

# Non-Registered Site Treatability Test Report

TVA Gallatin Fossil Plant  
Summer County, Tennessee

Tennessee Valley Authority

Revision 0

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## Executive Summary

This report details a series of laboratory treatability tests conducted in response to the Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order Number OGC19-0004 (the Order). In accordance with the Order, the Tennessee Valley Authority (TVA) is conducting a laboratory treatability test and field demonstration aimed at adjusting (increasing) the pH to sequester metals along the Non-Registered Site (NRS) boundary adjacent to the Cumberland River at the Gallatin Fossil Plant (GAF). The work was conducted in accordance with the NRS Treatability Test Work Plan (AECOM, 2019) approved by TDEC on November 25, 2019.

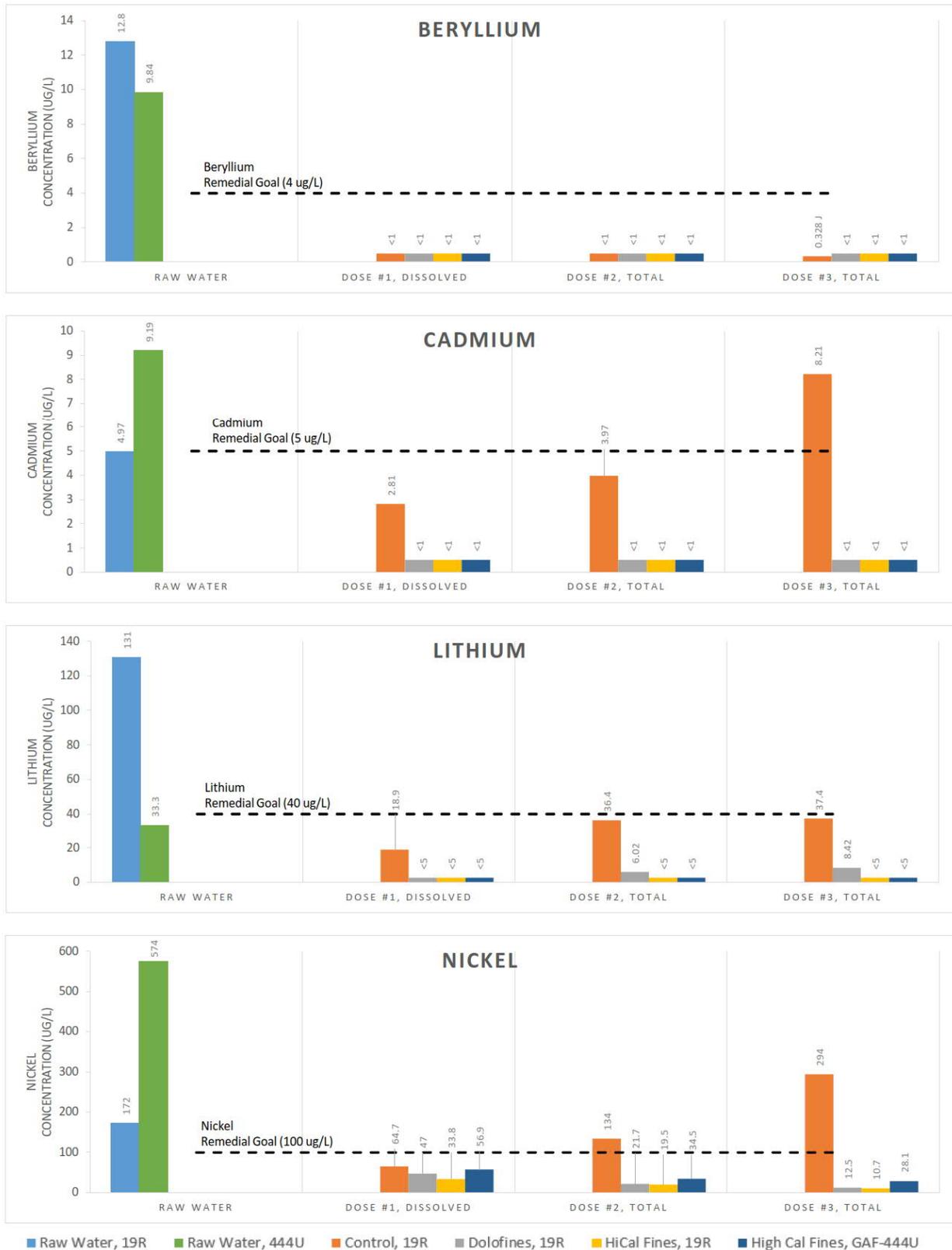
This report documents laboratory treatability test activities performed to identify remedial amendments that can be used in a Field Demonstration to achieve the objective of meeting groundwater protection standards (GWPS) at the downgradient boundary of the NRS. Based on the results of the testing and the field investigation documented in the NRS Field Investigation Report (AECOM, 2021), a Field Demonstration Work Plan, which will present the design for a permeable reactive barrier (PRB), and an associated monitoring plan are being developed. In addition to testing the downgradient PRB concept, a series of tests were conducted in support of potential source material treatment by direct soil treatment and in-situ stabilization (ISS). Source treatment may be an element of the overall NRS remedial approach and included in the Field Demonstration Work Plan also.

The treatability testing presented in this report included the following series of tests:

- A table-top study of a wide range of potential remedial amendments and selection of the most promising amendments for laboratory testing;
- Simple titration testing, which tests the effect of mixing remedial amendments with site groundwater;
- Microcosm testing, which tests the remedial amendments with combinations of site groundwater/amendment/sand and groundwater/amendment/site soil; and
- Column testing, using site groundwater and sand to simulate field conditions during remedial implementation of a PRB consisting of sand and remedial amendments.

The treatability testing included testing of 16 different possible amendments selected from the table-top study. In the titration trials only FerroBlack® (an iron sulfide based remedial amendment) provided treatment of all four target metals (beryllium [Be], cadmium [Cd], lithium [Li] and nickel [Ni]). Several other amendments treated Be, Cd, and Ni but showed poor treatment of Li in the titration trials. In the subsequent microcosm trials with sand, two limestone products provided the best treatment, including removal of Li. The successful limestone products were Dolomitic Fines (DoloFines) and High Calcium Fines (HiCalFines). DoloFines has a higher percentage of magnesium compared to HiCalFines. Successful treatment of target metals in site groundwater (both downgradient wells 19R and GAF-444U) with both HiCalFines and DoloFines is shown in Figure ES-1.

Figure ES-1 Microcosm Stage III Trials



The laboratory testing included adding site groundwater to DoloFines/sand mixtures until breakthrough of target metals was observed. In the laboratory studies, the fraction of DoloFines in sand with the maximum

concentration tested (0.2% by weight) providing the best results (i.e., the most site groundwater treated before breakthrough of target metals at concentrations above GWPS). This concentration corresponded to an effective dose of 0.45 liters of impacted site groundwater per gram of DoloFines. Thus, the a 0.2% DoloFines/sand mixture is anticipated to be used for design of the PRB field demonstration. The effective dose, along with calculated groundwater flow velocities and desired PRB amendment effective lifespan, will be used in the Field Demonstration Work Plan to determine dimensions of the pilot scale PRB.

The NRS Treatability Test Work Plan (Section 4.1.1) established five criteria for a successful remedial amendment. The criteria and evaluation that led to the selection DoloFines as the remedial amendment are as follows:

1. *Is appropriate for safe handling and application at field scale at the NRS in the vicinity of the Cumberland River: **Meets this requirement.*** DoloFines is a natural product derived from crushed limestone with high magnesium content. Groundwater with similar chemistry from the underlying limestone aquifer already discharges to the Cumberland River. As used in the PRB application, the DoloFines/sand material can temporarily generate a pH up to 11 within the barrier wall. However, this elevated pH will quickly dissipate in the native formation prior to reaching the river.
2. *Reduces metals concentration to below GWPS in groundwater: **Meets this requirement.*** In several trials DoloFines reduced concentrations of target metals (beryllium, cadmium, lithium and nickel) to below the GWPS values.
3. *Sequesters metals such that they are not remobilized above the GWPS: **Meets this requirement with appropriate PRB design.*** The effective dose for a 0.2% DoloFines PRB wall is 0.45 liters of groundwater treated per gram of reagent. Longevity of the PRB will depend on the location specific groundwater flow velocity, the width of the PRB selected, and the flow of groundwater through the PRB. Field verification of PRB longevity is a goal of the Field Demonstration. The PRB will not have an indefinite effective lifetime. The treatability testing showed that after the effective dose is exceeded, continued exposure to low pH groundwater will cause desorption of metals from the PRB and potentially exceedance of the GWPS in downgradient areas. The PRB therefore must be designed and maintained to stay within the effective dose of the treatment reagent.
4. *Does not alter aquifer geochemistry in such a way as to mobilize non-target metals at concentrations, approaching GWPS at a point-of-compliance: **Meets this requirement.*** Treated groundwater was tested for a comprehensive list of metals, anions, and general chemistry parameters in site soils. No GWPSs were approached or exceeded. The chemistry of the treated groundwater is similar to naturally occurring groundwater in the area that is not impacted by low pH or target metals. Use of DoloFines does not introduce new constituents to alluvial groundwater, which overlies limestone bedrock, and thus adding additional monitoring parameters in the demonstration test is unnecessary.
5. *Has the potential to be utilized in a long-term cost-effective remedial treatment in terms of capital cost and operations and maintenance: **Meets this requirement.*** DoloFines is a commercially available product readily available to the Gallatin area. DoloFines used in the treatability testing was provided by Longview Quarry in Saginaw, Alabama operated by Carmeuse Lime and Stone. Options for PRB construction and associated cost will be evaluated as part of the Field Demonstration Work Plan. Cost of reagents will be a small portion of the overall cost of a PRB demonstration or full-scale application. Cost-effectiveness of the PRB is most likely to be driven by the cost of construction, monitoring and operation.

## Path Forward for PRB Field Demonstration

The treatability results provided the basis for the next step, preparation of the Field Demonstration Work Plan for a downgradient PRB. The Field Demonstration Work Plan will specify the use of DoloFines, and the effective dose for sizing the PRB wall and calculating durability will be 0.45 liters of groundwater per gram of DoloFines. As the Field Demonstration Work Plan is being developed, some additional treatability tests are proposed to optimize the PRB design, including:

- The PRB longevity may be extended by increasing the dosage of DoloFines. Thus far, doses of 0.0082%, 0.1% and 0.2% have been tested. Each increase in dose provided some improved treatment. Testing of higher doses of DoloFines in sand column studies is recommended.
- Another area of optimization testing is the use of alternative sources of sand. Testing alternative sources of sand is proposed to see if alternative sources increase longevity or are less likely to leach metals after the PRB effective lifespan is exceeded.

The above tests can be conducted relatively quickly before fieldwork for PRB Field Demonstration begins. The results of these tests only affect the concentration of DoloFines and potentially the source of sand, and flexibility to accommodate such minor variations will be incorporated into the design provided in the PRB Field Demonstration Work Plan. For the purposes of the Field Demonstration Workplan, the concentration of DoloFines will be presented as a range from 0.2% to a maximum of 0.6%. The exact DoloFines concentration and sand source will be determined based on supplemental testing and will be specified in the Field Demonstration Workplan or in an addendum prior to the start of PRB construction.

### **Path Forward for Suspected Source Area Field Demonstration**

Over the course of the treatability testing and field investigation conducted at the NRS, TVA has identified the possible need to also complete remediation of source material in addition to conducting a field demonstration for a downgradient PRB, as a means of providing both upgradient and downgradient treatment. If the upgradient sources are removed or reduced, the PRB will either no longer be needed or will last longer and potentially not have to be regenerated or replaced. Both In-Situ Stabilization (ISS) and direct treatment of suspected source area soils (blending in an amendment to neutralize the acid but not creating a cement-like monolith) is being considered. Testing to date has been conducted as generally described in the Treatability Test Workplan and is presented in this report. Lessons learned from testing to date has led to develop of new methods to prepare and test samples. Laboratory testing of suspected source area soils is on-going. The completed results of tests focused on treatment of suspected source area soils will be reported in an addendum to this Treatability Test Report, and any field demonstration for source area treatment will be part of a separate Field Demonstration Work Plan.

## 1. Introduction and Purpose

AECOM has prepared the following Treatability Test Report on behalf of the Tennessee Valley Authority (TVA) to detail results of laboratory bench testing in response to the Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order Number OGC19-0004 (the Order). The Order requires that TVA conduct a laboratory treatability test and field demonstration aimed at adjusting pH to sequester metals along the Non-Registered Site (NRS) boundary adjacent to the Cumberland River at TVA's Gallatin Fossil Plant (GAF) to evaluate whether such actions can result in achievement of groundwater protection standards (GWPS). The Order also requires development of a Field Demonstration Work Plan, a Monitoring Plan, and ultimately a Corrective Action/Risk Assessment (CARA) Plan for closure of the NRS and remediation of groundwater to be completed following the field demonstration.

This report documents bench-scale treatability testing of potential remedial amendments (reagents) under various conditions. Based on the bench-scale studies conducted, recommendations for specific reagents and doses to be used in subsequent field demonstrations are provided in this report. The work described herein was conducted in accordance with the NRS Treatability Test Work Plan, TVA Gallatin Fossil Plant, Summer County, Tennessee (AECOM, 2019).

### 1.1 Background

The NRS location is depicted in Figure 1-1. The NRS is an approximately 70-acre closed surface impoundment historically used for the disposal of coal combustion residuals (CCR) prior to 1970. During groundwater monitoring activities for the NRS, concentrations of beryllium (Be), cadmium (Cd), nickel (Ni), and lithium (Li) were detected in groundwater samples collected from downgradient monitoring wells at concentrations greater than TDEC GWPS (TVA, 2017a).

The Draft Environmental Assessment Report (EAR) indicated that the source of the GWPS exceedances at the NRS did not appear to be associated with CCR, but rather with disposal of pyrite, which oxidizes to form acid in the presence of water and oxygen. The acidic conditions are believed to have resulted in Be, Cd, Li, and Ni concentrations above the GWPS in places along the downgradient boundary of the NRS. The Draft EAR concluded that the use of a pH adjustment strategy appears to be a feasible and effective groundwater corrective action technology to mitigate potential GWPS exceedances in the alluvium at the NRS.

Preliminary treatability testing was performed in 2018 to test reagents that could remove dissolved Be, Cd, and Ni from NRS groundwater samples and to obtain additional data necessary to develop additional pre-design studies. The preliminary treatability testing assessed five amendments: three strong bases (i.e., sodium hydroxide [NaOH], EnviroBlend® (EB), and AQUAMAG®) and two combination reagents (i.e., zero valent iron and FerroBlack®) that alter pH and/or oxidation-reduction potential (ORP). The preliminary treatability testing also looked at the nature of solids that precipitated during testing and the stability of those precipitates. The results of the treatability testing indicated that NaOH, EB, and FerroBlack® were successful at reducing Cd, Be, and Ni concentrations in groundwater samples. At the time of the 2018 bench testing, Li had not been identified as requiring treatment. At the conclusion of the preliminary treatability test, it was recommended that additional treatability testing be performed using site soil and incorporating additional site data to support the design and implementation of an in-situ pilot study.

On June 13, 2019, TDEC issued the Order requiring that TVA perform a treatability test and field demonstration to effect remediation of groundwater such that GWPS are met along the NRS boundary at compliance points adjacent to the Cumberland River. The Order also requires the submittal of a monitoring plan prior to the implementation of the field demonstration project and that a Corrective Action/Risk Assessment (CARA) Plan be developed by TVA and approved by TDEC following the demonstration project to develop a comprehensive remedial approach for the NRS.

## 1.2 Objectives

The objective of the laboratory treatability test and subsequent field demonstration is to determine whether pH and geochemical conditions can be adjusted in alluvial groundwater at the NRS and if such an adjustment can be an effective method to meet GWPS at the NRS boundary compliance points. The GWPS goals are:

<b>Metal</b>	<b>GWPS (µg/L)</b>
Beryllium (Be)	4
Cadmium (Cd)	5
Lithium (Li)	40
Nickel (Ni)	100

µg/L – micrograms per liter

As described in the NRS Treatability Test Work Plan a successful reagent would also meet these criteria:

1. Is appropriate for safe handling and application at field scale at the NRS in the vicinity of the Cumberland River,
2. Reduces metals concentrations to below the GWPS in groundwater,
3. Sequesters metals such that they are not remobilized at concentrations above the GWPS,
4. Does not alter aquifer geochemistry in such a way as to mobilize non-target metals at concentrations approaching GWPS at a point-of-compliance, and
5. Has the potential to be utilized in a long-term cost-effective remedial treatment in terms of capital cost and operations and maintenance.

## 1.3 Overview of Approach and Report Organization

The bench-scale testing was conducted at the AECOM treatability test laboratory in Austin, Texas. Tests were conducted using soil and groundwater samples collected from the NRS. Collection of soil and groundwater samples is described in Section 2.0.

Bench-scale testing was designed and conducted in support of three possible remediation scenarios, a permeable reactive barrier (PRB), soil blending, and in-situ stabilization (ISS). These remedial scenarios and the way they were approached in the treatability testing are described below.

In a PRB, the treatment reagent or amendment is blended with a permeable material (e.g., medium sand), and the mixture is placed along the groundwater flow path. As impacted water flows through the PRB, groundwater comes into contact with the amendment and the metals are removed from solution and sequestered within the PRB materials. Testing and development of the PRB scenario was a four-step process:

1. The first step was a table-top evaluation of a wide range of potential amendments to select the most promising amendment for laboratory testing.
2. The second step was titration testing of wide range of potential amendments. In these tests site groundwater was mixed with potential amendments to determine which reagents could be effective at removing metals to concentrations below GWPS.
3. The third step was microcosm testing of promising amendments identified in the titration studies. Microcosm studies consisted of blending amendments with sand and then repeatedly dosing the mixture with site groundwater. Water from each dosing was analyzed and the results compared to the GWPS. The dosing and testing cycles were continued until GWPS were no longer met. The microcosm testing provided both an indication of amendment effectiveness and required dose (amount of water treated per unit of amendment).

4. The fourth step was column studies. In these tests, the best amendments from the microcosm studies were blended with sand and placed in vertical columns. Site groundwater was then pumped into the bottom of each column at a controlled rate. The column studies provided data on the reaction time necessary for the metals to precipitate and further data on effectiveness and required dose.

The approach for PRB testing is shown in Figure 1-2 and presented in Section 3.0.

The second remediation scenario is direct blending of treatment amendments with site soil and site groundwater. This approach would most likely be applied in the source area rather than downgradient areas. Amendments could be delivered by injection or by soil blending. The titration testing was used to identify promising amendments for the direct blending tests. Promising reagents were first tested with site soil and site groundwater in a series of microcosm studies. Subsequent testing was conducted with site soil and site groundwater with the resulting mixture subject to a series of leaching tests. Direct soil treatment testing is described in Section 4.0.

The third treatment scenario is in-situ stabilization (ISS). For the ISS scenario, the goal is to treat source materials to create a low permeability area that rainwater and groundwater will flow around the material instead of passing through it. Under this concept, groundwater with elevated metals and low pH is not generated and therefore does not migrate to downgradient areas. The ISS testing involved mixing site soil with various doses and types of Portland cement. The resulting mixtures were subjected to hardness, permeability, leaching and long-term durability testing. ISS testing is presented in Section 5.0.

Conclusion and recommendations are presented in Section 6.0.

This report is primarily focused on development of amendments for use in a downgradient PRB. This report provides specific information on the anticipated effectiveness, required amendment dose, durability and limitations of a PRB. Testing of remedial options for source material is also presented in this report. Those options include direct soil treatment and ISS. The information presented in this report will later be used to evaluate the feasibility of various remediation scenarios.

## 2. Site Groundwater and Soil Collection

Soil and groundwater samples were collected at the site in accordance with the NSR Treatability Test Work Plan, as documented in the Field Investigation Report (AECOM, 2021) and shipped to the treatability laboratory. The following samples were collected:

- Groundwater from monitoring well 19R: This is a downgradient location near the river and contains low pH (<5) groundwater with Be, Cd, Li and Ni at concentrations above the GWPS.
- Groundwater from monitoring well GAF-444U: This is a downgradient location near the GAF Discharge Channel and contains low pH (<5) groundwater with Be, Cd and Ni at concentrations above the GWPS.
- Groundwater from monitoring well GAF-441U: This well is located in the suspected source area and contains low pH (<5) groundwater with Be, Cd, and Ni at concentrations above the GWPS.
- Groundwater from monitoring well GAF-440U: This well is in close proximity to the suspected source area but has neutral pH and metals are below the GWPS. This well is being used in the treatability testing to represent groundwater that would be present around the source area after direct soil or ISS treatment.
- Soil from the monitoring well GAF-441U Area: This soil was collected from boring NRS068 in the suspected source area at the same depth as the well screen for GAF441U and has been used for the direct soil treatment and ISS trials.
- Soil from monitoring well 19R area: Soil was collected from boring NRS068 at the same depth as the well screen for well 19R to be used in conjunction with groundwater from well 19R.
- Soil from the monitoring well GAF-444U area: Soil was collected from boring NRS070 at the same depth as the well screen for GAF-444U to be used in conjunction with groundwater from well GAF-444U.

Sample collection locations are depicted in Figure 2-1. Baseline laboratory analysis of groundwater and soil samples was conducted. The baseline laboratory analysis was used in this report to compare chemical parameters before and after treatment. Baseline results for groundwater are provided in Table 2-1. These baseline results were also used to assure that water collected for treatability testing would exceed the GWPS and thereby provide a valid test of the amendments. Groundwater used in the treatability testing was then re-tested periodically and those results are presented with each applicable trial. Baseline soil sampling results are provided in Table 2-2.

### 3. Bench Study Tests in Support of Permeable Reactive Barrier (PRB) Design

Bench testing for the PRB design included titrations studies, microcosm studies and column studies. A flow chart for these tests is shown in Figure 1-2. These tests are discussed in Sections 3.1 to 3.3. A summary of findings is provided in Section 3.4.

#### 3.1 Titration Studies

As presented in the NRS Treatability Test Work Plan, a wide range of potential reagents (also referred to as amendments) were screened based on their anticipated safety and effectiveness, likelihood of avoiding adverse impacts during field application, and whether the reagent was a proven technology. The final screening table is provided in Appendix A. Based on this screening sixteen different reagents were selected for titration testing to determine whether they could reduce target metal concentrations to below GWPS. Reagents selected for titration testing included reagents designed specifically for groundwater treatment, food-grade products and other commodity chemicals. This range of reagents includes sulfur-based products, phosphate-based products, products high in magnesium and several carbonate-based products.

##### 3.1.1 Titration Test Procedure

The titration test set-up is depicted in Figure 3-1:

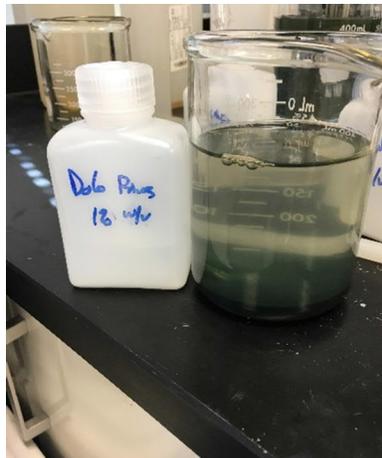


Figure 3-1 Titration Test Set-up

Titration testing was performed by adding measured amounts of the test reagent to site groundwater (water from monitoring wells 19R and GAF-444U). Reagent addition continued until the pH was near neutral. The blended water was then sampled for target metal concentrations.

To facilitate titration, solid reagents were first blended with deionized water to allow measured addition to the site groundwater. For solid materials with very low solubility a slurry was prepared, and the slurry was added to the groundwater sample and allowed time (>1 hour) to react.

After titration the treated water was allowed to settle and then water was decanted from the top for laboratory analysis. All samples were submitted for total metals (no filtration) for the target metals (Be, Cd, Ni and Li). To determine whether the presence of metals was the result of suspended particles in the sample, a subset of samples was also submitted for dissolved metals analysis. The bulk of the laboratory analyses were conducted by Eurofins TestAmerica, Pittsburg, Pennsylvania.

##### 3.1.2 Titration Test Results

Table 3-1 provides a summary of the titration testing conducted and results.

Titration testing was completed with no significant deviation from the NRS Treatability Test Work Plan. Three phases of titration tests were conducted for a total of 24 individual tests. In the first phase, a large number of potential reagents were tested. The second and third phases focused on improving Li treatment and repeating earlier successful trials. The primary goal of the titration testing was to screen a large number of potential reagents down to a shorter list of the most promising reagents for use in subsequent testing.

Findings of the titration studies were as follows:

- In the first phase of testing, four products (MagOx®, Tennessee Valley Limestone, Hydroxyapaite, PeroxyChem Geoform ®) failed to treat more than two of the four target metals and were dropped from further consideration.
- In the first phase, several reagents successfully treated three metals (Be, Cd, and Ni) but failed to treat Li.
- During titration testing, only the FerroBlack® products provided adequate Li treatment in the titration studies.

An effort to improve Li treatment was made in the second and third phases of testing. Efforts to improve Li treatment included combining reagents with calcium chloride (CaCl<sub>2</sub>) and zeolite and allowing three weeks for possible biological reactions to take place. These tests were generally unsuccessful.

For the titration trials, total metals results were similar to dissolved metals results, indicating that solid particles were not a significant source of recorded Li or other metals concentrations. In some cases dissolved metals concentrations were higher than total metals. This may be a result of interaction of the water with the preservative.

One limitation of titration studies is the lack of a solid matrix onto which metals can precipitate or to which they can adhere. This limitation was inferred to be a reason for the limited effectiveness of most reagents for Li and the relatively good performance of the FerroBlack® products, which rapidly generated a solid phase that settled out of solution during titration testing. Due to this known limitation, additional reagents were retained for use in the microcosm studies, which incorporate sand or site soil.

Among the reagents that treated Be, Cd, and Ni, but not Li; High Calcium Fines (HiCalFines) and Dolomitic Fines (DoloFines) were selected to advance to the microcosm trials, based on the following:

- Ni treatment with these reagents was generally better than other reagents in titration testing;
- These limestone-based products are known to be compatible with the site geochemistry, which is affected by limestone bedrock; and
- The processed limestone products were expected to have greater longevity compared to more soluble carbonate additives, such as sodium bicarbonate.

Sodium hydroxide (NaOH) was also selected to advance to microcosm studies because it provided good treatment for Be, Cd, and Ni and because NaOH is highly soluble in water and would be expected to be easier to inject in the field compared to FerroBlack®, HiCalFines or DoloFines. Its non-carbonate chemistry was also deemed desirable for purposes of comparing results between amendments during testing.

An expanded list of metals was also analyzed for the two best overall reagents (FerroBlack® and DoloFines). This testing was conducted to determine if the reagents contained metals or other constituents that may exceed the GWPS. Results are provided in Table 3-2. No metals or other constituents of potential concern were identified.

### 3.1.3 Recommendations from the Titration Testing

Four reagents were retained for the next stage trials (microcosm testing). The reagents retained for microcosm testing were FerroBlack® (T22 and Fe+ products), HiCalFines, DoloFines, and NaOH. CaCl<sub>2</sub> was also retained as a possible amendment to improve Li removal.

## 3.2 Microcosm Testing to Support PRB Design

The initial microcosm testing relied primarily on analytical testing for the target metals. The initial trials were followed by increasingly complex analytical testing of successful reagents, as described in Sections 3.2.1 to 3.2.5. The microcosm trials were conducted as described in the NRS Treatability Test Work Plan. As microcosm testing proceeded, additional trials were added to test different reagent combinations and to confirm earlier testing. Overall conclusions from the microcosm studies with recommendations for the column studies are provided in Section 3.2.6.

### 3.2.1 Microcosm Test Procedure

The microcosm test set-up is depicted in Figure 3-2.



Figure 3-2 Microcosm Test Set-up

The microcosm testing was designed to simulate the interactions between the site groundwater, reagents, and the PRB matrix material (in this case sand). The microcosm testing was conducted in 2.5-gallon buckets with spigot drains near the bottom. To conduct a trial, the test reagent was blended with the sand and then placed in the bucket. Site groundwater was then poured in from the top until the sand mixture was fully saturated and a small layer of water remained at the top of the bucket. For these trials, the mixture was allowed to react for one to two weeks after each dosing prior to sampling. Sampling was conducted by draining water out of the spigot. Water samples were allowed to settle for one hour and then the sample bottles were filled. The remaining water was then drained from the bucket and the bucket re-dosed with groundwater. Each redosing required approximately 1.8 liters of water to fully saturate the sand mixture. Buckets were then resampled and re-dosed at approximately one-week intervals. Trials were conducted with groundwater from well 19R, and separate trials were conducted with groundwater

from well GAF-444U. For each set of trials, a control (sand but no reagent) was also run. Concrete sand from a Gallatin local source was chosen as the PRB matrix material. This sand was selected because it has a low organic carbon content, is highly permeable and is readily available in the area. Specifications and metals analysis of the sand are provided in Appendix B.

Three phases (Phase I, Phase II, and Phase III) of microcosm testing were conducted. Results of each test were reviewed and evaluated to plan the next phase of testing.

In total, 12 microcosm buckets were prepared and tested. The number of dosing and draining cycles was 3 to 5 cycles as shown in the tables. Most of the early trials continued until breakthrough (i.e., when one or more target metals exceeded GWPS). Laboratory analysis in the early phases of microcosm studies focused primarily on the target metals (Be, Cd, Ni, and Li). In the final phase (Phase III) testing of successful reagents was repeated and additional laboratory analysis conducted. Additional analysis of treated groundwater included a longer list of metals, (including major cations calcium, sodium, and magnesium), anions, and alkalinity.

In the Phase III trials, the buckets were opened after the groundwater dosing and draining sequences were completed. Sand was removed from the approximate center of the bucket and sent for laboratory testing. The sand from the buckets was tested for metals, by sequential extraction, and minerals analysis. The sequential extraction analysis is a specialty analysis performed by TestAmerica, which is described in Section 3.2.4.

### 3.2.2 Microcosm Results for Target Metals

The microcosm results are provided in Tables 3-3a and 3-3b and depicted as bar graphs in Figures 3-3a, 3-3b and 3-3c.

Three controls were run during the microcosm trials. Two controls were run with sand and groundwater from well 19R, and one control was run with sand and groundwater from well GAF-444U. No treatment reagents were added to the controls. In the first trial with 19R water (Table 3-3a) all target metals were met after the first dose. The second dose exceeded the GWPS for Cd, Li, and Ni. Metals increased in subsequent dosing and failed for all four target metals by dose 4. The repeat of the sand/19R trial (Table 3-3b) had very similar results with the first dose meeting the GWPS and subsequent doses failing. The early dosing results for the 19R/sand alone trial indicate that the sand alone has some treatment capacity for metals in site groundwater. This observation is supported by the observed neutral pH after one application of site groundwater. However, the treatment capacity of the sand only lasted for one application of groundwater to the microcosm (i.e., approximately one pore volume of water). After breakthrough, metals concentrations continue to increase with each dose. Ni, in particular, increased to levels above the influent 19R water. The GAF-444U/sand trial showed breakthrough of Be after the first dose. For the GAF-444U/sand trial the pH after the first dose was in the acidic range (4.84).

One FerroBlack® trial was conducted during the microcosm study. The FerroBlack®/19R trial showed Li breakthrough on the first dose. After the first dose Li results were uneven with a result below the Li GWPS in dose 2 and results slightly above the GWPS in doses 3, 4, and 5. Be, Cd, and Ni results for the FerroBlack®/19R trial were below the GWPS for all five dosing events. The cause for the poor treatment of Li with FerroBlack® in the microcosm trial is unknown.

Four trials were run with HiCalFines. Results of the first two trials are shown in Table 3-3a. The third and fourth trials are shown in Table 3-3b. The HiCalFines/19R and HiCalFines & CaCl<sub>2</sub>/19R trials had similar results with successful treatment through three doses and breakthrough for Li and Ni at dose 4. Considering that no Li treatment was indicated in the titration studies, successful treatment of Li in the microcosm study indicated that the solid matrix (sand in this case) improves Li removal. The HiCalFines & CaCl<sub>2</sub> trial was conducted to evaluate calcium chloride (CaCl<sub>2</sub>) as a supplement to improve Li removal through biologically mediated reaction. No improvement in Li removal by use of CaCl<sub>2</sub> was observed in either short-term testing, or in extended testing, wherein the amended microcosm was allowed to react in a temperature-controlled environment for one month. The Phase III trials for HiCalFines include a repeat of the HiCalFines/19R trial and a trial of HiCalFines/GAF-444U. In both Phase III trials, HiCalFines provided successful treatment through 3 applications of site groundwater.

Three trials were run with DoloFines. Results of the first two trials are shown in Table 3-3a and 3-3b. Results of the third trial are shown in Table 3-3c. The 19R/DoloFines trial showed successful treatment through two doses and then failure for all metals at dose 3. This result was only slightly better than the control/19R trial. On the other hand, the GAF-444U/DoloFines trial showed successful treatment as evidenced by no breakthrough of target metals through 5 dosing cycles, with failure for Ni at dose 6. In Phase III, repeat trials were conducted by preparing fresh test vessels (new sand and amendments) and repeating the cycles of adding and draining site groundwater. For the repeat trial in Phase III, the DoloFines dose was increased slightly (from 0.082% to 0.1%). The repeat trial with 19R water yielded better results (no evidence of breakthrough after 3 doses), compared to the Phase I and II trials.

One trial was run with NaOH and 19R water. NaOH provided treatment through two applications of groundwater, but Ni concentrations exceeded the GWPS on the third application.

Based on the results of the microcosm testing, HiCalFines and DoloFines were selected for additional testing. NaOH was omitted from further testing, due to its limited efficacy treating Ni. FerroBlack® was not recommended for further testing due to its inability to consistently treat lithium, combined with its greater perceived potential for adverse effects and more complicated chemistry to manage during design. FerroBlack® has been used successfully in several applications, but compared to the limestone amendments (HiCalFines and DoloFines), FerroBlack® represents a greater geochemical shift in the aquifer. The primary components of FerroBlack® are iron and sulfur. Sulfur and iron chemistry is complex and subject to change by several factors, including microbial mediated reactions and reactions with oxygen. Introduction of more reduced iron and more sulfur into the system presents the possibility of unintended reactions. Generation of hydrogen sulfide is one possible adverse reaction that can occur when FerroBlack® is combined with low pH waters. While no evidence of adverse reactions with FerroBlack® were observed in these trials, and the potential problems would likely be manageable, there is no reason to pursue the use of FerroBlack® when other more effective options are available. One additional test using FerroBlack® was later run, as discussed in Section 3.3.

### 3.2.3 Microcosm Testing of Additional Groundwater Parameters

In addition to testing for the target metals (Be, Cd, Li, and Ni), samples from the Phase III microcosm trials were tested for a comprehensive list of metals, anions, and alkalinity. The purpose of this testing was to determine if the treatment process was mobilizing other constituents at levels that could exceed the GWPS. The comprehensive testing was conducted on the HiCalFines, DoloFines, and sand-only controls. Results and comparison to the GWPS are provided in Tables 3-4a and 3-4b. Testing results for the 19R raw water are also provided for comparison. As shown in Table 3-4a, GWPS criteria were met for all metals in all the HiCalFines and DoloFines trials. As shown in Table 3-4b, anions and other general chemistry parameters were low and similar to the raw groundwater chemistry (except pH and removal of the target metals).

### 3.2.4 Sequential Extraction and Metals Analysis of Sand and Soil Samples

To gain insight on the mechanisms and durability of metals removal, sequential extraction testing was conducted on various solid materials. The sequential extraction analytical protocol followed a seven-step process with each step consisting of a different extraction solution. Conceptually, the extractions generally progress from the least aggressive extraction agent to the most aggressive, as follows:

- In the first extraction, a magnesium sulfate solution extracts weakly sorbed (exchangeable) metals and electrostatic adsorption.
- In the second extraction, a sodium acetate/acetic acid solution (pH = 5) extracts metals associated with carbonate minerals by precipitation, co-precipitation or adsorption. .
- In the third extraction, an ammonium oxalate solution (pH = 3) extracts metals co-precipitated or otherwise associated with non-crystalline, amorphous solids (e.g., iron oxides).
- In the fourth extraction, a HAD/HDC acetic acid solution (pH < 3) extracts metals adsorbed to metal hydroxide precipitates.

- In the fifth extraction, a sodium hypochlorite solution (pH = 9.5) extracts metals bound in organic complexes.
- In the sixth extraction, a hydrochloric acid/nitric acid solution (pH = ~1) extracts metals precipitated as sulfides or bound to sulfides.
- In the final extraction, a hydrofluoric acid solution digests the sample. The residual solid should contain mainly primary and secondary minerals which may hold trace metals. These metals are not expected to be released into solution over a reasonable time span under conditions normally encountered in nature (Tessier et al., 1979).

The extract from each test was analyzed for the target metals plus iron and, in the case of the sand trials, aluminum. These metals are common natural components of sands and soil and provide information regarding the concentrations of these metals naturally present in the sand, the leachability of these metals under various circumstances and the ability to compare these properties in amended and unamended sand. The resolution or ability to differentiate treated and untreated sand by sequential extraction was hampered by the fact that the amendment doses were low (0.2% and less). This is further compounded by the fact, as noted in the mineral analysis, that the sand used contained dolomite and other minerals also present in the treatment amendments. Total metals were also analyzed for each sample prior to any of the extraction processes.

These tests extract both metals that have sorbed or precipitated to the sand/soil matrix, but also extract metals bound in the mineralogical matrix of the sand and native clay soils. While these tests provide insight into the possible forms (minerals they may be absorbed on to or precipitates that may have formed) of the target metals most of the components of the extraction solutions are not present at the site. Thus, the sequential extraction testing is not a predictor of metals leaching under site conditions. In concept, if two different reagents provided similar removal of target metals in the microcosm trials but one of the reagents had markedly different performance in the sequential testing (lower rate of leaching in specific leaching steps), then the mechanisms for metals removal from solution could be inferred and the relative durability of metal sequestered from solution could be a factor in selecting the final reagent.

Sequential extraction was conducted on the following materials:

- Sand used in the trials with no exposure to groundwater (sand/no groundwater),
- Sand after three doses with 19R groundwater (sand control),
- Sand and HiCalFines after three doses of 19R groundwater (HiCalFines/sand/groundwater),
- Sand and DoloFines after three doses of 19R groundwater (DoloFines/sand/groundwater),
- Untreated soil from the well 19R area (19R soil) also referred to as sample identification NRS068,
- Untreated soil from the well GAF-444U area (GAF-444U soil) also referred to as sample identification NRS070, and
- Untreated soil from near well GAF-441U (suspected source area soil) also referred to as sample identification NRS069.

Sample collection locations are depicted in Figure 2-1. Sequential extraction results for sand samples collected as part of the microcosm testing is presented in Table 3-5a. Sequential extraction testing on untreated soil samples from the site are presented in Table 3-5b.

The total concentration of Be and Cd in the sand and treated sand samples was relatively low (less than 1 milligram per kilogram [mg/kg]), and thus the extraction results in some trials are near or below the laboratory detection limits. For the sand trials, results for treated and untreated sand were similar, because the total amount of metals deposited by the groundwater, which contains concentrations of metals measured in the parts per billion range, and thus metals accumulation on the treated sand is small and difficult for the laboratory methods to detect. For example, in these microcosm studies with 19R groundwater containing 197 micrograms per liter ( $\mu\text{g/L}$ ) of Ni, three doses of site groundwater (total of 6 liters) could deposit a maximum of approximately 1,200  $\mu\text{g}$  of Ni onto the sand. There is approximately

7,800 grams of sand in the vessel. Adding 1,200 ug (0.0012 grams) of nickel to 7,800 grams of sand would increase the Ni content of the sand by only 0.15 mg/kg. The sequential extraction results are most valuable when considered together with the microcosm studies, the mineral analysis, and the column studies.

Sequential extraction results are discussed from the least aggressive (Step 1) to most aggressive (Step 7).

**Step 1 Exchangeable Fraction:** For the sand trials (both treated and untreated sands), no leaching for any of the target metals, iron (Fe), or aluminum (Al) occurred in Step #1 with the exception of a single sample. Three percent of the total nickel leached from the control sand sample during the seven steps of the sequential extraction process was removed in Step 1. Results for the untreated site soils samples were similar to the sand trials with no significant leaching of metals (i.e., >5% of the total mass leached during the seven steps) in Step 1.

**Step 2 Carbonate Fraction:** For the sand trials, no significant (>5%) leaching occurred for Be, Li, Ni, Fe and Al. However, Cd was observed to leach from the sand/no groundwater, DoloFines/sand/groundwater and HiCalFines/sand/groundwater samples with 18 to 25% of the Cd present leaching at Stage 2. The sand control sample had no detection of Cd at Step 2. However, all the Cd results were either below the method detection limit or only slightly above the method detection limit for all of these samples, and the total Cd concentration in the sand samples was between 0.0344 and 0.0832 mg/kg. For the site soils, no significant leaching of any of the metals occurred at Step 2. This comparison suggests that Cd in the sand and sand exposed to groundwater is not as tightly bound as Cd in site soils.

**Step 3 Non-crystalline Fraction:** For the sand trials, leaching was observed for Be (6 to 10%), Cd (32-47%), and Ni (7-14%) in the non-crystalline fraction. No significant Li leaching occurred in Step 3. Iron leaching ranged from 5 to 9%. Leaching results for all the sand samples in Step 3 were similar, with one exception, the sand control sample from which 47% of the Cd leached during Step 3, compared to 25% to 32% for the other sand trials. The site soil samples had similar results to the sand trials for Be and Li. However, Cd results for the soil were significantly higher (68 to 76%), compared to the sand samples, exceeding the cumulative percentage of Cd extracted from the sand trials during steps 1, 2, and 3. Ni leaching from the soil samples remained low (<5%) in Step 3.

**Step 4 Metal Hydroxide Fraction:** For the sand trials, significant leaching occurred for all the target metals in Step 4. The proportions of target metals leached in the metal hydroxide fraction were Be (13 to 16%), Cd (32 to 35%), Li (16-18%), and Ni (44 to 51%). Step 4 was the first stage to see significant (>5%) leaching of Li. Fe leaching ranged from 28 to 33%. For the soil trials, Ni leaching remained low on a percent basis (5 to 7%) compared to the sand trials. Step 4 is where the highest percent of Fe was leached from site soils. For the soil trials, the last of the Cd leached at Stage 4.

**Step 5 Organic Phase:** For the sand trials, no significant (>5%) leaching for Be, Cd, Li, Fe or Al occurred in Step 5. Leaching of Ni ranged from 9 to 11%. Soil results for Step 5 also showed no significant leaching of any of the metals, with the exception of Ni in the 19R soil sample.

**Step 6 Acid/sulfide Fraction:** For the sand trials, significant (>5%) leaching is observed for Be (7-9%), Li (18-22%), Ni (19-20%), and Fe (33 to 37%). No significant leaching of Cd or Al is observed in Step 6 for the sand trials. Soil results for Step 6 were similar to the sand trials.

**Step 7 Residual Fraction:** For the sand trials, all metals were still present at the final step at percentages above 5%. The proportions of target metals remaining in the Step 7 extraction were Be (57 to 65%), Cd (11 to 24%), Li (63 to 64%), Ni (7 to 11%), Fe (22 to 31%) and Al (92 to 93%). Comparing the soil trials to the sand trials shows that result at Step 7 are similar for Be, Li, and Fe, whereas no Cd remained in Step 7 for the soil samples whereas 11-24% of the Cd remained in the sand samples. (Al was not analyzed in the soil trials.) For Ni the opposite was observed. Residual Ni at Step 7 was higher in the soil trials (46 to 56%) compared to the sand trials (7-11%).

As presented previously, firm conclusions cannot be drawn solely from the sequential extraction data. The sequential extraction data indicate that Li and Be are relatively tightly bound (>70% of these metals

leached in Steps 6 and 7) in the sand and soil samples. By contrast, 20 to 25% of the Ni leached in Steps 1, 2 and 3 in the sand samples, but less than 3% of the Ni leached from soil during those steps. Cd showed total leaching of 44 to 57% in Steps 2 and 3 in the sand samples but showed 68 to 76% in Step 3 in the soil samples. These results indicate that leaching of Ni occurs in later steps in the soil trials compared to the sand trials, suggesting that nickel is more tightly bound to the soil than to the sand.

Total metals analysis on the treated and untreated sand was also conducted and is presented in **Table 3-6**. Enrichment of sand exposed to three doses of site groundwater is difficult to observe because the mass of metals in impacted groundwater is relatively low and likely overshadowed by natural variation in the sand.

Metals concentrations in the sand with no exposure to groundwater or treatment reagents are compared to the site soil below:

Metal	Sand 6010B analysis (mg/kg)	Site Soil (average 19R/GAF-444U/GAF-441U locations) 6010B analysis (mg/kg)
Be	0.463	1.09
Cd	0.0539	0.462
Li	5.42	19.8
Ni	10.0	19.1

These data demonstrate that Metals concentrations in the sand are lower than those in the site soil, and cadmium concentrations are an order of magnitude lower. Considering that the GWPS goals are in the parts per billion range and metals in soil are measured in parts per million, even the low metals level observed in the sand samples could result in exceedance of the GWPS if it readily leaches to groundwater. This observation has implications in the selection of the sand to be used in the PRB, and points to the importance of designing and maintaining the PRB to avoid exceeding the treatment capacity of the amendment selected. Ideally the sand used in the PRB would either have very low concentrations of target metals or the target metals would be present in a mineral form that resists leaching when exposed to site groundwater. As discussed later in this document, the prudent approach is to both conduct tests to find the best sand and to design and operate the PRB in a manner to avoid breakthrough, as sand naturally contains metals and acidic groundwater has been shown to leach metals from both sand and site soil.

### 3.2.5 Minerals Analysis of Soil and Sand Samples

To gain insight into the nature mechanisms of metals removal, sand and soil samples were sent to DCM Science Laboratory, Inc. (DCM) in Wheat Ridge, Colorado for minerals analysis. Reports from DCM are provided in Appendix C.

DCM Science Labs ran X-ray Diffraction Analysis (XRD) on three untreated site soils (GAF-SB-NRS069-40-50-03092020, GAF-SB-NRS070-50-60-03102020, and GAF-SB-NRS068-40-58-03122020), which were obtained from adjacent to the screen intervals of monitoring wells GAF-441U, GAF-444U, and 19R, respectively. XRD responses were compared to a library of minerals.

- Bulk samples were 26 to 48% quartz with possible trace amounts of Goethite and K-Feldspar.
- Total clay ranged from 52 to 74%. Clay was mostly Illite and Kaolinite with possible trace Chlorite.

Quartz is a silicate crystal and probably has little bearing on the absorption/desorption of the target metals. Illite and Kaolinite are clay minerals that would be expected to have some capacity to absorb and desorb the target metals. Illite is a layered alumino-silicate with primary components of silicon, Al, Fe, Mg, and K. Cation exchange capacity is in the range of 20-30 milliequivalents per 100 grams of soil (meq/100g). Kaolinite is  $Al_2Si_2O_5(OH)_4$  and will also contain Fe and other metals. Its cation exchange

capacity is generally weaker (1-15meq/100g) compared to Illite, indicating that it has less potential to sorb (or desorb) target metals present in the environment.

Chlorite is a  $\text{ClO}_2$  crystal. It is not considered relevant to treatment of target metals, because it is not likely that metals would be removed from solution or prevented from being soluble by chlorite.

Goethite is an iron oxyhydroxide which can play an important role in the sort of precipitation reactions that treatment is intended to induce. Iron/sulfur/hydroxide chemistry is very complex and dynamic, continuously changing. These iron bearing minerals may allow mobilization of the target metals or cause them to precipitate. The presence of Goethite is probable but not definite.

The baseline mineral analysis yielded the following conclusions:

- Confirms field observations about clay content in soil,
- Identifies mineralogical species such as Illite, Kaolinite, and Goethite that can affect the sorption and desorption of target metals, and
- Provides good baseline on the composition of minerals present, which can be compared to soils after treatment to better understand the treatment processes at work.

Mineral analysis samples were collected from the Phase III microcosm sand trials as follows:

**AECOM-Sand - 073020:** This material is sand without addition of any reagents or any dosing with site groundwater. The sand is a natural material with limited processing (water washed and sieved to meet ASTM standards for concrete sand). The material was produced by Pine Bluff Materials Company and was provided by a supplier in the Gallatin area (Garrot Brothers).

**AECOM- CONTROL +2 – 073020:** This material is sand from the same source as AECOM-Sand that has been dosed twice with water from monitoring well 19R. The process was to dose the sand with site groundwater, wait one week, drain the water out, and repeat the dose a second time, wait one week, drain it again, and then collect a sample of sand from the approximate center of the test vessel (bucket).

**AECOM-DOLO - +2 – 073020:** This material is sand from the same source as AECOM-Sand, which has been amended with 0.2% by weight of sand of DoloFines. The amended sand was then subjected to dosing with monitoring well 19R water two times and sampling as described for AECOM-CONTROL +2.

**AECOM-Hi CAL +2 – 073020:** This material is sand from the same source as AECOM-Sand which has been amended with 0.1% by weight of sand of HiCalFines. The amended sand was then subjected to dosing with monitoring well 19R water and sampling as described for AECOM-CONTROL +2.

Monitoring well 19R water used for the dosing has a low pH (<4) and contains Be (approx. 13 micrograms per liter [ $\mu\text{g/L}$ ]), Cd (approximately 6  $\mu\text{g/L}$ ), Li (approximately 140  $\mu\text{g/L}$ ) and Ni (approximately 200  $\mu\text{g/L}$ ).

DCM conducted the following tests:

- Semi-Quantitative X-Ray Diffraction (XRD)
- X-Ray Fluorescence (XRF)
- Scanning Electron Microscopy (SEM)

The nature of the samples and purpose of the study were discussed with DCM prior to analysis. In addition to standard analysis, DCM was asked to focus on the following:

- Calcite (present in the HiCalFines and DoloFines),
- Dolomite,
- Quartzite,
- Illite and Kaolinite,

- Iron  $\text{Fe}(\text{OOH})_x$ , pyrite, and other iron minerals,
- Al,
- Cadmium –  $\text{CdCO}_3$  (otavite)  $\text{CdS}$  (greenockite or hawleyite),  $\text{Cd}(\text{OH})_2$  (cadmium hydroxide),
- Beryllium (not detectable by XRF) –  $\text{BeO}$ ,  $\text{Be}(\text{OH})_2$ , (beryllium oxide and hydroxide),
- Nickel –  $\text{NiS}$  (millerite),  $\text{NiS}_2$  (vaesite)  $\text{Ni}_3\text{S}_2$  (heazlewoodite),  $\text{Fe}_5\text{NiS}_8/(\text{FeNi})_9\text{S}_8$  (greigite,/pentlandite),  $(\text{Fe}, \text{Ni})\text{O}(\text{OH})$  (limonite),  $\text{Mg},\text{Ni}(\text{OH})_3(\text{Si}_2\text{O}_5)$  (garnierite), and
- Lithium (not detectable by XRF) – Li minerals can be divided into three groups: silicates (spodumene- $\text{LiAlSi}_2\text{O}_6$ , petalite- $\text{LiAlSi}_4\text{O}_{10}$ ); micas (lepidolite- $[\text{Li},\text{Al}]_3[\text{Al},\text{Si}]_4\text{O}_{10}[\text{F},\text{OH}]_2$ , zinnwaldite- $[\text{Li},\text{Al},\text{Fe}]_3[\text{Al},\text{Si}]_4\text{O}_{10}[\text{F},\text{OH}]_2$  and phosphates (mainly amblygonite -  $[\text{Li},\text{Na}]\text{Al}[\text{F},\text{OH}]$ ).

### 3.2.5.1 XRD Results for Sand Samples

The results of the XRD testing is provided in Appendix C. All four samples were found to be predominantly quartz and silicate minerals (amphibole, K-feldspar, and plagioclase). These results are consistent with the sand that forms the base material for all four samples. Enrichment of calcite from the reagents is not apparent because only 0.1 to 0.2% of calcium bearing amendments were added to the sand samples. Enrichment of minerals associated with the target metals was not observable by XRD, because the amount of target metals deposited by dosing with 19R groundwater is very low.

### 3.2.5.2 XRF Results for Sand Trials

The results of the XRF testing is provided in Appendix C. As with XRD, the sensitivity of XRF makes it difficult to draw distinctions between the four samples tested.  $\text{MgO}$  appears slightly enriched in the AECOM-DOLO sample, consistent with the presence of  $\text{MgO}$  in dolomitic fines. Similarly,  $\text{CaO}$  may be slightly enriched in the amended samples. XRF results for Ni were essentially the same for all four samples. For the AECOM-DOLO and AECOM-Hi Cal samples, enrichment of nickel would be expected as nickel is removed from the groundwater during each dose and added to the sand. However, two doses of groundwater can only deposit a maximum of approximately 0.1 mg/kg of nickel. Thus, nickel enrichment from two doses of groundwater is not observable by XRF (10-15% precision/accuracy on the 1-100 mg/kg range).

### 3.2.5.3 SEM Results for Sand Trials

The results of the SEM testing are provided in Appendix C. The sample with no amendments and no dosing with groundwater (AECOM-Sand) shows trace amounts of calcite, dolomite, apatite and iron minerals. This finding explains why the unamended sand is providing a degree of groundwater treatment. These trace minerals are consistent with sand from a marine environment (calcite/dolomite from shell fragments, apatite from remains of fish bones).

The observation by SEM of calcite/dolomite fragments with primary and secondary coatings provides some insight into the mechanisms behind removal of the target metals from groundwater. Because the concentrations of amendments (DoloFines and HiCalFines) were less than 1% of the sand mass, it was difficult to observe major differences by SEM.

### 3.2.5.4 Overall Conclusions from Mineral Analysis

The mineralogy of amended sand and unamended sand are very similar. This is consistent with the relatively small doses of amendments that have been applied, the similarity of the amendments to minerals naturally present in the sand, and the low concentration of target analytes being treated in the microcosms. As anticipated in the NRS Treatability Test Work Plan, the mineral analysis does not have the resolution to observe the small amount of target metals deposited by application of site groundwater. It is also difficult to observe the amendments because the amount of amendments applied is very low.

Further mineral analysis with samples taken to failure (dosed with groundwater until breakthrough) or with much higher amendment doses (>1%) might provide clearer results. However, additional mineralogical testing is unlikely to change amendment selection or dosing. At this time, the practical value of further mineralogical testing seems minimal, and therefore, no further mineralogical testing is planned.

### 3.2.6 Discussion of Overall Microcosm Results and Selection of Reagents for Column Studies

HiCalFines and DoloFines were selected to advance to the next phase of testing (sand column studies). The selection was based primarily on meeting the GWPS for target metals (Tables 3-3a and 3-3b) as well as meeting GWPS for other metals (Tables 3-4a and 3-4b). Sequential extraction and minerals analysis did not show any major differences among untreated sand, DoloFines-treated sand and HiCalFines-treated sand. Both HiCalFines and DoloFines were effective for 3 or more dosings in the microcosm studies. Estimated effective doses are

- HiCalFines/19R Groundwater: >1.15 liters per gram of reagent
- HiCalFines/GAF-444U Groundwater: >1.10 liters per gram of reagent
- DoloFines/19R Groundwater: >0.81 liters per gram of reagent
- DoloFines/GAF-444U Groundwater: >1.16 liters per gram of reagent

The estimated effective doses were calculated by dividing the volume of groundwater added prior to breakthrough of one or more target metals by the mass of reagent blended into the sand. Effective doses for the two different limestone-based amendments with the two different groundwater sources were very similar. These results show consistency in treatment. While these calculations are a useful reference point for comparison among different amendments, the microcosm tests are a static batch process and may over-estimate the effective dose. The flow-through sand column tests (discussed later in this report) account for reduced contact time between the amendment and groundwater and typically provide more realistic estimates of effective dose. Thus, the sand column results will be used as the basis for selecting an effective dose for the field demonstration.

The matrix sand alone provided a limited degree of treatment. Mineral analysis of the sand showed traces of dolomite and other minerals that can provide pH adjustment and metals treatment.

If dosing with acid site groundwater past the effective dose occurs, desorption of metals from the sand/reagent matrix will occur as successive doses of acidic groundwater is added. Sequential extraction results further indicate that desorption, especially of Cd and Ni, is likely with these sand and reagent combinations.

FerroBlack® showed good treatment results for Be, Cd, and Ni but uneven results for Li. FerroBlack® was retained as an option, in the event that HiCalFines and DoloFines failed in subsequent testing.

NaOH provided short-term treatment and may be considered in regeneration trials at a later time but was eliminated as a primary treatment agent.

CaCl<sub>2</sub> did not provide improved treatment in the titration or microcosm trials and will not be tested further.

### 3.3 Sand Column Studies to Support PRB

The test set-up for sand column studies is shown in Figure 3-4.

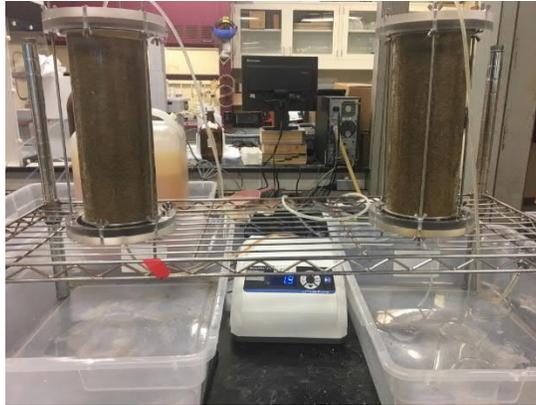


Figure 3-4 Sand Column Test Setup

In these trials, sand was blended with the test reagent then placed and lightly tamped into columns, which are approximately four inches in diameter and one foot high. During the column tests, water is pumped into the bottom of the column at a set rate, passes through the sand column, and comes out the top of the column. Water samples were periodically collected, allowed to settle in a beaker for one hour, and a subsample drawn from the top of the beaker and sent for laboratory analysis.

These studies are designed to mimic the dynamic condition of groundwater flowing through a permeable reactive barrier wall. The flow rates selected were an order of magnitude faster than the fastest local velocities expected in the field to accommodate the schedule for treatability testing. Flow rates were varied by a factor of two to assess whether reaction kinetics might bias the results of the column testing.

In total, six sand column trials were conducted as follows:

- Stage 1: Control Sand With no reagent, flow rate 0.5 milliliter per minute (mL/min)
- Stage 1: HiCalFines at 0.1% dose, flow rate 0.5 (mL/min)
- Stage 2: DoloFines at 0.2% dose, flow rate 0.5 (mL/min)
- Stage 2: ½ column FerroBlack® at 0.2%, ½ column HiCalFines at 0.2%, flow rate 0.5 mL/min
- Stage 3: HiCalFines at 0.2% dose, flow rate 0.25 mL/min
- Stage 4: Regeneration of DoloFines column, flow rate 0.25 mL/min.

Results of the sand column studies are presented in Tables 3-7a through 3-7d. As shown in Table 3-7a, the control column (sand only) was able to treat 1.39 liters of water (2.6 pore volumes [PV]) before breaking through for Cd, Li, and Ni concentrations and exceeding GWPS. Be breakthrough occurred after 3.01 liters (10 PV) of water was passed through the sand only column. The initial treatment followed by breakthrough of all the target metals is similar to results observed in the microcosm study controls (with sand only). After breakthrough, Li levels remained similar to the influent 19R groundwater. However, Be, Cd, and Ni levels after breakthrough increased to levels two or more times higher than the influent 19R groundwater. It is probable that repeated dosing of the sand with low pH groundwater eventually causes target metals naturally present in the sand to leach out of the sand.

In the Stage 1a trial with HiCalFines (0.1% dose), goals for target metals were met at 2.86 liters (5.5 PV) and showed breakthrough for Li at 4.47 liters (8.6 PV). The calculated dose for successful treatment was 0.7 liters per gram of HiCalFines. This result is similar to the microcosm studies. In this trial, breakthrough occurred when pH was above 7, and pH remained above 5 after breakthrough, whereas in the microcosm studies, breakthrough typically occurred as pH dropped below 5. Thus, the testing was continued to 21 pore volumes (10 liters). After breakthrough, Li and Be levels remained similar to the influent 19R groundwater. However, Cd, and Ni concentrations continued to rise and reach concentrations well above the influent 19R water, similar to the control column. For the HiCalFines trial, the test was continued to 21.6 pore volumes, which was well past the breakthrough point at 8.6 pore volumes. At that point, target metals concentrations in the water from the sand column were higher than the raw groundwater by a

factor of approximately 8 for Cd and 6 for Ni. For the control, the test was taken to 14.4 pore volumes, and target metals exceeded the raw water by a factor of 2 for Be, 6 for Cd, and 5 for Ni. Li levels in the control at the conclusion of the test were similar to the raw water (147 µg/L in control verses 131 µg/L in the raw water).

The cause for increasing metals concentrations after breakthrough is not known with certainty. In the early stages, target metals are removed from groundwater and adhere to the sand surface. As more low pH water is added, the amendment is neutralized and loses effectiveness. Newly deposited metals may then be desorbed from the sand with subsequent doses. However, the mass of recently deposited metals is not sufficient to account for the elevated metals concentrations at the end of the trials. It is therefore likely that removal of metals from the sand itself was occurring. This idea is supported by the sequential extraction studies done as part of the microcosm studies where target metals were removed from the sand only samples by the extraction steps that utilized a weak acid.

In Stage 1b (Table 3-7b), DoloFines at a 0.2% dose was tested. Goals for the target metals were met through 3.85 liters (7.9 PV) and showed breakthrough for Li at 4.40 liters (9 PV). The calculated dose for successful treatment was 0.45 liters per gram of DoloFines. After breakthrough, Li concentrations gradually increased as more groundwater was added and were similar to the influent concentrations at the end of the test. Be and Cd levels remained below the detection limit at the conclusion of the test, at which point 12.9 PV of groundwater had passed through the column. Ni levels remained below the GWPS throughout the test and showed a downward trend as more groundwater was added. At the conclusion of the test the Ni concentration was 0.477 µg/L (estimated below the reporting limit), which is far below the GWPS of 100 µg/L. Compared to the Stage 1a HiCalFines 0.1% trial, the DoloFines 0.2% trial had better results in term of the volume of groundwater treated before breakthrough and in terms of avoiding elevated metals after Li breakthrough.

In Stage 2, a layered column of 0.2% FerroBlack® and 0.2% HiCalFines was also tested to see if FerroBlack® could treat Be, Cd, and Ni and HiCalFines could remove residual Li. This concept was based on the microcosm trials where FerroBlack® provided successful treatment of Be, Cd, and Ni but provided mixed results for Li. Compared to the microcosm study, the dose of FerroBlack® was reduced from 2% to 0.2% to reduce the likelihood of coating the sand particles and plugging the column. Results for the layered column test are shown in Table 3-7b. Li breakthrough occurred at 2.63 liters (5.5 PV), similar to HiCalFines alone. Ni failed at 3.19 liters (6.6PV) and continued to climb to above the influent concentration. Cd remained below the GWPS (5 µg/L) but was detected above 3 µg/L. The addition of FerroBlack® did not improve performance compared to HiCalFines alone.

In Stage 3, an effort was made to improve the performance of HiCalFines by increasing the dose to 0.2% (same as DoloFines) and lowering the flow rate to 0.25 ml/min. The results of the Stage 3 trial are presented in Table 3-7c. The Stage 3 HiCalFines trial showed immediate breakthrough for Ni, but Ni concentrations fell as more groundwater was added and were below the GWPS at the conclusion of the test. The cause for temporary breakthrough of Ni is not known. Breakthrough of Li occurred at 2.64 liters. This result is not an improvement over the Stage 1 trial of HiCalFines.

In Stage 4, an initial experiment was conducted to evaluate the feasibility of regenerating amended sand after breakthrough has occurred by injecting additional reagent. The DoloFines column from Stage 2 was used for this experiment. After testing injection methods on untreated sand, a process for injecting fresh DoloFines into the spent column was developed. DoloFines were mixed at 8.5 g in 400 ml of deionized water to create a slurry. Water from the sand column was drained and the DoloFines slurry injected using a syringe at various depths starting at the bottom of the column. The concept was to simulate regeneration of a reactive barrier wall in the field by direct push injections. Visual observation showed that the distribution of the DoloFines slurry was uneven, and the slurry tended to rise to the top of the column. The effectiveness of the treatment regeneration was tested by pumping in 19R groundwater in the same manner as previous trials. Pumping water into the regenerated column was more difficult compared to previous trials, indicating that injection of the DoloFines slurry caused plugging of the column. It was possible to pump in 1.02 liters of groundwater and collect two samples of the effluent. Results are shown in Table 3-7d. Water passing through the regenerated column was successfully treated. However,

plugging of the column was a significant problem that would have to be resolved before deploying the regeneration method.

Conclusions from the sand columns trials are:

- DoloFines at a concentration of 0.2% provided the best overall treatment. The effective dose was >0.45 liters of groundwater treated per gram of DoloFines. Breakthrough was observed for Li at 4.40 liters (9.0 PV), but breakthrough of Be, Cd, and Ni was not observed during the test which ended at 6.32 liters (12.9 PV). For areas of the site where Li is below the GWPS (the GAF-444U area, for example), the effective dose for DoloFines will be higher (i.e., the PRB would remain effective for a longer period of time).
- As with the microcosm trials, dosing with acid water past the effective dose caused desorption of metals in the sand column trials. The effect was less pronounced with the DoloFines compared to HiCalFines. Field trials and full-scale applications must be designed to avoid exceeding the effective dose.
- The combination of FerroBlack® and HiCalFines in a layered column did not show improvement compared to HiCalFines alone. No further trials with FerroBlack® are proposed.
- For HiCalFines, increasing the percent of amendment from 0.1% to 0.2% did not increase the amount of water that could be treated before breakthrough.
- Regeneration of the spent DoloFines column was partially successful. The regenerated column was able to provide additional treatment but plugging of the column was observed. Further regeneration trials using liquid reagents or a thinner DoloFines slurry may be more successful. Additional testing of regeneration is anticipated, and the results will be compared to results for employing increased doses of DoloFines in the original sand mixture.

## 4. Trials in Support of Direct Source Soil Treatment

As described in the NRS Treatability Test Work Plan, a series of microcosm studies using site soil, treatment reagents and site groundwater was conducted. The purpose of these tests was to determine the feasibility and dosing for direct treatment of suspected source area soil. As discussed in Section 4.1 the microcosm trials were difficult to conduct as envisioned in the NRS Treatability Test Work Plan due to the low permeability and fine-grained site soils. Based on these observations, an alternative approach to developing direct source area treatment was envisioned. That alternative approach (Soil Blending) is discussed in Section 4.2. The Soil Blending Trials have not been completed and will be reported in a subsequent report addendum.

