIOMETRIC SURFACE MAP

General Chemical, East Point, GA

Figure 3-1

N:\genchem\GIS\MXDs\January 2013 Potmap.mxd/DYfru 02-15-2013

Figure 3-2
Monitoring Well Sulfate and pH Trends
General Chemical Site
East Point, Georgia

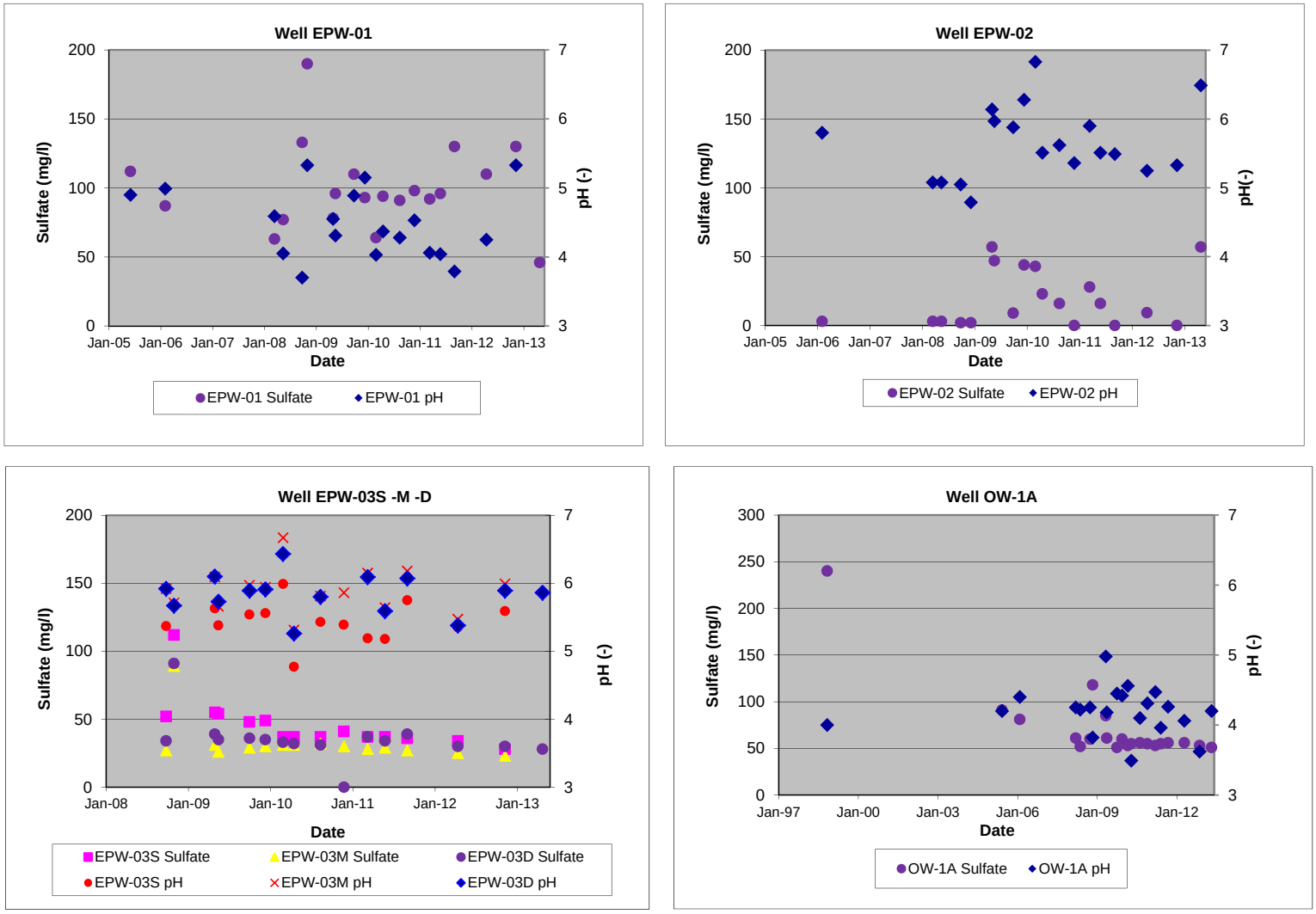
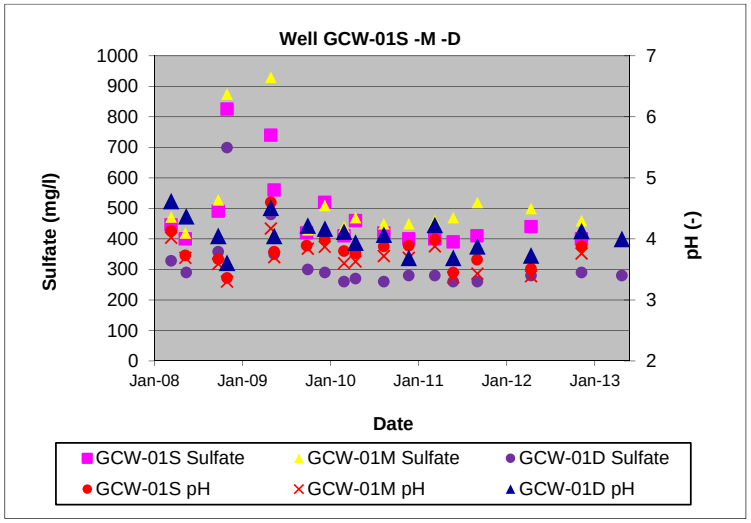
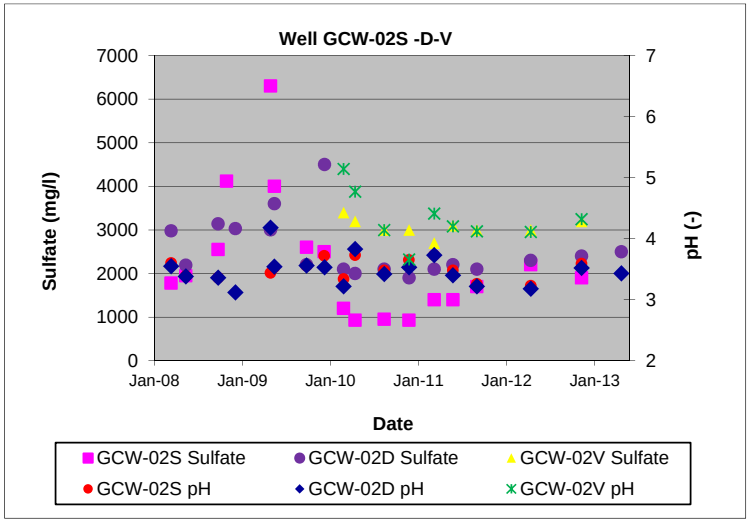
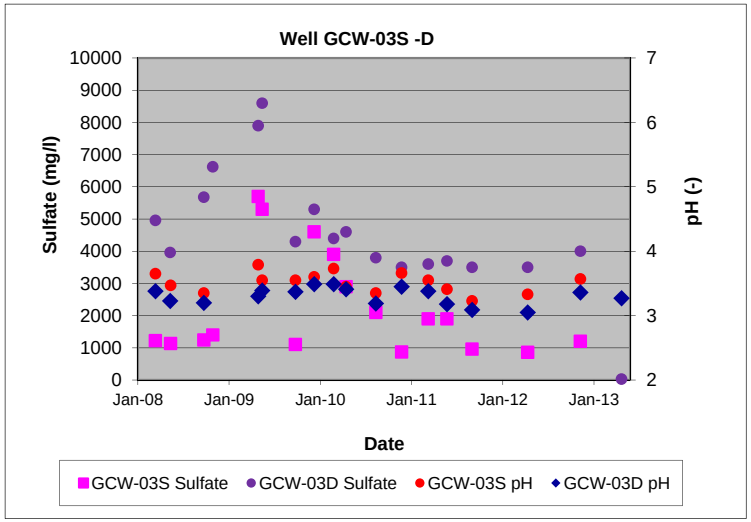


Figure 3-2 (Cont)
Monitoring Well Sulfate and pH Trends
General Chemical Site
East Point, Georgia







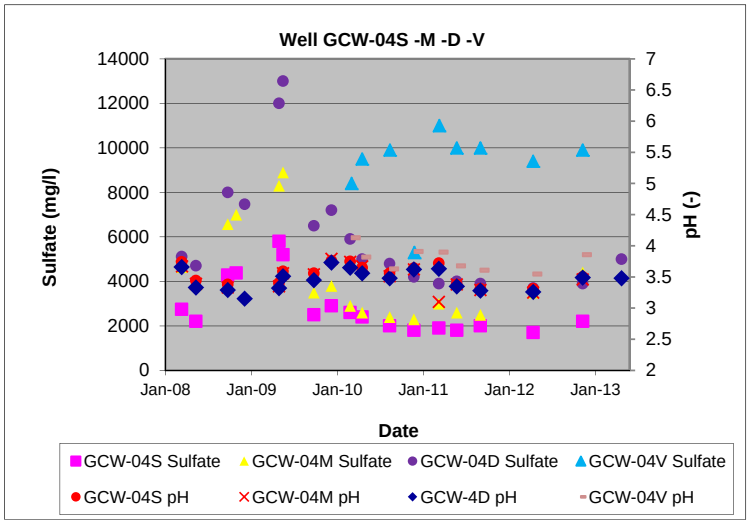


Figure 3-2 (Cont)
Monitoring Well Sulfate and pH Trends
General Chemical Site
East Point, Georgia

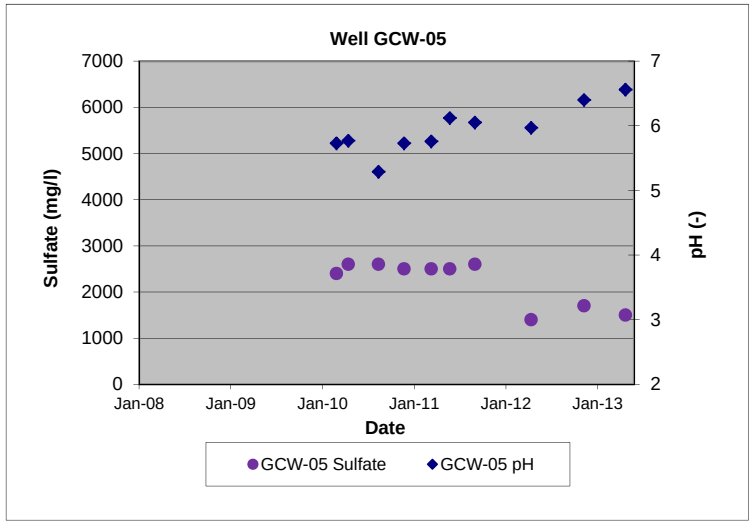
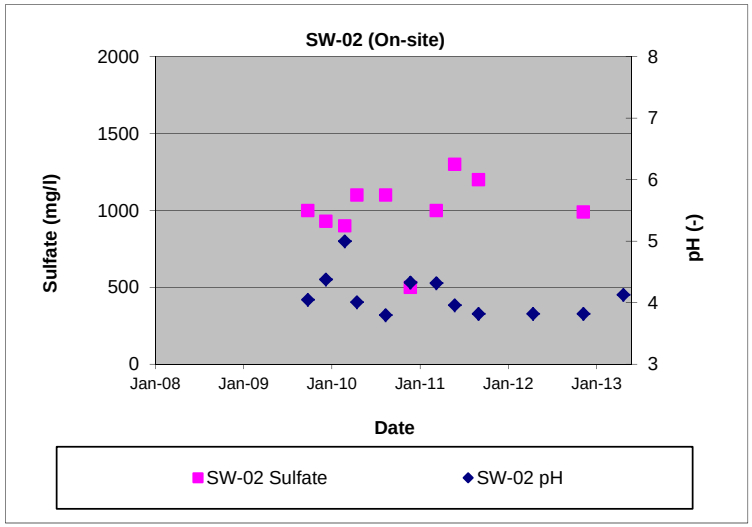
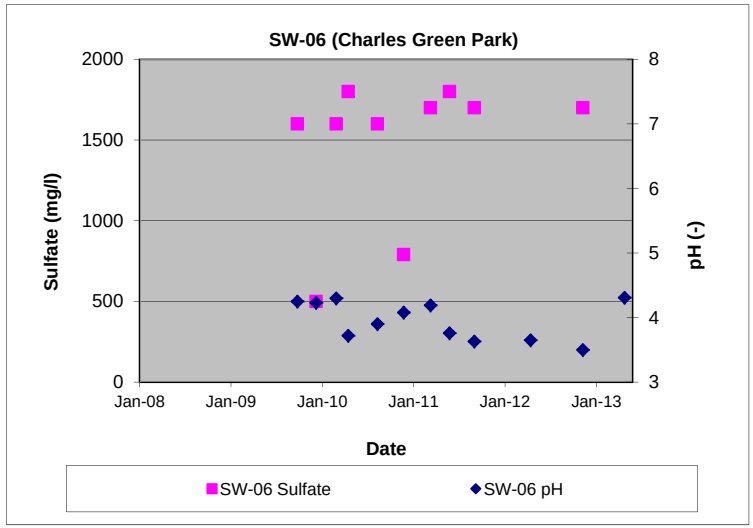
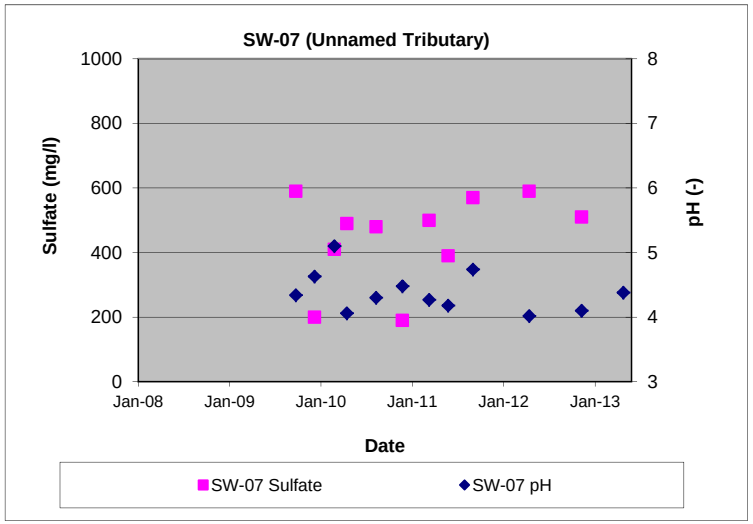


Figure 3-3
Storm Drain Sulfate and pH Trends
General Chemical Site
East Point, Georgia







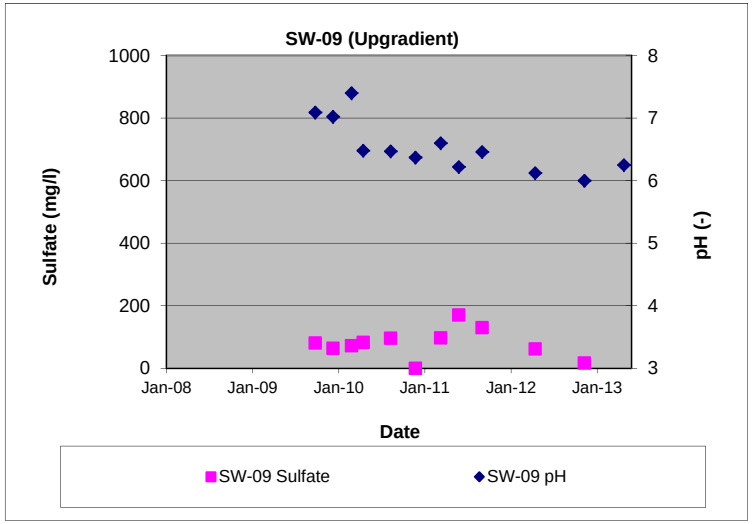
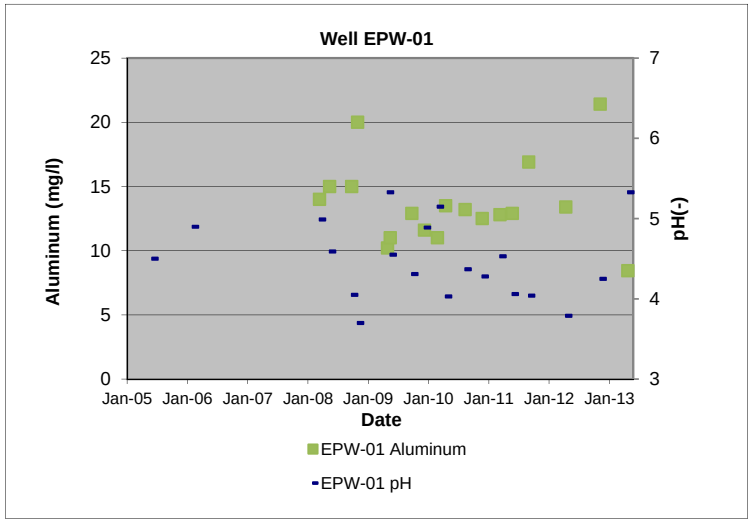
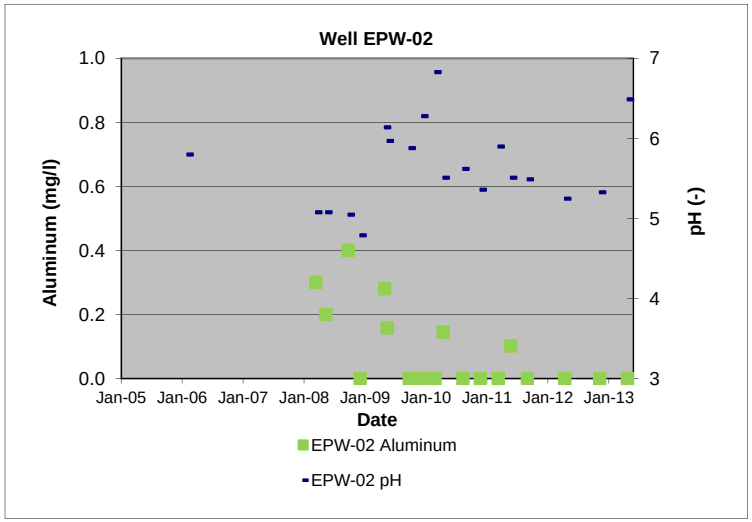
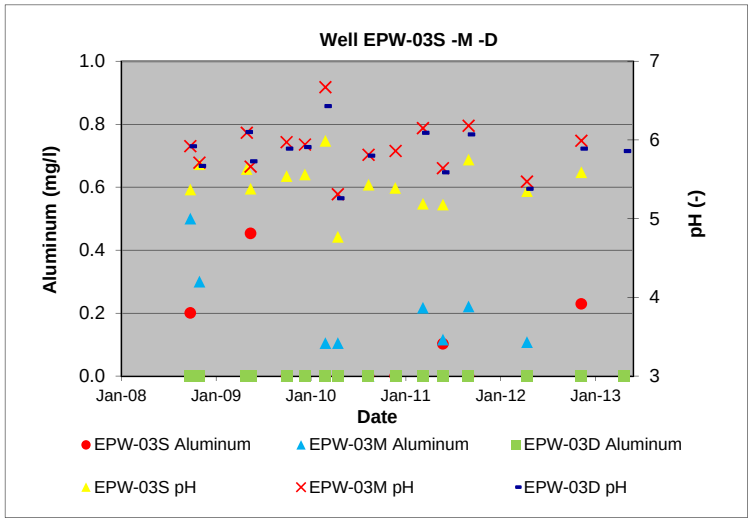


Figure 3-2 (Cont)
Monitoring Well Aluminum and pH Trends
General Chemical Site
East Point, Georgia







