

Response to City Questions Regarding Exide Site Closure

Property:

**Former Operating Plant
7471 South 5th Street
Frisco, Collin County, Texas**

Prepared for:

**City of Frisco
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Attention: Mr. Kerry Russell**

Prepared by:

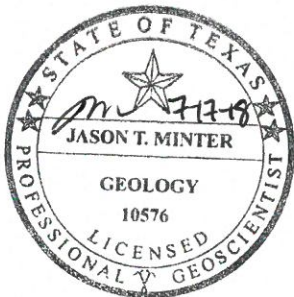



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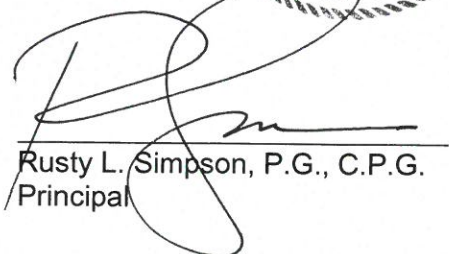
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July 17, 2018




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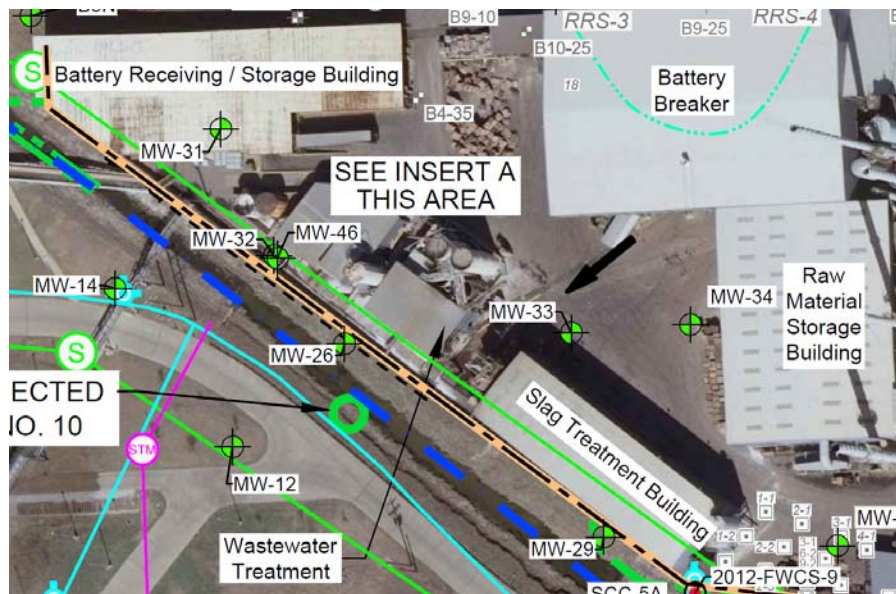
July 2018 Apex, Titan, Inc. Response to City Questions Regarding Exide Site Closure

1. *Is it likely Pb in the old landfills will transfer into the groundwater?*

Review of groundwater data collected during affected property assessment activities indicates that dissolved lead concentrations beneath the FOP are already present in groundwater. Since only perimeter wells are located near the landfills, the concentrations of COCs are unknown; therefore, dissolved lead could be released or migrate from buried waste present in landfill areas. In addition, the geochemical conditions within the landfills will likely change following capping which could change geochemical conditions and increase leaching.

Shallow monitoring wells installed within the “perched zone” of the former FOP near the Slag Treatment Building (MW-33) and the Raw Material Storage Building (MW-34), indicate dissolved lead concentrations above the critical PCL (^{GW}PCL (0.015 mg/L)) during the latest groundwater sampling event in February 2014. Each of these wells was screened from 2.5-5 feet bgs.

Dissolved lead was detected above the critical PCL in the initial groundwater sample collected in monitoring well MW-46 in January 2014; however, groundwater samples collected in February and March 2014 did not indicate dissolved lead above the critical PCL. MW-46 is located within the former FOP adjacent to one of the “perched zone” wells (MW-32) and screened within the uppermost GWBU (10-20 feet bgs) to evaluate potential hydraulic connectivity between the two zones and the potential of the shallow zone to discharge to Stewart Creek. Note that dissolved lead was detected above the critical PCL in shallow monitoring well MW-32 during the February 2014 groundwater sampling event. Below is a portion of Figure 1B.1 from Exide’s May 22, 2014 APAR showing the locations of the above monitoring wells.



Cook-Joyce, Inc. (CJI) noted in a letter to Russell & Rodriguez, LLP, dated July 15, 2014, that “SPLP data presented in the revised FOP APAR suggests that lead and cadmium will leach at concentrations above critical PCLs when in moderately acidic conditions. This

may be why there was a groundwater lead exceedance in MW-46 – one of the two most acidic pH measurements obtained at the Site came from that monitoring well. The City's technical consultants suggest that the FOP's groundwater chemistry be more thoroughly evaluated, particularly in the area adjacent to and downgradient from the brick lined trenches, acid recovery pits, and other processes involving acid collection and treatment in the battery breaker building and the wastewater treatment plant. This information will also allow the establishment of a Site baseline and aid in the eventual design of control, recovery, and/or in-situ treatment methods and materials at the FOP." No additional assessment to address this comment has been conducted since this statement.

2. *Is contaminated groundwater likely to move from the Exide site into Stewart Creek?*

Exide installed a French Drain in November 2012 to an approximate depth of four feet below grade surface (bgs) in an effort to drain any water collecting behind the flood wall and eliminate seepage through the flood wall. The system was installed along the flood wall to transfer water to a sump where it is collected and transferred to the Storm Water Retention Pond. Exide previously stated that "when the French Drain is in operation, it appears to be effective in preventing seepage through the wall and effective in collecting and conveying the shallow perched water from the zone of saturated, shallow fill behind the Flood Wall to the collection sump."

Based on Apex, Titan, Inc. (Apex's) Draft Comments to the Affected Property Assessment Report (APAR) for the Frisco Recycling Center Former Operating Plant dated May 22, 2014, Apex stated:

- "The French Drain is insufficient in preventing discharges of all contaminated groundwater to Stewart Creek based on the limited extent (vertical and lateral) of the system. Additional measures should be taken to prevent contaminated groundwater from entering Stewart Creek."

TCEQ requested quarterly reports in a comments letter to the 2014 APAR dated May 5, 2015. The quarterly reports were requested to document the "performance of the system, gallons of water intercepted, concentrations of contaminants in the water, the presence and/or absence of leakage along the flood wall and into Stewart Creek, the presence or absence of white crystalline substance and sample results, and a determination as to whether ongoing discharges to Stewart Creek are continuing to occur."

Additionally, Apex's Draft Comments to the Groundwater Remedy Proposed for the Remediation Consolidation Area in the Response Action Plan for the Frisco Recycling Center Former Operating Plant (FOP) dated August 1, 2017 stated that:

- "It is likely that the FDS is collecting some shallow surface water that infiltrates; however, the impacted groundwater identified at MW-32, MW-33 and MW-34 is not apparently derived from the fill material."
- "Based on Apex's review, a full groundwater assessment of the GWBU in the process area is required to evaluate potential groundwater impacts at the FOP"

process area. Additionally, the scope of the groundwater analytical program should be expanded to include all relevant metal COCs and VOCs based on Exide's Notice of Registration (NOR). In addition, due to building demolition, more areas are available for well installation in source areas."

No additional assessment to address this comment has been conducted since this statement.

TCEQ issued a Notice of Deficiency for the FOP RAP in a letter dated December 7, 2017. The following comments addressing the City of Frisco's issues are provided below:

- No liner [40 CFR §264.552(e)(3)(1)] or barrier for containment of wastes is proposed, though barriers are proposed as contingency remedies should the French Drain System (FDS) not perform as Exide expects. Please include in the RCA design a physical barrier that prevents release of wastes and constituents into groundwater and Stewart Creek.
- No leachate detection/collection system (LCS) (FDS appears to be too shallow and not designed to function effectively as an LCS).
- Section XI.D and the RAP should be revised to address affected groundwater at the RCA. In Appendix 3 of the RAP, Exide argues that the shallowest GW encountered near the FOP and proposed RCA is "perched". "Perched" groundwater in the granular material fill located directly beneath the concrete slab appears to be captured by the FDS when saturated by storm events. However, it is still considered groundwater and is in communication with deeper groundwater. Groundwater is therefore only partially captured by the FDS. The release should be addressed through the establishment of a corrective action program.

Samples were collected from the French Drain System on a quarterly basis. A summary of the analytical results for lead is provided in the following table:

Date	Lead Concentration (mg/L) (Critical PCL = 0.015 mg/L)
April 2015	0.207
July 2015	0.195
October 2015	0.351
January 2016	0.836
April 2016	0.089
July 2016	0.065
October 2016	0.055
March 2017	0.015
May 2017	0.022
July 2017	0.024
October 2017	10/4/2017 – 0.114
	10/23/2017 – 0.030
	10/27/2017 – 0.008
February 2018	0.014

- Shading denotes a concentration above the Critical PCL.

Since April 2015, Golder has provided daily flow volumes (gallons/day) in the FDS along with daily precipitation totals. Based on Apex's review, concentrations of lead were consistently detected above the critical PCL in water samples collected from the FDS, indicating a need to contain impacted water documented near the FDS which is proximal to Stewart Creek.

Charts depicting lead concentrations versus 7-day average daily flow and lead concentrations versus 7-day accumulated rainfall and 7-day rainfall versus 7-day flow are provided with this document.

3. *Will Exide's proposed PRB prevent contaminated groundwater from reaching Stewart Creek?*

At this time, it is not clear how the PRB would be designed if it was proposed as 'the physical barrier' required by TCEQ; however, it is assumed that the feature would be installed between the flood wall and Stewart Creek. It is assumed that a PRB would be designed to intercept groundwater with dissolved lead originating from the FOP/CAMU and sequester the dissolved fraction in an insoluble form utilizing imported media capable of facilitating the conversion. The insoluble lead, it is assumed, would generally be stored in the PRB.

Please note that the geologic setting in which the PRB will be installed is very dynamic. During flood events, a potential change in conditions may occur within the PRB which may alter the static conditions normally controlling the dissolved lead originating from the FOP/CAMU, potentially threatening the effectiveness of the control. Flushing may cause a change in geochemical conditions which could result in a release of dissolved lead to Stewart Creek.

Additionally, it should be noted that the artificially induced geochemical conditions could mobilize other constituents associated with releases at the FOP (for example, arsenic). Many literature citations are available that document an unfavorable change in groundwater conditions downgradient of PRB trenches.

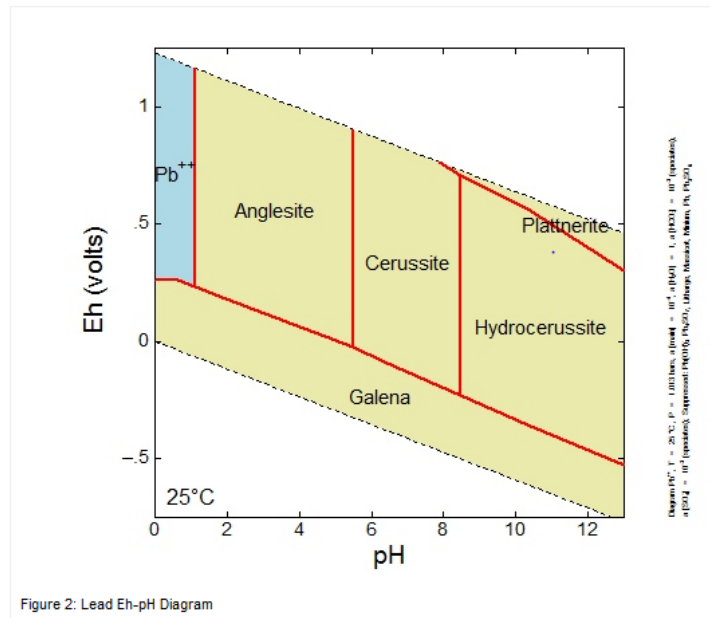
4. *Has low pH in the groundwater been observed at the Exide site which might cause adsorbed Pb in the landfills or elsewhere to transfer into the groundwater?*

- Groundwater samples have not been collected within the North Disposal Area or within the Slag Landfill, so conditions are not known.
- Dissolution of lead in the environment can certainly be influenced by pH; however, the solubility of lead is also determined by redox conditions in the environment along with many other factors.
- As stated previously, dissolved lead in groundwater is documented on the FOP and lead-impacted groundwater is documented in samples collected from the FDS. Subsurface conditions at the FOP are obviously not fully understood since the FDS continues to exhibit elevated lead concentrations.

- Generally stated, a decrease in pH increases the solubility of most lead compounds; however, the solubility of lead is complex based on pH and geochemistry. Below are diagrams depicting the solubility of lead at relatively high and low concentrations in water. The charts were obtained from the website:

<http://www.coalgeology.com/lead-geochemistry-eh-ph-solubility-and-remedial-technologies/21720/>

- Pb activity = 10^{-5}
- HCO_3^- activity = .001
- SO_4^{2-} activity = .001



It is evident from the Eh-pH diagram that lead is mobile at low pH condition ($\text{pH} < 2$). With increasing pH, the lead sulfate Anglesite becomes first to precipitate if enough sulfate is available below pH 6. Above pH 6, the carbonates cerussite and hydrocerussite stable. In a reducing condition, galena could also be stable over wide range of pH.

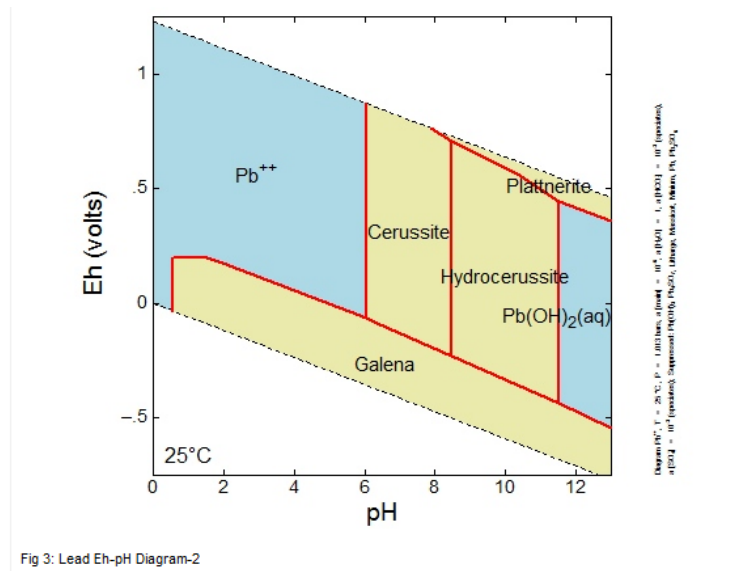


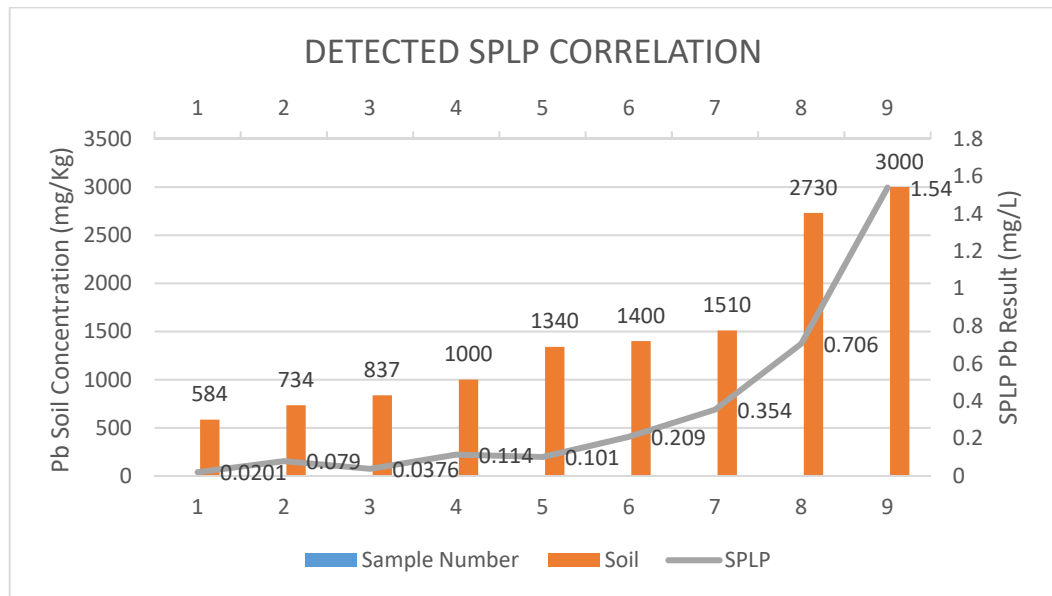
Figure 3 is generated with lead activity = 1.E-6. Notice, how lower concentration of lead leads to higher field of soluble phase.

- According to May 2014 APAR, Golder stated: “perched zone [shallow] wells had pH levels ranging from 6.83 to 8.37 SU, whereas nearby wells screened in the upper GWBU [deeper wells] had pH levels ranging from 5.64 to 6.48 SU, possibly indicating a buffered (less acidic) condition in the perched water, which is in contact with limestone aggregate in the sub-base.” It should be noted that the 8.37 pH reading was observed in a single reading (due to low recharge) from shallow well MW-32, located adjacent to MW-46. Even at an elevated pH, dissolved lead was still detected above the critical PCL in the groundwater sample collected from MW-32.

Cook-Joyce, Inc. (CJI) noted in a letter to Russell & Rodriguez, LLP, dated July 15, 2014, that “SPLP data presented in the revised FOP APAR suggests that lead and cadmium will leach at concentrations above critical PCLs when in moderately acidic conditions. This may be why there was a groundwater lead exceedance in MW-46 – one of the two most acidic pH measurements obtained at the Site came from that monitoring well.”

Ten soil samples were submitted for SPLP analysis during PBW’s and Golder’s affected property assessment activities. Based on the analytical results, 9 of the 10 samples submitted exceeded the critical PCL for lead. Laboratory simulated leachate testing indicates that lead will leach above the critical PCL with a pH of approximately 5.0 SU (EPA SW-846 #1312 methodology) and a total lead concentration as low as 584 mg/Kg.