### 4.1 Microcosm Testing of Source Material Treatment

The microcosm testing was designed to simulate the interactions between the treatment reagents, site soil that may contain source material or residual source materials and site groundwater. For these trials, the approach was to blend site soil from an area of elevated metals in groundwater and low pH with treatment reagents, place in 2.5-gallon buckets, apply site groundwater, allow the site groundwater to drain from the mixture and sample the resulting water for target metals. This approach is designed to simulate treatment of soil and groundwater in an area of broad groundwater impacts. The concept was to continue adding impacted groundwater until breakthrough. At that point an effective dose for direct soil treatment could be calculated. The same bucket with spigots set-up used in the sand/reagent trials were used for the initial soil treatment trials. Blended mixtures were allowed to react for two weeks prior to sampling.

The first soil treatment trial was conducted with FerroBlack®. This trial was conducted shortly after the titration studies in which FerroBlack® provided the best overall treatment. For the first trial, small test mixes were used to establish the FerroBlack® dose required to reach neutral pH with the soil and groundwater. The first dose was 69.4 grams of FerroBlack® per kilogram of site soil. In the first trial, soil was obtained from near monitoring well 19R and 19R groundwater was used. A control sample was prepared by mixing soil from the 19R area with groundwater from 19R with no reagents added. The laboratory personnel reported significant difficulty blending the soil due to the high clay content (confirmed by the mineral analysis reported in Section 3.2) and stiffness of the soil. Further difficulty was encountered adding groundwater to the mixture. Very little water would seep into the blended soil and it was difficult to drain any water from the spigot at the bottom. Samples were drained from the spigot. After flow stopped, a vacuum pump was hooked up to the spigot, with a centrifuge tube in-line to collect the samples. The total metals split was centrifuged and then preserved. The dissolved metals split was filtered using a 0.45 µm filter and then preserved.

Results of the first and subsequent soil microcosm trials are presented in Table 4-1. The first trial with FerroBlack® was unsuccessful. Although the pH of the extracted water was near neutral (6.86), the water contained all target metals at levels above the GWPS. A probable explanation for elevated metals was the presence of very fine particles (less than 0.45 filter) in the water samples. The control sample with no reagent also had a neutral pH. The control failed for all target metals in the unfiltered sample but was below the GWPS in the filtered sample. Variability in the soil may partially explain the results. Acidic groundwater and acidic soils in the 19R area appear to exist as seams within a larger soil matrix of neutral pH. As the soil is blended, the overall pH becomes closer to neutral. Also, the test set-up is not well suited to very low permeability soils with very fine particles.

Lessons learned from the first trial were incorporated into the second trial. Soil for mixing was taken from the GAF-441U area which has more consistent low pH and a higher permeability. GAF-441U is located within the suspected source area for acidic groundwater. The test set-up and sampling procedures were also changed to include mixing with an epoxy-coated paint stirrer for an hour after the initial draining and prior to using the vacuum pump. The second trial used HiCalFines at a dose of 4.48 grams per kilogram site soil. HiCalFines were used because results of the early sand microcosm trials were available and were showing better results compared to FerroBlack®.

Three applications of groundwater were conducted in the second trial. The volume of water added and recovered in each application were very low, collecting only 0.5 to 0.6 L of per sample. In the second trial, the control samples consistently exceeded the GWPS. The HiCalFines samples met the GWPS for all metals in after all three applications of groundwater. The second set of trials showed that neutralization of site soil with low pH and meeting GWPS using HiCalFines was possible. However, the difficulties of blending the still low permeability soils remained. The primary problem for the test set-up was getting site groundwater to seep into the soil and then drawing a sample out for testing. While the microcosm trials did provide some useful information, an alternative method for preparing and testing was considered to be necessary. To compensate for the low permeability, an alternative test set-up was required and a more robust means of separating fine particles from leachate samples was needed. EPA sample preparation and leachate testing Methods 1315 and 1316, with modifications, were selected to assess amendment suitability for direct soil treatment. The alternative approach is discussed in Section 4.2.

## 4.2 Soil Blending and Leaching Studies for Direct Soil Treatment

As discussed in Section 4.1, the microcosm studies provided some encouraging results for HiCalFines (i.e., increased pH and target metal concentrations below the GWPS in treated groundwater), but the testing approach was not well suited to the low permeability soils and presence of very fine sand grains. The approach to testing direct soil treatment was revised. In the revised approach, the soil was blended with the reagent and then subjected to EPA leaching test methods 1315 and 1316. Water for the leaching tests was from the site, but not a monitoring well with low pH or elevated target metals. The logic for substituting out the impacted groundwater was two-fold. First using site groundwater that is not impacted better simulates a source area treatment where water infiltrating into the treated area would either not be impacted or be minimally impacted. The second reason is that conducting leaching tests with water that already has elevated metals would make it difficult to evaluate if the treated material is leaching or absorbing metals. Groundwater from monitoring well GAF-440U was selected for this testing because of near neutral pH, metals less than the GWPS, and total organic carbon (TOC) similar or above TOC level in wells impacted with metals. TOC may play a role in mobilizing or sequestering metals. Metals may be found in groundwaters with organic content associated with humic acid complexes or otherwise associated with decaying matter.

These trials consisted of the following formulations:

Test	Soil	Groundwater
Control – No Reagent	GAF-441U area	GAF-440U
0.5% HiCalFines	GAF-441U	GAF-440U
0.5% DoloFines	GAF-441U	GAF-440U
1% DoloFines	GAF-441U	GAF-440U

The above formulations were blended by hand by repeatedly overturning the soil in one third increments and then the blending of the whole volume. The blended soil was allowed to rest for one week before the start of the leaching tests.

EPA Method 1315 is an immersion test of whole samples. The test soils were compacted and placed in a permeable basket and submerged in the test water. Water was then sampled at predetermined times and tested for total and dissolved metals. The splits for total metals were centrifuged and decanted into the sample bottle. The dissolved sample splits were filtered using a 0.45 µm filter.

EPA Method 1316 is a leaching test where extractions are conducted using site groundwater and various liquid to solid ratios.

For both leaching tests the primary performance criteria for the reagent blends is demonstrating low levels of metals compared to the control. Achieving the GWPS in all leaching tests may not be a practical goal considering the aggressive nature of these leaching tests.

Results of the leaching tests for Direct Soil Treatment will be reported in an addendum to this report.

## 5. Trials of In-Situ Stabilization (ISS)

ISS is designed to both immobilize metals within a matrix and to create a low permeability zone that minimizes groundwater flow through the treated area and reduces the mass flux of metals from the stabilized soil. In this specific application the stabilizing agent, Portland cement may also serve to increase the soil pH and further reduce the mobility of the target metals. ISS is primarily applicable to the source area and thus ISS testing was conducted with soils from the suspected source area near monitoring well GAF-441U.

For this project a low dose (lean) and high dose (rich) of Portland cement were tested. Each dose has a slightly different objective. The lean dose would be designed to immobilize the metals, reduce permeability of the soils but not create a solid monolith. The rich dose is designed to achieve the same objectives and to create a solid monolith.

Samples from each test were first homogenized using a large spoon. The necessary soil and Portland cement weights were measured with a scale. Portland cement was pre-blended with a measured volume of potable water to create a thick slurry (approximately a one to one ratio). The Portland cement and soil were thoroughly blended by hand. Blending continued until the material was uniform in color and no clumps of unblended material were apparent. The approximate volume change between only soil and blended soil with Portland cement was noted.

Once blending was complete, the material was immediately placed in 3-inch by 6-inch cylindrical forms. The forms were carefully filled to minimize void spaces. Each test run required filling of five forms (three unconfined compressive strength [UCS] tests [at 7, 14, and 28-day intervals], one permeability test, and one leachability test). Upon filling, the forms were capped and placed in a cooler. Samples were sent to a geotechnical laboratory for UCS and permeability testing. The geotechnical laboratory stored the samples in a cooler and ran the UCS testing at the 7, 14, and 28-day intervals.

### 5.1 Stage I Trials

The purpose of the Stage I trials was to find the optimal percent of Portland cement to meet specific goals for permeability and unconfined compressive strength (UCS). A lean mix (3% Portland) and rich mix (6% Portland) were tested. Results from the first Trials are shown in Table 5-1. The first trials were conducted using Type II Portland cement from a Gallatin local supplier. Both mixes meet the goals for permeability and UCS.

### 5.2 Stage II Trials

The approach proposed in the NRS Treatability Test Work Plan was to select the best single blend from Stage I for additional testing. Additional testing would include 1315 leaching tests and wet/dry cycling tests. Considering that both lean and rich mixes performed well in Stage I and the importance of developing a viable source treatment, it was decided to test both mixes in Stage I. To provide a better understanding of treatment effectiveness and to compare results with the direct soil treatments (DoloFines and HiCalFines), testing by EPA Method 1316 leaching was added.

Type V cement is formulated to reduce degradation of concrete in high sulfate environments. According to the U.S. Bureau of Reclamation, Concrete Manual (1975), use of Type V cement is recommended if sulfate in groundwater is in the range of 1,500 to 10,000 mg/L. Groundwater in the suspected source area (well 441U) has shown sulfate levels of 7,060 and 7,560 mg/L and indicates that use of Type V cement may be appropriate. The Stage II trials will use Type V Portland cement. Permeability and UCS tests will be repeated to confirm that those parameters still meet the goals.

Results of the ISS leaching tests will be reported in an addendum to this report.

## 6. Data Quality Assessment

The methods used to assess data quality during the treatability test deviated from the methods presented in the Treatability Test Workplan (AECOM, 2019) and associated sampling and analysis plan (SAP). The SAP referenced the default data validation protocols for the Environmental Investigation being performed at GAF. However, while these protocols are appropriate to site data that are used in support of risk assessment or compliance determination, such protocols are not applicable to analysis of samples that have been processed in a treatability lab.

The data developed in the treatability lab were used to develop qualitative information that supported the selection of reagents for application to a future Field Demonstration. While analytical data from the various treatability lab tests were compared to GWPS for purposes of assessing the relative utility of the various remedial amendments being tested, those data are used in a qualitative sense (e.g., DoloFines treated groundwater in the microcosms better than FerroBlack®), rather than as a quantitative metric.

Data developed from treatability lab samples were reviewed to ensure that analytical results were not rejected for data quality issues, but formal validation and identification of estimated values beyond those determined by the analytical laboratory was not performed. However, analytical results for samples of soil and groundwater representative of site conditions (**Table 2-1** and **Table 2-2**) were validated in accordance with the Quality Assurance Framework Addendum for GAF (TVA, 2019), and data qualifiers appended to the results accordingly. Laboratory reports for these data were provided in the Field Investigation Report (AECOM, 2021). Laboratory data reports for treatability testing activities are provided in Appendix D.

## 7. Conclusions and Design Inputs for Field Demonstration

Conclusions and design input are organized by potential treatment strategy (i.e., downgradient PRB and suspected source area) in Sections 6.1 and 6.2.

### 7.1 Downgradient PRB

Conclusions and recommendations for a downgradient PRB wall approach were developed based on the following testing:

- 24 titration tests;
- 12 microcosm tests, including 3 to 6 applications of groundwater and sampling of each microcosm;
- 6 sand column studies with 8 to 10 samples collected in each study;
- Testing of treated water for a full suite of metals, anions and general chemistry parameters;
- Sequential extraction tests of sand, groundwater and reagent combinations; and
- Mineral analysis of sand, groundwater and reagent combinations.

For the PRB application consisting of an amendment and sand mixture, HiCalFines and DoloFines provided similar results and consistently met GWPS for the target metals (Be, Cd, Li and Ni) in the microcosm and sand column studies. Both HiCalFines and DoloFines provide successful treatment of groundwater from both the 19R and GAF-444U locations. Both HiCalFines and DoloFines met all GWPS criteria when treated water was tested for a comprehensive list of metals and other groundwater parameters. DoloFines provided better treatment in the final sand column trials (3.85 liters treated with DoloFines compared to 2.86 liters treated with HiCalFines). Additionally, the DoloFines showed a lower rate of desorption of metals after the effective dose was exceeded. For these reasons, DoloFines is recommended for the field demonstration.

The mixture of DoloFines used in the final sand column studies was 0.2% DoloFines by weight of sand and provided an effective dose of 0.45 liters of groundwater treated per gram of DoloFines. These parameters are recommended for use in designing the Field Demonstration for the PRB. DoloFines showed a higher effective dose in the microcosm studies (0.81 liters per gram with 19R groundwater and 1.16 liters per gram with GAF-444U groundwater). Thus, use of 0.45 liters per gram for pilot study design purposes has a degree of conservatism.

A PRB constructed with DoloFines or any reagent will have a finite life. When the PRB is operated past the design life, breakthrough of metals will occur. In the DoloFines sand column studies, application of groundwater after breakthrough of Li did not result in excess desorption of Cd, Be, or Ni and Li after 6.32 liters (12.9 PV) added. However, the potential for desorption of metals was observed in the microcosm studies. Based on the results of the column studies using unamended sand, desorption of metals after breakthrough is inferred to be due to leaching of metals from the sand used in the treatability tests. Testing of alternative sand for use in the PRB Field Demonstration is recommended.

The NRS Treatability Test Work Plan established criteria for a successful reagent. The criteria and evaluation for DoloFines is as follows:

#### **Is the amendment appropriate for safe handling and application at field scale at the NRS in the vicinity of the Cumberland River?**

Meets this requirement. DoloFines is a natural product derived from crushed limestone with high magnesium content. Groundwater with similar chemistry from the underlying limestone aquifer already discharges to the Cumberland River. As used in the PRB application, the DoloFines/sand material creates a pH up to 11 within the barrier wall. However, this elevated pH will quickly dissipate in the native formation prior to reaching the river.

### **Will the amendment reduce metals concentration to below GWPS in groundwater?**

Meets this requirement. In several trials DoloFines reduced concentrations of target metals (Beryllium, Cadmium, Lithium and Nickel) to below the GWPS values.

### **Does the amendment sequester metals such that they are not remobilized at concentrations above the GWPS??**

Meets this requirement if PRB is properly designed. The effective dose for a 0.2% DoloFines PRB wall is 0.45 liters of groundwater treated per gram of reagent. Longevity of the PRB will depend on the location specific groundwater flow velocity, the width of the PRB selected, and the flow of groundwater through the PRB. Field verification of PRB longevity is a goal of the Field Demonstration. The PRB will not have an indefinite effective lifetime. The treatability testing showed that after the effective dose is exceeded, continued exposure to low pH groundwater will cause desorption of metals from the PRB and potentially exceedance of the GWPS in downgradient areas. The PRB therefore must be designed and maintained to stay within the effective dose of the treatment reagent.

### **Does the amendment avoid altering aquifer geochemistry in such a way as to mobilize non-target metals at concentrations approaching GWPS at a point-of-compliance?**

Meets this requirement. Treated groundwater was tested for a comprehensive list of metals, anions, and general chemistry parameters in site soils. No GWPSs were approached or exceeded. The chemistry of the treated groundwater is very similar to naturally occurring groundwater in the area that is not impacted by low pH or target metals. Use of DoloFines does not introduce new constituents to alluvial groundwater, which overlies limestone bedrock, and thus adding additional monitoring parameters in the demonstration test is unnecessary.

### **Does the amendment have the potential to be utilized in a long-term cost-effective remedial treatment in terms of capital cost and operations and maintenance?**

Meets this requirement. DoloFines is a commercially available product readily available to the Gallatin area. DoloFines used in the treatability testing was provided by Longview Quarry in Saginaw, Alabama operated by Carmeuse Lime and Stone. Options for PRB construction and associated cost will be evaluated as part of the Field Demonstration Work Plan. Cost of reagents will be a small portion of the overall cost of a PRB demonstration or full-scale application. Cost-effectiveness of the PRB is most likely to be driven by the cost of construction, monitoring and operation.

### **Path Forward for PRB Implementation**

The treatability results provide the basis for the next step, preparation of a PRB design and development of the Field Demonstration Work Plan. As the PRB design is being prepared and prior to site work, some additional treatability tests are proposed to optimize the design. The PRB longevity may be extended by increasing the dosage of DoloFines. Thus far doses of 0.0082%, 0.1% and 0.2% have been tested. Each increased dose provided some improved treatment. Column studies of higher concentrations of DoloFines in sand (e.g., 0.3 to 0.6%) is recommended. Another area of optimization testing is evaluating alternative sources of sand. After breakthrough, when the treatment capacity of the reagent dose was exceeded, continued application of low pH groundwater appears to leach metals from the sand used in the treatability studies. Testing alternative sources of sand is proposed to minimize the potential for leaching metals and possibly extend the life of the PRB.

## **7.2 Suspected Source Area**

Two options for source materials treatment are undergoing supplemental treatability testing. One option is direct soil treatment utilizing amendments similar to those tested for downgradient treatment. Initial trials of direct soil treatment showed some promise using HiCalFines. However, the low permeability of the soil made effective testing using microcosms and dosing with groundwater difficult. Trials with direct blending and subsequent whole sample leaching (EPA Method 1315) and aggressive mixing and extraction (EPA Method 1316) are on-going. These tests will be reported in an addendum to this report. The second option for source materials treatment is ISS. Initial trials showed that 3% and 6% doses produced low

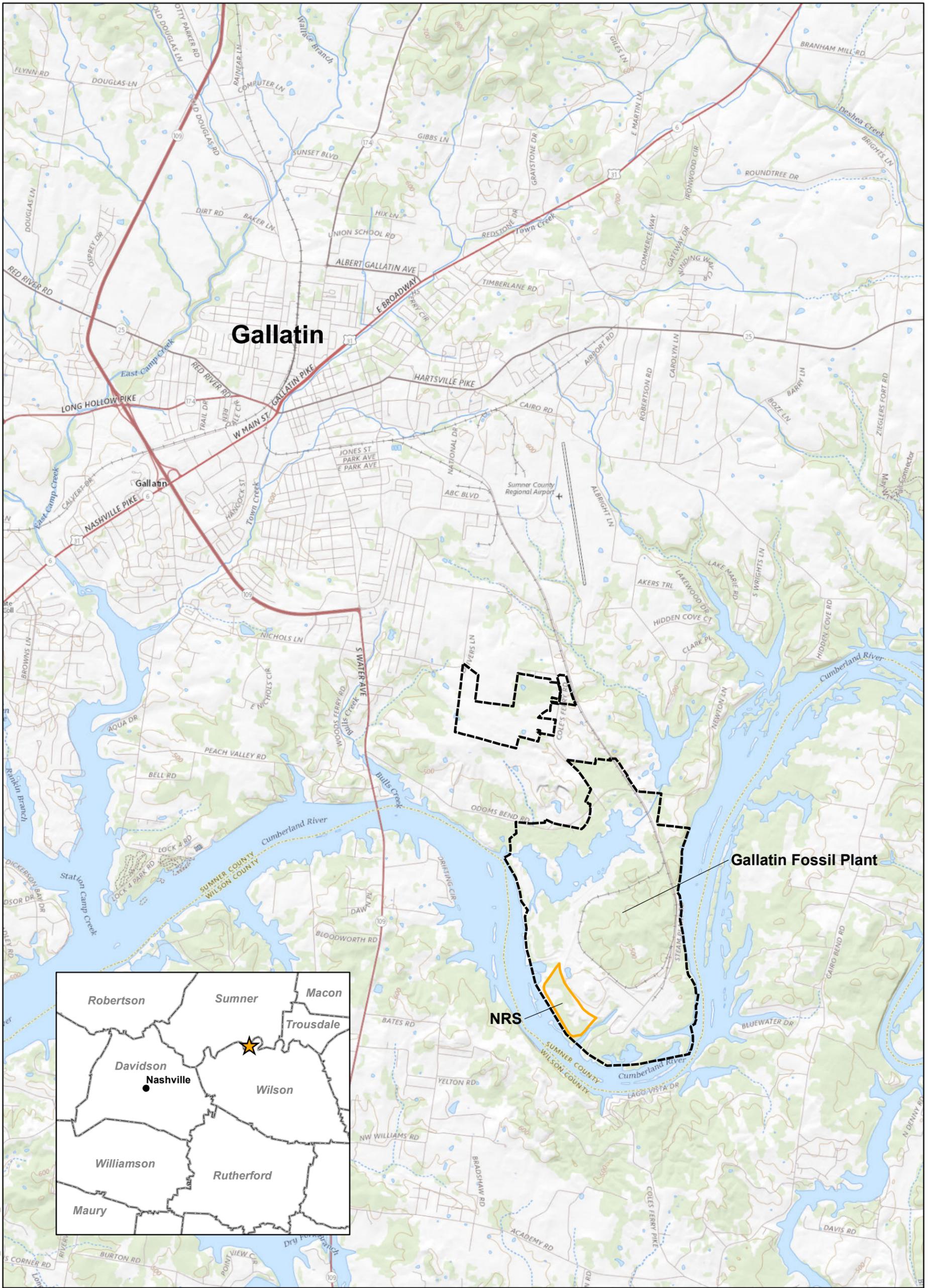
permeability and cohesive monoliths. EPA Method 1315 and 1316 leaching tests of ISS samples are underway. Those results will be reported in an addendum to this report.

The leaching results for direct soil treatment and ISS will provide the data necessary to evaluate if source treatment is a viable option. The data may further be used to develop a field demonstration of source area treatment.

## 8. References

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GAF Draft EAR Section 5.2.2 Seep Soil and Seep Water Characterization  
GAF Draft EAR Section 5.3.1 CCR Chemistry and Leachability  
GAF Draft EAR Section 5.3.2 CCR Pore Water  
GAF Draft EAR Section 5.3.3 CCR Physical Properties
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## Figures



**Gallatin**

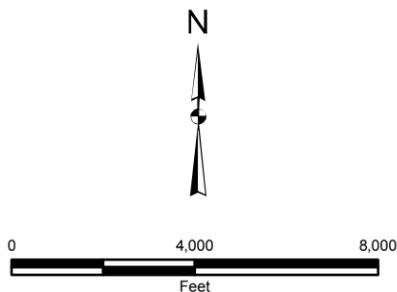
**Gallatin Fossil Plant**

**NRS**

**LEGEND**

-  Non-Registered Site (NRS) Boundary
-  TVA Gallatin Fossil Plant Property Boundary (Approximate)

NOTE: USGS 7.5' Topographic Quadrangle Map  
Source - ESRI USGS Topo Layer



**AECOM**

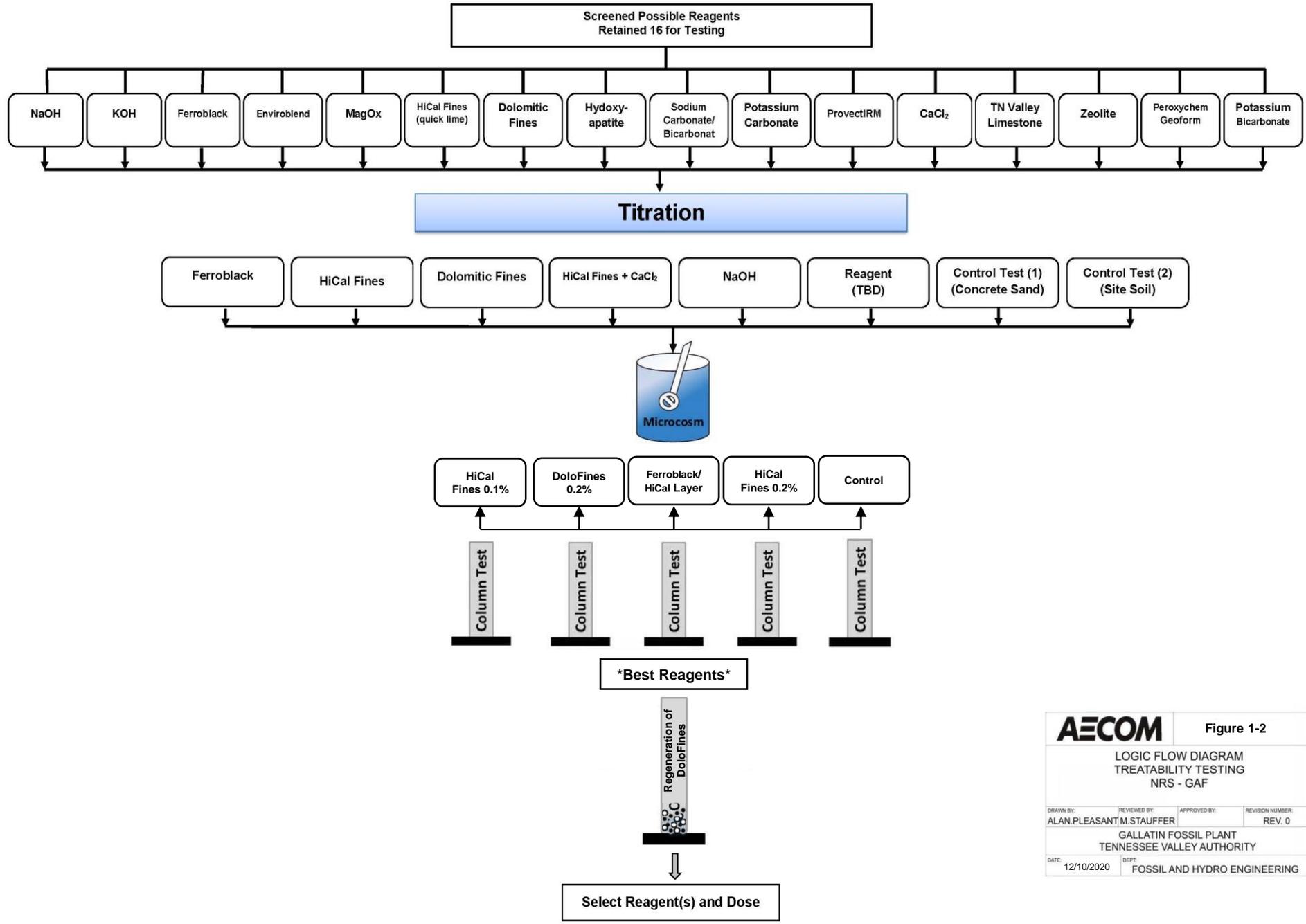
**Figure 1-1**

**GALLATIN FOSSIL PLANT (GAF) LOCATION MAP**

DRAWN BY: <b>CARRIE SMITH</b>	REVIEWED BY: <b>M. STAUFFER</b>	APPROVED BY: <b>M. STAUFFER</b>	REVISION NUMBER: <b>REV. B</b>
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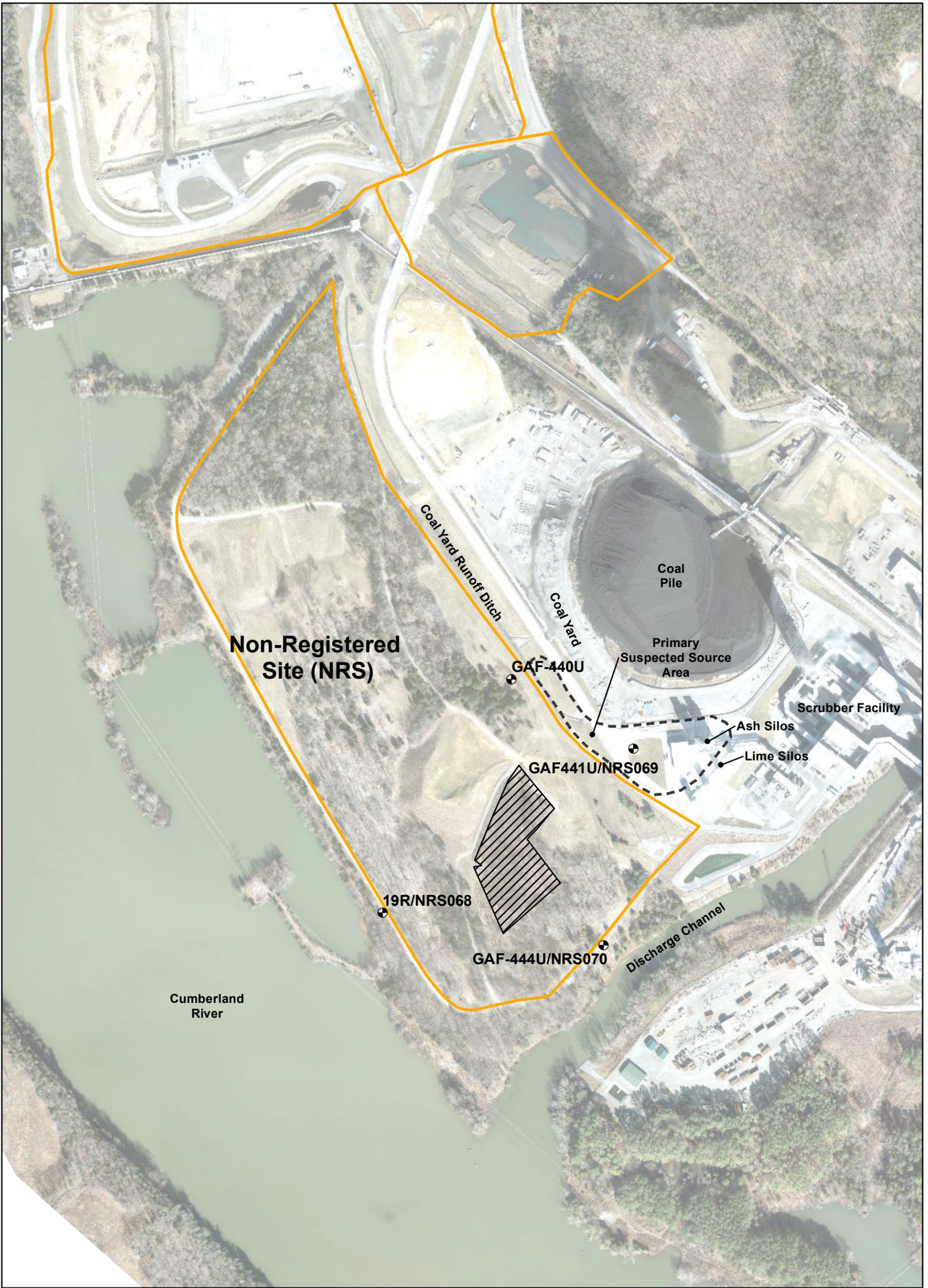
**GALLATIN FOSSIL PLANT  
TENNESSEE VALLEY AUTHORITY**

DATE: <b>11/2/2020</b>	DEPT: <b>FOSSIL AND HYDRO ENGINEERING</b>
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**AECOM** Figure 1-2  
 LOGIC FLOW DIAGRAM  
 TREATABILITY TESTING  
 NRS - GAF

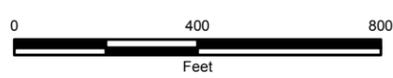
DRAWN BY: ALAN.PLEASANT	REVIEWED BY: M.STAUFFER	APPROVED BY:	REVISION NUMBER: REV. 0
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
DATE: 12/10/2020	DEPT: FOSSIL AND HYDRO ENGINEERING		



**LEGEND**

	Asbestos Landfill Limit
	CCR Management Units
	Primary Suspected Source Area

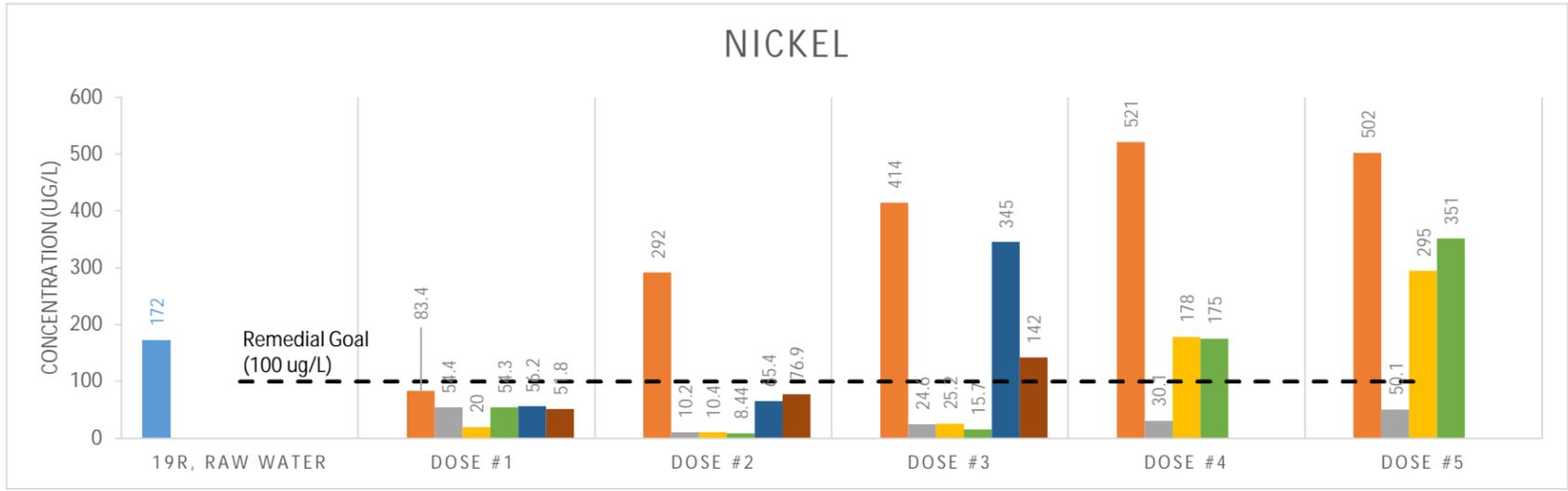
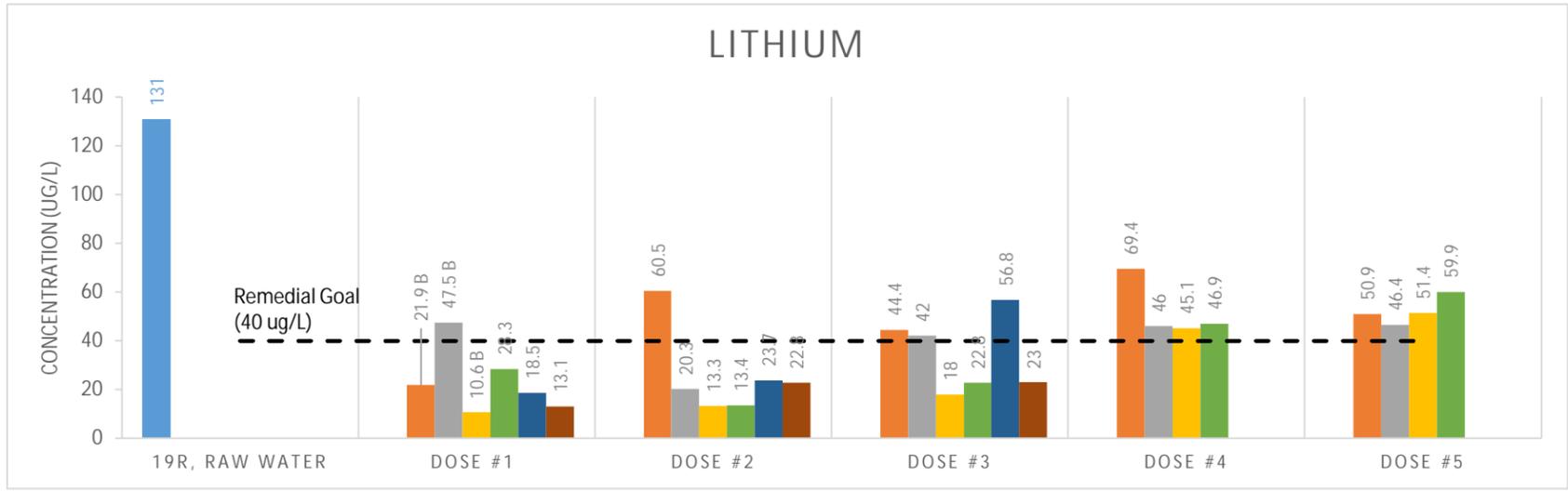
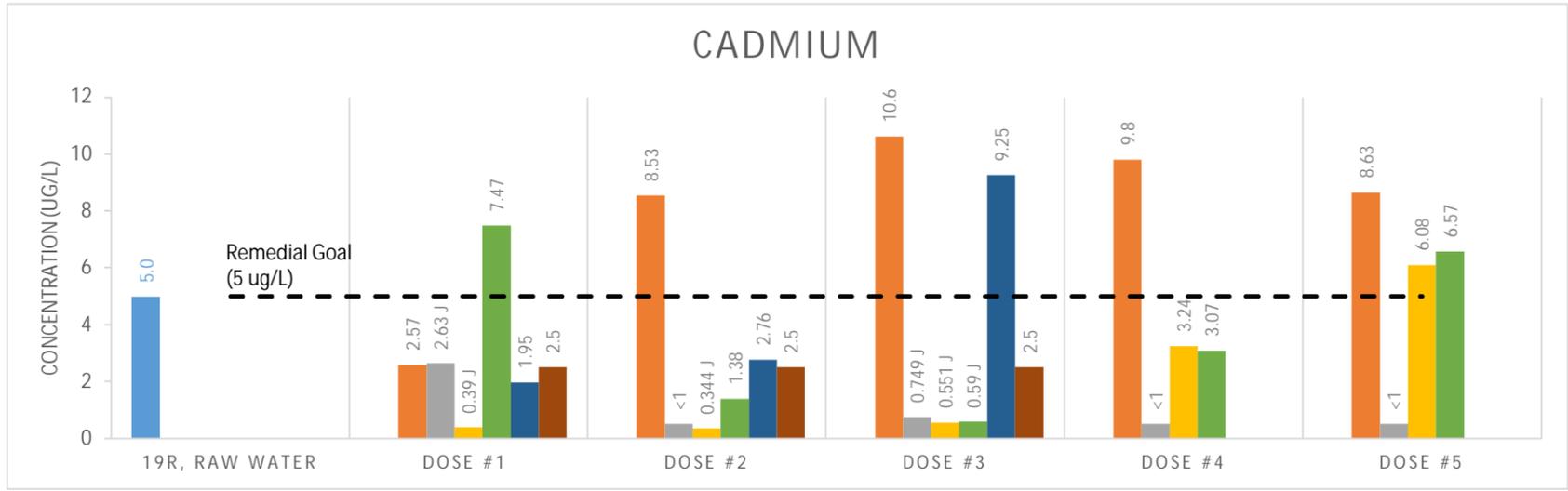
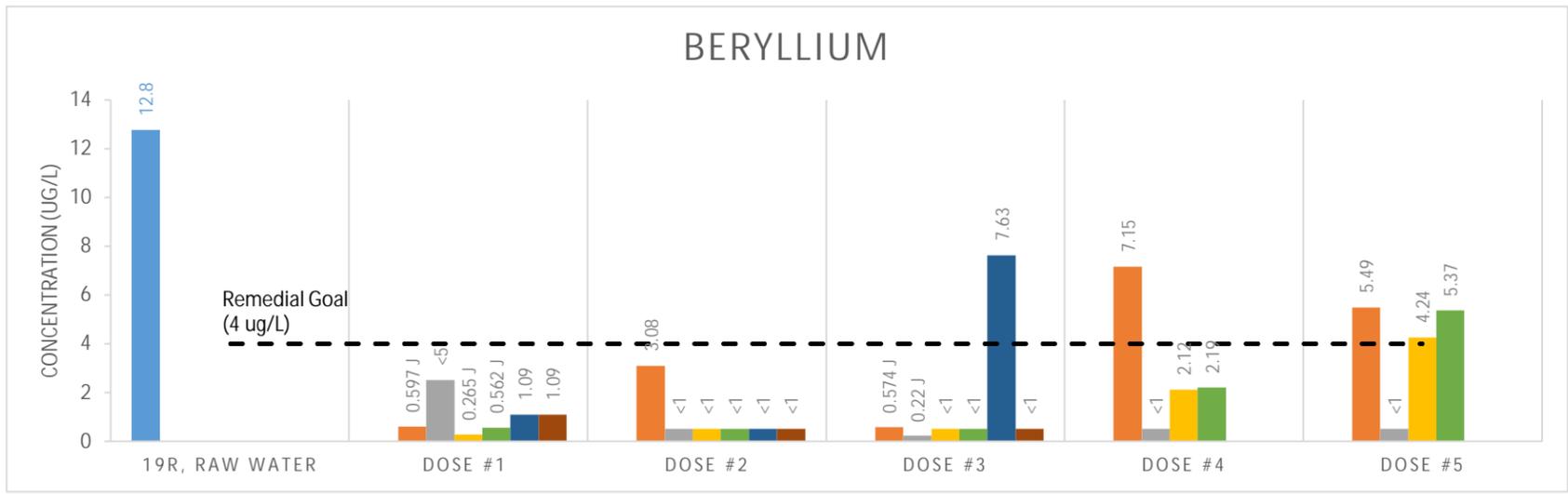
 Approximate Locations for Groundwater and Soil Collection



**Notes:**  
 CCR - Coal Combustion Residuals  
 Aerial image dated February 2017

<b>AECOM</b>		<b>Figure 2-1</b>	
<b>GROUNDWATER AND SOIL COLLECTION LOCATIONS</b>			
<small>DRAWN BY:</small> T.ADHAM	<small>REVIEWED BY:</small> M.FRIEDMAN	<small>APPROVED BY:</small> C.MACPHEE	<small>REVISION NUMBER:</small> REV. B
<b>GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY</b>			
<small>DATE:</small> 12/23/2020	<small>DEPT:</small> FOSSIL AND HYDRO ENGINEERING		

Document Path: K:\TVA\_GAENRS020 - GIS\Groundwater\_Soil\_Collection\_V2.mxd



■ Raw Water, 19R     
 ■ 19R-Sand-None     
 ■ 19R-Sand-FerroBlack     
 ■ 19R-Sand-High Cal Fines  
■ 19R-Sand-High Cal Fines/CaCl2     
 ■ 19R-Sand-Dolomitic Fines     
 ■ 19R-Sand-NaOH

Microcosm nomenclature: Well Water-Solid Matrix-Treatment Reagent

Raw water concentration is an average of the "total metals" concentration at monitoring well 19R over three groundwater sampling events (January 2020, April 2020, and June 2020) and is provided only for comparison purposes.

Total metals concentrations from the treatability testing were used.

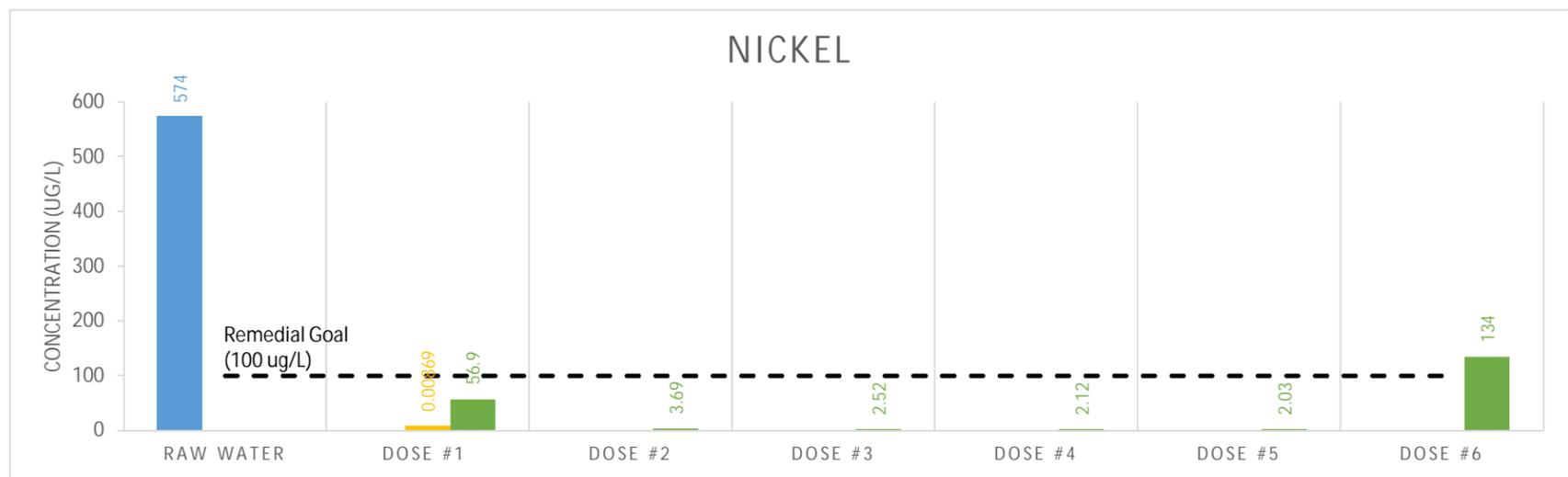
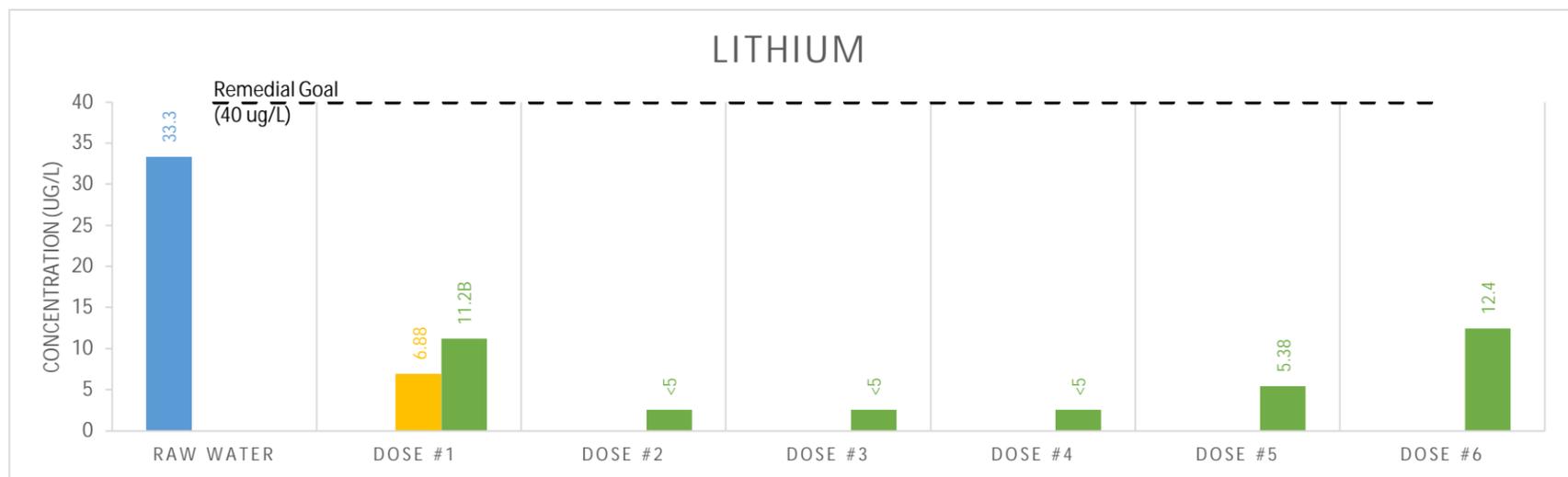
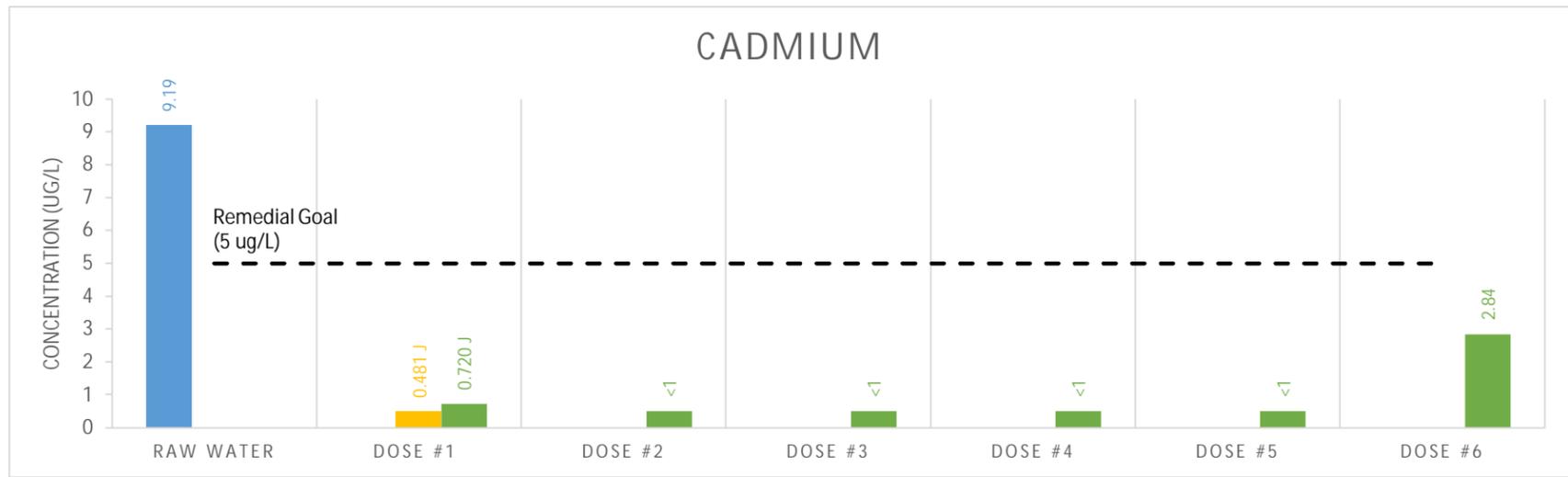
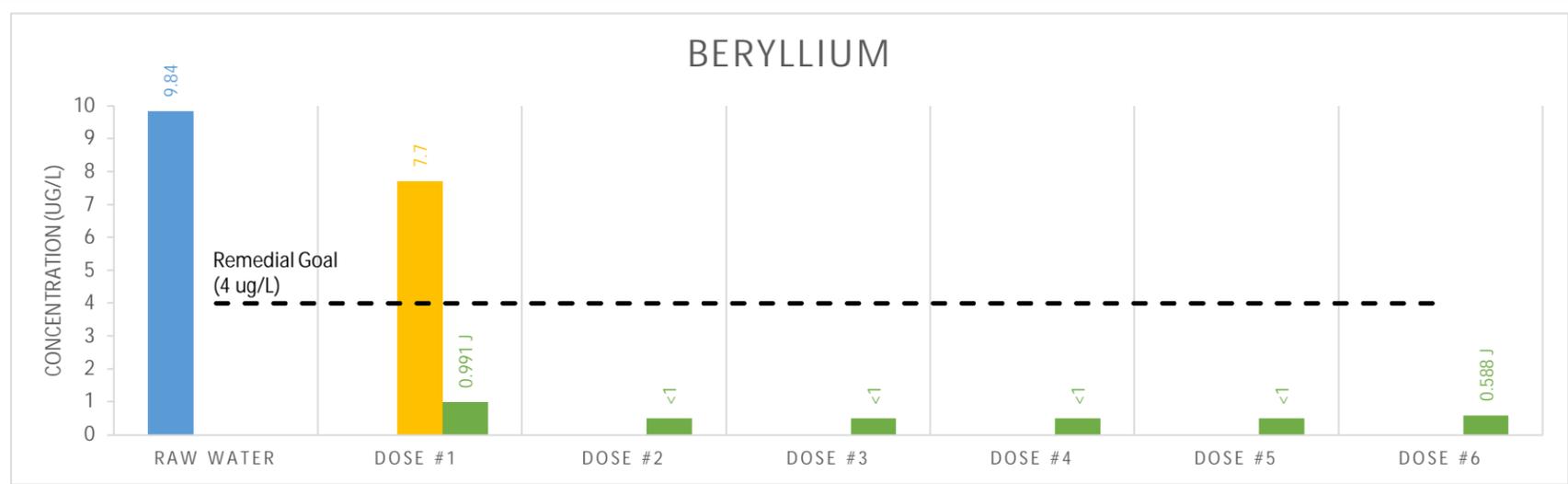
ug/L = micrograms per liter

J = estimated concentration between reporting limit and method detection limit

B = Analyte detected in blank and in sample.

< = not detected at laboratory quantitation limit noted; graphed at half the quantitation limit

<b>AECOM</b>		<b>Figure 3-3a</b>	
<b>Phase I and II Microcosm Results</b>			
<b>Well 19R</b>			
DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
M FRIEDMAN	P. HASKELL	C. MACPHEE	1
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
DATE:	DEPT:		
1/26/2021	FOSSIL AND HYDRO ENGINEERING		



■ Raw Water, 444U    
 ■ 444U-Sand-Control    
 ■ 444U-Sand-Dolofines

Microcosm nomenclature: Well Water-Solid Matrix-Treatment Reagent

Raw water concentration for monitoring well GAF-444U is an average of the "total metals" concentration over three groundwater sampling events (January 2020, April 2020, and June 2020) and is provided only for comparison purposes.

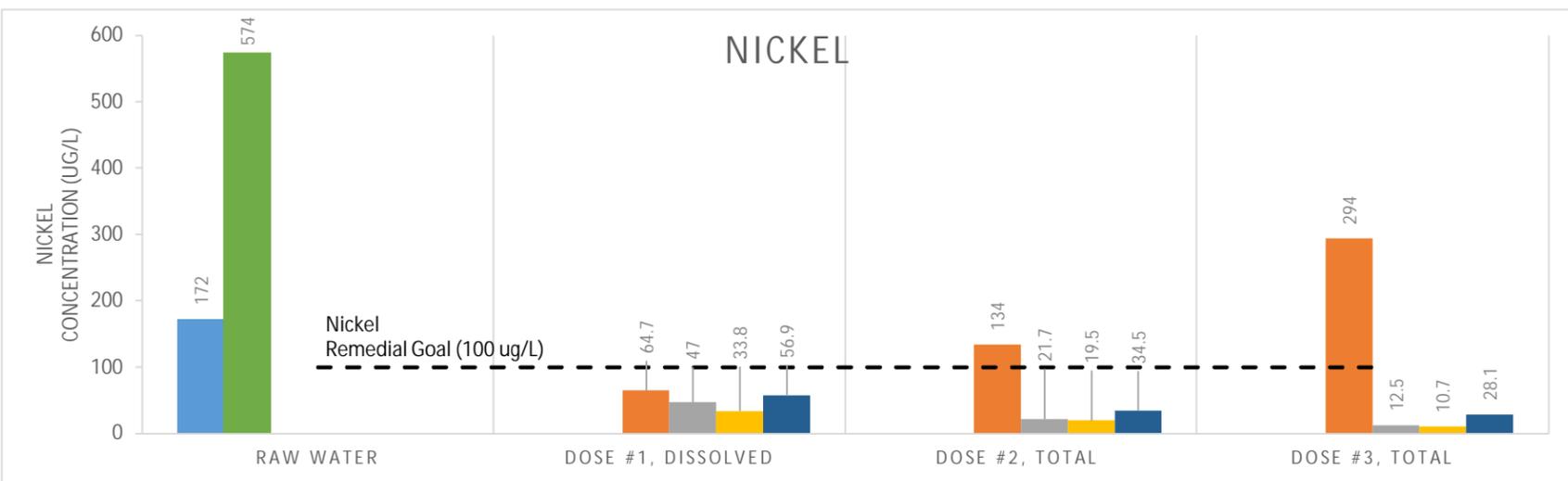
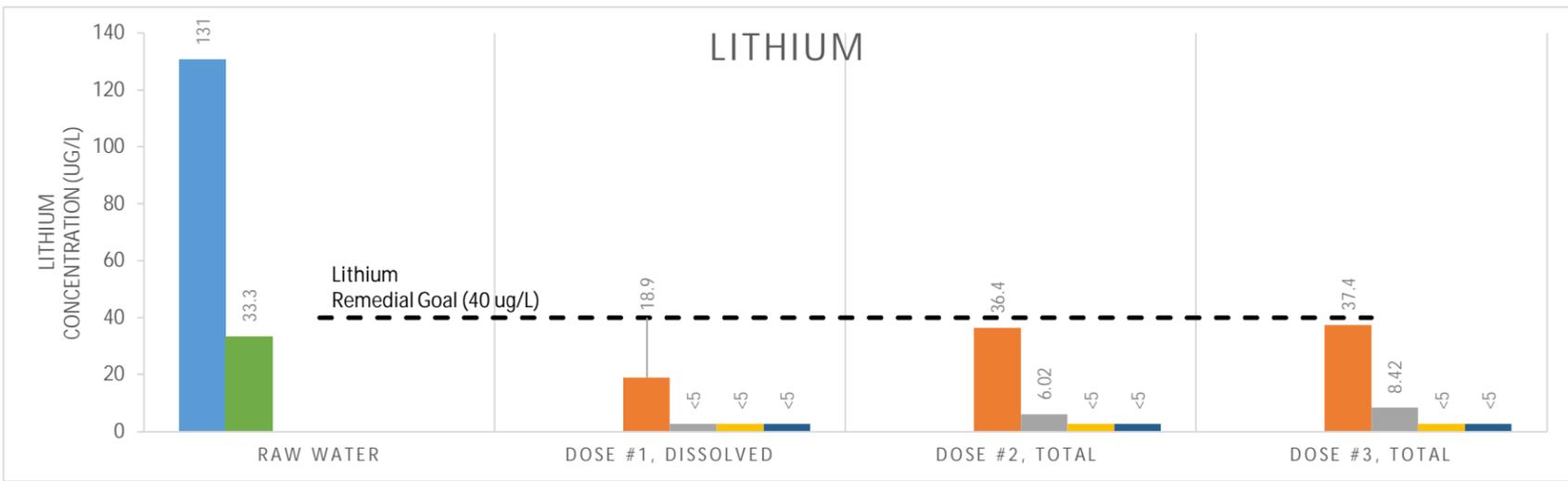
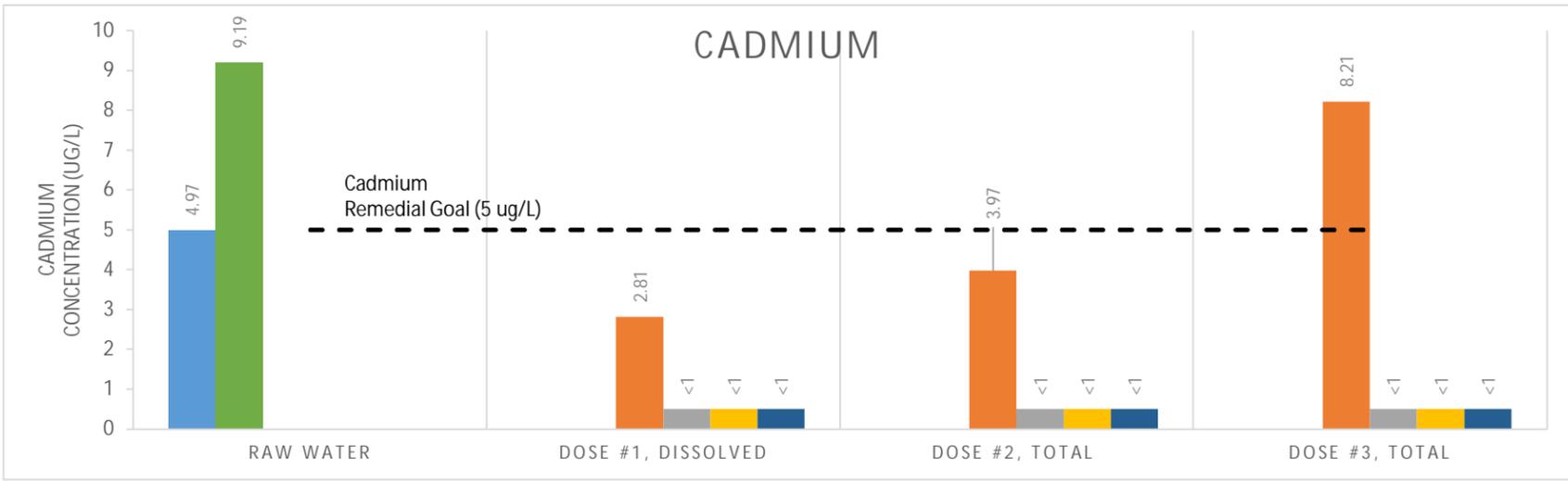
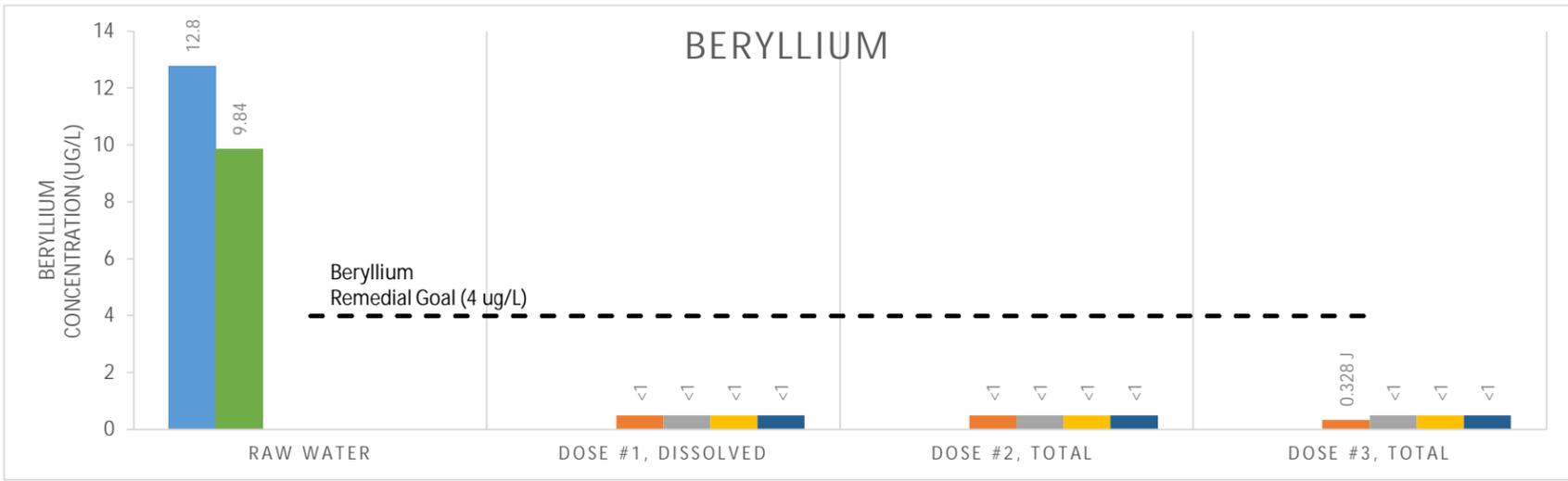
Total metals concentrations from the treatability testing were used.

ug/L = micrograms per liter

J = estimated concentration between reporting limit and method detection limit

< = not detected at reporting limit noted; graphed at half the reporting limit

<b>AECOM</b>		<b>Figure 3-3b</b>	
<b>Phase I and II Microcosm Results</b>			
<b>Well GAF-444U</b>			
DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
M FRIEDMAN	P. HASKELL	C. MACPHEE	2
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
DATE:	DEPT:		
2/3/2021	FOSSIL AND HYDRO ENGINEERING		



■ Raw Water, 19R   
 ■ Raw Water, 444U   
 ■ Control, 19R   
 ■ Dolofines, 19R   
 ■ HiCal Fines, 19R   
 ■ High Cal Fines, GAF-444U

Microcosm nomenclature: Treatment Reagent, source of groundwater. All tests run in sand.