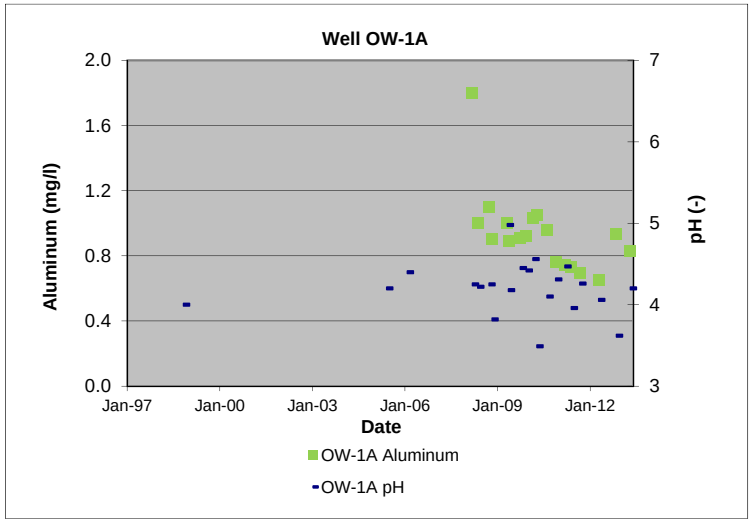
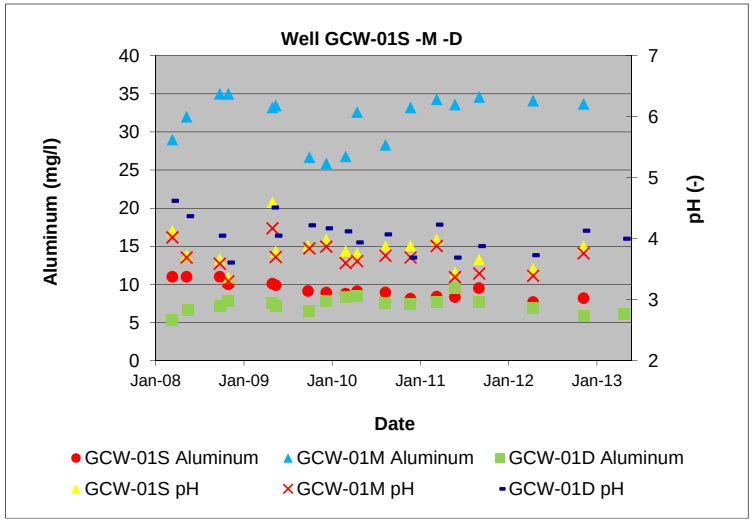
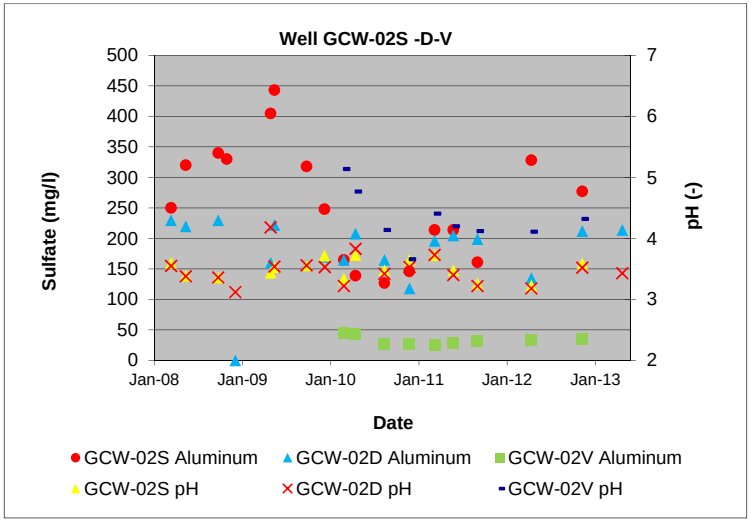
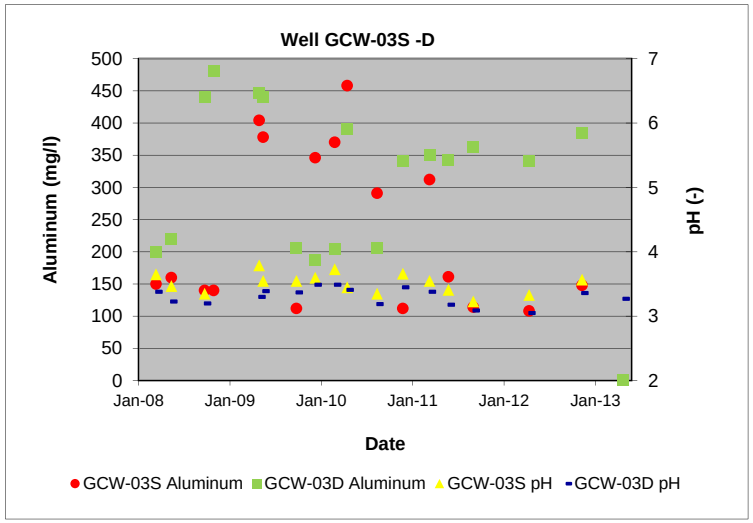


Figure 3-2 (Cont)
Monitoring Well Aluminum and pH Trends
General Chemical Site
East Point, Georgia







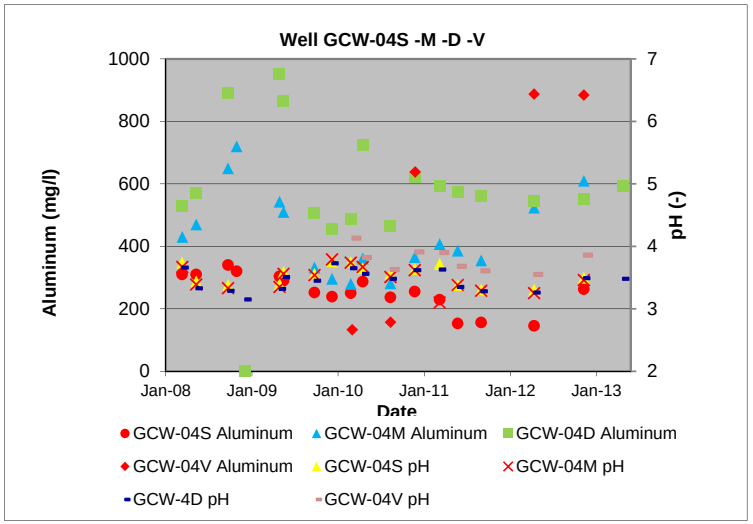


Figure 3-2 (Cont)
Monitoring Well Aluminum and pH Trends
General Chemical Site
East Point, Georgia

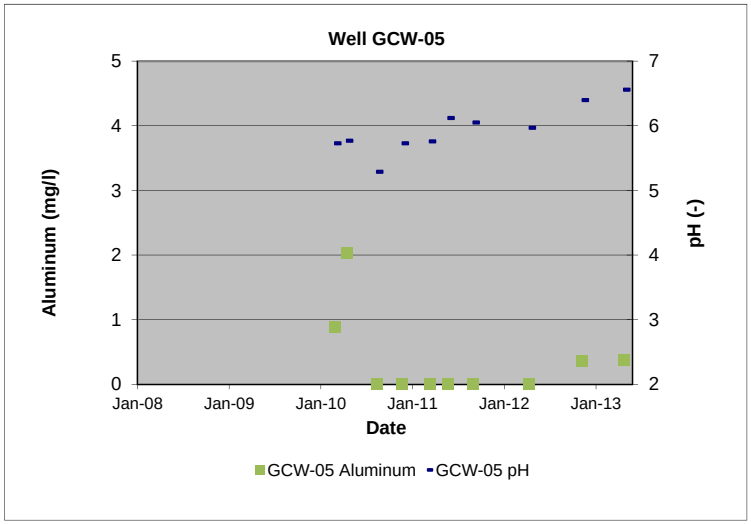
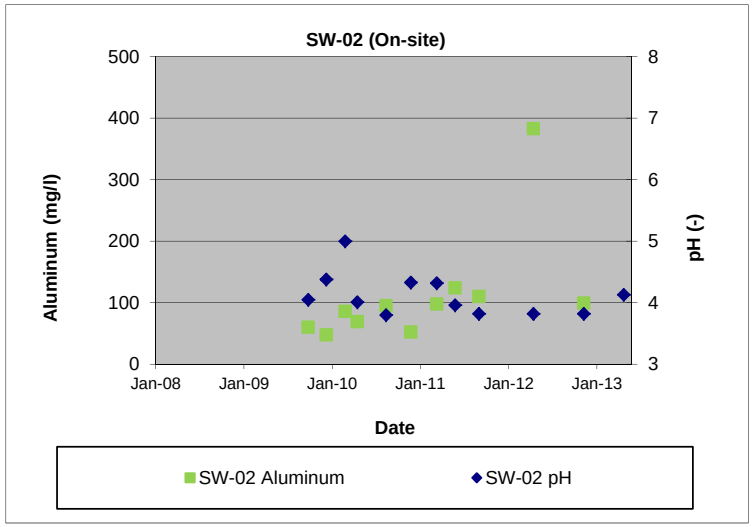
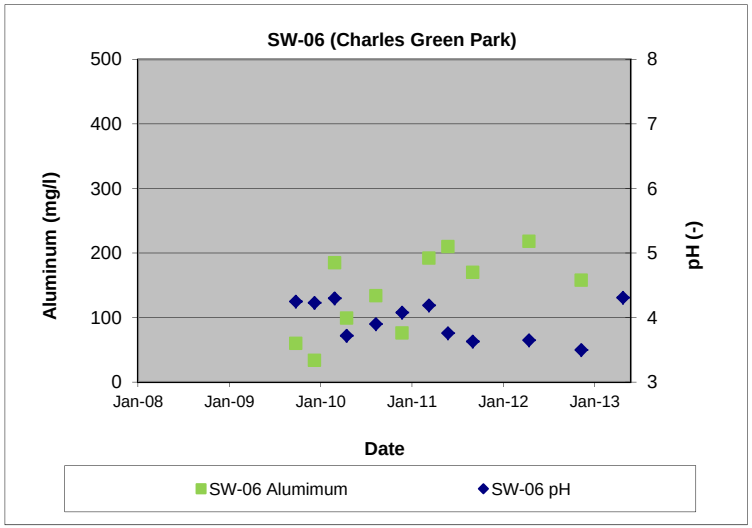
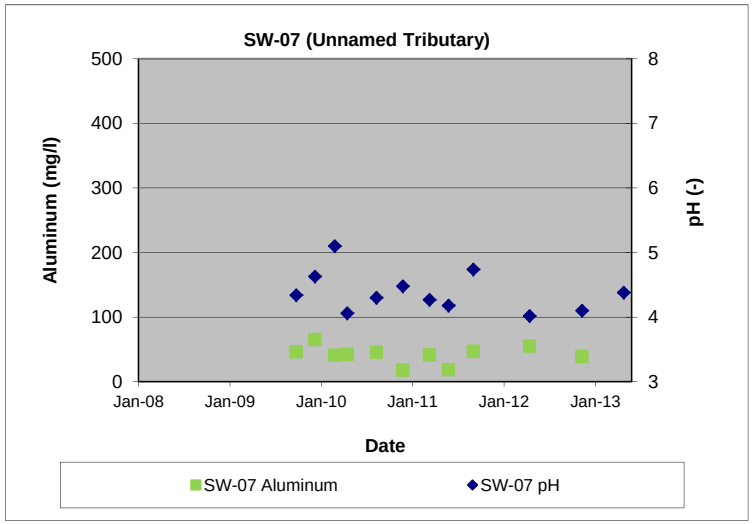


Figure 3-3
Storm Drain Sulfate and pH Trends
General Chemical Site
East Point, Georgia







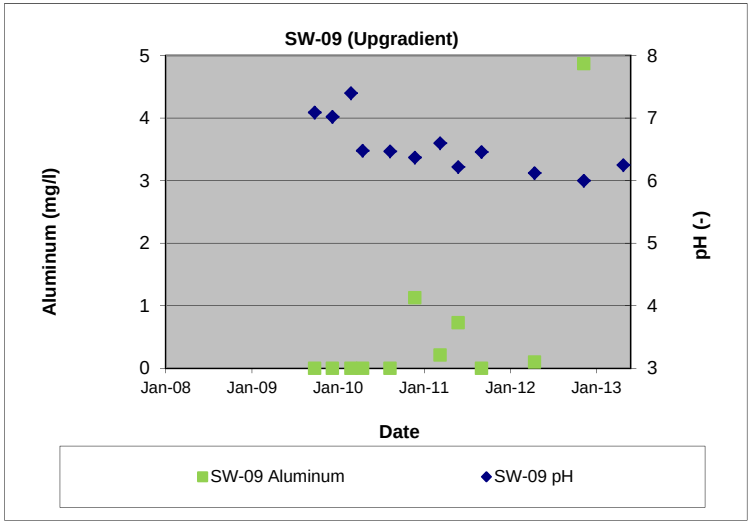
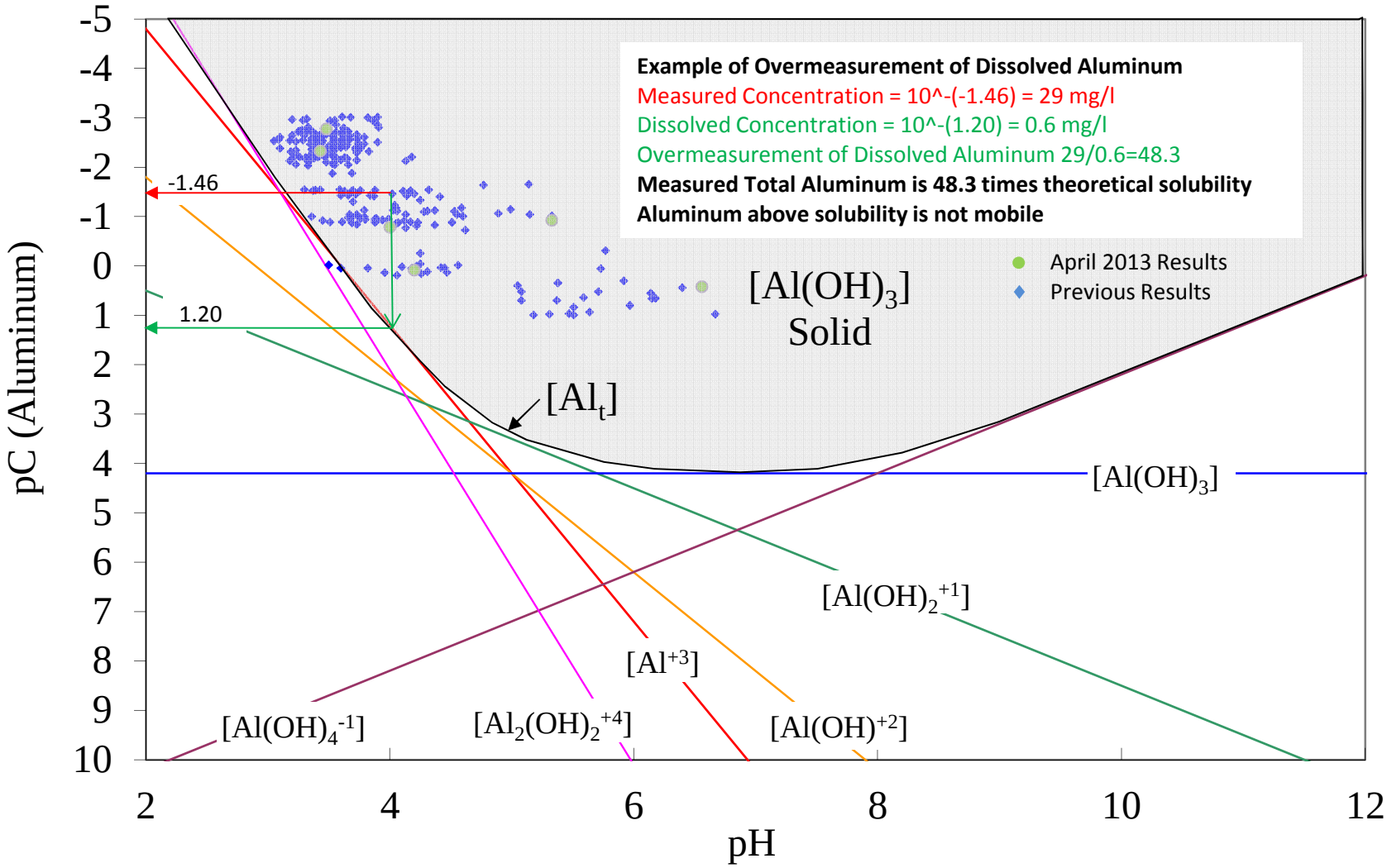


Figure 6-1
General Chemical
Groundwater Sampling
April 2013
Aluminum Results Analysis



APPENDIX A

GROUNDWATER AND STORM DRAIN LABORATORY RESULTS

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ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Prepared For:

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw, GA 30144

Attention: Mr. Brian Jacobson

Report Number: AWK0393
November 26, 2013
Project: General Chemical
Project #:[none]

We appreciate the opportunity to provide the analytical support for your project. The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Approved:

Project Manager

This report may not be reproduced, except in full, without written approval from Analytical Services, Inc.
Analytical Services, Inc. certifies that the following analytical results meet all requirements of the National Environmental Laboratory Accreditation Conference(NELAC).
All test results relate only to the samples analyzed.

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Attention: Mr. Brian Jacobson

November 26, 2013

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GCW-01D	AWK0393-01	Ground Water	11/12/13 10:35	11/15/13 09:30
Dup-1	AWK0393-02	Ground Water	11/12/13 00:00	11/15/13 09:30
OW-01A	AWK0393-03	Ground Water	11/12/13 11:40	11/15/13 09:30
EPW-01	AWK0393-04	Ground Water	11/12/13 13:45	11/15/13 09:30
EPW-02	AWK0393-05	Ground Water	11/12/13 14:50	11/15/13 09:30
EPW-03D	AWK0393-06	Ground Water	11/12/13 16:05	11/15/13 09:30
SW-07	AWK0393-07	Surface Water	11/12/13 16:30	11/15/13 09:30
SW-09	AWK0393-08	Surface Water	11/13/13 08:15	11/15/13 09:30
SW-06	AWK0393-09	Surface Water	11/13/13 08:45	11/15/13 09:30
GCW-02D	AWK0393-10	Ground Water	11/13/13 10:40	11/15/13 09:30
GCW-03D	AWK0393-11	Ground Water	11/13/13 12:10	11/15/13 09:30
SW-02	AWK0393-12	Surface Water	11/13/13 12:45	11/15/13 09:30
GCW-05	AWK0393-13	Ground Water	11/13/13 15:55	11/15/13 09:30
GCW-04D	AWK0393-14	Ground Water	11/13/13 17:10	11/15/13 09:30
Dup-2	AWK0393-15	Ground Water	11/13/13 00:00	11/15/13 09:30

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November 26, 2013

Report No.: AWK0393
Client ID: GCW-01D
Date/Time Sampled: 11/12/2013 10:35:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-01
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	250	50	mg/L	EPA 9056A		10	11/19/13 16:25	11/19/13 16:25	3110417	MZP
Metals, Total										
Aluminum	7.39	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:34	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: Dup-1
Date/Time Sampled: 11/12/2013 12:00:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-02
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	270	50	mg/L	EPA 9056A		10	11/20/13 12:24	11/20/13 12:24	3110417	MZP
Metals, Total										
Aluminum	6.93	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:36	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: OW-01A
Date/Time Sampled: 11/12/2013 11:40:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-03
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	54	10	mg/L	EPA 9056A		2	11/20/13 12:44	11/20/13 12:44	3110417	MZP
Metals, Total										
Aluminum	0.659	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:39	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: EPW-01
Date/Time Sampled: 11/12/2013 1:45:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-04
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	130	25	mg/L	EPA 9056A		5	11/20/13 13:05	11/20/13 13:05	3110417	MZP
Metals, Total										
Aluminum	14.0	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:42	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: EPW-02
Date/Time Sampled: 11/12/2013 2:50:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-05
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	15	10	mg/L	EPA 9056A		2	11/19/13 18:08	11/19/13 18:08	3110417	MZP
Metals, Total										
Aluminum	ND	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:51	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: EPW-03D
Date/Time Sampled: 11/12/2013 4:05:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-06
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	28	5.0	mg/L	EPA 9056A		1	11/19/13 18:28	11/19/13 18:28	3110417	MZP
Metals, Total										
Aluminum	ND	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:54	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: SW-07
Date/Time Sampled: 11/12/2013 4:30:00PM
Matrix: Surface Water

Project: General Chemical
Lab Number ID: AWK0393-07
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	540	100	mg/L	EPA 9056A		20	11/20/13 13:26	11/20/13 13:26	3110417	MZP
Metals, Total										
Aluminum	40.8	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:56	3110340	FBS