A chart depicting the general correlation between lead concentrations in soil and leachability in a laboratory environment based on detected SPLP results is provided below:



- The maximum lead concentrations in water were detected in the samples collected from the shallow monitoring wells with near neutral pH. A definitive correlation between pH and dissolved lead in groundwater at the facility has not been identified based solely on groundwater analytical results; however, enough uncertainty exists to warrant additional investigation to evaluate the presence of dissolved lead in various pH and geochemical conditions.
 - CJI stated in their July 15, 2014 letter that “[t]he City’s technical consultants suggest that the FOP’s groundwater chemistry be more thoroughly evaluated, particularly in the area adjacent to and downgradient from the brick lined trenches, acid recovery pits, and other processes involving acid collection and treatment in the battery breaker building and the wastewater treatment plant. This information will also allow the establishment of a Site baseline and aid in the eventual design of control, recovery, and/or in-situ treatment methods and materials at the FOP.” No additional assessment to address this comment has been conducted since this statement.
5. *Will Exide’s proposed PRB effectively remove Pb from the groundwater before it reaches Stewart Creek?*
- TCEQ provided a response to Exide’s Deep Groundwater Preliminary Design Investigation (DGWPI) Work Plan, dated March 1, 2018. TCEQ noted the following:
 - “If the Revised RAP includes a Permeable Reactive Barrier (PRB), it will need to address conditions that could affect the efficacy of the system including, but not limited to: changes in flow direction during Stewart Creek

flood events, fouling or failure of the reactive media, possible flow along preferential pathways such as utility lines, and variable groundwater and contaminant flux through the multiple transmissive zones present above the shale along the groundwater protection element.”

- Under static conditions, a PRB could possibly sequester dissolved Pb within the PRB’s artificially induced geochemical conditions; however, Stewart Creek can act as a gaining stream or as a losing stream based on the current conditions in the area, potentially threatening the effectiveness of the PRB.
- Generally stated, Pb is not removed from the system in a PRB. The PRB only sequesters soluble Pb to an insoluble form under the artificially induced geochemical conditions produced by the PRB. Any change in those induced conditions could release the sequestered Pb.
- Hydraulic failures are another potential issue associated with the physical constraints of the area where the PRB would need to be installed. Mounding of groundwater on the upgradient side of the PRB, impacted groundwater bypassing the PRB on the flanking sides and groundwater flowing over the PRB are all exacerbated by the proximity of Stewart Creek and known conditions observed during frequent flooding.
- The heterogeneity and complexity of the physical setting is highlighted by Golder’s *Response to City of Frisco Comment Letters Dated June 1, 2018 and March 19, 2018*, dated June 22, 2018.
 - According to Golder’s June 22, 2018 letter, Exide modified the DGWPDI and completed investigation activities in May and June 2018 based on TCEQ’s comments to the original DGWPDI. Golder stated that “[a]n objective of the [DGWPDI] was to investigate shallow and deep groundwater communication” from 13 monitoring wells. Additionally, Golder stated that “Exide/Golder believe that though “shallow” and “deep” groundwater are indeed all within the unconsolidated materials above bedrock, the different characteristics of shallow and deep groundwater can be significant (in terms of quantity and quality) and should be investigated separately where possible.
 - Golder stated that the “DGWPDI has provided hydrogeologic and geochemical information for the proposed protectiveness element for Stewart Creek and will be used for a detailed design and direct incorporation into the August 2018 Permit Application.”
- The geologic setting in which the PRB will be installed is very active and the groundwater regime in which the CAMU will be established is very complex

(physically and chemically). If “the different characteristics of shallow and deep groundwater can be significant (in terms of quantity and quality)” a substantial amount of temporal data, in addition to the limited data collected during the DGWPDI, may be required to “address conditions that could affect the efficacy of the system” enumerated in TCEQ’s March 1, 2018 comments outlined above if a PRB is the proposed remedy. A slurry wall, as proposed in the City’s FOP RAP, is a proven and accepted technology that would not require the level of design, research and monitoring necessary to confirm its effectiveness. Given the magnitude of impacts to the Stewart Creek downstream area, the use of a proven technology should be preferred over an emerging technology that is still under evaluation.

- The downstream extent of the DGWPDI appears to terminate at the confluence of Stewart Creek and the North Tributary. It is not clear whether the DGWPDI has provided sufficient information for the design of a groundwater control element that will control a release(s) from the Slag Landfill and North Disposal Area to the North Tributary.

6. *Can groundwater flowing through Exide’s proposed PRB be monitored such that remedial action can be taken before contaminated groundwater reaches Stewart Creek?*

- It may be possible to evaluate groundwater within the PRB; however, based on the geologic setting in which the control would be installed and the limited horizontal distance from impacted groundwater (FDS) to Stewart Creek (generally less than 25 feet) it is unlikely remedial action could be conducted prior to impacting Stewart Creek.
- Monitoring wells are proposed to monitor the effectiveness of the controls for the FOP/CAMU. Since a proposed PRB would require installation in close proximity to Stewart Creek, monitoring wells installed between the PRB and Stewart Creek would only indicate whether the creek is protected or has been affected and would not allow for a timely contingency option.

7. *Where and how many monitor wells would be required to properly monitor groundwater flowing through Exide’s proposed PRB?*

- As previously stated, since a proposed PRB would require installation in close proximity to Stewart Creek, monitoring wells installed between the PRB and Stewart Creek would only indicate whether the creek is protected or has been affected.

- Generally, monitoring wells are utilized to determine whether a release has occurred so that corrective measures can be implemented *prior to* reaching a sensitive receptor. Since the wells would only indicate whether Stewart Creek is affected by a release, this would not allow a timely contingency option to mitigate a release *that has already occurred* at the point of exposure.
- Significant additional physical and geochemical information would be required to determine the number and placement of monitoring wells outside of a proposed PRB. At a minimum, monitoring wells upgradient, within the PRB and downgradient of the PRB at several transects along its horizontal distance would be required.

8. *How long would it take groundwater flowing through Exide's proposed PRB to reach Stewart Creek?*

- PBW calculated the geometric mean of the hydraulic conductivity (for gravelly clay) at the FOP at 1.7×10^{-3} cm/second.
- Specific yield of the GWBU is utilized as a proxy for effective porosity in calculating average linear velocity. Average specific yield is assumed to be 0.1 for the clay matrix; however, the specific yield for clay can vary between 0.01 to 0.1 (Driscoll, F.G., 1986).
- From monitoring well MW-30 to MW-26, the hydraulic gradient is approximately 0.0239 ft/ft based on elevation data collected January 21, 2014.

It should be noted that the hydraulic gradient between the proposed PRB and Stewart Creek could be significantly steeper. Based on the elevation of the water level in Stewart Creek collected February 29, 2016 and gauging information collected at MW-46 on February 29, 2016, the hydraulic gradient in the vicinity of the PRB could be as high as 0.073 ft/ft; however, the broad hydraulic gradient over the FOP was utilized for this evaluation. It should be noted that, following implementation of the PRB, these assumptions could also change.

Linear Groundwater Velocity

- **Based on the assumptions above, the average calculated linear groundwater velocity is approximately 1.15 ft/day.**

However, if a steep gradient is considered in the vicinity of the PRB, the average calculated linear velocity could be as high as 3.53 feet/day to over 30 feet/day depending on the hydraulic gradient and effective porosity inputs utilized. A table summarizing linear groundwater velocities is provided below:

Linear Groundwater Velocity		
Assumption	Linear Groundwater Velocity Range	
Average Hydraulic Gradient (0.0239 ft/ft) and Effective Porosity (n) of 0.1	1.15 ft/day (n=0.1)	
Steep Hydraulic Gradient (0.073 ft/ft) and Effective Porosities (n) from 0.01 to 0.1	3.53 ft/Day (n=0.1)	>30 ft/day (n=0.01)

Estimated Travel Time

- The assumed maximum distance between the proposed location of the PRB in the vicinity of the former slag treatment building to the surface of Stewart Creek is approximately 18 feet. The distance can be as little as 12 feet. For this calculation, 15 feet is the assumed distance.
- **Assuming an average distance of 15 feet, the estimated travel time from the proposed PRB to Stewart Creek is approximately 13 days. Assuming a distance of 12 feet, the estimated linear travel time may be as little as 10 days.**

Depending on the hydraulic gradient in the vicinity of the PRB and effective porosity inputs utilized, travel time from the PRB to Stewart Creek may range from approximately 0.5 to 4 days. Assuming a distance of 12 feet, the estimated linear travel time may range from approximately 0.3 to 3.5 days. A table summarizing linear groundwater velocities is provided below:

Estimated Linear Travel Time (PRB to Stewart Creek)		
Assumption	Travel Time Range	
Average Hydraulic Gradient 15 Feet to Stewart Creek	13 Days (n=0.1)	
Average Hydraulic Gradient 12 Feet to Stewart Creek	10 Days (n=0.1)	
Steep Hydraulic Gradient 15 Feet to Stewart Creek	4 Days (n=0.1)	0.5 Days (n=0.01)
Steep Hydraulic Gradient 12 Feet to Stewart Creek	3.5 Days (n=0.1)	0.3 Days (n=0.01)

- Assuming monitoring wells were installed approximately 5 feet from the proposed PRB, the estimated linear travel time from the monitoring wells to Stewart Creek can range from approximately 6 days to 8.5 days.

Depending on the inputs utilized, the estimated linear travel time from the monitoring wells to Stewart Creek can range from approximately 0.2 days to 3 days.

A table summarizing linear groundwater velocities is provided below:

Estimated Linear Travel Time (Monitoring Wells to Stewart Creek)		
Assumption	Travel Time Range	
Average Hydraulic Gradient 10 Feet to Stewart Creek	8.5 Days (n=0.1)	
Average Hydraulic Gradient 7 Feet to Stewart Creek	6 Days (n=0.1)	
Steep Hydraulic Gradient 10 Feet to Stewart Creek	3 Days (n=0.1)	0.3 Days (n=0.01)
Steep Hydraulic Gradient 7 Feet to Stewart Creek	2 Days (n=0.1)	0.2 Days (n=0.01)

- Retardation factor and dispersion assumptions were not considered for the estimated linear velocity of lead in groundwater. The retardation factor could vary significantly depending on the species of dissolved lead and other geochemical conditions.
- The linear groundwater velocity estimates presented above assume static groundwater flow and surface water flow conditions. Travel time to Stewart Creek will be less during high-water conditions. Additionally, the possibility of surface water passing over/through the proposed PRB exists; however, the specific design of a proposed PRB is unknown at this time.

9. *What general type of system is required to protect Stewart Creek from contaminated groundwater flowing from the Exide site?*

A release was documented in Stewart Creek in June of 2015 as a result of a wastewater management system failure during flood conditions.

Seepage was observed from the floodwall as a result of apparent pressure from standing water behind the flood wall. A white substance appeared upon contact with the creek. Based on analytical results of the samples collected from the white substance, lead concentrations from 870 mg/Kg to 1,030 mg/Kg were detected. Additionally, a sample collected from discharge water exhibited concentrations of lead above human health PCLs and cadmium above chronic aquatic life RBELs. J-value concentrations of lead were detected in discharge water and surface water samples above the acute aquatic life RBEL. Below is a description of the event from Golder's 2015 Second Quarter French Drain Operational Report:

"At the time of the wall inspection on June 12, 2015 no seepage from the flood wall was observed. The flood wall waterstops and joint fillers were generally in good condition with the exception of one area (described below). Some minor cracks were observed, but were repaired with cement filler by Exide personnel at the time of the Golder inspection. No major cracks were observed."

"As described in the letter dated June 12, 2015, RE: Follow-up Written Report Submittal for Telephone Notification Report Number 20152072 (June 12th Letter), an apparent seepage from the floodwall (approximately 40 feet upstream from a stormwater conveyance pipe crossover on Stewart Creek) was observed on June 5, 2015. The seepage close to the flood wall appeared clear and turned white when it came into contact with the creek. As explained in the June 12th letter, an aboveground storage tank (AST) containing a 50% sodium hydroxide solution was not leaking prior to the area being flooded (see description of heavy rainfall in May and June as described above), but was observed to have a small leak when the standing stormwater was removed. Exide suspects that the 50% sodium hydroxide solution may have leaked into the standing stormwater, some of which is suspected to have infiltrated the joints in the concrete wall while this area of the facility was flooded and potentially been released to the banks of Stewart Creek due to water pressure from the standing water on the facility side of the flood wall. As indicated above, the French drain was not being pumped when this portion of the facility was flooded."

Based on the sampling results conducted in Stewart Creek during the damage caused by the 2015 flood, media has been affected by COCs as a result of a release from the FOP. Any groundwater protection element chosen must withstand the dynamic conditions exemplified by the June 2015 flood event. Stewart Creek will continue to be re-impacted without a robust groundwater protection element proven for use in a similar physical setting. A summary of the post flood analytical results is provided with this summary.

Attachment A

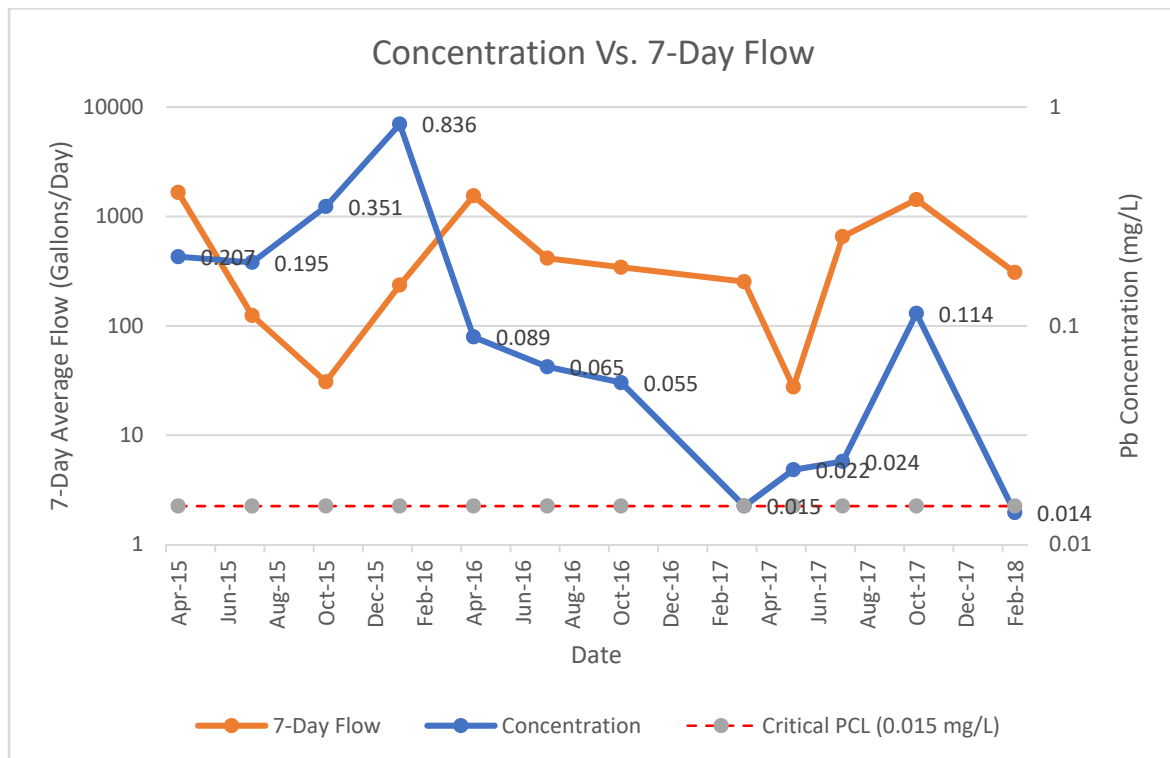
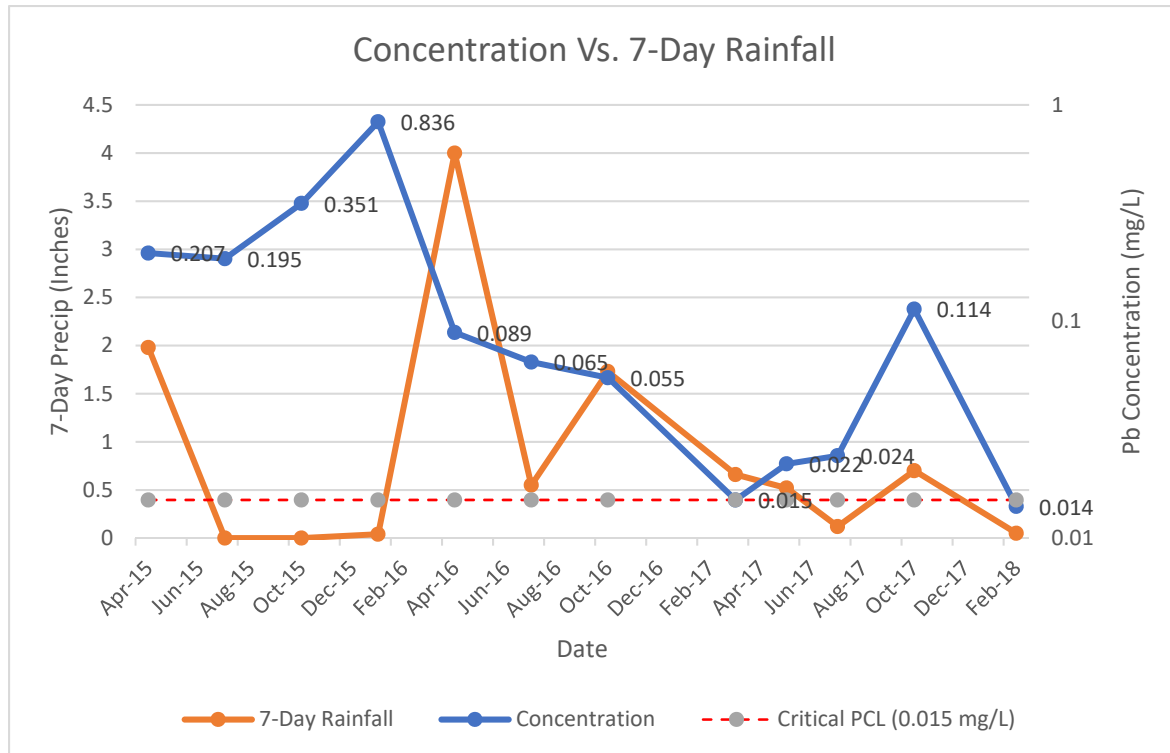
French Drain Comparison Charts

Former Operating Plant French Drain System

Data Summarized from Golder Associates Inc.