Raw water concentration is the average of the "total metals" concentration for the respective monitoring wells (19R and GAF-444U) over three groundwater sampling events (January 2020, April 2020, and June 2020) and is shown for comparison purposes only.

ug/L = micrograms per liter

J = estimated concentration between reporting limit and method detection limit

< = not detected at reporting limit noted; graphed at half the reporting limit

<b>AECOM</b>		<b>Figure 3-3c</b>	
<b>Phase III Microcosm Results</b>			
DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
M FRIEDMAN	P. HASKELL	C. MACPHEE	2
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
DATE:	DEPT:		
2/3/2021	FOSSIL AND HYDRO ENGINEERING		

## Tables

**Table 2-1**  
**Baseline Groundwater Analytical Results**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant, Gallatin, Tennessee**

Location ID	Sample ID	Sample Depth	Sample Date	Sample Type	Parameter Unit	Parameter	pH, Field	aerated pH	Dissolved Oxygen	ORP	Specific Conductance, Field	Temperature	Turbidity, field	Sulfide	Iron, Ferrous	Carbon Dioxide	Acidity	Alkalinity, Carbonate	Alkalinity, Hydroxide as	Alkalinity, Total as CaCO3	Alkalinity, Bicarbonate (CaCO3)					
						Total (T) or Dissolved (D)	pH units	pH units	mg/L	MV	umhos/cm	deg c	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
						Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier			
19R	GAF-GW-19R-01152020	39.5-49.5	1/15/2020	N	D																					
19R	GAF-GW-19R-01152020		1/15/2020	N	T	3.54	3.58	0.15	235.4	2326	16.1	17.1			7.0	100.0	1060	< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U	
19R	GAF-GW-19R-03182020		3/18/2020	N	T	3.44	3.45	0.10	312.9	2679	15.5	55.2	0	6.5	30											
19R	GAF-GW-19R-04222020		4/22/2020	N	D																					
19R	GAF-GW-19R-04222020		4/22/2020	N	T	3.49	3.47	0.26	257.2	2970	15.8	12.5	10.0	7.5	> 100	1280			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
19R	GAF-GW-19R-06162020		6/16/2020	N	T	3.77		0.23	124.9	3259	16.2	3.98	0	3.6	>100	1070			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
19R	GAF-GW-19R-07142020		7/14/2020	N	D																					
19R	GAF-GW-19R-07142020		7/14/2020	N	T	4.12		1.10	231.0	3244	16.9	5.82							< 5.00	U			< 5.00	U	< 5.00	U
19R	GAF-GW-19R-08172020		8/17/2020	N	D																					
19R	GAF-GW-19R-08172020		8/17/2020	N	T	3.58	3.62	1.32	255.0	3164	17.5	29.2	0	5.5	>100	1120			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
19R	GAF-GW-19R-08182020		8/18/2020	N	T	5.21		0.31	262.9	3139	16.5	19.3														
19R	GAF-GW-19R-10212020		10/21/2020	N	D																					
19R	GAF-GW-19R-10212020		10/21/2020	N	T	3.59	3.59	5.97	238.6	3199	16.3	4.06	0	7.0	50	1050			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-440U	GAF-GW-440U-01172020		41-51	1/17/2020	N	D																				
GAF-440U	GAF-GW-440U-01172020	1/17/2020		N	T	6.70	6.78	1.27	141.9	1156	12.2	240		0.5	62.5	-503			< 5.00	U	< 5.00	U	563	563		
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	D																					
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	T	6.53	6.53	0.29	8.9	1879	16.6	56.4	>10	2.5	55	-754			< 5.00	U	< 5.00	U	559	559		
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	D																					
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	T	6.48	6.39	0.37	-21.9	1826	19.1	OR	0	1.0	>100	-369			< 5.00	U	< 5.00	U	575	575		
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	D																					
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	T	6.77	6.73	0.32	0.9	1821	19.3	139	0	1.5	72	-688			< 5.00	U	< 5.00	U	580	580		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	D																					
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	T	6.67	6.67	0.89	103.7	1903	18.1	54.4	0	1.0	100	-523			< 5.00	U	< 5.00	U	580	580		
GAF-441U	GAF-GW-441U-01162020	40-50	1/16/2020	N	D																					
GAF-441U	GAF-GW-441U-01162020		1/16/2020	N	T	3.50	3.62	0.44	230.1	5546	18.5	149		7	100	1110			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-441U	GAF-GW-441U-03172020		3/17/2020	N	T	3.57	3.49	0.45	266.9	6442	15.3	470	0	>7	100											
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	D																					
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	T	3.29	3.29	0.39	286.1	7416	17.2	781	>10	6	80	1810			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	D																					
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	T	3.25	3.27	0.14	326.8	7103	20.6	570	0	6	60	1230			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	D																					
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	T	2.72	2.7	0.20	242.8	7124	21.0	240	0	5.5	>100	1840			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-441U	GAF-GW-441U-10222020		10/22/2020	N	D																					
GAF-441U	GAF-GW-441U-10222020	10/22/2020	N	T	3.74	3.76	0.18	198.8	6717	21.6	154	0	5.5	70	1010			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U	
GAF-444U	GAF-GW-444U-01202020	50-60	1/20/2020	N	D																					
GAF-444U	GAF-GW-444U-01202020		1/20/2020	N	T	4.13	4.13	0.43	292.6	1917	15.1	9.97		3	25	298			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-444U	GAF-GW-444U-02132020		2/13/2020	N	T	3.94		0.74	230.3	2261	14.2	10.6	>2	5.5	100											
GAF-444U	GAF-GW-444U-03172020		3/17/2020	N	T	3.86	3.81	7.37	259.2	2405	16.4	224	1	>7	25											
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	D																					
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	T	4.30	4.3	0.33	217.3	2610	17.5	23.7	3	3	30	406			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	D																					
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	T	4.47	4.51	0.30	190.2	2792	19.0	10.2	0	5.5	>100	364			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	D																					
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	T	6.53	6.52	0.32	224.9	2807	18.8	34.1	0	3	>100	369			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	D																						
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	T	4.17	4.2	2.64	222.1	2999	23.4	55.6	0	6	40	369			< 5.00	U	< 5.00	U	< 5.00	U	< 5.00	U	

**Notes:**  
mg/L = milligrams per liter  
MV = millivolts  
umhos/cm = MicroSiemens  
deg C = degrees Celsius  
NTU = nephelometric turbidity unit  
µg/L = micrograms per liter  
OR = Over range of turbidity meter  
< = compound not detected above the value listed  
J = Quantitation is approximate due to limitations identified during data validation  
U = compound not detected above value reported  
\* = This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level  
Red = concentration of treatability test target metal (beryllium, cadmium, lithium, and nickel) exceeds standard

GWPS: groundwater protection standard  
GWPS of treatability test target metals:  
Beryllium: 4 µg/L  
Cadmium: 5 µg/L  
Lithium: 40 µg/L  
Nickel: 100 µg/L

**Table 2-1**  
**Baseline Groundwater Analytical Results**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant, Gallatin, Tennessee**

		Parameter			Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium		Chloride		Chromium		Cobalt		Copper				
		Unit			µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		mg/L		µg/L		µg/L		µg/L				
Location ID	Sample ID	Sample Depth	Sample Date	Sample Type	Total (T) or Dissolved (D)	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier		
19R	GAF-GW-19R-01152020	39.5-49.5	1/15/2020	N	D	68700		< 0.378	U	< 1.86	U*	15.0		13.3		3880		4.65		443000				< 1.53	U	202		10.4			
19R	GAF-GW-19R-01152020		1/15/2020	N	T	69000		< 0.378	U	2.06			16.1		13.3		3950		6.07		434000		2.62		< 1.53	U	252		11.7		
19R	GAF-GW-19R-03182020		3/18/2020	N	T																										
19R	GAF-GW-19R-04222020		4/22/2020	N	D	57800		0.511	J	3.11			13.9		12.6		3750	J	4.89		436000				< 1.53	U	215		9.01		
19R	GAF-GW-19R-04222020		4/22/2020	N	T	65800		0.472	J	2.41			14.5		12.5		3610	J	4.45		452000		2.05	J	< 1.53	U	213		< 9.11	U*	
19R	GAF-GW-19R-06162020		6/16/2020	N	T	55300		< 0.378	U	2.56			15.0		12.5		3390	J	4.40		417000		2.12	J	< 1.53	U	193		8.00		
19R	GAF-GW-19R-07142020		7/14/2020	N	D			< 0.756	U	2.84			13.6	J	13.5		3310	J	5.79		457000				< 3.06	U	276	J	9.37		
19R	GAF-GW-19R-07142020		7/14/2020	N	T			< 0.756	U	2.61			16.7	J	14.0		3440	J	4.10		473000		2.63		< 3.06	U	177	J	< 9.62	U*	
19R	GAF-GW-19R-08172020		8/17/2020	N	D	59700		< 0.378	U	2.23			11.7	J	11.2		2980	J	3.71		441000				< 1.53	U	167		6.34		
19R	GAF-GW-19R-08172020		8/17/2020	N	T	60700		< 0.378	U	2.23			11.9		10.7		3390	J	4.67		467000		2.11	J	< 1.53	U	214		7.98		
19R	GAF-GW-19R-08182020		8/18/2020	N	T																										
19R	GAF-GW-19R-10212020		10/21/2020	N	D	57600		< 0.378	U	3.44			14.4	J	12.4		3490	J	4.54		415000				< 1.53	U	203		7.01		
19R	GAF-GW-19R-10212020		10/21/2020	N	T	56700		< 0.378	U	3.32			13.9	J	12.5		3320	J	4.14		422000		2.26	J	< 1.53	U	186		7.41		
GAF-440U	GAF-GW-440U-01172020		41-51	1/17/2020	N	D	2630	J	34.0	J	0.753	J	55.4		0.215	J	1810		< 0.217	U	342000				2.48		15.6		2.27		
GAF-440U	GAF-GW-440U-01172020			1/17/2020	N	T	3150	J	14.2	J	< 0.948	U*	53.8		< 0.287	U*	1880		< 0.217	U	345000		36.6		3.27		20.5		2.58		
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	D	< 16.3	U*	< 1.54	U*	< 0.640	U*	33.2		< 0.182	U	1860		< 0.217	U	324000				< 1.53	U	23.6		< 0.656	U*		
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	T	566		< 2.22	U*	< 0.792	U*	39.3		< 0.182	U	1910		< 0.217	U	341000		41.3		< 1.53	U	24.6		< 1.21	U*		
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	D	185		1.25	J	0.674	J	42.2		< 0.182	U	1800		< 0.217	U	340000				< 1.53	U	26.1		1.48	J		
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	T	243		1.81	J	0.680	J	42.6		< 0.182	U	1730		< 0.217	U	340000		48.7		< 1.53	U	25.6		< 0.627	U		
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	D	< 12.5	U	1.32	J	0.671	J	38.7		< 0.182	U	1960		< 0.217	U	339000				< 1.53	U	26.0		0.840	J		
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	T	480		1.45	J	0.859	J	37.4		< 0.182	U	1790		< 0.217	U	326000		41.5		< 1.53	U	25.6		1.22	J		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	D	18.7	J	< 0.378	U	0.563	J	34.6		< 0.182	U	1950	J	< 0.217	U	347000				< 1.53	U	25.0		< 0.627	U		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	T	188		0.695	J	0.555	J	35.0		< 0.182	U	1930		< 0.217	U	337000		40.7		< 1.53	U	24.6		< 0.627	U		
GAF-441U	GAF-GW-441U-01162020	40-50	1/16/2020	N	D	122000		< 0.905	U*	3.36		9.84	J	18.6		2960	J	11.8	J	426000				1.67	J	956	J	14.7	J		
GAF-441U	GAF-GW-441U-01162020		1/16/2020	N	T	129000		< 2.57	U*	5.40			22.7		19.2		2970	J	11.6		437000		45.5		4.63		1100		53.5		
GAF-441U	GAF-GW-441U-03172020		3/17/2020	N	T																										
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	D	97100		< 1.89	U	19.5			11.5	J	17.2		2800		15.0		436000				< 7.65	U	1320		56.2		
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	T	106000		< 1.89	U	19.8			19.3	J	16.8		2930		15.7		457000		37.0		< 7.65	U	1350		69.9		
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	D	106000		< 1.89	U	16.1			14.5	J	14.8		2740		19.9		473000	J			15.1		1680		54.0		
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	T	109000		< 1.89	U	14.8			9.82	J	14.2		2520		19.1		457000		42.0		< 7.65	U	1680		46.1		
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	D	95400		< 0.378	U	13.2			< 16.0	U	12.4		2800		13.9		433000				2.02		1420		24.6		
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	T	101000		2.45		16.1			37.7	J	13.0		2850		12.8		423000		37.9		6.86		1280		34.3		
GAF-441U	GAF-GW-441U-10222020		10/22/2020	N	D	82500		< 0.756	U	16.5			11.5	J	13.1		< 2950	U*	8.23		440000				< 3.06	U	862		16.7		
GAF-441U	GAF-GW-441U-10222020	10/22/2020	N	T	85700		2.39	J	17.6			19.4	J	12.7		< 2940	U*	7.56		441000		41.5		4.05		845		18.7			
GAF-444U	GAF-GW-444U-01202020	50-60	1/20/2020	N	D	11000		0.554	J	3.60		16.2		11.7		3740		7.22		501000				< 1.91	U*	1430		< 0.809	U*		
GAF-444U	GAF-GW-444U-01202020		1/20/2020	N	T	11400		1.57	J	4.21			19.4		12.8		3740		8.17		509000		6.33		1.60	J	1500		< 5.32	U*	
GAF-444U	GAF-GW-444U-02132020		2/13/2020	N	T																										
GAF-444U	GAF-GW-444U-03172020		3/17/2020	N	T																										
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	D	13300	J	0.478	J	7.50	J	17.3		9.20		4080		9.79		507000				< 1.53	U	1430		4.54			
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	T	11400	J	0.919	J	6.56	J	17.7		8.77		4250		9.29		516000		6.73		< 1.53	U	1400		< 5.08	U*		
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	D	9660		0.610	J	6.27		< 15.3	U*	7.58		4230		9.17		530000				< 1.53	U	1390		11.8	J		
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	T	9610		0.692	J	5.67			15.1		7.96		4000	J	10.1		535000		7.01		< 1.53	U	1360		< 3.62	U*	
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	D	10900		< 0.378	U	5.12			18.1		7.36		4590		9.60		517000				< 1.53	U	1320		5.34		
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	T	11600		0.989	J	5.16			19.1		7.24		4500		9.92		523000		6.38		1.53	J	1330		5.61		
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	D	10900		< 0.378	U	7.72			17.1		8.44		4520	J	9.26		484000				< 1.53	U	1330		< 1.31	U*		
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	T	12400		0.717	J	8.14			20.2		8.42		< 4320	U*	9.40		464000		6.47		2.10		1280		4.44			

**Notes:**  
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OR = Over range of turbidity meter  
< = compound not detected above the value listed  
J = Quantitation is approximate due to limitations identified during data validation  
U = compound not detected above value reported  
U\* = This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level  
Red = concentration of treatability test target metal (beryllium, cadmium, lithium, and nickel) exceeds standard

GWPS: groundwater protection standard  
GWPS of treatability test target metals:  
Beryllium: 4 µg/L  
Cadmium: 5 µg/L  
Lithium: 40 µg/L  
Nickel: 100 µg/L



**Table 2-1**  
**Baseline Groundwater Analytical Results**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant, Gallatin, Tennessee**

Parameter		Phosphorus		Potassium		Selenium		Silicon		Silver		Sodium		Strontium		Sulfate		Sulfide		Thallium		Total Dissolved Solids		Total Organic Carbon						
Unit		mg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		mg/L		mg/L		µg/L		mg/L		mg/L						
Location ID	Sample ID	Sample Depth	Sample Date	Sample Type	Total (T) or Dissolved (D)	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier					
19R	GAF-GW-19R-01152020	39.5-49.5	1/15/2020	N	D			17400		< 1.51	U	19100		< 0.177	U	8460		1180						1.45						
19R	GAF-GW-19R-01152020		1/15/2020	N	T	< 0.0320	U	16800		1.66	J	18600		< 0.177	U	8580		1160		2600		43.8		< 1.13	U*	4000	J	0.686	J	
19R	GAF-GW-19R-03182020		3/18/2020	N	T																									
19R	GAF-GW-19R-04222020		4/22/2020	N	D			15900		< 1.51	U	17800		< 0.177	U	8860		1150						1.18						
19R	GAF-GW-19R-04222020		4/22/2020	N	T	< 0.0320	U	16100		< 1.51	U	18000		< 0.177	U	8780		1250		2430	J	59.8		0.676	J	3540	J	0.732	J	
19R	GAF-GW-19R-06162020		6/16/2020	N	T	< 0.0320	U	15400		< 1.51	U	17400		< 0.177	U	7670		1200	J	2500		65.7		< 1.23	U*	2670		0.817	J	
19R	GAF-GW-19R-07142020		7/14/2020	N	D			14900		< 3.02	U			< 0.354	U	8010								1.24	J					
19R	GAF-GW-19R-07142020		7/14/2020	N	T			16500		< 3.02	U			< 0.354	U	8030			2420					1.40	J	3830	J			
19R	GAF-GW-19R-08172020		8/17/2020	N	D			16100		< 1.51	U	18700		< 0.177	U	7710		966	J					< 0.947	U*					
19R	GAF-GW-19R-08172020		8/17/2020	N	T	< 0.0320	U	16600		< 1.51	U	19000		< 0.177	U	8390		970	J	2550		20.1		< 0.952	U*	2550		0.743	J	
19R	GAF-GW-19R-08182020		8/18/2020	N	T																									
19R	GAF-GW-19R-10212020		10/21/2020	N	D			15500		< 1.51	U	18000		< 0.177	U	7620		1200						0.938	J					
19R	GAF-GW-19R-10212020		10/21/2020	N	T	< 0.0320	U	15500		< 1.51	U	18200		< 0.177	U	7470		1200		2360		< 6.70	U	1.14		3570		0.745	J	
GAF-440U	GAF-GW-440U-01172020		41-51	1/17/2020	N	D			3450		< 1.51	U	9950		< 0.177	U	80000		561					< 0.148	U					
GAF-440U	GAF-GW-440U-01172020			1/17/2020	N	T	< 0.102	U*	4760		< 1.51	U	9980		< 0.177	U	84500		584		507		< 1.34	U	< 0.165	U*	1460		3.24	
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	D			4670		< 1.51	U	4800		< 0.177	U	86300		551					< 0.148	U						
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	T	0.190		5150		< 1.51	U	5700		< 0.177	U	93200		570		515		< 1.34	U	< 0.148	U	1360		3.17		
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	D			3980		< 1.51	U	6160		< 0.177	U	93300		580					< 0.148	U						
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	T	0.0966	J	4280		< 1.51	U	6150		< 0.177	U	93200		571		502		< 1.34	U	< 0.148	U	1360		3.00		
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	D			4150		< 1.51	U	5940		< 0.177	U	89000		591					< 0.178	U*						
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	T	< 0.0320	U	4740		< 1.51	U	6210		< 0.177	U	87300		576		580		< 1.34	U	0.430	J	1420		3.14		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	D			4760		< 1.51	U	5450		< 0.177	U	92200		598					< 0.148	U						
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	T	< 0.0320	U	4990		< 1.51	U	5370		< 0.177	U	95200		575		563		6.19		< 0.148	U	1390		3.23		
GAF-441U	GAF-GW-441U-01162020	40-50	1/16/2020	N	D			18400		5.44		10400		< 0.177	U	97200		1000					3.69							
GAF-441U	GAF-GW-441U-01162020		1/16/2020	N	T	0.211		19500		7.15		20800		< 0.177	U	97500		1020		8440		45.3		3.87		11100		4.80		
GAF-441U	GAF-GW-441U-03172020		3/17/2020	N	T																									
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	D			16100		< 7.55	U	10200		< 0.885	U	84800		879						< 4.83	U*					
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	T	0.554		16900		< 7.55	U	14900		< 0.885	U	89900		964		7300		28.7		< 3.70	U*	5500		4.64		
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	D			16000	J	< 7.55	U	13500	J	< 0.885	U	94300	J	996	J					< 3.89	U*					
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	T	0.427		16100		< 7.55	U	12500		< 0.885	U	90600		940		7060		17.1	J	4.15	J	5360		4.55		
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	D			14500		4.13	J	11500		< 0.177	U	76300		842						3.29						
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	T	0.212		15200		4.30	J	19300		< 0.177	U	78400		869		7560		23.1		3.54		5290		5.09		
GAF-441U	GAF-GW-441U-10222020		10/22/2020	N	D			14400		< 3.02	U	9470		< 0.354	U	89100		981						3.47						
GAF-441U	GAF-GW-441U-10222020	10/22/2020	N	T	0.326		15200		< 3.02	U	12500		< 0.354	U	90200		982		6640		< 23.7	U*	3.44		5550	J	4.42			
GAF-444U	GAF-GW-444U-01202020	50-60	1/20/2020	N	D			9630		1.52	J	8760		< 0.177	U	52500		922					< 0.460	U*						
GAF-444U	GAF-GW-444U-01202020		1/20/2020	N	T	< 0.0320	U	9970		1.86	J	8900		< 0.177	U	53100		936		1570		< 6.70	U	< 0.587	U*	2820		5.31		
GAF-444U	GAF-GW-444U-02132020		2/13/2020	N	T																									
GAF-444U	GAF-GW-444U-03172020		3/17/2020	N	T																									
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	D			12300		< 1.51	U	9120		< 0.177	U	58400		1230						< 0.893	U*					
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	T	0.0994	J	12100		< 1.51	U	9070		< 0.177	U	68100		1500		1940		< 1.34	U	< 0.510	U*	2060		4.26		
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	D			11900		< 1.51	U	9290		< 0.177	U	65300		1430						< 0.997	U*					
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	T	< 0.0320	U	11800		< 1.51	U	9350		< 0.177	U	67600		1440	J	1870		< 6.70	U	< 0.544	U*	2060		6.51		
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	D			12300		1.79	J	8900		< 0.177	U	75200		1510						< 0.429	U*					
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	T	< 0.0320	U	12500		1.92	J	9290		< 0.177	U	69400		1460		2220		< 13.4	U	0.454	J	2080		2.77		
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	D			11500		< 1.51	U	8170		< 0.177	U	71800		1440						0.506	J						
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	T	0.0674	J	11400		< 1.51	U	9010		< 0.177	U	65500		1350		2010		< 13.4	U	0.490	J	2800		2.39			

**Notes:**  
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NTU = nephelometric turbidity unit  
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OR = Over range of turbidity meter  
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Red = concentration of treatability test target metal (beryllium, cadmium, lithium, and nickel) exceeds standard

GWPS: groundwater protection standard  
GWPS of treatability test target metals:  
Beryllium: 4 µg/L  
Cadmium: 5 µg/L  
Lithium: 40 µg/L  
Nickel: 100 µg/L

**Table 2-1**  
**Baseline Groundwater Analytical Results**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant, Gallatin, Tennessee**

Parameter						Total Suspended Solids	Vanadium		Zinc			
Unit						mg/L	µg/L		µg/L			
Location ID	Sample ID	Sample Depth	Sample Date	Sample Type	Total (T) or Dissolved (D)	Result	Validator Qualifier	Result	Validator Qualifier	Result	Validator Qualifier	
19R	GAF-GW-19R-01152020	39.5-49.5	1/15/2020	N	D			25.0		764		
19R	GAF-GW-19R-01152020		1/15/2020	N	T	6.00		22.9		727		
19R	GAF-GW-19R-03182020		3/18/2020	N	T							
19R	GAF-GW-19R-04222020		4/22/2020	N	D			20.7		601		
19R	GAF-GW-19R-04222020		4/22/2020	N	T	4.40		22.5		597		
19R	GAF-GW-19R-06162020		6/16/2020	N	T	1.50		21.7		636		
19R	GAF-GW-19R-07142020		7/14/2020	N	D			17.3		607		
19R	GAF-GW-19R-07142020		7/14/2020	N	T	1.40		20.2		620		
19R	GAF-GW-19R-08172020		8/17/2020	N	D			20.4		569		
19R	GAF-GW-19R-08172020		8/17/2020	N	T	1.20		20.4		594		
19R	GAF-GW-19R-08182020		8/18/2020	N	T							
19R	GAF-GW-19R-10212020		10/21/2020	N	D			18.7		552		
19R	GAF-GW-19R-10212020		10/21/2020	N	T	0.700		18.1		554		
GAF-440U	GAF-GW-440U-01172020		41-51	1/17/2020	N	D			3.52		36.0	J
GAF-440U	GAF-GW-440U-01172020			1/17/2020	N	T	62.8		4.05		16.6	J
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	D			< 0.991	U	< 7.77	U*	
GAF-440U	GAF-GW-440U-04232020	4/23/2020		N	T	23.9		< 0.991	U	< 8.44	U*	
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	D			< 0.991	U	8.47		
GAF-440U	GAF-GW-440U-06182020	6/18/2020		N	T	31.0		< 0.991	U	6.36		
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	D			< 0.991	U	4.69	J	
GAF-440U	GAF-GW-440U-08192020	8/19/2020		N	T	26.6		< 0.991	U	6.58		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	D			< 0.991	U	5.07		
GAF-440U	GAF-GW-440U-10202020	10/20/2020		N	T	12.9		< 0.991	U	6.37		
GAF-441U	GAF-GW-441U-01162020	40-50	1/16/2020	N	D			32.3		2760		
GAF-441U	GAF-GW-441U-01162020		1/16/2020	N	T	97.0		42.3		2930		
GAF-441U	GAF-GW-441U-03172020		3/17/2020	N	T							
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	D			28.3		2680		
GAF-441U	GAF-GW-441U-04242020		4/24/2020	N	T	486		37.1		2730		
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	D			34.7		2880		
GAF-441U	GAF-GW-441U-06172020		6/17/2020	N	T	306		34.3		2820		
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	D			27.2		2630		
GAF-441U	GAF-GW-441U-08182020		8/18/2020	N	T	152		37.5		2580		
GAF-441U	GAF-GW-441U-10222020		10/22/2020	N	D			24.7		2290		
GAF-441U	GAF-GW-441U-10222020	10/22/2020	N	T	148		29.5		2280			
GAF-444U	GAF-GW-444U-01202020	50-60	1/20/2020	N	D			< 0.991	U	677		
GAF-444U	GAF-GW-444U-01202020		1/20/2020	N	T	1.40		< 0.991	U	724		
GAF-444U	GAF-GW-444U-02132020		2/13/2020	N	T							
GAF-444U	GAF-GW-444U-03172020		3/17/2020	N	T							
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	D			< 0.991	U	788	J	
GAF-444U	GAF-GW-444U-04242020		4/24/2020	N	T	< 13.2	U*	< 0.991	U	699	J	
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	D			< 0.991	U	677		
GAF-444U	GAF-GW-444U-06162020		6/16/2020	N	T	7.00		< 0.991	U	649		
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	D			< 0.991	U	718		
GAF-444U	GAF-GW-444U-08192020		8/19/2020	N	T	10.0		< 0.991	U	734		
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	D			< 0.991	U	720			
GAF-444U	GAF-GW-444U-10222020	10/22/2020	N	T	4.10		2.31		713			

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Red = concentration of treatability test target metal (beryllium, cadmium, lithium, and nickel) exceeds standard

GWPS: groundwater protection standard  
GWPS of treatability test target metals:  
Beryllium: 4 µg/L  
Cadmium: 5 µg/L  
Lithium: 40 µg/L  
Nickel: 100 µg/L

**Table 2-2  
Baseline Soil Analytical Results  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Location ID	Adjacent to Well:	Sample ID	Sample Date	Sample Type	Aluminum		Antimony		Arsenic		Barium		Beryllium		Boron		Cadmium		Calcium	
					mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
					Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers
NRS 053	GAF-444U	GAF-SB-NRS053-45-50-01292020	1/29/2020	N	12400		0.351	J	20.0		41.6		1.64		8.44	J	0.113		771	
NRS 053	GAF-444U	GAF-SB-NRS053-70-72-01302020	1/30/2020	N	9340		0.149	J	5.33		93.8		1.24		10.0	J	0.557		16700	
NRS 054	GAF-444U	GAF-SB-NRS054-10-15-01282020	1/28/2020	N	13100		0.254	J	6.39		38.8		0.522		3.19	J	3.01		540	
NRS 054	GAF-444U	GAF-SB-NRS054-65-66-01292020	1/29/2020	N	12900		0.204	J	9.44		140		1.70		7.92	J	1.34		70400	
NRS 058	GAF-441U	GAF-SB-NRS058-10-15-02032020	2/3/2020	N	14400		0.652	J	27.7		151		1.14		24.3		0.138		16800	
NRS 058	GAF-441U	GAF-SB-NRS058-45-50-02032020	2/3/2020	N	16100		0.170	J	5.51		47.1		0.829		4.72	J	0.0206	J	359	
NRS 060	GAF-441U	GAF-SB-NRS060-5-10-01312020	1/31/2020	N	17900		1.16	J	14.3		158		1.95		32.3		3.16		4570	
NRS 060	GAF-441U	GAF-SB-NRS060-30-35-01312020	1/31/2020	N	17100		0.175	J	4.99		39.8		0.479		9.25		0.0510	J	580	
NRS 068	19R	GAF-SB-NRS068-40-58-03122020	3/12/2020	N	7020		0.207	J	5.58	J	43.6		0.516		8.83	J	0.0508	J	324	J
NRS 069	GAF-441U	GAF-SB-NRS069-40-50-03092020	3/9/2020	N	7430		0.202	J	4.77	J	40.7	J	0.420		< 7.45	U*	0.0399	J	617	J
NRS 069	GAF-441U	GAF-SO-903-03092020	3/9/2020	FD	6830		0.195	J	4.44	J	27.3	J	0.446		8.74	J	0.0446	J	181	J
NRS 070	GAF-444U	GAF-SB-NRS070-50-60-03102020	3/10/2020	N	5870		0.312	J	13.5	J	38.9		1.14		< 7.68	U*	0.191		591	J

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< = not detected at the reporting limit shown

mg/kg = milligrams per kilogram

Borings NRS053, NRS054, and NRS070 were installed within approximately 50 feet of monitoring well GAF-444U

Borings NRS060 and NRS069 were installed within approximately 50 feet of monitoring well GAF-441U, and boring NRS058 was installed within approximately 200 feet of monitoring well GAF-441U

Boring NRS068 was installed within approximately 50 feet of monitoring well 19R.

**Table 2-2  
Baseline Soil Analytical Results  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Location ID	Adjacent to Well:	Sample ID	Sample Date	Chromium		Cobalt		Copper		Iron		Lead		Lithium		Magnesium		Manganese		Mercury			
				mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers
NRS 053	GAF-444U	GAF-SB-NRS053-45-50-01292020	1/29/2020	11.8		6.30		12.6		35000		17.8		6.42		540		272	J	< 0.0274	U		
NRS 053	GAF-444U	GAF-SB-NRS053-70-72-01302020	1/30/2020	8.92		7.50		12.0		17900		11.3		10.8		1140		1150	J	0.0561			
NRS 054	GAF-444U	GAF-SB-NRS054-10-15-01282020	1/28/2020	12.6		1.49		15.6		18100		7.60		7.21		479		62.7	J	0.152			
NRS 054	GAF-444U	GAF-SB-NRS054-65-66-01292020	1/29/2020	12.8		9.42		13.2		29000		14.5		15.3		1570		2450	J	0.0707			
NRS 058	GAF-441U	GAF-SB-NRS058-10-15-02032020	2/3/2020	18.6	J	3.39	J	21.8	J	48000		24.1		7.43		580		48.7		0.144			
NRS 058	GAF-441U	GAF-SB-NRS058-45-50-02032020	2/3/2020	10.5	J	3.42	J	12.0	J	16800		10.3		13.6		793		176		0.0529			
NRS 060	GAF-441U	GAF-SB-NRS060-5-10-01312020	1/31/2020	36.2	J	7.94	J	15.7	J	42700		11.9		13.6		333		47.6		< 0.0289	U		
NRS 060	GAF-441U	GAF-SB-NRS060-30-35-01312020	1/31/2020	12.1	J	4.77	J	7.59	J	19300		7.26		10.5		831		227		0.0610			
NRS 068	19R	GAF-SB-NRS068-40-58-03122020	3/12/2020	10.3		2.20	J	7.09		19300	J	7.81		4.46		311	J	95.5	J	< 0.0245	U		
NRS 069	GAF-441U	GAF-SB-NRS069-40-50-03092020	3/9/2020	16.8	J	2.89	J	6.83		17600	J	5.96		3.95		443	J	175	J	< 0.0274	U		
NRS 069	GAF-441U	GAF-SO-903-03092020	3/9/2020	6.45	J	17.3	J	8.95		16700	J	6.09		3.34		302	J	97.6	J	< 0.0272			
NRS 070	GAF-444U	GAF-SB-NRS070-50-60-03102020	3/10/2020	25.8		28.5	J	11.2		29000	J	9.72		3.90		366	J	1200	J	0.0309	J		

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mg/kg = milligrams per kilogram

Borings NRS053, NRS054, and NRS070 were installed within approximately 50 feet of monitoring well GAF-444U

Borings NRS060 and NRS069 were installed within approximately 50 feet of monitoring well GAF-441U, and boring NRS058 was installed within approximately 200 feet of monitoring well GAF-441U

Boring NRS068 was installed within approximately 50 feet of monitoring well 19R.

**Table 2-2  
Baseline Soil Analytical Results  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Location ID	Adjacent to Well:	Sample ID	Sample Date	Molybdenum		Nickel		Phosphorus		Potassium		Selenium		Silver		Sodium		Sulfur		Thallium	
				mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers
NRS 053	GAF-444U	GAF-SB-NRS053-45-50-01292020	1/29/2020	2.37		17.0		1490		1170		2.43		< 0.0303	U	33.0	J	835		0.241	
NRS 053	GAF-444U	GAF-SB-NRS053-70-72-01302020	1/30/2020	0.585	J	21.7		587		1300		2.45		< 0.0323	U	56.3	J	187	J	0.215	
NRS 054	GAF-444U	GAF-SB-NRS054-10-15-01282020	1/28/2020	1.48		5.37		456		602		0.972		< 0.0293	U	< 21.6	U	1960		0.220	
NRS 054	GAF-444U	GAF-SB-NRS054-65-66-01292020	1/29/2020	0.841		30.9		753		1430		2.17		< 0.0304	U	62.4		< 172	U	0.647	
NRS 058	GAF-441U	GAF-SB-NRS058-10-15-02032020	2/3/2020	7.02		11.2	J	467		1710		2.54	J	0.0429	J	228		16500		2.24	
NRS 058	GAF-441U	GAF-SB-NRS058-45-50-02032020	2/3/2020	1.45		9.79	J	663		1180		1.23	J	< 0.0325	U	< 24.0	U	< 179	U	0.240	
NRS 060	GAF-441U	GAF-SB-NRS060-5-10-01312020	1/31/2020	3.26		27.7	J	236		533		9.00	J	0.0487	J	128		18900		1.13	
NRS 060	GAF-441U	GAF-SB-NRS060-30-35-01312020	1/31/2020	1.58		7.44	J	506		870		0.759	J	< 0.0311	U	29.2	J	1510		0.262	
NRS 068	19R	GAF-SB-NRS068-40-58-03122020	3/12/2020	1.60		8.15	J	460		636		< 0.119	UJ	< 0.0262	U	< 19.3	UJ	553	J	0.201	
NRS 069	GAF-441U	GAF-SB-NRS069-40-50-03092020	3/9/2020	1.44		7.32	J	379		590		< 0.135	UJ	< 0.0298	U	27.5	J	867		0.380	
NRS 069	GAF-441U	GAF-SO-903-03092020	3/9/2020	1.36		17.2	J	510		604		< 0.0937	UJ	< 0.0207	U	28.5	J	1030		0.339	
NRS 070	GAF-444U	GAF-SB-NRS070-50-60-03102020	3/10/2020	2.12		25.2	J	659		672		< 0.0957	UJ	< 0.0212	U	26.3	J	< 175	U	0.226	

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mg/kg = milligrams per kilogram

Borings NRS053, NRS054, and NRS070 were installed within approximately 50 feet of monitoring well GAF-444U

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Boring NRS068 was installed within approximately 50 feet of monitoring well 19R.

**Table 2-2  
Baseline Soil Analytical Results  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Location ID	Adjacent to Well:	Sample ID	Sample Date	Total Inorganic Carbon		Total Organic Carbon		Vanadium		Zinc	
				mg/kg		mg/kg		mg/kg		mg/kg	
				Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers	Result	Validator Qualifiers
NRS 053	GAF-444U	GAF-SB-NRS053-45-50-01292020	1/29/2020	< 684	U	< 684	UJ	26.3		46.5	J
NRS 053	GAF-444U	GAF-SB-NRS053-70-72-01302020	1/30/2020	15000		1170	J	12.0		66.6	J
NRS 054	GAF-444U	GAF-SB-NRS054-10-15-01282020	1/28/2020	< 684	U	1370	J	24.5		22.4	J
NRS 054	GAF-444U	GAF-SB-NRS054-65-66-01292020	1/29/2020	40700		11200	J	17.2		81.7	J
NRS 058	GAF-441U	GAF-SB-NRS058-10-15-02032020	2/3/2020	4780		21100		50.0	J	37.2	
NRS 058	GAF-441U	GAF-SB-NRS058-45-50-02032020	2/3/2020	< 684	U	1260		20.0	J	37.5	
NRS 060	GAF-441U	GAF-SB-NRS060-5-10-01312020	1/31/2020	7360		15100		86.2	J	61.3	
NRS 060	GAF-441U	GAF-SB-NRS060-30-35-01312020	1/31/2020	< 684	U	5190		23.6	J	26.9	
NRS 068	19R	GAF-SB-NRS068-40-58-03122020	3/12/2020	< 684	U			20.6		23.7	J
NRS 069	GAF-441U	GAF-SB-NRS069-40-50-03092020	3/9/2020	< 684	U			23.3		25.6	J
NRS 069	GAF-441U	GAF-SO-903-03092020	3/9/2020	< 684	U			16.9		45.4	J
NRS 070	GAF-444U	GAF-SB-NRS070-50-60-03102020	3/10/2020	< 684	U			22.9		60.7	J

**Notes:**

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Borings NRS053, NRS054, and NRS070 were installed within approximately 50 feet of monitoring well GAF-444U

Borings NRS060 and NRS069 were installed within approximately 50 feet of monitoring well GAF-441U, and boring NRS058 was installed within approximately 200 feet of monitoring well GAF-441U

Boring NRS068 was installed within approximately 50 feet of monitoring well 19R.

**Table 3-1**  
**Titration Study Results - Target Metals**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Reagents Added	Raw Water Source	Total / Dissolved	Sample Type	pH (S.U.)	Beryllium, Be Goal 4 ug/L	Cadmium, Cd Goal 5 ug/L	Lithium, Li Goal 40 ug/L	Nickel, Ni Goal 100 ug/L	Observation	Recommendation
FerroBlack T22	19R	Total	N	7.97	<10/1.82 MDL	<10/2.17 MDL	<50/33.9 MDL	<10	No target analytes detected. MDLs below goals, but reporting limits for Be, Cd & Li elevated.	Retain Ferroblack for microcosm.
FerroBlack T22 (Repeat Test)	19R	Total	N	6.50	<1	<1	7.32	3.59	Met all goals.	
		Total	FD		<5/0.910 MDL	<5/1.09 MDL	36.9	16.6		
FerroBlack Plus	19R	Total	N	7.00	<10/1.82 MDL	<10/2.17 MDL	<50/33.9 MDL	<10	No target analytes detected. MDLs below goals, but reporting limits for Be, Cd & Li elevated.	Retain as potential component of mixture in study.
NaOH	19R	Total	N	7.22	<1	1.31	128	18.0 B	Effective for Be, Cd & Ni. No Li treatment.	
NaOH	444U	Total	N	6.72	4.32 B	6.56	33	590	No Ni treatment; poor Be & Cd treatment.	
KOH	19R	Total	N	7.30	<1	<1	128	17.7 B	Effective for Be, Cd & Ni; no Li treatment.	Drop from study.
KOH	444U	Total	N	7.01	0.252 J	3.43	29.0	218	Good Be and Cd results, but did not meet Ni goal.	
		Dissolved	N		<1.0	3.20	30.0	219	Note that Ni concentration in 444U is higher than in 19R.	
Enviroblend	19R	Total	N	6.22	2.14	1.67	150	83.7	Effective for Be, Cd & Ni, although Ni treatment limited; no Li treatment.	Not cost-effective. Drop from study.
MagOx	19R	Total	N	6.11	2.58	2.51	138	110	Did not meet Ni goals. No Li treatment.	Drop from study.
TN Valley Limestone	19R	Total	N	5.57	0.964 J	158 J	134	169 B	Increased Cd concentrations. No Li, Ni treatment. pH change limited.	Drop from study.
Hydroxyapatite	19R	Total	N	6.04	4.26 J	15.4	167	129 B	No treatment.	Drop from study.
Sodium carbonate/bicarbonate	19R	Total	N	7.01	<10/1.82 MDL	<10/2.17 MDL	136	62.2 B	Effective for Ni, but treatment limited. Be & Cd not detected. MDLs below goals, but reporting limits for Be, Cd & Li elevated.	Hold for potential use later in study.
Potassium carbonate	19R	Total	N	6.98	0.236 J	1.47	118	74.8 B	Effective for Be, Cd & Ni, although Ni treatment limited; no Li treatment.	Hold for potential use later in study.
Potassium bicarbonate	19R	Total	N	6.92	1.28	0.979 J	122	90.8	Effective for Be, Cd & Ni, although Ni treatment limited; no Li treatment.	Hold for potential use later in study.
Provect IRM®	19R	Total	N	6.47	0.242 J	0.476 J	110	21.1 *	Effective for Be, Cd & Ni; no Li treatment. Hi dose required.	Not cost-effective. Drop from study.
PeroxyChem Geoform™	19R	Total	N	5.78	<100/18.2 MDL	<100/21.7 MDL	367 J	1,270 B	Be & Cd treatment unknown. Li & Ni worse. pH change limited.	Drop from study.
HiCalFines	19R	Total	N	7.59	<1	0.618 J	128	4.35 B	Effective for Be, Cd and Ni; no Li treatment.	Retain HiCalFines for microcosm. Consider addition of CaCl <sub>2</sub> .
HiCalFines & CaCl <sub>2</sub>	19R	Total	N	7.70	<10/1.82 MDL	<10/2.17 MDL	<50/33.9 MDL	<10	MDLs below goals, but reporting limits for Be, Cd & Li elevated.	
		Total	FD		<10/1.82 MDL	<10/2.17 MDL	141	3.78 J	Effective for Ni. Inconsistent Li results.	
HiCalFines & CaCl <sub>2</sub> (Repeat test)	19R	Total	N	7.07	<1.0	0.941 J	213	34.9	Effective for Be, Cd & Ni. No Li treatment.	
		Dissolved	N		<1.0	0.969 J	212	34.3		
HiCal Fines & CaCl <sub>2</sub> - 3 weeks reaction time	19R	Total	N	7.62	<1.0	<1.0	184 B	0.603 J	No Li treatment relative to raw water. Extended time provided some improvement in Ni treatment, but Li still 4x goal.	
		Dissolved	N		<1.0	<1.0	184 B	<1.0		
NaOH, Zeolite & CaCl <sub>2</sub>	19R	Total	N	6.67	<10/1.82 MDL	<10/2.17 MDL	184	<10	No Li treatment. Cd & Ni goals achieved, but Ni results inconsistent. Be MDLs below goals, but reporting limits elevated.	
		Total	FD		<10/1.82 MDL	2.66 J	238	88.3		
NaOH, zeolite & CaCl <sub>2</sub> - 3 weeks reaction time	19R	Total	N	9.98	<1.0	1.91	286	67.4	Higher Li concentrations than raw water.	
		Dissolved	N		<1.0	1.66	300	69.7		
DoloFines	19R	Total	N	7.68	0.187 J	0.258 J	128	2.91 B	Effective for Be, Cd and Ni; no Li treatment.	Retain DoloFines for microcosm.
DoloFines & CaCl <sub>2</sub>	444U	Total	N	6.72	<10/1.82 MDL	<10/2.17 MDL	143	4.07 J	Be & Ni treated. Cd results inconsistent. No Li treatment. No short-term benefit to CaCl <sub>2</sub> noted.	
		Total	FD		2.91 JB	7.41 J	198	10.9		
<b>Raw Water Data</b>										
N/A	19R	Total	N	3.56	13.3	6.07	137	197	Analytical results from sample collected on 1/15/2020	
		Dissolved	N		13.3	4.65	146	191		
N/A	444U	Total	N	4.84	12.8	8.17	37.4	660	Analytical results from sample collected on 1/20/2020	
		Dissolved	N		11.7	7.22	35.9	643		

**Notes**

All results presented in micrograms per liter (ug/L).  
Concentrations in excess of cleanup goal presented in red text. Discussions of successful obtainment of cleanup goal in green text.  
Sample type is either normal (N) or field duplicate (FD).  
pH was measured at the treatability laboratory at the time of sample collection. Raw water pH may not match field-measured pH  
Raw water analytical data presented here is from the January 2020 sampling event and was validated by Environmental Standards, Inc.  
Analytical data for titration testing was not validated, and includes the laboratory qualifiers.  
S.U. = Standard units  
MDL = Method detection limit, provided when analytes is not detected but reporting limit is higher than the goal.  
J = Estimated value between laboratory reporting limit and method detection limit.  
\* = Instrument-related QC outside acceptance limits.  
< = Analyte not detected above the laboratory reporting quantitation limit shown.  
B = Analyte was found in the laboratory method blank and associated sample.  
TN = Tennessee  
N/A = Not applicable

HiCalFines = Lime product derived from limestone and heated to drive off carbon dioxide to leave behind a mixture of CaO and CaCO<sub>3</sub>.  
CaO = Calcium oxide  
CaCl<sub>2</sub> = Calcium chloride  
CaCO<sub>3</sub> = Calcium carbonate  
DoloFines = Lime derived from magnesium-rich limestone (dolomite)  
KOH = Potassium hydroxide  
MagOx = Magnesium oxide  
NaOH = Sodium hydroxide  
Be = Beryllium  
Cd = Cadmium  
Li = Lithium  
Ni = Nickel  
Provect IRM® = Solid, Antimethanogenic Reagent for ISCR and Heavy Metal Stabilization

**Table 3-2**  
**Titration Study Results - Additional Parameters**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Analyte	GWPS (ug/L)	Results (ug/L)			Notes
		GAF-GW-FerroBlack		GAF-GW-DOLO	
		Total	Total (Duplicate)	Fines-444U Total	
Aluminum	NE	320	--	1,910	
Antimony	6 (a,b)	<2.00	--	<2.00	
Arsenic	10 (a,b)	<1.00	--	1.12	
Barium	2,000 (a,b)	3.4 J	--	14.4	
Beryllium	4 (a,b)	<1.00	<5.00	1.76 B	
Boron	NE	682	--	4,040	
Cadmium	5 (a,b)	<1.00	<5.00	1.39	
Calcium	NE	107,000	--	628,000	
Chromium	100 (a,b)	<2.00	--	<2.00	
Cobalt	NE (c)	13.1	--	191	High levels of naturally occurring cobalt in soil preclude the use of cobalt as a detection monitoring constituent
Copper	NE	<2.00	--	1.62 J	
Fluoride	4,000 (a,b)	<1,000	--	612	
Iron	NE	75,800 B	--	10,300	
Lead	15 (a,b)	<1.00	--	0.602 J	
Lithium	40 (b)	7.32	36.9	34.2	
Magnesium	NE	4,700	--	97,400	
Manganese	NE	2,880 B	--	10,900 B	
Mercury	2 (a,b)	<0.200	--	<0.200	
Molybdenum	100 (b)	<5.00	--	<5.00	
Nickel	100 (a)	3.59	16.6	78.3	
Potassium	NE	20,300	--	85,100	
Selenium	50 (a,b)	<5.00	--	<5.00	
Silver	100 (a)	<1.00	--	10.2	
Sodium	NE	442,000	--	57,400	
Thallium	2 (a,b)	<1.00	--	0.185 J	
Vanadium	NE	<1.00	--	<1.00	
Zinc	NE	14.3	--	131	

**Notes:**  
ug/L = micrograms per liter  
-- = not analyzed. Only a subset of metals were analyzed in this sample.  
NE = Not established at the Non-Registered Site  
GWPS = Groundwater protection standard  
DoloFines = lime derived from magnesium-rich limestone (dolomite)  
B = Analyte was detected in the blank and sample  
J = result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value  
< = Analyte not detected at the reporting quantitation limit shown  
(a) - Default published GWPS based on TN MCLs from Tennessee solid waste regulations, Appendix III (TN Rule 0400-11-01-.04). Site-specific GWPS may be developed under TN Rules (Alternate Concentration Limits, ACLs) with TDEC Approval.  
(b) - Default published GWPS from CCR Rule, Appendix IV (40 CFR 257.95) based on Primary MCLs for public drinking water supplies (<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>) and default values for parameters without primary MCLs. Site-specific GWPSs may be developed under the CCR Rule if background is above the default GWPS/MCL.  
(c) TDEC approved an Alternate Source Demonstration for cobalt at the NRS; no alternate GWPS established.

**Table 3-3a**  
**Phase I and II Microcosm Study Results - Target Metals**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Site Water Source	Media	Reagent Added and Dose	Dose	Total/ Dissolved	Sample Date	pH (S.U.)	Beryllium, Be Goal 4 ug/L	Cadmium, Cd Goal 5 ug/L	Lithium, Li Goal 40 ug/L	Nickel, Ni Goal 100 ug/L	Observation
19R	NA	NA - Raw water	NA	Total	1/15/2020	3.54	13.3	6.07	137	197	Concentrations in raw water used in microcosm tests.
				Dissolved			13.3	4.65	146	191	
				Total	4/22/2020	3.49	12.5	4.45	125	160	
				Dissolved			12.5	4.45	125	160	
				Total	6/16/2020	3.77	12.5	4.40	130	159	
444U	NA	NA - Raw water	NA	Total	1/20/2020	4.13	12.8	8.17	37.4	660	No lithium exceedance, but higher nickel concentrations. Similar to source area groundwater.
				Dissolved			11.7	7.22	35.9	643	
				Total	4/24/2020	4.30	8.77	9.29	31.2	527	
				Dissolved			9.20	9.79	30.7	520	
				Total	6/16/2020	4.47	7.96	10.1	31.2	534	
				Dissolved			7.58	9.17	31.5	552	
19R	Sand	Control	#1	Total	4/27/2020	7.80	0.597 J	2.57	21.9 B	83.4	Met goals. Clean sand (concrete sand) was enough to remove metals from solution on first dosing.
				Dissolved	4/27/2020		<1.00	2.16	18.4 B	63.9	
			#2	Total	5/28/2020	6.00	3.08	8.53	60.5	292	Breakthrough for cadmium, lithium, and nickel.
			#3	Total	6/4/2020	5.91	0.574 J	10.6	44.4	414	Breakthrough for cadmium, lithium, and nickel.
			#4	Total	6/24/2020	5.04	7.15	9.8	69.4	521	Breakthrough for all target metals.
			#5	Total	7/1/2020	5.44	5.49	8.63	50.9	502	Breakthrough for all target metals.
19R	Sand	FerroBlack "Plus"	#1	Total	4/27/2020	7.72	<5.00 / 0.91 MDL	2.63 J	47.5 B	54.4	Did not meet goal for lithium, but lithium also in QA/QC blank.
			#2	Total	5/28/2020	5.80	<1.00	<1.00	20.3	10.2	Met goals.
			#3	Total	6/4/2020	5.37	0.220 J	0.749 J	42.0	24.6	Did not meet goal for lithium.
			#4	Total	6/24/2020	6.21	<1.00	<1.00	46.0	30.1	Did not meet goal for lithium.
			#5	Total	7/1/2020	6.35	<1.00	<1.00	46.4	50.1	Did not meet goal for lithium.
19R	Sand	HiCal Fines (0.062% by weight)	#1	Total	4/27/2020	8.15	0.265 J	0.39 J	10.6 B	20.0	Met goals.
			#2	Total	5/28/2020	6.49	<1.00	0.344 J	13.3	10.4	Met goals.
			#3	Total	6/4/2020	6.34	<1.00	0.551 J	18.0	25.2	Met goals.
			#4	Total	6/24/2020	6.02	2.12	3.24	45.1	178	Breakthrough for lithium and nickel.
			#5	Total	7/1/2020	4.63	4.24	6.08	51.4	295	Breakthrough for all target metals.
19R	Sand	HiCal Fines/CaCl <sub>2</sub>	#1	Total	4/27/2020	7.50	0.562 J	7.47	28.3	54.3	Did not meet goal for cadmium.
			#2	Total	5/28/2020	6.07	<1.00	1.38	13.4	8.44	Met goals.
			#3	Total	6/4/2020	6.00	<1.00	0.590 J	22.8	15.7	Met goals.
			#4	Total	6/24/2020	5.74	2.19	3.07	46.9	175	Breakthrough for lithium and nickel.
			#5	Total	7/1/2020	4.62	5.37	6.57	59.9	537	Breakthrough for all target metals.
19R	Sand	DoloFines (0.082%)	#1	Total	6/4/2020	6.88	1.09	1.95	18.5	56.2	Met goals.
			#2	Total	6/24/2020	4.79	<1.00	2.76	23.7	65.4	Met all goals, but performance diminishing.
			#3	Total	7/1/2020	5.85	7.63	9.25	56.8	345	Breakthrough for all target metals.
19R	Sand	NaOH	#1	Total	6/4/2020	6.82	1.09	1.36	13.1	51.8	Met goals.
			#2	Total	6/24/2020	5.93	<1.00	2.19	22.8	76.9	Met all goals, but performance diminishing.
			#3	Total	7/1/2020	5.34	<1.00	3.61	23.0	142	Did not meet goal for nickel.
444U	Sand	Control	#1	Total	6/4/2020	4.84	7.70	0.481 J	6.88	8.69	Did not meet goal for beryllium. No change to pH.
444U	Sand	DoloFines (0.1%)	#1	Total	4/27/2020	9.32	0.991 J	0.72 J	11.2	56.9	Met goals.
			#2	Total	5/28/2020	6.88	<1.00	<1.00	<5.00	3.69	Met goals.
			#2B	Total	6/4/2020	7.08	<1.00	0.256 J	<5.00	8.16	Same water, but longer time on soil.
			#3	Total	6/24/2020	6.35	<1.00	<1.00	<5.00	2.52	Met goals.
			#4	Total	7/1/2020	7.65	<1.00	<1.00	<5.00	2.12	Met goals.
			#5	Total	7/8/2020	7.23	<1.00	<1.00	5.38	2.03	Met goals.
			#6	Total	7/16/2020	7.65	0.558 J	2.84	12.4	134	Did not meet goal for nickel.

**Notes**

MDL = Method detection limit provided when analyte is not detected but reporting limit is higher than the goal.  
J = Estimated value between laboratory reporting limit and method detection limit.  
All results presented in micrograms per liter (ug/L).  
Red text = Concentrations exceed cleanup goal, pH measurements <5 S.U.  
B = Lithium detected in laboratory quality assurance blank at 4 ug/L. Thus, reported values may be biased high.  
Analytical results obtained by USEPA SW-846 Method 6020A (ICP/MS), except where otherwise indicated.  
< = analyte not detected above the reporting quantitation limit shown (MDL if limit exceeded goal).  
S.U. = Standard pH units  
pH values for raw water at 19R and GAF-444U is based on the field pH. The remaining pH values were measured in the treatability study laboratory.

HiCal Fines = lime product derived from limestone and heated to drive off carbon dioxide to leave behind a mixture of CaO and CaCO<sub>3</sub>.  
CaO = Oxycalcium  
CaCl<sub>2</sub> = calcium chloride  
CaCO<sub>3</sub> = calcium carbonate  
DoloFines = lime derived from magnesium-rich limestone (dolomite)  
NaOH = sodium hydroxide  
NA = not applicable  
ug/L = micrograms per liter

**Table 3-3b**  
**Phase III Microcosm Study Results - Target Metals**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Site Water Source	Media	Reagent Added (Dose)	Dose	Total/ Dissolved	Sample Date	pH (S.U.)	Beryllium, Be Goal 4 ug/L	Cadmium, Cd Goal 5 ug/L	Lithium, Li Goal 40 ug/L	Nickel, Ni Goal 100 ug/L	Observation
19R	Sand	Control	#1	Total	7/23/2020	5.90	<1.00	2.12	16.0	58.3	Met goals.
				Dissolved			<1.00	2.81	18.9	64.7	Met goals.
			#2	Total	7/30/2020	7.80	<1.00	3.97	36.4	134	Did not meet goal for nickel.
				Dissolved			<1.00	5.67	45.0	170	Did not meet goal for cadmium, lithium and nickel.
			#3	Total	8/6/2020	6.88	0.328 J	8.21	37.4	294	Did not meet goal for cadmium and nickel.
				Dissolved			<1.00	<1.00	<5.00	47.0	Met goals.
19R	Sand	DoloFines (0.1%)	#1	Total	7/23/2020	9.32	1.50	2.26	5.26	71.5	Met goals.
				Dissolved			<1.00	<1.00	<5.00	47.0	Met goals.
			#2	Total	7/30/2020	9.41	<1.00	<1.00	6.02	21.7	Met goals.
				Dissolved			<1.00	<1.00	<5.00	28.2	Met goals.
			#3	Total	8/6/2020	10.65	<1.00	<1.00	8.42	12.5	Met goals.
				Dissolved			<1.00	<1.00	<5.00	33.8	Met goals.
19R	Sand	HiCal Fines (0.062% by weight)	#1	Total	7/23/2020	9.61	<1.00	<1.00	<5.00	42.9	Met goals.
				Dissolved			<1.00	<1.00	<5.00	33.8	Met goals.
			#2	Total	7/30/2020	9.36	<1.00	<1.00	<5.00	19.5	Met goals.
				Dissolved			<1.00	<1.00	<5.00	16.8	Met goals.
			#3	Total	8/6/2020	9.67	<1.00	<1.00	<5.00	10.7	Met goals.
				Dissolved			<1.00	<1.00	<5.00	56.9	Met goals.
GAF-444U	Sand	HiCal Fines (0.062% by weight)	#1	Total	7/23/2020	9.89	<1.00	<1.00	<5.00	62.7	Met goals.
				Dissolved			<1.00	<1.00	<5.00	56.9	Met goals.
			#2	Total	7/30/2020	9.87	<1.00	<1.00	<5.00	34.5	Met goals.
				Dissolved			<1.00	<1.00	<5.00	28.1	Met goals.

**Notes:**

J = Estimated value between laboratory reporting limit and method detection limit.

ug/L = micrograms per liter

S.U. = Standard pH units

Red text = Concentrations exceed cleanup goal, pH measurements <5 S.U.

Analytical results obtained by USEPA SW-846 Method 6020A (ICP/MS), except where otherwise indicated.

pH measured at the treatability testing laboratory.

HiCal Fines = lime product derived from limestone and heated to drive off carbon dioxide to leave behind a mixture of CaO and CaCO<sub>3</sub>.

CaO = Oxycalcium

CaCl<sub>2</sub> = calcium chloride

CaCO<sub>3</sub> = calcium carbonate

DoloFines = lime derived from magnesium-rich limestone (dolomite)

< = analyte not detected above the reporting quantitation limit shown

**Table 3-4a**  
**Phase III Microcosm Study Results - Additional Parameters**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Compound	GWPS (ug/L)	Raw Water, Well 19R	Control, 19R					Dolofines, 19R					High Cal Fines, 19R					Notes
		6/16/2020	Dose #1		Dose #2		Dose #3	Dose #1		Dose #2		Dose #3	Dose #1		Dose #2		Dose #3	
		Total	Dissolved*	Total	Dissolved*	Total*	Total	Dissolved*	Total	Dissolved*	Total*	Total	Dissolved*	Total	Dissolved*	Total*	Total	
Aluminum	NE	55,300	27.1 J	NA	27.1 J	50.3	580	51.8	NA	179	<30.0	62.6	<30.0	NA	<30.0	103	52.6	No issue
Antimony	6 (a,b)	<0.378	<2.00	NA	<2.00	<2.00	<2.00	<2.00	NA	<2.00	<2.00	<2.00	<2.00	NA	<2.00	<2.00	<2.00	OK
Arsenic	10 (a,b)	2.56	0.608 J	NA	<1.00	0.378 J	0.635J	3.08	NA	2.98	1.39	1.92	3.65	NA	2.46	3.48	2.04	OK
Barium	2,000 (a,b)	15.0	64.9	NA	59.6	58.2	66.4	132	NA	162	165	156	104	NA	144	150	167	OK
Beryllium	4 (a,b)	12.5	<1.00	<1.00	<1.00	<1.00	0.328 J	<1.00	1.50	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	Beryllium goals met for both reagents and control sand for all three doses.
Boron	NE	3,390 J	2,680	NA	3,260	3,160	3,830	319	NA	592	815	1,500	687	NA	1,420	1,280	2,630	No issue
Cadmium	5 (a,b)	4.40	2.81	2.12	5.67 J	3.97	8.21	<1.00	2.26	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	Cadmium goal met with reagents for all three doses. Control fails on 2 of 3 samples.
Calcium	NE	417,000	760,000	NA	758,000	773,000	749,000	642,000	NA	811,000	790,000	803,000	655,000	NA	751,000	781,000	780,000	No issue; Note that control sand contains soluble calcium
Chromium	100 (a,b)	<1.53	<2.00	NA	<2.00	<2.00	<2.00	4.44	NA	1.72 J	<2.00	<2.00	2.58	NA	<2.00	<2.00	<2.00	OK. Standard based on total chromium.
Cobalt	NE (c)	193	1.63	NA	27.7	22.5	278	4.21	NA	2.61	2.44	1.51	4.30	NA	2.64	2.80	2.47	Reagents are removing cobalt
Copper	NE	8.00	0.713 J	NA	<2.00	0.659 J	1.33J	102	NA	43.1	33.6	18.5	52.2	NA	21.5	26.4	12.3	No issue
Iron	NE	481,000	<50.0	NA	<50.0	37.8 J	420	<50.0	NA	121	<50.0	35.3J	<50.0	NA	<50.0	<50.0	<50.0	No issue; iron is being removed by reagents.
Lead	15 (a,b)	<1.78 U*	0.290 J	NA	<1.00	0.197 J	0.606J	0.202 J	NA	0.349 J	<1.00	<1.00	<1.00	NA	<1.00	0.245 J	<1.00	OK
Lithium	40 (b)	130	18.9	16.0	45.0	36.4	37.4	<5.00	5.26	<5.00	6.02	8.42	<5.00	<5.00	<5.00	<5.00	<5.00	Lithium goals met for both reagents for all three doses. Control sand shows failure for lithium at Dose 2.
Magnesium	NE	21,900	88,700	NA	98,700	100,000	99,400	229 J	NA	17,500	12,600	45,300	901	NA	4,880	4,630	22,700	No issue
Manganese	NE	15,100	7,390	NA	22,000	17,600	43,500	3.02 J	NA	14.0	5.09	184	<5.00	NA	<5.00	6.49	7,000	No issue
Mercury	2 (a,b)	<0.13	<0.200	NA	<0.200	<0.200	<0.200	<0.200	NA	0.301	<0.200	<0.200	<0.200	NA	<0.200	<0.200	<0.200	OK
Molybdenum	100 (b)	<0.61	<5.00	NA	<5.00	<5.00	<5.00	24.2	NA	17.5	13.9	12.3	21.1	NA	12.5	14.9	8.74	OK
Nickel	100 (a)	159	64.7	58.3	170	134	294	47.0	71.5	28.2	21.7	12.5	33.8	42.9	16.8	19.5	10.7	Nickel goals met for both reagents at all three doses. Nickel treatment may be improving over time. Control sand fails at Dose 2.
Potassium	NE	15,400	20,500	NA	11,900	11,100	13,500	23,400	NA	10,300	11,000	12,700	5,160	NA	8,930	8,890	11,800	No issue
Selenium	50 (a,b)	<1.51	<5.00	NA	<5.00	<5.00	<5.00	4.62 J	NA	3.03 J	2.52 J	1.73J	3.22 J	NA	2.06 J	2.09 J	<5.00	OK
Silicon	NE	17,400	8,500	NA	13,100	12,100	12,200	2,060	NA	3,130	2,360	3,410	2,020	NA	2,740	2,760	3,480	No issue
Silver	100 (a,b)	<0.177	<1.00	NA	<1.00	<1.00	<1.00	<1.00	NA	0.370 J	<1.00	<1.00	<1.00	NA	<1.00	<1.00	<1.00	OK
Sodium	NE	7,670	12,700	NA	11,600	12,100	25,800	6,460	NA	9,180	8,990	25,900	12,700	NA	22,900	23,800	38,800	No issue
Strontium	NE	1,200 J	1,730	NA	1,730	1,720	1,680	977	NA	1,270	1,270	1,330	1,070	NA	1,270	1,320	1,440	No issue
Thallium	2 (a,b)	<1.23 U*	0.592 J	NA	0.264 J	0.223 J	0.451 J	0.199 J	NA	<1.00	<1.00	<1.00	<1.00	NA	<1.00	0.257 J	<1.00	OK
Vanadium	NE	21.7	<1.00	NA	<1.00	<1.00	<1.00	3.26	NA	4.73	3.43	4.76	3.70	NA	4.44	4.73	2.98	No issue
Zinc	NE	636	56.1	NA	139	96.0	302	3.94 J	NA	<5.00	3.46 J	<5.00	4.95 J	NA	<5.00	<5.00	<5.00	No issue

**Notes:**

The raw water used in the Phase III Microcosm tests was from the June 16, 2020 groundwater sampling event. Results given in micrograms per liter (ug/L).

Target metals for treatment (Be, Cd, Li and Ni) are highlighted in green.

Red = Concentration exceeds the GWPS.

NE = No established standard for the Non-Registered Site.

NA = Not analyzed for this parameter.

<= Analyte not detected above laboratory quantitation limit shown.

J = Quantitation is approximate due to limitations identified during data validation (19R data only), or reported value is between the reporting limit and the method detection limit (remaining samples).

U\* = This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level.

\* Coolers outside of temperature upon receipt at the lab.

"OK" means that a criteria exists for a non-target metal and is not exceeded.

"No issue" means a standard for that metal does not exist, and treatment has no adverse effect.

GWPS = groundwater protection standard

(a) - Default published GWPS based on TN MCLs from Tennessee solid waste regulations, Appendix III (TN Rule 0400-11-01-.04). Site-specific GWPS may be developed under TN Rules (Alternate Concentration Limits, ACLs) with TDEC Approval.

(b) - Default published GWPS from CCR Rule, Appendix IV (40 CFR 257.95) based on Primary MCLs for public drinking water supplies (<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>) and default values for parameters without primary MCLs. Site-specific GWPSs may be developed under the CCR Rule if background is above the default G

(c) TDEC approved an Alternate Source Demonstration for cobalt at the NRS; no alternate GWPS calculated.

(d) Site-specific GWPS for lithium has been calculated for bedrock wells based on background under the CCR Rule monitoring (2018 Annual Report; AECOM, 2019). 0.045 mg/L is used for Carters Limestone and 0.189 mg/L for Lebanon Limestone (L1).

**Table 3-4b**  
**Phase III Microcosm Study Results - Additional Parameters**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Compound or Parameter (units)	GWPS	Raw Water, 19R	Control, 19R			Dolofines, 19R			High Cal Fines, 19R			Notes
		6/16/2020 Total	Dose #1 Total *	Dose #2 Total *	Dose #3 Total	Dose #1 Total *	Dose #2 Total *	Dose #3 Total	Dose #1 Total *	Dose #2 Total *	Dose #3 Total	
Chloride (mg/L)	NE	2.12 J	NA	NA	4.6	NA	NA	6.21	NA	NA	5.39	No issue
Fluoride (mg/L)	4 (a,b)	0.289	NA	NA	0.230 J	NA	NA	0.134 J	NA	NA	0.182	OK
Sulfate (mg/L)	NE	2500	NA	NA	2240	NA	NA	2100	NA	NA	2040	No issue, same in all conditions
Nitrogen, Kjeldahl (mg/L)	NE	< 0.963 U*	NA	NA	1.02 B	NA	NA	2.46 B	NA	NA	1.88	No issue
Nitrate Nitrite Nitrogen (mg/L)	NE	< 0.065	NA	NA	2.89	NA	NA	3.91	NA	NA	1.01	No issue
Phosphate as PO <sub>4</sub> (mg/L)	NE	0.155 J	NA	NA	<0.307	NA	NA	<0.307	NA	NA	<0.307	No issue
Sulfide (mg/L)	NE	65.7	NA	NA	<15.0	NA	NA	<15.0	NA	NA	<15.0	No issue
Total Dissolved Solids (mg/L)	NE	2670	NA	NA	2180	NA	NA	2840	NA	NA	2010	No issue, similar in all conditions
Total Organic Carbon (mg/L)	NE	0.817 J	NA	NA	2.58	NA	NA	5.34	NA	NA	3.94	No issue
Total Alkalinity as CaCO <sub>3</sub> to pH 4.5 (mg/L)	NE	< 5.00	176	151	99.8	234	95.4	57.2	164	100	33.4	No issue, higher with control and reagents compared to raw water. Decreasing alkalinity indicates gradual consumption of treatment capacity.
Bicarbonate Alkalinity as CaCO <sub>3</sub> (mg/L)	NE	< 5.00	176	151	99.8	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	6.49	No issue, control adds bicarbonate alkalinity.
Carbonate Alkalinity as CaCO <sub>3</sub> (mg/L)	NE	< 5.00	< 5.00	< 5.00	< 5.00	61.6	55.1	36.6	45.9	35.7	26.9	No issue. Fines > raw water, decreasing with time
Hydroxide Alkalinity (mg/L)	NE	< 5.00	< 5.00	< 5.00	< 5.00	172	40.3	20.6	118	64.3	< 5.00	No issue. Fines > raw water, decreasing with time
pH (standard units)	NE	3.77	5.90	7.80	6.88	9.32	9.41	10.65	9.61	9.36	9.67	No issue

**Notes:**

The raw water used in the Phase III Microcosm tests was from the June 16, 2020 groundwater sampling event.

pH values for raw water is based on the field pH. The remaining pH values were measured in the treatability study laboratory.

mg/L = milligrams per liter.

Red = Concentration exceeds the GWPS.

NE = No established standard for the Non-Registered Site.

NA = Not analyzed for this parameter.

< = Analyte not detected above laboratory quantitation limit shown.

B = Analyte was found in associated blank sample.

J = Quantitation is approximate due to limitations identified during data validation (19R data only), or reported value is between the reporting limit and the method detection limit (remaining samples).

U\* = This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level.

\* Coolers outside of temperature upon receipt at the lab.

"OK" means that a criteria exists for a non-target metal and is not exceeded.

"No issue" means a standard for that metal does not exist, and treatment has no adverse effect.

GWPS = groundwater protection standard

(a) - Default published GWPS based on TN MCLs from Tennessee solid waste regulations, Appendix III (TN Rule 0400-11-01-.04). Site-specific GWPS may be developed under TN Rules (Alternate Concentration Limits, ACLs) with TDEC Approval.