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Report No.: AWK0393
Client ID: SW-09
Date/Time Sampled: 11/13/2013 8:15:00AM
Matrix: Surface Water

Project: General Chemical
Lab Number ID: AWK0393-08
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	92	20	mg/L	EPA 9056A		4	11/20/13 13:46	11/20/13 13:46	3110417	MZP
Metals, Total										
Aluminum	ND	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 18:59	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: SW-06
Date/Time Sampled: 11/13/2013 8:45:00AM
Matrix: Surface Water

Project: General Chemical
Lab Number ID: AWK0393-09
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	2200	250	mg/L	EPA 9056A		50	11/20/13 14:07	11/20/13 14:07	3110417	MZP
Metals, Total										
Aluminum	197	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:02	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: GCW-02D
Date/Time Sampled: 11/13/2013 10:40:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-10
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	2800	500	mg/L	EPA 9056A		100	11/19/13 22:15	11/19/13 22:15	3110417	MZP
Metals, Total										
Aluminum	214	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:05	3110340	FBS

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Report No.: AWK0393
Client ID: GCW-03D
Date/Time Sampled: 11/13/2013 12:10:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-11
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	3900	500	mg/L	EPA 9056A		100	11/19/13 22:36	11/19/13 22:36	3110417	MZP
Metals, Total										
Aluminum	361	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:08	3110340	FBS

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Report No.: AWK0393
Client ID: SW-02
Date/Time Sampled: 11/13/2013 12:45:00PM
Matrix: Surface Water

Project: General Chemical
Lab Number ID: AWK0393-12
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	1500	250	mg/L	EPA 9056A		50	11/19/13 22:57	11/19/13 22:57	3110417	MZP
Metals, Total										
Aluminum	112	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:11	3110340	FBS

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November 26, 2013

Report No.: AWK0393
Client ID: GCW-05
Date/Time Sampled: 11/13/2013 3:55:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-13
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	1100	250	mg/L	EPA 9056A		50	11/19/13 23:17	11/19/13 23:17	3110417	MZP
Metals, Total										
Aluminum	ND	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:14	3110340	FBS

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Report No.: AWK0393
Client ID: GCW-04D
Date/Time Sampled: 11/13/2013 5:10:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-14
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	5500	1000	mg/L	EPA 9056A		200	11/19/13 23:38	11/19/13 23:38	3110417	MZP
Metals, Total										
Aluminum	592	2.00	mg/L	EPA 6010C		20	11/18/13 11:30	11/19/13 11:10	3110340	FBS

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Report No.: AWK0393
Client ID: Dup-2
Date/Time Sampled: 11/13/2013 12:00:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWK0393-15
Date/Time Received: 11/15/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	2400	500	mg/L	EPA 9056A		100	11/20/13 14:27	11/20/13 14:27	3110417	MZP
Metals, Total										
Aluminum	201	0.100	mg/L	EPA 6010C		1	11/18/13 11:30	11/18/13 19:25	3110340	FBS

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Report No.: AWK0393

Inorganic Anions - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3110417 - EPA 9056A										
Blank (3110417-BLK1)					Prepared & Analyzed: 11/19/13					
Sulfate	ND	5.0	mg/L							
LCS (3110417-BS1)					Prepared & Analyzed: 11/19/13					
Sulfate	9.59	5.0	mg/L	10.000		96	90-110			
Matrix Spike (3110417-MS1)		**Source: AWK0449-03**			Prepared & Analyzed: 11/19/13					
Sulfate	31.0	5.0	mg/L	10.000	23.0	81	90-110			QM-05
Matrix Spike (3110417-MS2)		**Source: AWK0393-15RE1**			Prepared & Analyzed: 11/20/13					
Sulfate	2780	500	mg/L	1000.0	2370	42	90-110			QM-05
Matrix Spike Dup (3110417-MSD1)		**Source: AWK0449-03**			Prepared & Analyzed: 11/19/13					
Sulfate	31.0	5.0	mg/L	10.000	23.0	81	90-110	0.06	15	QM-05

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Report No.: AWK0393

Metals, Total - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3110340 - EPA 3010A										
Blank (3110340-BLK1)					Prepared & Analyzed: 11/18/13					
Aluminum	ND	0.100	mg/L							
LCS (3110340-BS1)					Prepared & Analyzed: 11/18/13					
Aluminum	0.996	0.100	mg/L	1.0000		100	80-120			
Matrix Spike (3110340-MS1)		**Source: AWK0393-01**			Prepared & Analyzed: 11/18/13					
Aluminum	8.31	0.100	mg/L	1.0000	7.39	92	75-125			
Matrix Spike Dup (3110340-MSD1)		**Source: AWK0393-01**			Prepared & Analyzed: 11/18/13					
Aluminum	7.93	0.100	mg/L	1.0000	7.39	54	75-125	5	20	QM-05
Post Spike (3110340-PS1)		**Source: AWK0393-01**			Prepared & Analyzed: 11/18/13					
Aluminum	8.28		mg/L	1.0000	7.39	89	80-120			

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November 26, 2013

Laboratory Certifications

Code	Description	Number	Expires
LA	Louisiana	02069	06/30/2014
NC	North Carolina	381	12/31/2013
NELAC	FL DOH (Non-Pot. Water, Solids) Eff:: 07/01/2013	E87315	06/30/2014
SC	South Carolina	98011001	06/30/2014
TX	Texas	T104704397-08-TX	03/31/2014
VA	Virginia	1340	12/14/2013

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November 26, 2013

Legend

Definition of Laboratory Terms

ND - None Detected at the Reporting Limit
TIC - Tentatively Identified Compound
CFU - Colony Forming Units
SOP - Method run per ASI Standard Operating Procedure
RL - Reporting Limit
DF - Dilution Factor
***** - Analyte not included in the NELAC list of certified analytes.

Sample Information

N-Nitrosodiphenylamine breaks down to diphenylamine in the GCMS; both analytes are reported as N-Nitrososdiphenylamine. ASI is not NELAC certified for diphenylamine.

Phthalic acid and phthalic anhydride are reported as dimethyl phthalate

Maleic acid and maleic anhydride are reported as dimethyl malate

1,2-Diphenylhydrazine breaks down to azobenzene in the GCMS; both analytes are reported as azobenzene

Definition of Qualifiers

QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD and/or PDS due to suspected matrix interference. Sample results for the QC batch were accepted based on acceptable LCS recoveries.

Note: Unless otherwise noted, all results are reported on an as received basis.

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1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

November 26, 2013

222658

CHAIN OF CUSTODY RECORD

ASI ANALYTICAL SERVICES, INC.
ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS
110 TECHNOLOGY PARKWAY NORCROSS, GA 30092
(770) 734-4200 : FAX (770) 734-4201 : www.asi-lab.com

PAGE: 1 OF 2

CLIENT NAME: Brian Jacobson (Geosyntec)
CLIENT ADDRESS/PHONE NUMBER/FAX NUMBER: 1255 Roberts Blvd NW Suite 200, Kennesaw, GA
REPORT TO: BJacobson@Geosyntec.com CC:
REQUESTED COMPLETION DATE: PO #:
PROJECT NAME/STATE: General Chemical | GA
PROJECT #:

ANALYSIS REQUESTED: Metals (Al), Sulfate

DATE	TIME	MATRIX CODE*	# of CONTAINERS	SAMPLE IDENTIFICATION	Metals (Al)	Sulfate	REMARKS/ADDITIONAL INFORMATION
11/12/13	10:35	GW	2	GCW-01D	X	X	1
11/12/13	—	—	2	DUP-1	X	X	2
11/12/13	11:40	GW	2	OW-01A	X	X	3
11/12/13	13:45	GW	2	EPW-01	X	X	4
11/12/13	14:50	GW	2	EPW-02	X	X	5
11/12/13	16:05	GW	2	EPW-03D	X	X	6
11/12/13	16:30	SW	2	SW-01	X	X	7

CONTAINER TYPE: A - P - PLASTIC; B - A - AMBER GLASS; G - CLEAR GLASS; V - VOA VIAL; S - STERILE; O - OTHER

PRESERVATION: 1 - HCl, 4°; 2 - H2SO4, 4°; 3 - HNO3, 4°; 4 - NaOH, 4°; 5 - NaOH/ZnAc, 4°; 6 - Na2S2O3, 4°; 7 - 4°

*MATRIX CODES: DW - DRINKING WATER; WW - WASTEWATER; GW - GROUNDWATER; SW - SURFACE WATER; ST - STORM WATER; W - WATER; S - SOIL; SL - SLUDGE; SD - SOLID; A - AIR; L - LIQUID; P - PRODUCT

SAMPLED BY AND TITLE: Rachel Gross | Staff Engineer DATE/TIME: 11/12/13
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: Rachel Gross DATE/TIME: 11/14/13 15:35
RELINQUISHED BY: DATE/TIME:
RECEIVED BY/LAB: DATE/TIME: 11/15/13 0920
pH: Labels Received Ice: Yes or No
SAMPLE SHIPPED VIA: UPS FEDEX COURIER CLIENT OTHER:
Temp Blank: Custody Seal: Intact Broken Missing Cooler #
FOR LAB USE ONLY
LAB #: AUK0393
Cross-Location: 1/4
Entered Into LIMS: 1/4

Please use Black Ink to complete form.

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
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Attention: Mr. Brian Jacobson

November 26, 2013

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PAGE: 2 OF 2

CLIENT NAME: Brian Jacobson (Geosyntec)
CLIENT ADDRESS/PHONE NUMBER/FAX NUMBER: 1255 Roberts Blvd, NW Suite 200, Kennesaw, GA
REPORT TO: BJacobson@Geosyntec.com CC:
REQUESTED COMPLETION DATE: PO #:
PROJECT NAME/STATE: General Chemical / GA
PROJECT #:

ANALYSIS REQUESTED: Metals (4) Sulfate

DATE	TIME	MATRIX CODE*	COMP GRAB	SAMPLE IDENTIFICATION	# of containers	Metals (4)	Sulfate	REMARKS/ADDITIONAL INFORMATION
11/13/13	8:15	SW	X	SW-09	2	X	X	8
11/13/13	~~8:30~~	SW	X	SW-06	2	X	X	9
11/13/13	8:45	GW	X	GCW-02D	2	X	X	10
11/13/13	10:40	GW	X	GCW-03D	2	X	X	11
11/13/13	12:10	GW	X	GCW-04D	2	X	X	12
11/13/13	12:45	SW	X	SW-02	2	X	X	13
11/13/13	15:55	GW	X	GCW-05	2	X	X	14
11/13/13	17:10	GW	X	GCW-01D	2	X	X	15
11/13/13	—	—	X	DUP-2	2	X	X	

CONTAINER TYPE: P - PLASTIC; A - AMBER GLASS; G - CLEAR GLASS; V - VOA VIAL; S - STERILE; O - OTHER

PRESERVATION: 1 - HCl, 4°; 2 - H2SO4, 4°; 3 - HNO3, 4°; 4 - NaOH, 4°; 5 - NaOH/ZnAc, 4°; 6 - Na2S2O3, 4°; 7 - 4°

MATRIX CODES: DW - DRINKING WATER; WW - WASTEWATER; GW - GROUNDWATER; SW - SURFACE WATER; ST - STORM WATER; W - WATER; S - SOIL; SL - SLUDGE; SD - SOLID; A - AIR; L - LIQUID; P - PRODUCT

SAMPLED BY AND TITLE: Rachel Gross / Staff Engineer DATE/TIME: 11/13/13
RECEIVED BY: DATE/TIME:
RELINQUISHED BY: Rachel Gross DATE/TIME: 15:35 11/14/13
RELINQUISHED BY: DATE/TIME:
RECEIVED BY/LAB: DATE/TIME: 11/15/13 0930
SAMPLE SHIPPED VIA: UPS FEDEX COURIER CLIENT OTHER:
Temperature: Custody Seal: Intact Broken Missing Cooler #:
Received Intact: Ice: Yes or No
FOR LAB USE ONLY: LAB #: AWK0393 Entered Into LIMS: CMT

Please use Black Ink to complete form.

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

LOG-IN CHECKLIST **Printed: 11/26/2013 4:04:57PM**

Attn: Mr. Brian Jacobson

Client: Geosyntec Consultants Inc.
Project: General Chemical
Date Received: 11/15/13 09:30

Work Order: AWK0393
Logged In By: Charles Hawks

OBSERVATIONS

#Samples: 15 **#Containers:** 30

Minimum Temp(C): 1.0 **Maximum Temp(C):** 1.0 **Custody Seal(s) Used:** Yes

CHECKLIST ITEMS

COC included with Samples	YES
Sample Container(s) Intact	YES
Chain of Custody Complete	YES
Sample Container(s) Match COC	YES
Custody seal Intact	YES
Temperature in Compliance	YES
Sufficient Sample Volume for Analysis	YES
Zero Headspace Maintained for VOA Analyses	YES
Samples labeled preserved (If Applicable)	YES
Samples received within Allowable Hold Times	YES
Samples Received on Ice	YES
Preservation Confirmed	YES

Comments:

APPENDIX B

GROUNDWATER AND STORM DRAIN SAMPLING FORMS

Geosyntec Consultants: Water Level Measurements

Project.: General Chemical ; Date: 11/12-/11/13

Proj.No.: _____; Task No.: _____; Name: Rachel Gross

Well	Time	DTW	Well	Time	DTW
GCW-01M	8:15	12.56	vault damaged, filling in w/ seal		
GCW-01S	8:16	12.59			
GCW-01D	8:17	12.05			
OCW-1	8:20	14.19			
EPW-01	8:30	19.36			
EPW-3D	8:40	9.51			
EPW-3M	8:41	9.62			
EPW-3S	8:42	9.73			
EPW-2	8:44	10.22	No bolts, vault holes broken		
GCW-02S	10:30	4.93			
GCW-02D	10:31	4.62			
GCW-02V	10:32	4.75			
GCW-03D	11:25	5.05			
GCW-03S	12:15	4.92	water in casing, dropped into well when opened cap, waited a bit to take DTW		
GCW-04D	16:20	10.70			
GCW-04S	16:31	10.03			
GCW-04M	16:30	10.13			
GCW-04V	16:32	9.47			
GCW-05	17:05	21.03	Taken an hour after purging -> most likely not representative of groundwater level		

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: GCW-1D Sampling Date: 11/12/13

Sample ID: GCW-1D Sampler: Rachel Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
10:00	X				18.40	3.94	0.499	258	0.00	10.57	clear, no odor
10:05		X			18.65	4.02	0.484	260	0.00	10.34	
10:10		X			18.80	4.04	0.473	265	0.00	10.39	
10:15		X			18.91	4.05	0.467	270	0.00	9.99	
10:20		X			18.95	4.05	0.468	278	0.00	10.28	
10:25		X			18.93	4.05	0.468	281	0.00	10.09	
10:30		X			18.91	4.05	0.469	282	0.00	10.34	
10:35			X	X							

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
Dup-1	

Miscellaneous

Initial Depth to Water: 12.65 ft

Final Depth to Water: 12.47 ft

Total Purge Volume: 4 gal

Pump Rate: 0.11 gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sample taken at 10:35 w/ Dup-1

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013
Monitoring Well: ~~GCW-A~~ GCW-02 Sampling Date: 11/13/13
Sample ID: GCW-02D Sampler: R. Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
10:05	X				15.91	3.48	2.89	371	5.24	0.45	clear, no particles
10:10		X			16.00	3.49	2.88	372	2.72	0.27	
10:15		X			16.16	3.51	2.83	371	~~2.59~~	0.04	
10:20		X			16.37	3.52	2.73	369	1.00 0.64	0.00	
10:25		X			16.51	3.54	2.67	368	0.38	0.00	
10:30		X			16.74	3.56	2.53	364	0.41	0.00	
10:35		X			16.78	3.57	2.51	364	0.32	0.00	
10:40	~~X~~	X	X	X	16.80	3.56	2.48	363	0.23	0.00	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 4.60 ft
Final Depth to Water: 4.52 ft
Total Purge Volume: 5 gal
Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sample taken at 10:40

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: GW-03 Sampling Date: 11/13/13

Sample ID: GW-03D Sampler: R. Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
11:20	X				17.60	3.37	3.17	354	2.07	1.53	clear, no odor
11:25		X			17.72	3.38	3.22	363	0.45	0.29	
11:30		X			17.77	3.39	3.23	368	0.00	0.14	
11:35		X			17.77	3.40	3.23	369	0.00	0.12	
11:40		X			17.78	3.40	3.23	372	0.00	0.09	
11:45		X			17.93	3.40	3.23	376	0.17	0.02	
11:50		X			17.89	3.40	3.22	377	0.17	0.01	
11:55		X			17.85	3.41	3.23	379	0.00	0.00	
12:00		X			17.94	3.41	3.23	381	1.71	0.00	
12:05		X			18.05	3.41	3.23	382	0.73	0.00	
12:10			X	X	18.11	3.41	3.22	383	0.73	0.00	

Split, Blank, Duplicate, & Filtered Samples	
Sample ID	Description

Miscellaneous	
Initial Depth to Water:	5.05 ft
Final Depth to Water:	4.75 ft
Total Purge Volume:	gal
Pump Rate:	gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sample taken at 12:10

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013
Monitoring Well: GW-04 Sampling Date: 11/13/13
Sample ID: GW-04D Sampler: R.Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
16:20	X				17.94	6.00	0.214	31	33.9	4.75	most turbid water so far
16:25		X			18.01	6.03	0.198	30	26.6	1.44	
16:30		X			17.95	6.01	0.166	39	15.8	0.33	
16:35		X			17.66	5.92	0.165	51	8.00	0.10	
16:40		X			17.58	5.89	0.166	54	6.82	0.03	
16:45		X			17.48	5.30	0.375	95	7.67	0.00	
16:50		X			17.19	3.75	2.85	220	2.28	0.00	
16:55		X			17.26	3.52	3.26	261	0.44	0.00	
17:00		X			17.23	3.51	3.29	298	0.19	0.00	
17:05		X			17.11	3.53	3.32	298	0.00	0.00	
17:10		X			17.11	3.54	3.32	304	0.00	0.00	
17:10		X			17.05	3.54	3.32	307	0.00	0.00	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 10.70 ft
Final Depth to Water: 12.95
Total Purge Volume: 5 gal
Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

sample collected at 17:10

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: _____ Sampling Date: _____

Sample ID: GCW-05 Sampler: _____

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
15:00	X				17.63	6.48	2.15	-61	8.59	9.58	slightly turbid, no odor
15:05		X			17.64	6.48	2.15	-64	6.84	9.10	
15:10		X			17.63	6.49	2.16	-69	5.52	8.35	
15:15		X			17.61	6.50	2.16	-73	6.77	7.79	
15:25		X			17.56	6.52	2.16	-78	4.43	6.81	
15:30		X			17.43	6.53	2.16	-81	4.31	6.21	
15:35		X			17.35	6.54	2.17	-83	3.86	5.86	
~~15:40~~		~~X~~			~~17.35~~	~~6.54~~	~~2.17~~	~~-83~~	~~3.86~~	~~5.86~~	
15:40		X			17.27	6.54	2.18	-85	3.67	5.53	
15:45		X			17.16	6.54	2.18	-86	3.61	5.21	
15:50		X			17.08	6.54	2.18	-87	3.61	5.01	
15:55		X	X	X	16.96	6.56	2.19	-89	3.45	4.70	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: — ft

Final Depth to Water: _____ ft

Total Purge Volume: _____ gal

Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Forgot to take DTW initially, after 25 minutes of pumping DTW was

Returned minutes after sampling, DTW =

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013
Monitoring Well: EPW-1 Sampling Date: 11/12/13
Sample ID: EPW-01 Sampler: Rachel Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
13:00	X				19.42	4.11	0.242	270	0.00	1.84	clear, no odor
13:05		X			19.03	4.07	0.244	274	0.00	1.44	
13:10		X			18.67	4.04	0.245	277	0.00	1.31	
13:15		X			18.15	3.97	0.246	284	0.00	1.14	
13:20		X			17.92	3.91	0.246	291	0.00	0.98	
13:25		X			17.94	3.97	0.244	291	0.00	0.79	
13:30		X			17.78	3.98	0.241	292	0.00	0.70	
13:35		X			17.64	4.01	0.240	290	0.00	0.65	
13:40		X			17.41	4.07	0.239	286	0.00	0.63	
13:45			X	X	17.14	4.09	0.240	289	0.00	0.62	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 19.64 ft
Final Depth to Water: 20.81 ft
Total Purge Volume: 2.5 gal
Pump Rate: 0.056 gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Sampled at 13:45