Quarterly French Drain Operational Reports

August 3, 2015 to May 8, 2018

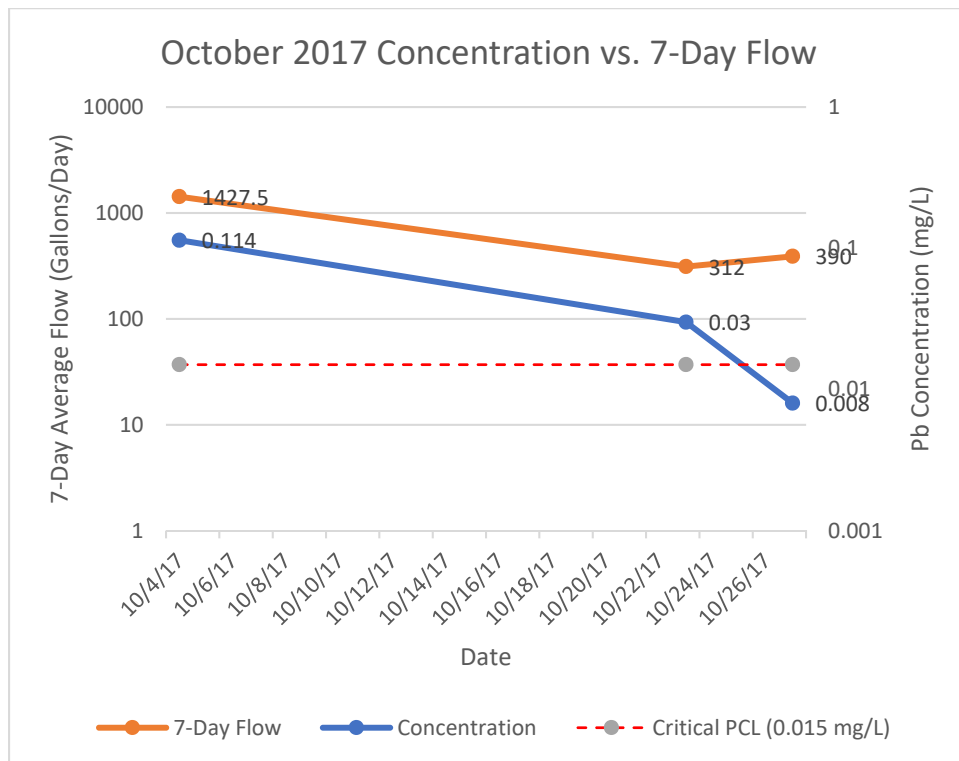
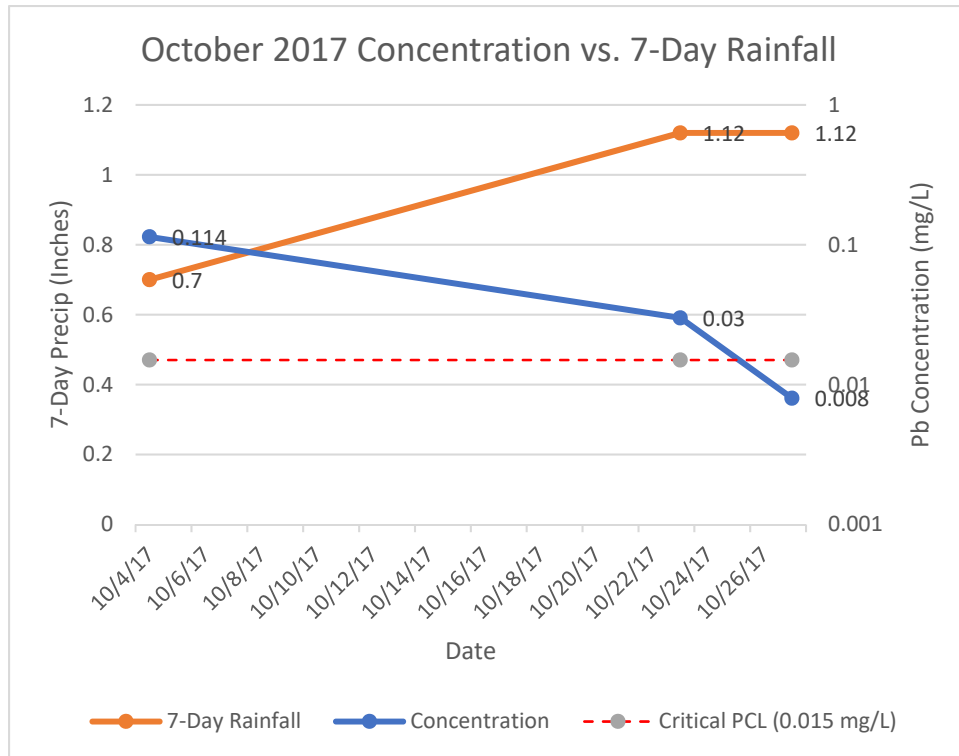


Former Operating Plant French Drain System

Data Summarized from Golder Associates Inc.

Quarterly French Drain Operational Reports

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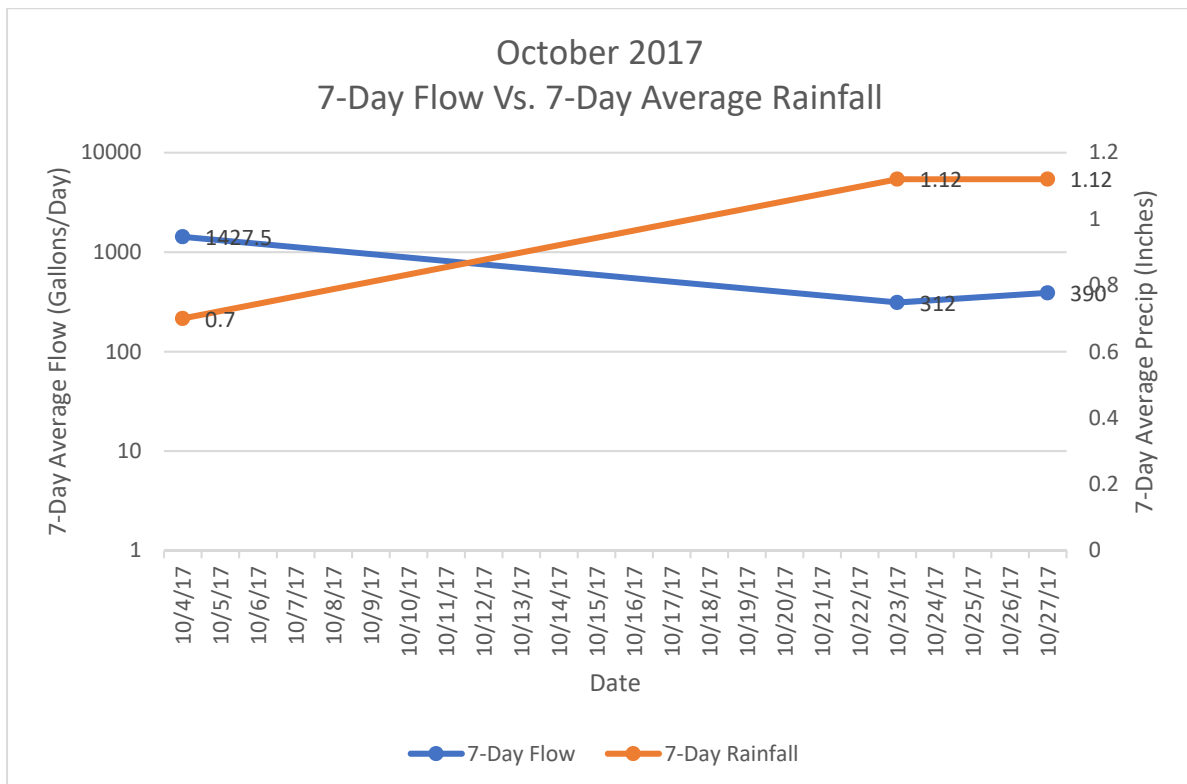
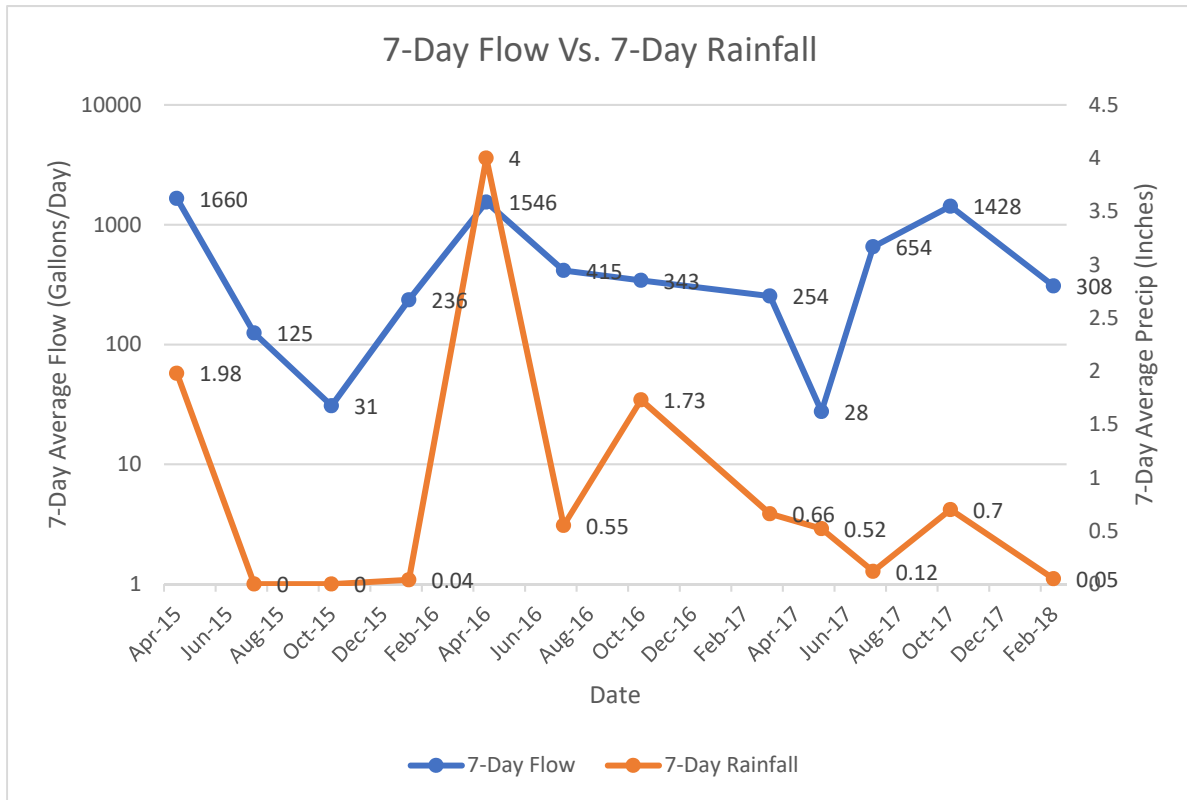


Former Operating Plant French Drain System

Data Summarized from Golder Associates Inc.

Quarterly French Drain Operational Reports

August 3, 2015 to May 8, 2018



Attachment B

June 2015

Post Flood Analytical Results



DRAFT

**SURFACE WATER, SOLIDS AND
DISCHARGE WATER SAMPLING ACTIVITIES
RESULTS SUMMARY**

For:

Stewart Creek – Former Operating Plant
Frisco, Collin County, Texas

Prepared for:

City of Frisco

c/o

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July 2, 2015
Project 7020112C079

Figure 1

Stewart Creek FOP Surface Water, Solids and Discharge Water Sample Location Map

DRAFT



Google

City of Frisco
Surface Water, Solids and
Discharge Water Sampling
Stewart Creek FOP
Frisco, Texas

Project No. 7020112C079



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FIGURE 1

**Stewart Creek FOP
Surface Water, Solids and Discharge
Water Sample Location Map**

Aerial Photograph March 2015

Summary Tables

Table 1 – Solid Sample Analytical Results

Table 2 – Surface Water Analytical Results

Table 3 – Surface Water Quality Parameters

Table 1
Solid Sample Analytical Results
Stewart Creek - Former Operating Plant
Frisco, Texas

Sample ID	Date	pH (Unitless)	Percent Solids (%)	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Calcium mg/kg	Chromium mg/kg	Lead mg/kg	Magnesium mg/kg	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Sulfate mg/kg
TRRP Ecological Benchmarks for Sediment		NA	NA	2	9.79	NE	NE	0.99	NE	43.4	35.8	NE	0.18	22.7	NE	1	NA
TRRP Ecological Protective Concentration Level		NA	NA	13.5*	21.4*	NE	NE	2.985*	NE	77.2*	81.9*	NE	0.62*	35.65*	NE	1.6*	NA
TCEQ Second Effects Levels for Sediment		NA	NA	25	33	NE	NE	4.98	NE	111	128	NE	1.06	48.6	NE	2.2	NA
TRRP Human Health Sediment Protective Concentration Levels		NA	NA	83	24	23,000	27	1,100	NE	36,000	500 (250) ¹	NE	34	1,400	2,700*	350	NE
Maximum Concentrations Previously Detected in Sediment Near the Former Operating Plant (Source: Exide APAR (2014) and Interim Action Report (August 2014))		NA	NA	NA	57.9	NA	NA	4.53 J	NA	NA	19,100	NA	NA	NA	NA	NA	NA
TRRP Tier 1 Residential ^{SW} Soil _{ing} PCL (30-Acre Source Area)		NA	NA	2.7**	3.1	220	0.92	30**	NE	1,200**	280	NE	0.0039	79**	1.6	0.24	NE
TRRP Tier 1 Residential ^{Total} Soil _{Comb} PCL		NA	NA	15	24	8,100	38	52	NE	27,000	500	NE	2.1	840	310	97	NE
Site-Specific Background		NA	NA	1	15.9**	NE	NE	NE	NE	NE	31.5**	NE	NE	NE	NE	NE	NE
Frisco Background Concentrations		NA	NA	NE	8.6	161	NE	0.4	NE	32.7	13.7	NE	0.019	NE	2.1**	0.44**	NE
TRRP Texas-Specific Background		NA	NA	1	5.9	300**	1.5**	NE	NE	30	15	NE	0.04**	10	0.3	NE	NE
Maximum Concentrations Previously Detected In Soil		NA	NA	102	115	131	0.806	984	NA	22.4	95,000	NA	0.013 J	12.4	29.2	NA	8,710
Total Metals and Sulfate																	
2015-COF-SOLID-01 (0-0.25)	6/8/2015	8.70	57.8	0.085 J	5.0	224	<0.024	1.7	342,000	0.54	1,030	2,130	<0.021	2.6	0.66 J	<0.031	75.2
2015-COF-SOLID-02 (0-0.25)	6/8/2015	10.03	54.7	0.12 J	10.1	226	<0.025	0.23 J	335,000	0.36 J	870	3,780	<0.021	2.2	1.1	<0.033	311
Toxicity Characteristic Leaching Procedure (TCLP)																	
Sample ID	Date	pH (Unitless)	Percent Solids (%)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Calcium (mg/l)	Chromium (mg/l)	Lead (mg/l)	Magnesium (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Sulfate (mg/l)
TCLP Regulatory Levels		< 2 or > 12.5		NE	5.0	100.0	NE	1.0	NE	5.0	5.0	NE	0.2	NE	1.0	5.0	NE
TCEQ Class 1 Toxic Constituents' Maximum Leachable Concentrations		NE	NA	1	1.8	100.0	0.08	0.5	NE	5.0	1.5	NE	0.2	70	1.0	5.0	NE
2015-COF-SOLID-01 (0-0.25)	6/8/2015	8.70	57.8	<0.0051	0.0074 J	0.48 J	<0.00080	0.0070 J	N/A	0.0049 J	0.14	N/A	<0.000050	0.020 J	<0.0049	<0.0012	N/A
2015-COF-SOLID-02 (0-0.25)	6/8/2015	10.03	54.7	<0.0051	<0.0050	0.46 J	<0.00080	0.0011 J	N/A	<0.0014	0.23	N/A	<0.000050	0.013 J	<0.0049	<0.0012	N/A

NE - Not Established

N/A - Not Analyzed

NA - Not Applicable


mg/Kg - milligrams per kilogram


* Applicable Sediment PCL


** Applicable Soil PCL


Italicized RBEL or PCL - RBEL or PCL listed in Table 7A of Exide's APAR dated May 2014


Maximum concentrations based on Exide's APAR dated May 2014

 Bold and shading indicates a concentration above the TRRP Ecological Benchmark for Sediment.

 Bold and shading indicates a concentration above the TRRP Critical Protective Concentration Level.

 Bold and shading indicates a concentration above the TCEQ Second Effects Level for sediment.

 Bold and shading indicates a concentration above the TRRP Human Health Sediment Protective Concentration Levels.

 Italicized and gray shading indicates a concentration detected above a Critical soil PCL (if evaluated as a soil sample).

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

¹ - Based on an agreement between the City of Frisco and Exide Technologies, Inc., the Tier 1 Human Health PCL was established as 250 mg/Kg.

Benchmarks obtained from the TCEQ guidance document Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised Draft), dated January 2014.

Site-Specific Background concentrations obtained from a letter to TCEQ titled *Revised Site-Specific Background Soil Concentration Evaluation*, dated May 30, 2013, prepared by PBW, L.L.C.