(b) - Default published GWPS from CCR Rule, Appendix IV (40 CFR 257.95) based on Primary MCLs for public drinking water supplies (<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>) and default values for parameters without primary MCLs. Site-specific GWPSs may be developed under the CCR Rule if background is above the default GWPS/MCL.

pH for well 19R was measured during the field investigation. The remaining pH values were measured at treatability laboratory.

**Table 3-5a**  
**Sequential Extraction Laboratory Results - Sand From Microcosm Studies**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Soil Sample - Description	Metal	Extraction Reagent		Exchangeable MgSO <sub>4</sub>		Carbonate Fraction NaOAc/HOAc pH 5		Non-crystalline NH <sub>4</sub> oxalate, pH3		Metal Hydroxide had/hdc/acetic acid		Organic Bound NaClO, pH 9.5		Acid/Sulfide Fraction HCl-HNO <sub>3</sub> -H <sub>2</sub> O		Residual HF/HNO <sub>3</sub> /H <sub>3</sub> BO <sub>3</sub>	
		6010B Total Metals	Sum Total of All Extractions	Step 1 Result	Step 1 Percent	Step 2 Result	Step 2 Percent	Step 3 Result	Step 3 Percent	Step 4 Result	Step 4 Percent	Step 5 Result	Step 5 Percent	Step 6 Result	Step 6 Percent	Step 7 Result	Step 7 Percent
Sand, no exposure to site groundwater	Be	0.463	0.466	<1.03	NC	<0.770	NC	0.0416J	9%J	0.0765J	16%J	<3.85	NC	0.0426J	9%J	0.305	65%
Sand with 3 doses of 19R GW	Be	0.504	0.610	<1.19	NC	<0.890	NC	0.0374J	6%J	0.0801J	13%J	<4.45	NC	0.0404J	7%J	0.346	57%
DoloFines/Sand with 3 doses 19R GW	Be	0.545	0.506	<1.18	NC	<0.885	NC	0.0484J	10%J	0.0803J	16%J	<4.43	NC	0.0531J	10%J	0.324	64%
HiCalFines/Sand with 3 doses 19R GW	Be	0.569	0.518	<1.18	NC	<0.884	NC	0.0519J	10%J	0.0872J	17%J	<4.42	NC	0.0495J	10%J	0.329	64%
Sand, no exposure to site groundwater	Cd	0.0539	0.222	<1.03	NC	0.0431J	19%J	0.0549JB	25%JB	0.0719J	32%J	<3.85	NC	<0.257	NC	0.0524J	24%J
Sand with 3 doses of 19R GW	Cd	0.0344J	0.170J	<1.19	NC	<0.890	NC	0.0795JB	47%JB	0.0594J	35%J	<4.45	NC	<0.297	NC	0.0315J	19%J
DoloFines/Sand with 3 doses 19R GW	Cd	0.0832J	0.232J	<1.18	NC	0.0584J	25%J	0.0744JB	32%JB	0.0744J	32%J	<4.43	NC	<0.292	NC	0.0248J	11%J
HiCalFines/Sand with 3 doses 19R GW	Cd	0.0696J	0.240J	<1.18	NC	0.0442J	18%J	0.0778JB	32%JB	0.0796J	33%J	<4.42	NC	<0.295	NC	0.0383J	16%J
Sand, no exposure to site groundwater	Li	5.42	5.31	<10.3	NC	<7.70	NC	<2.57	NC	0.949J	18%J	<38.5	NC	1.02J	19%J	3.34	63%
Sand with 3 doses of 19R GW	Li	8.60	5.77	<11.9	NC	<8.90	NC	<2.97	NC	1.02J	18%J	<44.5	NC	1.06J	18%J	3.68	64%
DoloFines/Sand with 3 doses 19R GW	Li	6.69	5.43	<11.8	NC	<8.85	NC	<2.95	NC	0.92J	17%J	<44.3	NC	1.05J	19%J	3.46	64%
HiCalFines/Sand with 3 doses 19R GW	Li	6.01	6.98	<11.8	NC	<8.84	NC	<2.95	NC	1.09J	16%J	<44.2	NC	1.51J	22%J	4.38	63%
Sand, no exposure to site groundwater	Ni	10.0	12.0	<8.22	NC	0.337 J	3% J	1.66 J	14% J	5.43	45%	1.36 J	11% J	2.34	20%	0.912 J	8% J
Sand with 3 doses of 19R GW	Ni	18.2	11.4	0.351 J	3% J	0.191 J	2% J	0.807 J	7% J	5.77	51%	1.13J	10% J	2.19 J	19% J	0.966 J	8% J
DoloFines/Sand with 3 doses 19R GW	Ni	12.6	12.2	<9.44	NC	0.666 J	5% J	1.58 J	13% J	5.40	44%	1.33J	11% J	2.43	20%	0.821 J	7% J
HiCalFines/Sand with 3 doses 19R GW	Ni	12.8	15.3 J	<9.43	NC	0.624 J	4% J	1.85 J	12% J	6.79	44% J	1.42J	9% J	2.94	19%	1.63 J	11% J
Sand, no exposure to site groundwater	Fe	8,570	8,150	<20.5	NC	18.7 JB	0.2% J	405	5%	2,520	31%	<77.0	NC	2,990	37%	2,220	27%
Sand with 3 doses of 19R GW	Fe	18,400	8,480	<23.7	NC	25.8 JB	0.3% J	675	8%	2,820	33%	<89.0	NC	2,780	33%	2,180	26%
DoloFines/Sand with 3 doses 19R GW	Fe	10,500	8,590	<23.6	NC	138 JB	2% J	736	9%	2,740	32%	<88.5	NC	3,090	36%	1,880	22%
HiCalFines/Sand with 3 doses 19R GW	Fe	10,800	10,700	<23.6	NC	69.7 JB	0.7% J	733	7%	2,950	28%	104 JB	1% J	3,570	33%	3,300	31%
Sand, no exposure to site groundwater	Al	20,200	16,300	<41.1	NC	6.45 J	0.04% J	57.2	0.4%	435	3%	102	0.6%	591	4%	15,100	93%
Sand with 3 doses of 19R GW	Al	18,700	19,900	<47.5	NC	14.1	0.1%	86.2	0.4%	521	3%	101	0.5%	627	3%	18,500	93%
DoloFines/Sand with 3 doses 19R GW	Al	21,300	20,000	<47.2	NC	49.6	0.2%	101	0.5%	450	2%	106	0.5%	631	3%	18,600	93%
HiCalFines/Sand with 3 doses 19R GW	Al	22,600	20,200	<47.2	NC	30.7	0.2%	102	0.5%	515	3%	101	0.5%	832	4%	18,600	92%

**Notes:**

Results given in milligrams per kilogram (analyte mass extracted by given method per total sample mass).

Fractional percentages based on the sum total of extractions.

B = One of the conditions applies: compound was found in the blank; laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) outside acceptance limits; and/or LCS/LCSD relative percent difference exceeds control limits.

J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an estimated value.

< = Not detected above reporting quantitation limit shown

NC = Not calculated

GW = Groundwater

DoloFines = Dolomitic fines

HiCalFines = High calcium fines

Blue = percent extracted at the step was between 25 to 50 percent of the sum total of all extractions.

Red = percent extracted was 50 percent or greater of the sum total of all extractions.

Be = Beryllium

Cd = Cadmium

had/hdc = Hydroxylamine hydrochloride

H<sub>2</sub>O = Water

H<sub>3</sub>BO<sub>3</sub> = Boric acid

HCl = Hydrochloric acid

HF = Hydrofluoric acid

HNO<sub>3</sub> = Nitric acid

HOAc = Acetic acid

Li = Lithium

MgSO<sub>4</sub> = Magnesium sulfate

NaClO = Sodium hypochlorite

NaOAc = Sodium acetate

NC = Not calculated

NH<sub>4</sub> oxalate = Ammonium oxalate

Ni = Nickel

Al = Aluminum

**Table 3-5b**  
**Sequential Extraction Laboratory Results - Untreated Site Soil**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Soil Sample Location (Depth Range) Date	Metal	Extraction Reagent		Exchangeable MgSO <sub>4</sub>		Carbonate Fraction NaOAc/HOAc pH 5		Non-crystalline NH <sub>4</sub> oxalate, pH3		Metal Hydroxide had/hdc/acetic acid		Organic Bound NaClO, pH 9.5		Acid/Sulfide Fraction HCl-HNO <sub>3</sub> -H <sub>2</sub> O		Residual HF/HNO <sub>3</sub> /H <sub>3</sub> BO <sub>3</sub>	
		6010B Total Metals	Sum Total of All Extractions	Step 1 Result	Step 1 Percent	Step 2 Result	Step 2 Percent	Step 3 Result	Step 3 Percent	Step 4 Result	Step 4 Percent	Step 5 Result	Step 5 Percent	Step 6 Result	Step 6 Percent	Step 7 Result	Step 7 Percent
NRS068 (40-58) 03122020	Be	1.01	1.03	<1.20	NC	<0.897*	NC	0.0640J	6% J	0.299	29%	<4.48*	NC	0.105 J	10% J	0.566	55%
NRS069 (40-50) 03092020	Be	1.04	1.04	<1.23	NC	<0.920	NC	0.0533J	5% J	0.278J	27% J	<4.60	NC	0.128 J	12% J	0.586	56%
NRS070 (50-60) 03102020	Be	1.21	1.08	<1.23	NC	<0.924*	NC	0.0727 J	7% J	0.278J	26% J	<4.62*	NC	0.109 J	10% J	0.615	57%
NRS068 (40-58) 03122020	Cd	0.444	0.0640 J	<1.20	NC	<0.897	NC	0.0442JB*	69% JB	0.0197J	31% J	<4.48	NC	<0.299	NC	<0.299	NC
NRS069 (40-50) 03092020	Cd	0.441	0.0662 J	<1.23	NC	<0.920	NC	0.0454JB*	69% JB	0.0208J	31% J	<4.60	NC	<0.307	NC	<0.307	NC
NRS070 (50-60) 03102020	Cd	0.506	0.115 J	<1.23	NC	<0.924	NC	0.0875JB*	76% JB	0.0271J	24% J	<4.62	NC	<0.308	NC	<0.308	NC
NRS068 (40-58) 03122020	Li	22.3	21.1	<12.0	NC	<8.97	NC	<2.99	NC	1.57J	7% J	2.81J	13%J	2.43 J	12% J	14.3	68%
NRS069 (40-50) 03092020	Li	18.3	17.5	<12.3	NC	<9.20	NC	<3.07	NC	0.917J	5% J	<46.0	NC	2.91 J	17% J	13.7	78%
NRS070 (50-60) 03102020	Li	18.9	22.8	<12.3	NC	<9.24	NC	<3.08	NC	1.22J	5% J	<46.2	NC	1.98 J	9% J	19.6	86%
NRS068 (40-58) 03122020	Ni	21.9	21.0	<9.56	NC	<7.17	NC	<2.39	NC	6.26	30%	<35.9	NC	4.00	19%	10.7	51%
NRS069 (40-50) 03092020	Ni	15.1	15.2	0.365J	2%J	<7.36	NC	<2.45	NC	4.50	30%	<36.8	NC	3.30	22%	7.02	46%
NRS070 (50-60) 03102020	Ni	20.3	17.7	<9.86	NC	<7.39	NC	0.271J	2% J	4.79	27%	<37.0	NC	2.63	15%	10.0	56%
NRS068 (40-58) 03122020	Fe	21,400	25,000	265	1%	28.9*	0.1%*	1,940	8%	15,100	60%	<89.7 **1	NC	4,240	17%	3,470	14%
NRS069 (40-50) 03092020	Fe	23,200	23,800	999	4%	91.6*	0.4%*	993	4%	12,900	54%	<92.0 **1	NC	5,130	22%	3,700	16%
NRS070 (50-60) 03102020	Fe	19,400	14,200	<24.6	NC	<18.5*	NC	509	4%	7,700	54%	<92.4 **1	NC	2,680	19%	3,340	23%

**Notes:**

Boring NRS068 was located within approximately 50 feet of well 19R. Soil was sampled from 40 to 58 feet below ground surface (bgs)  
 Boring NRS069 was located within approximately 50 feet of well GAF-441U. Soil was sampled from 40 to 50 feet bgs  
 Boring NRS070 was located within approximately 50 feet of well GAF-444U. Soil was sampled from 50 to 60 feet bgs  
 Results given in milligrams per kilogram (analyte mass extracted by given method per total sample mass.)  
 Fractional percentages based on the sum total of extractions.  
 B = Analyte detected in laboratory blank  
 J = result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value  
 < = Not detected above reporting quantitation limit shown  
 \* = Laboratory control sample (LCS) or LCS duplicate (LCSD) is outside of acceptance limits  
 \*\*1 = LCS/LCSD relative percent difference exceeds control limits  
 NC = Not calculated  
 Blue = percent extracted at the step was between 25 to 50 percent of the sum total of all extractions.  
 Red = percent extracted was 50 percent or greater of the sum total of all extractions.

Be = Beryllium  
 Cd = Cadmium  
 had/hdc = Hydroxylamine hydrochloride  
 H<sub>2</sub>O = Water  
 H<sub>3</sub>BO<sub>3</sub> = Boric acid  
 HCl = Hydrochloric acid  
 HF = Hydrofluoric acid  
 HNO<sub>3</sub> = Nitric acid  
 HOAc = Acetic acid  
 Li = Lithium  
 MgSO<sub>4</sub> = Magnesium sulfate  
 NaClO = Sodium hypochlorite  
 NaOAc = Sodium acetate  
 NH<sub>4</sub> oxalate = Ammonium oxalate  
 Ni = Nickel  
 Fe = Iron

**Table 3-6**  
**Target Metals Analytical Results - Sand from Microcosm Studies**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Sample ID	Soil Source	Water Source	Reagent	Trial	Date Collected	Beryllium	Cadmium	Lithium	Nickel
GAF-GW-PHIII-BKT-SAND	Sand	none	none	NA	7/30/2020	0.129	0.110 B	1.69	7.68
GAF-GW-PHIII-BKT-SAND-T3	Sand	none	none	#3	8/6/2020	0.150	0.0930	2.05	9.37
GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T2	Sand	19R	None	#2	7/30/2020	0.155	0.102 B	2.24	9.91
GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Sand	19R	None	#3	8/6/2020	0.177	0.0429 J	2.38	10.3
GAF-GW-PHIII-BKT-DOLO-SAND-19R-T2	Sand	19R	DoloFines	#2	7/30/2020	0.168	0.120 B	2.08	9.40
GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Sand	19R	DoloFines	#3	8/6/2020	0.181	0.0884	2.57	11.5
GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T2	Sand	19R	HiCal™	#2	7/30/2020	0.170	0.127 B	2.41	11.7
GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Sand	19R	HiCal™	#3	8/6/2020	0.161	0.0832	2.28	10.0

**Notes:**

Analytical method used was SW846 6020A.

B = Analyte was found in the blank and sample

J = Estimated value between laboratory reporting limit and method detection limit.

Results in milligrams per kilogram (mg/kg)

Dolofines = dolomitic lime fines

HiCal™ = high purity, fine particle, calcium carbonate

**Table 3-7a**  
**Column Test Results, Stage 1a**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Sample ID	Pore Volumes	Liters Added	pH	Beryllium Goal 4 ug/L	Cadmium Goal 5 ug/L	Lithium Goal 40 ug/L	Nickel Goal 100 ug/L	Observations
<b>Hi Cal Fines - 0.1% by Weight Dose</b>								
GAF-GW-HICAL-STAGE1-PV1-18HRS	2.4	1.2	11.81	< 1.00	< 1.00	< 5.00	15.1	Analytes met goals.
GAF-GW-HICAL-STAGE1-PV4-54HR	4.7	2.4	11.71	< 1.00	< 1.00	< 5.00	8.37	Analytes met goals.
GAF-GW-HICAL-STAGE 1-PV4-68-70HRS	5.5	2.9	11.28	0.280 J	0.362 J	15.1	5.89	Analytes met goals; 0.7 liters treated per gram of reagent.
GAF-GW-HICAL-STAGE1-PV8-120HR	8.6	4.5	8.18	< 1.00	< 1.00	110	4.52	Failed for Li, other goals met.
GAF-GW-HICAL-STAGE1-PV10-160HR	10.9	5.7	7.34	< 1.00	4.05	138	401	Failed for Li & Ni; Ni higher than raw groundwater.
GAF-GW-HICAL-STAGE1-PV13-202HR	13.4	6.9	7.05	< 1.00	12.4	123	594	Failed for Cd, Li & Ni; Cd & Ni higher than raw groundwater.
GAF-GW-HICAL-STAGE1-PV18-294HR	18.7	9.7	6.82	1.54	20.0	115	746	Failed for Cd, Li & Ni; Cd & Ni higher than raw groundwater.
GAF-GW-HICAL-STAGE1-PV21-342HR	21.6	11.2	6.36	10.8	33.6	143	928	Failed for all analytes; Be, Cd & Ni higher than raw groundwater.
<b>Sand Control</b>								
GAF-GW-CON-STAGE1-PV2-21HR	2.6	1.4	7.91	< 1.00	0.479 J	14.5	6.11	Analytes met goals.
GAF-GW-CON-STAGE1-PV4-45HR	4.0	2.1	7.18	< 1.00	8.31	137	157	Failed for Cd, Li & Ni; Cd & Ni higher than raw groundwater.
GAF-GW-CON-STAGE1-PV5-72HR	5.7	3.0	6.80	0.824 J	16.0	140	725	Failed for Cd, Li & Ni; Cd & Ni higher than raw groundwater.
GAF-GW-CON-STAGE1-PV10-144HR	10.1	5.3	5.13	15.2	56.1	135	1,060	Failed for all analytes; Cd & Ni higher than raw groundwater.
GAF-GW-CON-STAGE1-PV11-168HR	11.5	6.1	4.67	26.1	30.1	125	721	Failed for all analytes; Be, Cd & Ni higher than raw groundwater.
GAF-GW-CON-STAGE1-PV14-216HR	14.4	7.5	4.62	28.0	23.0	147	748	Failed for all analytes; Be, Cd & Ni higher than raw groundwater.
<b>19R Influent Water</b>								
GAF-GW-COL1-GW-BL	NA	NA	2.87	12.5	4.19	131	148	Influent water used for each column.

**Notes:**

Metal/metalloid concentrations presented in micrograms per liter (ug/L).  
pH was measured at the treatability laboratory at the time of sample collection and is presented in standard units.  
Flow rates for the test were approximately 0.5 milliliters per minute.  
< = Analyte not detected above the laboratory reporting limit shown.  
Red = pH value is less than 5 standard units; analyte concentration exceeds its groundwater protection standard (goal)  
Be = beryllium  
Cd = cadmium  
Li = lithium  
Ni = nickel  
J = Estimated value between laboratory reporting limit and method detection limit.  
NA = not applicable

**Table 3-7b**  
**Column Test Results, Stage 1b and 2**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Sample ID	Pore Volumes	Liters Added	pH	Beryllium Goal 4 ug/L	Cadmium Goal 5 ug/L	Lithium Goal 40 ug/L	Nickel Goal 100 ug/L	Observations
<b>DoloFines - 0.2% by Weight Dose</b>								
GAF-GW-COL1-PV0	1.0	0.49	NM	0.659 J	0.289 J	<5.00	6.79	Analytes met goals.
GAF-GW-COL1-PV1	2.0	0.96	NM	0.362 J	0.219 J	<5.00	13.0	Analytes met goals.
GAF-GW-COL1-PV2	3.0	1.45	NM	<1.00	<1.00	<5.00	7.07	Analytes met goals.
GAF-GW-COL1-PV3.2	4.2	2.06	12.35	<1.00	<1.00	<5.00	4.40	Analytes met goals.
GAF-GW-COL1-4.6PV	5.6	2.74	10.13	<1.00	<1.00	<5.00	2.63	Analytes met goals.
GAF-GW-COL1-5.8PV	6.8	3.33	8.81	<1.00	<1.00	<5.00	1.74	Analytes met goals.
GAF-GW-COL1-6.9	7.9	3.85	7.88	<1.00	<1.00	11.5	1.28	Analytes met goals; 0.45 liters treated per gram of reagent.
GAF-GW-COL1-PV8.0	9.0	4.40	6.36	<1.00	<1.00	43.4	1.38	Fail for Li, other goals met.
GAF-GW-COL1-9.2PV	10.2	4.96	7.10	<1.00	<1.00	79.5	0.877 J	Fail for Li, other goals met.
GAF-GW-COL1-PV10	10.8	5.27	7.57	<1.00	<1.00	95.1	0.985 J	Fail for Li, other goals met.
GAF-GW-COL1-10.3PV	11.3	5.51	6.49	<1.00	<1.00	108	0.931 J	Fail for Li, other goals met.
GAF-GW-COL1-10.8PV	11.8	5.76	8.21	<1.00	<1.00	125	0.727 J	Fail for Li, other goals met.
GAF-GW-COL1-11.4PV	12.4	6.08	7.32	<1.00	<1.00	127	0.676 J	Fail for Li, other goals met.
GAF-GW-COL1-11.9PV	12.9	6.32	7.94	<1.00	<1.00	132	0.477 J	Fail for Li, other goals met.
<b>Layered Column - Ferroblack 0.2% by Weight Upstream / Hi Cal Fines 0.2% By Weight Downstream</b>								
GAF-GW-COL2-PV0	1.0	0.48	NM	<1.00	<1.00	<5.00	9.92	Analytes met goals.
GAF-GW-COL2-PV1	1.9	0.92	NM	<1.00	<1.00	<5.00	25.7	Analytes met goals.
GAF-GW-COL2-PV2	3.0	1.46	NM	0.563 J	0.314 J	<5.00	9.36	Analytes met goals.
GAF-GW-COL2-PV3	4.1	1.99	12.41	0.214 J	<1.00	<5.00	3.26	Analytes met goals.
GAF-GW-COL2-PV4.6	5.5	2.63	10.23	0.492 J	0.296 J	54.2	2.31	Fail for Li, other goals met.
GAF-GW-COL2-PV5.6	6.6	3.19	7.85	<1.00	0.248 J	104	37.5	Fail for Li, other goals met.
GAF-GW-COL2-PV6.6	7.6	3.65	5.79	<1.00	1.89	184	123	Fail Ni & Li.
GAF-GW-COL2-PV8	8.7	4.18	5.55	<1.00	3.21	283	128	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV8.7	9.7	4.67	6.21	<1.00	3.68	116	339	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV9.8	10.3	4.95	6.20	<1.00	3.40	110	349	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV10	10.8	5.19	5.42	<1.00	3.60	111	349	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV10.3	11.3	5.46	6.20	<1.00	3.63	109	376	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV11	12.0	5.77	6.12	<1.00	3.06	108	373	Fail Ni & Li: Ni higher than raw groundwater.
GAF-GW-COL2-PV11.9	12.4	5.98	6.23	<1.00	3.04	107	395	Fail Ni & Li: Ni higher than raw groundwater.
<b>19R Influent Water</b>								
GAF-GW-COL1-BL	NA	NA	2.31	11.8	4.34	119	137	Dolofines column
GAF-GW-COL2-BL	NA	NA	3.12	10.9	3.77	123	121	Layered column

**Notes:**

Metal/metalloid concentrations presented in micrograms per liter (ug/L).  
pH was measured at the treatability laboratory at the time of sample collection and is presented in standard units.  
Flow rates for the test were approximately 0.5 milliliters per minute.  
< = Analyte not detected above the laboratory reporting limit shown.  
Red = pH value is less than 5 standard units; analyte concentration exceeds its groundwater protection standard (goal)  
J = Estimated value between laboratory reporting limit and method detection limit.

Be = beryllium  
Cd = cadmium  
Li = lithium  
Ni = nickel  
NA = not applicable  
NM = not measured

**Table 3-7c  
Column Test Results, Stage 3  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Sample ID	Pore Volumes	Liters Added	pH	Beryllium Goal 4 ug/L	Cadmium Goal 5 ug/L	Lithium Goal 40 ug/L	Nickel Goal 100 ug/L	Observations
<b>Hi Cal Fines - 0.2% by Weight Dose</b>								
GAF-GW-COL3-PV0	1.0	0.42	10.62	<1.00	<1.00	<5.00	67.6	Nickel did not meet goals initially. Other analytes met goals.
GAF-GW-COL3-PV2	2.0	0.85	12.33	<1.00	<1.00	<5.00	102	Nickel did not meet goals initially. Other analytes met goals.
GAF-GW-COL3-PV3	3.2	1.33	12.35	<1.00	<1.00	<5.00	31.1	Analytes met goals.
GAF-GW-COL3-PV4	4.2	1.76	11.81	<1.00	<1.00	8.88	8.80	Analytes met goals.
GAF-GW-COL3-PV5	5.2	2.19	11.32	<1.00	<1.00	17.4	8.62	Analytes met goals. 0.25 liters treated per gram of reagents.
GAF-GW-COL3-PV6	6.3	2.64	10.37	<1.00	<1.00	43.2	5.86	Lithium exceeds goals. Other analytes met goals.
GAF-GW-COL3-PV7	7.4	3.12	8.47	<1.00	<1.00	71.7	4.61	Lithium exceeds goals. Other analytes met goals.
GAF-GW-COL3-PV8	8.0	3.37	8.46	<1.00	<1.00	93.3	5.43	Lithium exceeds goals. Other analytes met goals.
<b>19R Influent Water</b>								
GAF-GW-COL3-BL	NA	NA	2.44	12.8	3.99 J	122	131	

**Notes:**

Metal/metalloid concentrations presented in micrograms per liter (ug/L).

pH was measured at the treatability laboratory at the time of sample collection and is presented in standard units.

Flow rates for the test were approximately 0.5 milliliters per minute.

< = Analyte not detected above the laboratory reporting limit shown.

Red = pH value is less than 5 standard units; analyte concentration exceeds its groundwater protection standard (goal)

J = Estimated value between laboratory reporting limit and method detection limit.

NA = not applicable

**Table 3-7d**  
**Column Test Results, Column Regeneration**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Sample ID	Pore Volumes	Liters Added	pH	Beryllium Goal 4 ug/L	Cadmium Goal 5 ug/L	Lithium Goal 40 ug/L	Nickel Goal 100 ug/L	Observations
<b>DoloFines Column Regeneration</b>								
GAF-GW-COL1 Redose-PV0.5	0.5	0.53	12.68	<1.00	<1.00	3.64J	9.55	Analytes met goals.
GAF-GW-COL 1 Redose-PV1	1	1.02	12.49	<1.00	<1.00	<5.00	17.8	Analytes met goals.

**Notes:**

Metal/metalloid concentrations presented in micrograms per liter (ug/L).

pH was measured at the treatability laboratory at the time of sample collection and is presented in standard units.

Flow rates for the test were approximately 0.5 milliliters per minute.

< = Analyte not detected above the laboratory reporting limit shown.

Red = pH value is less than 5 standard units; analyte concentration exceeds its groundwater protection standard (goal)

J = Estimated value between laboratory reporting limit and method detection limit.

**Table 4-1a**  
**Direct Soil Treatment Microcosm Study Results - Target Metals**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Water Source	Media	Reagent Added	Dosage	Trial	Total/ Dissolved	pH (SU)	Beryllium, Be Goal 4 ug/L	Cadmium, Cd Goal 5 ug/L	Lithium, Li Goal 40 ug/L	Nickel, Ni Goal 100 ug/L	Observations
19R	NA	Raw Water	NA	NA	Total	3.56	13.3	6.07	137	197	Water collected 1/15/2020. Concentrations in raw water used in microcosm tests.
					Dissolved		13.3	4.65	146	191	
GAF-444U	NA	Raw Water	NA	NA	Total	4.84	12.8	8.17	37.4	660	Water collected 1/20/2020. No lithium exceedance, but higher nickel concentrations. Similar to source area groundwater.
					Dissolved		11.7	7.22	35.9	643	
19R	19R soil	Control	NA	T1	Total	7.06	8.08	12.8	89.7 B	323	Control failed; not centrifuged.
					Dissolved		<1.00	<1.00	11.2 B	0.545 J	Filtered sample met goals; not centrifuged.
19R	19R soil	Ferroblack Plus 22	69.4 g/kg	T1	Total	6.86	10.5	31.4	127 B	1,020	Fails for all metals; not centrifuged.
					Dissolved		14.5	78.5	150 B	1,930	Fails for all metals; not centrifuged.
19R	441U Soil	Control	NA	T1	Total	2.13	53.9	17.8J	113J*	1,470	Acidific water leaches metals off source area soils at higher concentrations than detected in well 441U water.
					Dissolved		48.0 J	15.4J	105J*	1,390	
				T2	Total	2.31	80.2	15.2	118	1,500	No improvement at T2.
					Dissolved		81.7	14.7	117	1,470	
				T3	Total	2.24	84.3	14.6	116	1,480	No improvement at T3.
					Dissolved		NA	NA	NA	NA	
19R	441U Soil	HiCalFines	4.48 g/kg	T1	Total	6.71	<4.00*	0.460 J*	10.9 J*	5.11 J*	Met goals
					Dissolved		<4.00*	0.300 J*	10.7 J*	3.76 J*	
				T2	Total	7.10	<1.00	<1.00	<5.00	0.929 J	Met goals
					Dissolved		<1.00	<1.00	<5.00	0.703 J	
				T3	Total	6.93	0.461 J	<1.00	5.41	5.86	Met goals
					Dissolved		NA	NA	NA	NA	

**Notes:**

PH was measured at the treatability laboratory at the time of sample collection. Raw water pH may not match field-measured pH.

Raw water analytical data presented here is from the January 2020 sampling event and was validated by Environmental Standards, Inc.

Analytical data for microcosm testing was not validated, and includes the laboratory qualifiers.

441U soil = Soil collected from between 40 to 50 feet below ground surface (bgs) at boring NRS069, located near monitoring well GAF-441U.

19R soil = Soil collected from between 40 to 58 feet bgs at boring NRS068, located near monitoring well 19R.

HiCalFines = High purity, fine particle, calcium carbonate.

g/kg = Grams reagent per kilogram of soil.

ug/L = Micrograms per liter.

J = Estimated value between laboratory reporting limit and method detection limit.

B = Analyte was detected in the laboratory method blank and associated sample.

< = Analyte not detected above the laboratory reporting limit shown.

Red = pH value is less than 5 standard units; analyte concentration exceeds its groundwater protection standard (goal)

\* = Due to matrix interference, the method detection limit for EPA Method 6020A (ICP/MS) exceeded the groundwater protection standard (goal), to which results are being compared for screening purposes. The concentration reported was obtained via EPA Method 6010D (ICP).

SU = standard units

NA = Not analyzed. Total and dissolved concentrations were similar in previous trials; dissolved removed from the analytical parameters for this trial.

**Table 4-1b**  
**Direct Soil Treatment Microcosm Study Results - Additional Parameters**  
**NRS Treatability Study Report**  
**TVA Gallatin Fossil Plant**  
**Gallatin, Tennessee**

Compound	GWPS (ug/L)	Hi Cal Fines, 441U Soil & Water	
		Dose #2	Dose #3
		Total	Total
Aluminum	NE	530	7,820
Antimony	6 (a,b)	0.517 J	0.826 J
Arsenic	10 (a,b)	0.706 J	4.45
Barium	2,000 (a,b)	11.6	26.7
Beryllium	4 (a,b)	<1.00	0.461 J
Cadmium	5 (a,b)	<1.00	<1.00
Calcium	NE	630,000	688,000
Chromium	100 (a,b)	<2.00	5.44
Cobalt	NE (c)	1.06	3.45
Copper	NE	1.50 J	5.22
Iron	NE	674	13,800
Lead	15 (a,b)	0.377 J	4.05
Lithium	40 (b)	<5.00	5.41
Magnesium	NE	4,690	2,280
Molybdenum	100 (b)	8.09	36.2
Nickel	100 (a)	0.929 J	5.86
Potassium	NE	3,530	3,740
Selenium	50 (a,b)	<5.00	<5.00
Silicon	NE	502	6,730
Silver	100 (a)	<1.00	<1.00
Sodium	NE	17,200	17,300
Strontium	NE	610	641
Thallium	2 (a,b)	0.469 J	0.313 J
Vanadium	NE	<1.00	14.2
Zinc	NE	4.47	18.8 J

**Notes**

Target metals for treatment (Be, Cd, Li and Ni) are highlighted in green.

Results given in milligrams per liter (mg/L).

NE - No established standard

< = Analyte not detected above the laboratory reporting quantitation limit shown.

J = Estimated value between laboratory reporting limit and method detection limit.

GWPS = Groundwater protection standard

(a) - Default published GWPS based on TN MCLs from Tennessee solid waste regulations, Appendix III (TN Rule 0400-11-01-.04). Site-specific GWPS may be developed under TN Rules (Alternate Concentration Limits, ACLs) with TDEC Approval.

(b) - Default published GWPS from CCR Rule, Appendix IV (40 CFR 257.95) based on Primary MCLs for public drinking water supplies (<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>) and default values for parameters without primary MCLs. Site-specific GWPSs may be developed under the CCR Rule if background is above the default GWPS/MCL.

(c) TDEC approved an Alternate Source Demonstration for cobalt at the NRS; no alternate GWPS calculated.

**Table 5-1  
Stage I In-Situ Stabilization Testing Results  
NRS Treatability Study Report  
TVA Gallatin Fossil Plant  
Gallatin, Tennessee**

Test	7 Day	14 Day	28 Day	Goal
Paint Filter Lean (3%)	Pass			Pass
Paint Filter Rich (6%)	Pass			Pass
Unconfined Strength (psi) Lean (3%)	34.2	33.4	51.9	no specific goal, >30 psi is OK
Unconfined Strength (psi) Rich (6%)	64.5	100.1	105.8	>50 psi
Permeability (cm/sec) Lean (3%)	5.60E-08			<1.0E-5
Permeability (cm/sec) Rich (6%)	1.00E07			<1.0E-6

**Notes:**

Both lean and rich mixes met goals. Recommend both be carried into next stage (1315 and 1316 leaching tests) to allow comparison.

Tests were conducted with Type II cement Portland Cement. Next Trials will use Type V Portland Cement. UCS and permeability will be repeated if adequate soil volume remains.

## Appendix A Screening of Potential Reagents

# Screening of Reagents to Test

Reagent	Safety	Effectiveness	Adverse Impacts to Stream and Downgradient Areas	Proven Technology	Ease of In Situ Injection	Retain?
NaOH (Iye)	Corrosive, strong base	Worked well in previous titration test. Limited long-term effectiveness is a concern	None identified	Yes, has been used for pH adjustment for in-situ use.	Easy to inject	Yes
Potassium hydroxide (KOH)	Corrosive, strong base	Expected to be effective for pH adjustment	None identified	Yes, has been used for pH adjustment for in-situ use.	Easy to inject	Yes
FerroBlack®-H (FeS/NaSH)	H <sub>2</sub> S generation at low pH a concern. Evaluate during bench test.	Titration results mixed	Mobile fraction (NaHS) possible impact to surface water. pH may be elevated. Evaluate during bench test. Possible other metals in FB-H	Very effective for As, Ni, Cd, Be, Pb and other multivalent metals	Suspension of iron particles, relatively difficult to create uniform distribution. Has been successfully injected at some sites.	Yes
EnviroBlend® (Magnesium oxide [MgO]/hydroxide [MgOH] product)	No major issues	Worked well in previous titration test. Alkaline reagent with high buffering capacity	None identified	Yes, primarily used ex situ for soil treatment but has also been used in situ.	Powder or pellet form can be mixed with water for simple injection.	Yes
MagOx	No Major Issues	Unknown	None identified	Primarily used for Lead	Powder or pellet form can be mixed with water for simple injection	Yes
Nano-scale ZVI	No major issues, must control dust	Micro-scale ZVI tested previously with mixed results in titration test. Effective for Cd & Be, but limited effectiveness for Ni.	Mobility in the environment and toxicity is a controversial issue.	Proven technology for chromium (Cr) VI treatment. Lowers ORP which promotes precipitation of some metals.	Moderately difficult, but easier to inject than micro-scale ZVI due to smaller particle size.	No

## Reagent Screening (cont.)

Reagent	Safety	Effectiveness	Adverse Impacts to Stream and Downgradient Areas	Proven Technology	Ease of In Situ Injection	Retain?
Micro-scale ZVI	No major issues, must control dust	Mixed titration results in previous test.	High mobility potential to impact the river.	Proven technology for soil mixing in reactive barriers and source areas.	Difficult to get good distribution with slurry injection.	No
Metals Remediation Compound (MRC) - organosulfur ester/poly lactate	No major issues	Effectiveness unknown for this site. Could provide short-term treatment and long-term bio treatment by changing redox conditions.	May potentially enhance mobility of other metals	Yes	Moderately difficult to inject and obtain uniform distribution.	No
Calcium Polysulfide (CaS <sub>x</sub> )	High Ph, potential to generate H <sub>2</sub> S in contact with acids. Combustible.	Unknown; treatment relies on native iron; may not be as effective as FerroBlack.	Highly mobile and deep red color, may impact surface water.	Proven technology for Cr VI.	Highly mobile, easy to inject. Plugging of wells with CaSO <sub>4</sub> possible.	No
Crushed limestone/dolomite – CaMg(CO <sub>3</sub> )	No safety issues	Uncertain, weak alkaline reagent with good buffering capacity	None anticipated	Limestone commonly used for pH adjustment	Not possible to inject, but could be soil mixed	Yes
AQUAMAG (blended phosphates)	No safety issues	Not effective in titration test.	None anticipated	Proven for lead and copper. Limited data for Cd.	Easy to inject.	No
CaO/CaCO <sub>3</sub> (lime)	No safety issues	Uncertain, weak alkaline reagent with good buffering capacity	None anticipated	Proven for pH adjustment.	Easy to inject. Can be prepared as powder, pellets, or liquid slurry. CaSO <sub>4</sub> plugging of wells possible.	Yes
Sodium carbonate/bicarbonate (Na <sub>2</sub> CO <sub>3</sub> /NaHCO <sub>3</sub> ) - baking soda	No safety issues	Uncertain, weak alkaline reagent with good buffering capacity	None anticipated	Used widely for various purposes but use for treatment of metals in groundwater limited.	Highly mobile, easy to inject.	Yes

## Reagent Screening (cont.)

Reagent	Safety	Effectiveness	Adverse Impacts to Stream and Downgradient Areas	Proven Technology	Ease of In Situ Injection	Retain?
Potassium bicarbonate (KHCO <sub>3</sub> )	No safety issues	Uncertain, weak alkaline reagent with good buffering capacity	None anticipated	Used widely for various purposes but use for treatment of metals in groundwater limited.	Highly mobile, easy to inject. Plugging of wells possible	Yes (or pick either NaHCO <sub>3</sub> or KHCO <sub>3</sub> )
Apatite (Ca/NaPO <sub>4</sub> )	No safety issues	Uncertain, effectiveness depends on site conditions	None anticipated	Excellent buffer for neutralizing acidity through PO <sub>4</sub> <sup>-3</sup>	Granular, powder, or slurry. Can be injected; not likely to be highly mobile.	Yes
Zeolite (aluminosilicates of Na, C, K or Ba)	No safety issues	Uncertain, effectiveness depends on site conditions	Could introduce other metals	High selectivity for many metals	Moderate-difficult to inject and obtain uniform distribution.	Yes
Emulsified vegetable oil (EVO)	No safety issues	Unknown, could form soluble organo-metals complexes	None anticipated	As biological amendment for treatment of Cr IV. Otherwise not demonstrated.	Easy to inject but wells can become fouled.	No

## Appendix B Specifications for Sand



5010 Linbar Drive,  
Suite 153  
Nashville, TN 37211  
615.331.7770  
[www.TTLUSA.com](http://www.TTLUSA.com)

**CLIENT:** Pine Bluff Materials Company  
1030 Visco Drive  
Nashville, Tennessee 37210

**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

**ASTM C 136 - 14 "Sieve Analysis of Fine and Coarse Aggregates"**

Sieve Size	Wt Retained	% Retained	Acc % Ret	% Passing	Spec: ASTM C 33
1/2"					
3/8"	0.00	0.00		100.00	100
#4	13.15	2.73		97.27	95 - 100
#8	43.84	9.11		90.89	80 - 100
#16	89.98	18.70		81.30	50 - 85
#30	199.04	41.36		58.64	25 - 60
#50	443.43	92.15		7.85	5 - 30
#100	480.28	99.81		0.19	0 - 10
#200	481.00	99.96		0.04	
Pan					
TOTAL					
Fineness Modulus				2.64	

ASTM C 33:  
(Sec. 6.4)

Fine aggregates failing to meet these grading requirements shall meet the requirements of this section provided that it demonstrates that concrete of the class specified, made with fine aggregate under consideration, will have relevant properties at least equal to those of concrete made with the same ingredients, with the exception that the referenced fine aggregate shall be selected from a source having an acceptable performance record in similar concrete construction.



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1030 Visco Drive  
Nashville, Tennessee 37210

**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

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<b>ASTM C 128 - 15 "Specific Gravity and Absorption of Fine Aggregates"</b>	
Bulk Specific Gravity	2.58
Bulk Specific Gravity (SSD)	2.60
Apparent Specific Gravity	2.65
Absorption (%)	1.54



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**DATE:** January 16, 2020

**PROJECT NO.** 200812005

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<b>ASTM C 40 - 19 "Organic Impurities in Fine Aggregates for Concrete"</b>	
Organic Plate No. .	ASTM C 33 Specification *
# 2	# 3 (Standard)

\* Aggregates subjected to the test for organic impurities and producing a color darker than the standard shall be rejected" (7.2.1) – **HIGHER NUMBER INDICATES DARK**



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**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

<b>ASTM C 88 - 18 "Soundness of Aggregates by use of Sodium Sulfate of Magnesium"</b>					
Sieve Size		Original Sample Grading (%)	Weight of Test Fractions Before Testing (g)	% Passing Finer Sieve After Test	Weighted % Loss
Passing	Retained				
# 3/8	#4	3.0	128.4	1.2	0.04
#4	#8	6.9	105.5	0.5	0.03
#8	#16	10.4	107.2	0.1	0.01
#16	#30	24.6	108.6	5.8	1.43
#30	#50	55.1	122.1	0.8	0.42
<b>Total Loss (%)</b>			ASTM C 33 Specification		
<b>1.94</b>			10 % Maximum		

- The test was performed using sodium sulfate.



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1030 Visco Drive  
Nashville, Tennessee 37210

**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

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<b>ASTM C 117 - 17 "Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing"</b>	
Percent Finer Than No. 200 Sieve	ASTM C 33 Specification (Table 1)
0.49 %	3.0 % max (concrete subject to abrasion) 5.0 % max (all other concrete)

\* Test was performed using Procedure A (washing with plain water)



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**CLIENT:** Pine Bluff Materials Company  
1030 Visco Drive  
Nashville, Tennessee 37210

**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

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ASTM C 123 - 14 "Lightweight Pieces in Aggregates"	
Percent Lightweight Pieces	ASTM C 33 Specification (Table 2)
0.02 %	0.5 % Maximum (where surface appearance of concrete is important)
	1.0 % Maximum (all other concrete)



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1030 Visco Drive  
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**MATERIAL:** Coarse Sand (Natural)

**SUPPLIER:** Client

**DATE:** January 16, 2020

**PROJECT NO.** 200812005

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ASTM C 142 - 17 "Clay Lumps and Friable Particles in Aggregates"	
Percent Clay Lumps and Friable Particles	ASTM C 33 - 16 Specification (Table 1)
0.02 %	3.0 % Maximum

## Appendix C Mineral Analysis Reports

**Project name:**  
NRS Treatability Study

**Project ref:**  
60621225

**From:**  
Craig McPhee, AECOM

**Date:**  
October 1, 2020

**To:**  
Jason Curtsinger, TVA

**CC:**  
Scott Veenstra, AECOM  
David Skeggs, AECOM  
Patrick Haskell, AECOM

**DRAFT**

# Memo

**Subject:** Minerals Analysis of Microcosm Samples

The purpose of this memorandum is to provide context for the mineralogical testing results conducted as part of the Non-Registered Site (NRS) treatability testing being completed by AECOM at TVA's Gallatin Fossil Plant (GAF). Observations and discussions are preliminary and have not been fully developed and reviewed.

## 1. Procedure

Mineral analysis samples were collected from the Phase III microcosm buckets as follows:

**AECOM-Sand - 073020:** This material is sand without addition of any reagents or any dosing with site groundwater. The sand is a natural material with limited processing (water washed and sieved to meet ASTM standards for concrete sand). The material was produced by Pine Bluff Materials Company and was provided by a supplier in the Gallatin area (Garrot Brothers).

**AECOM- CONTROL +2 – 073020:** This material is sand from the same source as **AECOM-Sand** that has been dosed twice with water from well 19R. The process was to dose the sand with site groundwater, wait one week, drain the water out, and repeat the dose a second time, wait one week, drain it again, and then collect a sample of sand from the approximate center of the test vessel (bucket).

**AECOM-DOLO - +2 – 073020:** This material is sand from the same source as **AECOM-Sand**, which has been amended with 0.2% by weight of sand dolomitic fines (dolo). The amended sand was then subjected to dosing with well 19R water and sampling as described for **AECOM-CONTROL +2**.

**AECOM-Hi CAL +2 – 073020:** This material is sand from the same source as **AECOM-Sand** which has been amended with 0.1% by weight of sand of high calcium fines (Hi CAL). The amended sand was then subjected to dosing with well 19R water and sampling as described for **AECOM-CONTROL +2**.

Well 19R water used for the dosing has a low pH (<4) and contains Be (approx. 13 micrograms per liter [ug/L]), Cd (approximately 6 ug/L), Li (approximately 140 ug/L) and Ni (approximately 200 ug/L).

The samples were sent to DCM Science Laboratory, Inc. (DCM) in Wheat Ridge, Colorado. DCM conducted the following tests:

- Semi-Quantitative X-Ray Diffraction (XRD)
- X-Ray Fluorescence (XRF)
- Scanning Electron Microscopy (SEM)

The nature of the samples and purpose of the study were discussed with DCM prior to analysis. In addition to standard analysis, DCM was asked to focus on the following:

- Calcite (present in the HiCal and Dolo fines)
- Dolomite
- Quartzite
- Illite and Kaolinite
- Iron Fe(OOH)<sub>x</sub>, pyrite, other iron minerals
- Al
- Cadmium – CdCO<sub>3</sub> (otavite) CdS (greenockite or hawleyite), Cd(OH)<sub>2</sub>
- Beryllium (not detectable by XRF) – BeO, Be(OH)<sub>2</sub>
- Nickel – NiS (millerite), NiS<sub>2</sub> (vaesite) Ni<sub>3</sub>S<sub>2</sub> (heazlewoodite), Fe<sub>5</sub>NiS<sub>8</sub>/(FeNi)<sub>9</sub>S<sub>8</sub> (greigite,/pentandite), (Fe, Ni)O(OH) (limonite), Mg,Ni<sub>3</sub>(OH)<sub>4</sub>(Si<sub>2</sub>O<sub>5</sub>)(garnerite)
- Lithium (not detectable XRF) - Li minerals can be divided into three groups: silicates (spodumene-LiAlSi<sub>2</sub>O<sub>6</sub>, petalite-LiAlSi<sub>4</sub>O<sub>10</sub>); micas (lepidolite-[Li,Al]<sub>3</sub>[Al,Si]<sub>4</sub>O<sub>10</sub>[F,OH]<sub>2</sub>, zinnwaldite-[Li,Al,Fe]<sub>3</sub>[Al,Si]<sub>4</sub>O<sub>10</sub>[F,OH]<sub>2</sub> and phosphates (mainly amblygonite - [Li,Na]Al[F,OH]).

## 2. Preliminary Evaluation of Results

### 2.1 XRD

The results of the XRD testing is provided in **Attachment A**. All four samples were found to be predominantly quartz and silicate minerals (amphibole, K-feldspar, and plagioclase). These results are consistent with the sand that forms the base material for all four samples. Enrichment of calcite is not apparent because only 0.1 to 0.2% of calcium bearing amendments were added. Enrichment of minerals associated with the target metals was not observable by XRD, because the amount deposited by dosing with 19R groundwater is very low (parts per billion).

### 2.2 XRF

The results of the XRF testing is provided in **Attachment B**. As with XRD, the sensitivity of XRF makes it difficult to draw distinctions between the four samples tested. MgO appears slightly enriched in the AECOM-DOLO sample, consistent with the presence of MgO in dolomitic fines. Similarly, CaO may be slightly enriched in the amended samples. XRF results for Ni were essentially the same for all four samples. For the AECOM-DOLO and AECOM-Hi Cal samples, enrichment of nickel would be expected as nickel is removed from the groundwater during each dose and added to the sand. However, two doses of groundwater can only deposit a maximum of approximately 0.1 parts per million (ppm) of nickel. Thus, nickel enrichment from two doses of groundwater is not observable by XRF (10-15% precision/accuracy on the 1-100 ppm range).

## 2.3 SEM

The results of the SEM testing is provided in **Attachment C**. The sample with no amendments and no dosing with groundwater (AECOM-Sand) shows trace amounts of calcite, dolomite, apatite and iron minerals. This finding explains why the unamended sand is providing a degree of groundwater treatment. These trace minerals are consistent with sand from a marine environment (calcite/dolomite from shell fragments, apatite from remains of fish bones).

The observation by SEM of calcite/dolomite fragments with primary and secondary coatings provides some insight into the mechanisms behind removal of the target metals from groundwater.

## 3. Conclusion and Preliminary Recommendations

The mineralogy of amended sand and unamended sand are very similar. This is consistent with the relatively small doses of amendments that have been applied, the similarity of the amendments to minerals naturally present in the sand, and the low concentration of target analytes being treated in the microcosms. As anticipated in the Workplan, the mineral analysis does not have the resolution to observe the small amount of target metals deposited by application of site groundwater. It is also difficult to observe the amendments because the amount of amendments applied is very low.

These mineral results will be further considered in the context of the sequential extraction results and other site data.

Further mineral analysis with samples taken to failure (dosed with groundwater until breakthrough) or with much higher amendment doses (>1%) might provide clearer results. However, additional mineralogical testing is unlikely to change amendment selection or dosing. At this time, the practical value of further mineralogical testing seems minimal, and therefore, no further mineralogical testing is proposed.

## Appendix A XRD



12421 W. 49th Avenue, Unit #6  
 Wheat Ridge, CO 80033 (303) 463-8270

**Semi-Quantitative X-Ray Diffraction Analysis**

Page 1 of 1

Client:	Analysis Date:	9-4-20
AECOM	Reporting Date:	9-4-20
9400 Amberglen Blvd.	Receipt Date:	7-31-20
Austin, TX 78729	Client Job No.:	None Given
	Client Project:	TVA - NRS Gallatin
	DCMSL Project:	AECOM6

Client Sample No.:	AECOM-SAND	AECOM-DOLO-+2	AECOM-CONTROL-+2	AECOM-HI CAL-+2
	<b>073020</b>	<b>073020</b>	<b>073020</b>	<b>073020</b>
Phase				
Amphibole	1	2	1	3
Calcite	<2*	<2*	-	-
Chlorite	4	2	4	3
K-Feldspar	12	11	11	13
Mica	4	4	4	4
Plagioclase	14	17	15	14
Quartz	63	61	63	61
Gypsum	-	-	<2*	-
Unaccounted	<5	<5	<5	<5

\*May be present

The sample(s) was/were prepared for x-ray diffraction analysis and scanned over a range of 3° to 45° 2θ Cu radiation, 40kV, 25mA. Mineral phases were identified with the aid of computer-assisted programs accessing a powder diffraction database. Estimates of mineral concentrations are based on relative peak heights and reference intensity ratios (RIR) measured in-house.

All information provided by clients, including sample results, is considered proprietary and confidential. Client results and other information will not be released to anyone but the client except by client request. When the laboratory is required by law or authorized by contractual arrangement to release confidential information, the client or individual concerned shall, unless prohibited by law, be notified of the information provided.

Jason Barnes, Analyst



12421 W. 49th Avenue, Unit #6  
Wheat Ridge, CO 80033

(303) 463-8270/(800) 852-7340  
(303) 463-8267 - fax

Date/Time Received \_\_\_\_\_ DCMSL Group No. 2020 DCMSL Log No. AECOM6

Field Data Sheet/Chain of Custody

Samples Submitted By:

Company: AECOM  
Address: 9400 Amberglen Blvd  
Austin, TX 78729

Job/P.O. # \_\_\_\_\_

Project Title TVA - NRS Gallatin

Contact: Francisco Barajas  
Phone: 512-419-6474  
Cell: \_\_\_\_\_  
Email: Francisco.Barajas@aecom.com

Archive: Asbestos samples are archived for 6 months unless other arrangements are made. All other samples are archived for 3 months.

Turnaround Time Requested:

- Standard (3 to 5 Business Days)
- 24 Hour Rush
- 2 Hour Rush (Asbestos Only)
- Other \_\_\_\_\_

Procedure Requested:

ASBESTOS

- Bulk  Standard EPA
- Progressive
- Point Count
- Other
- Air  NIOSH 7400
- OSHA ID-160
- Other

DUST & SILICA

- Silica - Air NIOSH 7500
- Silica - Bulk
- Silica - Bulk Respirable
- Dust - NIOSH 0500/0600

OTHER SERVICES

- Optical Microscopy
- X-ray Diffraction - Scan/Search
- X-ray Diffraction - Clay/Bulk
- SEM

Other Analysis: XRF, XRD, Polished Thin Section

Client Sample No.:	Sample Date	Air Volume	Other Information
<u>1 AECOM - Sand - 073020</u>	<u>7/30/20</u>	_____	_____
<u>2 AECOM - D010-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>3 AECOM - Control-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>4 AECOM - Hi, Cal-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>5</u>	_____	_____	_____
<u>6</u>	_____	_____	_____
<u>7</u>	_____	_____	_____
<u>8</u>	_____	_____	_____
<u>9</u>	_____	_____	_____
<u>10</u>	_____	_____	_____

Relinquished By: Recht Wetters Date/Time: 7/30/20 1400 Received By: D Downey Date/Time: 7/31/20 9:42

## Appendix B XRF

August 4, 2020  
Lab no. 220181

Mr. Ron Schott  
DCM Science Laboratory, Inc.  
12421 W. 49<sup>th</sup> Avenue, Unit #6  
Wheat Ridge, Colorado 80033

Dear Mr. Schott:

Enclosed are the x-ray fluorescence (XRF) analytical results for, "073020" samples received with your PO no. 2021. This report will be mailed and emailed to you.

A representative portion of each sample was ground to approximately -400 mesh in a steel swing mill and then analyzed by our standard XRF procedure for 31 major, minor and trace elements. The relative precision/accuracy for this procedure is ~5–10% for major–minor elements and ~10–15% for trace elements (those elements listed in ppm) at levels greater than twice the detection limit in samples of average geologic composition. A replicate sample and a standard reference material ("GSP-2", a USGS standard rock) was analyzed with the samples to demonstrate analytical reproducibility for your samples and analytical accuracy for a geologic standard, respectively. The accepted ("known") values for the quality control standard are listed with the XRF results.

Thank you for the opportunity to be of continuing service to DCM Science Laboratory.

Sincerely,

Joy Maes

IDENT	Wt %												
	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	S	Cl	K <sub>2</sub> O	CaO	TiO <sub>2</sub>	MnO	Fe <sub>2</sub> O <sub>3</sub>	BaO
SAND	1.17	0.39	4.38	85.8	0.09	< 0.05	< 0.02	1.10	0.73	0.18	0.06	1.56	0.04
DOLO+2	1.17	0.51	4.47	87.6	0.14	< 0.05	< 0.02	1.15	0.89	0.15	0.07	1.53	0.03
CONTROL+2	1.10	0.32	4.18	84.8	0.08	< 0.05	< 0.02	1.19	0.55	0.14	0.06	1.66	0.04
HICAL+2	1.40	0.40	4.62	84.4	0.10	< 0.05	< 0.02	1.14	0.71	0.14	0.06	1.55	0.03
<b>Quality Control - Replicate (R) sample and standard reference material (GSP-2) analyzed with samples</b>													
SAND(R)	1.16	0.38	4.39	85.8	0.09	< 0.05	< 0.02	1.10	0.73	0.18	0.06	1.55	0.03
GSP-2-XRF	3.16	1.11	14.7	65.7	0.33	0.07	0.06	5.48	2.16	0.60	0.04	4.24	0.14
GSP-2-known	2.78	0.96	14.9	66.6	0.29	----	----	5.38	2.10	0.66	0.04	4.90	0.15

IDENT	PPM										
	V	Cr	Ni	Cu	Zn	As	Sn	Pb	Mo	Sr	U
SAND	13	< 10	14	< 10	27	< 20	< 20	< 10	< 10	90	< 10
DOLO+2	16	< 10	13	< 10	30	< 20	< 20	< 10	< 10	92	< 10
CONTROL+2	15	< 10	14	12	27	< 20	< 20	< 10	< 10	108	< 10
HICAL+2	17	11	14	< 10	30	< 20	< 20	< 10	< 10	98	< 10
<b>Quality Control</b>											
SAND(R)	19	< 10	15	< 10	28	< 20	< 20	< 10	< 10	93	< 10
GSP-2-XRF	46	18	11	44	106	< 20	< 20	34	< 10	218	< 10
GSP-2-known	52	20	17	43	120	--	--	42	--	240	2

Ident	PPM				
	Th	Nb	Zr	Rb	Y
SAND	< 10	< 10	113	20	11
DOLO+2	< 10	< 10	90	24	12
CONTROL+2	< 10	< 10	99	24	< 10
HICAL+2	< 10	< 10	101	25	10
<b>Quality Control</b>					
SAND(R)	< 10	< 10	112	22	11
GSP-2-XRF	102	22	529	215	33
GSP-2-known	105	27	550	245	28

Initial \_\_\_\_\_

Date \_\_\_\_\_

Analysis Performed By The Mineral Lab, Inc



September 21, 2020

Mr. Francisco Barajas  
AECOM  
9400 Amberglen Blvd.  
Austin, TX 78729

Dear Mr. Barajas:

We have performed scanning electron microscopy on your four sand samples (client samples no. **AECOM-SAND – 073020, AECOM-DOLO - +2 – 073020, AECOM-CONTROL -+2 – 073020** and **AECOM-Hi CAL -+2 – 073020**).

Thank you for the opportunity to provide this service. If you have any questions, please call.

Sincerely,

A handwritten signature in black ink that reads "Ron Schott". The signature is written in a cursive style with a large initial "R".

Ron Schott  
Analyst

## Appendix C SEM



12421 W. 49<sup>th</sup> Avenue, Unit #6  
Wheat Ridge, CO 80033 - (303) 463-8270

## Scanning Electron Microscopy Analysis

Page 1 of 26

Client:	Analysis Date:	9-17-20
AECOM	Reporting Date:	9-21-20
9400 Amberglen Blvd	Receipt Date:	7-31-20
Austin, TX 78729	Client Job No.:	None Given
	Project Title:	TVA-NRS Gallatin
	DCMSL Project:	AECOM8

The purpose of this project is to confirm the bulk mineralogy of four sand samples and determine if additional minerals have formed as coatings/rinds on major phases as a result of groundwater treatment in four sand samples (client samples no. **AECOM-SAND – 073020**, **AECOM-DOLO - +2 – 073020**, **AECOM-CONTROL -+2 – 073020** and **AECOM-Hi CAL -+2 – 073020**) by field emission scanning electron microscopy (FE-SEM) equipped with an energy dispersive system (EDS). Each sample was prepared as a standard polished thin section and carbon coated. FE-SEM/EDS analyses were performed at magnifications ranging from 100X to 20,000X, 20keV. FE-SEM images and EDS spectra are included for documentation.

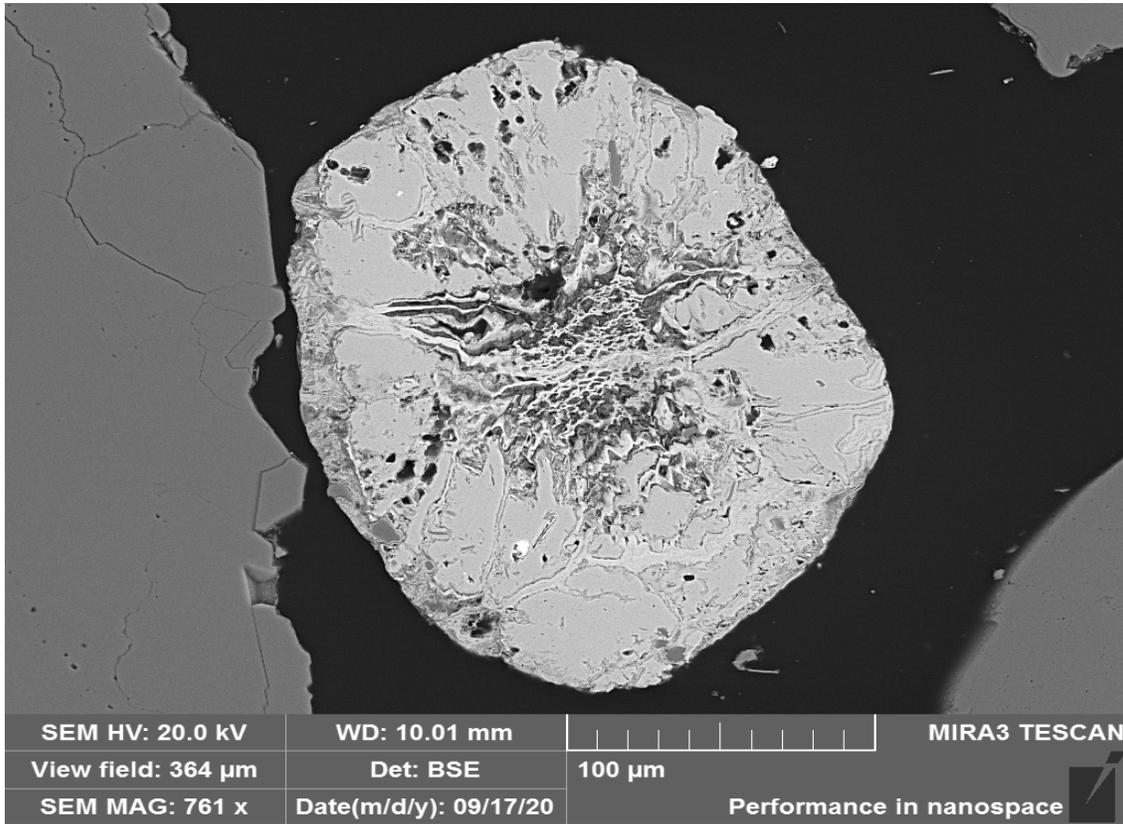
Client Sample No.: **AECOM-SAND – 073020**

*Major Mineralogy by XRD: Quartz 63%, Plagioclase 14% K-spar 12% Mica 4%  
Chlorite 4% Amphibole 1%*

*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Pyrite*

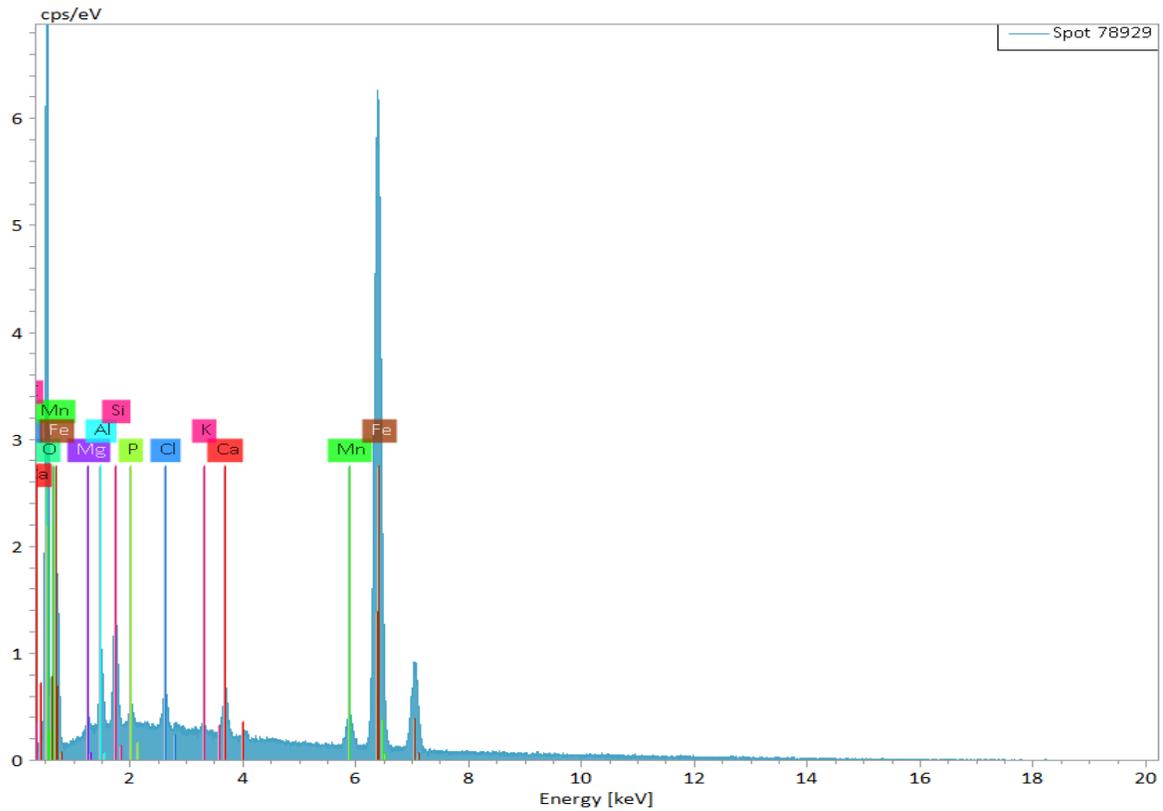
### Microscopic Description by FE-SEM

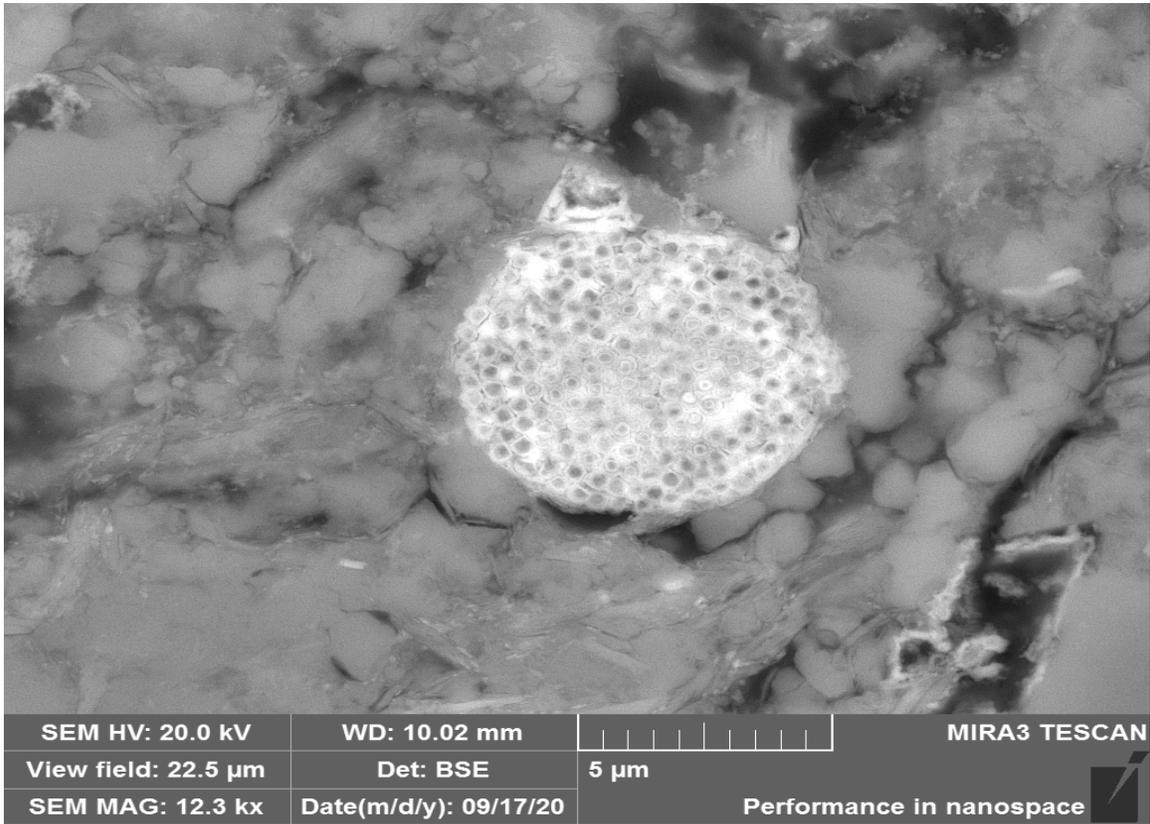
In hand specimen this sample is a brown colored fine, to coarse grained unconsolidated sand. XRD and FE-SEM indicate the sand is primarily composed of subrounded to rounded quartz, feldspar and lesser amounts of mica/chlorite and some amphibole. In thin section individual grains show little in the way of secondary coatings, however, there are a few silicate and carbonate grains that have some attachments of clay or thin rinds of iron oxide. Calcite/dolomite tends to show the most evidence of secondary alteration/coatings composed primarily of Mn. Although uncertain, the coating may represent Mn oxide or secondary Mn carbonate. Iron oxide with significant Mn content is also present as large rounded fragments and as goethite pseudomorphs after pyrite cubes and pyrite framboids. Although sulfides are rare, one small relict grain was identified in a mass of iron oxide.