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: _____ Sampling Date: _____

Sample ID: EPW-02 Sampler: _____

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
14:15	X				17.61	6.05	0.295	-60	0.00	2.11	~~[illegible]~~, some dirt particles
14:20		X			18.05	5.92	0.209	-43	0.00	1.06	
14:25		X			18.25	5.80	0.172	-28	0.00	0.85	
14:30		X			18.43	5.75	0.165	-20	0.00	0.89	
14:35		X			18.81	5.69	0.150	-6	0.00	0.90	
14:40		X			19.01	5.68	0.153	-1	0.00	0.88	
14:45		X			19.16	5.68	0.153	1	0.00	0.86	
14:50			X	X	19.28	5.69	0.154	2	0.00	0.87	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 11.94 ft

Final Depth to Water: 13.64 ft

Total Purge Volume: 4.0 gal

Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013
Monitoring Well: EPW-3 Sampling Date: 11/12/13
Sample ID: EPW-03D Sampler: R. Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
3 15:20	X				19.45	5.58	0.000	23	0.00	13.25	Some particles /clint
15:25		X			17.95	5.95	0.304	21	0.00	5.67	
15:30		X			18.16	5.89	0.314	38	0.00	5.96	
15:35		X			18.06	5.86	0.308	49	0.00	5.87	
15:40		X			17.90	5.86	0.308	54	0.00	5.86	
15:45		X			17.72	5.84	0.308	61	0.00	6.03	
15:50		X			17.64	5.82	0.309	67	0.00	6.14	
15:55		X			17.48	5.80	0.309	73	0.00	6.15	
16:00		X			17.27	5.77	0.309	78	0.00	6.23	
16:05		X			17.10	5.76	0.310	81	0.00	6.07	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 9.58 ft
Final Depth to Water: 9.88 ft
Total Purge Volume: _____ gal
Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: ~~[illegible]~~ Sampling Date: 11/12/13

Sample ID: ~~[illegible]~~ Sampler: R. Gross

OW-01A

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
11:10	X				18.42	4.11	0.000	294	0.00	14.20	Clear, no odor
11:15		X			18.50	4.08	0.000	295	0.00	13.86	
11:20		X			18.73	4.11	0.000	293	0.00	13.47	
11:25		X			19.15	4.12	0.00	292	0.00	12.49	
11:30		X			19.59	4.12	0.000	290	0.00	11.20	
11:35		X			19.93	4.11	0.000	290	0.00	11.58	
11:40		X			20.29	4.10	0.000	288	0.00	11.56	
11:40			X	X							

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: 15.28 ft

Final Depth to Water: 15.40 ft

Total Purge Volume: 2.5 gal

Pump Rate: 0.083 gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Took sample at 11:40

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013
Monitoring Well: ~~Stream~~ outfall Sampling Date: 11/13/13
Sample ID: SW-02 Sampler: R Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
12:45		X	X	X	18.26	3.69	~~8.61~~ 2.51	369	2.18	2.01	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: _____ ft
Final Depth to Water: _____ ft
Total Purge Volume: _____ gal
Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: Stream Sampling Date: 11/13/13

Sample ID: SW-06 Sampler: R Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
8:45		X	V	X	13.09	4.18	2.14	243	3.63	11.71	

Split, Blank, Duplicate, & Filtered Samples		Miscellaneous
Sample ID	Description	Initial Depth to Water: _____ ft
DUP-2		Final Depth to Water: _____ ft
		Total Purge Volume: _____ gal
		Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Dup-2 collected at 8:45 w/ SW-06

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: Stream Sampling Date: 11/11/13

Sample ID: SW-07 Sampler: R. Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
16:30		X	X	X	12.66	6.70	0.732	23	0.00	12.01	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: — ft

Final Depth to Water: — ft

Total Purge Volume: — gal

Pump Rate: — gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical Project No.: GR5060.2013

Monitoring Well: Storm Sampling Date: 11/13/13

Sample ID: SW-09 Sampler: R. Gross

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
8:15		X	X	X	13.93	5.93	0.249	101	0.85	8.21	

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description

Miscellaneous

Initial Depth to Water: _____ ft

Final Depth to Water: _____ ft

Total Purge Volume: _____ gal

Pump Rate: _____ gpm

Weather:

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

RESPONSE TO COMMENTS

Geosyntec consultants

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26 December 2013

David Brownlee
Georgia Environmental Protection Division
Hazardous Site Response Program
2 Martin Luther King Jr Dr, Ste 1462E
Atlanta, Georgia 30334

Subject: January 2013 VRP Application & Plan Approval
General Chemical Site, HSI# 10498
East Point, Georgia
Tax Parcel ID#s 14013100010176 & 14013100010184

Mr. Brown:

On behalf of General Chemicals LLC (GCL), Geosyntec is pleased to offer the following responses to comments received from the Georgia Environmental Protection Division (GaEPD), dated 12 April 2013.

General Comment No. 1:

For future submittals (e.g. CSR), please revise Figure I, Tax Plat Map, to include the tax parcel ID number and property owner information for the residential property on the northeast corner of Randall Street and N. Martin Street. In addition, the tax plat map should include utility right of way information as well illustrations of current site structures and site improvements managed by General Chemical and/or Newell Recycling.

Response:

It should be noted that delineation boring DB-04 at the northwest corner of N. Martin Street and Randall Street indicated background concentrations of sulfate and pH. The property to the northeast would be outside the delineation boundary.

There are no structures on the Martin Street property owned by Newell. A sanitary sewer is located along the southern boundary of the property and has a 20 foot wide easement. The location of the sanitary sewer and easement are shown in Attachment A on Figure 1-2 of the VRP Application. Delineation borings DB-02 and DB-03 are located adjacent to the sanitary sewer easement and indicated low (110 mg/l) or background (46 mg/l) concentrations for sulfate

at the respective locations. See Attachment 1 – Figure 1 Sulfate & aluminum Concretions in Delineation Borings. The 48-inch diameter storm drain on the northeast corner is assumed to have a similar easement. The location of this easement will be confirmed during the storm drain investigation. North Martin Street has a 60 foot wide right of way centered on the roadway.

These features will be shown on future versions of the Tax Plat Map. A revised version will be submitted with a memorandum documenting horizontal delineation in April 2014.

Risk Reduction Standards Comment No. 2:

Several discrepancies were noted with the development of the Type 1 soil RRS included in Appendix C. Pursuant to the HSRA Rules, the generic Type I soil RRS involves calculation of risk to the future adult resident only. A future child resident should be evaluated as part of the requirement of the site-specific Type 2 RRS criteria only. Since compliance to the Type 2 RRS is not being sought, all reference to the child-protective RRS should be omitted from the table. Additionally, although aluminum is non-volatile, the inhalation of dust and soil particulates should still be considered in the inhalation risk calculation. EPD calculated a Type 1 soil RRS of 3.2E+03 mg/kg based on the non-cancer risk to an adult resident and a Type 4 human health direct exposure risk from soil of 1.02E+04 mg/kg based on the non-cancer risk to the nonresidential receptor. Please make all necessary revisions to the calculations and tables.

Response:

The soil RRS calculations presented in Appendix C of the Voluntary Remediation Plan were revised by omitting the reference to the child-protective RRS from the RRS calculation tables. These revised calculations are submitted as Attachment 2 to this letter.

The soil RRS calculations presented in Appendix C of the Voluntary Remediation Plan did consider the inhalation of particulates, as shown in Table 2 and Table 3 of Appendix C. In that submittal, risk-based values calculated for the adult resident and the non-resident were 620,000 and 1,900,000 mg/kg, respectively.

Note that because the Type 4 risk-based RRS for soil is in excess of 1 million parts per million (i.e. not possible), the summary table deferred to the lower RRS based on the protection of groundwater.

Comment No. 3:

According to Section 5.2 of the January 2013 Application, a "linear regression" analysis of SPLP soil data was utilized to determine the Type 1 and 4 soil RRS for sulfate. Please note that when determining an acceptable soil cleanup value using "linear regression" EPD recommends that the following comments be addressed and the RRS for sulfate be recalculated:

a. At least half of the total soil concentration data points used in the SPLP should be at or above the midpoint of the range of total soil concentrations, which was not met for SPLP data provided in Table 1.

b. EPD concurs with the application of the 25% safety factor that was used for sulfate RRS. However, EPD recommends that the following equation be used with the SPLP data (Appendix D) to determine the acceptable soil concentration: C,=(Cw-b)/m, where Ct is the acceptable soil concentration, Cw is the target leachate concentration, b is the y-intercept of the linear trend line, and m is the slope of the linear trend line.

c. Provide the following information in support of the SPLP data evaluation: a narrative description of the sampling and test methods, laboratory analytical data and pH determinations for the soil and leachate.

Response:

a. Additional data points were located from the Corrective Action Plan (CAP) submitted during September 2002 (see Attachment 3 - Table A1 and revised VRP Application Table 1). The additional data points provide the recommended distribution with 6 points above and 8 points below 5000 mg/kg sulfate. The points were for HCA material. Since the samples were collected after source removal it was not possible to obtain higher concentration soil samples during confirmation sampling.

b. The revised SPLP analysis trend line is attached. Based on the revised analysis the soil concentration that produces a SPLP leachate above 500 mg/L is 8,500 mg/kg. Applying a similar 25 percent safety factor results in a Type 1 and Type 4 RRS of 6,375 mg/kg for soil protection of groundwater. The slope and intercept are presented in the equation on the graph. The revised figure is presented in Attachment 4 – Revised Attachment D SPLP Correlation to Extractable Sulfate.

c. A narrative description of the sampling and test methods, laboratory analytical data and pH determinations for the soil and leachate were presented in the March 2007 CAP. Copies of the relevant pages of the CAP are presented in Attachment 5.

Conceptual Site Model Comment No. 4:

According to Section 6.2 of the January 2013 Application, the target sections of the storm drains downgradient of the site will be repaired if it is determined that site related impacted groundwater is infiltrating the storm drain system. Please note that according to a 1995 City of East Point Storm Sewer Inspection video of the Martin Street Storm Drain, groundwater infiltration and visual deterioration of the storm sewer has already been confirmed.

Response:

The application describes storm drains upstream of the site (i.e., water flowing between SW-06 and SW-02) as shown on Figure 2 of the VRP Application. The 1995 video inspection was performed between SW-02 and SW-07 based on a GaEPD memorandum dated 14 July 1995 which states "Inspection was conducted from the entrance of the International Commerce Park (i.e., SW-07) on South Martin Street upstream to … the corner of Martin and Randall Streets…".

The actual extent of storm drain deterioration and the number and type of interconnections will need to be evaluated before any work can proceed. Also the extent of groundwater impacts will be evaluated by selective sampling at various locations along the storm drain.

Conceptual Site Model Comment No. 5:

Based on the information provided within the January 2013 Application, and within the public facility files for the HSI Site #I 0498, the groundwater to surface water pathway can be considered a potentially complete exposure pathway. Therefore, please revise the application to account for this exposure pathway and develop ecological endpoints/cleanup criteria values for in-stream water quality for aluminum and sulfate.

Response:

The intent of the selected remedial action is to eliminate the groundwater to surface water pathway. This will achieved by selective rehabilitation of storm drain lines upgradient of the

site. Elimination of the pathway to surface water will eliminate the need to determine and achieve ecological endpoints on a reach of stream affected by many sources.

The stormwater from the area around the site discharges to the unnamed tributary at a double culvert outlet structure. The eastern culvert originates near the site and the western culvert originates near a former landfill and the Owens Illinois plant. Based on sampling performed in 1993, the western culvert from the landfill had sulfate concentrations similar to the concentrations currently seen from the eastern culvert of approximately 500 ppm. Considering the combination of these discharges at the start of the stream it would likely be impossible to separate stream effects from the two different sources and reach cleanup criteria in the stream.

Conceptual Site Model Comment No. 6:

According to Section 4.0 of the January 2013 Application, a direct groundwater exposure pathway does not exist at the site. EPD does not entirely concur with the conclusion that the exposure pathway for groundwater is incomplete due to Section 12-8-108(5) of the Act stating that cleanup standards for soil must be protective of groundwater criteria at an established point of exposure for groundwater (i.e. hypothetical point of drinking water exposure 1,000-feet downgradient from the delineated site contamination). Therefore, please utilize the calculated Type 1 and 4 groundwater RRS derived for sulfate and aluminum in groundwater for the evaluation of the hypothetical point of exposure (POE) for groundwater and for the derivation of the appropriate soil screening values. While EPD has requested that the groundwater exposure pathway be taken into account when completing the VRP Application, EPD understands that the environmental covenants that are to be placed on the site property, and any additional affected properties, to restrict the groundwater exposure pathway may relieve GC from the requirement to remediate groundwater to an established non-residential standard. In addition, please provide a specific indication of which monitoring location(s) will be used as the point of demonstration (POD) monitoring location(s) for an established Point of Exposure (POE) or an established hypothetical POE for groundwater.

Response:

The Type 4 RRS has already taken the soil to groundwater pathway into consideration, as shown by the values in Table 3 of Appendix C in the Voluntary Remediation Plan. In that submittal, the Type 4 RRS for soil calculated for the protection of groundwater was 150,000 mg/kg for aluminum.

As described in Table 2 of Appendix C in the Voluntary Remediation Plan, the soil to groundwater pathway was considered during Type 1 RRS calculations, but the Type 1 RRS value is non-calculable. This is based on the fact that aluminum is not listed in Appendix 1 or in Table 1 of Appendix III; thus, the concentration under Rule 391-3-19- .07(6)(c)1. shall be considered non-calculable.

Well EPW-03D is proposed as the POD well. The well is located significantly less than 1000 feet (i.e., approximately 150 feet) from the site but already meets the proposed groundwater Type 1 and 4 RRS of 250 and 500 mg/l for sulfate, respectively and 35 and 102 mg/l for aluminum, respectively. The November 2013 sampling at EPW-03D measured 28 mg/l for sulfate and <0.1 mg/l for aluminum. Trend analysis and time/concentration plots are presented as part of the semi-annual reports. The trend analysis shows no change (not increasing or decreasing with time) and the time concentration plots indicate the measurements are consistent with time with little variability (See Semi-annual Report # 11).

Conceptual Site Model Comment No. 7:

According to Section 12-8-1 08(1) of the Act, evidence of the horizontal and vertical delineation of soil and groundwater contamination to the default residential cleanup standards must be provided. Based on the data provided in the January 2013 Application, additional delineation measures should be conducted at the following areas of the site:

a. According to Section 5.1 of the January 2013 Application, 35 mg/L has been proposed as the Type I groundwater RRS, based on background groundwater concentrations from upgradient groundwater monitoring well GCW-01M. Please provide additional data to support the 35 mg/L background value and associated Type I RRS, including but not limited to the analytical data set used to establish local ambient or anthropogenic background conditions not affected by the subject site release (§I 2-8-I 08(1)). When compiling the supporting documentation for the site specific background value, please take into consideration the other groundwater wells upgradient and downgradient of the site, technically unaffected by the release, that exhibit aluminum levels less than 1 mg/L, i.e. OW-OIA, EPW-02 & -03.

b. According to the data presented in Figure 4, horizontal delineation for sulfate is needed to the east of the confirmation sidewall sample grid location L5 (9,940 mg/kg). Additionally, please note that while the sulfate concentration at soil location G4 (1 0,300

mg/kg sulfate) and groundwater location GWC-04V (9,900 mg/L) exceeds the established Type I delineation criteria; EPD will not be requiring additional onsite vertical soil and groundwater delineation at these locations at this time.

c. According to the data presented in Figures 10 and 11, horizontal groundwater delineation for sulfate is needed to the south of GWC-05, and to the south of GWC-02 well cluster for both sulfate and aluminum.

Response:

a. Aluminum in groundwater is purely a function of groundwater pH and aluminum solubility. The average aluminum concentration in the delineation borings was 3.75 mg/L excluding DB-05. However, DB-05 had aluminum concentrations of 116 and 122 mg/L and that location is upgradient of the site. The aluminum concentrations measured at GCW-01 and DB-05 may reflect effects of the former acid pits at the former Furman Fertilizer site. See Attachment 1 - Figure 1 Sulfate & Aluminum Concentrations in Delineation Borings. Since groundwater potentially impacted by the Furman Fertilizer site enters the General Chemical site upgradient the background at impacted on-site locations is higher than regional background.

b. The L5W wall location was resampled on 12 January 2006 with a result of 1100 mg/kg sulfate. This resampled data point was inadvertently omitted in the data processing for the figure. No additional sampling should be required. The attached revised VRP Application Table 1 including the additional confirmation sample data.

c. Additional delineation borings and temporary monitoring wells were installed to the south and east of GCW-05 and GCW-02. The borings DB-02 and DB-03 provide delineation to the south of the site. See Attachment 1- Figure 1 Sulfate & Aluminum Concentrations in Delineation Borings

Conceptual Site Model Comment 8:

Please revise the surface water monitoring plan included in Section 6.4 to include all surface water monitoring locations previously established for the site.

Response:

The surface water monitoring plan will be revised to include the original four surface water monitoring locations. (i.e., SW-02, SW-06, SW-07, and SW-09).