Frisco Background Concentrations obtained from the *Background Study* report prepared by Southwest Geoscience, dated March 4, 2014

Table 2
Surface Water Analytical Results
Stewart Creek - Former Operating Plant
Frisco, Texas

Sample ID	Date	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Calcium (mg/l)	Chromium (mg/l)	Lead (mg/l)	Magnesium (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Sulfate (mg/l)
Acute Aquatic Life RBEL		NE	0.340 ¹	NE	NE	0.00908 ²	NE	NE	0.0688 ²	NE	0.0024 ¹	0.00079 ^{2*}	0.020 ¹	0.0008 ^{1*}	NE
Chronic Aquatic Life RBEL		NE	0.150 ¹	NE	NE	0.00256 ^{2*}	NE	NE	0.00268 ^{2*}	NE	0.0013 ^{1*}	0.00060 ^{2**}	0.005 ^{1*}	NE	NE
Human Health RBEL Values (Fish Only)		10.71 ³	NE	NE	NE	NE	NE	NE	0.0383 ³	NE	0.000122 ³	11.4 ³	NE	NE	NE
TRRP Human Health Contact Recreation PCL		0.199 ^{4*}	0.0285 ^{4*}	64.9 ^{4*}	0.0943 ^{4*}	0.149 ⁴	NE	126 ⁴	0.015 ⁵	NE	0.0973 ⁵	11.3 ⁵	4.13 ⁴	1.57 ⁴	NE
Maximum Concentrations Previously Detected (Source: Exide APAR (2014))		NA	0.00393	NA	NA	0.002 J	NA	NA	0.0046 J	NA	NA	NA	NA	NA	127
Dissolved Metals															
2015-COF-DW-01	6/8/2015	0.0274	0.0097	0.0128	<0.00026	0.0043	9.33	0.0020	0.0487	1.76	<0.000050	0.0022 J	0.0069	<0.00020	N/A
2015-COF-SW-01	6/8/2015	<0.00072	0.00095 J	0.0936	<0.00026	<0.00027	142	0.00065 J	<0.00048	5.84	<0.000050	0.0014 J	0.0014 J	<0.00020	N/A
2015-COF-SW-02	6/8/2015	<0.00072	0.0014 J	0.0870	<0.00026	<0.00027	128	0.00042 J	0.00220	5.52	<0.000050	0.0014 J	0.0014 J	<0.00020	N/A
Total Metals and Sulfate															
2015-COF-DW-01	6/8/2015	0.0213	0.0158	0.115	0.00051 J	0.0228	24.1	0.0253	0.765	9.51	<0.000050	0.0179	0.0068	<0.00020	856
2015-COF-SW-01	6/8/2015	<0.00072	0.0010 J	0.0949	<0.00026	<0.00027	143	0.00036 J	0.002	5.79	<0.000050	0.0014 J	0.0011 J	<0.00020	1190
2015-COF-SW-02	6/8/2015	<0.00072	0.0014 J	0.0960	<0.00026	<0.00027	143	0.00040 J	0.0123	5.83	<0.000050	0.0015 J	0.0014 J	<0.00020	1190

N/A - Not Analyzed

NA - Not Applicable

NE - Not Established

mg/L - milligrams per liter

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.


* Applicable Surface Water PCL


Italicized RBEL or PCL - RBEL or PCL listed in Table 6A of Exide's APAR dated May 2014

Maximum Concentrations Detected based on Exide's APAR dated May 2014

 Bold and shading indicates a concentration above the Acute Aquatic Life RBEL for Surface Water.

 Bold and shading indicates a concentration above the TRRP Critical Protective Concentration Level (Chronic Aquatic Life RBEL).

 Bold and shading indicates a concentration above the TCEQ Human Health RBEL values.

 Bold and shading indicates a concentration above the TRRP Human Health Surface Water Protective Concentration Levels.

 Gray shading indicates dissolved metals samples.

¹ - TCEQ Aquatic Life RBELs - Texas Surface Water Quality Standards, 2014

² - Calculated RBEL (Assuming a Hardness of 106 mg/L) - Texas Surface Water Quality Standards, 2014

^{2*} - Calculated RBEL by Apex (Assuming a Hardness of 106 mg/L) - Texas Surface Water Quality Standards, 2014

³ - TCEQ Human Health RBELs, 2014 (Assuming a Second Order Perennial Stream)

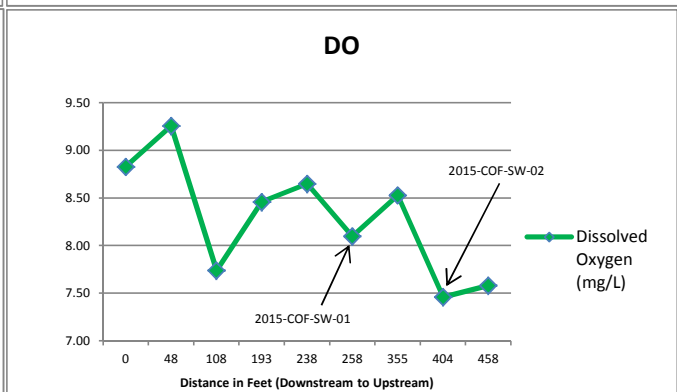
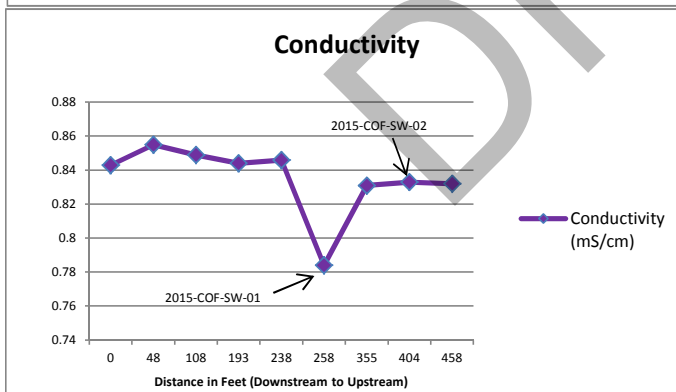
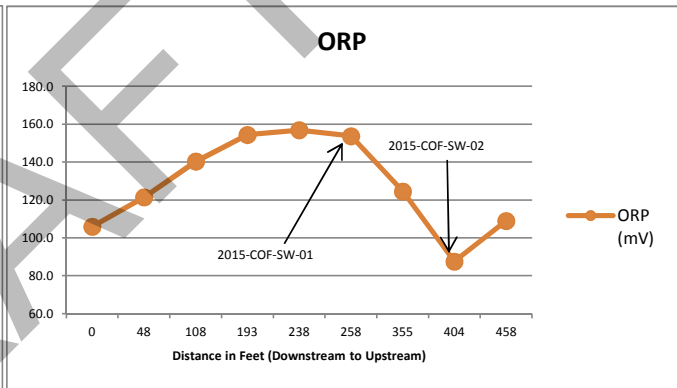
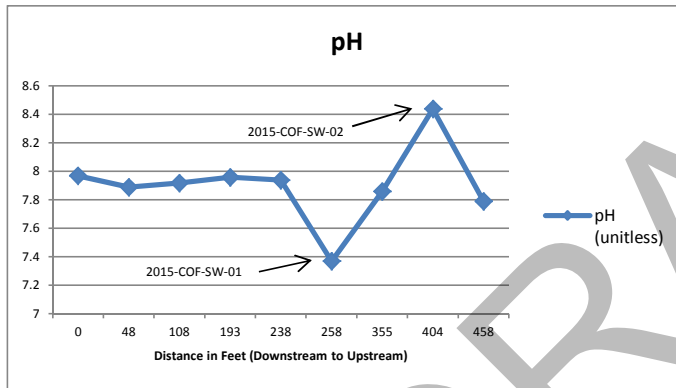
⁴ - TCEQ Tier 1 Contact Recreation Water PCLs, March 2006

⁵ - Contact Recreation PCL Not Established - Drinking Water Standard Utilized

⁶ - Based on Maximum Contaminant Levels (MCLs) specified in 30 TAC §290 (relating to Public Drinking Water)

Table 3
Surface Water Quality Parameters
Stewart Creek - Former Operating Plant
Frisco, Texas

Location	Date	Depth (Feet)	Temperature (°C)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH (unitless)	ORP (mV)	Distance (Downstream to Upstream in Feet)
SC-1	6/8/2015	0.5	28.03	0.843	8.83	7.97	106.0	0
SC-2	6/8/2015	0.33	27.92	0.855	9.26	7.89	121.5	48
SC-3	6/8/2015	1.5	27.84	0.849	7.74	7.92	140.4	108
SC-4	6/8/2015	0.5	27.41	0.844	8.46	7.96	154.5	193
SC-5	6/8/2015	0.67	27.29	0.846	8.65	7.94	157.0	238
2015-COF-SW-01	6/8/2015	0.33	27.10	0.784	8.10	7.37	153.8	258
SC-6	6/8/2015	0.33	26.78	0.831	8.53	7.86	124.6	355
2015-COF-SW-02	6/8/2015	0.5	26.68	0.833	7.46	8.44	87.7	404
SC-7	6/8/2015	1	26.49	0.832	7.58	7.79	109.1	458
Discharge Water From Waste Water Pipe								
2015-COF-DW-01	6/8/2015	N/A	27.93	0.520	6.95	11.00	228.7	N/A



Surface Water and Discharge Water Analytical Results

**Accutest Laboratories Report
Dated June 23, 2015**

Accutest Job Number: TC68547



06/23/15

Technical Report for

APEX TITAN, Inc.

7020112C079 / Stewart Creek

7020112C079

Accutest Job Number: TC68547

Sampling Date: 06/08/15

Report to:

APEX TITAN, Inc.
2351 W. Northwest Hwy Suite 3321
Dallas, TX 75220
JMinter@apexcoss.com

ATTN: Jason Minter

Total number of pages in report: **40**



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Richard Rodriguez
Laboratory Director

Client Service contact: Sylvia Garza 713-271-4700

Certifications: TX (T104704220-15-21, 1M104704220-15-2) AR (14-016-0) AZ (AZ0769) FL (E87628)
KS (E-10366) LA (85695/04004) NJ (TX010) OK (2014-172) VA (7654)

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Test results relate only to samples analyzed.

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Sample Summary

APEX TITAN, Inc.

Job No: TC68547

7020112C079 / Stewart Creek
Project No: 7020112C079

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
TC68547-1	06/08/15	18:53	06/10/15	AQ	Water	2015-COF-SW-01
TC68547-1F	06/08/15	18:53	06/10/15	AQ	Water Filtered	2015-COF-SW-01
TC68547-2	06/08/15	19:55	06/10/15	AQ	Water	2015-COF-SW-02
TC68547-2F	06/08/15	19:55	06/10/15	AQ	Water Filtered	2015-COF-SW-02
TC68547-3	06/08/15	20:50	06/10/15	AQ	Water	2015-COF-DW-01
TC68547-3F	06/08/15	20:50	06/10/15	AQ	Water Filtered	2015-COF-DW-01

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: APEX TITAN, Inc.

Job No TC68547

Site: 7020112C079 / Stewart Creek

Report Date 6/23/2015 9:39:42 AM

3 Samples were collected on 06/08/2015 and received intact at Accutest on 06/10/2015 and properly preserved in 1 cooler at 0.8 Deg C. These Samples received an Accutest job number of TC68547. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Metals By Method SW846 6020A

Matrix AQ

Batch ID: MP26096

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68547-1MS, TC68547-1MSD, TC68547-1SDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Arsenic, Chromium, Lead, Nickel, Selenium are outside control limits for sample MP26096-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- RPD(s) for Serial Dilution for Barium, Magnesium are outside control limits for sample MP26096-SD1. Serial dilution indicates possible matrix interference.

Metals By Method SW846 7470A

Matrix AQ

Batch ID: MP26097

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68547-1MS, TC68547-1MSD were used as the QC samples for metals.

Wet Chemistry By Method EPA 300

Matrix AQ

Batch ID: GP32525

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68707-10DUP, TC68707-10MS were used as the QC samples for Sulfate.

Accutest Laboratories Gulf Coast (ALGC) certifies that this report meets the project requirements for analytical data produced for the samples as received at ALGC and as stated on the COC. ALGC certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the ALGC Quality Manual except as noted above. This report is to be used in its entirety. ALGC is not responsible for any assumptions of data quality if partial data packages are used

Summary of Hits

Job Number: TC68547
Account: APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek
Collected: 06/08/15



Lab Sample ID	Client Sample ID	Result/ Qual	MQL	SDL	Units	Method
---------------	------------------	-----------------	-----	-----	-------	--------

TC68547-1 2015-COF-SW-01

Arsenic	0.0010 J	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.0949	0.0020	0.00019	mg/l	SW846 6020A
Calcium	143	0.50	0.019	mg/l	SW846 6020A
Chromium	0.00036 J	0.0020	0.00013	mg/l	SW846 6020A
Lead	0.0020	0.0020	0.00048	mg/l	SW846 6020A
Magnesium	5.79	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0014 J	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0011 J	0.0040	0.00054	mg/l	SW846 6020A
Sulfate	1190	25	13	mg/l	EPA 300

TC68547-1F 2015-COF-SW-01

Arsenic	0.00095 J	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.0936	0.0020	0.00019	mg/l	SW846 6020A
Calcium	142	0.50	0.019	mg/l	SW846 6020A
Chromium	0.00065 J	0.0020	0.00013	mg/l	SW846 6020A
Magnesium	5.84	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0014 J	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0014 J	0.0040	0.00054	mg/l	SW846 6020A

TC68547-2 2015-COF-SW-02

Arsenic	0.0014 J	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.0960	0.0020	0.00019	mg/l	SW846 6020A
Calcium	143	0.50	0.019	mg/l	SW846 6020A
Chromium	0.00040 J	0.0020	0.00013	mg/l	SW846 6020A
Lead	0.0123	0.0020	0.00048	mg/l	SW846 6020A
Magnesium	5.83	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0015 J	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0014 J	0.0040	0.00054	mg/l	SW846 6020A
Sulfate	1190	25	13	mg/l	EPA 300

TC68547-2F 2015-COF-SW-02

Arsenic	0.0014 J	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.0870	0.0020	0.00019	mg/l	SW846 6020A
Calcium	128	0.50	0.019	mg/l	SW846 6020A
Chromium	0.00042 J	0.0020	0.00013	mg/l	SW846 6020A
Lead	0.0022	0.0020	0.00048	mg/l	SW846 6020A
Magnesium	5.52	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0014 J	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0014 J	0.0040	0.00054	mg/l	SW846 6020A

Summary of Hits

Job Number: TC68547
Account: APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek
Collected: 06/08/15



Lab Sample ID Analyte	Client Sample ID	Result/ Qual	MQL	SDL	Units	Method
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TC68547-3 2015-COF-DW-01

Antimony	0.0213	0.0040	0.00072	mg/l	SW846 6020A
Arsenic	0.0158	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.115	0.0020	0.00019	mg/l	SW846 6020A
Beryllium	0.00051 J	0.0020	0.00026	mg/l	SW846 6020A
Cadmium	0.0228	0.0020	0.00027	mg/l	SW846 6020A
Calcium	24.1	0.50	0.019	mg/l	SW846 6020A
Chromium	0.0253	0.0020	0.00013	mg/l	SW846 6020A
Lead	0.765	0.0020	0.00048	mg/l	SW846 6020A
Magnesium	9.51	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0179	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0068	0.0040	0.00054	mg/l	SW846 6020A
Sulfate	856	25	13	mg/l	EPA 300

TC68547-3F 2015-COF-DW-01

Antimony	0.0274	0.0040	0.00072	mg/l	SW846 6020A
Arsenic	0.0097	0.0040	0.00054	mg/l	SW846 6020A
Barium	0.0128	0.0020	0.00019	mg/l	SW846 6020A
Cadmium	0.0043	0.0020	0.00027	mg/l	SW846 6020A
Calcium	9.33	0.50	0.019	mg/l	SW846 6020A
Chromium	0.0020	0.0020	0.00013	mg/l	SW846 6020A
Lead	0.0487	0.0020	0.00048	mg/l	SW846 6020A
Magnesium	1.76	0.50	0.014	mg/l	SW846 6020A
Nickel	0.0022 J	0.0040	0.00010	mg/l	SW846 6020A
Selenium	0.0069	0.0040	0.00054	mg/l	SW846 6020A

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: 2015-COF-SW-01
Lab Sample ID: TC68547-1
Matrix: AQ - Water
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: n/a

Total Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.00072 U	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Arsenic	0.0010 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Barium	0.0949	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Beryllium	0.00026 U	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Cadmium	0.00027 U	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Calcium	143	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Chromium	0.00036 J	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Lead	0.0020	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Magnesium	5.79	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC SW846 7470A ¹	SW846 7470A ⁴
Nickel	0.0014 J	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Selenium	0.0011 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID:	2015-COF-SW-01	Date Sampled:	06/08/15
Lab Sample ID:	TC68547-1	Date Received:	06/10/15
Matrix:	AQ - Water	Percent Solids:	n/a
Project:	7020112C079 / Stewart Creek		

General Chemistry

Analyte	Result	MQL	SDL	Units	DF	Analyzed	By	Method
Sulfate	1190	25	13	mg/l	50	06/18/15 15:34 ES	EPA	300

MQL = Method Quantitation Limit
SDL = Sample Detection Limit

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-SW-01
Lab Sample ID: TC68547-1F
Matrix: AQ - Water Filtered
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: n/a

Dissolved Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.00072 U	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Arsenic	0.00095 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Barium	0.0936	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Beryllium	0.00026 U	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Cadmium	0.00027 U	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Calcium	142	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Chromium	0.00065 J	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Lead	0.00048 U	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Magnesium	5.84	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC SW846 7470A ¹	SW846 7470A ⁴
Nickel	0.0014 J	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Selenium	0.0014 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-SW-02
Lab Sample ID: TC68547-2
Matrix: AQ - Water
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: n/a

Total Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.00072 U	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Arsenic	0.0014 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Barium	0.0960	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Beryllium	0.00026 U	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Cadmium	0.00027 U	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Calcium	143	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Chromium	0.00040 J	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Lead	0.0123	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Magnesium	5.83	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC SW846 7470A ¹	SW846 7470A ⁴
Nickel	0.0015 J	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Selenium	0.0014 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID:	2015-COF-SW-02	Date Sampled:	06/08/15
Lab Sample ID:	TC68547-2	Date Received:	06/10/15
Matrix:	AQ - Water	Percent Solids:	n/a
Project:	7020112C079 / Stewart Creek		

General Chemistry

Analyte	Result	MQL	SDL	Units	DF	Analyzed	By	Method
Sulfate	1190	25	13	mg/l	50	06/18/15 15:51 ES	EPA	300

MQL = Method Quantitation Limit
SDL = Sample Detection Limit

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-SW-02
Lab Sample ID: TC68547-2F
Matrix: AQ - Water Filtered
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: n/a

Dissolved Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.00072 U	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Arsenic	0.0014 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Barium	0.0870	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Beryllium	0.00026 U	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Cadmium	0.00027 U	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Calcium	128	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Chromium	0.00042 J	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Lead	0.0022	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Magnesium	5.52	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC SW846 7470A ¹	SW846 7470A ⁴
Nickel	0.0014 J	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Selenium	0.0014 J	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG SW846 6020A ²	SW846 3010A ³