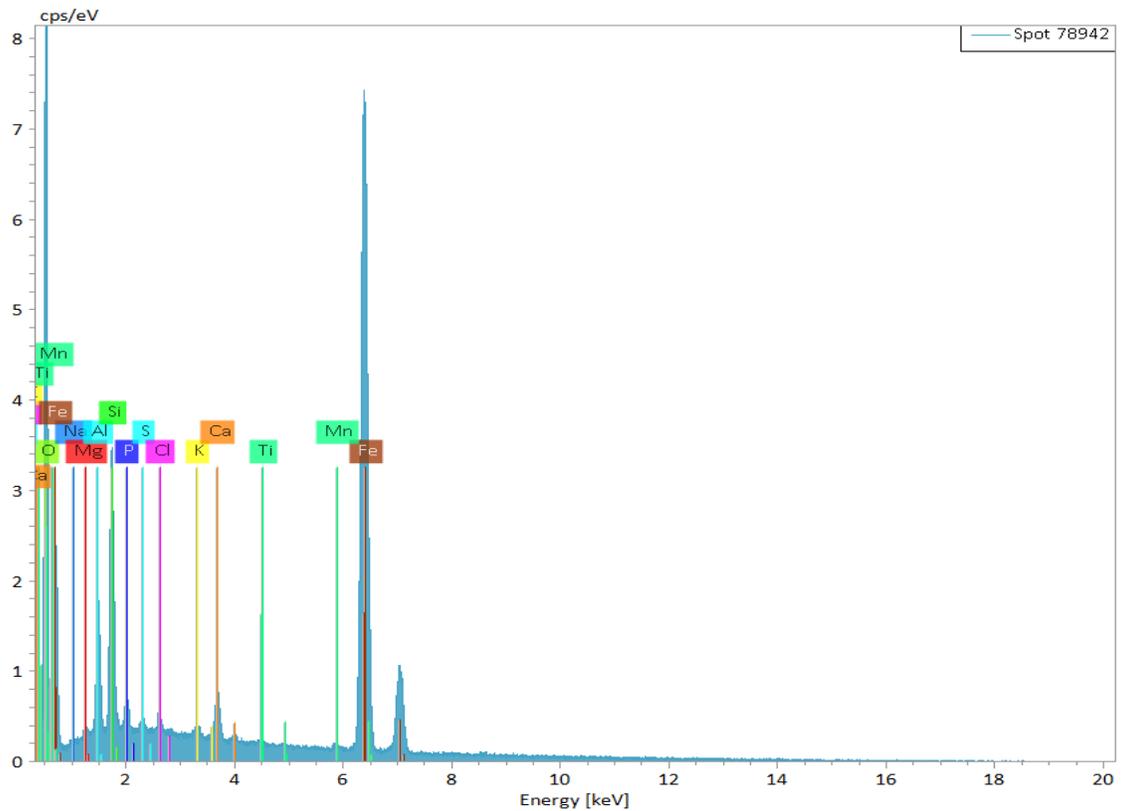
Client Sample No.: **AECOM-SAND – 073020**

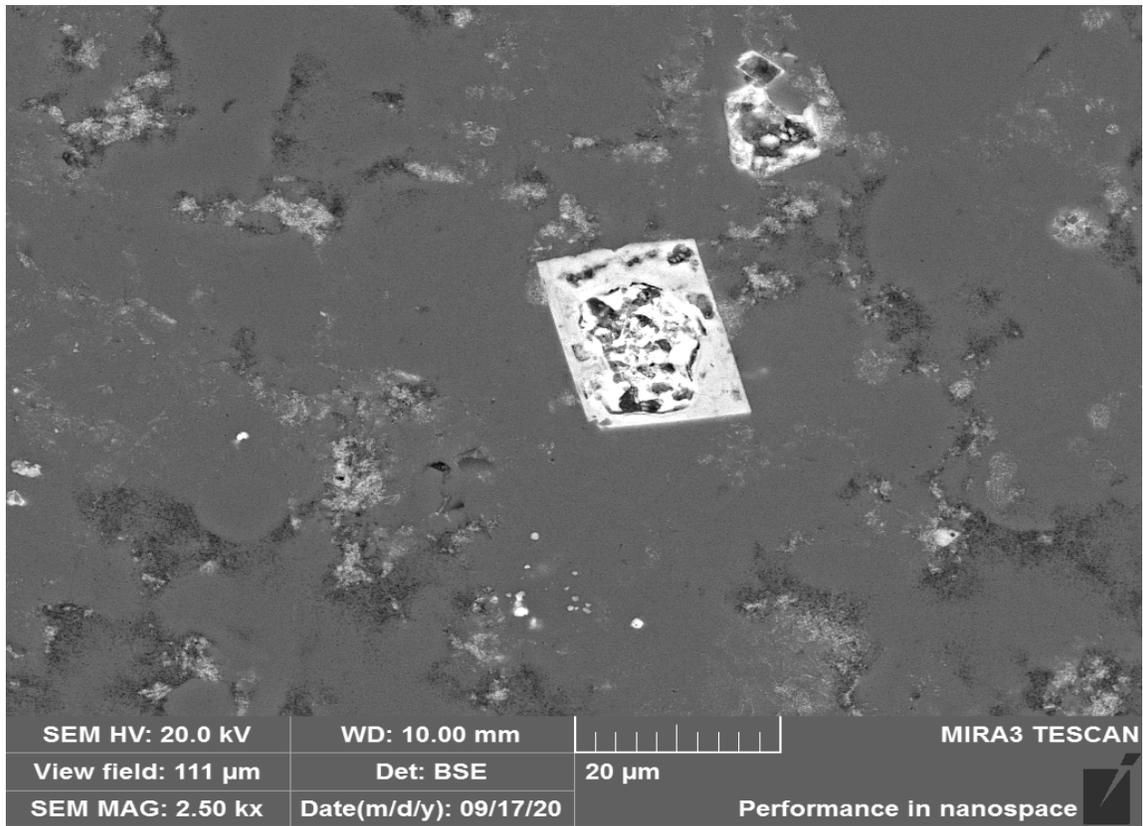
Backscatter image of a large rounded grain of iron oxide with a bright grain of pyrite in lower left – 761X



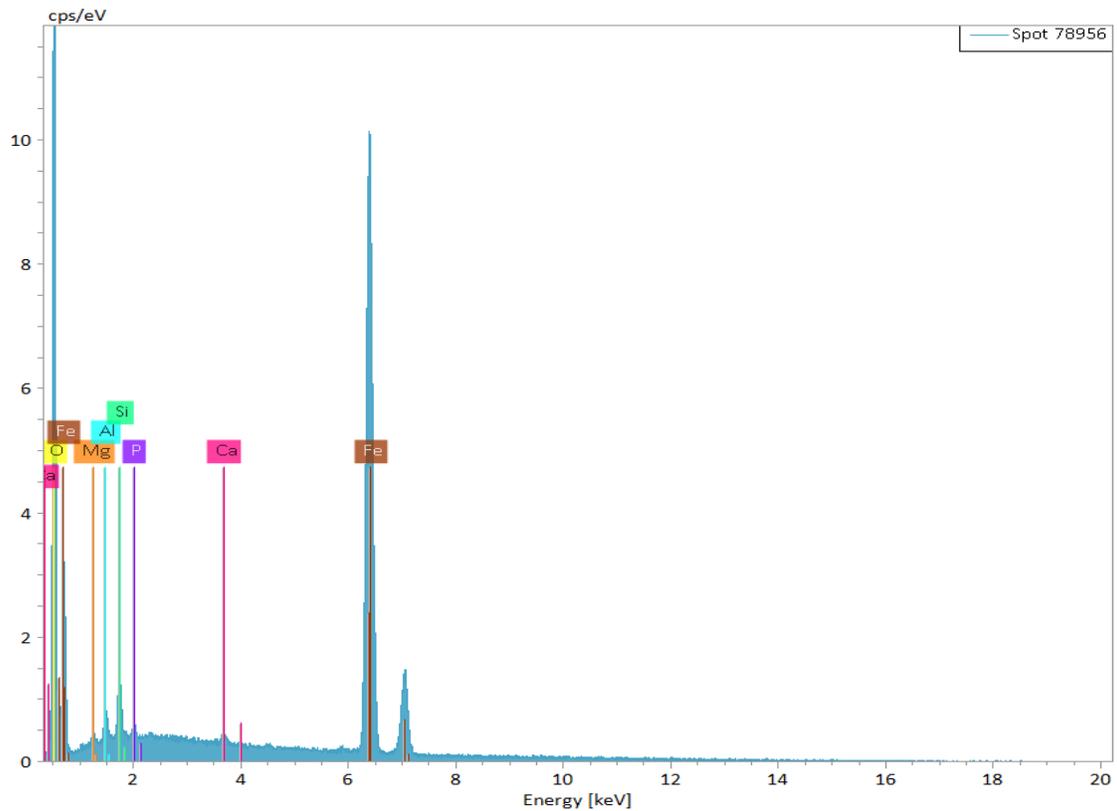


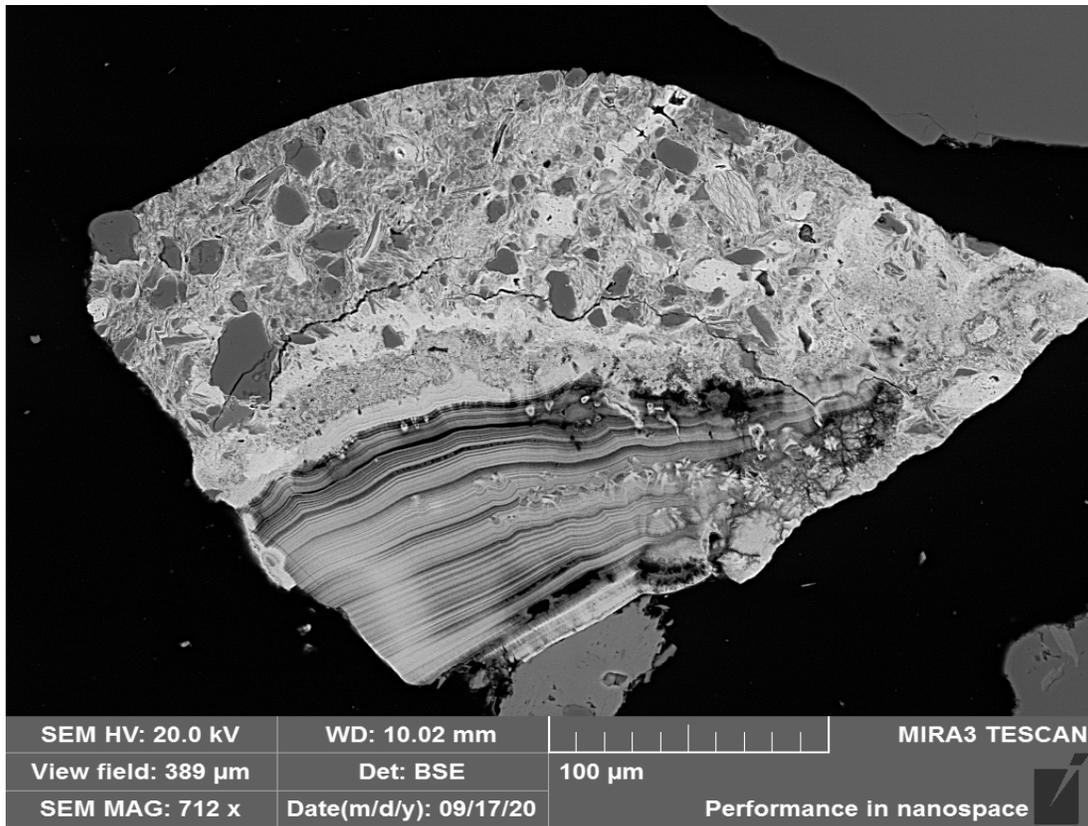
Client Sample No.: **AECOM-SAND – 073020**  
 Backscatter image of a goethite pseudomorph after a pyrite framboid – 12,300X



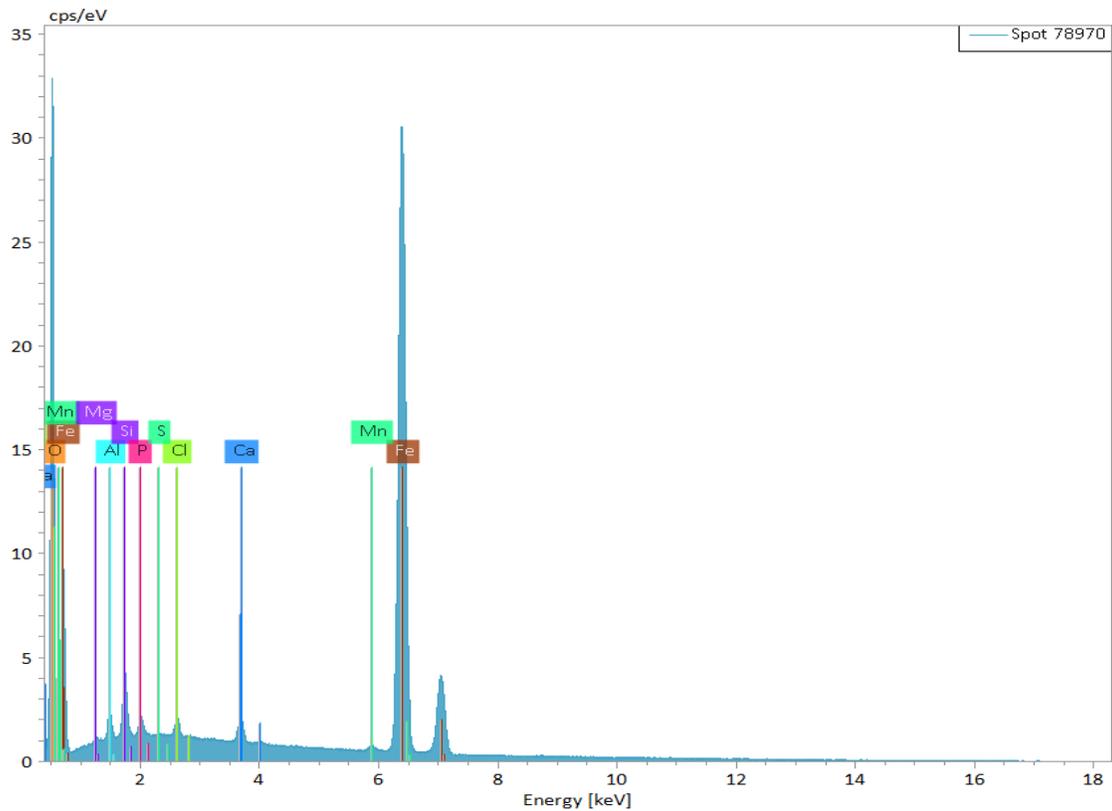


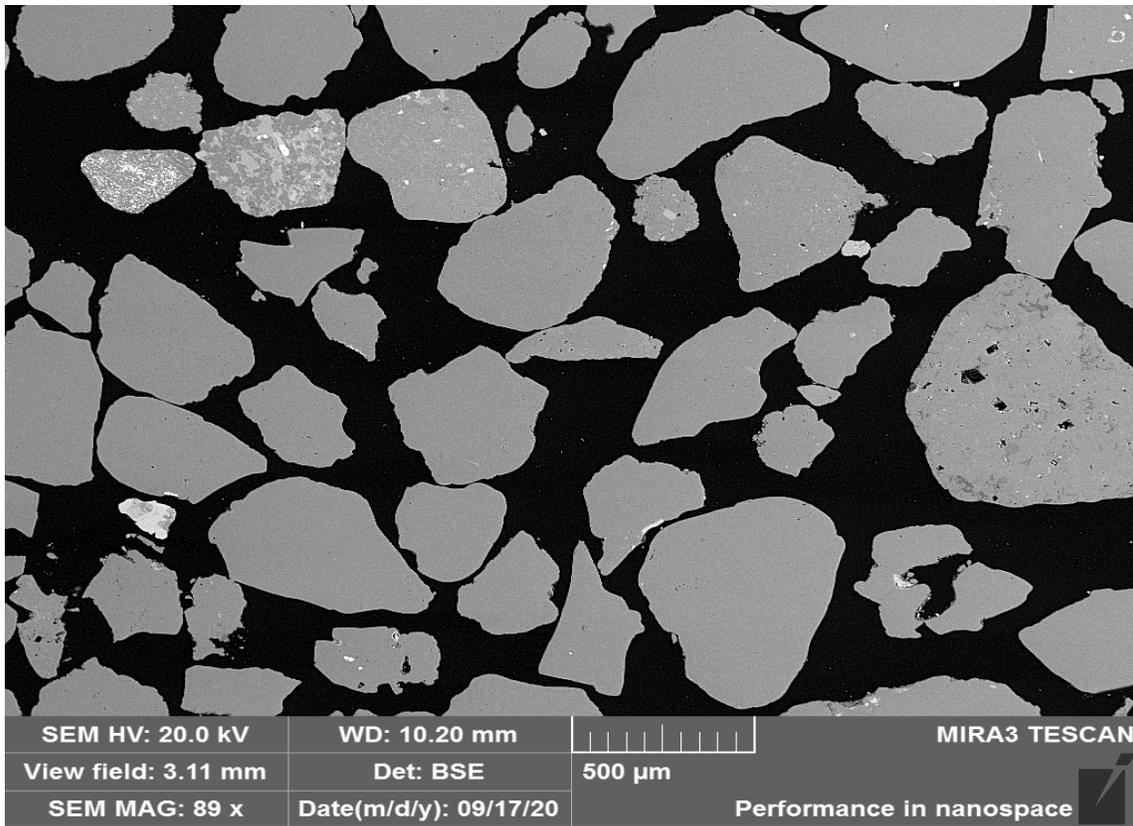
Client Sample No.: **AECOM-SAND – 073020**  
Backscatter image of goethite pseudomorph after pyrite in quartz – 2,500X





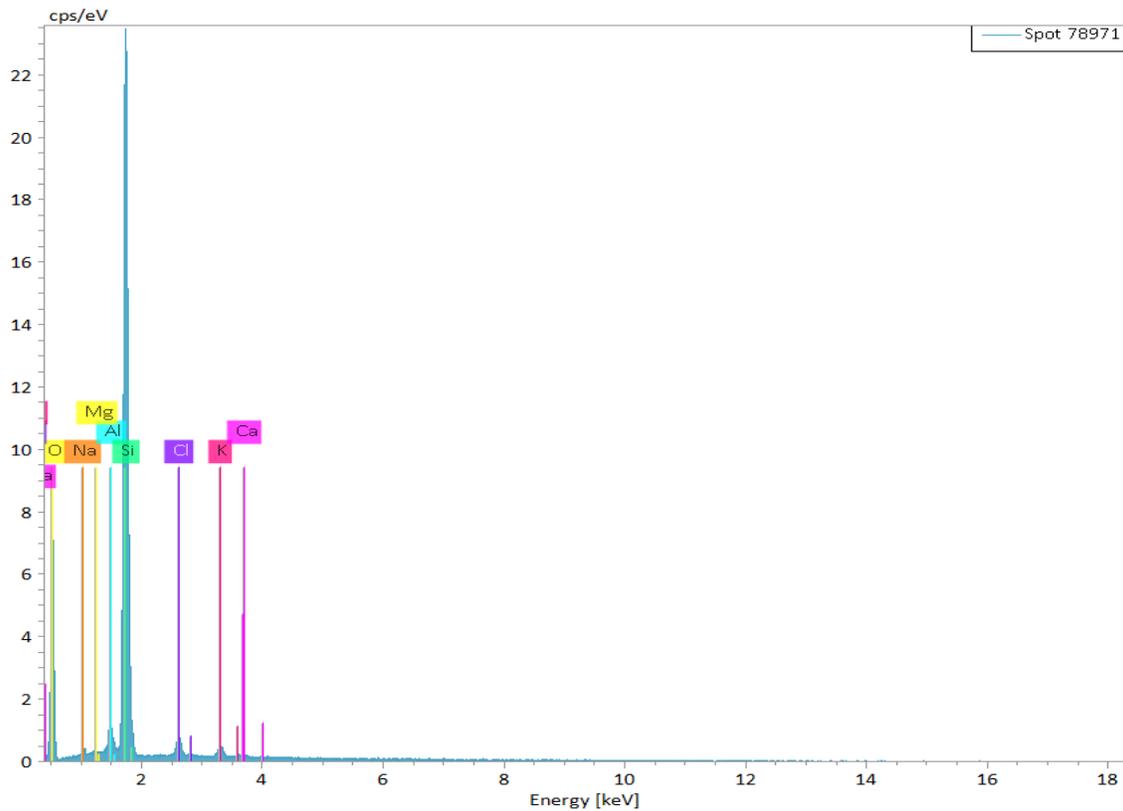
Client Sample No.: **AECOM-SAND – 073020**  
Backscatter image of iron oxide cementing small rock fragments – 712X

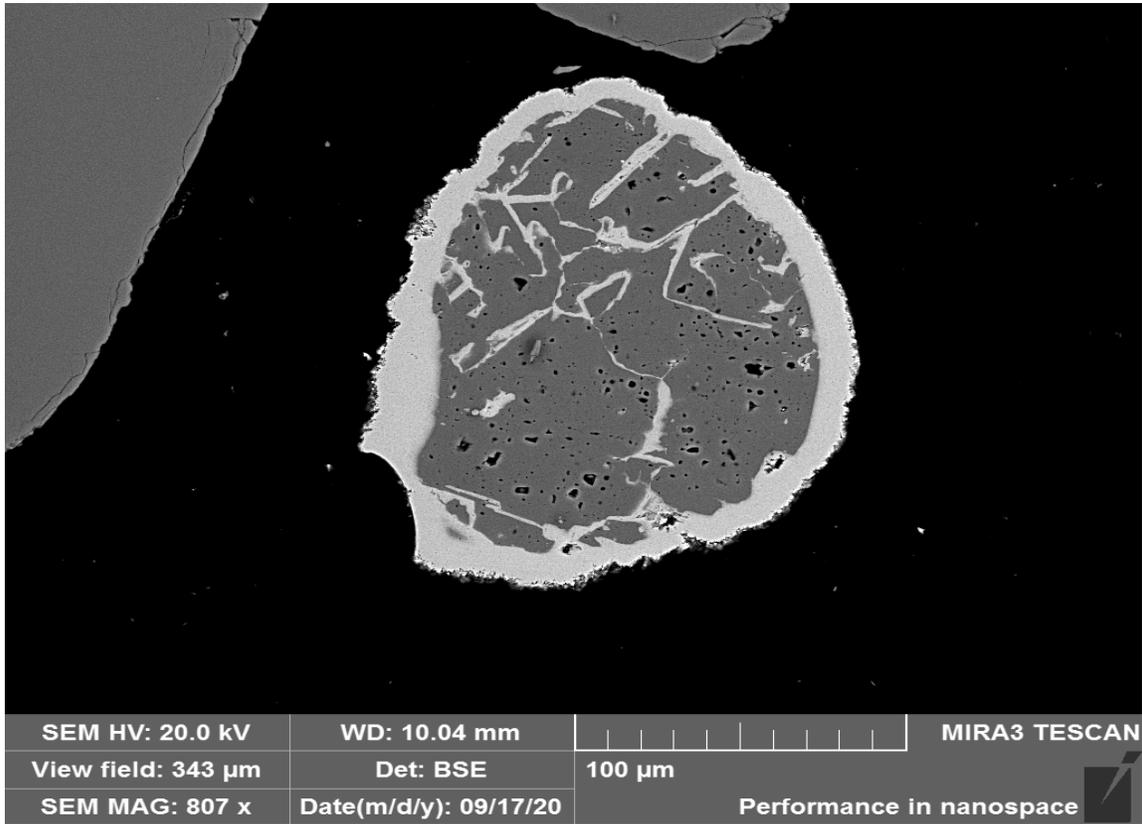




Client Sample No.: **AECOM-SAND – 073020**

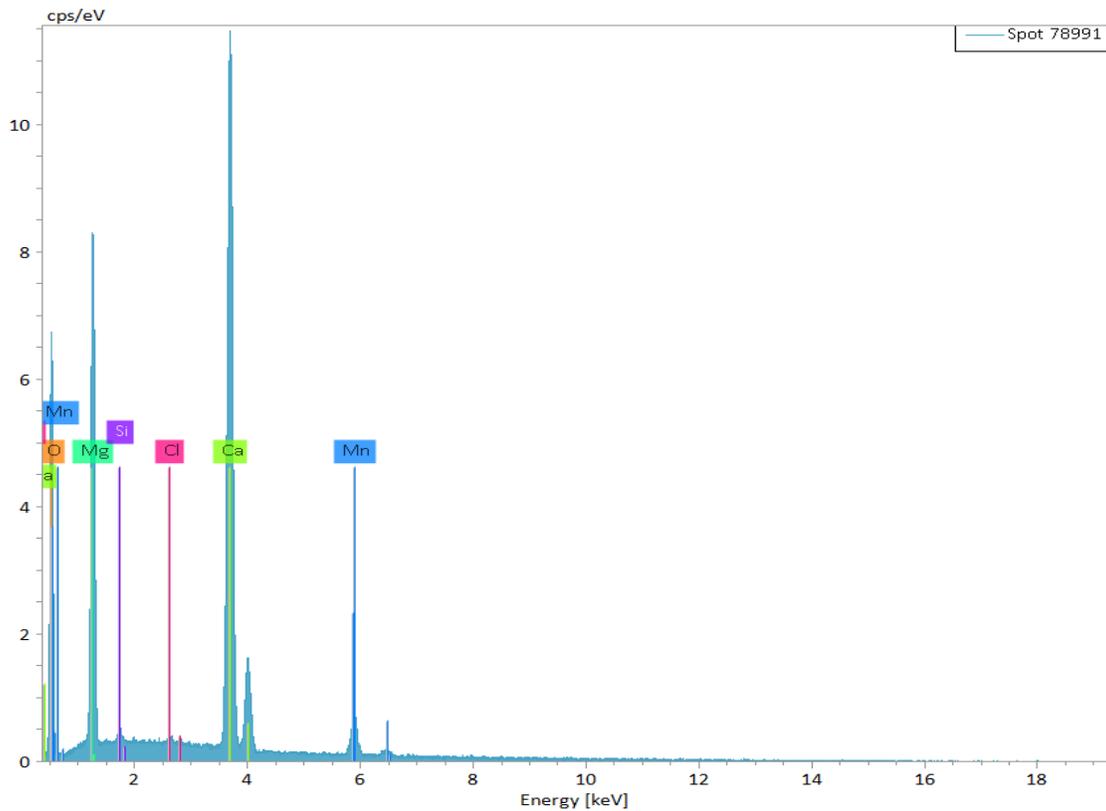
Low magnification backscatter image showing grain morphology and size variation – 89X





Client Sample No.: **AECOM-SAND – 073020**

Backscatter image of a rounded grain of dolomite with a bright Mn rich rind – 807X



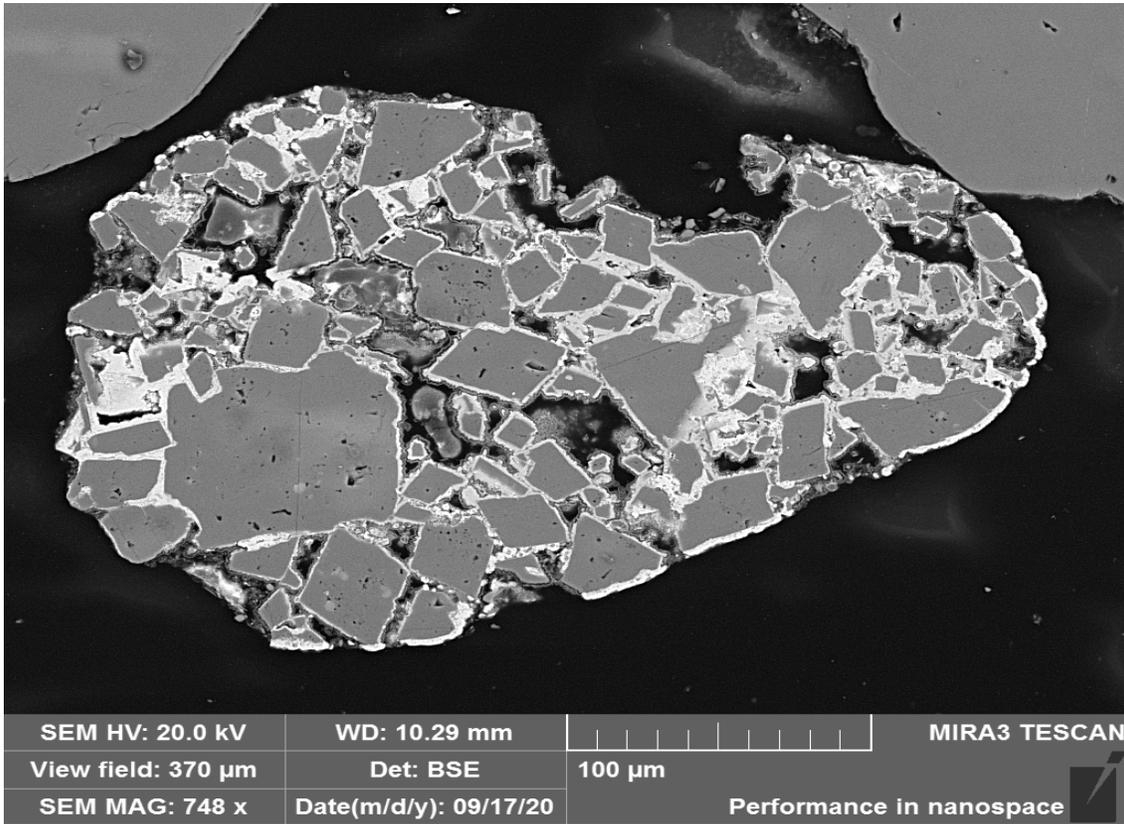
Client Sample No.: **AECOM-DOLO - +2 – 073020**

*Major Mineralogy by XRD: Quartz 61%, Plagioclase 17% K-spar 11% Mica 4%  
Chlorite 2% Amphibole 2%*

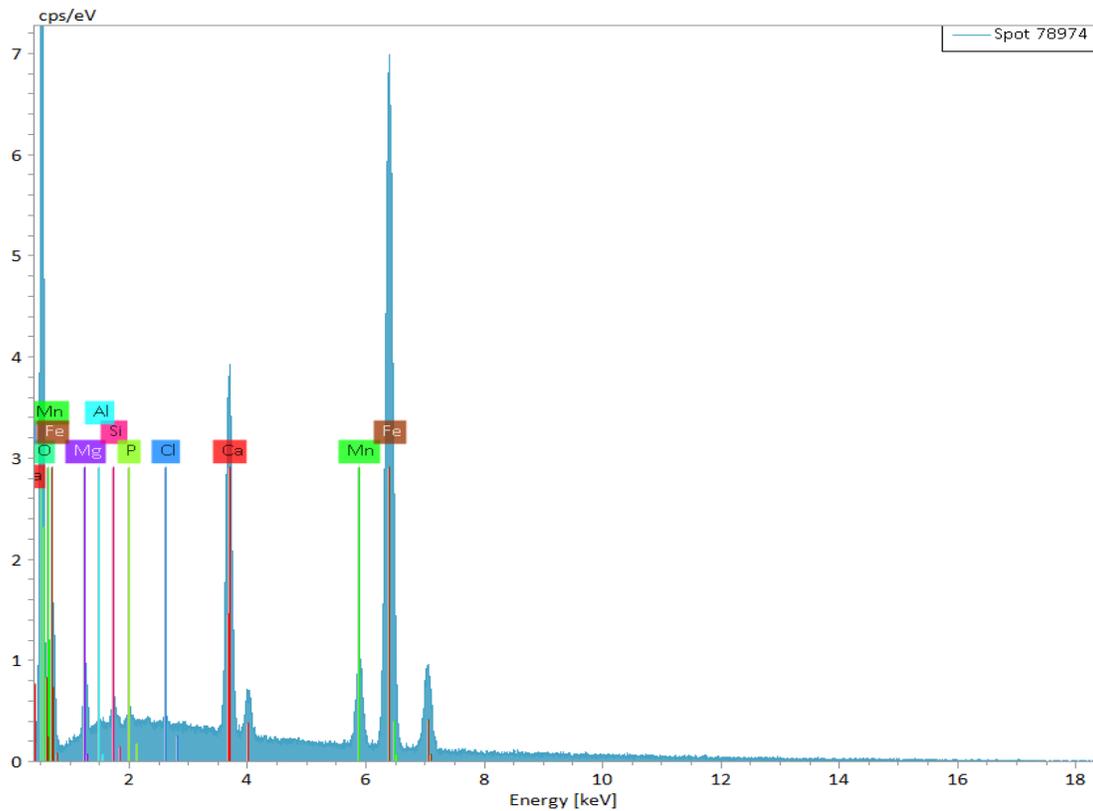
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Pyrite*

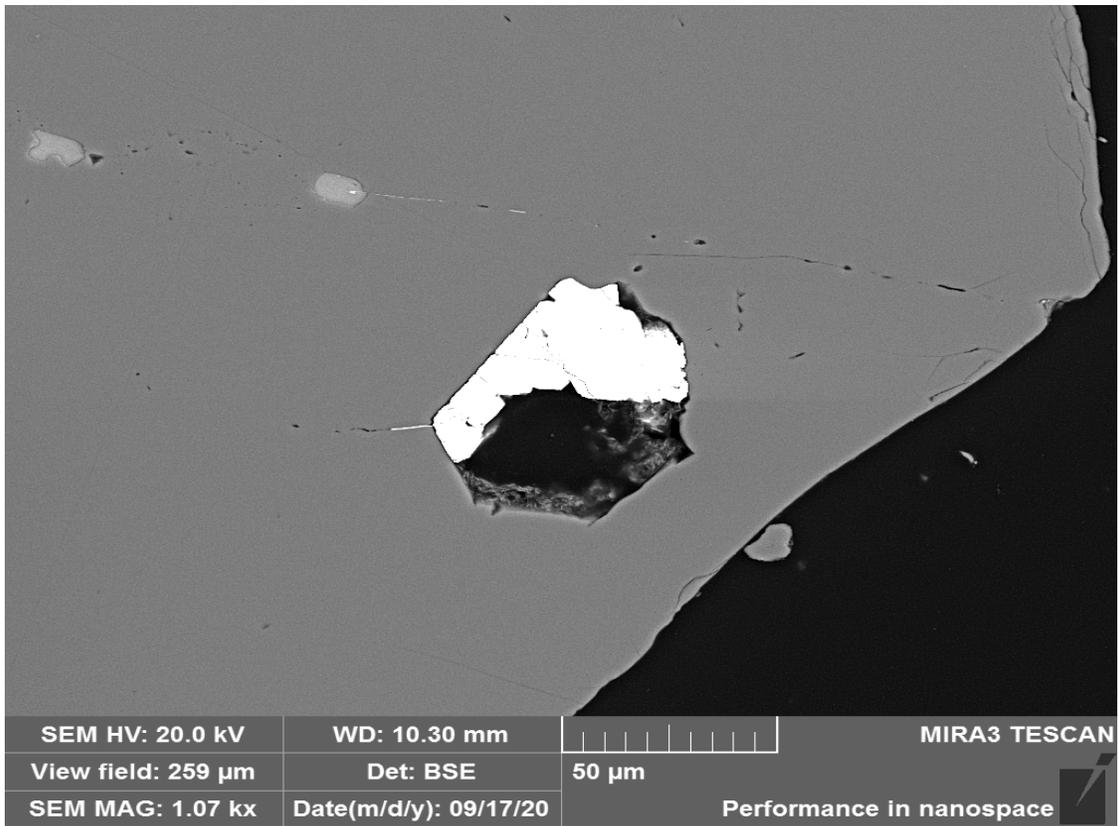
Microscopic Description by FE-SEM

This sample is a brown colored, fine to coarse unconsolidated sand. FE-SEM and XRD confirm the sample is composed mainly of subrounded to rounded quartz/feldspar with lesser amounts of mica and amphibole. A small population of grains shows some minor banding and coatings of secondary iron oxide. Calcite/dolomite fragments show the greatest degree of secondary coatings. Iron oxide with significant Mn content is commonly seen cementing and banding euhedral grains of carbonate. When associated with silicates, iron oxide is seen filling small exterior pits and as occasional thin bands around grains. Iron oxide also occurs as goethite pseudomorphs after pyrite cubes and small pyrite framboids associated with clay. Unaltered pyrite is present as a trace in quartz.

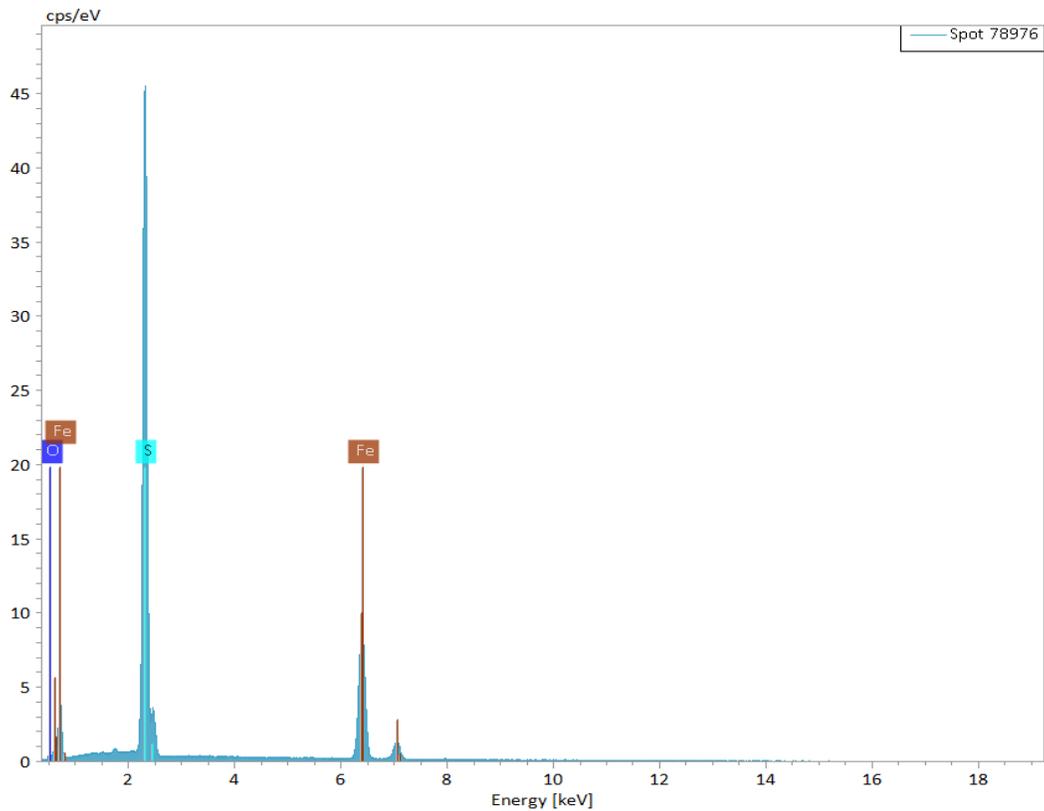


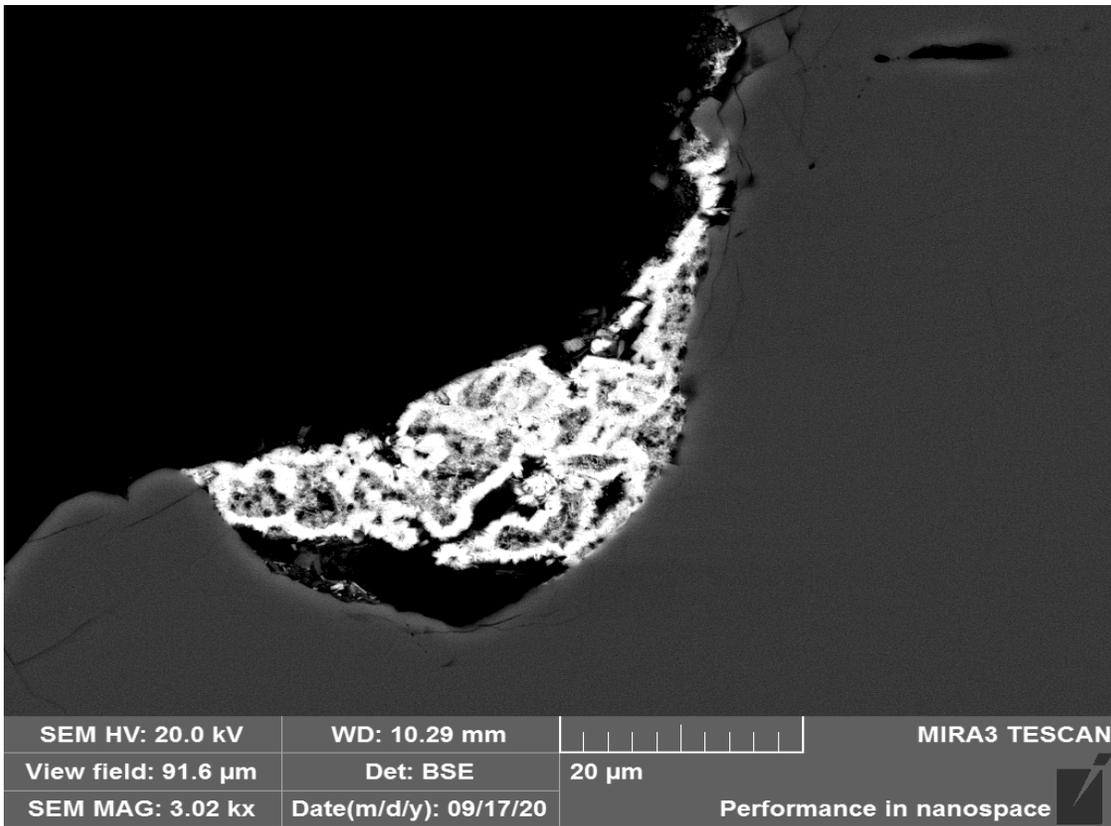
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
 Backscatter image of dolomite grains cemented and rimmed with iron oxide – 748X





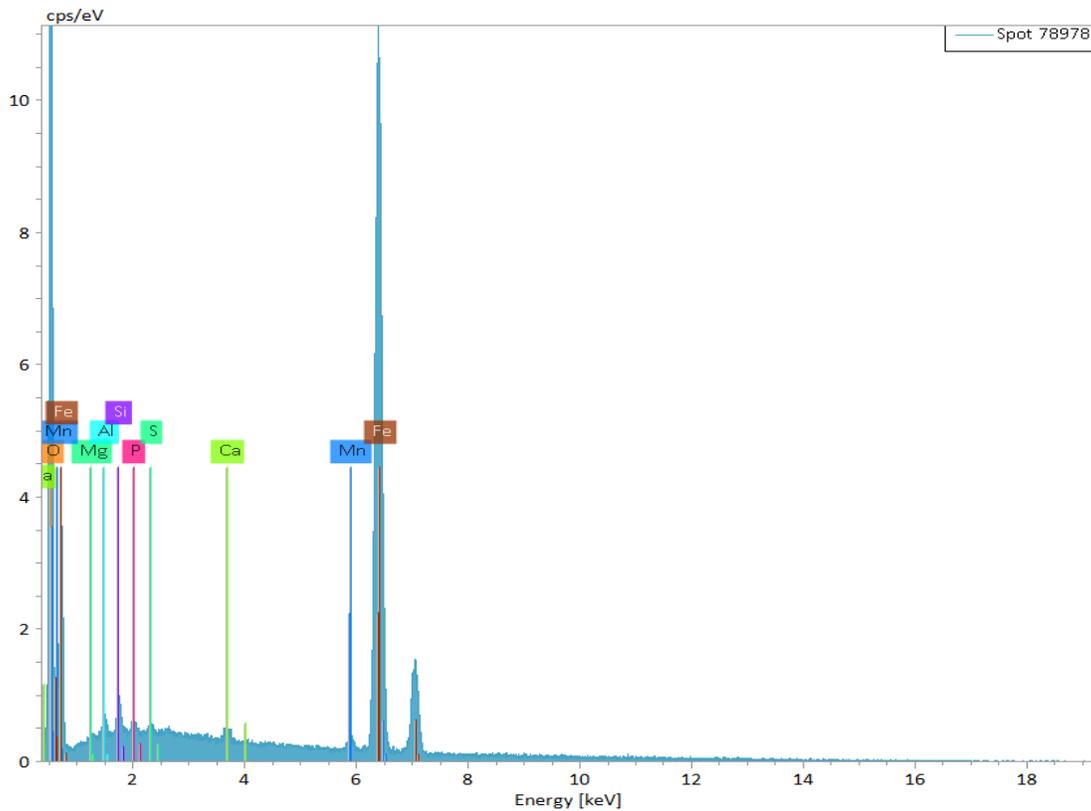
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
Backscatter image of quartz with inclusion of pyrite – 1,070X

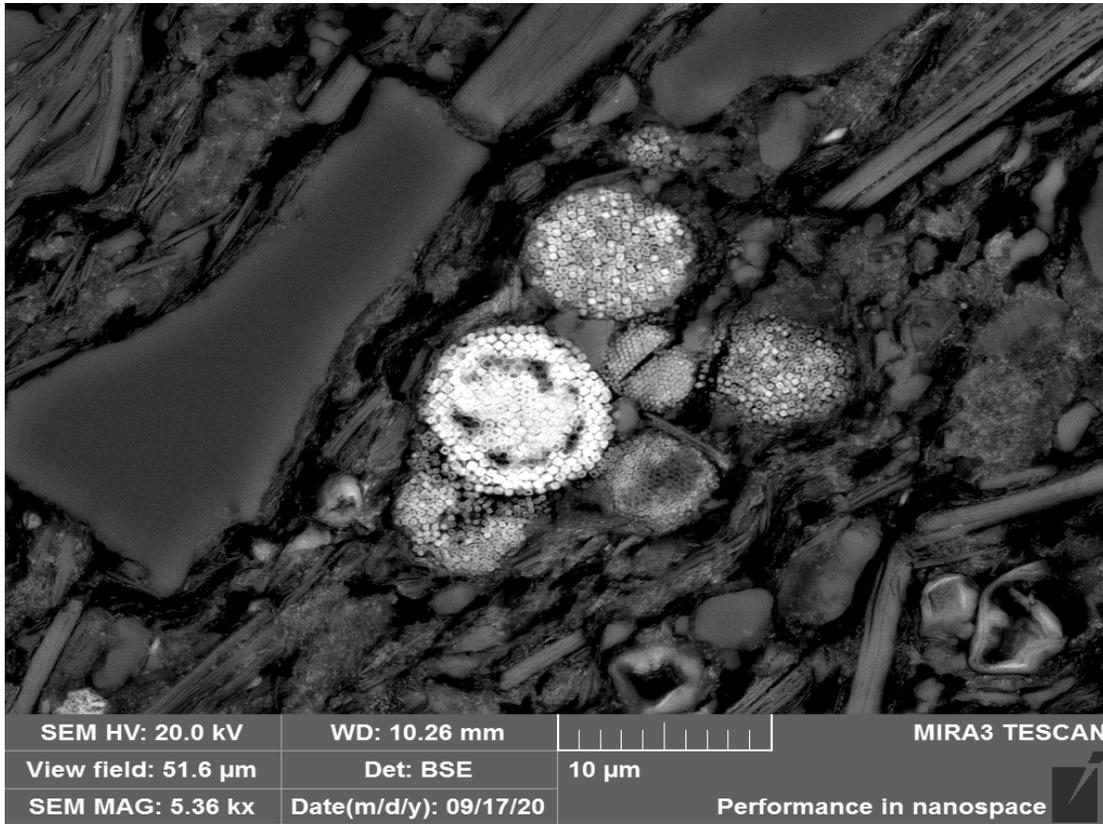




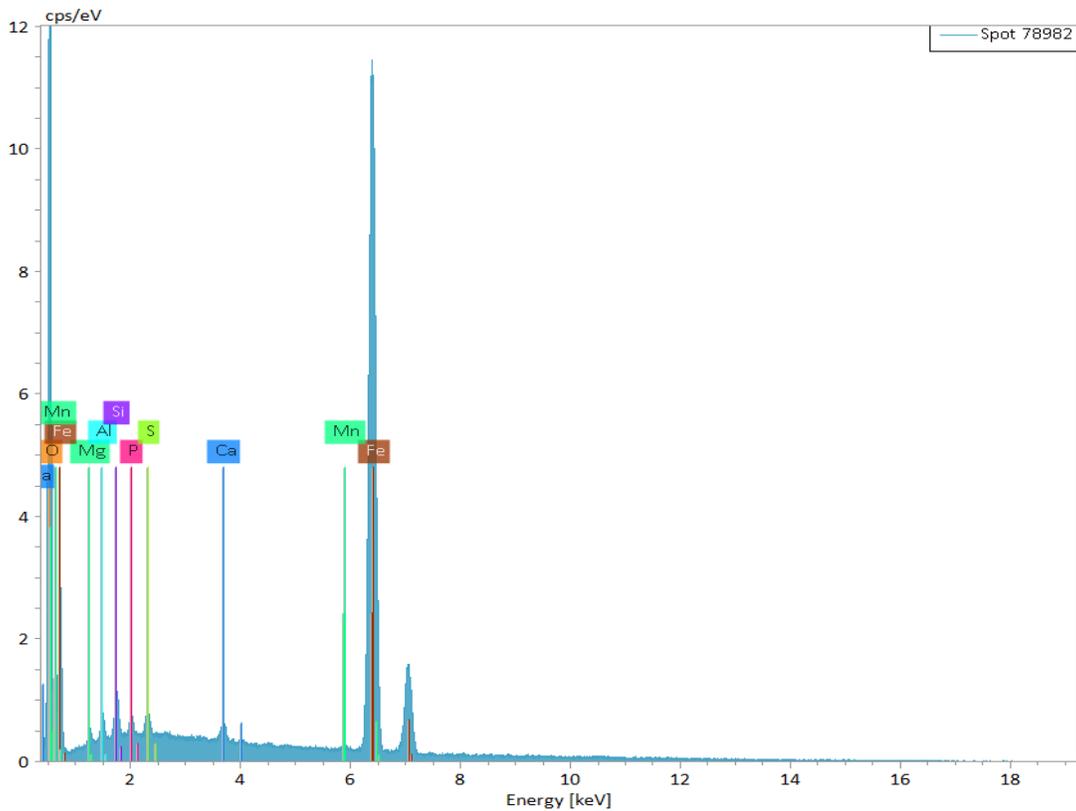
Client Sample No.: **AECOM-DOLO - +2 - 073020**

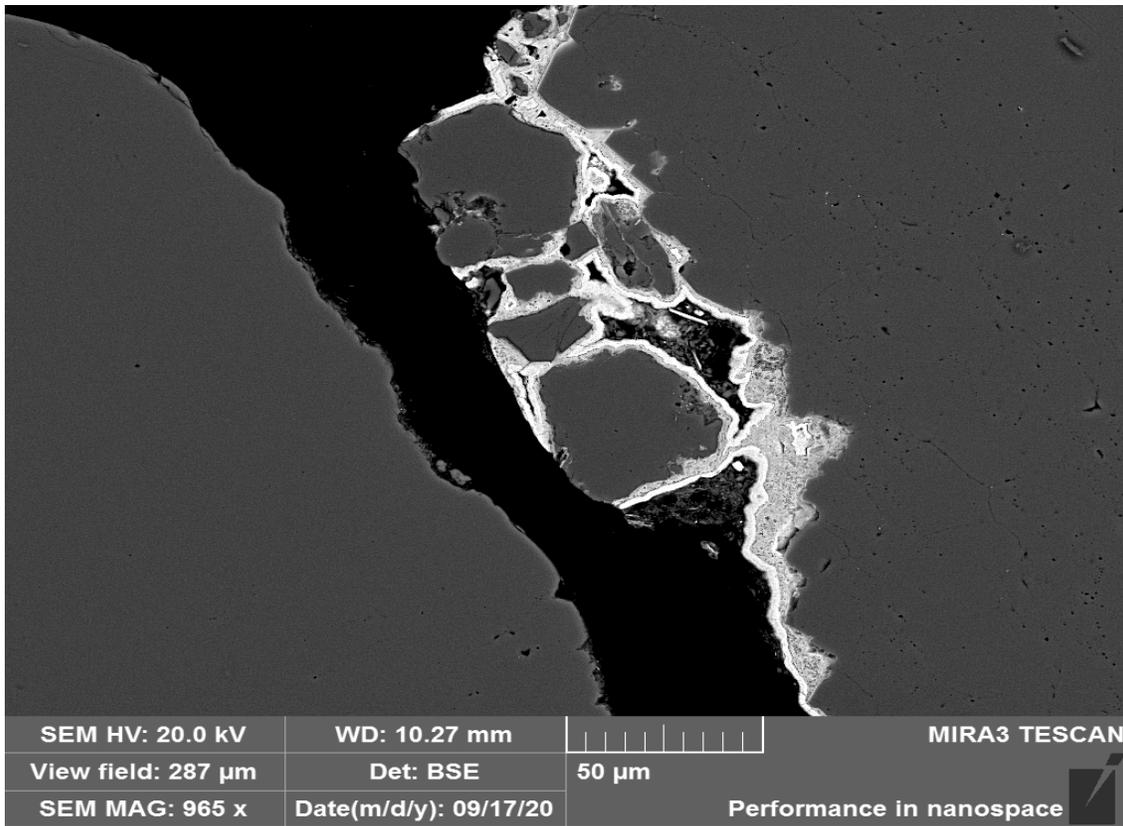
Backscatter image of a small pit on the exterior of a quartz grain filled with iron oxide – 3,020X





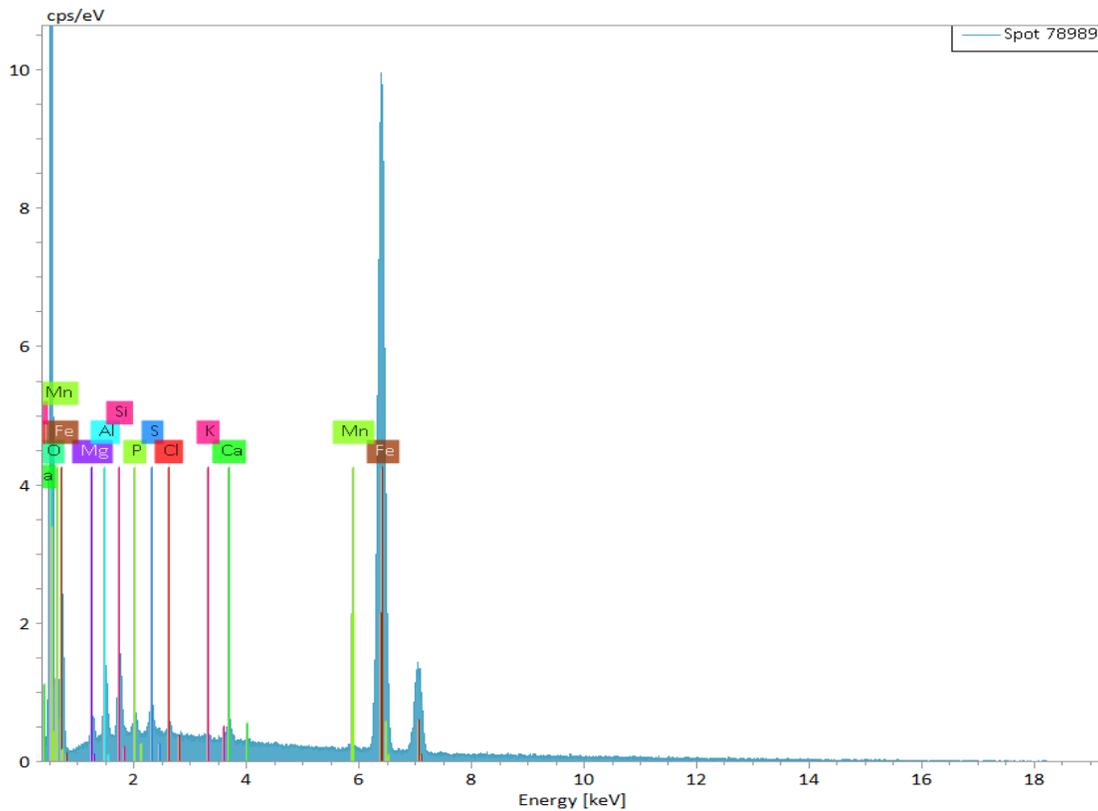
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
 Backscatter image of goethite pseudomorphs after pyrite framboids – 5,360X

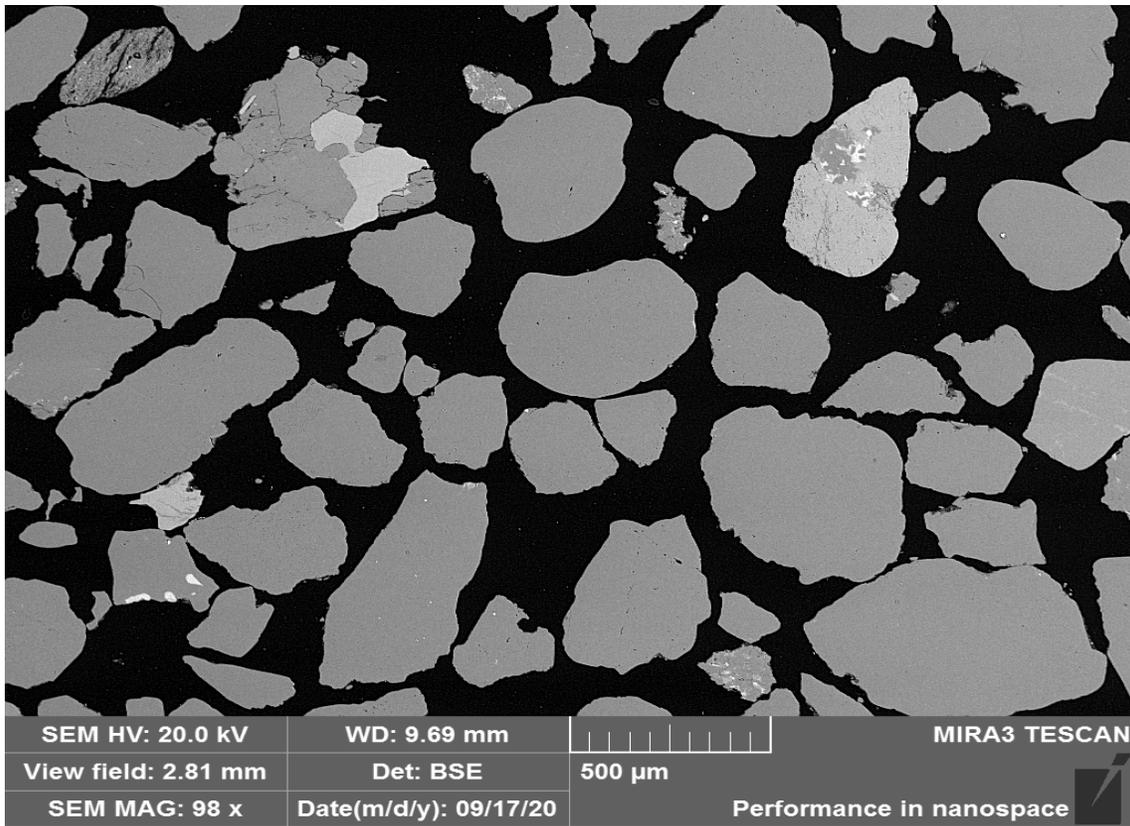




Client Sample No.: **AECOM-DOLO - +2 - 073020**

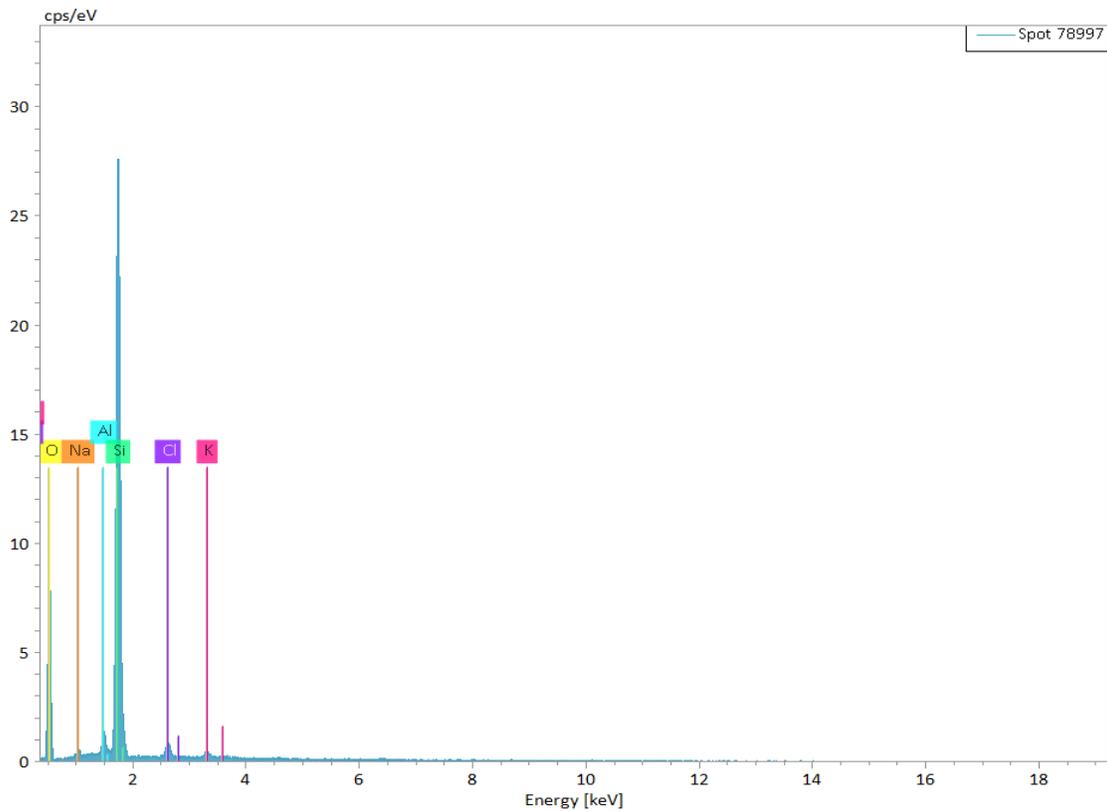
Backscatter image of bright iron oxide rimming and cementing quartz fragments – 965X





Client Sample No.: **AECOM-DOLO - +2 - 073020**

Low magnification backscatter image showing grain morphology and size variation – 98X



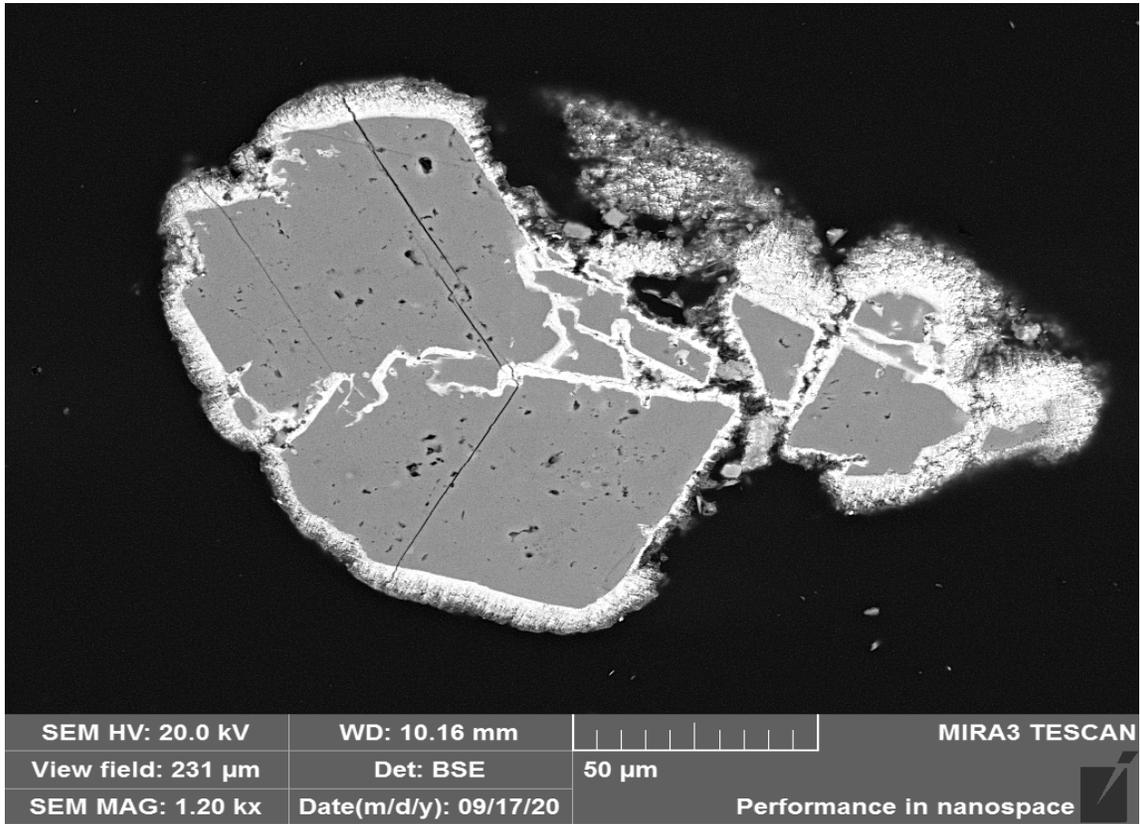
Client Sample No.: **AECOM-CONTROL -+2 – 073020**

*Major Mineralogy by XRD: Quartz 63%, Plagioclase 15% K-spar 11% Mica 4%  
Chlorite 4% Amphibole 1%*

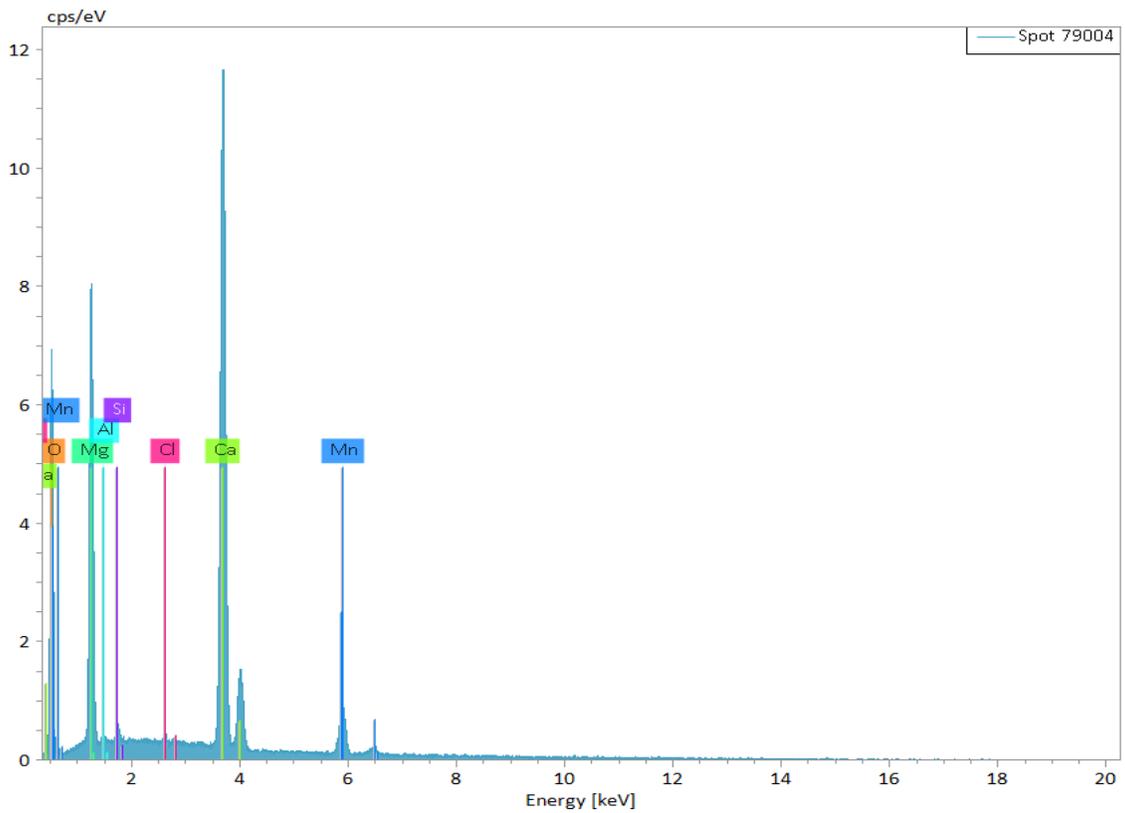
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite*

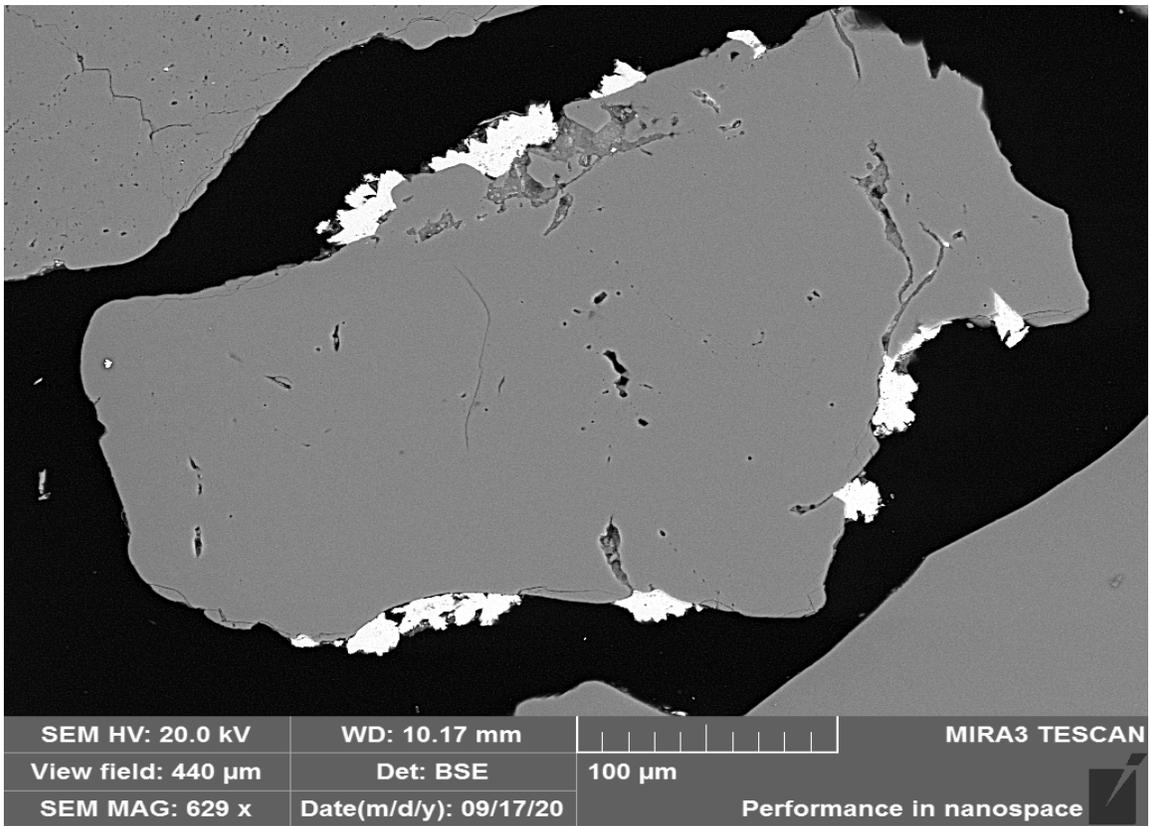
Microscopic Description by FE-SEM

This sample is a brown colored, fine to coarse sand composed primarily of subrounded to rounded quartz/feldspar and lesser amounts of mica and amphibole. A small population of the clasts show secondary coatings composed primarily of Fe/Mn oxide. Calcite/dolomite is commonly seen with Mn rich bands along crystal boundaries and fractures. Although uncertain, the bands may be an oxide or a secondary Mn carbonate. Some silicate grains have small exterior pits and grain boundaries coated with thin skins of secondary Fe oxide. Contained in rock fragments with significant clay content are goethite pseudomorphs after pyrite framboids. In rounded grains of quartz, goethite pseudomorphs after pyrite cubes occur as a trace.