Sincerely,

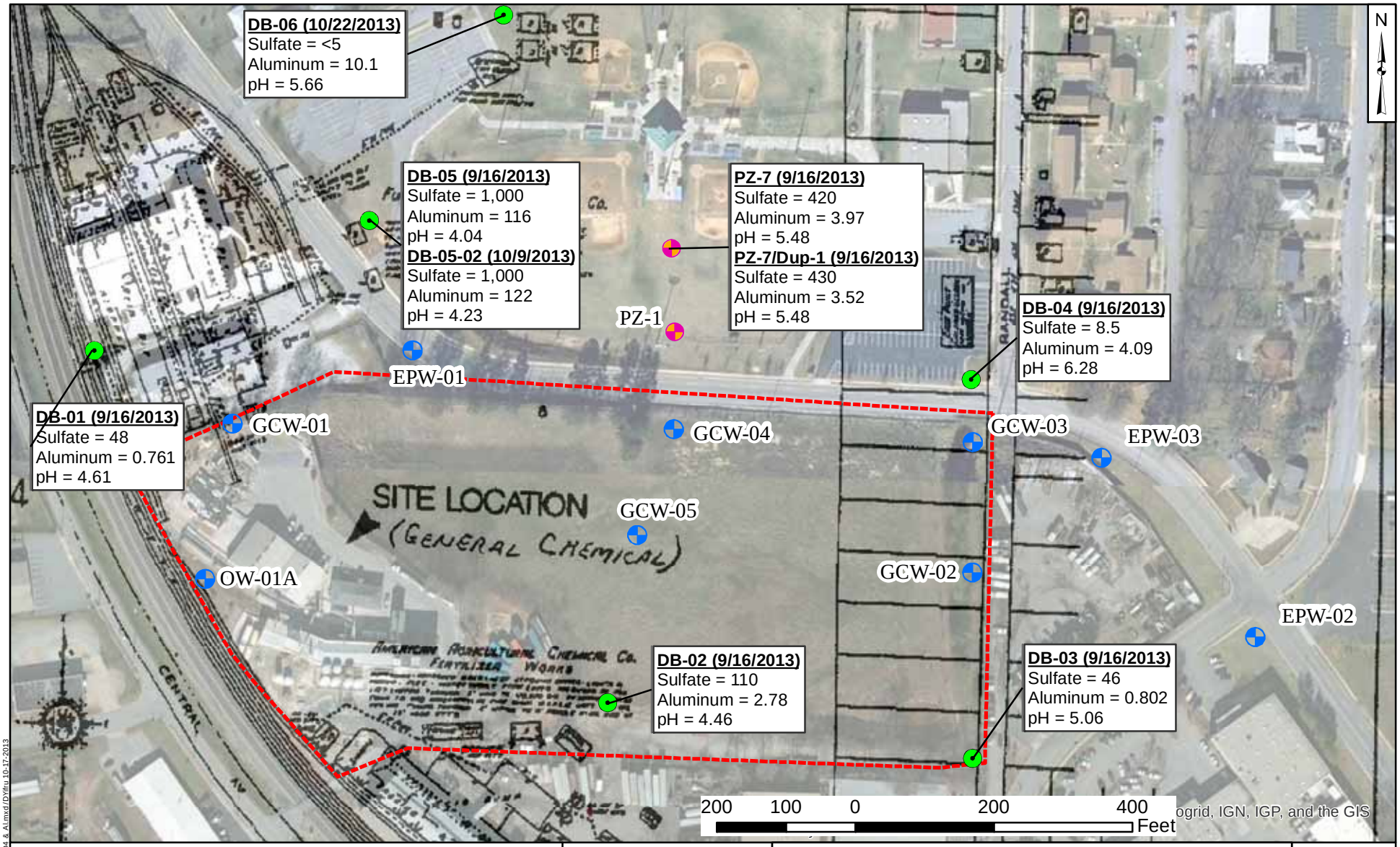
Brian D. Jacobson, P.E.
Senior Engineer

James Deitsch, PhD, P.E.
Senior Engineer

Attachments:

Copies to: Mr. Rob Savarese (GCL)

ATTACHMENT 1
FIGURE 1
SULFATE & ALUMINUM CONCENTRATIONS IN DELINEATION BORINGS



Legend

- Delineation Boring
- Piezometer
- Monitoring Well
- Approximate Property Boundary

Notes:
Concentrations are in mg/L
Dup-1 is a duplicate sample from PZ-7

Geosyntec consultants

Kennesaw, GA

October 2013

Sulfate & Aluminum Concentrations in Delineation Borings

General Chemical, East Point, GA

Figure 1

N:\gencheml\GIS\MXDs\2013\October\SO4 & Al.mxd/DVillru 10-17-2013

ATTACHMENT 2
SOIL RRS CALCULATION TABLES

Table 1
Calculation of Type 1 and Type 4 Risk Reduction Standards for Aluminum [1]
Toxicity Values and Receptor-Specific Inputs
General Chemicals
East Ponit, Georgia

Parameters		Definitions	Units	Residential Adult	Non-Residential Adult
Toxicity Values	RfDo	Non-Cancer Oral Reference Dose	mg/kg-day	1.0E+00	1.0E+00
	RfC	Noncancer Reference Concentration	mg/m^3	5.0E-03	5.0E-03
	RfDi	Noncancer Inhalation Reference Dose	mg/kg-day	1.4E-03	1.4E-03
RRS Equation Inputs [4]	RRS_{GW}	Risk Reduction Standard - Groundwater	mg/L	calculated	calculated
	RRS_{SO}	Risk Reduction Standard - Soil	mg/kg	calculated	calculated
	THQ	Target Hazard Quotient	unitless	1	1
	ATN	Averaging time - noncancer	days	10,950	9,125
	BW	Body weight	kg	70	70
	IRW	Groundwater ingestion rate	L/day	2	1
	IRS	Soil ingestion rate	mg/day	114	50
	FI	Fractional intake	unitless	1	1
	IRa	Soil (Particulate) Inhalation Rate	m^3/day	15	20
	EF	Exposure frequency	d/yr	350	250
	ED	Exposure duration	yr	30	25
	PEF	Particulate Emission Factor	m^3/kg	4.63E+09	4.63E+09
	CFs	Conversion factor soil	kg/mg	1.0E-06	1.0E-06

Notes:

1. Aluminum is not listed in Appendix I of the Rules of Hazardous Site Response (i.e., aluminum is not a regulated substance) and, therefore, risk reduction standards (RRS) are typically not applicable. However, at the request of the Georgia Environmental Protection Division (GAEPD), Type 1 and 4 RRS have been calculated.

2. Toxicity values were obtained from: United States Environmental Protection Agency Regions 3, 6, and 9. (Accessed 05-29-13). Regional Screening Levels for Chemical Contaminants at Superfund Sites. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Updated November 2012. The noncancer toxicity values for aluminum presented in the RSL Tables are EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Aluminum is not classified as a carcinogen; therefore, cancer toxicity values are not presented.

3. RfDi = RfC x $20m^3$/day / 70kg

4. Exposure assumptions are based on Table 3 of Appendix 3 of GAEPD 391-19-.07.

Table 2
Type 1 Risk Reduction Standards for Aluminum
Residential Scenario
General Chemicals
East Point, Georgia

Analyte	CAS NO.	Groundwater Type 1 RRS [1]	Soil Type 1 RRS [2]	Soil Calculations [2]			
				Protection of Groundwater [2a]	Protection of Human Health - Direct Contact Adult Resident [2b]		
					Ingestion	Inhalation	Total
		mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7429-90-5	3.5E+01	6.3E+05	--	6.4E+05	3.2E+07	6.3E+05

Notes:

1. Concentrations of regulated substances in groundwater shall not exceed concentrations given in Table 1 of Appendix III, or for those substances not listed, the background or detection limit concentrations. Aluminum is not listed in Table 1 of Appendix III; therefore, the Type 1 GW RRS is the background value of 35 mg/L.
2. Concentrations at any point above the uppermost groundwater zone in soil that has been affected by a release shall not exceed the concentrations given in Table 2 of Appendix III or, for those substances not listed (i.e., aluminum), the least of the concentrations based on the protection of groundwater and the protection of human health.
   a. Protection of Groundwater. For substances not listed in Appendix 1 or in Table 1 of Appendix III, the concentration under Rule 391-3-19- .07(6)(c)1. shall be considered non-calculable. Aluminum is not listed in either of these tables.
   b. Protection of human health. As noted in Table 1, aluminum is non-carcinogenic; therefore, the RRS based on the protection of human health are concentrations in soil which are unlikely to result in any noncancer toxic effects on human health via soil ingestion along with inhalation of volatiles and particulates. Type 1 soil RRS were determined using Equation 7 of RAGS, Part B, and standard adult residential exposure assumptions.

Table 3
Type 4 Risk Reduction Standards for Aluminum
Non-Residential Scenario
General Chemicals
East Point, Georgia

Analyte	CAS NO.	Groundwater Type 4 RRS [1] mg/L	Soil Type 4 RRS [2,4] mg/kg	Soil Calculations			
				Protection of Groundwater [3] mg/kg	Protection of Human Health - Direct Contact [4]		
					Ingestion mg/kg	Inhalation mg/kg	Total mg/kg
Aluminum	7429-90-5	1.0E+02	1.5E+05	1.5E+05	2.0E+06	3.4E+07	1.9E+06

Notes:

1. Concentrations of regulated substances in groundwater samples must not exceed, at any point within the property boundary, the lesser of the risk-based values calculated using Equations 1 and 2 from RAGS, Part B, and non-residential exposure factors as described in Sections (9)(c)(1) and (9)(c)(2) of GAEPD 391-19-.07. Because aluminum is non-carcinogenic and non-volatile, the Type 4 RRS for groundwater corresponds to a concentration in groundwater that is unlikely to result in non-cancer effects to non-residential receptors via ingestion of groundwater.
2. Concentrations of regulated substances in soil must not exceed the leachability-based value (Item 3 above) AND, for surface soil, the lesser of the risk-based values calculated using Equations 1 and 2 from RAGS, Part B, and non-residential exposure factors as described in Sections (9)(d)(2) of GA EPD 391-19-.07. Because aluminum is non-carcinogenic and non-volatile, the Type 4 RRS for soil corresponds to a concentration in soil that is unlikely to result in non-cancer effects on non-residential receptors via ingestion of soil or inhalation of soil particulates. This direct contact value is also protective of human health.
3. Concentrations of regulated substances in soil will not cause contamination of groundwater at levels which exceed Type 4 groundwater concentration criteria. Soil concentrations protective of groundwater were determined by the following fate-and-transport model:

RRS_{LEACH} (mg/kg) = RRS_{GW} x DAF x [Kd + ($\theta w/\rho_\beta$)]

where:

RRS_{GW}	Target Groundwater RRS	1.0E+02	mg/L
DAF	Dilution attenuation factor	1	unitless
K_d	Soil-water partition coefficient	1.50E+03	L/kg
θ_w	Water-filled soil porosity (=ω x ρ_β)	0.3	L_{water}/L_{soil}
ρ_β	Dry soil bulk density	1.5	g/cm^3
ω	Average soil moisture content	0.2	g_{water}/g_{soil}

4. Concentrations of regulated substances in surface soil must not exceed the lesser of the risk-based values calculated using Equations 1 and 2 from RAGS, Part B, and non-residential exposure factors as described in Sections (9)(d)(2) of GA EPD 391-19-.07. Because aluminum is non-carcinogenic and non-volatile, the Type 4 RRS for soil corresponds to a concentration in soil that is unlikely to result in non-cancer effects on non-residential receptors via ingestion of soil or inhalation of soil particulates. A concentration in excess of 1 million parts per million (mg/kg) is impossible; thus, the proposed Type 4 RRS for aluminum is soil based on the protection of groundwater, which is also protective of human health based on direct contact with soil.

Table 4
Summary of Risk Reduction Standards for Aluminum
Non-Residential Scenario
General Chemicals
East Point, Georgia

Analyte	CAS NO.	Groundwater RRS (mg/L)		Soil RRS (mg/kg)	
		Type 1	Type 4	Type 1	Type 4
Aluminum	7429-90-5	3.5E+01	1.0E+02	6.3E+05	1.5E+05

Basis of RRS:
GW Type 1: Background
GW Type 4: Protection of Human Health, Non-Resident, Non-Cancer Endpoint
Soil Type 1: Protection of Human Health, Resident, Non-Cancer Endpoint
Soil Type 4: Protection of Groundwater (102 mg/L)

ATTACHMENT 3
TABLE A1 FROM 2002 CAP AND
REVISED VRP APPLICATION TABLE 1

TABLE A.1
LEACHABILITY ANALYSIS OF HCA AND DEVELOPMENT OF MIGRATION TO GROUNDWATER TYPE 4 RRSs

GENERAL CHEMICAL EAST POINT FACILITY
EAST POINT, GEORGIA

	HCA			Extraction Liquid - Rainwater[1]			Synthetic Leachate[2]			Distribution Coefficient - K_d[3]				Groundwater Type 4 RRS[4]		Migration to Groundwater Type 4 RRS[5]	
										Aluminum (L/kg)		Sulfate (L/kg)					
Sample ID	Aluminum (mg/kg)	Sulfate (mg/kg)	pH (-)	Aluminum (mg/L)	Sulfate (mg/L)	pH (-)	Aluminum (mg/L)	Sulfate (mg/L)	pH (-)	Per Test (L/kg)	Average (L/kg)	Per Test (L/kg)	Average (L/kg)	Aluminum (mg/L)	Sulfate (mg/L)	Aluminum (mg/kg)	Sulfate (mg/kg)
HCA (1-2 ft)	48,300	6,650	4.09	0.5 mg/L	11.6	7.18	49.6	365	3.46	963.8	583.3	8.2	6.2	102	1,200	59,517	7,676
HCA (3-4 ft)	21,200	8,920	4.22				81.4	548	3.45	250.4		6.3					
HCA (5-7 ft)	22,700	5,680	3.94				41.6	403	3.35	535.7		4.1					

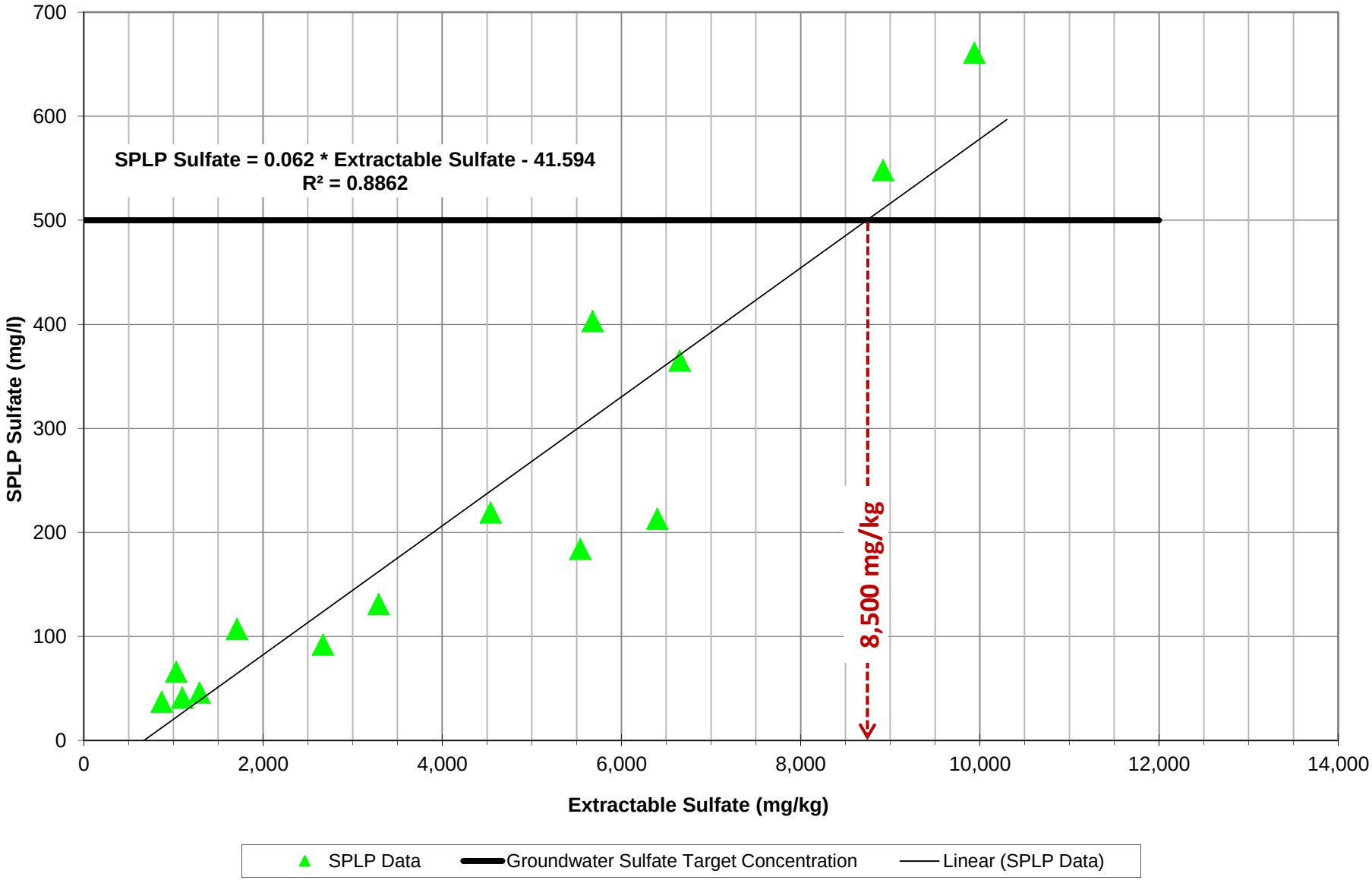
Notes:

1. Rainwater collected in Atlanta area during July 2002 was used as extraction liquid for synthetic leachate generation.
2. Synthetic leachate was prepared utilizing a modified TCLP/SPLP procedure where the rainwater was used as extraction liquid instead of the standard extraction liquid.
3. Distribution coefficient (K_d) defined as the simple ratio of the sorbed phase concentration to the solution phase concentration at equilibrium (Alley 1993) is calculated based on the HCA and Synthetic Leachate concentrations.
4. Developed based on site-specific risk assessment as discussed in Section 3.2.
5. Migration to groundwater (leachability-based) soil concentrations (protective of groundwater) were calculated based on distribution coefficients and groundwater Type 4 RRSs developed for this site in accordance with formulation given by EPA guidelines [EPA/540/R-95/128].

ATTACHMENT 4
REVISED ATTACHMENT D
SPLP CORRELATION TO EXTRACTABLE SULFATE

ATTACHMENT D
SPLP CORRELATION TO EXTRACTABLE SULFATE

GENERAL CHEMICAL
EAST POINT, GEORGIA



ATTACHMENT 5
SPLP PROCEDURES AND CALCULATIONS
FROM 2007 CAP

Prepared for:

General Chemical Corporation
90 East Halsey Road
Parsippany, New Jersey 07054

REVISED CORRECTIVE ACTION PLAN

GENERAL CHEMICAL CORPORATION EAST POINT, GEORGIA

Prepared by:

GEOSYNTEC CONSULTANTS
1255 Roberts Blvd., Suite 200
Atlanta, Georgia 30144

Project Number: GR3712-03

March 2007

sulfate in soil is expected to be in the form of insoluble compounds, and 2) soil ingestion would have to be at least 24-times higher than USEPA recommendations (50 mg × 24 = 1200 mg) for even a theoretical possibility of reaching the NOAEL intake.

Not withstanding the above, GCL reached agreement with GaEPD in letter correspondence dated September 29, 2005 and 7 October 2005 to utilize a maximum concentration of 500 mg/L for leachable sulfates from soils as the remediation level for soils removal. It is noted that this is significantly below the Type 4 RRS and is therefore considered extremely conservative.

4.2.2 Development of Migration to Groundwater Type 4 RRS for Soil

The migration to groundwater (Leachability-based) RRSs are used to provide a conservative estimate of constituent concentrations (protective of groundwater), above which migration through vadose-zone soil could have a potential impact on the groundwater quality. The lack of reasonably consistent and readily available soil-to-water partitioning coefficients (K_d) for sulfate requires the use of site-specific leachability test results, as allowed under Chapter 391-3-19-.07(9)(d), to determine whether leachability from soil could result in water concentrations exceeding the groundwater RRS for these compounds.

The standard method for calculating a leachability-based Type 4 RRS for soil is taken from USEPA's *Soil Screening Guidance* and incorporates a standard linear equilibrium soil/water partition equation to estimate release of chemicals of concern from soil and a dilution factor to account for dilution of soil leachates within an aquifer. The Type 4 soil criteria are then back-calculated from the site-specific Type 4 RRS for groundwater.

The calculation of leachability-based Type 4 soil criteria is heavily dependant on K_d. For certain inorganic constituents such as sulfate, K_d can be strongly influenced by a variety of soil parameters including pH, redox potential, iron oxide content, cation exchange capacity, and organic carbon content. Because of the variability of these parameters from site to site, K_d values for the same constituent can vary by several

orders of magnitude. There is no single K_d recommended in USEPA or GaEPD guidance for sulfate.

Given the variability in K_d, the migration potential of sulfate was evaluated at the GCL site utilizing a modified Synthetic Precipitation Leaching Procedure (SPLP – EPA Method 1312), using the standard extraction liquid specified by the method. The extraction liquid is a reagent water acidified to pH 4.2 with a 60/40 sulfuric/nitric acid solution. The extraction liquid contained either 2.85 or 7.2 mg/L sulfate. The increase in sulfate in the final samples was neglected since the relative concentration was small. Neglecting the extraction solution provided a more conservative result. Site soil under the HCA cells was used as the extracted material. The leachability test results are presented in Table 3.1 and Figure 3.2. The data analysis and calculations of migration to groundwater are presented in Appendix A. This approach is consistent with Chapter 391-3-19-.07(9)(d) 1, compliance with Type 4 RRS, which requires that concentrations in soil:

> *"will not cause contamination of groundwater at levels which exceed Type 4 groundwater concentration criteria, as determined by any laboratory test and/or fate-and- transport model recognized by USEPA and approved by the Director, at a point of exposure defined as any point at which a drinking water well could be installed"*

Groundwater wells placed beyond at the Site boundary (e.g., EPW-03) could be used to document compliance with the Type 4 RRS for groundwater.

The SPLP tests were performed on HCA samples in the previous CAP [Geosyntec, 2002] and not on the native residual soils. Since the HCA has been removed from the site, the results obtained from the second series of SPLP tests were used to evaluate the migration to groundwater Type 4 RRS for soil. However, the calculated value for confirmation of HCA and impacted soil removal was based on the target concentration of 500 mg/L, instead of the GCL's proposed Type 4 RRS value of 1200 mg/L for migration to groundwater. Additionally, the calculated theoretical maximum leachate concentrations were used to develop the soil concentration. Using the calculated leached concentration allowed all of the soil confirmation data to be used and demonstrated no exceedances of the groundwater target concentration for any samples. The calculated soil sulfate concentration required to impact the groundwater above the 500 mg/L target concentration was 12,650 mg/kg.