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-DW-01

Lab Sample ID: TC68547-3

Matrix: AQ - Water

Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15

Date Received: 06/10/15

Percent Solids: n/a

Total Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method	
Antimony	0.0213	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Arsenic	0.0158	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Barium	0.115	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Beryllium	0.00051 J	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Cadmium	0.0228	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Calcium	24.1	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Chromium	0.0253	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Lead	0.765	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Magnesium	9.51	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC	SW846 7470A ¹	SW846 7470A ⁴
Nickel	0.0179	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Selenium	0.0068	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²	SW846 3010A ³

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID:	2015-COF-DW-01	Date Sampled:	06/08/15
Lab Sample ID:	TC68547-3	Date Received:	06/10/15
Matrix:	AQ - Water	Percent Solids:	n/a
Project:	7020112C079 / Stewart Creek		

General Chemistry

Analyte	Result	MQL	SDL	Units	DF	Analyzed	By	Method
Sulfate	856	25	13	mg/l	50	06/18/15 16:30 ES		EPA 300

MQL = Method Quantitation Limit
SDL = Sample Detection Limit

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-DW-01
Lab Sample ID: TC68547-3F
Matrix: AQ - Water Filtered
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15

Date Received: 06/10/15

Percent Solids: n/a

Dissolved Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.0274	0.0040	0.00072	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Arsenic	0.0097	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Barium	0.0128	0.0020	0.00019	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Beryllium	0.00026 U	0.0020	0.00026	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Cadmium	0.0043	0.0020	0.00027	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Calcium	9.33	0.50	0.019	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Chromium	0.0020	0.0020	0.00013	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Lead	0.0487	0.0020	0.00048	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Magnesium	1.76	0.50	0.014	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Mercury	0.000050 U	0.00020	0.000050	mg/l	1	06/15/15	06/15/15	CC	SW846 7470A ¹
Nickel	0.0022 J	0.0040	0.00010	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Selenium	0.0069	0.0040	0.00054	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²
Silver	0.00020 U	0.0020	0.00020	mg/l	2	06/15/15	06/16/15	EG	SW846 6020A ²

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11105

(3) Prep QC Batch: MP26096

(4) Prep QC Batch: MP26097

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Misc. Forms

5


Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody
- LRC Form

CHAIN OF CUSTODY RECORD

TC68547

 APEX Office Location: <u>Dallas</u> Project Manager: <u>R. Simpson</u>		Laboratory: <u>Acute</u> Address: _____ Contact: _____ Phone: <u>713-271-4700</u> PO/SO #: _____		ANALYSIS REQUESTED: _____		Lab use only Due Date: _____ Temp. of coolers when received (C°): _____ Page <u>1</u> of <u>1</u>											
Sampler's Name: <u>Jason Minter</u> Proj. No.: <u>2020120079</u>		Sampler's Signature: <u>[Signature]</u> Project Name: <u>Lawrence Creek</u>		No/Type of Containers: _____													
Matrix	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	Start Depth	End Depth	VOA	A/G 1L	250 ml	Glass Jar	P/O	Lab Sample ID (Lab Use Only)				
1 W	6-8-15	1853		X	2015-COF-SW-01							4	X	X	X		
2 W	6-8-15	1955		X	2015-COF-SW-02							4	X	X	X		
3 W	6-8-15	2050		X	2015-COF-DW-01							4	X	X	X		
W					Temp Blank												
Turn around time: <input checked="" type="checkbox"/> Normal <input type="checkbox"/> 25% Rush <input type="checkbox"/> 50% Rush <input type="checkbox"/> 100% Rush																	
Relinquished by (Signature): <u>[Signature]</u>		Date: <u>6-9-15</u> Time: <u>1910</u>		Received by (Signature): <u>FedEx</u>		Date: <u>6-9-15</u> Time: <u>1910</u>		NOTES: <u>FedEx 6170 1279 6104</u>									
Relinquished by (Signature): <u>FedEx</u>		Date: <u>6/10/15</u> Time: <u>0900</u>		Received by (Signature): <u>Blanka Henry</u>		Date: <u>6/10/15</u> Time: <u>0900</u>											
Relinquished by (Signature): _____		Date: _____ Time: _____		Received by (Signature): _____		Date: _____ Time: _____											
Relinquished by (Signature): _____		Date: _____ Time: _____		Received by (Signature): _____		Date: _____ Time: _____											

Matrix: WW - Wastewater, W - Water, S - Soil, SD - Solid, L - Liquid, A - Air Bag, C - Charcoal tube, SL - sludge, O - Oil
Container: VOA - 40 ml vial, A/G - Amber / Or Glass 1 Liter, 250 ml - Glass wide mouth, P/O - Plastic or other

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TC68547: Chain of Custody

Page 1 of 3

Accutest Job Number: TC68547 **Client:** APEX **Project:** SEAWORTCREEK
Date / Time Received: 6/10/2015 **Delivery Method:** **Airbill #'s:** 617012796104
No. Coolers: 1 **Therm ID:** IR-5; **Temp Adjustment Factor:** 0;
Cooler Temps (Initial/Adjusted): #1: (0.8/0.8);

<u>Cooler Security</u>		<u>Y or N</u>		<u>Y or N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. SmpI Dates/Time OK	<input checked="" type="checkbox"/> <input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y or N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Cooler temp verification:	_____
3. Cooler media:	Ice (Bag)

<u>Quality Control Preservation</u>	<u>Y or N</u>	<u>N/A</u>	<u>WTB</u>	<u>STB</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
4. VOCs headspace free:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

<u>Sample Integrity - Documentation</u>	<u>Y or N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/> <input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/> <input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y or N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/> <input type="checkbox"/>
3. Condition of sample:	Intact

<u>Sample Integrity - Instructions</u>	<u>Y or N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Bottles received for unspecified tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Compositing instructions clear:	<input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>

Comments

Sample Receipt Log

Job #: TC68547

Date / Time Received: 6/10/2015 9:00:00 AM

Initials: BH

Client: APEX

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	TC68547-1	500ml	1	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-1	500ml	2	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-1	500ml	3	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8
1	TC68547-1	500ml	4	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8
1	TC68547-2	500ml	1	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-2	500ml	2	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-2	500ml	3	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8
1	TC68547-2	500ml	4	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8
1	TC68547-3	500ml	1	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-3	500ml	2	M3B	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68547-3	500ml	3	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8
1	TC68547-3	500ml	4	M3B	HNO3	pH < 2	IR-5	0.8	0	0.8

TC68547: Chain of Custody
Page 3 of 3

Appendix A Laboratory Data Package Cover Page

TC68547 This data package consists of

- ☐ This signature page, the laboratory review checklist, and the following reportable data:
- ☐ R1 Field chain-of-custody documentation;
- ☐ R2 Sample identification cross-reference;
- ☐ R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - a) Items consistent with NELAC 5.13 or ISO/IEC 17025 Section 5.10
 - b) dilution factors,
 - c) preparation methods,
 - d) cleanup methods, and
 - e) if required for the project, tentatively identified compounds (TICs).
- ☐ R4 Surrogate recovery data including:
 - a) Calculated recovery (%R), and
 - b) The laboratory's surrogate QC limits.
- ☐ R5 Test reports/summary forms for blank samples;
- ☐ R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - a) LCS spiking amounts,
 - b) Calculated %R for each analyte, and
 - c) The laboratory's LCS QC limits.
- ☐ R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - a) Samples associated with the MS/MSD clearly identified,
 - b) MS/MSD spiking amounts,
 - c) Concentration of each MS/MSD analyte measured in the parent and
 - d) Calculated %Rs and relative percent differences (RPDs), and
 - e) The laboratory's MS/MSD QC limits
- ☐ R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - a) The amount of analyte measured in the duplicate,
 - b) The calculated RPD, and
 - c) The laboratory's QC limits for analytical duplicates.
- ☐ R9 List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each
- ☐ R10 Other problems or anomalies.


The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Report. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC&25.6 and was last inspection by

☐ [X] TCEQ or ☐ _____ on April 2011. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

QA Manager

Name (Printed)	Signature	Official Title (printed)	Date
Richard Rodriguez		Laboratory Director	6/23/2015
_____			_____

LABORATORY REVIEW CHECKLIST: REPORTABLE DATA									
Laboratory Name:		Accutest Gulf Coast		LRC Date:		6/23/2015			
Project Name:		7020112C079 / Stewart Creek		Laboratory Project Number:		TC68547			
Reviewer Name:		Anita Patel		Prep Batch Number(s):		GP32525, MP26096, MP26097			
# ¹	A ²	DESCRIPTION				YES	NO	NA ³	NR ⁴ ER # ⁵
R1	OI	CHAIN-OF-CUSTODY (C-O-C):							
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?				X			
		Were all departures from standard conditions described in an exception report?				X			
R2	OI	Sample and quality control (QC) identification							
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?				X			
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?				X			
R3	OI	Test reports							
		Were samples prepared and analyzed within holding times?				X			
		Other than those results <MQL, were all other raw values bracketed by calibration standards?				X			
		Were calculations checked by a peer or supervisor?				X			
		Were all analyte identifications checked by a peer or supervisor?				X			
		Were sample detection limits reported for all analytes not detected?				X			
		Were all results for soil and sediment samples reported on a dry weight basis?						X	
		Were % moisture (or solids) reported for all soil and sediment samples?						X	
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?						X	
		If required for the project, are TIC's reported?						X	
R4	O	Surrogate recovery data							
		Were surrogates added prior to extraction?						X	
		Were surrogate percent recoveries in all samples within the laboratory QC limits?						X	
R5	OI	Test reports/summary forms for blank samples							
		Were appropriate type(s) of blanks analyzed?				X			
		Were blanks analyzed at the appropriate frequency?				X			
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?				X			
		Were blank concentrations <MQL?				X			
R6	OI	Laboratory control samples (LCS):							
		Were all COCs included in the LCS?				X			
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?				X			
		Were LCSs analyzed at required frequency?				X			
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?				X			
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?				X			
		Was the LCSD RPD within QC limits?						X	
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data							
		Were the project/method specified analytes included in the MS and MSD?				X			
		Were MS/MSD analyzed at the appropriate frequency?				X			
		Were MS (and MSD, if applicable) %Rs within the laboratory QC Limits?				X			
		Were the MS/MSD RPDs within laboratory QC limits?				X			
R8	OI	Analytical duplicate data							
		Were appropriate analytical duplicates analyzed for each matrix?				X			
		Were analytical duplicates analyzed at the appropriate frequency?				X			
		Were RPDs or relative standard deviations within the laboratory QC limits?				X			
R9	OI	Method quantitation limits (MQLs):							
		Are the MQLs for each method analyte included in the laboratory data package?				X			
		Do the MQLs correspond to the concentration of the lowest non-zero calibration				X			
		Are unadjusted MQLs and DCSSs included in the laboratory data package?					X		2
R10	OI	Other problems/anomalies							
		Are all known problems/anomalies/special conditions noted in this LRC and ER?				X			
		Was applicable and available technology used to lower the SDL to minimize the				X			
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package?				X			3

Laboratory Name:		Accutest Gulf Coast	LRC Date:		6/23/2015	
Project Name:		7020112C079 / Stewart Creek	Laboratory Project Number:		TC68547	
Reviewer Name:		Anita Patel	Prep Batch Number(s):		GP32525, MP26096, MP26097	
# ¹	A ²	DESCRIPTION	YES	NO	NA ³	NR ⁴ ER # ⁵
S1	OI	Initial calibration (ICAL)				
		Were response factors and/or relative response factors for each analyte within QC limits?	X			
		Were percent RSDs or correlation coefficient criteria met?	X			
		Was the number of standards recommended in the method used for all analytes?	X			
		Were all points generated between the lowest and highest standard used to calculate the curve?	X			
		Are ICAL data available for all instruments used?	X			
		Has the initial calibration curve been verified using an appropriate second source standard?	X			
S2	OI	Initial and continuing calibration verification (ICCV AND CCV) and continuing				
		Was the CCV analyzed at the method-required frequency?	X			
		Were percent differences for each analyte within the method-required QC limits?	X			
		Was the ICAL curve verified for each analyte?	X			
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?		X		5
S3	O	Mass spectral tuning				
		Was the appropriate compound for the method used for tuning?			X	
		Were ion abundance data within the method-required QC limits?			X	
S4	O	Internal standards (IS)				
		Were IS area counts and retention times within the method-required QC limits?			X	
S5	OI	Raw data (NELAC Section 5.5.10)				
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X			
		Were data associated with manual integrations flagged on the raw data?	X			
S6	O	Dual column confirmation				
		Did dual column confirmation results meet the method-required QC?			X	
S7	O	Tentatively identified compounds (TICs):				
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X	
S8	I	Interference Check Sample (ICS) results				
		Were percent recoveries within method QC limits?	X			
S9	I	Serial dilutions, post digestion spikes, and method of standard additions				
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X		4
S10	OI	Method detection limit (MDL) studies				
		Was a MDL study performed for each reported analyte?	X			
		Is the MDL either adjusted or supported by the analysis of DCSs?	X			
S11	OI	Proficiency test reports				
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X			
S12	OI	Standards documentation				
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate source?	X			
S13	OI	Compound/analyte identification procedures				
		Are the procedures for compound/analyte identification documented?	X			
S14	OI	Demonstration of analyst competency (DOC)				
		Was DOC conducted consistent with NELAC Chapter 5?	X			
		Is documentation of the analyst's competency up-to-date and on file?	X			
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)				
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X			
S16	OI	Laboratory standard operating procedures (SOPs)				
		Are laboratory SOPs current and on file for each method performed?	X			

LABORATORY REVIEW CHECKLIST (continued): Exception Reports			
Laboratory Name:	Accutest Gulf Coast	LRC Date:	6/23/2015
Project Name:	7020112C079 / Stewart Creek	Laboratory Project Number:	TC68547
Reviewer Name:	Anita Patel	Prep Batch Number(s):	GP32525, MP26096, MP26097
ER#	Description		
1	For reporting purposes, the MQL is defined in the report as the RL. The unadjusted MQL/RL is reported in the method blank. The SDL is defined in the report as the MDL.		
2	For reporting purposes, the method blank represents the unadjusted MQL. The DCS is on file in the laboratory and is not included in the laboratory data package.		
3	The laboratory is NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package for analytes that are listed in the Texas Fields of Accreditation.		
4	All anomalies are discussed in the case narrative		
5	See Metals CCB MDL check section of report.		

1ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked on

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries
- Metals CCB MDL Check

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26096
Matrix Type: AQUEOUS

Methods: SW846 6020A
Units: ug/l

Prep Date: 06/15/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	25	18		
Antimony	4.0	.048	.72	-0.79	<4.0
Arsenic	4.0	.12	.54	-0.10	<4.0
Barium	2.0	.026	.19	-0.66	<2.0
Beryllium	2.0	.04	.26	-0.37	<2.0
Boron	10	.73	.78		
Cadmium	2.0	.058	.27	-0.13	<2.0
Calcium	500	24	19	-15	<500
Chromium	2.0	.062	.13	-0.065	<2.0
Cobalt	4.0	.038	.11		
Copper	4.0	.09	.11		
Iron	100	32	14		
Lead	2.0	.05	.48	-0.31	<2.0
Lithium	2.0	.7	.66		
Magnesium	500	24	14	-7.1	<500
Manganese	2.0	.052	.45		
Molybdenum	2.0	.71	.56		
Nickel	4.0	.054	.1	-0.18	<4.0
Potassium	500	27	20		
Selenium	4.0	.98	.54	0.094	<4.0
Silver	2.0	.036	.2	-0.19	<2.0
Sodium	500	24	21		
Strontium	10	.068	.25		
Thallium	2.0	.1	.1		
Tin	10	.096	.35		
Titanium	10	.58	.56		
Vanadium	2.0	.068	.43		
Zinc	4.0	.084	.82		

Associated samples MP26096: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68547
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26096
 Matrix Type: AQUEOUS

Methods: SW846 6020A
 Units: ug/l

Prep Date: 06/15/15

Metal	TC68547-1 Original MS		Spikelot MPTW11	% Rec	QC Limits
Aluminum					
Antimony	0.0	443	400	110.8	75-125
Arsenic	1.0	407	400	101.5	75-125
Barium	94.9	532	400	109.3	75-125
Beryllium	0.0	381	400	95.3	75-125
Boron					
Cadmium	0.0	403	400	100.8	75-125
Calcium	143000	195000	50000	104.0	75-125
Chromium	0.36	442	400	110.4	75-125
Cobalt					
Copper					
Iron					
Lead	2.0	395	400	98.3	75-125
Lithium					
Magnesium	5790	60700	50000	109.8	75-125
Manganese					
Molybdenum					
Nickel	1.4	398	400	99.2	75-125
Potassium					
Selenium	1.1	346	400	86.2	75-125
Silver	0.0	403	400	100.8	75-125
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP26096: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26096
Matrix Type: AQUEOUS

Methods: SW846 6020A
Units: ug/l

Prep Date: 06/15/15

Metal	TC68547-1 Original	MSD	Spikelot MPTW11	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony	0.0	458	400	114.5	3.3	20
Arsenic	1.0	422	400	105.3	3.6	20
Barium	94.9	552	400	114.3	3.7	20
Beryllium	0.0	394	400	98.5	3.4	20
Boron						
Cadmium	0.0	406	400	101.5	0.7	20
Calcium	143000	198000	50000	110.0	1.5	20
Chromium	0.36	449	400	112.2	1.6	20
Cobalt						
Copper						
Iron						
Lead	2.0	400	400	99.5	1.3	20
Lithium						
Magnesium	5790	61300	50000	111.0	1.0	20
Manganese						
Molybdenum						
Nickel	1.4	401	400	99.9	0.8	20
Potassium						
Selenium	1.1	360	400	89.7	4.0	20
Silver	0.0	406	400	101.5	0.7	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc						

Associated samples MP26096: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68547

Account: APEXTTXD - APEX TITAN, Inc.

Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26096

Methods: SW846 6020A

Matrix Type: AQUEOUS

Units: ug/l

Prep Date:

06/15/15

Metal	BSP Result	Spikelot MPTW11	% Rec	QC Limits
Aluminum				
Antimony	433	400	108.3	80-120
Arsenic	402	400	100.5	80-120
Barium	436	400	109.0	80-120
Beryllium	393	400	98.3	80-120
Boron				
Cadmium	396	400	99.0	80-120
Calcium	50900	50000	101.8	80-120
Chromium	416	400	104.0	80-120
Cobalt				
Copper				
Iron				
Lead	394	400	98.5	80-120
Lithium				
Magnesium	52600	50000	105.2	80-120
Manganese				
Molybdenum				
Nickel	406	400	101.5	80-120
Potassium				
Selenium	366	400	91.5	80-120
Silver	412	400	103.0	80-120
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP26096: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: TC68547
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26096
 Matrix Type: AQUEOUS

Methods: SW846 6020A
 Units: ug/l

Prep Date: 06/15/15

Metal	TC68547-1 Original	SDL 2:10	%DIF	QC Limits
Aluminum				
Antimony	0.00	0.00	NC	0-10
Arsenic	1.02	0.00	100.0(a)	0-10
Barium	94.9	82.3	13.3*(b)	0-10
Beryllium	0.00	0.00	NC	0-10
Boron				
Cadmium	0.00	0.00	NC	0-10
Calcium	143000	131000	8.4	0-10
Chromium	0.364	0.00	100.0(a)	0-10
Cobalt				
Copper				
Iron				
Lead	1.97	0.420	78.6 (a)	0-10
Lithium				
Magnesium	5790	5100	12.0*(b)	0-10
Manganese				
Molybdenum				
Nickel	1.35	3.60	165.8(a)	0-10
Potassium				
Selenium	1.15	0.00	100.0(a)	0-10
Silver	0.00	0.00	NC	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP26096: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

(b) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26097
Matrix Type: AQUEOUS

Methods: SW846 7470A
Units: ug/l

Prep Date: 06/15/15

Metal	RL	IDL	MDL	MB	
				raw	final
Mercury	0.20	.05	.05	-0.045	<0.20

Associated samples MP26097: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68547
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26097
 Matrix Type: AQUEOUS

Methods: SW846 7470A
 Units: ug/l

Prep Date: 06/15/15

Metal	TC68547-1 Original MS	Spikelot HGTXAQ40 % Rec	QC Limits
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Mercury 0.0 3.1 3 103.3 75-125

Associated samples MP26097: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68547
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26097
 Matrix Type: AQUEOUS

Methods: SW846 7470A
 Units: ug/l

Prep Date: 06/15/15

Metal	TC68547-1		SpikeLot		MSD	QC
	Original	MSD	HGTXAQ40	% Rec		
Mercury	0.0	2.8	3	93.3	10.2	20

Associated samples MP26097: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68547
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26097
 Matrix Type: AQUEOUS

Methods: SW846 7470A
 Units: ug/l

Prep Date: 06/15/15

Metal	BSP Result	Spikelot HGTXAQ40	% Rec	QC Limits
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Mercury	3.0	3	100.0	80-120
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Associated samples MP26097: TC68547-1, TC68547-2, TC68547-3, TC68547-1F, TC68547-2F, TC68547-3F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

Metals CCB MDL Check

Job Number: TC68547
Account: APEXTTXD APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

The following elements are bracketed by CCB's at or above the MDL.

Sample	Element	Run ID	Time	MDL	Units	CCB Before		CCB After	
TC68547-1	Mercury	MA11098	13:59	.050	ug/l	CCB1	-0.069	CCB2	-0.063
TC68547-2	Mercury	MA11098	14:27	.050	ug/l	CCB2	-0.063	CCB3	-0.061
TC68547-3	Mercury	MA11098	14:29	.050	ug/l	CCB2	-0.063	CCB3	-0.061
TC68547-1F	Mercury	MA11098	14:30	.050	ug/l	CCB2	-0.063	CCB3	-0.061
TC68547-2F	Mercury	MA11098	14:32	.050	ug/l	CCB2	-0.063	CCB3	-0.061
TC68547-3F	Mercury	MA11098	14:34	.050	ug/l	CCB2	-0.063	CCB3	-0.061
TC68547-1	Antimony	MA11105	19:36	.36	ug/l	CCB1	-0.44	CCB2	-0.41
TC68547-2	Antimony	MA11105	20:39	.36	ug/l	CCB2	-0.41	CCB3	-0.44
TC68547-3	Antimony	MA11105	20:52	.36	ug/l	CCB2	-0.41	CCB3	-0.44
TC68547-1F	Antimony	MA11105	21:17	.36	ug/l	CCB3	-0.44	CCB4	-0.45
TC68547-2F	Antimony	MA11105	21:29	.36	ug/l	CCB3	-0.44	CCB4	-0.45
TC68547-3F	Antimony	MA11105	21:42	.36	ug/l	CCB3	-0.44	CCB4	-0.45
TC68547-1	Barium	MA11105	19:36	.093	ug/l	CCB1	-0.34	CCB2	-0.34
TC68547-2	Barium	MA11105	20:39	.093	ug/l	CCB2	-0.34	CCB3	-0.34
TC68547-3	Barium	MA11105	20:52	.093	ug/l	CCB2	-0.34	CCB3	-0.34
TC68547-1F	Barium	MA11105	21:17	.093	ug/l	CCB3	-0.34	CCB4	-0.34
TC68547-2F	Barium	MA11105	21:29	.093	ug/l	CCB3	-0.34	CCB4	-0.34
TC68547-3F	Barium	MA11105	21:42	.093	ug/l	CCB3	-0.34	CCB4	-0.34
TC68547-1	Beryllium	MA11105	19:36	.13	ug/l	CCB1	-0.18	CCB2	-0.18
TC68547-2	Beryllium	MA11105	20:39	.13	ug/l	CCB2	-0.18	CCB3	-0.18
TC68547-3	Beryllium	MA11105	20:52	.13	ug/l	CCB2	-0.18	CCB3	-0.18
TC68547-1F	Beryllium	MA11105	21:17	.13	ug/l	CCB3	-0.18	CCB4	-0.18
TC68547-2F	Beryllium	MA11105	21:29	.13	ug/l	CCB3	-0.18	CCB4	-0.18
TC68547-3F	Beryllium	MA11105	21:42	.13	ug/l	CCB3	-0.18	CCB4	-0.18
TC68547-1	Calcium	MA11105	19:36	9.3	ug/l	CCB1	-20	CCB2	-21
TC68547-2	Calcium	MA11105	20:39	9.3	ug/l	CCB2	-21	CCB3	-21
TC68547-3	Calcium	MA11105	20:52	9.3	ug/l	CCB2	-21	CCB3	-21
TC68547-1F	Calcium	MA11105	21:17	9.3	ug/l	CCB3	-21	CCB4	-22
TC68547-2F	Calcium	MA11105	21:29	9.3	ug/l	CCB3	-21	CCB4	-22
TC68547-3F	Calcium	MA11105	21:42	9.3	ug/l	CCB3	-21	CCB4	-22
TC68547-1	Nickel	MA11105	19:36	.050	ug/l	CCB1	-0.10	CCB2	-0.098
TC68547-2	Nickel	MA11105	20:39	.050	ug/l	CCB2	-0.098	CCB3	-0.10
TC68547-3	Nickel	MA11105	20:52	.050	ug/l	CCB2	-0.098	CCB3	-0.10
TC68547-1F	Nickel	MA11105	21:17	.050	ug/l	CCB3	-0.10	CCB4	-0.10
TC68547-2F	Nickel	MA11105	21:29	.050	ug/l	CCB3	-0.10	CCB4	-0.10
TC68547-3F	Nickel	MA11105	21:42	.050	ug/l	CCB3	-0.10	CCB4	-0.10

Calibration blank validation to the MDL is not a method requirement, but is included for information purposes only.

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries
- General Chemistry CCB MDL Check

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chloride	GP32525/GN66488	0.50	0.0	mg/l	10	10.1	101.0	90-110%
Sulfate	GP32525/GN66488	0.50	0.0	mg/l	10	10.8	108.0	90-110%

Associated Samples:
Batch GP32525: TC68547-1, TC68547-2, TC68547-3
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chloride	GP32525/GN66488	TC68707-10	mg/l	51.8	51.9	0.2	0-20%
Sulfate	GP32525/GN66488	TC68707-10	mg/l	33.6	33.5	0.3	0-20%

Associated Samples:

Batch GP32525: TC68547-1, TC68547-2, TC68547-3

(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68547
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chloride	GP32525/GN66488	TC68707-10	mg/l	51.8	50	103	102.4	80-120%
Sulfate	GP32525/GN66488	TC68707-10	mg/l	33.6	50	83.4	99.6	80-120%

Associated Samples:

Batch GP32525: TC68547-1, TC68547-2, TC68547-3

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

General Chemistry CCB MDL Check

Job Number: TC68547
Account: APEXTTXD APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

The following parameters are braketted by CCB's at or above the MDL.

Sample	Parameter	Run ID	Time	MDL	Units	CCB Before	CCB After
--------	-----------	--------	------	-----	-------	------------	-----------

No CCB's found at or above MDL.

Calibration blank validation to the MDL is not a method requirement, but is included for information purposes only.

Solid Sample Analytical Results

Accutest Laboratories Report

Dated June 23, 2015

Accutest Job Number: TC68548



06/23/15

Technical Report for

APEX TITAN, Inc.

7020112C079 / Stewart Creek

7020112C079

Accutest Job Number: TC68548

Sampling Date: 06/08/15

Report to:


APEX TITAN, Inc.
2351 W. Northwest Hwy Suite 3321
Dallas, TX 75220
JMinter@apexcoss.com

ATTN: Jason Minter

Total number of pages in report: 47



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.


Richard Rodriguez
Laboratory Director

Client Service contact: Sylvia Garza 713-271-4700

Certifications: TX (T104704220-15-21, 1M104704220-15-2) AR (14-016-0) AZ (AZ0769) FL (E87628)
KS (E-10366) LA (85695/04004) NJ (TX010) OK (2014-172) VA (7654)

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Test results relate only to samples analyzed.

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Sample Summary

APEX TITAN, Inc.

Job No: TC68548

7020112C079 / Stewart Creek
Project No: 7020112C079

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
TC68548-1	06/08/15	19:18	06/10/15	SO	Solid	2015-COF-SOLID-01 0-0.25
TC68548-1A	06/08/15	19:18	06/10/15	SO	Solid	2015-COF-SOLID-01 0-0.25
TC68548-2	06/08/15	20:15	06/10/15	SO	Solid	2015-COF-SOLID-02 0-0.25
TC68548-2A	06/08/15	20:15	06/10/15	SO	Solid	2015-COF-SOLID-02 0-0.25

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: APEX TITAN, Inc.

Job No TC68548

Site: 7020112C079 / Stewart Creek

Report Date 6/22/2015 4:55:39 PM

2 Samples were collected on 06/08/2015 and received intact at Accutest on 06/10/2015 and properly preserved in 1 cooler at 0.8 Deg C. These Samples received an Accutest job number of TC68548. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Metals By Method SW846 6010B

Matrix LEACHATE	Batch ID: MP26094
------------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68548-1AMS, TC68548-1AMSD, TC68548-1ASDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Cadmium, Chromium are outside control limits for sample MP26094-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

Metals By Method SW846 6020A

Matrix SO	Batch ID: MP26109
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC67604-12MSD, TC67604-12MS, TC67604-12SDL were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Lead, Selenium are outside control limits. Spike recovery indicates possible matrix interference or sample non-homogeneity.
- Matrix Spike Duplicate Recovery(s) for Chromium, Lead, Selenium, Antimony are outside control limits. High RPD due to possible sample nonhomogeneity or matrix interference.
- Matrix Spike/Matrix Spike Duplicate Recovery(s) for Calcium, Barium, Arsenic are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- RPD(s) for MSD for Antimony, Arsenic are outside control limits for sample MP26109-S2. High RPD due to possible sample nonhomogeneity or matrix interference.
- RPD(s) for Serial Dilution for Selenium are outside control limits for sample MP26109-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- RPD(s) for Serial Dilution for Arsenic, Beryllium, Cadmium, Chromium, Calcium, Silver are outside control limits for sample MP26109-SD1. Serial dilution indicates possible matrix interference.
- TC68548-2 for Chromium: Elevated reporting limit due to dilution required for matrix interference.
- TC68548-2 for Cadmium: Elevated reporting limit due to dilution required for matrix interference.
- TC68548-2 for Nickel: Elevated reporting limit due to dilution required for matrix interference.

Metals By Method SW846 7470A

Matrix LEACHATE	Batch ID: MP26101
------------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68548-1AMS, TC68548-1AMSD were used as the QC samples for metals.

Metals By Method SW846 7471A

Matrix SO	Batch ID: MP26111
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68645-1MS, TC68645-1MSD were used as the QC samples for metals.

Wet Chemistry By Method EPA 300

Matrix SO	Batch ID: GP32496
------------------	--------------------------

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) TC68635-2DUP, TC68635-2MS were used as the QC samples for Sulfate.
- Matrix Spike Recovery(s) for Sulfate are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Wet Chemistry By Method SM 2540 G

Matrix SO	Batch ID: GN66305
------------------	--------------------------

- Sample(s) TC68548-1DUP were used as the QC samples for Solids, Percent.

Wet Chemistry By Method SW846 9045C

Matrix SO	Batch ID: GN66306
------------------	--------------------------

- Sample(s) TC68548-1DUP were used as the QC samples for pH.
- TC68548-2 for pH: temp. 22.1 c
- TC68548-1 for pH: temp. 22.0 c

Accutest Laboratories Gulf Coast (ALGC) certifies that this report meets the project requirements for analytical data produced for the samples as received at ALGC and as stated on the COC. ALGC certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the ALGC Quality Manual except as noted above. This report is to be used in its entirety. ALGC is not responsible for any assumptions of data quality if partial data packages are used

Summary of Hits

Job Number: TC68548
Account: APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek
Collected: 06/08/15

Lab Sample ID	Client Sample ID	Result/ Qual	MQL	SDL	Units	Method
---------------	------------------	-----------------	-----	-----	-------	--------

TC68548-1 2015-COF-SOLID-01 0-0.25

Antimony	0.085 J	0.89	0.032	mg/kg	SW846 6020A
Arsenic	5.0	0.89	0.033	mg/kg	SW846 6020A
Barium	224	0.44	0.14	mg/kg	SW846 6020A
Cadmium	1.7	0.44	0.038	mg/kg	SW846 6020A
Calcium	342000	1100	49	mg/kg	SW846 6020A
Chromium	0.54	0.44	0.068	mg/kg	SW846 6020A
Lead	1030	1.8	0.25	mg/kg	SW846 6020A
Magnesium	2130	110	4.5	mg/kg	SW846 6020A
Nickel	2.6	0.89	0.058	mg/kg	SW846 6020A
Selenium	0.66 J	0.89	0.11	mg/kg	SW846 6020A
Sulfate	75.2	4.3	2.2	mg/kg	EPA 300
pH ^a	8.70			su	SW846 9045C

TC68548-1A 2015-COF-SOLID-01 0-0.25

Arsenic	0.0074 J	0.050	0.0050	mg/l	SW846 6010B
Barium	0.48 J	5.0	0.017	mg/l	SW846 6010B
Cadmium	0.0070 J	0.020	0.00045	mg/l	SW846 6010B
Chromium	0.0049 J	0.050	0.0014	mg/l	SW846 6010B
Lead	0.14	0.025	0.0089	mg/l	SW846 6010B
Nickel	0.020 J	0.20	0.0070	mg/l	SW846 6010B

TC68548-2 2015-COF-SOLID-02 0-0.25

Antimony	0.12 J	0.93	0.034	mg/kg	SW846 6020A
Arsenic	10.1	0.93	0.035	mg/kg	SW846 6020A
Barium	226	0.47	0.15	mg/kg	SW846 6020A
Cadmium ^b	0.23 J	0.93	0.081	mg/kg	SW846 6020A
Calcium	335000	1200	52	mg/kg	SW846 6020A
Chromium ^b	0.36 J	0.93	0.14	mg/kg	SW846 6020A
Lead	870	0.93	0.13	mg/kg	SW846 6020A
Magnesium	3780	230	9.6	mg/kg	SW846 6020A
Nickel ^b	2.2	1.9	0.12	mg/kg	SW846 6020A
Selenium	1.1	0.93	0.11	mg/kg	SW846 6020A
Sulfate	311	4.6	2.3	mg/kg	EPA 300
pH ^c	10.03			su	SW846 9045C

TC68548-2A 2015-COF-SOLID-02 0-0.25

Barium	0.46 J	5.0	0.017	mg/l	SW846 6010B
Cadmium	0.0011 J	0.020	0.00045	mg/l	SW846 6010B
Lead	0.23	0.025	0.0089	mg/l	SW846 6010B
Nickel	0.013 J	0.20	0.0070	mg/l	SW846 6010B

Summary of Hits

Job Number: TC68548
Account: APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek
Collected: 06/08/15



Lab Sample ID	Client Sample ID	Result/ Qual	ML	SDL	Units	Method
Analyte						

- (a) temp. 22.0 c
- (b) Elevated reporting limit due to dilution required for matrix interference.
- (c) temp. 22.1 c

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: 2015-COF-SOLID-01 0-0.25
Lab Sample ID: TC68548-1
Matrix: SO - Solid
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: 57.8

Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Antimony	0.085 J	0.89	0.032	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Arsenic	5.0	0.89	0.033	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Barium	224	0.44	0.14	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Beryllium	0.024 U	0.44	0.024	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Cadmium	1.7	0.44	0.038	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Calcium	342000	1100	49	mg/kg	50	06/17/15	06/19/15 EG	SW846 6020A ³	SW846 3050B ⁴
Chromium	0.54	0.44	0.068	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Lead	1030	1.8	0.25	mg/kg	20	06/17/15	06/19/15 EG	SW846 6020A ³	SW846 3050B ⁴
Magnesium	2130	110	4.5	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Mercury	0.021 U	0.053	0.021	mg/kg	1	06/17/15	06/17/15 CC	SW846 7471A ¹	SW846 7471A ⁵
Nickel	2.6	0.89	0.058	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Selenium	0.66 J	0.89	0.11	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴
Silver	0.031 U	0.44	0.031	mg/kg	5	06/17/15	06/18/15 EG	SW846 6020A ²	SW846 3050B ⁴

- (1) Instrument QC Batch: MA11106
 (2) Instrument QC Batch: MA11114
 (3) Instrument QC Batch: MA11120
 (4) Prep QC Batch: MP26109
 (5) Prep QC Batch: MP26111

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID:	2015-COF-SOLID-01 0-0.25	Date Sampled:	06/08/15
Lab Sample ID:	TC68548-1	Date Received:	06/10/15
Matrix:	SO - Solid	Percent Solids:	57.8
Project:	7020112C079 / Stewart Creek		