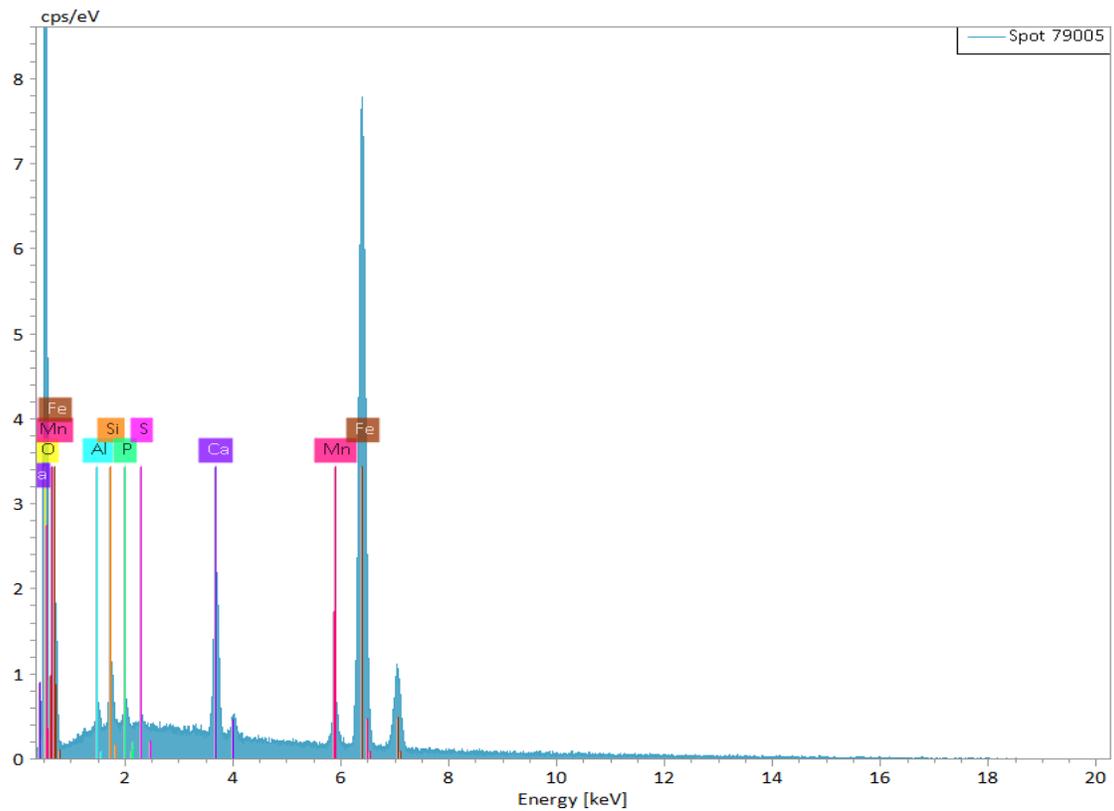


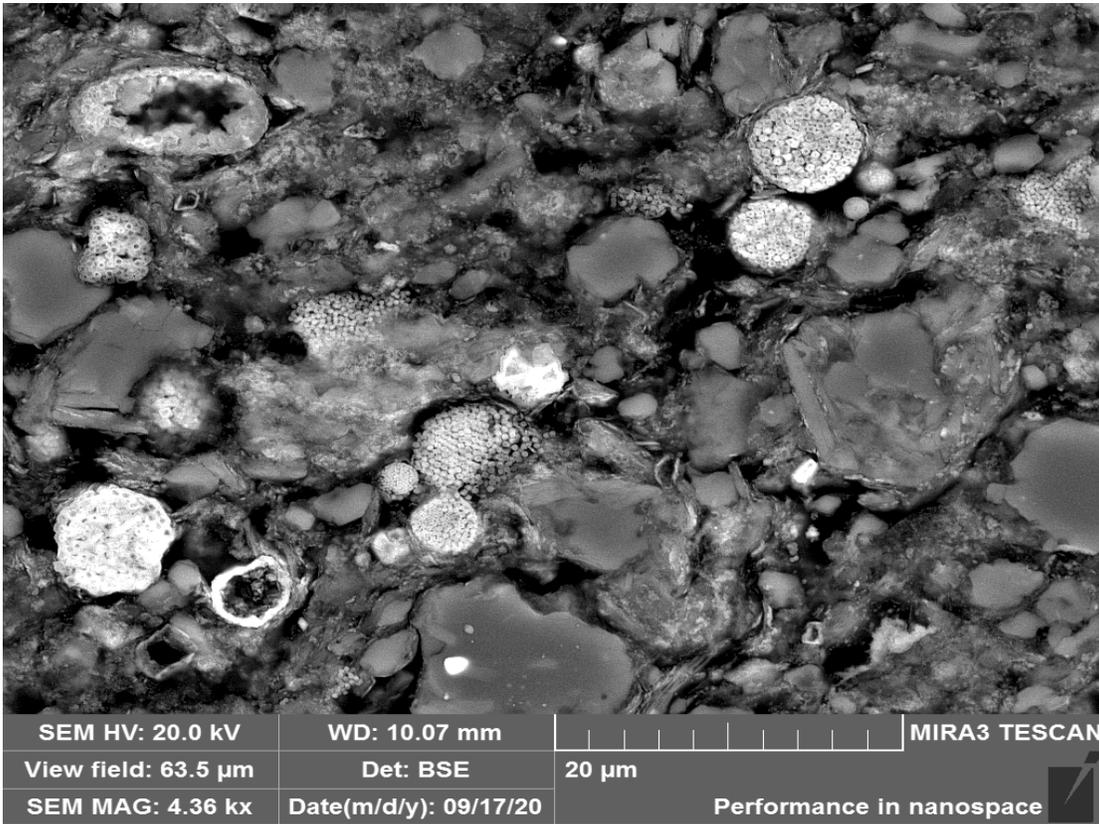
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
Backscatter image of dolomite with bright Mn rich rinds – 1,200X



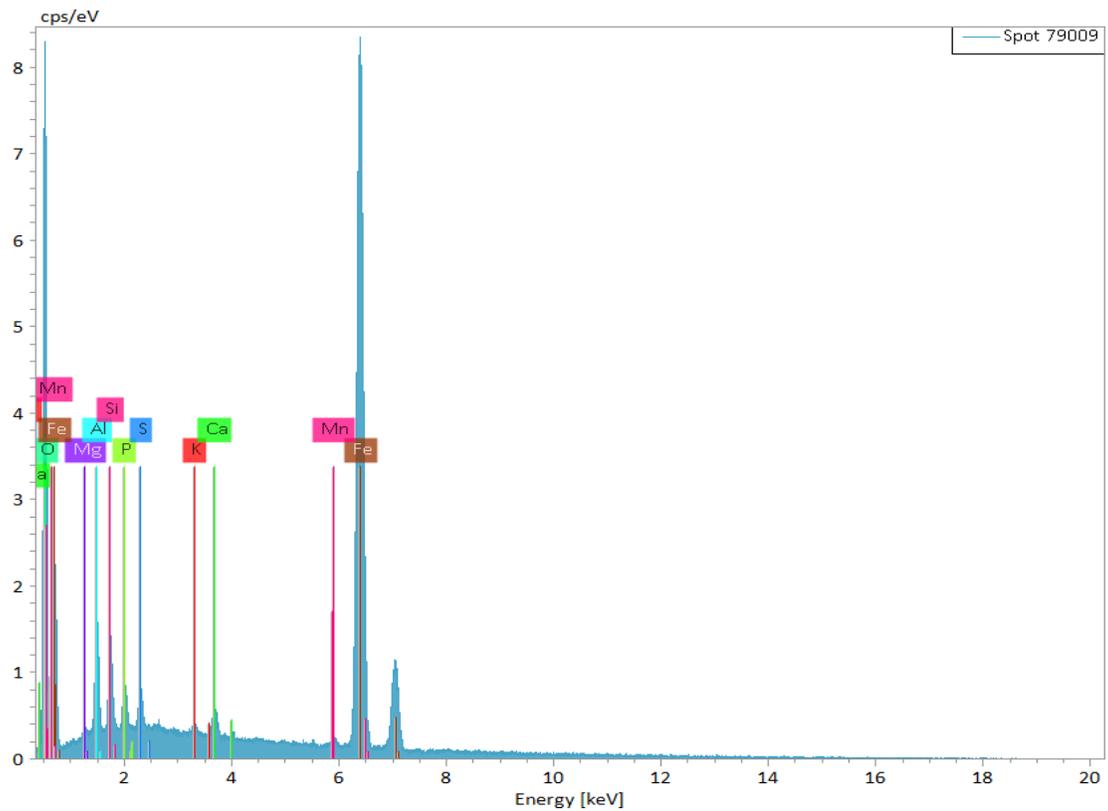


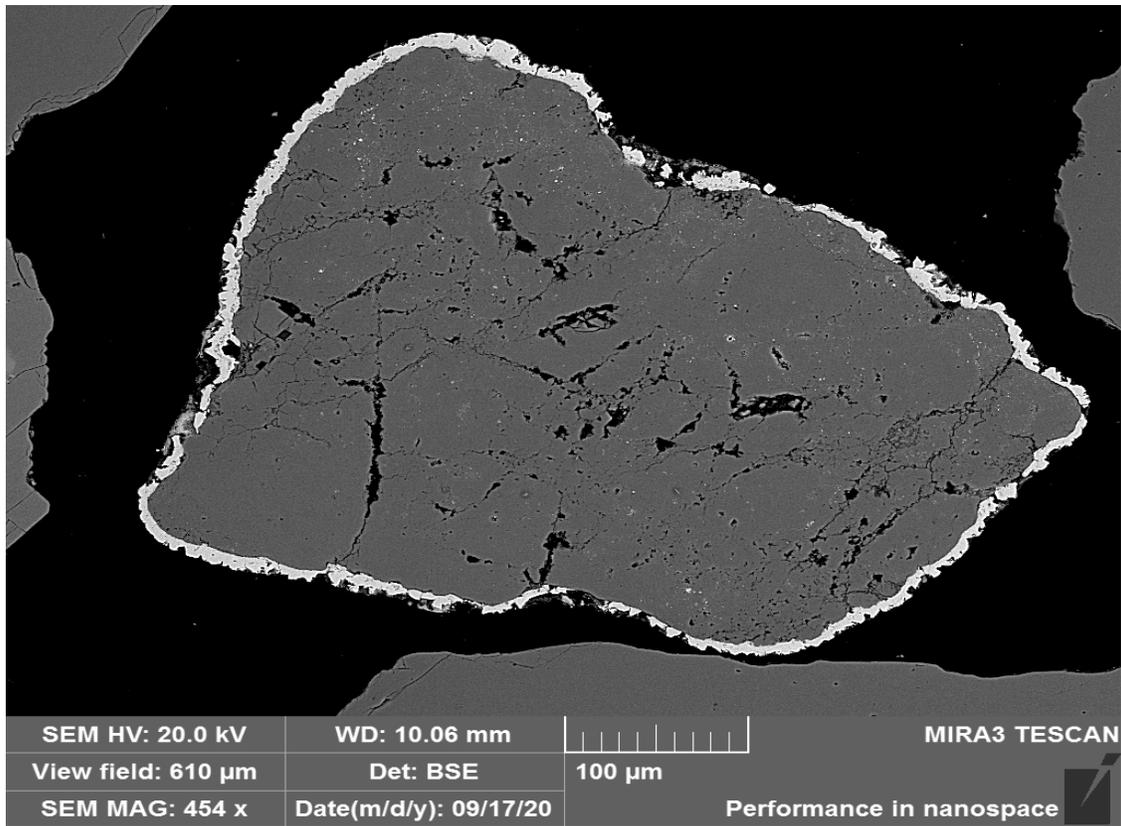
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
Backscatter image of bright iron oxide attached to quartz – 629X





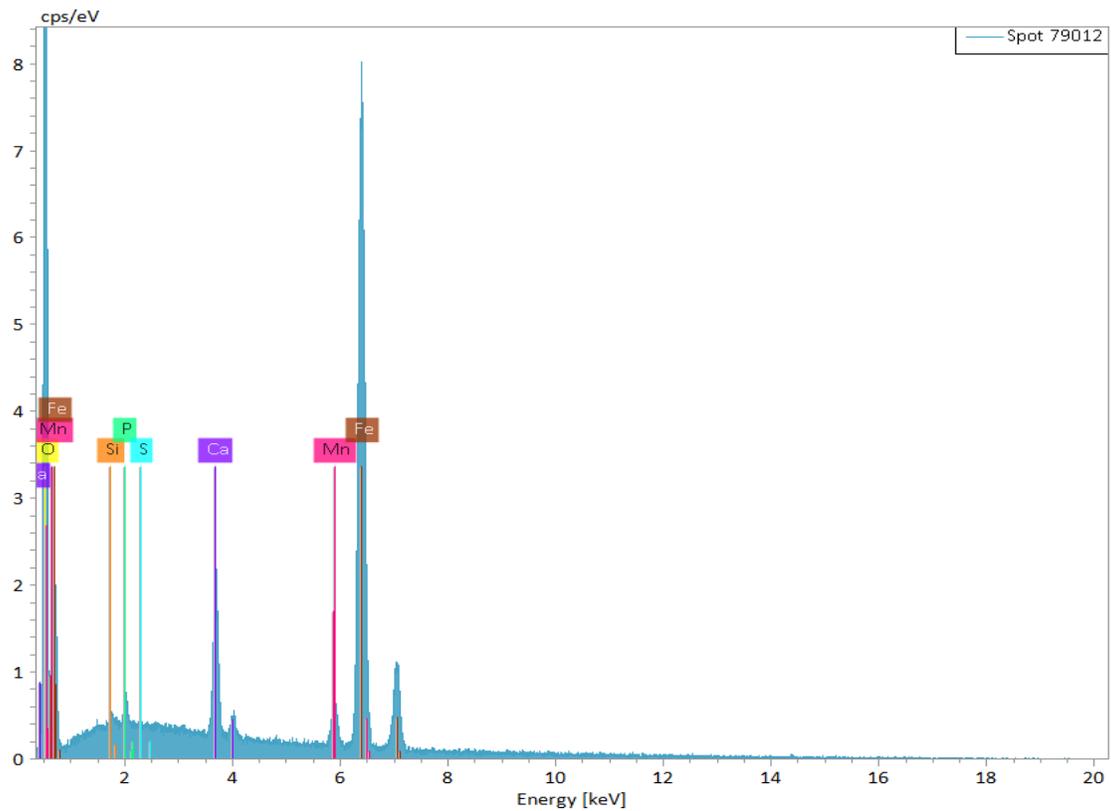
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
 Backscatter image of goethite replaced pyrite framboids – 4,360X

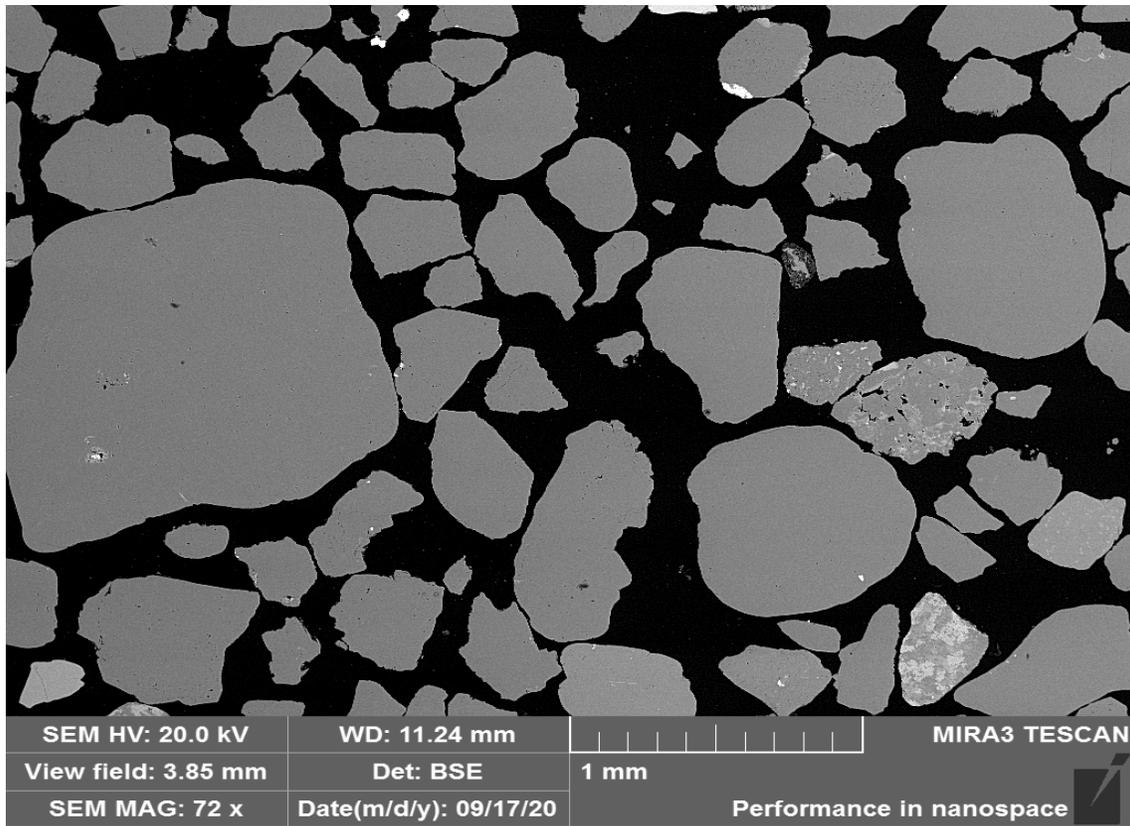




Client Sample No.: **AECOM-CONTROL -+2 – 073020**

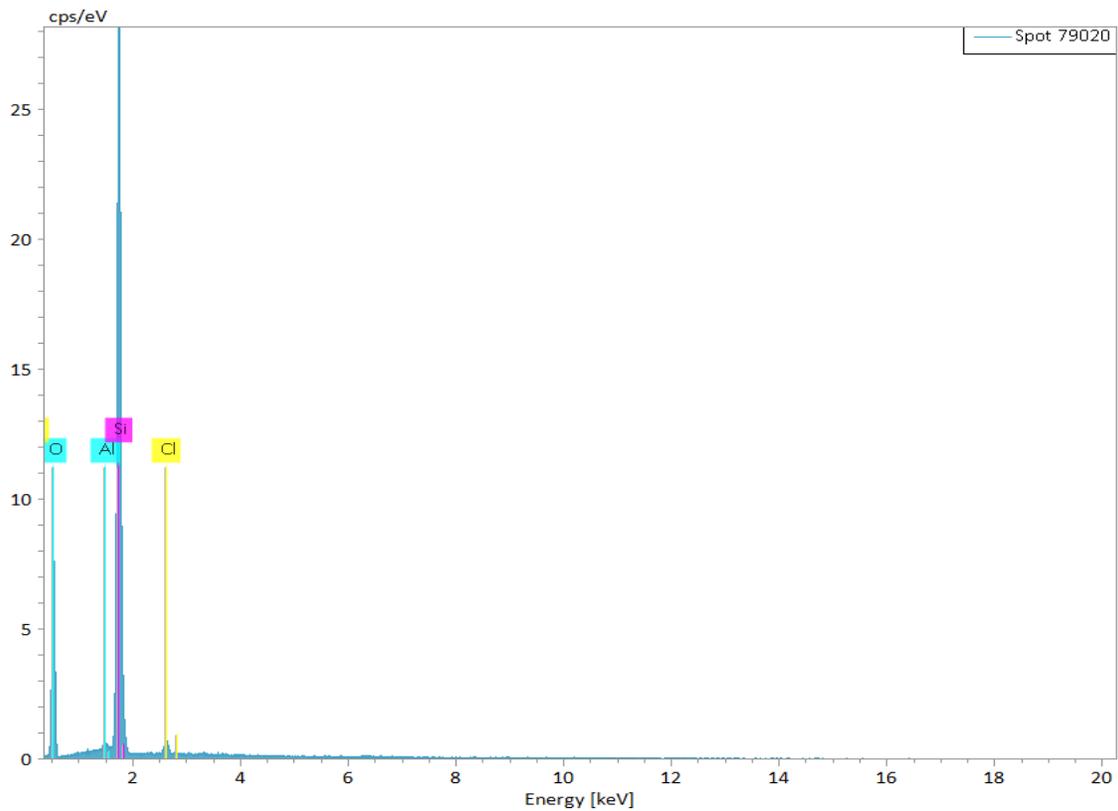
Backscatter image of a quartz grain with continuous rind of iron oxide – 454X





Client Sample No.: **AECOM-CONTROL -+2 – 073020**

Low magnification backscatter image showing grain morphology and size variation – 72X



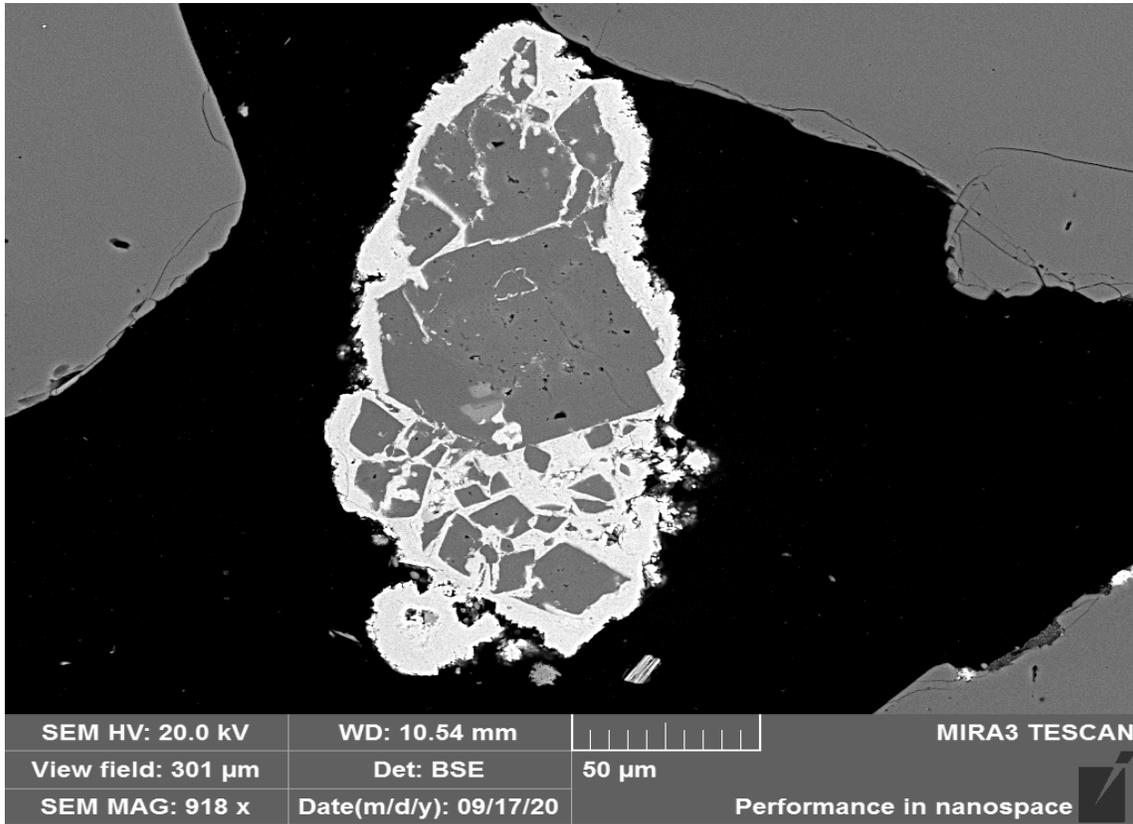
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**

*Major Mineralogy by XRD: Quartz 61%, Plagioclase 14% K-spar 13% Mica 4%  
Chlorite 3% Amphibole 3%*

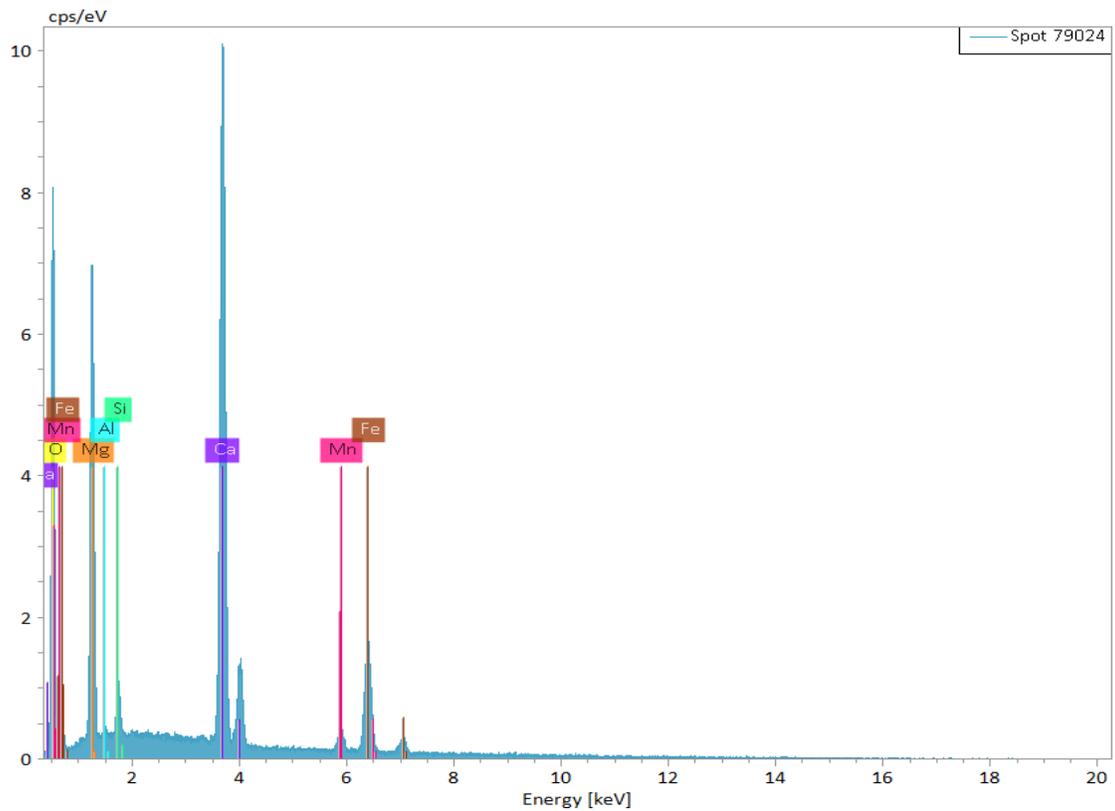
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Gypsum*

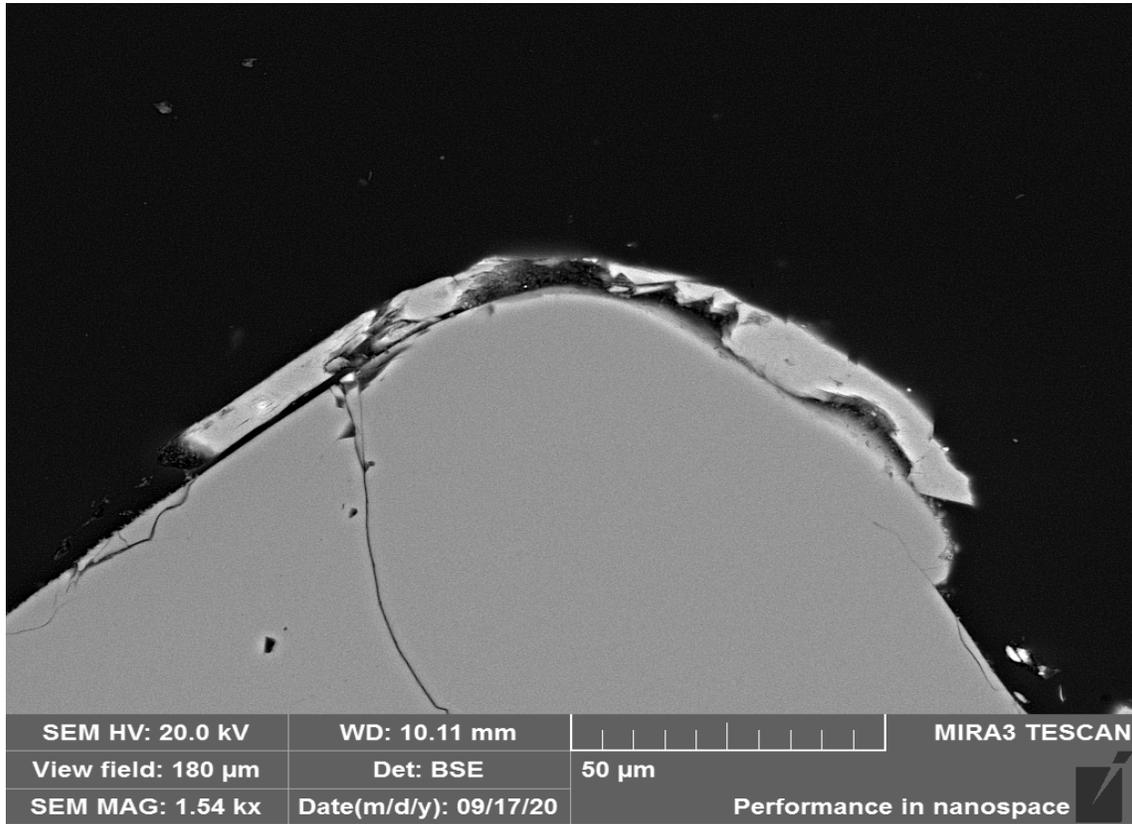
Microscopic Description by FE-SEM

This sample a fine to coarse grained, brown colored unconsolidated sand and is essentially the same as the previous samples. XRD and FE-SEM identify the main phases as subrounded to rounded quartz/feldspar with lesser amounts of mica and amphibole. In thin section a minor population of the clasts shows coatings of secondary phases. Most common is calcite/dolomite with fairly thick coats of iron oxide. Iron oxide also occurs as thin coats on silicates and as liberated masses. In rock fragments with significant clay content, goethite pseudomorphs after pyrite cubes and pyrite frambooids are common. A few rare quartz grains show discontinuous rinds of secondary gypsum.

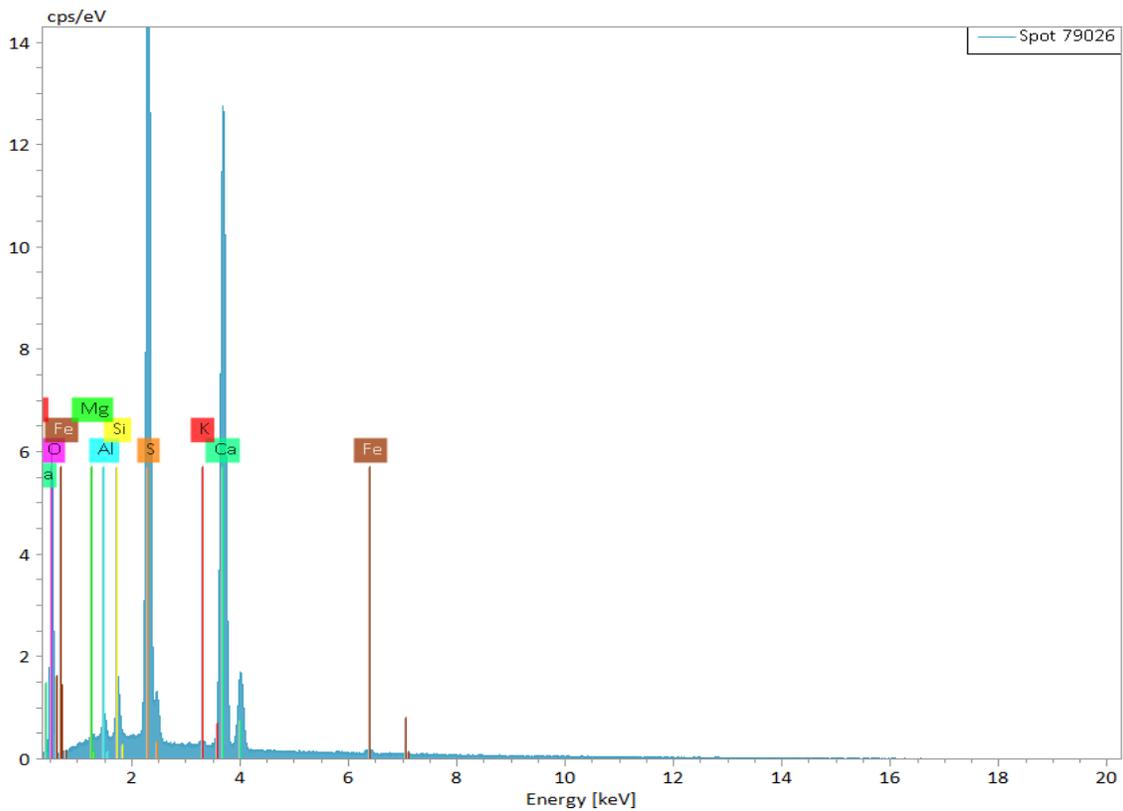


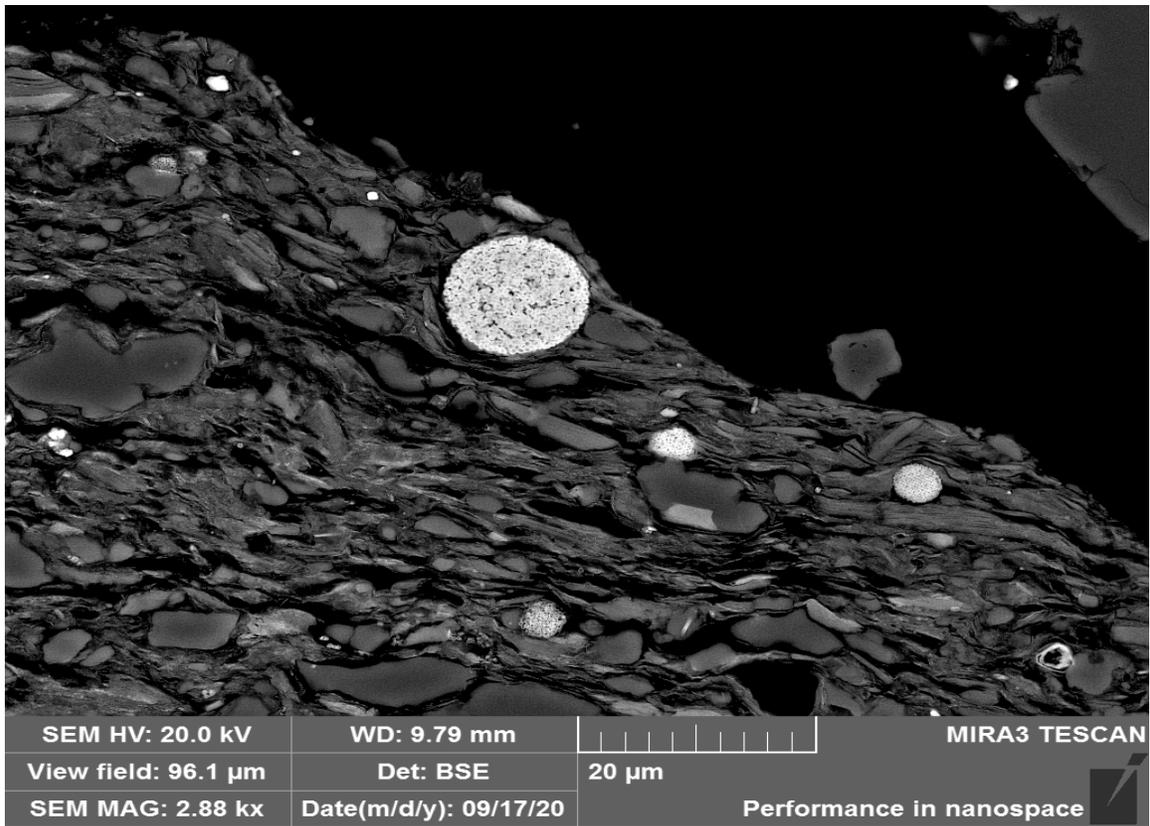
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of dolomite cemented by secondary iron oxide – 918X



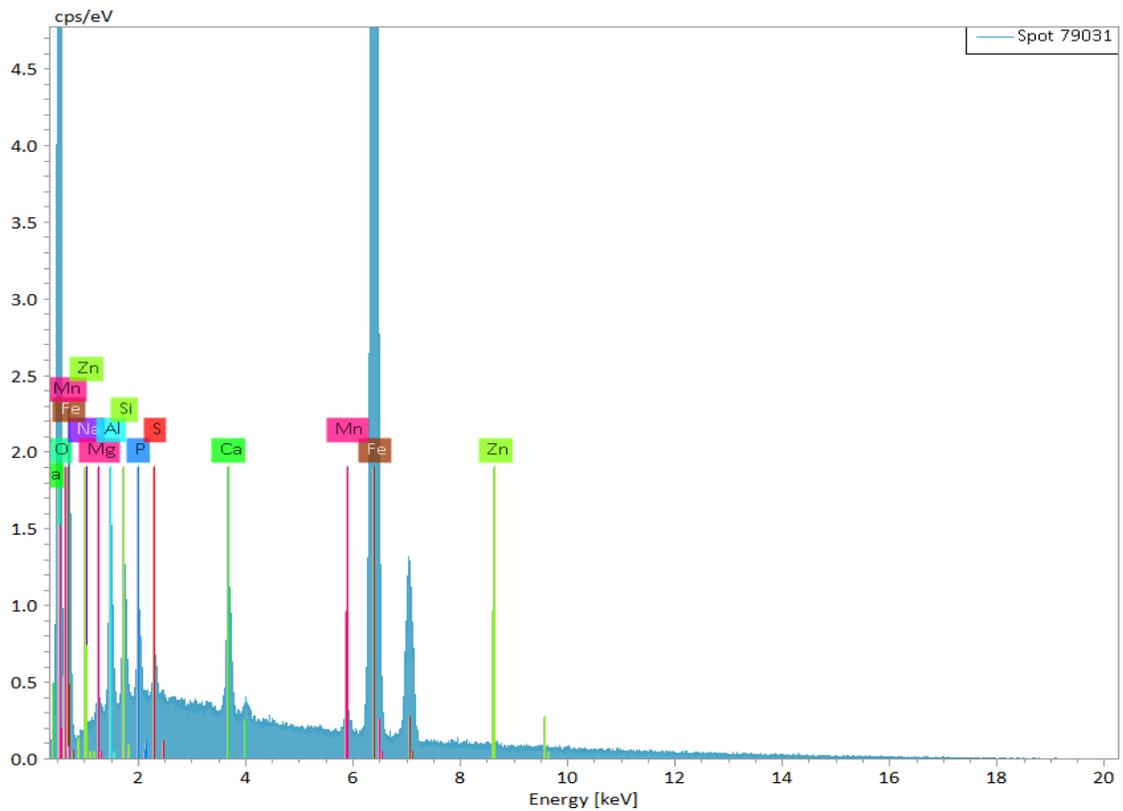


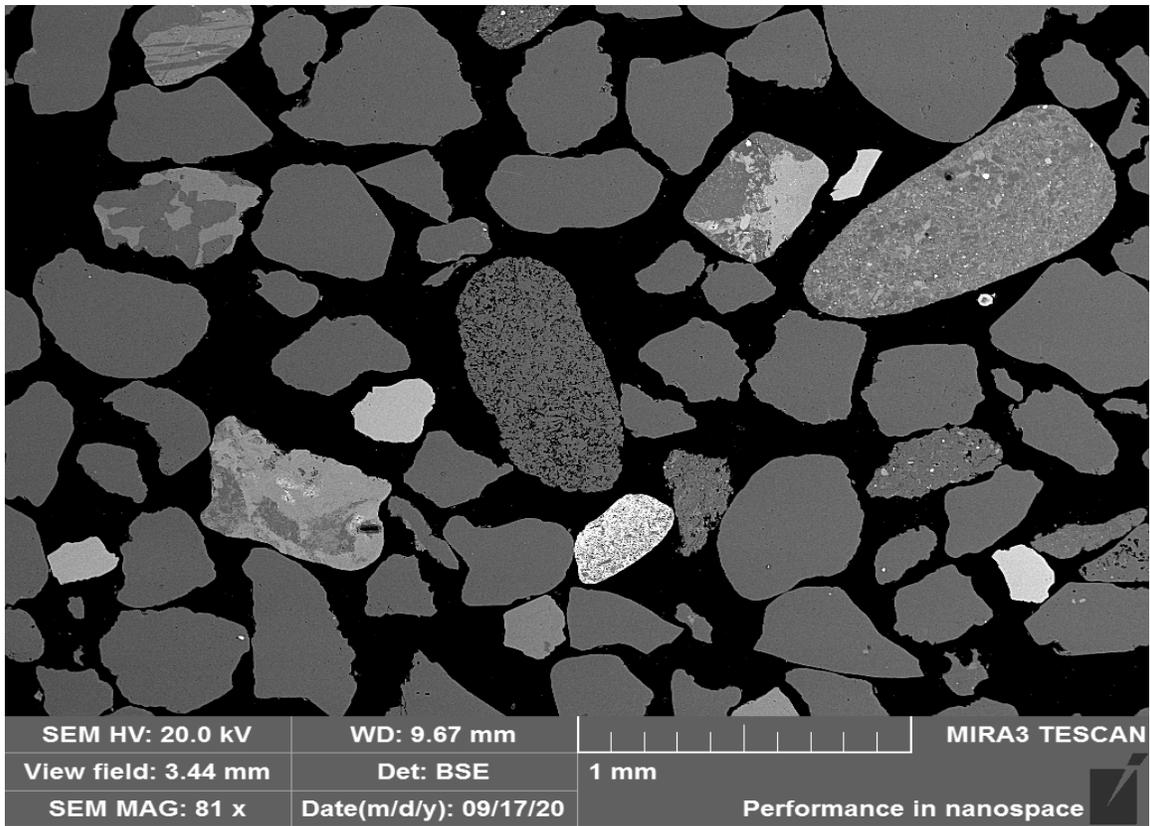
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of quartz with a rind of secondary gypsum – 1,540X





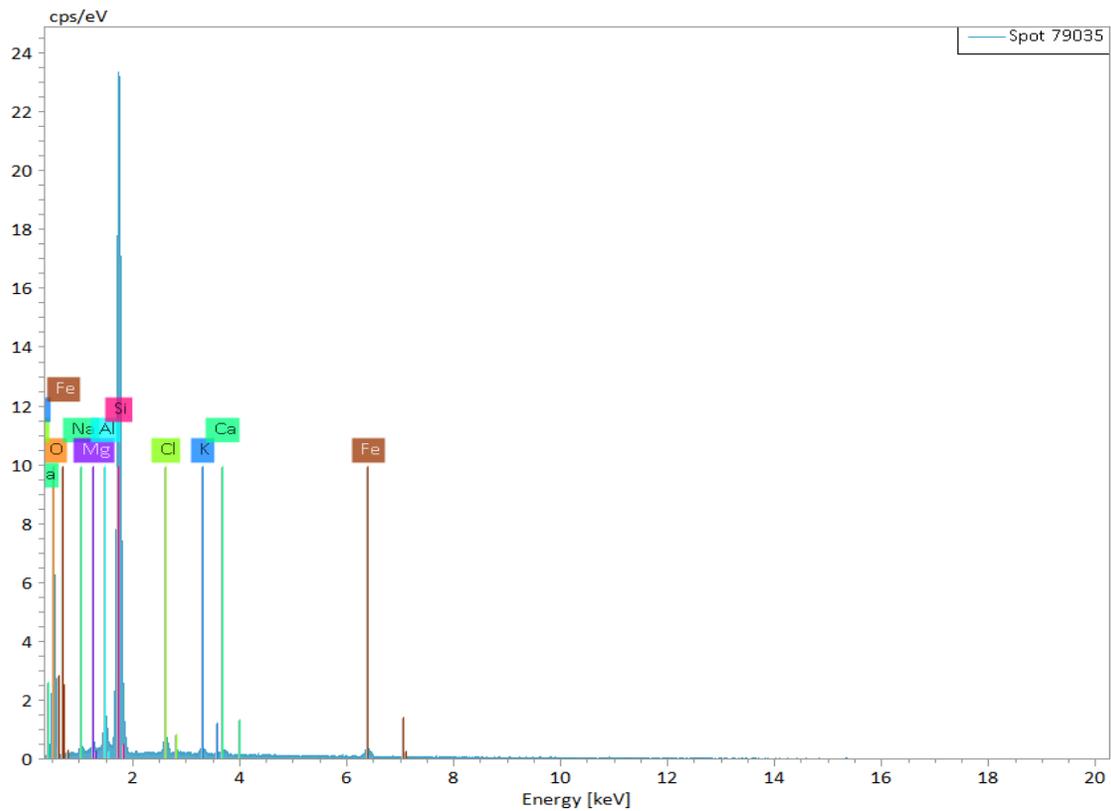
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
 Backscatter image of goethite replaced pyrite framboids – 2,880X

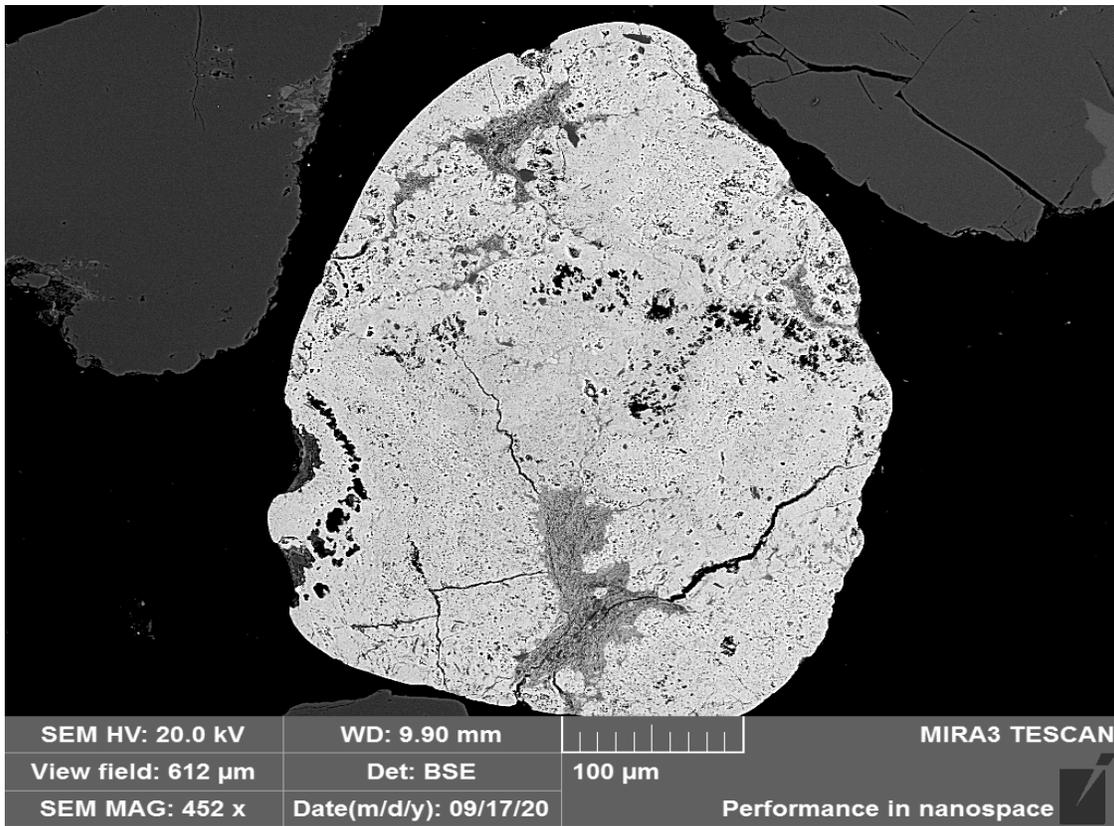




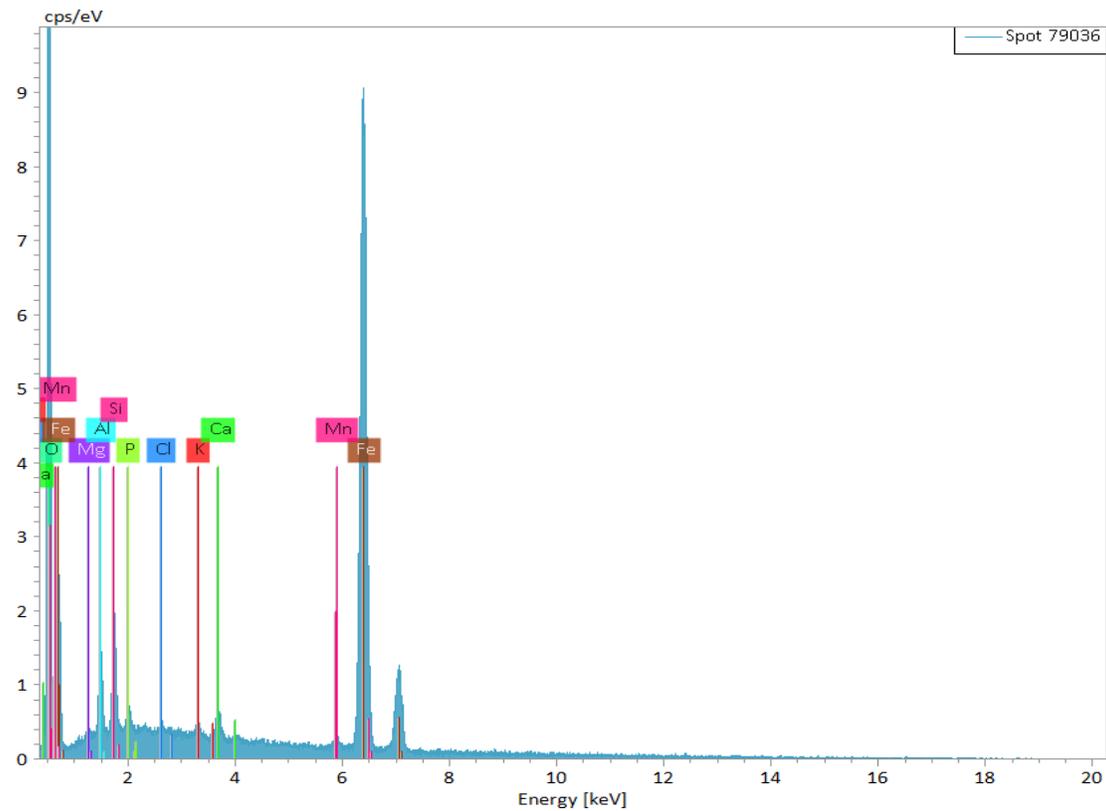
Client Sample No.: **AECOM-Hi CAL -+2 - 073020**

Low magnification backscatter image showing grain morphology and size variation – 81X





Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of a large iron oxide mass – 452X



## Appendix D Laboratory Reports

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

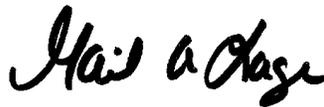
Laboratory Job ID: 180-105162-1

Laboratory Sample Delivery Group: GAF NRS Treatability  
Client Project/Site: TVA GAF AECOM Lab  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:17:05 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

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## Job ID: 180-105162-1

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Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-105162-1

#### Revised Report

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

#### Receipt

The samples were received on 4/30/2020 8:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

#### Metals

Method 3005A: The following samples were diluted due to the nature of the sample matrix: GAF-GW-BKT-PHI-FB22-T1 (180-105162-2), GAF-GW-BKT-PHI-SOILCONTROL-T1 (180-105162-8) and GAF-GW-BKT-PHI-FB22 SOIL-T1 (180-105162-9). Elevated reporting limits (RLs) are provided.

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-26-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
Oregon	NELAP	PA-2151	07-01-20
Pennsylvania	NELAP	02-00416	05-21-20
Rhode Island	State	LAO00362	12-31-20
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Water	04/29/20 12:00	04/30/20 08:15	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Water	04/29/20 12:00	04/30/20 08:15	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:20	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:04	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:17	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 01:53	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:24	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:07	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:27	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:10	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:31	WTR	TAL PIT
Instrument ID: A										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-4**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:14	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-5**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:34	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:17	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-6**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:41	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:24	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:37	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:21	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-7**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:55	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:31	RSK	TAL PIT
Instrument ID: DORY										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

**Date Collected: 04/27/20 14:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:51	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:28	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:02	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:45	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:58	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:35	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:09	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:52	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 18:05	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:49	RSK	TAL PIT
Instrument ID: DORY										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Analyst References:**

Lab: TAL PIT  
Batch Type: Prep  
    KEM = Kimberly Mahoney  
Batch Type: Analysis  
    RSK = Robert Kurtz  
    WTR = Bill Reinheimer

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000597	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:53	1
Cadmium	0.00257		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:17	1
Lithium	0.0219	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:53	1
Nickel	0.0834		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:17	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:04	1
Cadmium	0.00216		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:20	1
Lithium	0.0184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:04	1
Nickel	0.0639		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:20	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:07	1
Cadmium	0.00263	J	0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:24	1
Lithium	0.0475	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:07	1
Nickel	0.0544		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:24	1

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000991	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:10	1
Cadmium	0.000720	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:27	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:10	1
Nickel	0.0569		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:27	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000265	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:14	1
Cadmium	0.000390	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:31	1
Lithium	0.0106	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:14	1
Nickel	0.0200		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:31	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000562	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:17	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00747		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:34	1
Lithium	0.0283	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:17	1
Nickel	0.0543		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:34	1

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**

**Lab Sample ID: 180-105162-6**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:21	1
Cadmium	0.00191		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:37	1
Lithium	0.286	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:21	1
Nickel	0.0674		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:37	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:24	1
Cadmium	0.00166		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:41	1
Lithium	0.300	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:24	1
Nickel	0.0697		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:41	1

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:28	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:51	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:28	1
Nickel	0.000603	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:51	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:31	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:55	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:31	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:55	1

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00808		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:35	1
Cadmium	0.0128		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:58	1
Lithium	0.0897	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:35	1
Nickel	0.323		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:58	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:45	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:02	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:45	1
Nickel	0.000545	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:02	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0105		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:49	1
Cadmium	0.0314		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 18:05	1
Lithium	0.127	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:49	1
Nickel	1.02		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 18:05	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0145		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:52	1
Cadmium	0.0785		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:09	1
Lithium	0.150	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:52	1
Nickel	1.93		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:09	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 16:28	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 16:28	1

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:04	1
Lithium	0.004190	J	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:04	1

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.500	0.4964		mg/L		99	80 - 120
Nickel	0.500	0.4945		mg/L		99	80 - 120

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.500	0.4915		mg/L		98	80 - 120
Lithium	0.500	0.4770		mg/L		95	80 - 120

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		0.500	0.5064		mg/L		101	75 - 125
Nickel	0.00138		0.500	0.4950		mg/L		99	75 - 125

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		0.500	0.4881		mg/L		98	75 - 125
Lithium	0.00497	J B	0.500	0.4746		mg/L		94	75 - 125

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.500	0.5022		mg/L		100	75 - 125	1	20
Nickel	0.00138		0.500	0.4921		mg/L		98	75 - 125	1	20

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
 SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Beryllium	ND		0.500	0.4837		mg/L		97	75 - 125	1	20
Lithium	0.00497	J B	0.500	0.4660		mg/L		92	75 - 125	2	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals

### Prep Batch: 314367

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	3005A	
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	3005A	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	3005A	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	3005A	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	3005A	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	3005A	
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 314621

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367

### Analysis Batch: 314781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals (Continued)

### Analysis Batch: 314781 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-105162-1  
SDG Number: GAF NRS Treatability

**Login Number: 105162**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-106977-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA GAF EIP

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
7/6/2020 2:33:14 PM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

**Job ID: 180-106977-1**

**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

### Job Narrative 180-106977-1

#### Receipt

The samples were received on 6/12/2020 8:30 AM; the samples arrived in good condition properly preserved and on ice. The temperature of the cooler at receipt was 3.8° C.

#### Receipt Exceptions

The Field Sampler was not listed on the Chain of Custody.

The client requested the results to be run by ICP metals in order to achieve lower reporting limits on 6/19/20. Both metals runs are reported.

#### Metals

Method 6010D: Due to sample matrix effect on the internal standard (ISTD), a dilution was required for the following samples: GAF-GW-Bkt-PHII-Control-441uSoil-19R (180-106977-1), GAF-GW-Bkt-PHII-Control-441uSoil-19R (180-106977-3) and (180-106977-A-1-B SD ^50). All analytes referencing the yttrium internal standards required dilution due to the yttrium internal standard counts being high and outside the 70%-130% control limits.

Method 6020A: The following samples were diluted due to the nature of the sample matrix on the internal standard: GAF-GW-Bkt-PHII-Control-441uSoil-19R (180-106977-1), GAF-GW-Bkt-PHII-HiCal-441uSoil-19R (180-106977-2), GAF-GW-Bkt-PHII-Control-441uSoil-19R (180-106977-3), GAF-GW-Bkt-PHII-HiCal-441uSoil-19R (180-106977-4) and (180-106977-A-4-A SD ^250). Elevated reporting limits (RLs) are provided.