No confirmation samples collected from soils under the former HCA cells exceeded 12,650 mg/kg, the highest measured value was 10,300 mg/kg. The 95% upper confidence value for all the soil confirmation samples was 3,143 mg/kg. Calculations supporting the 12,650 mg/kg (based on 500 mg/L) value are presented in Appendix A.

Based on data presented in Section 3.2, the discussions presented in Sections 4.2.1.2 above, and the agreement reached in letter correspondence with GaEPD, HCA and impacted soil removal activities are considered complete and no further soils removal is warranted to attain a Type 4 RRS at the site.

4.3 Groundwater Migration Assessment

The GCL Site is an active industrial facility and provides no habitat for ecological receptors. There is currently some potential for groundwater discharge from the site to enter the City of East Point's storm sewer which ultimately discharges into the unnamed tributary. As a result, GaEPD has expressed concern that the human health-based Type 4 groundwater RRS may not adequately protect the receiving waters.

A detailed study of the storm sewer system discharging into the unnamed tributary would be difficult to implement and interpret due to uncertainties associated with the condition of the system, unknown connections, and other industrial and municipal activities in the vicinity of the GCL Site. There are various other known sources (industrial and municipal), that discharge both surface water and groundwater (via infiltration) into this system. Separating any impacts of the GCL Site from other potential sources would be difficult if not impossible to evaluate.

Considering the changes that have occurred in the groundwater flow regime in the area of the GCL Site since the removal of the HCA, additional data needs to be collected before any assessment can be made to evaluate potential impacts to receiving waters. Quarterly monitoring data from the existing and proposed monitoring wells should provide information to evaluate if current Site conditions are adversely impacting receiving waters in a significant way compared to other sources. A part of the evaluation will be development and calibration of a site groundwater model to assess potential for offsite migration.

APPENDIX A

LEACHABILITY ANALYSIS AND DEVELOPMENT OF MIGRATION TO GROUNDWATER TYPE 4 RRSS

APPENDIX A

A S S U M P T I O N S A N D C A L C U L A T I O N S

LEACHABILITY ANALYSIS OF HCA AND DEVELOPMENT OF MIGRATION TO GROUNDWATER TYPE 4 RRSs

---

The EPA Soil Screening Guidance, Second Edition, July 1996 (EPA/540/R-96/018) was used in calculating the migration from soil to groundwater. The Soil Screening Guidance uses a simple linear equilibrium soil/water partition equation. It also uses a simple water-balance equation to calculate a dilution factor to account for reduction of soil leachate concentration from mixing in an aquifer.

The methodology is based on rather conservative, simplified assumptions about the release of contaminants in the subsurface. These assumptions are inherent in the SSL equations. Simplified assumptions for the SSL migration to groundwater includes:

- Infinite source (i.e., steady-state concentrations are maintained over the exposure period)
- Uniformly distributed contamination from the surface to the top of the aquifer
- No contaminant attenuation (i.e., adsorption, biodegradation, chemical degradation) in soil
- Instantaneous and linear equilibrium soil/water portioning
- Unconfined, unconsolidated aquifer with homogenous and isotropic hydrologic properties
- No contaminant attenuation in the aquifer
- Receptor well at the down gradient edge of the source and screened within the plume.

The soil/water portioning equation relates concentrations of contaminants adsorbed to soil organic carbon to soil leachate concentrations in the zone of contamination.

$$Screening\ Level\ in\ Soil\ (mg/kg) = C_W * [K_d + \frac{(\theta_W + \theta_a * H')}{\rho_b}] * \text{DAF}$$

where

C_W = target soil leachate concentration (mg/L)
K_d = soil-water partition coefficient (L/kg)
θ_W = water-filled soil porosity (L_{water}/L_{soil})
θ_a = air-filled soil porosity (L_{air}/L_{soil})
ρ_b = dry soil bulk density (kg/L)
H' = Henry's law constant
DAF = dilution-attenuation factor (always greater than or equal to 1)

The distribution coefficient, K_d, is defined as the simple ratio of the sorbed phase concentration to the solution phase concentration at equilibrium (Alley 1993) is calculated based on the HCA and Synthetic leachate concentrations presented in Table A.1. The bulk density (ρ_b) used was 1.5 kg/L. The water-filled porosity (θ_W) was 0.3. The Henry's law constant was assumed to be zero, which leads to that the term $\theta_a * H'$ = 0. The DAF was assumed equal to one for the most conservative result.

<u>Migration to Groundwater for Sulfate:</u>

C_W = 500 mg/L GaEPD Target Concentration << 1,200 mg/L Type 4 RRS
K_d = 25.1 L/kg
θ_W = 0.3
ρ_b = 1.5 kg/L

⇒ Migration to Groundwater based on Target Concentration = 12,650 mg/kg

* * * * *

ATTACHMENT 1

Geosyntec consultants

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PH 678.202.9500
FAX678.202.9501
www.geosyntec.com

Memorandum

Date: 18 December 2013

To: Mr. David Brownlee

From: Brian Jacobson, James Deitsch, Geosyntec

Subject: General Chemical Horizontal Delineation Sampling
Geosyntec Project: GR5060

Geosyntec installed temporary groundwater wells at seven locations surrounding the General Chemical East Point site. The wells were installed to provide horizontal delineation to Type 1 Risk Reduction Standards (RRS) for aluminum and sulfate. The Type 1 RRS presented in the Voluntary Remediation Program (VRP) application were 35 mg/l for aluminum and 500 mg/l for sulfate.

The temporary one-inch diameter PVC wells were installed using a four-inch diameter hollow stem auger (DB-01 through DB-06) or a Geoprobe (PZ-7). The delineation borings DB-01 through DB-05 were installed 11 through 13 September 2013. DB-06 was installed on 18 October 2013. PZ-7 was previously installed as part of the soil sampling in Green Park on 22 January 2013. The wells were constructed by installing the casing, placing sand to a foot above the well screen, installing a three- to five-foot thick bentonite seal, then native soil to the ground surface. The wells were developed and purged until visually clear water was produced. After collecting samples of groundwater and verifying the results, the wells were removed and the ground surface at the boring locations was restored on 22 and 31 October 2013. Petroleum like material was present in the cuttings at the DB-04 location; however, it did not interfere with collection of samples for sulfate and aluminum. The investigation derived waste at DB-04 will be characterized for proper disposal. The delineation well construction data and groundwater elevations are presented in Table 1.

Well DB-01 through DB-05 and PZ-7 were sampled on 16 September 2013. The sulfate result at DB-05 was higher than expected (1,000 mg/l for sulfate, 116 mg/l for aluminum) and the well was resampled on 9 October 2013. The DB-05 location is up and cross gradient to the location of the former HCA disposal cells (See Figure 3-1 from the Semi-Annual Report #11 attached for reference). Additionally, the December 2013 groundwater results at EPW-01 between the former HCA cells and DB-05 were lower for both constituents (130 mg/l for sulfate, 14 mg/l for

aluminum). These findings may indicate an additional offsite source, such as the former Furman Fertilizer acid pits, may be located directly upgradient of the DB-05 location (See Figure 3-1). Resampling of DB-05 provided results similar to the 16 September 2013 results, thus an additional well was installed at the DB-06 location and was sampled on 22 October 2013. The results of the sampling are presented in Table 2 and are shown on Figure 1.

The results at DB-01 through DB-04, DB-06, and PZ-7 met the Type 1 RRS for aluminum and sulfate. These wells, in combination with existing onsite well OW-01A, provide horizontal delineation of the site. These data will be used to develop the theoretical Point of Exposure (POE) and select the Point of Determination (POD) well, which is anticipated to be EPW-03D. A separate technical memorandum to be submitted in April 2014 will provide the rationale for selection of the POD well and demonstrate the site meets the goals at the POE location.

* * * * *

Attachments:

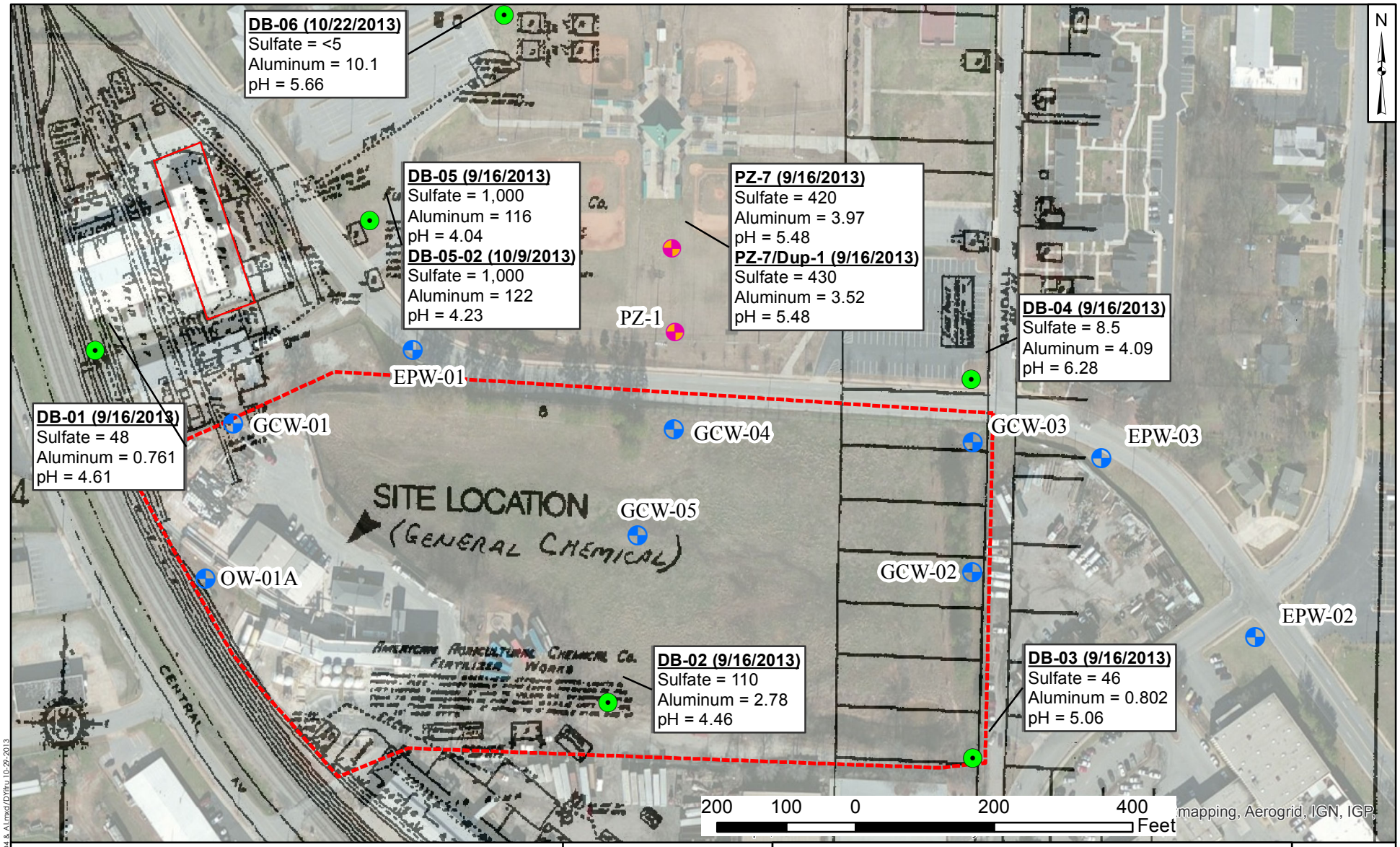
Table 1 Delineation Well Construction Data and Groundwater Elevations
Table 2 Delineation Well Groundwater Sampling Results
Figure 1 Sulfate Concentration in Soil Samples January 2013
Figure 3-1 November 2013 Potentiometric Surface Map
Laboratory Reports – AWI0479, AWJ0333, AWJ0779
Field Forms

Table 1
Delineation Well Construction Data and Groundwater Elevations
September and October 2013
General Chemical Site
East Point, Georgia

Location	Well Casing Elevation	Adjacent Soil Elevation	Screen Interval (ft bgs)	Depth to Water (ft)	Groundwater Elevation (ft msl)
				Sep-13	Sep-13
DB-01	1031.21	1027.6	12-22	9.86	1021.4
DB-02	1008.66	1009.0	15-25	12.03	996.6
DB-03	998.10	993.3	10-20	10.35	987.7
DB-04	992.64	992.3	15-25	13.90	978.7
DB-05	1014.68	1014.7	20-30	11.62	1003.1
DB-06	1009.83	1008.8	15-25	19.12	990.7
PZ-7	998.9	997.9	9-19	9.93	988.9

Table 2
Delineation Well Groundwater Sampling Results
September and October 2013
General Chemical Site
East Point, Georgia

Location	Sample Date	pH (-) EPA 150.1	Sulfate (mg/l) EPA 9056A	Aluminum (mg/l) EPA6010C
DB-01	9/16/2013	4.6	48	0.761
DB-02	9/16/2013	4.5	110	2.78
DB-03	9/16/2013	5.1	46	0.802
DB-04	9/16/2013	6.3	8.5	4.09
DB-05	9/16/2013	4.0	1,000	116.0
DB-05(1)	10/9/2013	4.2	1,000	122.0
DB-06	10/22/2013	5.7	<5	10.1
PZ-7	9/16/2013	5.5	420	3.97



Legend

- Delineation Boring
- Piezometer
- Monitoring Well
- Approximate Property Boundary

Notes:
Concentrations are in mg/L
Dup-1 is a duplicate sample from PZ-7

Geosyntec consultants

Kennesaw, GA

October 2013

Sulfate & Aluminum Concentrations in Delineation Borings

General Chemical, East Point, GA

Figure 1

N:\genchem\GIS\MXDs\2013\October\SO4 & Al.mxd/DYlfru 10-29-2013

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Prepared For:

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw, GA 30144

Attention: Mr. Brian Jacobson

Report Number: AWI0479
October 02, 2013
Project: General Chemical
Project #:GR5060

We appreciate the opportunity to provide the analytical support for your project. The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Approved:

Judy Wagner
Project Manager

This report may not be reproduced, except in full, without written approval from Analytical Services, Inc.
Analytical Services, Inc. certifies that the following analytical results meet all requirements of the National Environmental Laboratory Accreditation Conference(NELAC).
All test results relate only to the samples analyzed.

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Attention: Mr. Brian Jacobson

October 02, 2013

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DB-01-0913	AWI0479-01	Ground Water	09/16/13 10:00	09/18/13 09:30
DB-05-0913	AWI0479-02	Ground Water	09/16/13 11:35	09/18/13 09:30
PZ-07-0913	AWI0479-03	Ground Water	09/16/13 13:25	09/18/13 09:30
DB-02-0913	AWI0479-04	Ground Water	09/16/13 14:35	09/18/13 09:30
DB-03-0913	AWI0479-05	Ground Water	09/16/13 15:35	09/18/13 09:30
DB-04-0913	AWI0479-06	Ground Water	09/16/13 16:30	09/18/13 09:30
Dup -1-0913	AWI0479-07	Ground Water	09/16/13 13:25	09/18/13 09:30

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October 02, 2013

Report No.: AWI0479
Client ID: DB-01-0913
Date/Time Sampled: 9/16/2013 10:00:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-01
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	48	5.0	mg/L	EPA 9056A		1	9/23/13 20:16	9/23/13 20:16	3090477	MZP
Metals, Total										
Aluminum	0.761	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 12:29	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: DB-05-0913
Date/Time Sampled: 9/16/2013 11:35:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-02
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	1000	250	mg/L	EPA 9056A		50	9/24/13 14:09	9/24/13 14:09	3090477	MZP
Metals, Total										
Aluminum	116	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 12:48	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: PZ-07-0913
Date/Time Sampled: 9/16/2013 1:25:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-03
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	420	100	mg/L	EPA 9056A		20	9/24/13 14:30	9/24/13 14:30	3090477	MZP
Metals, Total										
Aluminum	3.97	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 12:55	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: DB-02-0913
Date/Time Sampled: 9/16/2013 2:35:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-04
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	110	50	mg/L	EPA 9056A		10	9/24/13 14:51	9/24/13 14:51	3090477	MZP
Metals, Total										
Aluminum	2.78	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 13:03	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: DB-03-0913
Date/Time Sampled: 9/16/2013 3:35:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-05
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	46	5.0	mg/L	EPA 9056A		1	9/23/13 21:39	9/23/13 21:39	3090477	MZP
Metals, Total										
Aluminum	0.802	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 13:10	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: DB-04-0913
Date/Time Sampled: 9/16/2013 4:30:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-06
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	8.5	5.0	mg/L	EPA 9056A		1	9/23/13 23:43	9/23/13 23:43	3090477	MZP
Metals, Total										
Aluminum	4.09	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 13:18	3090637	FBS

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October 02, 2013

Report No.: AWI0479
Client ID: Dup -1-0913
Date/Time Sampled: 9/16/2013 1:25:00PM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWI0479-07
Date/Time Received: 9/18/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	430	100	mg/L	EPA 9056A		20	9/27/13 11:14	9/27/13 11:14	3090477	MZP
Metals, Total										
Aluminum	3.52	0.100	mg/L	EPA 6010C		1	9/30/13 14:40	10/01/13 13:33	3090637	FBS

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October 02, 2013

Report No.: AWI0479

Inorganic Anions - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3090477 - EPA 300.0										
Blank (3090477-BLK1)					Prepared & Analyzed: 09/23/13					
Sulfate	ND	5.0	mg/L							
LCS (3090477-BS1)					Prepared & Analyzed: 09/23/13					
Sulfate	9.60	5.0	mg/L	10.000		96	90-110			
Matrix Spike (3090477-MS1)		**Source: AWI0601-01**			Prepared & Analyzed: 09/23/13					
Sulfate	18.0	5.0	mg/L	10.000	8.84	92	90-110			
Matrix Spike (3090477-MS2)		**Source: AWI0621-02**			Prepared & Analyzed: 09/24/13					
Sulfate	9.87	5.0	mg/L	10.000	ND	99	90-110			
Matrix Spike Dup (3090477-MSD1)		**Source: AWI0601-01**			Prepared & Analyzed: 09/23/13					
Sulfate	18.0	5.0	mg/L	10.000	8.84	92	90-110	0.2	15	

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October 02, 2013

Report No.: AWI0479

Metals, Total - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3090454 - EPA 3010A										
Blank (3090454-BLK1)					Prepared & Analyzed: 09/23/13					
Aluminum	ND	0.100	mg/L							
LCS (3090454-BS1)					Prepared & Analyzed: 09/23/13					
Aluminum	1.04	0.100	mg/L	1.0000		104	80-120			
Matrix Spike (3090454-MS1)		**Source: AWI0479-01**			Prepared & Analyzed: 09/23/13					
Aluminum	1.77	0.100	mg/L	1.0000	0.541	123	75-125			
Matrix Spike Dup (3090454-MSD1)		**Source: AWI0479-01**			Prepared & Analyzed: 09/23/13					
Aluminum	1.80	0.100	mg/L	1.0000	0.541	126	75-125	2	20	QM-05
Post Spike (3090454-PS1)		**Source: AWI0479-01**			Prepared & Analyzed: 09/23/13					
Aluminum	1.61		mg/L	1.0000	0.541	106	80-120			
Batch 3090637 - EPA 3010A										
Blank (3090637-BLK1)					Prepared: 09/30/13 Analyzed: 10/01/13					
Aluminum	ND	0.100	mg/L							
LCS (3090637-BS1)					Prepared: 09/30/13 Analyzed: 10/01/13					
Aluminum	1.03	0.100	mg/L	1.0000		103	80-120			
Duplicate (3090637-DUP1)		**Source: AWI0479-01RE1**			Prepared: 09/30/13 Analyzed: 10/01/13					
Aluminum	0.718	0.100	mg/L		0.761			6	20	
Duplicate (3090637-DUP2)		**Source: AWI0479-02RE1**			Prepared: 09/30/13 Analyzed: 10/01/13					
Aluminum	115	0.100	mg/L		116			0.8	20	

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Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 02, 2013

Report No.: AWI0479

Metals, Total - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3090637 - EPA 3010A										
Duplicate (3090637-DUP3)		**Source: AWI0479-03RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	3.76	0.100	mg/L		3.97			6	20	
Duplicate (3090637-DUP4)		**Source: AWI0479-04RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	2.81	0.100	mg/L		2.78			1	20	
Duplicate (3090637-DUP5)		**Source: AWI0479-05RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	0.793	0.100	mg/L		0.802			1	20	
Duplicate (3090637-DUP6)		**Source: AWI0479-06RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	4.09	0.100	mg/L		4.09			0.1	20	
Duplicate (3090637-DUP7)		**Source: AWI0479-07RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	3.87	0.100	mg/L		3.52			9	20	
Matrix Spike (3090637-MS1)		**Source: AWI0479-01RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	2.12	0.100	mg/L	1.0000	0.761	136	75-125			QM-05
Matrix Spike Dup (3090637-MSD1)		**Source: AWI0479-01RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	1.99	0.100	mg/L	1.0000	0.761	123	75-125	6	20	
Post Spike (3090637-PS1)		**Source: AWI0479-01RE1**			Prepared: 09/30/13			Analyzed: 10/01/13		
Aluminum	1.80		mg/L	1.0000	0.761	104	80-120			

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110 Technology Parkway, Norcross, GA 30092
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Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 02, 2013

Laboratory Certifications

Code	Description	Number	Expires
LA	Louisiana	02069	06/30/2014
NC	North Carolina	381	12/31/2013
NELAC	FL DOH (Non-Pot. Water, Solids) Eff:: 07/01/2012	E87315	06/30/2014
SC	South Carolina	98011001	06/30/2014
TX	Texas	T104704397-08-TX	03/31/2014
VA	Virginia	1340	12/14/2013

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October 02, 2013

Legend

Definition of Laboratory Terms

ND - None Detected at the Reporting Limit
TIC - Tentatively Identified Compound
CFU - Colony Forming Units
SOP - Method run per ASI Standard Operating Procedure
RL - Reporting Limit
DF - Dilution Factor
***** - Analyte not included in the NELAC list of certified analytes.