General Chemistry

Analyte	Result	MQL	SDL	Units	DF	Analyzed	By	Method
Solids, Percent	57.8			%	1	06/12/15	PA	SM 2540 G
Sulfate	75.2	4.3	2.2	mg/kg	1	06/17/15 12:16 ES		EPA 300
pH ^a	8.70			su	1	06/12/15 16:15 MS		SW846 9045C

(a) temp. 22.0 c

MQL = Method Quantitation Limit
SDL = Sample Detection Limit

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-SOLID-01 0-0.25
Lab Sample ID: TC68548-1A
Matrix: SO - Solid
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: 57.8

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	QML	SDL	Units	DF	Prep	Analyzed By	Method
Antimony	0.0051 U			0.025	0.0051	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Arsenic	0.0074 J	D004	5.0	0.050	0.0050	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Barium	0.48 J	D005	100	5.0	0.017	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Beryllium	0.00080 U			0.025	0.00080	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Cadmium	0.0070 J	D006	1.0	0.020	0.00045	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Chromium	0.0049 J	D007	5.0	0.050	0.0014	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Lead	0.14	D008	5.0	0.025	0.0089	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Mercury	0.000050 U	D009	0.20	0.00020	0.000050	mg/l	1	06/15/15	06/15/15 CC	SW846 7470A ¹
Nickel	0.020 J			0.20	0.0070	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Selenium	0.0049 U	D010	1.0	0.050	0.0049	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Silver	0.0012 U	D011	5.0	0.050	0.0012	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11100

(3) Prep QC Batch: MP26094

(4) Prep QC Batch: MP26101

QML = Method Quantitation Limit SDL = Sample Detection Limit
MCL = Maximum Contamination Level (40 CFR 261.6/96)

U = Indicates a result < SDL
J = Indicates a result > = SDL but < QML

Report of Analysis

Client Sample ID: 2015-COF-SOLID-02 0-0.25
Lab Sample ID: TC68548-2
Matrix: SO - Solid
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: 54.7

Metals Analysis

Analyte	Result	MQL	SDL	Units	DF	Prep	Analyzed By	Method	Prep Method	
Antimony	0.12 J	0.93	0.034	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Arsenic	10.1	0.93	0.035	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Barium	226	0.47	0.15	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Beryllium	0.025 U	0.47	0.025	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Cadmium ^a	0.23 J	0.93	0.081	mg/kg	10	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Calcium	335000	1200	52	mg/kg	50	06/17/15	06/19/15	EG	SW846 6020A ³	SW846 3050B ⁴
Chromium ^a	0.36 J	0.93	0.14	mg/kg	10	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Lead	870	0.93	0.13	mg/kg	10	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Magnesium	3780	230	9.6	mg/kg	10	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Mercury	0.021 U	0.054	0.021	mg/kg	1	06/17/15	06/17/15	CC	SW846 7471A ¹	SW846 7471A ⁵
Nickel ^a	2.2	1.9	0.12	mg/kg	10	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Selenium	1.1	0.93	0.11	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴
Silver	0.033 U	0.47	0.033	mg/kg	5	06/17/15	06/18/15	EG	SW846 6020A ²	SW846 3050B ⁴

(1) Instrument QC Batch: MA11106

(2) Instrument QC Batch: MA11114

(3) Instrument QC Batch: MA11120

(4) Prep QC Batch: MP26109

(5) Prep QC Batch: MP26111

(a) Elevated reporting limit due to dilution required for matrix interference.

MQL = Method Quantitation Limit
 SDL = Sample Detection Limit

U = Indicates a result < SDL
 J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID:	2015-COF-SOLID-02 0-0.25	Date Sampled:	06/08/15
Lab Sample ID:	TC68548-2	Date Received:	06/10/15
Matrix:	SO - Solid	Percent Solids:	54.7
Project:	7020112C079 / Stewart Creek		

General Chemistry

Analyte	Result	MQL	SDL	Units	DF	Analyzed	By	Method
Solids, Percent	54.7			%	1	06/12/15	PA	SM 2540 G
Sulfate	311	4.6	2.3	mg/kg	1	06/17/15 12:33 ES	EPA	300
pH ^a	10.03			su	1	06/12/15 16:15 MS	SW846	9045C

(a) temp. 22.1 c

MQL = Method Quantitation Limit
SDL = Sample Detection Limit

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Report of Analysis

Client Sample ID: 2015-COF-SOLID-02 0-0.25
Lab Sample ID: TC68548-2A
Matrix: SO - Solid
Project: 7020112C079 / Stewart Creek

Date Sampled: 06/08/15
Date Received: 06/10/15
Percent Solids: 54.7

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	QML	SDL	Units	DF	Prep	Analyzed By	Method
Antimony	0.0051 U			0.025	0.0051	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Arsenic	0.0050 U	D004	5.0	0.050	0.0050	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Barium	0.46 J	D005	100	5.0	0.017	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Beryllium	0.00080 U			0.025	0.00080	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Cadmium	0.0011 J	D006	1.0	0.020	0.00045	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Chromium	0.0014 U	D007	5.0	0.050	0.0014	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Lead	0.23	D008	5.0	0.025	0.0089	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Mercury	0.000050 U	D009	0.20	0.00020	0.000050	mg/l	1	06/15/15	06/15/15 CC	SW846 7470A ¹
Nickel	0.013 J			0.20	0.0070	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Selenium	0.0049 U	D010	1.0	0.050	0.0049	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²
Silver	0.0012 U	D011	5.0	0.050	0.0012	mg/l	5	06/15/15	06/15/15 NS	SW846 6010B ²

(1) Instrument QC Batch: MA11098

(2) Instrument QC Batch: MA11100

(3) Prep QC Batch: MP26094

(4) Prep QC Batch: MP26101

MQL = Method Quantitation Limit SDL = Sample Detection Limit
MCL = Maximum Contamination Level (40 CFR 261.6/96)

U = Indicates a result < SDL
J = Indicates a result > = SDL but < MQL

Misc. Forms

5

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody
- LRC Form

Office Location

Dallas

Project Manager R. Simpson

Sampler's Name

Laboratory: Acetest

Address:

Contact:

Phone: 713-771-4700

PO/SO #:

ANALYSIS
REQUESTED

70108548

CHAIN OF CUSTODY RECORD

Lab use only
Due Date:

Temp. of coolers
when received (C°):

1	2	3	4	5
---	---	---	---	---


Page 1 of 1

Lab Sample ID (Lab Use Only)

ANALYSIS REQUESTED

~~WFF~~ 6-8-15

Turn around time	<input checked="" type="checkbox"/> Normal	<input type="checkbox"/> 25% Rush	<input type="checkbox"/> 50% Rush	<input type="checkbox"/> 100% Rush
------------------	--	-----------------------------------	-----------------------------------	------------------------------------

Relinquished by (Signature)	Date:	Time:	Received by: (Signature)
	10-3-15	1910	FedEx

Relinquished by (Signature)	Date:	Time:	Received by: (Signature)
<i>[Signature]</i>	6/10/15	0900	<i>[Signature]</i>

Relinquished by (Signature)	Date:	Time:	Received by: (Signature)
-----------------------------	-------	-------	--------------------------

Relinquished by (Signature)	Date:	Time:	Received by: (Signature)
-----------------------------	-------	-------	--------------------------

Date: 10-9-95 Time: 1610

Date: 4/10/15 Time: 0900

Date: _____ Time: _____

Date:	Time:
-------	-------

NOTES:

FedEx 617012796104

Matrix	WW - Wastewater
Container	VOA - 40 ml vial

W - Water S - Soil SD - Solid
A/G - Amber / Or Glass 1 Liter

L - Liquid A - Air Bag
250 ml - Glass wide mouth

C - Charcoal tube
P/O - Plastic or other

SL - sludge O - Oil

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TC68548: Chain of Custody

Page 1 of 3

Accutest Job Number: TC68548 **Client:** APEX **Project:** SEAWORTCREEK
Date / Time Received: 6/10/2015 **Delivery Method:** **Airbill #'s:** 617012796104
No. Coolers: 1 **Therm ID:** IR-5; **Temp Adjustment Factor:** 0;
Cooler Temps (Initial/Adjusted): #1: (0.8/0.8);

<u>Cooler Security</u>		<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>		3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>		<input type="checkbox"/>		4. SmpI Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Cooler temp verification:	_____		
3. Cooler media:	Ice (Bag)		

<u>Quality Control Preservation</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>	<u>WTB</u>	<u>STB</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>		
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>			
4. VOCs headspace free:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>		

<u>Sample Integrity - Documentation</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	Intact		

<u>Sample Integrity - Instructions</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

Sample Receipt Log

Job #: TC68548

Date / Time Received: 6/10/2015 9:00:00 AM

Initials: BH

Client: APEX

Cooler #	Sample ID:	Vol	Bot #	Location	Pres	pH	Therm ID	Initial Temp	Therm CF	Corrected Temp
1	TC68548-1	4oz	1	2-18	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8
1	TC68548-2	4oz	1	2-18	N/P	Note #2 - Preservative check not applicable.	IR-5	0.8	0	0.8

5.1

5

TC68548: Chain of Custody
Page 3 of 3

Appendix A Laboratory Data Package Cover Page

TC68548 This data package consists of

- ☐ This signature page, the laboratory review checklist, and the following reportable data:
- ☐ R1 Field chain-of-custody documentation;
- ☐ R2 Sample identification cross-reference;
- ☐ R3 Test reports (analytical data sheets) for each environmental sample that includes:
 - a) Items consistent with NELAC 5.13 or ISO/IEC 17025 Section 5.10
 - b) dilution factors,
 - c) preparation methods,
 - d) cleanup methods, and
 - e) if required for the project, tentatively identified compounds (TICs).
- ☐ R4 Surrogate recovery data including:
 - a) Calculated recovery (%R), and
 - b) The laboratory's surrogate QC limits.
- ☐ R5 Test reports/summary forms for blank samples;
- ☐ R6 Test reports/summary forms for laboratory control samples (LCSs) including:
 - a) LCS spiking amounts,
 - b) Calculated %R for each analyte, and
 - c) The laboratory's LCS QC limits.
- ☐ R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
 - a) Samples associated with the MS/MSD clearly identified,
 - b) MS/MSD spiking amounts,
 - c) Concentration of each MS/MSD analyte measured in the parent and
 - d) Calculated %Rs and relative percent differences (RPDs), and
 - e) The laboratory's MS/MSD QC limits
- ☐ R8 Laboratory analytical duplicate (if applicable) recovery and precision:
 - a) The amount of analyte measured in the duplicate,
 - b) The calculated RPD, and
 - c) The laboratory's QC limits for analytical duplicates.
- ☐ R9 List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each
- ☐ R10 Other problems or anomalies.


The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Report. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC&25.6 and was last inspection by

[] [X] TCEQ or [] _____ on April 2011. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

QA Manager

Name (Printed)	Signature	Official Title (printed)	Date
Richard Rodriguez		Laboratory Director	6/22/2015
_____			_____

LABORATORY REVIEW CHECKLIST: REPORTABLE DATA									
Laboratory Name:		Accutest Gulf Coast		LRC Date:		6/22/2015			
Project Name:		7020112C079 / Stewart Creek		Laboratory Project Number:		TC68548			
Reviewer Name:		Anita Patel		Prep Batch Number(s):		GN66305, GN66306, GP32496, MP26094, MP26101, MP26109, MP26111			
# ¹	A ²	DESCRIPTION				YES	NO	NA ³	NR ⁴ ER # ⁵
R1	OI	CHAIN-OF-CUSTODY (C-O-C):							
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?				X			
		Were all departures from standard conditions described in an exception report?				X			
R2	OI	Sample and quality control (QC) identification							
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?				X			
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?				X			
R3	OI	Test reports							
		Were samples prepared and analyzed within holding times?				X			
		Other than those results <MQL, were all other raw values bracketed by calibration standards?				X			
		Were calculations checked by a peer or supervisor?				X			
		Were all analyte identifications checked by a peer or supervisor?				X			
		Were sample detection limits reported for all analytes not detected?				X			
		Were all results for soil and sediment samples reported on a dry weight basis?				X			
		Were % moisture (or solids) reported for all soil and sediment samples?				X			
		Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?						X	
		If required for the project, are TIC's reported?						X	
R4	O	Surrogate recovery data							
		Were surrogates added prior to extraction?						X	
		Were surrogate percent recoveries in all samples within the laboratory QC limits?						X	
R5	OI	Test reports/summary forms for blank samples							
		Were appropriate type(s) of blanks analyzed?				X			
		Were blanks analyzed at the appropriate frequency?				X			
		Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?				X			
		Were blank concentrations <MQL?				X			
R6	OI	Laboratory control samples (LCS):							
		Were all COCs included in the LCS?				X			
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?				X			
		Were LCSs analyzed at required frequency?				X			
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?				X			
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?				X			
		Was the LCSD RPD within QC limits?						X	
R7	OI	Matrix spike (MS) and matrix spike duplicate (MSD) data							
		Were the project/method specified analytes included in the MS and MSD?				X			
		Were MS/MSD analyzed at the appropriate frequency?				X			
		Were MS (and MSD, if applicable) %Rs within the laboratory QC Limits?					X		4
		Were the MS/MSD RPDs within laboratory QC limits?					X		4
R8	OI	Analytical duplicate data							
		Were appropriate analytical duplicates analyzed for each matrix?				X			
		Were analytical duplicates analyzed at the appropriate frequency?				X			
		Were RPDs or relative standard deviations within the laboratory QC limits?				X			
R9	OI	Method quantitation limits (MQLs):							
		Are the MQLs for each method analyte included in the laboratory data package?				X			
		Do the MQLs correspond to the concentration of the lowest non-zero calibration				X			
		Are unadjusted MQLs and DCSS included in the laboratory data package?					X		2
R10	OI	Other problems/anomalies							
		Are all known problems/anomalies/special conditions noted in this LRC and ER?				X			
		Was applicable and available technology used to lower the SDL to minimize the				X			
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package?				X			3

Laboratory Name:		Accutest Gulf Coast	LRC Date:		6/22/2015	
Project Name:		7020112C079 / Stewart Creek	Laboratory Project Number:		TC68548	
Reviewer Name:		Anita Patel	Prep Batch Number(s):		GN66305, GN66306, GP32496, MP26094, MP26101, MP26109, MP26111	
# ¹	A ²	DESCRIPTION	YES	NO	NA ³	NR ⁴ ER # ⁵
S1	OI	Initial calibration (ICAL)				
		Were response factors and/or relative response factors for each analyte within QC limits?	X			
		Were percent RSDs or correlation coefficient criteria met?	X			
		Was the number of standards recommended in the method used for all analytes?	X			
		Were all points generated between the lowest and highest standard used to calculate the curve?	X			
		Are ICAL data available for all instruments used?	X			
		Has the initial calibration curve been verified using an appropriate second source standard?	X			
S2	OI	Initial and continuing calibration verification (ICCV AND CCV) and continuing				
		Was the CCV analyzed at the method-required frequency?	X			
		Were percent differences for each analyte within the method-required QC limits?	X			
		Was the ICAL curve verified for each analyte?	X			
		Was the absolute value of the analyte concentration in the inorganic CCB < MDL?		X		5
S3	O	Mass spectral tuning				
		Was the appropriate compound for the method used for tuning?			X	
		Were ion abundance data within the method-required QC limits?			X	
S4	O	Internal standards (IS)				
		Were IS area counts and retention times within the method-required QC limits?			X	
S5	OI	Raw data (NELAC Section 5.5.10)				
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X			
		Were data associated with manual integrations flagged on the raw data?	X			
S6	O	Dual column confirmation				
		Did dual column confirmation results meet the method-required QC?			X	
S7	O	Tentatively identified compounds (TICs):				
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X	
S8	I	Interference Check Sample (ICS) results				
		Were percent recoveries within method QC limits?	X			
S9	I	Serial dilutions, post digestion spikes, and method of standard additions				
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?		X		4
S10	OI	Method detection limit (MDL) studies				
		Was a MDL study performed for each reported analyte?	X			
		Is the MDL either adjusted or supported by the analysis of DCSs?	X			
S11	OI	Proficiency test reports				
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X			
S12	OI	Standards documentation				
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate source?	X			
S13	OI	Compound/analyte identification procedures				
		Are the procedures for compound/analyte identification documented?	X			
S14	OI	Demonstration of analyst competency (DOC)				
		Was DOC conducted consistent with NELAC Chapter 5?	X			
		Is documentation of the analyst's competency up-to-date and on file?	X			
S15	OI	Verification/validation documentation for methods (NELAC Chapter 5)				
		Are all the methods used to generate the data documented, verified, and validated, where applicable?	X			
S16	OI	Laboratory standard operating procedures (SOPs)				
		Are laboratory SOPs current and on file for each method performed?	X			

LABORATORY REVIEW CHECKLIST (continued): Exception Reports			
Laboratory Name:	Accutest Gulf Coast	LRC Date:	6/22/2015
Project Name:	7020112C079 / Stewart Creek	Laboratory Project Number:	TC68548
Reviewer Name:	Anita Patel	Prep Batch Number(s):	GN66305, GN66306, GP32496, MP26094, MP26101, MP26109, MP26111
ER# ¹	Description		
1	For reporting purposes, the MQL is defined in the report as the RL. The unadjusted MQL/RL is reported in the method blank. The SDL is defined in the report as the MDL.		
2	For reporting purposes, the method blank represents the unadjusted MQL. The DCS is on file in the laboratory and is not included in the laboratory data package.		
3	The laboratory is NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices, and methods associated with this laboratory data package for analytes that are listed in the Texas Fields of Accreditation.		
4	All anomalies are discussed in the case narrative.		
5	See Metals CCB MDL check section of report.		

1ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked on

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries
- Metals CCB MDL Check

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26094
Matrix Type: LEACHATE

Methods: SW846 6010B
Units: mg/l

Prep Date: 06/15/15 06/15/15

Metal	RL	IDL	MDL	MB raw	final	MB raw	final
Aluminum	1.0	.041	.061				
Antimony	0.025	.005	.0051	-0.0096	<0.025	-0.0090	<0.025
Arsenic	0.050	.0085	.005	-0.00045	<0.050	-0.00065	<0.050
Barium	5.0	.0049	.017	0.0015	<5.0	-0.00047	<5.0
Beryllium	0.025	.00028	.0008	-0.00038	<0.025	-0.00079	<0.025
Boron	0.50	.007	.039				
Cadmium	0.020	.00055	.00045	-0.00085	<0.020	-0.00058	<0.020
Calcium	25	.037	.12				
Chromium	0.050	.0012	.0014	-0.00036	<0.050	-0.0021	<0.050
Cobalt	0.25	.00075	.0011				
Copper	0.13	.0056	.03				
Iron	0.50	.0057	.12				
Lead	0.025	.005	.0089	-0.0022	<0.025	0.00097	<0.025
Lithium	1.5	.01	.01				
Magnesium	25	.038	.04				
Manganese	0.075	.00027	.0093				
Molybdenum	0.050	.002	.001				
Nickel	0.20	.0035	.007	0.0029	<0.20	0.0	<0.20
Potassium	25	.2	.22				
Selenium	0.050	.0077	.0049	-0.0089	<0.050	-0.015	<0.050
Silver	0.050	.0058	.0012	0.00099	<0.050	-0.00036	<0.050
Sodium	25	.046	.52				
Strontium	0.050	.00031	.002				
Thallium	0.050	.0034	.0058				
Tin	0.10	.0035	.014				
Titanium	0.10	.0015	.0015				
Vanadium	0.25	.0015	.0015				
Zinc	0.50	.0026	.017				

Associated samples MP26094: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26094
 Matrix Type: LEACHATE

Methods: SW846 6010B
 Units: mg/l

Prep Date: 06/15/15

Metal	TC68548-1A Original MS		Spikelot MPTW11	% Rec	QC Limits
Aluminum					
Antimony	0.0	0.42	0.40	105.0	75-125
Arsenic	0.0	0.44	0.40	110.0	75-125
Barium	0.48	0.85	0.40	92.5	75-125
Beryllium	0.0	0.42	0.40	105.0	75-125
Boron					
Cadmium	0.0070	0.43	0.40	105.8	75-125
Calcium					
Chromium	0.0049	0.41	0.40	101.3	75-125
Cobalt					
Copper					
Iron					
Lead	0.14	0.51	0.40	92.5	75-125
Lithium					
Magnesium					
Manganese					
Molybdenum					
Nickel	0.020	0.40	0.40	95.0	75-125
Potassium					
Selenium	0.0	0.43	0.40	107.5	75-125
Silver	0.0	0.41	0.40	102.5	75-125
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP26094: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26094
 Matrix Type: LEACHATE

Methods: SW846 6010B
 Units: mg/l

Prep Date: 06/15/15

Metal	TC68548-1A Original	MSD	Spikelot MPTW11	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony	0.0	0.42	0.40	105.0	0.0	20
Arsenic	0.0	0.44	0.40	110.0	0.0	20
Barium	0.48	0.86	0.40	95.0	1.2	20
Beryllium	0.0	0.42	0.40	105.0	0.0	20
Boron						
Cadmium	0.0070	0.43	0.40	105.8	0.0	20
Calcium						
Chromium	0.0049	0.41	0.40	101.3	0.0	20
Cobalt						
Copper						
Iron						
Lead	0.14	0.52	0.40	95.0	1.9	20
Lithium						
Magnesium						
Manganese						
Molybdenum						
Nickel	0.020	0.40	0.40	95.0	0.0	20
Potassium						
Selenium	0.0	0.43	0.40	107.5	0.0	20
Silver	0.0	0.41	0.40	102.5	0.0	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc						

Associated samples MP26094: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68548

Account: APEXTTXD - APEX TITAN, Inc.

Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26094

Methods: SW846 6010B

Matrix Type: LEACHATE

Units: mg/l

Prep Date:

06/15/15

Metal	BSP Result	Spikelot MPTW11	% Rec	QC Limits
Aluminum				
Antimony	0.40	0.40	100.0	80-120
Arsenic	0.42	0.40	105.0	80-120
Barium	0.41	0.40	102.5	80-120
Beryllium	0.43	0.40	107.5	80-120
Boron				
Cadmium	0.41	0.40	102.5	80-120
Calcium				
Chromium	0.41	0.40	102.5	80-120
Cobalt				
Copper				
Iron				
Lead	0.37	0.40	92.5	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	0.38	0.40	95.0	80-120
Potassium				
Selenium	0.43	0.40	107.5	80-120
Silver	0.41	0.40	102.5	80-120
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP26094: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26094
 Matrix Type: LEACHATE

Methods: SW846 6010B
 Units: ug/l

Prep Date: 06/15/15

Metal	TC68548-1A Original	SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony	0.00	0.00	NC	0-10
Arsenic	0.00	0.00	NC	0-10
Barium	479	467	2.5	0-10
Beryllium	0.00	0.00	NC	0-10
Boron				
Cadmium	7.01	0.00	100.0(a)	0-10
Calcium				
Chromium	4.86	0.00	100.0(a)	0-10
Cobalt				
Copper				
Iron				
Lead	136	123	9.5	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	20.5	20.6	0.6	0-10
Potassium				
Selenium	0.00	0.00	NC	0-10
Silver	0.00	0.00	NC	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP26094: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26101
Matrix Type: LEACHATE

Methods: SW846 7470A
Units: mg/l

Prep Date: 06/15/15

Metal	RL	IDL	MDL	MB	
				raw	final

Mercury	0.00020	.00005	.00005	-0.000045	<0.00020
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Associated samples MP26101: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26101
 Matrix Type: LEACHATE

Methods: SW846 7470A
 Units: mg/l

Prep Date: 06/15/15

Metal	TC68548-1A Original MS	Spikelot HGTXAQ40	% Rec	QC Limits
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Mercury	0.0	0.0030	0.0030	100.0	75-125
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Associated samples MP26101: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

6.2.2

6

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26101
 Matrix Type: LEACHATE

Methods: SW846 7470A
 Units: mg/l

Prep Date: 06/15/15

Metal	TC68548-1A		Spikelot		MSD	QC
	Original MSD		HGTXAQ40 % Rec		RPD	Limit
Mercury	0.0	0.0030	0.0030	100.0	0.0	20

Associated samples MP26101: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26101
 Matrix Type: LEACHATE

Methods: SW846 7470A
 Units: mg/l

Prep Date: 06/15/15

Metal	BSP Result	Spikelot HGTXAQ40	% Rec	QC Limits
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Mercury 0.0031 0.0030 103.3 80-120

Associated samples MP26101: TC68548-1A, TC68548-2A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26109
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 06/17/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	13	3.1	.83		
Antimony	0.50	.006	.018	-0.087	<0.50
Arsenic	0.50	.015	.019	-0.068	<0.50
Barium	0.25	.0033	.081	-0.051	<0.25
Beryllium	0.25	.005	.013	-0.068	<0.25
Boron	1.3	.091	.7		
Cadmium	0.25	.0073	.022	-0.060	<0.25
Calcium	63	3.1	2.8	-1.6	<63
Chromium	0.25	.0078	.038	-0.059	<0.25
Cobalt	0.50	.0048	.018		
Copper	0.50	.011	.057		
Iron	13	4	.99		
Lithium	0.25	.088			
Lead	0.25	.0063	.035	-0.031	<0.25
Magnesium	63	3	2.6	-0.52	<63
Manganese	0.25	.0065	.12		
Molybdenum	0.25	.088	.09		
Nickel	0.50	.0068	.033	0.024	<0.50
Potassium	63	3.3	1.2		
Selenium	0.50	.12	.061	-0.0088	<0.50
Silver	0.25	.0045	.017	-0.017	<0.25
Sodium	63	3	2.9		
Strontium	1.3	.0085	.015		
Thallium	0.25	.013	.024		
Tin	1.3	.012	.09		
Titanium	1.3	.073	.052		
Vanadium	0.25	.0085	.045		
Zinc	0.50	.011	.15		

Associated samples MP26109: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26109
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: mg/kg

Prep Date: 06/17/15

Metal	TC67604-12 Original MS		SpikeLot MPTW11	% Rec	QC Limits
Antimony	14.6	33.4	24.2	77.8	75-125
Arsenic	158	241	24.2	343.3(a)	75-125
Barium	250	202	24.2	-198.5(a)	75-125
Beryllium	0.49	21.4	24.2	86.5	75-125
Cadmium	0.82	25.0	24.2	100.0	75-125
Calcium	61700	69700	3020	264.7(a)	75-125
Chromium	37.0	61.1	24.2	99.7	75-125
Lead	24.7	64.0	24.2	162.5N(b)	75-125
Magnesium	2460	5390	3020	96.9	75-125
Nickel	10.2	36.3	24.2	107.9	75-125
Selenium	0.50	16.6	24.2	66.6N(b)	75-125
Silver	0.72	25.4	24.2	102.1	75-125

Associated samples MP26109: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

(b) Spike recovery indicates possible matrix interference or sample non-homogeneity.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26109
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: mg/kg

Prep Date: 06/17/15

Metal	TC67604-12 Original MSD		Spikelot MPTW11	% Rec	MSD RPD	QC Limit
Antimony	14.6	26.6	24.2	49.6N(a)	22.7 (b)	20
Arsenic	158	144	24.2	-57.9(c)	50.4 (b)	20
Barium	250	180	24.2	-289.5(c)	11.5	20
Beryllium	0.49	20.0	24.2	80.7	6.8	20
Cadmium	0.82	23.5	24.2	93.8	6.2	20
Calcium	61700	68000	3020	208.4(c)	2.5	20
Chromium	37.0	50.9	24.2	57.5N(a)	18.2	20
Lead	24.7	62.8	24.2	157.6N(a)	1.9	20
Magnesium	2460	4990	3020	83.7	7.7	20
Nickel	10.2	34.5	24.2	100.5	5.1	20
Selenium	0.50	16.1	24.2	64.5N(a)	3.1	20
Silver	0.72	24.0	24.2	96.3	5.7	20

Associated samples MP26109: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike recovery indicates possible matrix interference or sample non-homogeneity.

(b) High RPD due to possible sample nonhomogeneity or matrix interference.

(c) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68548

Account: APEXTTXD - APEX TITAN, Inc.

Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26109

Methods: SW846 6020A

Matrix Type: SOLID

Units: mg/kg

Prep Date:

06/17/15

Metal	LCS Result	Spikelot MPLCD068	% Rec	QC Limits
Aluminum				
Antimony	80.2	94	85.3	0-214
Arsenic	110	113	97.3	78-122
Barium	169	155	109.0	82-117
Beryllium	105	109	96.3	83-117
Boron				
Cadmium	70.1	67.5	103.9	82-118
Calcium	5920	5850	101.2	81-119
Chromium	172	164	104.9	79-121
Cobalt				
Copper				
Iron				
Lithium				
Lead	91.4	90.1	101.4	82-119
Magnesium	3070	2790	110.0	76-125
Manganese				
Molybdenum				
Nickel	88.2	89.3	98.8	82-118
Potassium				
Selenium	141	156	90.4	78-122
Silver	53.7	52.6	102.1	75-125
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP26109: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26109
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: ug/l

Prep Date: 06/17/15

Metal	TC67604-12		QC	Limits
	Original	SDL 5:25 %DIF		
Antimony	239	243	1.7	0-10
Arsenic	2590	3440	32.9*(a)	0-10
Barium	4090	4110	0.5	0-10
Beryllium	8.01	3.65	54.5*(a)	0-10
Cadmium	13.4	9.66	28.2*(a)	0-10
Calcium	1010000	1170000	15.5*(a)	0-10
Chromium	607	685	12.9*(a)	0-10
Lead	405	431	6.6	0-10
Magnesium	40400	44100	9.2	0-10
Nickel	168	180	7.2	0-10
Selenium	8.24	13.0	57.4 (b)	0-10
Silver	11.8	9.45	19.6*(a)	0-10

Associated samples MP26109: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Serial dilution indicates possible matrix interference.

(b) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26111
Matrix Type: SOLID

Methods: SW846 7471A
Units: mg/kg

Prep Date: 06/17/15

Metal	RL	IDL	MDL	MB	
				raw	final
Mercury	0.029	.007	.011	-0.0074	<0.029

Associated samples MP26111: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26111
 Matrix Type: SOLID

Methods: SW846 7471A
 Units: mg/kg

Prep Date: 06/17/15

Metal	TC68645-1		Spikelot		QC
	Original	MS	HGTXWS1	% Rec	Limits

Mercury	0.0	0.39	0.461	84.7	75-125
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Associated samples MP26111: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26111
 Matrix Type: SOLID

Methods: SW846 7471A
 Units: mg/kg

Prep Date: 06/17/15

Metal	TC68645-1 Original MSD		Spikelot HGTXWS1 % Rec		MSD RPD	QC Limit
Mercury	0.0	0.39	0.461	84.5	0.0	20

Associated samples MP26111: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: TC68548
 Account: APEXTTXD - APEX TITAN, Inc.
 Project: 7020112C079 / Stewart Creek

QC Batch ID: MP26111
 Matrix Type: SOLID

Methods: SW846 7471A
 Units: mg/kg

Prep Date: 06/17/15

Metal	LCS Result	Spikelot HGLCD068 % Rec	QC Limits
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Mercury	6.7	8.37	80.0	73-128
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Associated samples MP26111: TC68548-1, TC68548-2

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

6.4.3

6

Metals CCB MDL Check

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Job Number: TC68548
Account: APEXTTXD APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

The following elements are bracketed by CCB's at or above the MDL.

Sample	Element	Run ID	Time	MDL	Units	CCB Before		CCB After	
TC68548-1A	Mercury	MA11098	17:00	.050	ug/l	CCB5	-0.067	CCB6	-0.056
TC68548-2A	Mercury	MA11098	17:06	.050	ug/l	CCB5	-0.067	CCB6	-0.056
TC68548-1A	Antimony	MA11100	17:00	1.0	ug/l	CCB7	-0.38	CCB8	-1.0
TC68548-2A	Antimony	MA11100	17:36	1.0	ug/l	CCB7	-0.38	CCB8	-1.0
TC68548-1A	Selenium	MA11100	17:00	.98	ug/l	CCB7	-1.6	CCB8	-0.53
TC68548-2A	Selenium	MA11100	17:36	.98	ug/l	CCB7	-1.6	CCB8	-0.53
TC68548-1	Antimony	MA11114	13:15	.073	ug/l	CCB2	-0.27	CCB3	-0.30
TC68548-2	Antimony	MA11114	13:27	.073	ug/l	CCB2	-0.27	CCB3	-0.30
TC68548-1	Arsenic	MA11114	13:15	.074	ug/l	CCB2	-0.25	CCB3	-0.28
TC68548-2	Arsenic	MA11114	13:27	.074	ug/l	CCB2	-0.25	CCB3	-0.28
TC68548-1	Beryllium	MA11114	13:15	.053	ug/l	CCB2	-0.27	CCB3	-0.27
TC68548-2	Beryllium	MA11114	13:27	.053	ug/l	CCB2	-0.27	CCB3	-0.27
TC68548-1	Cadmium	MA11114	13:15	.086	ug/l	CCB2	-0.24	CCB3	-0.24
TC68548-2	Cadmium	MA11114	13:33	.086	ug/l	CCB2	-0.24	CCB3	-0.24
TC68548-1	Chromium	MA11114	13:15	.15	ug/l	CCB2	-0.25	CCB3	-0.26
TC68548-2	Chromium	MA11114	13:33	.15	ug/l	CCB2	-0.25	CCB3	-0.26
TC68548-2	Lead	MA11114	13:33	.14	ug/l	CCB2	-0.16	CCB3	-0.092
TC68548-1	Calcium	MA11120	07:44	11	ug/l	CCB2	-21	CCB3	-18
TC68548-2	Calcium	MA11120	08:03	11	ug/l	CCB2	-21	CCB3	-18
TC68548-1	Lead	MA11120	07:37	.14	ug/l	CCB2	-0.23	CCB3	-0.20

Calibration blank validation to the MDL is not a method requirement, but is included for information purposes only.

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries
- General Chemistry CCB MDL Check

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Bromide	GP32496/GN66412	2.5	0.0	mg/kg	49.8	48.2	96.8	90-110%
Chloride	GP32496/GN66412	2.5	0.0	mg/kg	49.8	50.3	101.0	90-110%
Fluoride	GP32496/GN66412	2.5	0.0	mg/kg	49.8	49.2	98.8	90-110%
Sulfate	GP32496/GN66412	2.5	0.0	mg/kg	49.8	53.7	107.8	90-110%

Associated Samples:
Batch GP32496: TC68548-1, TC68548-2
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Bromide	GP32496/GN66412	TC68635-2	mg/kg	0.0	0.0	0.0	0-20%
Chloride	GP32496/GN66412	TC68635-2	mg/kg	194	196	1.0	0-20%
Fluoride	GP32496/GN66412	TC68635-2	mg/kg	84.9	84.5	0.5	0-20%
Solids, Percent	GN66305	TC68548-1	%	57.8	57.2	1.0	0-5%
Sulfate	GP32496/GN66412	TC68635-2	mg/kg	679	625	8.3	0-20%
pH	GN66306	TC68548-1	su	8.70	8.70	0.0	0-20%

Associated Samples:

Batch GN66305: TC68548-1, TC68548-2

Batch GN66306: TC68548-1, TC68548-2

Batch GP32496: TC68548-1, TC68548-2

(*) Outside of QC limits

7.2

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MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: TC68548
Account: APEXTTXD - APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Bromide	GP32496/GN66412	TC68635-2	mg/kg	0.0	72.1	91.9(a)	127.5N	80-120%
Chloride	GP32496/GN66412	TC68635-2	mg/kg	194	72.1	234(a)	55.5N	80-120%
Fluoride	GP32496/GN66412	TC68635-2	mg/kg	84.9	72.1	122(a)	51.5N	80-120%
Sulfate	GP32496/GN66412	TC68635-2	mg/kg	679	72.1	437(a)	-335.7(b)	80-120%

Associated Samples:

Batch GP32496: TC68548-1, TC68548-2

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(a) Outside control limits due to matrix interference and/or sample nonhomogeneity.

(b) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

7.3
7

General Chemistry CCB MDL Check

Job Number: TC68548
Account: APEXTTXD APEX TITAN, Inc.
Project: 7020112C079 / Stewart Creek

The following parameters are braketted by CCB's at or above the MDL.

Sample	Parameter	Run ID	Time	MDL	Units	CCB Before	CCB After
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No CCB's found at or above MDL.

Calibration blank validation to the MDL is not a method requirement, but is included for information purposes only.