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	05-23-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Water	06/11/20 13:00	06/12/20 08:30	
180-106977-2	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Water	06/11/20 13:00	06/12/20 08:30	
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Water	06/11/20 13:00	06/12/20 08:30	
180-106977-4	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Water	06/11/20 13:00	06/12/20 08:30	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6010D	Metals (ICP)	SW846	TAL PIT
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-Bkt-PHII-Control-441uSoil-19R**

**Lab Sample ID: 180-106977-1**

**Date Collected: 06/11/20 13:00**

**Matrix: Water**

**Date Received: 06/12/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Analysis	EPA 6010D		1			319958	06/29/20 16:20	RJG	TAL PIT
	Instrument ID: C									
Total Recoverable	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6010D		10			320118	06/30/20 09:25	RJG	TAL PIT
	Instrument ID: C									
Total Recoverable	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	318353	06/12/20 17:18	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		50			318620	06/16/20 09:40	RJR	TAL PIT
	Instrument ID: A									

**Client Sample ID: GAF-GW-Bkt-PHII-HiCal-441uSoil-19R**

**Lab Sample ID: 180-106977-2**

**Date Collected: 06/11/20 13:00**

**Matrix: Water**

**Date Received: 06/12/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Analysis	EPA 6010D		1			319958	06/29/20 16:30	RJG	TAL PIT
	Instrument ID: C									
Total Recoverable	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	318353	06/12/20 17:18	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		50			318620	06/16/20 09:43	RJR	TAL PIT
	Instrument ID: A									

**Client Sample ID: GAF-GW-Bkt-PHII-Control-441uSoil-19R**

**Lab Sample ID: 180-106977-3**

**Date Collected: 06/11/20 13:00**

**Matrix: Water**

**Date Received: 06/12/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Analysis	EPA 6010D		1			319958	06/29/20 16:35	RJG	TAL PIT
	Instrument ID: C									
Dissolved	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT
Dissolved	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT
Dissolved	Analysis	EPA 6010D		10			320118	06/30/20 09:35	RJG	TAL PIT
	Instrument ID: C									
Dissolved	Prep	3005A			50 mL	50 mL	318353	06/12/20 17:18	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		50			318620	06/16/20 09:47	RJR	TAL PIT
	Instrument ID: A									

**Client Sample ID: GAF-GW-Bkt-PHII-HiCal-441uSoil-19R**

**Lab Sample ID: 180-106977-4**

**Date Collected: 06/11/20 13:00**

**Matrix: Water**

**Date Received: 06/12/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Analysis	EPA 6010D		1			319958	06/29/20 16:41	RJG	TAL PIT
	Instrument ID: C									
Dissolved	Prep	3005A			50 mL	50 mL	320002	06/30/20 09:28	KEM	TAL PIT

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-Bkt-PHII-HiCal-441uSoil-19R**

**Lab Sample ID: 180-106977-4**

**Date Collected: 06/11/20 13:00**

**Matrix: Water**

**Date Received: 06/12/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	318353	06/12/20 17:18	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		50			318620	06/16/20 09:50	RJR	TAL PIT

Instrument ID: A

## Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

## Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

KEM = Kimberly Mahoney

Batch Type: Analysis

RJG = Rob Good

RJR = Ron Rosenbaum

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-Bkt-PHII-Control-441uSoil-19R**

**Lab Sample ID: 180-106977-1**

Date Collected: 06/11/20 13:00

Matrix: Water

Date Received: 06/12/20 08:30

**Method: EPA 6010D - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0558		0.0400	0.00333	mg/L		06/30/20 09:28	06/30/20 09:25	10
Cadmium	0.0118	J	0.0500	0.00279	mg/L		06/30/20 09:28	06/30/20 09:25	10
Iron	324		1.00	0.305	mg/L		06/30/20 09:28	06/30/20 09:25	10
Nickel	1.44		0.0400	0.00152	mg/L		06/30/20 09:28	06/29/20 16:20	1
Lithium	0.113	J	0.500	0.0860	mg/L		06/30/20 09:28	06/30/20 09:25	10

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	53.9		50.0	9.10	ug/L		06/12/20 17:18	06/16/20 09:40	50
Cadmium	17.8	J	50.0	10.9	ug/L		06/12/20 17:18	06/16/20 09:40	50
Lithium	ND		250	170	ug/L		06/12/20 17:18	06/16/20 09:40	50
Nickel	1470		50.0	16.8	ug/L		06/12/20 17:18	06/16/20 09:40	50

**Client Sample ID: GAF-GW-Bkt-PHII-HiCal-441uSoil-19R**

**Lab Sample ID: 180-106977-2**

Date Collected: 06/11/20 13:00

Matrix: Water

Date Received: 06/12/20 08:30

**Method: EPA 6010D - Metals (ICP) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00400	0.000333	mg/L		06/30/20 09:28	06/29/20 16:30	1
Cadmium	0.000460	J	0.00500	0.000279	mg/L		06/30/20 09:28	06/29/20 16:30	1
Iron	0.458		0.100	0.0305	mg/L		06/30/20 09:28	06/29/20 16:30	1
Nickel	0.00511	J	0.0400	0.00152	mg/L		06/30/20 09:28	06/29/20 16:30	1
Lithium	0.0109	J	0.0500	0.00860	mg/L		06/30/20 09:28	06/29/20 16:30	1

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		50.0	9.10	ug/L		06/12/20 17:18	06/16/20 09:43	50
Cadmium	ND		50.0	10.9	ug/L		06/12/20 17:18	06/16/20 09:43	50
Lithium	ND		250	170	ug/L		06/12/20 17:18	06/16/20 09:43	50
Nickel	ND		50.0	16.8	ug/L		06/12/20 17:18	06/16/20 09:43	50

**Client Sample ID: GAF-GW-Bkt-PHII-Control-441uSoil-19R**

**Lab Sample ID: 180-106977-3**

Date Collected: 06/11/20 13:00

Matrix: Water

Date Received: 06/12/20 08:30

**Method: EPA 6010D - Metals (ICP) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0528		0.0400	0.00333	mg/L		06/30/20 09:28	06/30/20 09:35	10
Cadmium	0.0114	J	0.0500	0.00279	mg/L		06/30/20 09:28	06/30/20 09:35	10
Iron	305		1.00	0.305	mg/L		06/30/20 09:28	06/30/20 09:35	10
Nickel	1.41		0.0400	0.00152	mg/L		06/30/20 09:28	06/29/20 16:35	1
Lithium	0.105	J	0.500	0.0860	mg/L		06/30/20 09:28	06/30/20 09:35	10

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	48.0	J	50.0	9.10	ug/L		06/12/20 17:18	06/16/20 09:47	50
Cadmium	15.4	J	50.0	10.9	ug/L		06/12/20 17:18	06/16/20 09:47	50
Lithium	ND		250	170	ug/L		06/12/20 17:18	06/16/20 09:47	50
Nickel	1390		50.0	16.8	ug/L		06/12/20 17:18	06/16/20 09:47	50

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-Bkt-PHII-HiCal-441uSoil-19R**

**Lab Sample ID: 180-106977-4**

Date Collected: 06/11/20 13:00

Matrix: Water

Date Received: 06/12/20 08:30

**Method: EPA 6010D - Metals (ICP) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00400	0.000333	mg/L		06/30/20 09:28	06/29/20 16:41	1
<b>Cadmium</b>	<b>0.000300</b>	<b>J</b>	0.00500	0.000279	mg/L		06/30/20 09:28	06/29/20 16:41	1
Iron	ND		0.100	0.0305	mg/L		06/30/20 09:28	06/29/20 16:41	1
<b>Nickel</b>	<b>0.00376</b>	<b>J</b>	0.0400	0.00152	mg/L		06/30/20 09:28	06/29/20 16:41	1
<b>Lithium</b>	<b>0.0107</b>	<b>J</b>	0.0500	0.00860	mg/L		06/30/20 09:28	06/29/20 16:41	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		50.0	9.10	ug/L		06/12/20 17:18	06/16/20 09:50	50
Cadmium	ND		50.0	10.9	ug/L		06/12/20 17:18	06/16/20 09:50	50
Lithium	ND		250	170	ug/L		06/12/20 17:18	06/16/20 09:50	50
Nickel	ND		50.0	16.8	ug/L		06/12/20 17:18	06/16/20 09:50	50

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6010D - Metals (ICP)

**Lab Sample ID: MB 180-320002/1-A**  
**Matrix: Water**  
**Analysis Batch: 319958**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320002**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00400	0.000333	mg/L		06/30/20 09:28	06/29/20 16:05	1
Cadmium	ND		0.00500	0.000279	mg/L		06/30/20 09:28	06/29/20 16:05	1
Iron	ND		0.100	0.0305	mg/L		06/30/20 09:28	06/29/20 16:05	1
Nickel	ND		0.0400	0.00152	mg/L		06/30/20 09:28	06/29/20 16:05	1
Lithium	ND		0.0500	0.00860	mg/L		06/30/20 09:28	06/29/20 16:05	1

**Lab Sample ID: LCS 180-320002/2-A**  
**Matrix: Water**  
**Analysis Batch: 319958**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320002**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.500	0.5016		mg/L		100	80 - 120
Cadmium	0.500	0.4973		mg/L		99	80 - 120
Iron	5.00	4.994		mg/L		100	80 - 120
Nickel	0.500	0.4953		mg/L		99	80 - 120
Lithium	0.500	0.4902		mg/L		98	80 - 120

**Lab Sample ID: LCSD 180-320002/3-A**  
**Matrix: Water**  
**Analysis Batch: 319958**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320002**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	0.500	0.5056		mg/L		101	80 - 120	1	20
Cadmium	0.500	0.5034		mg/L		101	80 - 120	1	20
Iron	5.00	5.050		mg/L		101	80 - 120	1	20
Nickel	0.500	0.5016		mg/L		100	80 - 120	1	20
Lithium	0.500	0.4935		mg/L		99	80 - 120	1	20

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-318353/1-A**  
**Matrix: Water**  
**Analysis Batch: 318620**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318353**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		06/12/20 17:18	06/16/20 09:14	1
Cadmium	ND		1.00	0.217	ug/L		06/12/20 17:18	06/16/20 09:14	1
Lithium	ND		5.00	3.39	ug/L		06/12/20 17:18	06/16/20 09:14	1
Nickel	ND		1.00	0.336	ug/L		06/12/20 17:18	06/16/20 09:14	1

**Lab Sample ID: LCS 180-318353/2-A**  
**Matrix: Water**  
**Analysis Batch: 318620**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318353**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	500	458.1		ug/L		92	80 - 120
Cadmium	500	519.0		ug/L		104	80 - 120
Lithium	500	466.8		ug/L		93	80 - 120
Nickel	500	453.2		ug/L		91	80 - 120

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 180-318353/3-A  
Matrix: Water  
Analysis Batch: 318620

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total Recoverable  
Prep Batch: 318353

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	500	461.7		ug/L		92	80 - 120	1	20
Cadmium	500	532.4		ug/L		106	80 - 120	3	20
Lithium	500	479.6		ug/L		96	80 - 120	3	20
Nickel	500	456.1		ug/L		91	80 - 120	1	20



# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-106977-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 318353

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Total Recoverable	Water	3005A	
180-106977-2	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Total Recoverable	Water	3005A	
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Dissolved	Water	3005A	
180-106977-4	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Dissolved	Water	3005A	
MB 180-318353/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-318353/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 180-318353/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	

### Analysis Batch: 318620

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Total Recoverable	Water	EPA 6020A	318353
180-106977-2	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Total Recoverable	Water	EPA 6020A	318353
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Dissolved	Water	EPA 6020A	318353
180-106977-4	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Dissolved	Water	EPA 6020A	318353
MB 180-318353/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	318353
LCS 180-318353/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	318353
LCSD 180-318353/3-A	Lab Control Sample Dup	Total Recoverable	Water	EPA 6020A	318353

### Analysis Batch: 319958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Total Recoverable	Water	EPA 6010D	320002
180-106977-2	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Total Recoverable	Water	EPA 6010D	320002
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Dissolved	Water	EPA 6010D	320002
180-106977-4	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Dissolved	Water	EPA 6010D	320002
MB 180-320002/1-A	Method Blank	Total Recoverable	Water	EPA 6010D	320002
LCS 180-320002/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6010D	320002
LCSD 180-320002/3-A	Lab Control Sample Dup	Total Recoverable	Water	EPA 6010D	320002

### Prep Batch: 320002

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Total Recoverable	Water	3005A	
180-106977-2	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Total Recoverable	Water	3005A	
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Dissolved	Water	3005A	
180-106977-4	GAF-GW-Bkt-PHII-HiCal-441uSoil-19R	Dissolved	Water	3005A	
MB 180-320002/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-320002/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 180-320002/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	

### Analysis Batch: 320118

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106977-1	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Total Recoverable	Water	EPA 6010D	320002
180-106977-3	GAF-GW-Bkt-PHII-Control-441uSoil-19R	Dissolved	Water	EPA 6010D	320002

# Chain of Custody Record 420711 eurofins

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

Company Name: Environmental Stds Inc. Address: City/State/Zip: Phone: 412.935.5577 x414 Fax: Project Name: TVA Gallatin EIP Site: GAF-NRS-treatability P O #		Client Contact Project Manager: Craig MacPhail Tell/Email: craig.macphail@econ.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Site Contact: Francisco Barrios Date: 6/11/2020 Lab Contact: Rachel Watkins Carrier:		COC No.: _____ of _____ COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Sample Specific Notes: totals - Be, Cd, Li, Ni dissolved - Be, Cd, Li, Ni											
Sample Identification GAF-GW-Bkt-PHII-Control-44lu soil-19R GAF-GW-Bkt-PHII-Hi.Cal-44lu soil-19R GAF-GW-Bkt-PHII-Control-44lu soil-19R GAF-GW-Bkt-PHII-Hi.Cal-44lu soil-19R		Sample Date 6/11/20 6/11/20 6/11/20 6/11/20		Sample Time 1300 1300 1300 1300		Sample Type (C=Comp, G=Grab) G G G G		Matrix GW GW GW GW		# of Cont. 1 1 1 1		Filtered Sample (Y/N) N N Y Y		Perform MS/MSD (Y/N) N N Y Y		6020 totals - Be, Cd, Li, Ni 6020 dissolved - Be, Cd, Li, Ni	
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> 5kin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown																	
Special Instructions/QC Requirements & Comments:																	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No Relinquished by: Rachel Watkins Relinquished by: Rachel Watkins Relinquished by:				Custody Seal No.: Company: AECOM Company: Company:				Cooler Temp. (°C): Obs'd: Received by: J. Williams Received by: Received in Laboratory by:				Term ID No.: Date/Time: 6/12/20 Date/Time: 8:30 Date/Time:					





Environment Testing  
TestAmerica



180-106977 Waybill

ORIGIN ID:PHL  
FRANCISCO BARRAJAS  
AECOM  
8400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

CAD: 058207420/E9311

O

MAN

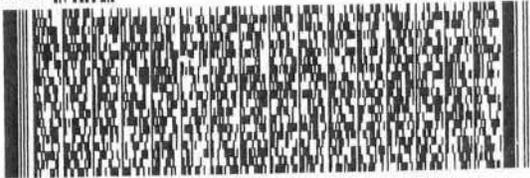
TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058

REF: \$180 - 58932

RMA: ||| ||| |||



FedEx  
Express



FedEx

TRK# 1680 3500 0780  
0221

FRI - 12 JUN 10:30A  
PRIORITY OVERNIGHT

XH AGCA

15238  
PA-US  
PIT

Uncorrected temp 3.8 °C  
Thermometer ID 14

CF 0 Initials TB



T-WI-SR-001 effective 7/26/13  
FID: 1711129 11Jun2020 MMRA 56CG1/C7DD/05A2

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# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-106977-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 106977**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-107627-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA Gallatin EIP  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:58:43 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

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results through

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-107627-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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## Narrative

**Job Narrative**  
**180-107627-1**

### Revised Report

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

### Receipt

The samples were received on 6/26/2020 9:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 3.2° C.

### Metals

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Water	06/24/20 13:00	06/26/20 09:00	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-1**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:33	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:37	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-3**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		1			320452	07/03/20 02:40	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-4**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		1			320452	07/03/20 02:44	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**

**Lab Sample ID: 180-107627-5**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:47	RSK	TAL PIT
Instrument ID: DORY										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHII-BKT-HICALACL2-SAND-19R-T3**

**Lab Sample ID: 180-107627-6**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:11	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-NAOH-SAND-19R-T2**

**Lab Sample ID: 180-107627-7**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:15	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-19R-T2**

**Lab Sample ID: 180-107627-8**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:18	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T3**

**Lab Sample ID: 180-107627-9**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:22	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-107627-10**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:25	RSK	TAL PIT
Instrument ID: DORY										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-FB22-SAND-19R-T3**

**Lab Sample ID: 180-107627-11**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:29	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T3**

**Lab Sample ID: 180-107627-12**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:32	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:36	RSK	TAL PIT
Instrument ID: DORY										

## Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

## Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-1**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0802		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:33	1
Cadmium	0.0152		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:33	1
Lithium	0.118		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:33	1
Nickel	1.50		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:33	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:37	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:37	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:37	1
Nickel	0.000929	J	0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:37	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-3**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0817		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:40	1
Cadmium	0.0147		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:40	1
Lithium	0.117		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:40	1
Nickel	1.47		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:40	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-4**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:44	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:44	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:44	1
Nickel	0.000703	J	0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:44	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**

**Lab Sample ID: 180-107627-5**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00212		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:47	1
Cadmium	0.00324		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:47	1
Lithium	0.0451		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:47	1
Nickel	0.178		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:47	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHII-BKT-HICALACL2-SAND-19R-T3**

**Lab Sample ID: 180-107627-6**

Date Collected: 06/24/20 13:00  
Date Received: 06/26/20 09:00

Matrix: Water

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00219		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:11	1
Cadmium	0.00307		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:11	1
Lithium	0.0469		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:11	1
Nickel	0.175		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:11	1

**Client Sample ID: GAF-GW-PHII-BKT-NAOH-SAND-19R-T2**

**Lab Sample ID: 180-107627-7**

Date Collected: 06/24/20 13:00  
Date Received: 06/26/20 09:00

Matrix: Water

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:15	1
Cadmium	0.00219		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:15	1
Lithium	0.0228		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:15	1
Nickel	0.0769		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:15	1

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-19R-T2**

**Lab Sample ID: 180-107627-8**

Date Collected: 06/24/20 13:00  
Date Received: 06/26/20 09:00

Matrix: Water

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:18	1
Cadmium	0.00276		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:18	1
Lithium	0.0237		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:18	1
Nickel	0.0654		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:18	1

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T3**

**Lab Sample ID: 180-107627-9**

Date Collected: 06/24/20 13:00  
Date Received: 06/26/20 09:00

Matrix: Water

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:22	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:22	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:22	1
Nickel	0.00252		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:22	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-107627-10**

Date Collected: 06/24/20 13:00  
Date Received: 06/26/20 09:00

Matrix: Water

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00715		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:25	1
Cadmium	0.00980		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:25	1
Lithium	0.0694		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:25	1
Nickel	0.521		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:25	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-FB22-SAND-19R-T3**

**Lab Sample ID: 180-107627-11**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:29	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:29	1
Lithium	0.0460		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:29	1
Nickel	0.0301		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:29	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T3**

**Lab Sample ID: 180-107627-12**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0843		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:32	1
Cadmium	0.0146		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:32	1
Lithium	0.116		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:32	1
Nickel	1.48		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:32	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000461	J	0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:36	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:36	1
Lithium	0.00541		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:36	1
Nickel	0.00586		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:36	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-320070/1-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:16	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:16	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:16	1
Nickel	ND		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:16	1

**Lab Sample ID: LCS 180-320070/2-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.500	0.5125		mg/L		102	80 - 120
Cadmium	0.500	0.5007		mg/L		100	80 - 120
Lithium	0.500	0.5116		mg/L		102	80 - 120
Nickel	0.500	0.4986		mg/L		100	80 - 120

**Lab Sample ID: 180-107627-5 MS**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.00212		0.500	0.5076		mg/L		101	75 - 125
Cadmium	0.00324		0.500	0.5101		mg/L		101	75 - 125
Lithium	0.0451		0.500	0.5549		mg/L		102	75 - 125
Nickel	0.178		0.500	0.6812		mg/L		101	75 - 125

**Lab Sample ID: 180-107627-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	0.00212		0.500	0.4919		mg/L		98	75 - 125	3	20
Cadmium	0.00324		0.500	0.4930		mg/L		98	75 - 125	3	20
Lithium	0.0451		0.500	0.5336		mg/L		98	75 - 125	4	20
Nickel	0.178		0.500	0.6460		mg/L		94	75 - 125	5	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 320070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Total Recoverable	Water	3005A	
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	3005A	
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Dissolved	Water	3005A	
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Dissolved	Water	3005A	
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Total Recoverable	Water	3005A	
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Total Recoverable	Water	3005A	
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Total Recoverable	Water	3005A	
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Total Recoverable	Water	3005A	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	3005A	
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-107627-5 MS	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-5 MSD	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	

### Analysis Batch: 320452

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Dissolved	Water	EPA 6020A	320070
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Dissolved	Water	EPA 6020A	320070
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	EPA 6020A	320070
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	320070
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	320070
180-107627-5 MS	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-5 MSD	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070

# Chain of Custody Record 420755 eurofins

Environment Testing  
TestAmerica

Address: 301 Alpha Dr.  
Pittsburgh PA 15238

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

<b>Client Contact</b> Company Name: Environmental Standards Address: City/State/Zip: 610. 935.5577 x 414 Fax: Project Name: TVA Gallatin EIP Site: GAF - NRS - Treatability P O #		<b>Project Manager: Craig MacPhee</b> Tel/Email: craig.m@epceurofins.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact: Francisco Bunnas</b> Date: 6/25/2020 Lab Contact: Rachel Watkins Carrier: Perform MS/MSD (Y/N) Filtered Sample (Y/N)		COC No. 1 of 2 COGs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Sample Specific Notes: totals Be, Cd, Li, Ni dissolved Be, Cd Li, Ni v op GAF PWD X	
Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Sample Specific Notes	
GAF-GW-PHII-Bkt-Control-444650.1-T2	6/18/20	1300	G	GW	1		
GAF-GW-PHII-Bkt-Hi Cal-44150.1-T2	6/18/20	1300	G	GW	1		
GAF-GW-PHII-Bkt-Control-444650.1-T2	6/18/20	1300	G	GW	1		
GAF-GW-PHII-Bkt-Hi Cal-441450.1-T2	6/18/20	1300	G	GW	1		
GAF-GW-PHII-Bkt-Hi Cal-Sand-19R-T3	6/24/20	1300	G	GW	1		
GAF-GW-PHII-Bkt-Hi Cal Collo-Sand-19R-T3							
GAF-GW-PHII-Bkt-NaOH-Sand-19R-T2							
GAF-GW-PHII-Bkt-Dolo-Sand-19R-T2							
GAF-GW-PHII-Bkt-Dolo-Sand-44444-T3							
GAF-GW-PHII-Bkt-Control-Sand-19R-T3							
GAF-GW-PHII-Bkt-FB22-Sand-19R-T3							



180-107627 Chain of Custody

Sample Disposal (A fee may be assessed if samples are)

Return to Client  
 Disposal by Lab  
 An

Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:

Custody Seal No.:	Company: AECOM	Date/Time: 6/25/2020 15:00	Received by: <i>Rachel Watkins</i>	Company: <i>EMM</i>	Date/Time: 6/26/20 9:00
Relinquished by:	Company:	Date/Time:	Relinquished by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Relinquished by:	Company:	Date/Time:



# Chain of Custody Record 420753

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

<b>Client Contact</b> Company Name: Environmental Standards Address: City/State/Zip: Phone: 412.935.5577 x414 Fax: Project Name: TWA Gallatin EIP Site: GAF - NRS - Treatability P O #		<b>Project Manager:</b> Craig MacPhee Tel/Email: craig.macphee@eurofins.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below: <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact:</b> Francisco Briggs Date: 6/25/2020 <b>Lab Contact:</b> Rachel Watkins Carrier:		COC No: 2 of 2 COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Sample Specific Notes:	
<b>Sample Identification</b> GAF-GW-PH II-BKT-Control-441usoil-t3 GAF-GW-PH II-BKT-Hi-Cal-441usoil-t3		Filtered Sample (Y/N) <input checked="" type="checkbox"/> N Perform MS / MSD (Y/N) <input checked="" type="checkbox"/> N		620 tnta15-Be, Cd, Cr, Ni 620 tnta15-Be, Cd, Cr, Ni		Total Be, Cd, Cr, Ni	
Sample Date: 6/25/20 Sample Time: 1300 Sample Type: G Matrix: GW # of Cont.: 1		Sample Date: ↓ Sample Time: ↓ Sample Type: ↓ Matrix: ↓ # of Cont.: 1		Sample Date: ↓ Sample Time: ↓ Sample Type: ↓ Matrix: ↓ # of Cont.: 1		Sample Date: ↓ Sample Time: ↓ Sample Type: ↓ Matrix: ↓ # of Cont.: 1	
<b>Preservation Used:</b> 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other							
<b>Possible Hazard Identification:</b> Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.							
<input checked="" type="checkbox"/> Non-Hazardous <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown							
<b>Special Instructions/QC Requirements &amp; Comments:</b>							
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Cooler Temp. (°C): Obs'd: _____ Corrid: _____ Therm ID No.: _____		Received by: Rachel Watkins Date/Time: 6/25/20 1500		Received by: [Signature] Date/Time: 6/26/20 900	
Relinquished by: Rachel Watkins Relinquished by:		Company: AECOM Company:		Company: GFA NW Company:		Company: _____ Company:	
Relinquished by:		Company:		Received in Laboratory by:		Date/Time:	



rdw  
7/16/20  
rew

# Chain of Custody Record 420755 eurofins

Environment Testing  
TestAmerica

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Project Manager: Craig MacPherson  
Tel/Email: craig.m@eurofins.com / craig@eurofins.com

Site Contact: Kenneth Watkins  
Lab Contact: Kenneth Watkins

Date: 6/25/2020  
COC No: 1 of 2 COCs

Sampler: \_\_\_\_\_  
For Lab Use Only: \_\_\_\_\_  
Walk-In Client: \_\_\_\_\_  
Lab Sampling: \_\_\_\_\_  
Job / SDG No.: \_\_\_\_\_

Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS  
TAT if different from Below: \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes:
GAF-GW-PHII-Bkt-Control-44450:1-t2	6/18/20	1300	G	GW	1	N	N	620 dissolved - Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-44450:1-t2	6/18/20	1300	G	GW	1	N	N	620 dissolved - Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Control-44450:1-t2	6/18/20	1300	G	GW	1	N	N	dissolved Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-44450:1-t2	6/18/20	1300	G	GW	1	N	N	Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-Sand-19R-t3	6/24/20	1300	G	GW	1	N	N	
GAF-GW-PHII-Bkt-Hi Cal-19R-Sand-19R-t3								
GAF-GW-PHII-Bkt-NaOH-Sand-19R-t2								
GAF-GW-PHII-Bkt-Dolo-Sand-19R-t2								
GAF-GW-PHII-Bkt-Dolo-Sand-44450-t3								
GAF-GW-PHII-Bkt-Control-Sand-19R-t3								
GAF-GW-PHII-Bkt-FB22-Sand-19R-t3								

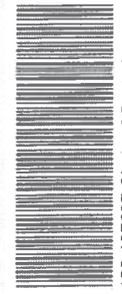
Preservation Used: 1=ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Sample Disposal (A fee may be assessed if samples are):  Return to Client  Disposal by Lab  Art



180-107627 Chain of Custody

Custody Seal No.: \_\_\_\_\_

Relinquished by: Rachel Watkins Date/Time: 6/25/2020 15:00

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received by: [Signature] Date/Time: 6/26/20 9w

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received in Laboratory by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Cooler Temp. (°C): \_\_\_\_\_ Obs'd: \_\_\_\_\_

Company: EA







Environment Testing  
TestAmerica

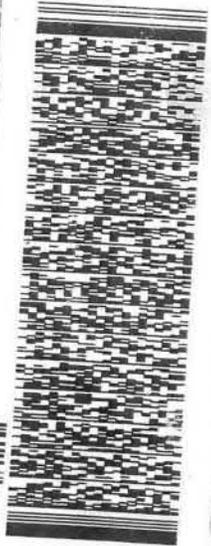
ORIGIN ID: PHDA (512) 454-4787  
FRANCISCO BARRAJAS  
REC'D  
37400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WGT: 30.00 LB TAN  
CAD: 05662071/CAFE3311

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058  
REF: \$180 - 58932

FMA: ||| ||| |||



FedEx  
Express



FedEx

PK# 1680 3500 0791

XH AGCA

FRI - 26 JUN 10:30A  
PRIORITY OVERNIGHT

15238  
PA-US  
PIT

Uncorrected temp 3.2 °C

Thermometer ID

CF  Initials

PT-WI-SR-001 effective 7/26/13

FID: 1711129 26Jun2020 MHBA 56CG1/C700/05A2



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- 13

# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-107627-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 107627**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-107627-2

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA Gallatin EIP  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

12/1/2020 9:09:10 AM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

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**Job ID: 180-107627-2**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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### Job Narrative 180-107627-2

#### Revised Report

This report was revised to include the chain of custody and email requesting the additional metals. This replaces the previous final report.

This data was pulled from a previous analysis of the samples. Due to quality issues with this particular batch, Mn and B could not be reported.

#### Receipt

The samples were received on 6/26/2020 9:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 3.2° C.

#### Metals

Method 6020A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 180-320070 and analytical batch 180-320452 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 6020A: The post digestion spike % recovery for Iron and Sodium associated with batch 180-320452 was outside of control limits. The associated sample is: (180-107627-A-5-A PDS).

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	09-20-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	09-20-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	09-20-20
Kansas	NELAP	E-10350	09-20-20
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	09-20-20
Louisiana	NELAP	04041	09-20-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	09-20-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	09-20-20
New Jersey	NELAP	PA005	09-20-20
New York	NELAP	11182	09-20-20
North Carolina (WW/SW)	State	434	11-01-20
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	09-20-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-14-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	07-22-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Water	06/24/20 13:00	06/26/20 09:00	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

**Date Collected: 06/18/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:37	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:36	RSK	TAL PIT
Instrument ID: DORY										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.530		0.0300	0.0125	mg/L		06/30/20 15:24	07/03/20 02:37	1
Antimony	0.000517	J	0.00200	0.000378	mg/L		06/30/20 15:24	07/03/20 02:37	1
Arsenic	0.000706	J	0.00100	0.000313	mg/L		06/30/20 15:24	07/03/20 02:37	1
Barium	0.0116		0.0100	0.00160	mg/L		06/30/20 15:24	07/03/20 02:37	1
Calcium	630		0.500	0.127	mg/L		06/30/20 15:24	07/03/20 02:37	1
Chromium	ND		0.00200	0.00153	mg/L		06/30/20 15:24	07/03/20 02:37	1
Cobalt	0.00106		0.000500	0.000134	mg/L		06/30/20 15:24	07/03/20 02:37	1
Copper	0.00150	J	0.00200	0.000627	mg/L		06/30/20 15:24	07/03/20 02:37	1
Iron	0.674		0.0500	0.0195	mg/L		06/30/20 15:24	07/03/20 02:37	1
Lead	0.000377	J	0.00100	0.000128	mg/L		06/30/20 15:24	07/03/20 02:37	1
Magnesium	4.69		0.500	0.0827	mg/L		06/30/20 15:24	07/03/20 02:37	1
Molybdenum	0.00809		0.00500	0.000610	mg/L		06/30/20 15:24	07/03/20 02:37	1
Potassium	3.53		0.500	0.156	mg/L		06/30/20 15:24	07/03/20 02:37	1
Selenium	ND		0.00500	0.00151	mg/L		06/30/20 15:24	07/03/20 02:37	1
Silicon	0.502		0.500	0.133	mg/L		06/30/20 15:24	07/03/20 02:37	1
Silver	ND		0.00100	0.000177	mg/L		06/30/20 15:24	07/03/20 02:37	1
Sodium	17.2		0.500	0.348	mg/L		06/30/20 15:24	07/03/20 02:37	1
Strontium	0.610		0.00500	0.000931	mg/L		06/30/20 15:24	07/03/20 02:37	1
Thallium	0.000469	J	0.00100	0.000148	mg/L		06/30/20 15:24	07/03/20 02:37	1
Vanadium	ND		0.00100	0.000991	mg/L		06/30/20 15:24	07/03/20 02:37	1
Zinc	0.00447	J	0.00500	0.00322	mg/L		06/30/20 15:24	07/03/20 02:37	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	7.82		0.0300	0.0125	mg/L		06/30/20 15:24	07/03/20 03:36	1
Antimony	0.000826	J	0.00200	0.000378	mg/L		06/30/20 15:24	07/03/20 03:36	1
Arsenic	0.00445		0.00100	0.000313	mg/L		06/30/20 15:24	07/03/20 03:36	1
Barium	0.0267		0.0100	0.00160	mg/L		06/30/20 15:24	07/03/20 03:36	1
Calcium	688		0.500	0.127	mg/L		06/30/20 15:24	07/03/20 03:36	1
Chromium	0.00544		0.00200	0.00153	mg/L		06/30/20 15:24	07/03/20 03:36	1
Cobalt	0.00345		0.000500	0.000134	mg/L		06/30/20 15:24	07/03/20 03:36	1
Copper	0.00522		0.00200	0.000627	mg/L		06/30/20 15:24	07/03/20 03:36	1
Iron	13.8		0.0500	0.0195	mg/L		06/30/20 15:24	07/03/20 03:36	1
Lead	0.00405		0.00100	0.000128	mg/L		06/30/20 15:24	07/03/20 03:36	1
Magnesium	2.28		0.500	0.0827	mg/L		06/30/20 15:24	07/03/20 03:36	1
Molybdenum	0.0362		0.00500	0.000610	mg/L		06/30/20 15:24	07/03/20 03:36	1
Potassium	3.74		0.500	0.156	mg/L		06/30/20 15:24	07/03/20 03:36	1
Selenium	ND		0.00500	0.00151	mg/L		06/30/20 15:24	07/03/20 03:36	1
Silicon	6.73		0.500	0.133	mg/L		06/30/20 15:24	07/03/20 03:36	1
Silver	ND		0.00100	0.000177	mg/L		06/30/20 15:24	07/03/20 03:36	1
Sodium	17.3		0.500	0.348	mg/L		06/30/20 15:24	07/03/20 03:36	1
Strontium	0.641		0.00500	0.000931	mg/L		06/30/20 15:24	07/03/20 03:36	1
Thallium	0.000313	J	0.00100	0.000148	mg/L		06/30/20 15:24	07/03/20 03:36	1
Vanadium	0.0142		0.00100	0.000991	mg/L		06/30/20 15:24	07/03/20 03:36	1
Zinc	0.0188		0.00500	0.00322	mg/L		06/30/20 15:24	07/03/20 03:36	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-320070/1-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		06/30/20 15:24	07/03/20 02:16	1
Antimony	ND		0.00200	0.000378	mg/L		06/30/20 15:24	07/03/20 02:16	1
Arsenic	ND		0.00100	0.000313	mg/L		06/30/20 15:24	07/03/20 02:16	1
Barium	ND		0.0100	0.00160	mg/L		06/30/20 15:24	07/03/20 02:16	1
Calcium	ND		0.500	0.127	mg/L		06/30/20 15:24	07/03/20 02:16	1
Chromium	ND		0.00200	0.00153	mg/L		06/30/20 15:24	07/03/20 02:16	1
Cobalt	ND		0.000500	0.000134	mg/L		06/30/20 15:24	07/03/20 02:16	1
Copper	ND		0.00200	0.000627	mg/L		06/30/20 15:24	07/03/20 02:16	1
Iron	ND		0.0500	0.0195	mg/L		06/30/20 15:24	07/03/20 02:16	1
Lead	ND		0.00100	0.000128	mg/L		06/30/20 15:24	07/03/20 02:16	1
Magnesium	ND		0.500	0.0827	mg/L		06/30/20 15:24	07/03/20 02:16	1
Molybdenum	ND		0.00500	0.000610	mg/L		06/30/20 15:24	07/03/20 02:16	1
Potassium	ND		0.500	0.156	mg/L		06/30/20 15:24	07/03/20 02:16	1
Selenium	ND		0.00500	0.00151	mg/L		06/30/20 15:24	07/03/20 02:16	1
Silicon	ND		0.500	0.133	mg/L		06/30/20 15:24	07/03/20 02:16	1
Silver	ND		0.00100	0.000177	mg/L		06/30/20 15:24	07/03/20 02:16	1
Sodium	ND		0.500	0.348	mg/L		06/30/20 15:24	07/03/20 02:16	1
Strontium	ND		0.00500	0.000931	mg/L		06/30/20 15:24	07/03/20 02:16	1
Thallium	ND		0.00100	0.000148	mg/L		06/30/20 15:24	07/03/20 02:16	1
Vanadium	ND		0.00100	0.000991	mg/L		06/30/20 15:24	07/03/20 02:16	1
Zinc	ND		0.00500	0.00322	mg/L		06/30/20 15:24	07/03/20 02:16	1

**Lab Sample ID: LCS 180-320070/2-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5.00	4.871		mg/L		97	80 - 120
Antimony	0.250	0.2616		mg/L		105	80 - 120
Arsenic	1.00	1.066		mg/L		107	80 - 120
Barium	1.00	1.001		mg/L		100	80 - 120
Calcium	25.0	28.35		mg/L		113	80 - 120
Chromium	0.500	0.5196		mg/L		104	80 - 120
Cobalt	0.500	0.5072		mg/L		101	80 - 120
Copper	0.500	0.5029		mg/L		101	80 - 120
Iron	5.00	5.096		mg/L		102	80 - 120
Lead	0.500	0.5152		mg/L		103	80 - 120
Magnesium	25.0	24.76		mg/L		99	80 - 120
Molybdenum	0.500	0.5241		mg/L		105	80 - 120
Potassium	25.0	24.23		mg/L		97	80 - 120
Selenium	1.00	1.002		mg/L		100	80 - 120
Silicon	1.00	1.020		mg/L		102	80 - 120
Silver	0.250	0.2435		mg/L		97	80 - 120
Sodium	25.0	26.65		mg/L		107	80 - 120
Strontium	0.500	0.4906		mg/L		98	80 - 120
Thallium	1.00	1.076		mg/L		108	80 - 120
Vanadium	0.500	0.4987		mg/L		100	80 - 120
Zinc	0.250	0.2521		mg/L		101	80 - 120

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: 180-107627-A-5-B MS**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Aluminum	3.41		5.00	8.018		mg/L		92	75 - 125
Antimony	0.000649	J	0.250	0.2630		mg/L		105	75 - 125
Arsenic	0.00153		1.00	1.064		mg/L		106	75 - 125
Barium	0.0575		1.00	1.058		mg/L		100	75 - 125
Calcium	786		25.0	814.3	4	mg/L		112	75 - 125
Chromium	ND		0.500	0.5201		mg/L		104	75 - 125
Cobalt	0.141		0.500	0.6554		mg/L		103	75 - 125
Copper	0.000844	J	0.500	0.5074		mg/L		101	75 - 125
Iron	6.29		5.00	11.41		mg/L		102	75 - 125
Lead	0.000195	J	0.500	0.5067		mg/L		101	75 - 125
Magnesium	72.7	F1	25.0	97.59		mg/L		99	75 - 125
Molybdenum	0.00114	J	0.500	0.5294		mg/L		106	75 - 125
Potassium	14.8		25.0	39.24		mg/L		98	75 - 125
Selenium	ND		1.00	1.001		mg/L		100	75 - 125
Silicon	11.7		1.00	12.64	4	mg/L		92	75 - 125
Silver	ND		0.250	0.2400		mg/L		96	75 - 125
Sodium	11.3		25.0	38.68		mg/L		109	75 - 125
Strontium	1.52	F1	0.500	1.999		mg/L		96	75 - 125
Thallium	0.000377	J	1.00	1.034		mg/L		103	75 - 125
Vanadium	ND		0.500	0.5119		mg/L		102	75 - 125
Zinc	0.277		0.250	0.5201		mg/L		97	75 - 125

**Lab Sample ID: 180-107627-A-5-C MSD**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Aluminum	3.41		5.00	7.661		mg/L		85	75 - 125	5	20
Antimony	0.000649	J	0.250	0.2544		mg/L		102	75 - 125	3	20
Arsenic	0.00153		1.00	1.006		mg/L		100	75 - 125	6	20
Barium	0.0575		1.00	1.014		mg/L		96	75 - 125	4	20
Calcium	786		25.0	749.6	4	mg/L		-147	75 - 125	8	20
Chromium	ND		0.500	0.4992		mg/L		100	75 - 125	4	20
Cobalt	0.141		0.500	0.6215		mg/L		96	75 - 125	5	20
Copper	0.000844	J	0.500	0.4789		mg/L		96	75 - 125	6	20
Iron	6.29		5.00	10.94		mg/L		93	75 - 125	4	20
Lead	0.000195	J	0.500	0.4899		mg/L		98	75 - 125	3	20
Magnesium	72.7	F1	25.0	90.77	F1	mg/L		72	75 - 125	7	20
Molybdenum	0.00114	J	0.500	0.5101		mg/L		102	75 - 125	4	20
Potassium	14.8		25.0	36.56		mg/L		87	75 - 125	7	20
Selenium	ND		1.00	0.9681		mg/L		97	75 - 125	3	20
Silicon	11.7		1.00	11.82	4	mg/L		9	75 - 125	7	20
Silver	ND		0.250	0.2305		mg/L		92	75 - 125	4	20
Sodium	11.3		25.0	37.24		mg/L		104	75 - 125	4	20
Strontium	1.52	F1	0.500	1.846	F1	mg/L		66	75 - 125	8	20
Thallium	0.000377	J	1.00	1.003		mg/L		100	75 - 125	3	20
Vanadium	ND		0.500	0.4897		mg/L		98	75 - 125	4	20
Zinc	0.277		0.250	0.4839		mg/L		83	75 - 125	7	20

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-2  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 320070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	3005A	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	3005A	
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-107627-A-5-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-107627-A-5-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 320452

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	EPA 6020A	320070
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	320070
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	320070
180-107627-A-5-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	320070
180-107627-A-5-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	320070

# Chain of Custody Record 420755

Environment Testing  
TestAmerica

301 Alpha Dr.  
Pittsburgh PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

Project Manager: Greg MacPhee Site Contact: Francisco Barias Date: 6/25/2020 COC No. 1 of 2 COGs  
 Tel/Email: enviro@mettest.com Lab Contact: Rachel Watkins Carrier: 620 TALS-BC, CA, L, N  
 Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS  
 TAT if different from below: 2 weeks  
 2 weeks  1 week  2 days  1 day

City/State/Zip: 10. 935. 5577 x 414  
 Project Name: TVA Gallatin EIP  
 Site: GAF - NRS - Treatability  
 P O #

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes	
								620 TALS-BC, CA, L, N	620 TALS-BC, CA, L, N
GAF-GW-PHII-Bkt-Control-444650.1-T2	6/18/20	1300	G	GW	1	N	N	Adsorb Be, Cd, Li, Ni	
GAF-GW-PHII-Bkt-Hi Cal-44150.1-T2	6/18/20	1300	G	GW	1	N	N	dissolved Be, Cd, Li, Ni	
GAF-GW-PHII-Bkt-Control-444650.1-T2	6/18/20	1300	G	GW	1	N	N		
GAF-GW-PHII-Bkt-Hi Cal-44150.1-T2	6/18/20	1300	G	GW	1	N	N		
GAF-GW-PHII-Bkt-Hi Cal-Sand-19R-T3	6/24/20	1300	G	GW	1	N	N		
GAF-GW-PHII-Bkt-Hi Cal-Call-Sand-19R-T3									
GAF-GW-PHII-Bkt-NaOH-Sand-19R-T2									
GAF-GW-PHII-Bkt-Dolo-Sand-19R-T2									
GAF-GW-PHII-Bkt-Dolo-Sand-44444-T3									
GAF-GW-PHII-Bkt-Control-Sand-19R-T3									
GAF-GW-PHII-Bkt-FB22-Sand-19R-T3									

Preservation Used: 1=Ice, 2=HCl, 3=H2SO4, 4=HNO3, 5=NaOH, 6=Other  
 Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown  
 Return to Client  Disposal by Lab  An

Sample Disposal (A fee may be assessed if samples are):  
 180-107627 Chain of Custody

Custody Seal No.:	Company:	Date/Time:	Received by:	Company:	Date/Time:	Received by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	AECOM	6/25/2020 1500	<u>Rachel Watkins</u>	EMM	6/26/20	<u>EMM</u>					



# Chain of Custody Record 420753

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

<b>Client Contact</b> Company Name: Environmental Standards Address: City/State/Zip: Phone: 412.935.5577 x414 Fax: Project Name: TWA Gallatin EIP Site: GAF - NRS - Treatability P O #		<b>Project Manager:</b> Craig MacPhee Tel/Email: craig.macphee@eurofins.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below: <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact:</b> Francisco Briggs Date: 6/25/2020 Lab Contact: Rachel Watkins Carrier: Filtered Sample (Y/N) Perform MS / MSD (Y/N)		COC No: 2 of 2 COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Sample Specific Notes: totals Be, Cd, Cr, Ni	
<b>Sample Identification</b> GAF-GW-PH II-BKT-Control-441uSoil-t3 GAF-GW-PH II-BKT-Hi-Cal-441uSoil-t3		Sample Date: 6/25/20 Sample Time: 1300 Sample Type (C=Comp, G=Grab): G Matrix: GW # of Cont.: 1		Filled Sample (Y/N) Perform MS / MSD (Y/N)		Return to Client: <input type="checkbox"/> Disposal by Lab: <input checked="" type="checkbox"/> Archive for: _____ Months	
<b>Preservation Used:</b> 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other <b>Possible Hazard Identification:</b> Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown							
<b>Special Instructions/QC Requirements &amp; Comments:</b>							
Relinquished by: Rachel Watkins Relinquished by:		Company: AECOM Company:		Received by: [Signature] Date/Time: 6/25/20 1500 Date/Time:		Company: GTM NW Company:	
Relinquished by:		Company:		Received in Laboratory by:		Date/Time:	



rdw  
7/16/20  
rew

# Chain of Custody Record 420755 eurofins

Environment Testing  
TestAmerica

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Project Manager: Craig MacPherson  
Tel/Email: craig.m@eurofins.com / craig@eurofins.com

Site Contact: Kenneth Watkins  
Lab Contact: Kenneth Watkins

Date: 6/25/2020

COC No: \_\_\_\_\_ of 2 COCs

Sampler: \_\_\_\_\_

For Lab Use Only:  
Walk-In Client: \_\_\_\_\_  
Lab Sampling: \_\_\_\_\_

Job / SDG No.: \_\_\_\_\_

Sample Specific Notes:  
tests Be, Cd, Li, Ni  
dissolved Be, Cd, Li, Ni  
Be, Cd  
Be, Cd  
Be, Cd  
Be, Cd

Sample Disposal (A fee may be assessed if samples are):  
 Return to Client  Disposal by Lab  Art

Sample Preservation Used: 1=ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Possible Hazard Identification:  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Client Contact  
Company Name: Environmental Standards  
Address: \_\_\_\_\_  
City/State/Zip: \_\_\_\_\_  
Phone: 610.935.5577 x414  
Fax: \_\_\_\_\_  
Project Name: TVA Gallatin EIP  
Site: GAF - NPS - Treatability  
PO # \_\_\_\_\_

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)
6/18/20	1300	G	GW	1	NN	✓
6/18/20	1300	G	GW	1	NN	✓
6/18/20	1300	G	GW	1	YN	✓
6/18/20	1300	G	GW	1	YN	✓
6/24/20	1300	G	GW	1	NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓
					NN	✓

Received by: Kenneth Watkins  
Date/Time: 6/25/2020 15:00  
Company: AECOM

Received by: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Company: \_\_\_\_\_

Received in Laboratory by: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Company: \_\_\_\_\_

Custody Seal No.: \_\_\_\_\_  
Custody Seals Intact:  Yes  No

Relinquished by: Kenneth Watkins  
Date/Time: 6/25/2020 9w  
Company: AECOM

Relinquished by: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Company: \_\_\_\_\_

Relinquished by: \_\_\_\_\_  
Date/Time: \_\_\_\_\_  
Company: \_\_\_\_\_

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## Lage, Gail

---

**From:** Rumble, Jennifer L.  
**Sent:** Friday, November 6, 2020 2:34 PM  
**To:** Haskell, Patrick  
**Cc:** Kara Hagan; Lage, Gail; Veenstra, Scott  
**Subject:** RE: Soil treatment lab report

Hi Patrick,

Can we report this as a job 2 instead of a report revision? Do you need the total, dissolved or both for 441U soil- T2? It looks like we should be able to report most analytes. Boron and Mn look to be the analytes that are going to give us trouble in reporting. Are these analytes necessary?

Jenn

### Jennifer Rumble

Project Manager

Eurofins TestAmerica

Phone: 412-963-2434

E-mail: [jennifer.rumble@eurofinset.com](mailto:jennifer.rumble@eurofinset.com)

---

**From:** Haskell, Patrick <Patrick.Haskell@aecom.com>  
**Sent:** Thursday, November 5, 2020 12:44 PM  
**To:** Rumble, Jennifer L. <Jennifer.Rumble@Eurofinset.com>  
**Cc:** Kara Hagan <khagan@envstd.com>; Lage, Gail <Gail.Lage@Eurofinset.com>; Veenstra, Scott <Scott.Veenstra@aecom.com>  
**Subject:** FW: Soil treatment lab report

EXTERNAL EMAIL\*

Hi Jennifer,

Would it be possible to report a wider list of metals for samples HiCal-441Usoil-T2 and HiCal-441soil-T3? The metals list that we would like to report is the same expanded list we have been using for the other treatability samples. (See attached.) I understand that you'll have to go back and check the instrument calibration to see which analytes can be reported and which cannot, but we'll take as complete a list as you can manage.

Thanks,

**Craig W. MacPhee, P.E.**

Director of Engineering

Environment

D 978-905-2299

C 978-758-6174

[craig.macphee@aecom.com](mailto:craig.macphee@aecom.com)

**AECOM**

250 Apollo Drive  
Chelmsford, MA 01824  
T 978.905.2100 F 978.905.2101  
[www.aecom.com](http://www.aecom.com)

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- 13

\* WARNING - EXTERNAL: This email originated from outside of Eurofins TestAmerica. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-107627-2  
SDG Number: GAF-NRS-Treatability

**Login Number: 107627**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

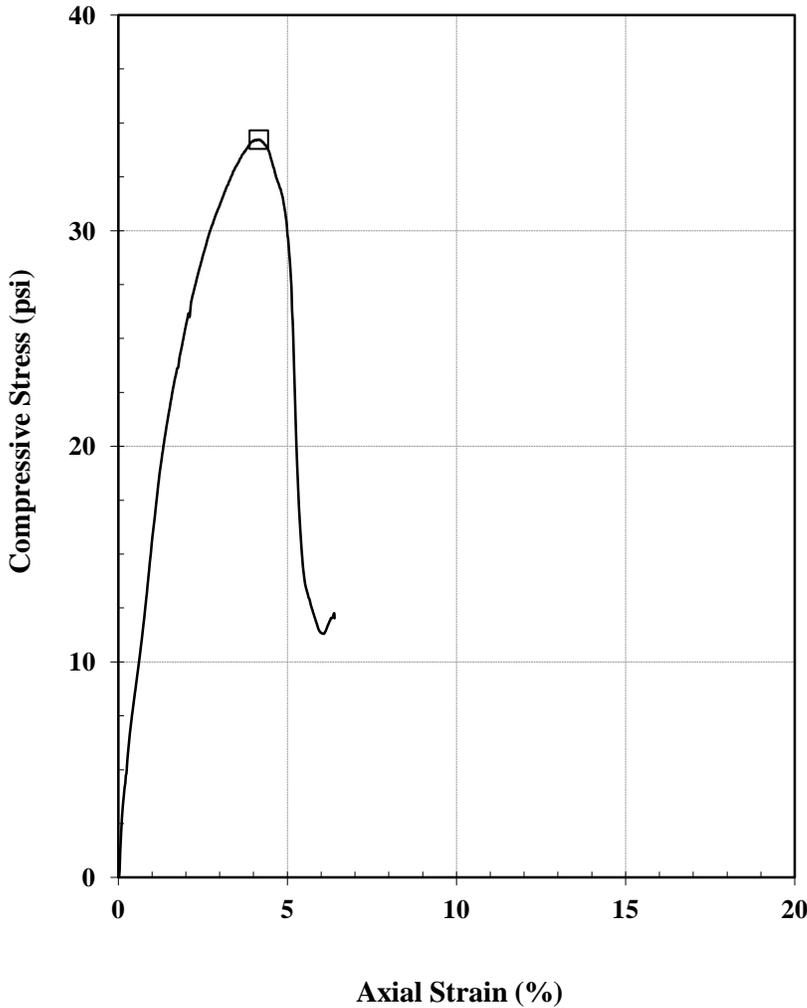




# Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Phase 1 Lean Mix 1 (Client-Prepared, 7-Day Cure)

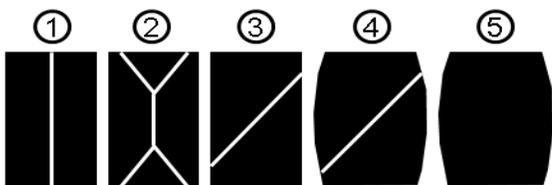
TRI Log No.: 59783.1  
 Type of Specimen: Cast  
 Test Method: ASTM D1633



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	$D_o$	1.98
Avg. Height (in)	$H_o$	3.91
Avg. Water Content (%)	$w_o$	22.6
Bulk Density (pcf)	$\gamma_{total}$	120.6
Dry Density (pcf)	$\gamma_{dry}$	98.4
Saturation (%)	$S_r$	86.4
Void Ratio	$e_o$	0.71
Assumed Specific Gravity	$G_s$	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	34.2
Axial Strain at Failure (%)	4.2
Total Stresses at Failure	
Major Principal Stress, $\sigma_1$ (psi)	34.2
Minor Principal Stress, $\sigma_3$ (psi)	0.0
<b>Undrained Shear Strength, <math>S_u</math> (psi)</b>	<b>17.1</b>

Failure Mode	4
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Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

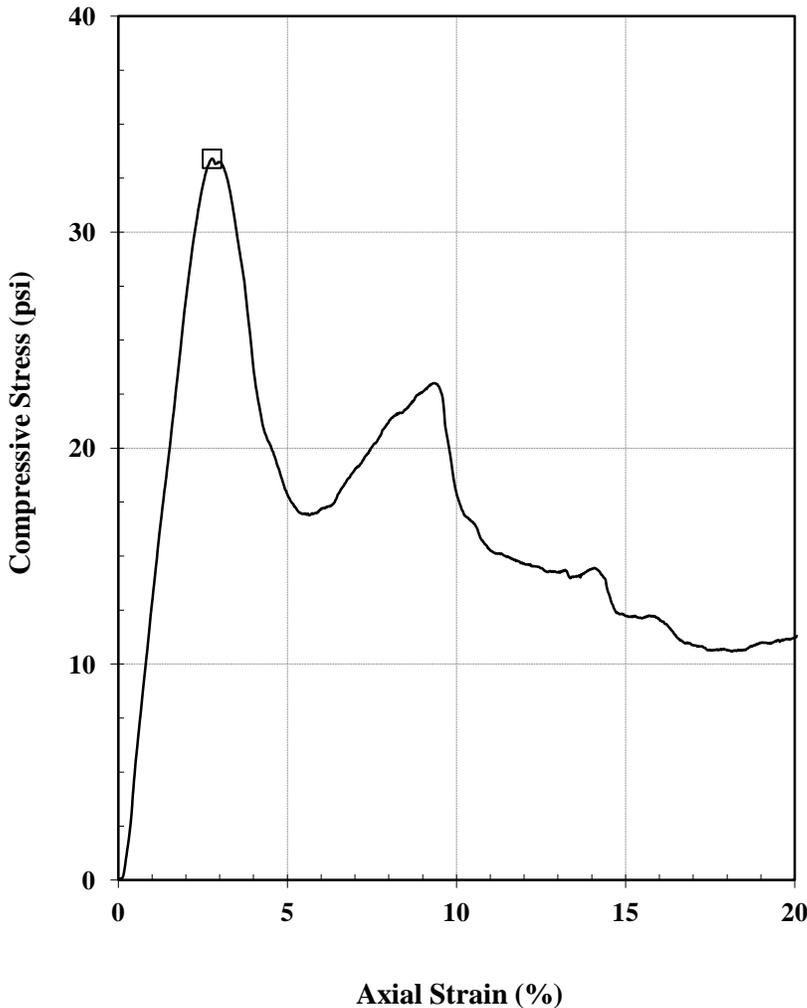
Jeffrey A. Kuhn, Ph.D., P.E., 10/9/20  
 Quality Review/Date

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

# Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Phase 1 Lean Mix 2 (Client-Prepared, 14-Day Cure)

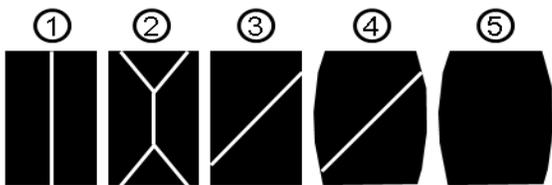
TRI Log No.: 59783.2  
 Type of Specimen: Cast  
 Test Method: ASTM D1633



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	D <sub>o</sub>	1.98
Avg. Height (in)	H <sub>o</sub>	3.92
Avg. Water Content (%)	w <sub>o</sub>	20.4
Bulk Density (pcf)	γ <sub>total</sub>	118.6
Dry Density (pcf)	γ <sub>dry</sub>	98.5
Saturation (%)	S <sub>r</sub>	81.2
Void Ratio	e <sub>o</sub>	0.71
Assumed Specific Gravity	G <sub>s</sub>	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	33.4
Axial Strain at Failure (%)	2.8
Total Stresses at Failure	
Major Principal Stress, σ <sub>1</sub> (psi)	33.4
Minor Principal Stress, σ <sub>3</sub> (psi)	0.0
<b>Undrained Shear Strength, S<sub>u</sub> (psi)</b>	<b>16.7</b>

Failure Mode	2
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Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

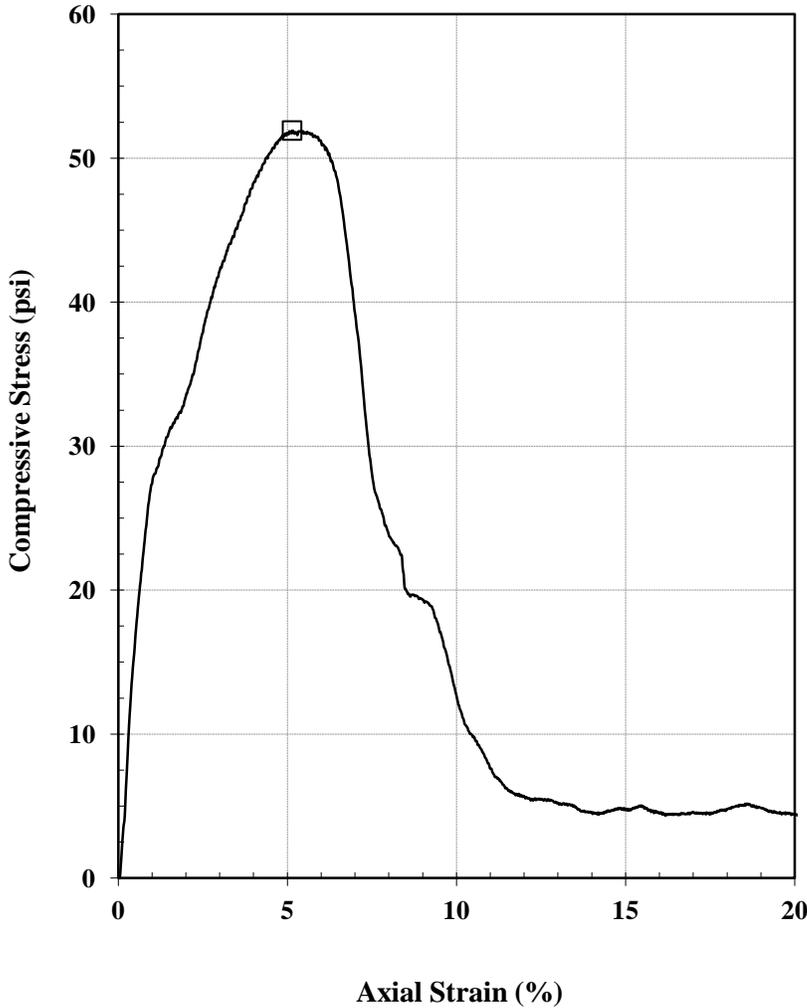
Jeffrey A. Kuhn, Ph.D., P.E., 11/3/20  
 Quality Review/Date

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# Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Phase 1 Lean Mix 3 (Client-Prepared, 28-Day Cure)

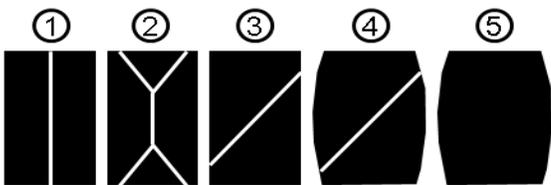
TRI Log No.: 59783.3  
 Type of Specimen: Cast  
 Test Method: ASTM D1633



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	$D_o$	1.98
Avg. Height (in)	$H_o$	3.85
Avg. Water Content (%)	$w_o$	20.8
Bulk Density (pcf)	$\gamma_{total}$	121.9
Dry Density (pcf)	$\gamma_{dry}$	100.9
Saturation (%)	$S_r$	84.5
Void Ratio	$e_o$	0.67
Assumed Specific Gravity	$G_s$	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	51.9
Axial Strain at Failure (%)	5.1
Total Stresses at Failure	
Major Principal Stress, $\sigma_1$ (psi)	51.9
Minor Principal Stress, $\sigma_3$ (psi)	0.0
<b>Undrained Shear Strength, <math>S_u</math> (psi)</b>	<b>26.0</b>

Failure Mode	1
--------------	---



Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

Jeffrey A. Kuhn, Ph.D., P.E., 11/3/20  
 Quality Review/Date

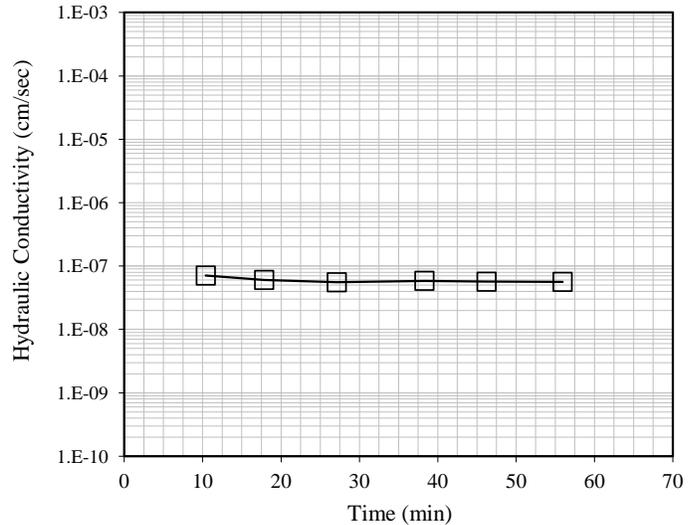
The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

## Hydraulic Conductivity

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: HC Lean Mix

TRI Log #: 59783.4  
 Test Method: ASTM D5084

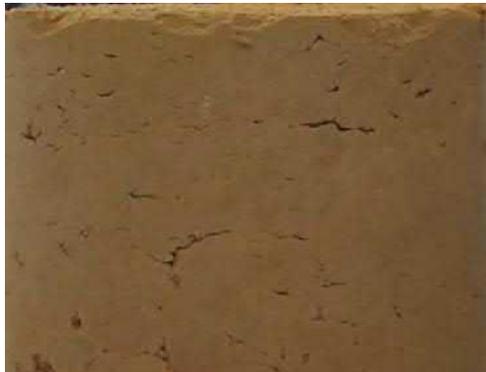
Sample Condition	Initial	Final
	Cast	Post-Test
Diameter (in)	1.99	1.99
Height (in)	1.78	1.75
Mass (g)	172.9	175.4
Sample Area (in <sup>2</sup> )	3.12	3.11
Water Content (%)	21.7	24.9
Total Unit Weight (pcf)	118.7	122.7
Dry Unit Weight (pcf)	97.6	98.3
Specific Gravity (Assumed)	2.75	
Degree of Saturation	78.6	91.7
Void Ratio	0.76	0.75
Porosity	0.43	0.43
1 Pore Volume (cc)	39.2	38.1



Eff. Confining Stress (psi)	5.0
Back-Pressure	80.0
B-Value Prior to Permeation	0.98
Permeant	De-Aired Tap Water

Method F—Constant Volume—Falling Head by mercury, rising tailwater elevation			
Manometer Constants		Aa (cm <sup>2</sup> )	0.767
M1	0.0302	Ap (cm <sup>2</sup> )	0.0314
M2	1.041	Z <sub>p</sub> (cm)	1.7
Time, t	Trial Constant, Z <sub>1</sub>	Gradient	K <sub>20</sub>
Min	-	-	cm/s
10.4	27.7	76.9	7.1E-08
17.9	25.5	70.8	6.0E-08
27.1	24.3	67.4	5.6E-08
38.3	22.9	63.6	5.9E-08
46.2	21.3	59.1	5.7E-08
55.9	20.2	56.2	5.6E-08
-	-	-	-
-	-	-	-
-	-	-	-
Average, Last 2 Readings			<b>5.6E-08</b>

Specimen Image

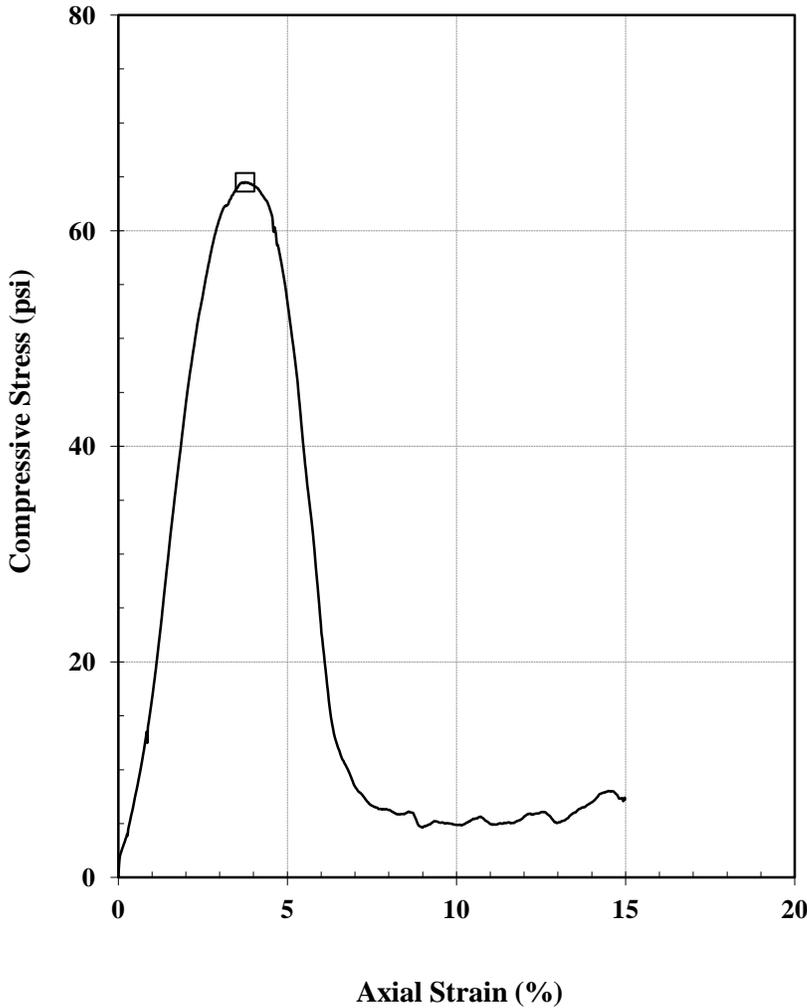


Jeffrey A. Kuhn, Ph.D., P.E. 10/9/2020  
 Analysis & Quality Review/Date

# Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Rich Mix 1 (Client-Prepared, 7-Day Cure)

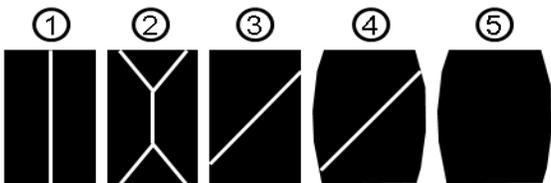
TRI Log No.: 59783.6  
 Type of Specimen: Cast  
 Test Method: ASTM D2166