Sample Information

N-Nitrosodiphenylamine breaks down to diphenylamine in the GCMS; both analytes are reported as N-Nitrososdiphenylamine. ASI is not NELAC certified for diphenylamine.

Phthalic acid and phthalic anhydride are reported as dimethyl phthalate

Maleic acid and maleic anhydride are reported as dimethyl malate

1,2-Diphenylhydrazine breaks down to azobenzene in the GCMS; both analytes are reported as azobenzene

Definition of Qualifiers

QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD and/or PDS due to suspected matrix interference. Sample results for the QC batch were accepted based on acceptable LCS recoveries.

Note: Unless otherwise noted, all results are reported on an as received basis.

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Attention: Mr. Brian Jacobson

October 02, 2013

225361

CHAIN OF CUSTODY RECORD

ANALYTICAL SERVICES, INC.
ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS
110 TECHNOLOGY PARKWAY NORCROSS, GA 30092
(770) 734-4200 : FAX (770) 734-4201 : www.asi-lab.com

PAGE: 1 OF 1

CLIENT NAME: Geosyntec
CLIENT ADDRESS/PHONE NUMBER/FAX NUMBER: 1255 Roberts Blvd, suite 200 Kennesaw, GA 30144
REPORT TO: Brian Jacobson
CC:
REQUESTED COMPLETION DATE: STD.
PO #:
PROJECT NAME/STATE: General Chemical - East Point, GA
PROJECT #: GR5060

ANALYSIS REQUESTED

DATE	TIME	MATRIX CODE*	COMP GRAB	SAMPLE IDENTIFICATION	# of containers	Solids 9056	Aluminum 6010	REMARKS/ADDITIONAL INFORMATION
9/16/13	1000	GW	X	DB-01-0913	2	X	X	1 Sampled by WM
9/16/13	1135	GW	X	DB-05-0913	2	X	X	2
9/16/13	1325	GW	X	PZ-07-0913	2	X	X	3
9/16/13	1435	GW	X	DB-02-0913	2	X	X	4
9/16/13	1535	GW	X	DB-03-0913	2	X	X	5
9/16/13	1630	GW	X	DB-04-0913	2	X	X	6
9/16/13	1335	GW	X	DUP-1-0913	2	X	X	7 Sampled by WM

CONTAINER TYPE: A - AMBER GLASS; B - CLEAR GLASS; I - VOA VIAL; D - STERILE; N - OTHER

PRESERVATION: 1 - HCl, 4°; 2 - H2SO4, 4°; 3 - HNO3, 4°; 4 - NaOH, 4°; 5 - NaOH/ZnAc, 4°; 6 - Na2S2O3, 4°; 7 - 4°

*MATRIX CODES: DW - DRINKING WATER; WW - WASTEWATER; GW - GROUNDWATER; SW - SURFACE WATER; ST - STORM WATER; W - WATER; S - SOIL; SL - SLUDGE; SD - SOLID; A - AIR; L - LIQUID; P - PRODUCT

SAMPLED BY AND TITLE: Will McGuire (WM) — DATE/TIME: 9/17/13 1130
RELINQUISHED BY: RD P. M. — DATE/TIME: 9/17/13 1130
RECEIVED BY: — DATE/TIME:
RELINQUISHED BY: — DATE/TIME:
RECEIVED BY LAB: — DATE/TIME: 09/18/13 0930
SAMPLE SHIPPED VIA: UPS FED-EX COURIER CLIENT OTHER:
Temperature: 2°C
Custody Seal: Intact Broken Missing
Cooler #
Labeled Preserved Iced: Yes or No
Please use Black Ink to complete form.

FOR LAB USE ONLY
LAB #: A0A0479
In-house location: 059
Entered into LIMS: MK

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110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

LOG-IN CHECKLIST **Printed: 10/2/2013 2:22:07PM**

Attn: Mr. Brian Jacobson

Client: Geosyntec Consultants Inc.
Project: General Chemical
Date Received: 09/18/13 09:30

Work Order: AWI0479
Logged In By: Mohammad M. Rahman

OBSERVATIONS

#Samples: 7 **#Containers:** 14

Minimum Temp(C): 2.0 **Maximum Temp(C):** 2.0 **Custody Seal(s) Used:** Yes

CHECKLIST ITEMS

COC included with Samples	YES
Sample Container(s) Intact	YES
Chain of Custody Complete	YES
Sample Container(s) Match COC	YES
Custody seal Intact	YES
Temperature in Compliance	YES
Sufficient Sample Volume for Analysis	YES
Zero Headspace Maintained for VOA Analyses	YES
Samples labeled preserved (If Applicable)	YES
Samples received within Allowable Hold Times	YES
Samples Received on Ice	YES
Preservation Confirmed	YES

Comments:

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Laboratory Report

Prepared For:

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw, GA 30144

Attention: Mr. Brian Jacobson

Report Number: AWJ0333
October 10, 2013
Project: General Chemical
Project #:GR5060.2013

We appreciate the opportunity to provide the analytical support for your project. The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Approved:

Project Manager

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Analytical Services, Inc. certifies that the following analytical results meet all requirements of the National Environmental Laboratory Accreditation Conference(NELAC).
All test results relate only to the samples analyzed.

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Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 10, 2013

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DB-05-02	AWJ0333-01	Ground Water	10/09/13 09:15	10/09/13 10:25

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October 10, 2013

Report No.: AWJ0333
Client ID: DB-05-02
Date/Time Sampled: 10/9/2013 9:15:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWJ0333-01
Date/Time Received: 10/9/2013 10:25:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	1000	250	mg/L	EPA 9056A		50	10/10/13 12:38	10/10/13 12:38	3100253	MZP
Metals, Total										
Aluminum	122	0.100	mg/L	EPA 6010C		1	10/09/13 11:00	10/09/13 15:21	3100177	FBS

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Attention: Mr. Brian Jacobson

October 10, 2013

Report No.: AWJ0333

Inorganic Anions - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3100253 - EPA 9056A										
Blank (3100253-BLK1)					Prepared & Analyzed: 10/10/13					
Sulfate	ND	5.0	mg/L							
LCS (3100253-BS1)					Prepared & Analyzed: 10/10/13					
Sulfate	9.91	5.0	mg/L	10.000		99	90-110			
Matrix Spike (3100253-MS1)		**Source: AWJ0338-08**			Prepared & Analyzed: 10/10/13					
Sulfate	11.6	5.0	mg/L	10.000	ND	116	90-110			QM-05
Matrix Spike (3100253-MS2)		**Source: AWJ0105-41**			Prepared & Analyzed: 10/10/13					
Sulfate	12.8	5.0	mg/L	10.000	ND	128	90-110			QM-05
Matrix Spike Dup (3100253-MSD1)		**Source: AWJ0338-08**			Prepared & Analyzed: 10/10/13					
Sulfate	11.6	5.0	mg/L	10.000	ND	116	90-110	0.4	15	QM-05

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Attention: Mr. Brian Jacobson

October 10, 2013

Report No.: AWJ0333

Metals, Total - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3100177 - EPA 3010A										
Blank (3100177-BLK1)					Prepared & Analyzed: 10/09/13					
Aluminum	ND	0.100	mg/L							
LCS (3100177-BS1)					Prepared & Analyzed: 10/09/13					
Aluminum	1.04	0.100	mg/L	1.0000		104	80-120			
Matrix Spike (3100177-MS1)		**Source: AWJ0333-01**			Prepared & Analyzed: 10/09/13					
Aluminum	126	0.100	mg/L	1.0000	122	389	75-125			QM-02
Matrix Spike Dup (3100177-MSD1)		**Source: AWJ0333-01**			Prepared & Analyzed: 10/09/13					
Aluminum	122	0.100	mg/L	1.0000	122	0.2	75-125	3	20	QM-02
Post Spike (3100177-PS1)		**Source: AWJ0333-01**			Prepared & Analyzed: 10/09/13					
Aluminum	127		mg/L	1.0000	122	440	80-120			QM-02

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October 10, 2013

Laboratory Certifications

Code	Description	Number	Expires
LA	Louisiana	02069	06/30/2014
NC	North Carolina	381	12/31/2013
NELAC	FL DOH (Non-Pot. Water, Solids) Eff:: 07/01/2012	E87315	06/30/2014
SC	South Carolina	98011001	06/30/2014
TX	Texas	T104704397-08-TX	03/31/2014
VA	Virginia	1340	12/14/2013

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October 10, 2013

Legend

Definition of Laboratory Terms

ND - None Detected at the Reporting Limit
TIC - Tentatively Identified Compound
CFU - Colony Forming Units
SOP - Method run per ASI Standard Operating Procedure
RL - Reporting Limit
DF - Dilution Factor
***** - Analyte not included in the NELAC list of certified analytes.

Sample Information

N-Nitrosodiphenylamine breaks down to diphenylamine in the GCMS; both analytes are reported as N-Nitrososdiphenylamine. ASI is not NELAC certified for diphenylamine.

Phthalic acid and phthalic anhydride are reported as dimethyl phthalate

Maleic acid and maleic anhydride are reported as dimethyl malate

1,2-Diphenylhydrazine breaks down to azobenzene in the GCMS; both analytes are reported as azobenzene

Definition of Qualifiers

QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD and/or PDS due to suspected matrix interference. Sample results for the QC batch were accepted based on acceptable LCS recoveries.

QM-02 The spike recovery is outside acceptance limits due to insignificant spike amount as compared to sample concentration.

Note: Unless otherwise noted, all results are reported on an as received basis.

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Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 10, 2013

CSX TRANSPORTATION

CHAIN OF CUSTODY

LABORATORY INFORMATION

☐ TestAmerica Savannah - 5102 LaRoche Avenue, Savannah, GA 31404 P: 912-354-7858 F: 912-352-0165
☐ TestAmerica North Canton - 4101 Shuffel Drive NW, North Canton, OH 44720 P: 330-497-9396 F: 330-497-0772
☐ TestAmerica Tampa - 6712 Benjamin Road, Suite 100, Tampa, FL 33634 P: 813-885-7427 F: 813-885-7049
☐ TestAmerica Pensacola 3355 McLemore Drive, Pensacola, FL 32514 P: 850-474-1001 F: 850-478-5571
☐ TestAmerica Buffalo - 10 Hazelwood Drive, Suite 106, Amherst, NY 14228 P: 716-691-2600 F: 716-691-7991
☐ TestAmerica Chicago - 2417 Bond Street, University Park, IL 60466 P: 708-534-5200 F: 708-534-5211

COC #

SHIPMENT INFORMATION
Shipment Method:
Shipment Tracking No:

CSXT PROJECT INFORMATION
CSXT Project Number: —
CSXT Project Name: General Chemical
CSXT Contact: —
Proj. State (State of Origin): GA
Proj. City: —
LVION: —

CONSULTANT INFORMATION
Project #: GR5060.2013
PM: Brian Jacobson
Company: Geosyntec
Address: 1255 Roberts Blvd
City, State, Zip: Kennesaw GA
Email: bjacobson@geosyntec.com
Phone: 678.264.3900 Fax: 678.264.3901

Turnaround Time:
☒ 1 Day Rush
☐ 2 Day Rush
☐ 3 Day Rush
☐ Standard 6-13 Days
Specify # Days
☐ Standard 14 Days
☐ Other

Preservative Codes:
0 = No Preservatives
1 = Hydrochloric Acid
2 = Nitric Acid
3 = Sulfuric Acid
4 = Sodium Thiosulfate
5 = Sodium Hydroxide
6 = Other

Deliverables:
☐ CSXT Standard (Level II)
☐ Level III
☐ Level IV
☐ Other Deliv:
☐ EDD Required, Format:

Matrix Codes:
GW = Groundwater
WW = Waste Water
SW = Surface Water
SO = Soil
SL = Sludge
OI = Oil
SOL = Other Solid
LIQ = Liquid

SAMPLE INFORMATION

METHODS FOR ANALYSIS: Aluminum (6010) Zn (6020)

Sample Identification	Containers Number & Type	Sample Collection Date	Time	Sampler	Filtered Y or N	Type Comp or Grab	Matrix Code	Note ➡ 0 2 Pres. Code	COMMENTS	LAB USE
DB-05-02	2	10/9/13	9:15	JT	N	Grab	GW	1 1	AA70333 Clay Dotty MR	1

Relinquished By: [signature] Date/Time: 10/9/13 10:20 Received By:
Relinquished By: Date/Time: Received By:
Relinquished By: Date/Time: Received By:
Received By Laboratory: Date/Time: Lab Remarks:

Date/Time: Received By:
Date/Time: Received By:
Date/Time: Received By:

Comments & Special Analytical Requirements: Friedman 10/09/13 1025 No ice, 19°C, No seal UP client.

LAB USE: Custody Intact ☐ Yes ☐ No
Custody Seal # #
LAB Log Number #

ORIGINAL - RETURN TO LABORATORY WITH SAMPLES
INVOICE MUST BE SUBMITTED TO CSXT WITH ORIGINAL COC
TAL-6006 (0509)

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LOG-IN CHECKLIST **Printed: 10/10/2013 3:13:53PM**

Attn: Mr. Brian Jacobson

Client: Geosyntec Consultants Inc.
Project: General Chemical
Date Received: 10/09/13 10:25

Work Order: AWJ0333
Logged In By: Mohammad M. Rahman

OBSERVATIONS

#Samples: 1 **#Containers:** 3

Minimum Temp(C): 19.0 **Maximum Temp(C):** 19.0 **Custody Seal(s) Used:** No

CHECKLIST ITEMS

COC included with Samples	YES
Sample Container(s) Intact	YES
Chain of Custody Complete	YES
Sample Container(s) Match COC	YES
Custody seal Intact	NO
Temperature in Compliance	NO
Sufficient Sample Volume for Analysis	YES
Zero Headspace Maintained for VOA Analyses	YES
Samples labeled preserved (If Applicable)	YES
Samples received within Allowable Hold Times	YES
Samples Received on Ice	NO
Preservation Confirmed	YES

Comments:

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Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Prepared For:

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw, GA 30144

Attention: Mr. Brian Jacobson

Report Number: AWJ0779
October 28, 2013
Project: General Chemical
Project #:GR5060.2013

We appreciate the opportunity to provide the analytical support for your project. The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Approved:

Project Manager

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All test results relate only to the samples analyzed.

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Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 28, 2013

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DB-06	AWJ0779-01	Ground Water	10/22/13 09:40	10/24/13 09:30

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Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 28, 2013

Report No.: AWJ0779
Client ID: DB-06
Date/Time Sampled: 10/22/2013 9:40:00AM
Matrix: Ground Water

Project: General Chemical
Lab Number ID: AWJ0779-01
Date/Time Received: 10/24/2013 9:30:00AM

Analyte	Result	RL	Units	Method	Qual.	DF	Preparation Date	Analytical Date	Batch	Init.
Inorganic Anions										
Sulfate	ND	5.0	mg/L	EPA 9056A		1	10/26/13 1:51	10/26/13 1:51	3100696	MZP
Metals, Total										
Aluminum	10.1	0.100	mg/L	EPA 6010C		1	10/25/13 8:45	10/25/13 15:07	3100656	FBS

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Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 28, 2013

Report No.: AWJ0779

Inorganic Anions - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3100696 - EPA 9056A										
Blank (3100696-BLK1)					Prepared & Analyzed: 10/24/13					
Sulfate	ND	5.0	mg/L							
LCS (3100696-BS1)					Prepared & Analyzed: 10/24/13					
Sulfate	9.74	5.0	mg/L	10.000		97	90-110			
Matrix Spike (3100696-MS1)		**Source: AWJ0779-01RE1**			Prepared & Analyzed: 10/26/13					
Sulfate	13.7	5.0	mg/L	10.000	ND	137	90-110			QM-05
Matrix Spike Dup (3100696-MSD1)		**Source: AWJ0779-01RE1**			Prepared & Analyzed: 10/26/13					
Sulfate	13.0	5.0	mg/L	10.000	ND	130	90-110	5	15	QM-05

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Attention: Mr. Brian Jacobson

October 28, 2013

Report No.: AWJ0779

Metals, Total - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 3100656 - EPA 3010A										
Blank (3100656-BLK1)					Prepared & Analyzed: 10/25/13					
Aluminum	ND	0.100	mg/L							
LCS (3100656-BS1)					Prepared & Analyzed: 10/25/13					
Aluminum	0.982	0.100	mg/L	1.0000		98	80-120			
Matrix Spike (3100656-MS1)		**Source: AWJ0779-01**			Prepared & Analyzed: 10/25/13					
Aluminum	9.05	0.100	mg/L	1.0000	10.1	0	75-125			QM-02
Matrix Spike Dup (3100656-MSD1)		**Source: AWJ0779-01**			Prepared & Analyzed: 10/25/13					
Aluminum	11.1	0.100	mg/L	1.0000	10.1	100	75-125	20	20	
Post Spike (3100656-PS1)		**Source: AWJ0779-01**			Prepared & Analyzed: 10/25/13					
Aluminum	8.84		mg/L	1.0000	10.1	0	80-120			QM-02

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Attention: Mr. Brian Jacobson

October 28, 2013

Laboratory Certifications

Code	Description	Number	Expires
LA	Louisiana	02069	06/30/2014
NC	North Carolina	381	12/31/2013
NELAC	FL DOH (Non-Pot. Water, Solids) Eff:: 07/01/2013	E87315	06/30/2014
SC	South Carolina	98011001	06/30/2014
TX	Texas	T104704397-08-TX	03/31/2014
VA	Virginia	1340	12/14/2013

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Attention: Mr. Brian Jacobson

October 28, 2013

Legend

Definition of Laboratory Terms

ND - None Detected at the Reporting Limit
TIC - Tentatively Identified Compound
CFU - Colony Forming Units
SOP - Method run per ASI Standard Operating Procedure
RL - Reporting Limit
DF - Dilution Factor
***** - Analyte not included in the NELAC list of certified analytes.

Sample Information

N-Nitrosodiphenylamine breaks down to diphenylamine in the GCMS; both analytes are reported as N-Nitrososdiphenylamine. ASI is not NELAC certified for diphenylamine.

Phthalic acid and phthalic anhydride are reported as dimethyl phthalate

Maleic acid and maleic anhydride are reported as dimethyl malate

1,2-Diphenylhydrazine breaks down to azobenzene in the GCMS; both analytes are reported as azobenzene

Definition of Qualifiers

QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD and/or PDS due to suspected matrix interference. Sample results for the QC batch were accepted based on acceptable LCS recoveries.

QM-02 The spike recovery is outside acceptance limits due to insignificant spike amount as compared to sample concentration.

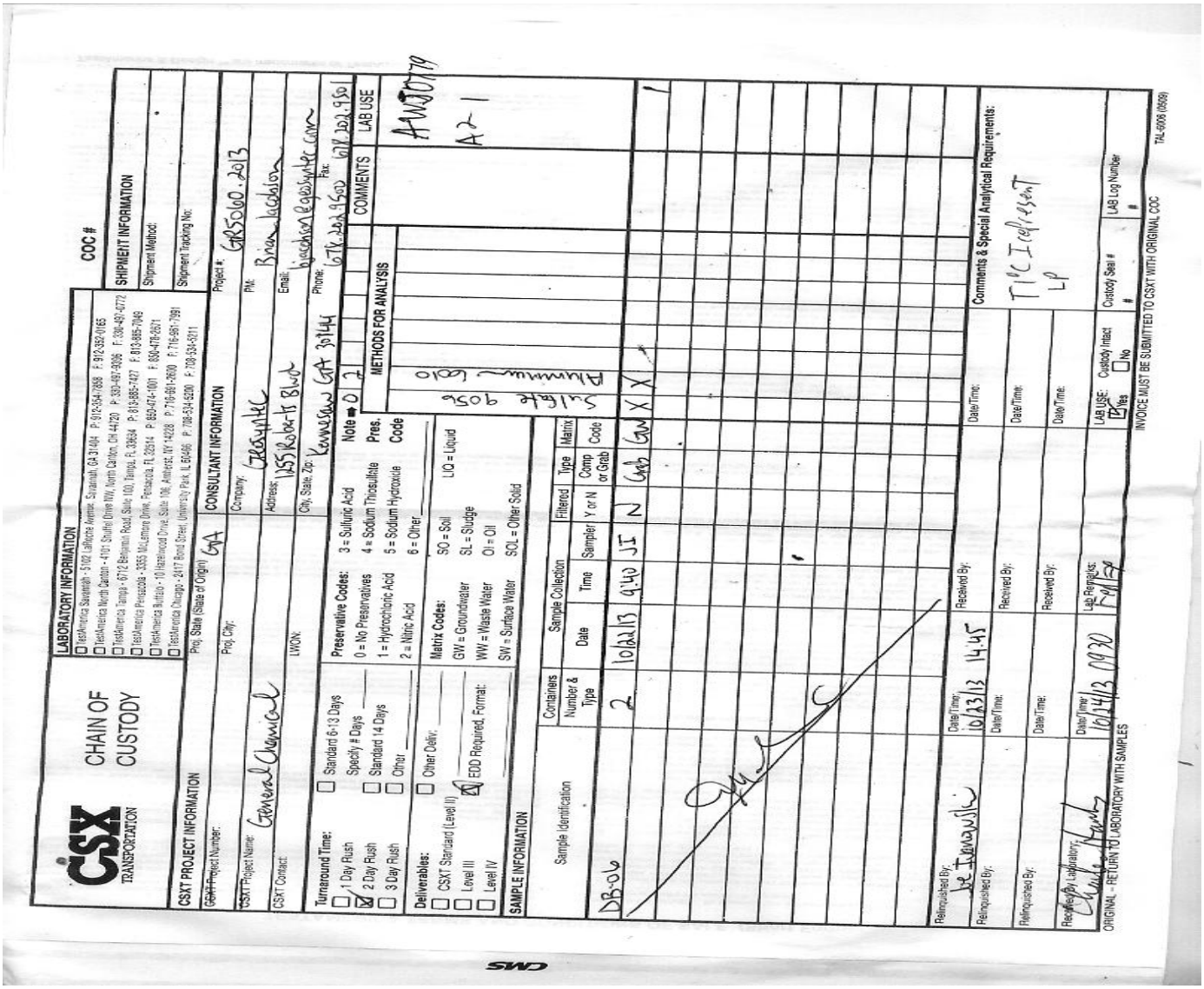
Note: Unless otherwise noted, all results are reported on an as received basis.

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Geosyntec Consultants Inc.
1255 Roberts Blvd N.W.
Kennesaw GA, 30144
Attention: Mr. Brian Jacobson

October 28, 2013



CSX TRANSPORTATION — CHAIN OF CUSTODY — COC #

LABORATORY INFORMATION
☐ TestAmerica Savannah - 5102 LaRoche Avenue, Savannah, GA 31404 P: 912-354-7858 F: 912-352-0165
☐ TestAmerica North Canton - 4101 Shuffel Drive NW, North Canton, OH 44720 P: 330-497-9396 F: 330-497-0772
☐ TestAmerica Tampa - 6712 Benjamin Road, Suite 100, Tampa, FL 33634 P: 813-885-7427 F: 813-885-7049
☐ TestAmerica Pensacola - 3355 McLemore Drive, Pensacola, FL 32514 P: 850-474-1001 F: 850-478-0571
☐ TestAmerica Buffalo - 10 Hazelwood Drive, Suite 106, Amherst, NY 14228 P: 716-691-2600 F: 716-691-7991
☐ TestAmerica Chicago - 2417 Bond Street, University Park, IL 60466 P: 708-534-5200 F: 708-534-5211

SHIPMENT INFORMATION
Shipment Method:
Shipment Tracking No:

CSXT PROJECT INFORMATION
CSXT Project Number:
Proj. State (State of Origin): GA
Proj. City:
CSXT Project Name: General Chemical
CSXT Contact:
LWON:

CONSULTANT INFORMATION
Project #: GR5060.2013
Company: Geosyntec
PM: Brian Jacobson
Address: 1255 Roberts Blvd
Email: bjacobson@geosyntec.com
City, State, Zip: Kennesaw GA 30144
Phone: 678.202.9561 Fax: 678.202.9561

Turnaround Time:
☐ Standard 6-13 Days
☐ 1 Day Rush — Specify # Days
☒ 2 Day Rush
☐ Standard 14 Days
☐ 3 Day Rush
☐ Other

Preservative Codes:
0 = No Preservatives
1 = Hydrochloric Acid
2 = Nitric Acid
3 = Sulfuric Acid
4 = Sodium Thiosulfate
5 = Sodium Hydroxide
6 = Other

Note ➡ 0 2

Deliverables:
☐ Other Deliv:
☐ CSXT Standard (Level II)
☐ Level III
☐ Level IV
☒ EDD Required, Format:

Matrix Codes:
SO = Soil
LIQ = Liquid
GW = Groundwater
SL = Sludge
WW = Waste Water
OI = Oil
SW = Surface Water
SOL = Other Solid

SAMPLE INFORMATION

Sample Identification	Containers Number & Type	Sample Collection Date	Time	Sampler	Filtered Y or N	Type Comp or Grab	Matrix Code	METHODS FOR ANALYSIS: Sulfide 9056	Aluminum 6010	COMMENTS	LAB USE
DB-06	2	10/23/13	9:40	JT	N	Grab	GW	X	X		A2-1

Relinquished By: Joe Tomanski — Date/Time: 10/23/13 14:45 — Received By:
Relinquished By: — Date/Time: — Received By:
Relinquished By: — Date/Time: — Received By:
Received By Laboratory: — Date/Time: 10/24/13 0930 — Lab Remarks: TMP

Comments & Special Analytical Requirements: TICI (all present) LP

LAB USE: Custody Intact ☒ Yes ☐ No — Custody Seal # — LAB Log Number

ORIGINAL - RETURN TO LABORATORY WITH SAMPLES — INVOICE MUST BE SUBMITTED TO CSXT WITH ORIGINAL COC — TAL-6008 (8/09)

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway, Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

LOG-IN CHECKLIST **Printed: 10/28/2013 4:20:26PM**

Attn: Mr. Brian Jacobson

Client: Geosyntec Consultants Inc.
Project: General Chemical
Date Received: 10/24/13 09:30

Work Order: AWJ0779
Logged In By: Charles Hawks

OBSERVATIONS

#Samples: 1 **#Containers:** 2

Minimum Temp(C): 1.0 **Maximum Temp(C):** 1.0 **Custody Seal(s) Used:** Yes

CHECKLIST ITEMS

COC included with Samples	YES
Sample Container(s) Intact	YES
Chain of Custody Complete	YES
Sample Container(s) Match COC	YES
Custody seal Intact	YES
Temperature in Compliance	YES
Sufficient Sample Volume for Analysis	YES
Zero Headspace Maintained for VOA Analyses	YES
Samples labeled preserved (If Applicable)	YES
Samples received within Allowable Hold Times	YES
Samples Received on Ice	YES
Preservation Confirmed	YES

Comments:

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:
Monitoring Well: DB-01 Sampling Date: 9/16/13
Sample ID: DB-01 - 0913 Sampler: umcbryde

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
0918	X				—	—	—	—	—	—	light orange
0920		X			20.36	4.37	0.217	219	—	2.77	light orange
0925		X			20.41	4.55	0.210	200	—	1.88	light orange
0930		X			20.46	4.57	0.209	198	—	1.84	clear
0935		X			20.49	4.58	0.208	197	—	1.87	clear
0940		X			20.51	4.60	0.206	195	—	1.81	clear
0945		X			20.52	4.62	0.209	193	—	1.79	clear
0950		X			20.54	4.62	0.206	189	—	1.79	clear
0955		X			20.50	4.61	0.206	187	—	1.79	clear
1000			X	X	—	—	—	—	—	—	—
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Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
DB-01 - 0913	1 QT Plastic Sqwt - sulfate
DB-01 - 0913	500 mL HDPE (HNO_3) - metals AL
—	—

Miscellaneous

Initial Depth to Water: 9.86 ft
Final Depth to Water: 10.12 ft
Total Purge Volume: ~5 gal
Pump Rate: 500 ml/min ~~gpm~~

Weather: Warm, sunny, ~74°F

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Stick up height 3.46' above ground surface (ags)
Total well depth 25.16' below top of casing (btoc)
Turbidity equipment not working, no measurements taken.
$\pi (0.042)^2 (15.3) = 0.085$ cu. ft. (1 vol.)

Product detected at 9.85' btoc.

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:
Monitoring Well: DB-02 Sampling Date: 9/16/13
Sample ID: DB-02-0913 Sampler: [illegible]

Time	Start Purge	Readings	Start Samp	End Samp	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
1347	X				—	—	—	—	—	—	light brown orange
1350		X			24.06	4.99	0.600	174	541	14.58	light brown orange
1355		X			23.56	4.83	0.565	194	324	8.68	light brown orange
1400		X			22.49	4.61	0.531	227	256	5.64	light brown
1405		X			21.90	4.56	0.537	241	155	5.39	clear / light brown
1410		X			21.07	4.51	0.544	252	115	5.25	clear
1415		X			20.86	4.47	0.554	258	96.2	5.03	clear
1420		X			20.79	4.45	0.555	260	65.7	4.90	clear
1425		X			20.48	4.44	0.556	265	34.5	4.54	clear
1430		X			20.53	4.46	0.556	266	21.9	4.27	clear
1435			X	X	—	—	—	—	—	—	—
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Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
DB-02-0913	1 QT Plastic Squat - sulfate
DB-02-0913	500 mL HDPE - HNO3 - metals AL
—	—

Miscellaneous

Initial Depth to Water: 12.03 ft
Final Depth to Water: 12.22 ft
Total Purge Volume: ≈ 5 gal
Pump Rate: 400 mL/min ~~gpm~~

Weather: warm, sunny, light breeze, ~85°F

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

stick up height - 4.5"
total depth 25.14' btoc

$\pi (0.042)^2 (13.11) = 0.073$ cu. ft (1 vol.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:
Monitoring Well: DB-03 Sampling Date: 9/16/13
Sample ID: DB-03 - 0913 Sampler: Wmcbryde

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
1457	X				—	—	—	—	—	—	white orange
1500		X			20.55	5.16	0.333	218	708	4.09	white orange
1505		X			20.01	5.12	0.237	221	283	3.42	white clear
1510		X			19.84	5.08	0.225	225	153	3.36	clear
1515		X			19.61	5.05	0.229	233	120	3.05	clear
1520		X			19.47	5.05	0.232	232	66.2	2.85	clear
1525		X			19.43	5.06	0.232	232	57.5	2.79	clear
1530		X			19.38	5.06	0.232	237	32.1	2.80	clear
1535			X	X	—	—	—	—	—	—	—
—											
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Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
DB-03-0913	1 qt Plastic Sediment - Sulfate
DB-03-0913	500 mL HDPE - HNO3 - metals AL
—	—

Miscellaneous

Initial Depth to Water: 10.35 ft
Final Depth to Water: 11.24 ft
Total Purge Volume: ~4 gal
Pump Rate: ~~450 ml/min gpm~~

Weather: Sunny, warm, light breeze, ~84°F

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Stick up height ~3.5"
total depth 20.15' btoc

$\pi (0.042)^2 (9.8) = 0.05$ cu.ft. (1 vol.)

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:
Monitoring Well: DB-04 Sampling Date: 9/16/13
Sample ID: DB-04-0913 Sampler: Wnebryde (WW)

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
1543	X				—	—	—	—	—	—	—
1545		X			23.11	6.04	0.409	-63	905	3.25	light grey/black
1550		X			23.02	6.09	0.438	-76	682	2.68	light grey/black
1555		X			22.68	6.22	0.515	-111	519	1.44	light grey/black
1600		X			22.69	6.23	0.526	-115	241	0.84	light grey
1605		X			22.64	6.28	0.544	-122	241	0.46	light grey
1610		X			22.59	6.31	0.552	-125	191	0.42	clear
1615		X			22.54	6.27	0.553	-124	189	0.24	clear
1620		X			22.38	6.27	0.552	-126	143	0.17	clear
1625		X			22.30	6.28	0.552	-127	145	0.17	clear
1630			X	X	—	—	—	—	—	—	—
—											
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Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
DB-04-0913	1 Qt Plastic Squirt - sulfate
DB-04-0913	500mL HDPE HNO3 metals AL
—	—

Miscellaneous

Initial Depth to Water: 13.90 ft
Final Depth to Water: 14.46 ft
Total Purge Volume: ~5 gal
Pump Rate: 450ml/min ~~gpm~~

Weather: Sunny, warm, light breeze, ~83°C

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

stick up height 3"
total well depth 25.16' btoc
~~(WW) Product at 13.89' btoc~~
$\pi (0.042)^2 (\quad) = \quad$ cuft (1 vol.)

Product detected at 13.89' btoc. (Pre)
" " " 14.45' btoc. (Post)
Diesel smell noted from purge water, sheen present.
Purge water discharged to drum at Gen Chem.
Drum labeled purge water 9/13/13 and 9/16/13.

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:

Monitoring Well: DB-05 Sampling Date: 09/16/13

Sample ID: DB-05-0913 Sampler: WMcBride (WM)

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
1053	X				—	—	—	—	—	—	brownish orange
1055		X			22.49	4.06	1.36	267	152	2.64	brownish orange
1100		X			21.89	4.13	1.47	305	139	0.47	light orange
1105		X			21.89	4.10	1.47	306	118	0.43	clear
1110		X			21.87	4.07	1.48	320	104	0.23	clear
1115		X			22.03	4.04	1.49	362	94.6	0.00	clear
1120		X			22.12	4.03	1.48	371	89.6	0.00	clear
1125		X			22.21	4.03	1.48	374	88.3	0.00	clear
1130		X	(WM)		22.26	4.04	1.48	376	80.9	0.00	clear
1135			X	X	—	—	—	—	—	—	—
—											
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Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
DB-05-0913	1qt Plastic Squat - sulfate
DB-05-0913	500mL HDPE-HNO_3 - metals AL
—	—

Miscellaneous

Initial Depth to Water: 11.62 ft

Final Depth to Water: 11.80 ft

Total Purge Volume: ~5 gal

Pump Rate: 450ml/min ~~2 gpm~~

Weather: Sunny, warm ~ 84°F

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

stick up height 4.4"

Total well depth 30.15' btoc

Horiba fixed. Turbidity measured.

$\pi (0.042)^2 (18.53) = 0.103$ cu.ft. (1 vol)

Location Glen Cheam Date 10/9/13

Project / Client

DB-05 - resample

Time	Temp	pH	ORP	mS/cm	Turb	DO
08:10	16.42	4.22	334	1.86	69.3	1.55
08:30	17.28	4.26	359	1.68	21.7	0.28
08:45	17.60	4.23	366	1.66	5.01	0.00
08:55	17.69	4.24	361	1.64	2.14	0.00
09:10	18.08	4.22	360	1.62	2.09	0.00
09:15	18.10	4.23	361	1.63	0.87	0.00

Final DTW = 13.80 btoc 11.53 btoc = static DTW

Pumping rate = 0.165 gpm

Location Gen Chem Date 10/22/13

Project / Client

Scale

DB-06

Time	Temp	pH	ORP	mS/cm	Turb	DO
8:35	19.93	5.72	194	0.116	95	1.97
8:45	20.28	5.65	207	0.114	50.4	2.04
8:50	20.19	5.61	189	0.112	55.2	1.06
8:55	19.96	5.66	153	0.110	50.4	0.12
9:05	19.80	5.68	139	0.109	48.2	0.00
9:15	19.64	5.65	116	0.108	46.3	0.00
9:25	19.48	5.69	94	0.107	40.8	0.00
9:35	19.46	5.67	90	0.106	46.2	0.00
9:40	19.39	5.66	94	0.106	43.7	0.00

Final DTW: 22.06 btoc

Geosyntec consultants

Ground Water Parameters for Low-Flow Sampling

Site: General Chemical - East Point Project No.:

Monitoring Well: P2-07 Sampling Date: 09/16/13

Sample ID: P2-07-0913 Sampler: WMcBride

DUP-01-0913 taken here.

Time	Start Purge	Readings	Start Samp.	End Samp.	Temperature (°C)	pH	Conductivity (mS/cm)	Redox Potential (± mv)	Turbidity (NTU)	DO (mg/L)	Appearance of Water
1227	X				—	—	—	—	—	—	Brown, thick, sediment
1230		X			23.04	6.07	1.06	28	643	2.61	Brown, thick, sediment
1235		X			22.78	6.04	1.05	23	240	1.94	Brown with sediment
1240		X			21.96	5.85	1.05	33	133	0.50	Brown with sediment
1245		X			21.25	5.50	1.07	72	112	0.13	light brown
1250		X			21.06	5.38	1.08	107	107	0.17	light brown
1300		X			21.21	5.42	1.09	124	90.5	0.18	light brown
1305		X			21.30	5.44	1.08	130	87.6	0.17	clear/light brown
1310		X			21.37	5.48	1.08	138	74.4	0.18	clear/light brown
1315		X			21.37	5.47	1.08	140	77.6	0.17	clear/light brown
1320		X			21.52	5.48	1.08	145	69.1	0.15	clear/light brown
1325			X	X	—	—	—	—	—	—	—
—											
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—											

Split, Blank, Duplicate, & Filtered Samples

Sample ID	Description
P2-07-0913	1qt Plastic Squat - Sulfate
P2-07-0913	500mL HDPE - HNO3 - Metals AL
—	—

Miscellaneous

Initial Depth to Water: 9.93 ft

Final Depth to Water: 11.13 ft

Total Purge Volume: ~5 gal

Pump Rate: 400ml/min ~~gpm~~

Weather: hot, sunny, ~85°F

Notes: (well condition, nearby activities or changes in land use, odors, problems, deviations from plan, etc.)

Stick up Height 0.0"

Total Depth 17.45' btoc. / Total depth after sampling 19.06' btoc

Joint in PVC ~10' bgs is hard to get tubing past.

$\pi (0.042)^2 (7.62) = 0.042$ cu. ft. (1vol)

PROFESSIONAL ENGINEER CERTIFICATION

I certify that I am a qualified engineer who has received a baccalaureate or post-graduate degree in the natural science or engineering, and have sufficient training and experience in environmental assessment and corrective measures, as demonstrated by state registration and completion of accredited university courses, that enable me to make sound professional judgments. I further certify that this report was prepared by myself or by a subordinate working under my direction.

12/26/13

Brian D. Jacobson, P.E.
Registered Professional Engineer
Georgia Registration #23332

GEORGIA REGISTERED NO. 23332 PROFESSIONAL ENGINEER BRIAN D. JACOBSON