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	D <sub>o</sub>	1.98
Avg. Height (in)	H <sub>o</sub>	3.86
Avg. Water Content (%)	w <sub>o</sub>	24.8
Bulk Density (pcf)	γ <sub>total</sub>	117.4
Dry Density (pcf)	γ <sub>dry</sub>	94.1
Saturation (%)	S <sub>r</sub>	84.0
Void Ratio	e <sub>o</sub>	0.79
Assumed Specific Gravity	G <sub>s</sub>	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	64.5
Axial Strain at Failure (%)	3.8
Total Stresses at Failure	
Major Principal Stress, σ <sub>1</sub> (psi)	64.5
Minor Principal Stress, σ <sub>3</sub> (psi)	0.0
<b>Undrained Shear Strength, S<sub>u</sub> (psi)</b>	<b>32.2</b>

Failure Mode	1
--------------	---



Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

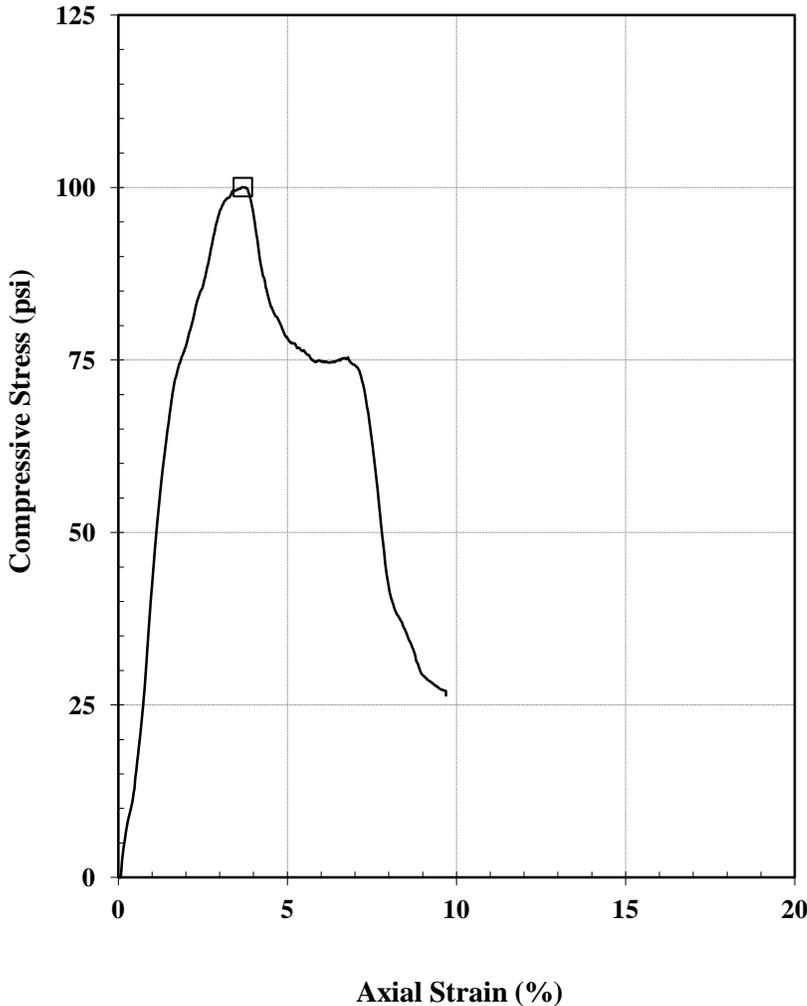
Jeffrey A. Kuhn, Ph.D., P.E., 10/9/20  
 Quality Review/Date

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## Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Rich Mix 2 (Client-Prepared, 14-Day Cure)

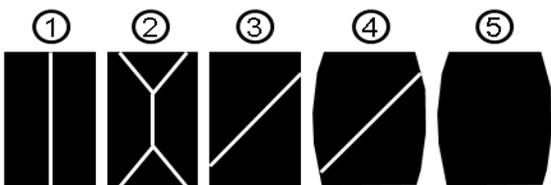
TRI Log No.: 59783.7  
 Type of Specimen: Cast  
 Test Method: ASTM D1633



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	D <sub>o</sub>	1.98
Avg. Height (in)	H <sub>o</sub>	3.81
Avg. Water Content (%)	w <sub>o</sub>	24.0
Bulk Density (pcf)	γ <sub>total</sub>	115.8
Dry Density (pcf)	γ <sub>dry</sub>	93.4
Saturation (%)	S <sub>r</sub>	79.8
Void Ratio	e <sub>o</sub>	0.80
Assumed Specific Gravity	G <sub>s</sub>	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	100.1
Axial Strain at Failure (%)	3.7
Total Stresses at Failure	
Major Principal Stress, σ <sub>1</sub> (psi)	100.1
Minor Principal Stress, σ <sub>3</sub> (psi)	0.0
<b>Undrained Shear Strength, S<sub>u</sub> (psi)</b>	<b>50.0</b>

Failure Mode	1
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Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

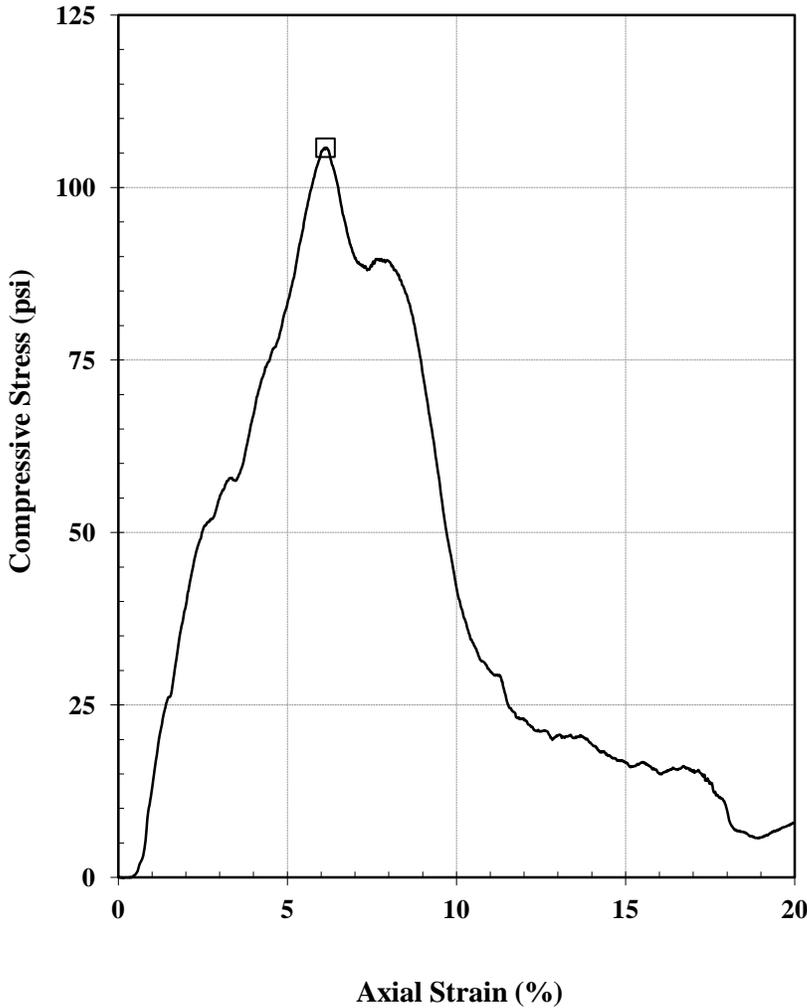
Jeffrey A. Kuhn, Ph.D., P.E., 11/3/20  
 Quality Review/Date

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# Unconfined Compression Test Report

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: Rich Mix 3 (Client-Prepared, 28-Day Cure)

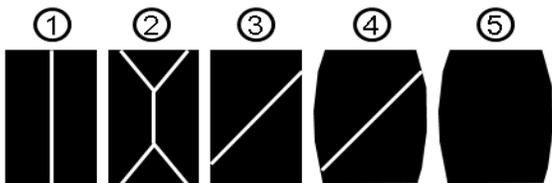
TRI Log No.: 59783.8  
 Type of Specimen: Cast  
 Test Method: ASTM D1633



Specimen Condition at Time of Test		
Specimen No.		1
Avg. Diameter (in)	D <sub>o</sub>	1.99
Avg. Height (in)	H <sub>o</sub>	3.91
Avg. Water Content (%)	w <sub>o</sub>	24.7
Bulk Density (pcf)	γ <sub>total</sub>	113.2
Dry Density (pcf)	γ <sub>dry</sub>	90.7
Saturation (%)	S <sub>r</sub>	78.6
Void Ratio	e <sub>o</sub>	0.86
Assumed Specific Gravity	G <sub>s</sub>	2.70

Stresses at Failure	
Unconfined Compressive Strength (psi)	105.8
Axial Strain at Failure (%)	6.1
Total Stresses at Failure	
Major Principal Stress, σ <sub>1</sub> (psi)	105.8
Minor Principal Stress, σ <sub>3</sub> (psi)	0.0
<b>Undrained Shear Strength, S<sub>u</sub> (psi)</b>	<b>52.9</b>

Failure Mode	2
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Brittle ← → Plastic

(Kuhn after Nygård et. Al 2005)

Jeffrey A. Kuhn, Ph.D., P.E., 11/3/20  
 Quality Review/Date

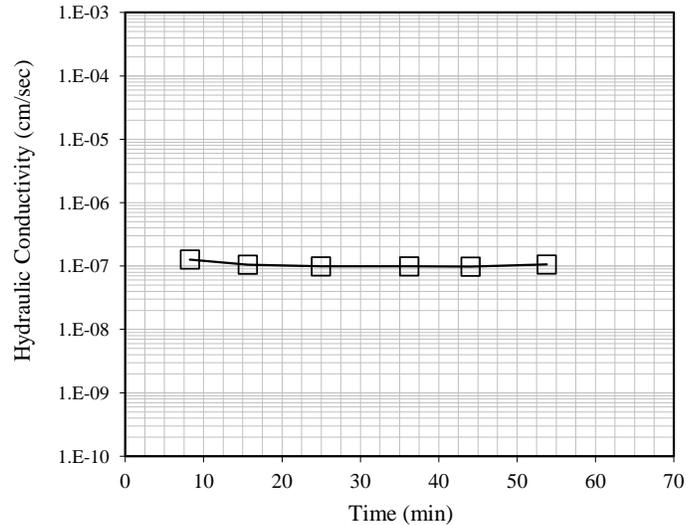
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## Hydraulic Conductivity

Client: AECOM  
 Project: 60621225 - NRS Treatability  
 Sample ID: HC Rich Mix

TRI Log #: 59783.9  
 Test Method: ASTM D5084

Sample Condition	Initial	Final
	Cast	Post-Test
Diameter (in)	1.98	1.99
Height (in)	1.58	1.57
Mass (g)	145.7	149.3
Sample Area (in <sup>2</sup> )	3.07	3.10
Water Content (%)	22.0	26.8
Total Unit Weight (pcf)	114.6	116.9
Dry Unit Weight (pcf)	94.0	92.2
Specific Gravity (Assumed)	2.75	
Degree of Saturation	73.2	85.7
Void Ratio	0.83	0.86
Porosity	0.45	0.46
1 Pore Volume (cc)	35.9	36.8



Eff. Confining Stress (psi)	5.0
Back-Pressure	80.0
B-Value Prior to Permeation	0.96
Permeant	De-Aired Tap Water

Method F—Constant Volume—Falling Head by mercury, rising tailwater elevation			
Manometer Constants		Aa (cm <sup>2</sup> )	0.767
M1	0.0302	Ap (cm <sup>2</sup> )	0.0314
M2	1.041	Z <sub>p</sub> (cm)	1.7
Time, t	Trial Constant, Z <sub>1</sub>	Gradient	K <sub>20</sub>
Min	-	-	cm/s
8.2	27.8	87.1	1.3E-07
15.6	24.4	76.5	1.1E-07
25.0	22.2	69.5	9.9E-08
36.2	19.8	62.0	9.9E-08
44.1	17.2	54.0	9.8E-08
53.8	15.7	49.1	1.1E-07
-	-	-	-
-	-	-	-
-	-	-	-
Average, Last 2 Readings			1.0E-07

Specimen Image



Jeffrey A. Kuhn, Ph.D., P.E. 10/9/2020  
 Analysis & Quality Review/Date



# TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

Client: AECOM  
Project: 60621225 - NRS Treatability

TRI Log #: 59783

Jeffrey A. Kuhn, Ph.D., P.E., 10/9/2020

Quality Review/Date

## Analytical

COC Line #	Sample Identification	Paint Filter Liquids Test
-	Test Method	EPA Method 9095B
5	Paint Lean Mix	No Free Liquids
10	Paint Rich Mix	No Free Liquids

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

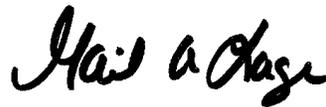
Laboratory Job ID: 180-105162-1

Laboratory Sample Delivery Group: GAF NRS Treatability  
Client Project/Site: TVA GAF AECOM Lab  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:17:05 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

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## Job ID: 180-105162-1

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Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-105162-1

#### Revised Report

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

#### Receipt

The samples were received on 4/30/2020 8:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

#### Metals

Method 3005A: The following samples were diluted due to the nature of the sample matrix: GAF-GW-BKT-PHI-FB22-T1 (180-105162-2), GAF-GW-BKT-PHI-SOILCONTROL-T1 (180-105162-8) and GAF-GW-BKT-PHI-FB22 SOIL-T1 (180-105162-9). Elevated reporting limits (RLs) are provided.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-26-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
Oregon	NELAP	PA-2151	07-01-20
Pennsylvania	NELAP	02-00416	05-21-20
Rhode Island	State	LAO00362	12-31-20
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Water	04/29/20 12:00	04/30/20 08:15	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Water	04/29/20 12:00	04/30/20 08:15	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:20	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:04	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:17	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 01:53	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:24	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:07	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:27	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:10	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:31	WTR	TAL PIT
Instrument ID: A										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-4**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:14	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-5**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:34	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:17	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-6**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:41	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:24	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:37	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:21	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-7**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:55	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:31	RSK	TAL PIT
Instrument ID: DORY										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

**Date Collected: 04/27/20 14:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:51	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:28	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:02	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:45	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:58	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:35	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:09	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:52	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 18:05	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:49	RSK	TAL PIT
Instrument ID: DORY										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Analyst References:**

Lab: TAL PIT  
Batch Type: Prep  
    KEM = Kimberly Mahoney  
Batch Type: Analysis  
    RSK = Robert Kurtz  
    WTR = Bill Reinheimer

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000597	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:53	1
Cadmium	0.00257		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:17	1
Lithium	0.0219	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:53	1
Nickel	0.0834		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:17	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:04	1
Cadmium	0.00216		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:20	1
Lithium	0.0184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:04	1
Nickel	0.0639		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:20	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:07	1
Cadmium	0.00263	J	0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:24	1
Lithium	0.0475	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:07	1
Nickel	0.0544		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:24	1

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000991	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:10	1
Cadmium	0.000720	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:27	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:10	1
Nickel	0.0569		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:27	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000265	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:14	1
Cadmium	0.000390	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:31	1
Lithium	0.0106	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:14	1
Nickel	0.0200		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:31	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000562	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:17	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00747		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:34	1
Lithium	0.0283	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:17	1
Nickel	0.0543		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:34	1

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**

**Lab Sample ID: 180-105162-6**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:21	1
Cadmium	0.00191		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:37	1
Lithium	0.286	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:21	1
Nickel	0.0674		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:37	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:24	1
Cadmium	0.00166		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:41	1
Lithium	0.300	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:24	1
Nickel	0.0697		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:41	1

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:28	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:51	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:28	1
Nickel	0.000603	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:51	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:31	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:55	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:31	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:55	1

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00808		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:35	1
Cadmium	0.0128		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:58	1
Lithium	0.0897	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:35	1
Nickel	0.323		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:58	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:45	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:02	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:45	1
Nickel	0.000545	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:02	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0105		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:49	1
Cadmium	0.0314		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 18:05	1
Lithium	0.127	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:49	1
Nickel	1.02		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 18:05	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0145		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:52	1
Cadmium	0.0785		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:09	1
Lithium	0.150	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:52	1
Nickel	1.93		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:09	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 16:28	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 16:28	1

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:04	1
Lithium	0.004190	J	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:04	1

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.500	0.4964		mg/L		99	80 - 120
Nickel	0.500	0.4945		mg/L		99	80 - 120

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.500	0.4915		mg/L		98	80 - 120
Lithium	0.500	0.4770		mg/L		95	80 - 120

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		0.500	0.5064		mg/L		101	75 - 125
Nickel	0.00138		0.500	0.4950		mg/L		99	75 - 125

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		0.500	0.4881		mg/L		98	75 - 125
Lithium	0.00497	J B	0.500	0.4746		mg/L		94	75 - 125

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.500	0.5022		mg/L		100	75 - 125	1	20
Nickel	0.00138		0.500	0.4921		mg/L		98	75 - 125	1	20

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
 SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Beryllium	ND		0.500	0.4837		mg/L		97	75 - 125	1	20
Lithium	0.00497	J B	0.500	0.4660		mg/L		92	75 - 125	2	20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals

### Prep Batch: 314367

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	3005A	
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	3005A	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	3005A	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	3005A	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	3005A	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	3005A	
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 314621

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367

### Analysis Batch: 314781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals (Continued)

### Analysis Batch: 314781 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367

# Chain of Custody Record 420758 eurofins

Environment Testing  
TestAmerica

Address: Pittsburgh, PA

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

Client Contact Company Name: <u>Jennifer Gabrels</u> Address: <u>ENVIRONMENTAL STANDARDS, INC</u> City/State/Zip: <u>MD. 935.5577 x 414</u> Phone: <u>MD. 935.5577 x 414</u> Fax: Project Name: <u>TVA Gallatin EIP</u> Site: <u>GAF-NRS-treatability</u> PO #		Project Manager: <u>Greg MacPhee</u> Tel/Email: <u>Greg.MacPhee@acccon.com</u> Site Contact: <u>Fernando Benayas</u> Lab Contact: <u>Rachel Watkins</u> Date: <u>4/28/2020</u> Carrier:		COC No: <u>    </u> of <u>    </u> COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.:			
Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Perform MS/MSD (Y/N) <input checked="" type="checkbox"/> Filtered Sample (Y/N) <input checked="" type="checkbox"/>					
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sample Specific Notes:	
GAF-GW-Bkt-PHI-Control-+1	4/27/20	1400	G	GW	2	Dissolved has been filtered	
GAF-GW-Bkt-PHI-FB22-+1	4/27/20	1400	G		1		
GAF-GW-Bkt-PHI-Dob-+1	4/27/20	1400	G		1		
GAF-GW-Bkt-PHI-Hi.Cal-+1	4/27/20	1400	G		1		
GAF-GW-Bkt-PHI-Hi.Cal-Calc2-+1	4/27/20	1400	G		1		
GAF-GW-WC-PHI-NaOH-zeolite-+1	4/27/20	1400	G		2		
GAF-GW-WC-PHI-444u-+1	4/27/20	1400	G	↓	2		
GAF-GW-Bkt-PHI-Soil control-+1	4/27/20	1200	G	↓	2		
GAF-GW-Bkt-PHI-FB22 Soil-+1	4/27/20	1200	G	↓	2		
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Special Instructions/QC Requirements & Comments: <u>total bottles were not filtered</u>							
Custody Seal No.:		Cooler Temp. (°C):		Obs'd:		Therm ID No.:	
Relinquished by: <u>Rachel Watkins</u>		Company: <u>AECON</u>		Received by: <u>John</u>		Company: <u>EMPAK</u>	
Relinquished by:		Company:		Received by:		Company:	
Relinquished by:		Company:		Received in Laboratory by:		Company:	



180-105162 Chain of Custody



## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-105162-1  
SDG Number: GAF NRS Treatability

**Login Number: 105162**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

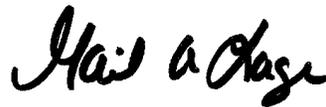
Laboratory Job ID: 180-106348-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA GAF AECOM Lab  
Revision: 1

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:29:01 PM

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-106348-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative  
180-106348-1**

**Revised Report**

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

**Receipt**

The samples were received on 5/29/2020 8:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2° C.

**Metals**

Methods 6020A: The ICVL recovered below 80% recovery for nickel(actual 77%) for 6020B method but passes for 6020A method with accompanying QC passing.

Methods 6020A: The following samples were diluted due to the high concentration of sodium in the sample matrix: (CCVL 180-317494/108), (180-106149-E-3-A ^10), (180-106149-E-3-B MS ^10) and (180-106149-E-3-A SD ^50). Elevated reporting limits (RLs) are provided.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-26-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	07-01-20
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-106348-1	GAF-BKT-PHII-CONTROL-T1-19R-SAND	Water	05/28/20 13:00	05/29/20 08:45	
180-106348-2	GAF-BKT-PHII-FB22-T1-SAND	Water	05/28/20 13:00	05/29/20 08:45	
180-106348-3	GAF-BKT-PHII-HICAL-T1-SAND	Water	05/28/20 13:00	05/29/20 08:45	
180-106348-4	GAF-BKT-PHII-HICAL-CACL2-T1-SAND	Water	05/28/20 13:00	05/29/20 08:45	
180-106348-5	GAF-BKT-PHII-DOLO-T1-444U-SAND	Water	05/28/20 13:00	05/29/20 08:45	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-19R-SAND**

**Lab Sample ID: 180-106348-1**

**Date Collected: 05/28/20 13:00**

**Matrix: Water**

**Date Received: 05/29/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317358	06/03/20 05:15	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317494	06/04/20 02:10	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-BKT-PHII-FB22-T1-SAND**

**Lab Sample ID: 180-106348-2**

**Date Collected: 05/28/20 13:00**

**Matrix: Water**

**Date Received: 05/29/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317358	06/03/20 05:18	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317494	06/04/20 02:13	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-BKT-PHII-HICAL-T1-SAND**

**Lab Sample ID: 180-106348-3**

**Date Collected: 05/28/20 13:00**

**Matrix: Water**

**Date Received: 05/29/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317358	06/03/20 05:22	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317494	06/04/20 02:17	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-BKT-PHII-HICAL-CACL2-T1-SAND**

**Lab Sample ID: 180-106348-4**

**Date Collected: 05/28/20 13:00**

**Matrix: Water**

**Date Received: 05/29/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317358	06/03/20 05:25	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317494	06/04/20 02:20	RSK	TAL PIT
Instrument ID: DORY										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-BKT-PHII-DOLO-T1-444U-SAND**

**Lab Sample ID: 180-106348-5**

**Date Collected: 05/28/20 13:00**

**Matrix: Water**

**Date Received: 05/29/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317358	06/03/20 05:36	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	316937	05/29/20 15:06	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			317494	06/04/20 02:24	RSK	TAL PIT
Instrument ID: DORY										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

## Client Sample ID: GAF-BKT-PHII-CONTROL-T1-19R-SAND

Lab Sample ID: 180-106348-1

Date Collected: 05/28/20 13:00

Matrix: Water

Date Received: 05/29/20 08:45

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00308		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 05:15	1
Cadmium	0.00853		0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 05:15	1
Lithium	0.0605		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 05:15	1
Nickel	0.292		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 02:10	1

## Client Sample ID: GAF-BKT-PHII-FB22-T1-SAND

Lab Sample ID: 180-106348-2

Date Collected: 05/28/20 13:00

Matrix: Water

Date Received: 05/29/20 08:45

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 05:18	1
Cadmium	ND		0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 05:18	1
Lithium	0.0203		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 05:18	1
Nickel	0.0102		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 02:13	1

## Client Sample ID: GAF-BKT-PHII-HICAL-T1-SAND

Lab Sample ID: 180-106348-3

Date Collected: 05/28/20 13:00

Matrix: Water

Date Received: 05/29/20 08:45

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 05:22	1
Cadmium	0.000344	J	0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 05:22	1
Lithium	0.0133		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 05:22	1
Nickel	0.0104		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 02:17	1

## Client Sample ID: GAF-BKT-PHII-HICAL-CACL2-T1-SAND

Lab Sample ID: 180-106348-4

Date Collected: 05/28/20 13:00

Matrix: Water

Date Received: 05/29/20 08:45

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 05:25	1
Cadmium	0.00138		0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 05:25	1
Lithium	0.0134		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 05:25	1
Nickel	0.00844		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 02:20	1

## Client Sample ID: GAF-BKT-PHII-DOLO-T1-444U-SAND

Lab Sample ID: 180-106348-5

Date Collected: 05/28/20 13:00

Matrix: Water

Date Received: 05/29/20 08:45

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 05:36	1
Cadmium	ND		0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 05:36	1
Lithium	ND		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 05:36	1
Nickel	0.00369		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 02:24	1

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-316937/1-A**  
**Matrix: Water**  
**Analysis Batch: 317358**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 316937**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/29/20 15:06	06/03/20 04:37	1
Cadmium	ND		0.00100	0.000217	mg/L		05/29/20 15:06	06/03/20 04:37	1
Lithium	ND		0.00500	0.00339	mg/L		05/29/20 15:06	06/03/20 04:37	1

**Lab Sample ID: MB 180-316937/1-A**  
**Matrix: Water**  
**Analysis Batch: 317614**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 316937**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	ND		0.00100	0.000336	mg/L		05/29/20 15:06	06/04/20 19:12	1

**Lab Sample ID: LCS 180-316937/2-A**  
**Matrix: Water**  
**Analysis Batch: 317358**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 316937**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.500	0.4863		mg/L		97	80 - 120
Cadmium	0.500	0.4863		mg/L		97	80 - 120
Lithium	0.500	0.4538		mg/L		91	80 - 120

**Lab Sample ID: LCS 180-316937/2-A**  
**Matrix: Water**  
**Analysis Batch: 317494**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 316937**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Nickel	0.500	0.4891		mg/L		98	80 - 120

**Lab Sample ID: 180-106149-E-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 317358**

**Client Sample ID: Matrix Spike**  
**Prep Type: Dissolved**  
**Prep Batch: 316937**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.00138		0.500	0.4955		mg/L		99	75 - 125
Cadmium	0.000395	J	0.500	0.4793		mg/L		96	75 - 125
Lithium	ND		0.500	0.4722		mg/L		94	75 - 125

**Lab Sample ID: 180-106149-E-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 317358**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Dissolved**  
**Prep Batch: 316937**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Beryllium	0.00138		0.500	0.4779		mg/L		95	75 - 125	4	20
Cadmium	0.000395	J	0.500	0.4695		mg/L		94	75 - 125	2	20
Lithium	ND		0.500	0.4570		mg/L		91	75 - 125	3	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-106348-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 316937

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106348-1	GAF-BKT-PHII-CONTROL-T1-19R-SAND	Total Recoverable	Water	3005A	
180-106348-2	GAF-BKT-PHII-FB22-T1-SAND	Total Recoverable	Water	3005A	
180-106348-3	GAF-BKT-PHII-HICAL-T1-SAND	Total Recoverable	Water	3005A	
180-106348-4	GAF-BKT-PHII-HICAL-CACL2-T1-SAND	Total Recoverable	Water	3005A	
180-106348-5	GAF-BKT-PHII-DOLO-T1-444U-SAND	Total Recoverable	Water	3005A	
MB 180-316937/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-316937/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-106149-E-3-B MS	Matrix Spike	Dissolved	Water	3005A	
180-106149-E-3-C MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	

### Analysis Batch: 317358

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106348-1	GAF-BKT-PHII-CONTROL-T1-19R-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-2	GAF-BKT-PHII-FB22-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-3	GAF-BKT-PHII-HICAL-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-4	GAF-BKT-PHII-HICAL-CACL2-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-5	GAF-BKT-PHII-DOLO-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	316937
MB 180-316937/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	316937
LCS 180-316937/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	316937
180-106149-E-3-B MS	Matrix Spike	Dissolved	Water	EPA 6020A	316937
180-106149-E-3-C MSD	Matrix Spike Duplicate	Dissolved	Water	EPA 6020A	316937

### Analysis Batch: 317494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106348-1	GAF-BKT-PHII-CONTROL-T1-19R-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-2	GAF-BKT-PHII-FB22-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-3	GAF-BKT-PHII-HICAL-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-4	GAF-BKT-PHII-HICAL-CACL2-T1-SAND	Total Recoverable	Water	EPA 6020A	316937
180-106348-5	GAF-BKT-PHII-DOLO-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	316937
LCS 180-316937/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	316937

### Analysis Batch: 317614

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 180-316937/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	316937

# Chain of Custody Record 420757 eurofins

Environment Testing  
TestAmerica

301 Alpha Dr.  
Pittsburgh, PA 15238

Address:

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

Company Name: Environmental Standards		Client Contact		Project Manager: Craig MacPhee		Site Contact: Francisco Bujaya		COC No: 1 of 1 COCs	
Address:		City/State/Zip:		Tel/Email: Craig.MacPhee@ae.com		Lab Contact: Rachel Watkins		Date: 5/28/2020	
Phone: 412.935.5577		Fax: X 414		Analysis Turnaround Time		Carrier:		Sampler:	
Project Name: TVA Gallatin EIP		Site: GAF-NRS - Treatability		<input type="checkbox"/> CALENDAR DAYS <input checked="" type="checkbox"/> WORKING DAYS TAT if different from Below <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Perform MS / MSD (Y / N) Filtered Sample (Y / N)		For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.:	
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Sample Specific Notes:	
GAF-Bkt-PHII-Control - +1-19R-Sand	5/28/20	1300	G	GW	1	N	N	6020 hrs - Be, Cd, Ni, V	
GAF-Bkt-PHII-FB22 - +1-Sand	5/28/20	1300	G						
GAF-Bkt-PHII-Hi.Cal - +1-Sand	5/28/20	1300	G						
GAF-Bkt-PHII-Hi.Cal - CaCl2 - +1-Sand	5/28/20	1300	G						
GAF-Bkt-PHII-Dolo - +1-444u-Sand	5/28/20	1300	G						
 180-106348 Chain of Custody									
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.									
Special Instructions/QC Requirements & Comments:									
Custody Seal Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C):		Obs'd:		Corr'd:	
Relinquished by: Rachel Watkins		Company: AECOM		Date/Time: 5/28/20		Received by: [Signature]		Company: EPNM	
Relinquished by:		Company:		Date/Time:		Received by:		Company:	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Company:	

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Environment Testing  
TestAmerica

ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARRAJAS  
RECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78728  
UNITED STATES US

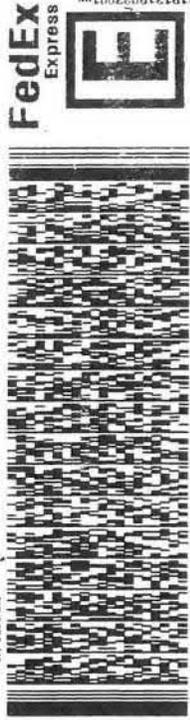
SHIP DATE: 28FEB20  
ACT WGT: 10.00 LB MAN  
CAD: 05662071/CAF E3311

TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7066  
REF: \$180-58963

RMA: |||||



RETURNS MON - SAT  
PRIORITY OVERNIGHT  
FRI - 29 MAY 10:30A  
PRIORITY OVERNIGHT

FedEx  
TRK# 1680 3500 1559

XH AGCA

15238  
PA-US  
PIT

Uncorrected temp 22 °C  
Thermometer ID 17

CF 0 Initials B

PT-WI-SR-001 effective 7/26/13

FID 171128 28MAY20 MHRA 56832025/01A2



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# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-106348-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 106348**  
**List Number: 1**  
**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



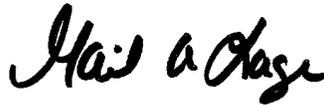
## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-106806-1  
Client Project/Site: GAF NRS Treatability  
Revision: 2

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
8/28/2020 8:39:39 PM  
Gail Lage, Senior Project Manager  
(615)301-5741  
[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for  
Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

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**Job ID: 180-106806-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative  
180-106806-1**

**Revised Report**

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

**Receipt**

The samples were received on 6/10/2020 10:30 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.3° C.

**Metals**

Method 6020A: The low level continuing calibration verification (CCVL) associated with batch 180-318395 recovered above the upper control limit for boron. The samples associated with this CCVL were 10X the RL for the affected analytes; therefore, the data have been reported.

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-26-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	07-01-20
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-106806-1	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Water	06/04/20 11:30	06/10/20 10:30	
180-106806-2	GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2	Water	06/04/20 11:30	06/10/20 10:30	
180-106806-3	GAF-GW-BKT-PHII-DOLO-444U-SAND-T2	Water	06/04/20 11:30	06/10/20 10:30	
180-106806-4	GAF-GW-BKT-PHII-FB22-SAND-19R-T2	Water	06/04/20 11:30	06/10/20 10:30	
180-106806-5	GAF-GW-BKT-PHII-HICAL-SAND-19R-T2	Water	06/04/20 11:45	06/10/20 10:30	
180-106806-6	GAF-GW-BKT-PHII-DOLO-19R-SAND-T1	Water	06/04/20 11:45	06/10/20 10:30	
180-106806-7	GAF-GW-BKT-PHII-NAOH-SAND-19R-T1	Water	06/04/20 11:45	06/10/20 10:30	
180-106806-8	GAF-GW-BKT-PHII-HICAL-CACL2-SAND-19R-T 2	Water	06/04/20 11:45	06/10/20 10:30	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND**

**Lab Sample ID: 180-106806-1**

**Date Collected: 06/04/20 11:30**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 02:50	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318395	06/13/20 02:26	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2**

**Lab Sample ID: 180-106806-2**

**Date Collected: 06/04/20 11:30**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:07	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318395	06/13/20 02:43	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHII-DOLO-444U-SAND-T2**

**Lab Sample ID: 180-106806-3**

**Date Collected: 06/04/20 11:30**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:11	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318395	06/13/20 02:47	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHII-FB22-SAND-19R-T2**

**Lab Sample ID: 180-106806-4**

**Date Collected: 06/04/20 11:30**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:14	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318395	06/13/20 02:50	RSK	TAL PIT
Instrument ID: DORY										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

**Client Sample ID: GAF-GW-BKT-PHII-HICAL-SAND-19R-T2**

**Lab Sample ID: 180-106806-5**

**Date Collected: 06/04/20 11:45**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:18	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318395	06/13/20 02:54	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHII-DOLO-19R-SAND-T1**

**Lab Sample ID: 180-106806-6**

**Date Collected: 06/04/20 11:45**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:28	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHII-NAOH-SAND-19R-T1**

**Lab Sample ID: 180-106806-7**

**Date Collected: 06/04/20 11:45**

**Matrix: Water**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:32	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID:**

**Lab Sample ID: 180-106806-8**

**GAF-GW-BKT-PHII-HICAL-CACL2-SAND-19R-T2**

**Matrix: Water**

**Date Collected: 06/04/20 11:45**

**Date Received: 06/10/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	318073	06/10/20 14:33	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			318327	06/12/20 03:35	RSK	TAL PIT
Instrument ID: DORY										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

Batch Type: Analysis

RSK = Robert Kurtz

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND**

**Lab Sample ID: 180-106806-1**

Date Collected: 06/04/20 11:30

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	7.70		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 02:50	1
Cadmium	0.481	J	1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:26	1
Lithium	6.88		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 02:50	1
Nickel	8.69		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:26	1

**Client Sample ID: GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2**

**Lab Sample ID: 180-106806-2**

Date Collected: 06/04/20 11:30

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.574	J	1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:07	1
Cadmium	10.6		1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:43	1
Lithium	44.4		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:07	1
Nickel	414		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:43	1

**Client Sample ID: GAF-GW-BKT-PHII-DOLO-444U-SAND-T2**

**Lab Sample ID: 180-106806-3**

Date Collected: 06/04/20 11:30

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:11	1
Cadmium	0.256	J	1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:47	1
Lithium	ND		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:11	1
Nickel	8.16		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:47	1

**Client Sample ID: GAF-GW-BKT-PHII-FB22-SAND-19R-T2**

**Lab Sample ID: 180-106806-4**

Date Collected: 06/04/20 11:30

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.220	J	1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:14	1
Cadmium	0.749	J	1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:50	1
Lithium	42.0		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:14	1
Nickel	24.6		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:50	1

**Client Sample ID: GAF-GW-BKT-PHII-HICAL-SAND-19R-T2**

**Lab Sample ID: 180-106806-5**

Date Collected: 06/04/20 11:45

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:18	1
Cadmium	0.551	J	1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:54	1
Lithium	18.0		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:18	1
Nickel	25.2		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:54	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

**Client Sample ID: GAF-GW-BKT-PHII-DOLO-19R-SAND-T1**

**Lab Sample ID: 180-106806-6**

Date Collected: 06/04/20 11:45

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.09		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:28	1
Cadmium	1.95		1.00	0.217	ug/L		06/10/20 14:33	06/12/20 03:28	1
Lithium	18.5		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:28	1
Nickel	56.2		1.00	0.336	ug/L		06/10/20 14:33	06/12/20 03:28	1

**Client Sample ID: GAF-GW-BKT-PHII-NAOH-SAND-19R-T1**

**Lab Sample ID: 180-106806-7**

Date Collected: 06/04/20 11:45

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.09		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:32	1
Cadmium	1.36		1.00	0.217	ug/L		06/10/20 14:33	06/12/20 03:32	1
Lithium	13.1		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:32	1
Nickel	51.8		1.00	0.336	ug/L		06/10/20 14:33	06/12/20 03:32	1

**Client Sample ID:**

**Lab Sample ID: 180-106806-8**

**GAF-GW-BKT-PHII-HICAL-CACL2-SAND-19R-T2**

Date Collected: 06/04/20 11:45

Matrix: Water

Date Received: 06/10/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 03:35	1
Cadmium	0.590	J	1.00	0.217	ug/L		06/10/20 14:33	06/12/20 03:35	1
Lithium	22.8		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 03:35	1
Nickel	15.7		1.00	0.336	ug/L		06/10/20 14:33	06/12/20 03:35	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-318073/1-A**  
**Matrix: Water**  
**Analysis Batch: 318327**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		06/10/20 14:33	06/12/20 02:33	1
Lithium	ND		5.00	3.39	ug/L		06/10/20 14:33	06/12/20 02:33	1

**Lab Sample ID: MB 180-318073/1-A**  
**Matrix: Water**  
**Analysis Batch: 318395**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		06/10/20 14:33	06/13/20 02:05	1
Nickel	ND		1.00	0.336	ug/L		06/10/20 14:33	06/13/20 02:05	1

**Lab Sample ID: LCS 180-318073/2-A**  
**Matrix: Water**  
**Analysis Batch: 318327**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	500	524.4		ug/L		105	80 - 120
Lithium	500	517.2		ug/L		103	80 - 120

**Lab Sample ID: LCS 180-318073/2-A**  
**Matrix: Water**  
**Analysis Batch: 318395**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	500	552.1		ug/L		110	80 - 120
Nickel	500	539.5		ug/L		108	80 - 120

**Lab Sample ID: 180-106806-1 MS**  
**Matrix: Water**  
**Analysis Batch: 318327**

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	7.70		500	527.5		ug/L		104	75 - 125
Lithium	6.88		500	531.5		ug/L		105	75 - 125

**Lab Sample ID: 180-106806-1 MS**  
**Matrix: Water**  
**Analysis Batch: 318395**

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.481	J	500	540.7		ug/L		108	75 - 125
Nickel	8.69		500	542.6		ug/L		107	75 - 125

**Lab Sample ID: 180-106806-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 318327**

**Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND**  
**Prep Type: Total Recoverable**  
**Prep Batch: 318073**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	7.70		500	529.8		ug/L		104	75 - 125	0	20
Lithium	6.88		500	533.4		ug/L		105	75 - 125	0	20

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

## Method: EPA 6020A - Metals (ICP/MS)

Lab Sample ID: 180-106806-1 MSD  
Matrix: Water  
Analysis Batch: 318395

Client Sample ID: GAF-BKT-PHII-CONTROL-T1-444U-SAND  
Prep Type: Total Recoverable  
Prep Batch: 318073

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.481	J	500	538.5		ug/L		108	75 - 125	0	20
Nickel	8.69		500	536.6		ug/L		106	75 - 125	1	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-106806-1

## Metals

### Prep Batch: 318073

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106806-1	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	3005A	
180-106806-2	GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2	Total Recoverable	Water	3005A	
180-106806-3	GAF-GW-BKT-PHII-DOLO-444U-SAND-T2	Total Recoverable	Water	3005A	
180-106806-4	GAF-GW-BKT-PHII-FB22-SAND-19R-T2	Total Recoverable	Water	3005A	
180-106806-5	GAF-GW-BKT-PHII-HICAL-SAND-19R-T2	Total Recoverable	Water	3005A	
180-106806-6	GAF-GW-BKT-PHII-DOLO-19R-SAND-T1	Total Recoverable	Water	3005A	
180-106806-7	GAF-GW-BKT-PHII-NAOH-SAND-19R-T1	Total Recoverable	Water	3005A	
180-106806-8	GAF-GW-BKT-PHII-HICAL-CACL2-SAND-19R-T	Total Recoverable	Water	3005A	
MB 180-318073/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-318073/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-106806-1 MS	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	3005A	
180-106806-1 MSD	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	3005A	

### Analysis Batch: 318327

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106806-1	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073
180-106806-2	GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-3	GAF-GW-BKT-PHII-DOLO-444U-SAND-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-4	GAF-GW-BKT-PHII-FB22-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-5	GAF-GW-BKT-PHII-HICAL-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-6	GAF-GW-BKT-PHII-DOLO-19R-SAND-T1	Total Recoverable	Water	EPA 6020A	318073
180-106806-7	GAF-GW-BKT-PHII-NAOH-SAND-19R-T1	Total Recoverable	Water	EPA 6020A	318073
180-106806-8	GAF-GW-BKT-PHII-HICAL-CACL2-SAND-19R-T	Total Recoverable	Water	EPA 6020A	318073
MB 180-318073/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	318073
LCS 180-318073/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	318073
180-106806-1 MS	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073
180-106806-1 MSD	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073

### Analysis Batch: 318395

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-106806-1	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073
180-106806-2	GAF-GW-BKT-PHII-CONTROL-19R-SAND-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-3	GAF-GW-BKT-PHII-DOLO-444U-SAND-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-4	GAF-GW-BKT-PHII-FB22-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	318073
180-106806-5	GAF-GW-BKT-PHII-HICAL-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	318073
MB 180-318073/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	318073
LCS 180-318073/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	318073
180-106806-1 MS	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073
180-106806-1 MSD	GAF-BKT-PHII-CONTROL-T1-444U-SAND	Total Recoverable	Water	EPA 6020A	318073

# Chain of Custody Record 420756 eurofins

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

<b>Client Contact</b> Company Name: ENVIRONMENTAL Address: City/State/Zip: P.O. 935.5577 X414 Phone: Fax: Project Name: TVA Gallatin EIP Site: GAF - NRS - Treatability P.O.#		<b>Project Manager: Craig MacPhail</b> Tel/Email: craig.macphail@calcom.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact: Franciso Buesing</b> Date: 6/14/2020 Lab Contact: Rachel Watkins Carrier:		COC No: _____ of _____ COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.:					
Sample Identification			Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes:	
GAF - Bkt - PHII - Control - 1-1444u - Sand			6/14/20	1130	G	GW	1	N	✓	 180-106806 Chain of Custody	
GAF - GW - Bkt - PHII - Control - 19R - Sand - 12			6/14/20	1130			1	N	✓		
GAF - GW - Bkt - PHII - Dolo - 444u - Sand - 12			6/14/20	1130			1	N	✓		
GAF - GW - Bkt - PHII - FB22 - Sand - 19R - 12			6/14/20	1130			1	N	✓		
GAF - GW - Bkt - PHII - Hi-Cal - Sand - 19R - 12			6/14/20	1145			1	N	✓		
GAF - GW - Bkt - PHII - Dolo - 19R - Sand - 11			6/14/20	1145			1	N	✓		
GAF - GW - Bkt - PHII - NaOH - Sand - 19R - 11			6/14/20	1145			1	N	✓		
GAF - GW - Bkt - PHII - Hi-Cal - CaCl2 - Sand - 19R - 12			6/14/20	1145			1	N	✓		
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown											
<b>Special Instructions/QC Requirements &amp; Comments:</b>											
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No Relinquished by: Rachel Watkins Relinquished by:		Custody Seal No.: Company: AECOM Company:		Date/Time: 6/12/20 1400 Date/Time:		Received by:  Received by:		Date/Time: 6/10/20 1030 Date/Time:		Company: EPM Company:	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Date/Time:		Company:	



Do Not Lift Using This Tag



Environment Testing  
TestAmerica

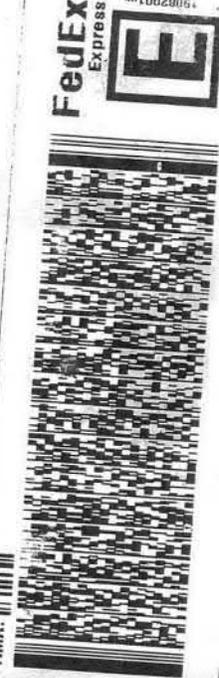
ORIGIN ID: 100A (512) 454-4797  
FRANCISCO BRAUNAS  
RECOM  
5400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WT: 10.00 LB  
CRD: 0562071/CAFE3911

TO

EUROFINS TESTAMERICA - PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907  
(412) 963-7066  
REF: \$180 - 58963

RMA:



FedEx

TRK# 1680 3500 1560  
0221

WED - 10 JUN 10:30A  
PRIORITY OVERNIGHT

XH AGCA

15238  
PA-US  
PIT

Uncorrected temp \_\_\_\_\_ °C  
Thermometer ID Y13  
CF 0 Initials JJ

PT-WLSR-001 effective 7/25/13  
1711129 99Jun2020 MRA 566C1/C700/85A2



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# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-106806-1

**Login Number: 106806**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-107627-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA Gallatin EIP  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:58:43 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-107627-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative  
180-107627-1**

**Revised Report**

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

**Receipt**

The samples were received on 6/26/2020 9:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 3.2° C.

**Metals**

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Water	06/18/20 13:00	06/26/20 09:00	
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Water	06/24/20 13:00	06/26/20 09:00	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Water	06/24/20 13:00	06/26/20 09:00	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-1**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:33	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:37	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-3**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		1			320452	07/03/20 02:40	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-4**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Dissolved	Analysis	EPA 6020A		1			320452	07/03/20 02:44	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**

**Lab Sample ID: 180-107627-5**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 02:47	RSK	TAL PIT
Instrument ID: DORY										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHII-BKT-HICALACL2-SAND-19R-T3**

**Lab Sample ID: 180-107627-6**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:11	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-NAOH-SAND-19R-T2**

**Lab Sample ID: 180-107627-7**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:15	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-19R-T2**

**Lab Sample ID: 180-107627-8**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:18	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T3**

**Lab Sample ID: 180-107627-9**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:22	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-107627-10**

**Date Collected: 06/24/20 13:00**

**Matrix: Water**

**Date Received: 06/26/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:25	RSK	TAL PIT
Instrument ID: DORY										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-FB22-SAND-19R-T3**

**Lab Sample ID: 180-107627-11**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:29	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T3**

**Lab Sample ID: 180-107627-12**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:32	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320070	06/30/20 15:24	JL	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			320452	07/03/20 03:36	RSK	TAL PIT
Instrument ID: DORY										

## Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

## Analyst References:

Lab: TAL PIT

Batch Type: Prep

JL = James Lyu

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-1**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0802		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:33	1
Cadmium	0.0152		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:33	1
Lithium	0.118		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:33	1
Nickel	1.50		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:33	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-2**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:37	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:37	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:37	1
Nickel	0.000929	J	0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:37	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T2**

**Lab Sample ID: 180-107627-3**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0817		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:40	1
Cadmium	0.0147		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:40	1
Lithium	0.117		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:40	1
Nickel	1.47		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:40	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T2**

**Lab Sample ID: 180-107627-4**

Date Collected: 06/18/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:44	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:44	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:44	1
Nickel	0.000703	J	0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:44	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**

**Lab Sample ID: 180-107627-5**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00212		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:47	1
Cadmium	0.00324		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:47	1
Lithium	0.0451		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:47	1
Nickel	0.178		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:47	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHII-BKT-HICALACL2-SAND-19R-T3**

**Lab Sample ID: 180-107627-6**

**Date Collected: 06/24/20 13:00**  
**Date Received: 06/26/20 09:00**

**Matrix: Water**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00219		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:11	1
Cadmium	0.00307		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:11	1
Lithium	0.0469		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:11	1
Nickel	0.175		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:11	1

**Client Sample ID: GAF-GW-PHII-BKT-NAOH-SAND-19R-T2**

**Lab Sample ID: 180-107627-7**

**Date Collected: 06/24/20 13:00**  
**Date Received: 06/26/20 09:00**

**Matrix: Water**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:15	1
Cadmium	0.00219		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:15	1
Lithium	0.0228		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:15	1
Nickel	0.0769		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:15	1

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-19R-T2**

**Lab Sample ID: 180-107627-8**

**Date Collected: 06/24/20 13:00**  
**Date Received: 06/26/20 09:00**

**Matrix: Water**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:18	1
Cadmium	0.00276		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:18	1
Lithium	0.0237		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:18	1
Nickel	0.0654		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:18	1

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T3**

**Lab Sample ID: 180-107627-9**

**Date Collected: 06/24/20 13:00**  
**Date Received: 06/26/20 09:00**

**Matrix: Water**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:22	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:22	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:22	1
Nickel	0.00252		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:22	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-107627-10**

**Date Collected: 06/24/20 13:00**  
**Date Received: 06/26/20 09:00**

**Matrix: Water**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00715		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:25	1
Cadmium	0.00980		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:25	1
Lithium	0.0694		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:25	1
Nickel	0.521		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:25	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-FB22-SAND-19R-T3**

**Lab Sample ID: 180-107627-11**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:29	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:29	1
Lithium	0.0460		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:29	1
Nickel	0.0301		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:29	1

**Client Sample ID: GAF-GW-PHII-BKT-CONTROL-441USOIL-T3**

**Lab Sample ID: 180-107627-12**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0843		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:32	1
Cadmium	0.0146		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:32	1
Lithium	0.116		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:32	1
Nickel	1.48		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:32	1

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-441USOIL-T3**

**Lab Sample ID: 180-107627-13**

Date Collected: 06/24/20 13:00

Matrix: Water

Date Received: 06/26/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000461	J	0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 03:36	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 03:36	1
Lithium	0.00541		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 03:36	1
Nickel	0.00586		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 03:36	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-320070/1-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		06/30/20 15:24	07/03/20 02:16	1
Cadmium	ND		0.00100	0.000217	mg/L		06/30/20 15:24	07/03/20 02:16	1
Lithium	ND		0.00500	0.00339	mg/L		06/30/20 15:24	07/03/20 02:16	1
Nickel	ND		0.00100	0.000336	mg/L		06/30/20 15:24	07/03/20 02:16	1

**Lab Sample ID: LCS 180-320070/2-A**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.500	0.5125		mg/L		102	80 - 120
Cadmium	0.500	0.5007		mg/L		100	80 - 120
Lithium	0.500	0.5116		mg/L		102	80 - 120
Nickel	0.500	0.4986		mg/L		100	80 - 120

**Lab Sample ID: 180-107627-5 MS**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.00212		0.500	0.5076		mg/L		101	75 - 125
Cadmium	0.00324		0.500	0.5101		mg/L		101	75 - 125
Lithium	0.0451		0.500	0.5549		mg/L		102	75 - 125
Nickel	0.178		0.500	0.6812		mg/L		101	75 - 125

**Lab Sample ID: 180-107627-5 MSD**  
**Matrix: Water**  
**Analysis Batch: 320452**

**Client Sample ID: GAF-GW-PHII-BKT-HICAL-SAND-19R-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320070**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	0.00212		0.500	0.4919		mg/L		98	75 - 125	3	20
Cadmium	0.00324		0.500	0.4930		mg/L		98	75 - 125	3	20
Lithium	0.0451		0.500	0.5336		mg/L		98	75 - 125	4	20
Nickel	0.178		0.500	0.6460		mg/L		94	75 - 125	5	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-107627-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 320070

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Total Recoverable	Water	3005A	
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	3005A	
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Dissolved	Water	3005A	
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Dissolved	Water	3005A	
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Total Recoverable	Water	3005A	
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Total Recoverable	Water	3005A	
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Total Recoverable	Water	3005A	
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Total Recoverable	Water	3005A	
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	3005A	
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-107627-5 MS	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-107627-5 MSD	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	3005A	

### Analysis Batch: 320452

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107627-1	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-2	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-3	GAF-GW-PHII-BKT-CONTROL-441USOIL-T2	Dissolved	Water	EPA 6020A	320070
180-107627-4	GAF-GW-PHII-BKT-HICAL-441USOIL-T2	Dissolved	Water	EPA 6020A	320070
180-107627-5	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-6	GAF-GW-PHII-BKT-HICALCACL2-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-7	GAF-GW-PHII-BKT-NAOH-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-8	GAF-GW-PHII-BKT-DOLO-SAND-19R-T2	Total Recoverable	Water	EPA 6020A	320070
180-107627-9	GAF-GW-PHII-BKT-DOLO-SAND-444U-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-10	GAF-GW-PHII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-11	GAF-GW-PHII-BKT-FB22-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-12	GAF-GW-PHII-BKT-CONTROL-441USOIL-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-13	GAF-GW-PHII-BKT-HICAL-441USOIL-T3	Total Recoverable	Water	EPA 6020A	320070
MB 180-320070/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	320070
LCS 180-320070/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	320070
180-107627-5 MS	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070
180-107627-5 MSD	GAF-GW-PHII-BKT-HICAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	320070

# Chain of Custody Record 420755 eurofins

Environment Testing  
TestAmerica

Address: 301 Alpha Dr.  
Pittsburgh PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

TAL-8210

Project Manager: Greg MacPhee Site Contact: Francisco Barias Date: 6/25/2020 COC No. 1 of 2 COGs

Tel/Email: enviro@eurofins.com Lab Contact: Rachel Watkins Carrier: 6204 Solved - Be, Cd, Ni

Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS

TAT if different from Below:  2 weeks  1 week  2 days  1 day

City/State/Zip: 10. 935. 5577 x 414

Project Name: TVA Gallatin EIP

Site: GAF - NRS - Treatability

P O #

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes:	
								6204 Solved - Be, Cd, Ni	6204 Solved - Be, Cd, Ni
GAF-GW-PHII-Bkt-Control-4446 So. 1-12	6/18/20	1300	G	GW	1	N	N	Adsorbed Be, Cd, Ni	
GAF-GW-PHII-Bkt-Hi Cal-441 So. 1-12	6/18/20	1300	G	GW	1	N	N	Adsorbed Be, Cd, Ni	
GAF-GW-PHII-Bkt-Control-4446 So. 1-12	6/18/20	1300	G	GW	1	N	N	Dissolved Be, Cd, Ni	
GAF-GW-PHII-Bkt-Hi Cal-441 So. 1-12	6/18/20	1300	G	GW	1	N	N	Dissolved Be, Cd, Ni	
GAF-GW-PHII-Bkt-Hi Cal-Sand-19R-13	6/24/20	1300	G	GW	1	N	N		
GAF-GW-PHII-Bkt-Hi Cal-1012-Sand-19R-13									
GAF-GW-PHII-Bkt-NaOH-Sand-19R-12									
GAF-GW-PHII-Bkt-Dolo-Sand-19R-12									
GAF-GW-PHII-Bkt-Dolo-Sand-4444-13									
GAF-GW-PHII-Bkt-Control-Sand-19R-13									
GAF-GW-PHII-Bkt-FB22-Sand-19R-13									

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

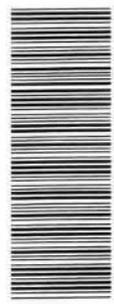
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Special Instructions/QC Requirements & Comments:

Sample Disposal (A fee may be assessed if samples are):  Return to Client  Disposal by Lab  An

Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Cor'd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Relinquished by: <u>Rachel Watkins</u>	Company: <u>AECOM</u>	Date/Time: <u>6/25/2020 1500</u>	Received by: <u>[Signature]</u>	Company: <u>[Signature]</u>	Date/Time: <u>6/26/20 900</u>
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:



180-107627 Chain of Custody



# Chain of Custody Record 420753

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

<b>Client Contact</b> Company Name: Environmental Standards Address: City/State/Zip: Phone: 412.935.5577 x414 Fax: Project Name: TVA Gallatin EIP Site: GAF - NRS - Treatability P O #		<b>Project Manager:</b> Craig MacPhee Tel/Email: craig.macphee@eurofins.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below: <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact:</b> Francisco Briggs Date: 6/25/2020 Lab Contact: Rachel Watkins Carrier:		COC No: 2 of 2 COCs Sampler: For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: Sample Specific Notes:	
<b>Sample Identification</b> GAF-GW-PH II-BKT-Control-441usoil-t3 GAF-GW-PH II-BKT-Hi-Cal-441usoil-t3		Filtered Sample (Y/N) <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N Perform MS / MSD (Y/N) <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N		6020 tnta15-BcCdLiNi 6020 tnta15-BcCdLiNi		6020 tnta15-BcCdLiNi 6020 tnta15-BcCdLiNi	
Sample Date: 6/25/20 Sample Time: 1300 Sample Type: G Matrix: GW # of Cont.: 1		Sample Date: 6/25/20 Sample Time: 1500 Sample Type: G Matrix: GW # of Cont.: 1		Sample Date: 6/25/20 Sample Time: 1500 Sample Type: G Matrix: GW # of Cont.: 1		Sample Date: 6/25/20 Sample Time: 1500 Sample Type: G Matrix: GW # of Cont.: 1	
<b>Preservation Used:</b> 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other <b>Possible Hazard Identification:</b> Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown							
<b>Special Instructions/QC Requirements &amp; Comments:</b> Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months							
Relinquished by: Rachel Watkins Relinquished by:		Company: AECOM Company:		Received by: [Signature] Received by:		Company: GTM NW Company:	
Relinquished by:		Company:		Received in Laboratory by:		Company:	
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd:		Therm ID No.:	



rdw  
7/16/20  
rew

# Chain of Custody Record 420755 eurofins

Environment Testing  
TestAmerica

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Project Manager: Craig MacPherson  
Tel/Email: craig.m@eurofins.com / craig@eurofins.com

Site Contact: Kenneth Watkins  
Lab Contact: Kenneth Watkins

Date: 6/25/2020  
COC No: 1 of 2 COCs

Sampler: \_\_\_\_\_  
For Lab Use Only: \_\_\_\_\_  
Walk-In Client: \_\_\_\_\_  
Lab Sampling: \_\_\_\_\_  
Job / SDG No.: \_\_\_\_\_

Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS  
TAT if different from Below: \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes:
GAF-GW-PHII-Bkt-Control-44450:1-t2	6/18/20	1300	G	GW	1	N	N	620 dissolved - Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-44450:1-t2	6/18/20	1300	G	GW	1	N	N	620 dissolved - Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Control-44450:1-t2	6/18/20	1300	G	GW	1	N	N	dissolved Be, Cd, Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-44450:1-t2	6/18/20	1300	G	GW	1	N	N	Li, Ni
GAF-GW-PHII-Bkt-Hi Cal-Sand-19R-t3	6/24/20	1300	G	GW	1	N	N	
GAF-GW-PHII-Bkt-Hi Cal-19R-Sand-19R-t3								
GAF-GW-PHII-Bkt-NaOH-Sand-19R-t2								
GAF-GW-PHII-Bkt-Dolo-Sand-19R-t2								
GAF-GW-PHII-Bkt-Dolo-Sand-44450-t3								
GAF-GW-PHII-Bkt-Control-Sand-19R-t3								
GAF-GW-PHII-Bkt-FB22-Sand-19R-t3								

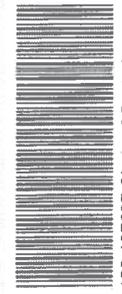
Preservation Used: 1=ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Sample Disposal (A fee may be assessed if samples are):  Return to Client  Disposal by Lab  Art



180-107627 Chain of Custody

Custody Seal No.: \_\_\_\_\_

Relinquished by: Rachel Watkins Date/Time: 6/25/2020 15:00

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received by: [Signature] Date/Time: 6/25/2020 15:00

Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received in Laboratory by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Company: AECOM

Company: \_\_\_\_\_

Company: \_\_\_\_\_

Company: EMM

Company: \_\_\_\_\_

Company: \_\_\_\_\_

Therm ID No.: \_\_\_\_\_

Corr'd: \_\_\_\_\_

Cooler Temp. (°C): \_\_\_\_\_

Obs'd: \_\_\_\_\_







Environment Testing  
TestAmerica

ORIGIN ID: PHDA (512) 454-4787  
FRANCISCO BARRAJAS  
REC'D  
37400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WGT: 30.00 LB TAN  
CAD: 05662071/CAFE3311

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058  
REF: \$180 - 58932

FMA: ||| ||| |||



FedEx  
Express



FedEx

PK# 1680 3500 0791

XH AGCA

FRI - 26 JUN 10:30A  
PRIORITY OVERNIGHT

15238  
PA-US  
PIT

Uncorrected temp 3.2 °C

Thermometer ID

CF  Initials

PT-WI-SR-001 effective 7/26/13

FID: 1711129 26Jun2020 MHBA 56CG1/C700/05A2



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-107627-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 107627**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-107846-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA GAF EIP

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
7/10/2020 3:23:49 PM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-107846-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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**Job Narrative**  
**180-107846-1**

### Receipt

The samples were received on 7/2/2020 8:30 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 11.0° C.

### Receipt Exceptions

The Field Sampler was not listed on the Chain of Custody.

### Metals

Methods 6020A: The continuing calibration blank (CCB) associated with batch 180-321088 recovered above the upper control limit for sodium. The samples associated with this CCB were 10X the RL for the affected analytes; therefore, the data have been reported.

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	08-01-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	05-23-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-107846-1	GAF-GW-PHII-Bkt-HiCal-Sand-19R-t4	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-2	GAF-GW-PHII-Bkt-HiCalCaCl2-Sand-19R-t4	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-3	GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-4	GAF-GW-PHII-Bkt-Dolo-Sand-19R-t3	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-5	GAF-GW-PHII-Bkt-Dolo-Sand-444a-t4	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-6	GAF-GW-PHII-Bkt-Control-Sand-19R-t4	Water	07/01/20 10:00	07/02/20 08:30	
180-107846-7	GAF-GW-PHII-Bkt-FB22-Sand-19R-t4	Water	07/01/20 10:00	07/02/20 08:30	



# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-Bkt-HiCal-Sand-19R-t4**

**Lab Sample ID: 180-107846-1**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:28	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-Bkt-HiCalCaCl2-Sand-19R-t4**

**Lab Sample ID: 180-107846-2**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:32	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3**

**Lab Sample ID: 180-107846-3**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:35	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-Bkt-Dolo-Sand-19R-t3**

**Lab Sample ID: 180-107846-4**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:38	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-Bkt-Dolo-Sand-444a-t4**

**Lab Sample ID: 180-107846-5**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:42	RSK	TAL PIT
Instrument ID: A										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-Bkt-Control-Sand-19R-t4**

**Lab Sample ID: 180-107846-6**

**Date Collected: 07/01/20 10:00**

**Matrix: Water**

**Date Received: 07/02/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:45	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-Bkt-FB22-Sand-19R-t4**

**Lab Sample ID: 180-107846-7**

**Date Collected: 07/01/20 10:00**

**Matrix: Water**

**Date Received: 07/02/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	320829	07/08/20 08:20	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321088	07/09/20 01:49	RSK	TAL PIT
Instrument ID: A										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

TJO = Tyler Oliver

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-Bkt-HiCal-Sand-19R-t4**

**Lab Sample ID: 180-107846-1**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	6.08		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:28	1
Beryllium	4.24		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:28	1
Nickel	295		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:28	1
Lithium	51.4		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:28	1

**Client Sample ID: GAF-GW-PHII-Bkt-HiCalCaCl2-Sand-19R-t4**

**Lab Sample ID: 180-107846-2**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	6.57		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:32	1
Beryllium	5.37		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:32	1
Nickel	351		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:32	1
Lithium	59.9		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:32	1

**Client Sample ID: GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3**

**Lab Sample ID: 180-107846-3**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	3.61		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:35	1
Beryllium	ND		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:35	1
Nickel	142		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:35	1
Lithium	23.0		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:35	1

**Client Sample ID: GAF-GW-PHII-Bkt-Dolo-Sand-19R-t3**

**Lab Sample ID: 180-107846-4**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	9.25		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:38	1
Beryllium	7.63		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:38	1
Nickel	345		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:38	1
Lithium	56.8		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:38	1

**Client Sample ID: GAF-GW-PHII-Bkt-Dolo-Sand-444a-t4**

**Lab Sample ID: 180-107846-5**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:42	1
Beryllium	ND		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:42	1
Nickel	2.12		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:42	1
Lithium	ND		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:42	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-Bkt-Control-Sand-19R-t4**

**Lab Sample ID: 180-107846-6**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	8.63		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:45	1
Beryllium	5.49		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:45	1
Nickel	502		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:45	1
Lithium	50.9		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:45	1

**Client Sample ID: GAF-GW-PHII-Bkt-FB22-Sand-19R-t4**

**Lab Sample ID: 180-107846-7**

Date Collected: 07/01/20 10:00

Matrix: Water

Date Received: 07/02/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 01:49	1
Beryllium	ND		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 01:49	1
Nickel	50.1		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 01:49	1
Lithium	46.4		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 01:49	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-320829/1-A**  
**Matrix: Water**  
**Analysis Batch: 321088**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320829**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		07/08/20 08:20	07/09/20 03:26	1
Beryllium	ND		1.00	0.182	ug/L		07/08/20 08:20	07/09/20 03:26	1
Nickel	ND		1.00	0.336	ug/L		07/08/20 08:20	07/09/20 03:26	1
Lithium	ND		5.00	3.39	ug/L		07/08/20 08:20	07/09/20 03:26	1

**Lab Sample ID: LCS 180-320829/2-A**  
**Matrix: Water**  
**Analysis Batch: 321088**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320829**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	500	486.8		ug/L		97	80 - 120
Beryllium	500	457.0		ug/L		91	80 - 120
Nickel	500	496.7		ug/L		99	80 - 120
Lithium	500	463.2		ug/L		93	80 - 120

**Lab Sample ID: 180-107308-D-2-C MS**  
**Matrix: Water**  
**Analysis Batch: 321088**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320829**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		500	463.9		ug/L		93	75 - 125
Beryllium	0.265	J	500	485.0		ug/L		97	75 - 125
Nickel	2.15		500	457.0		ug/L		91	75 - 125
Lithium	34.8		500	501.2		ug/L		93	75 - 125

**Lab Sample ID: 180-107308-D-2-D MSD**  
**Matrix: Water**  
**Analysis Batch: 321088**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 320829**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		500	476.5		ug/L		95	75 - 125	3	20
Beryllium	0.265	J	500	501.8		ug/L		100	75 - 125	3	20
Nickel	2.15		500	468.3		ug/L		93	75 - 125	2	20
Lithium	34.8		500	521.6		ug/L		97	75 - 125	4	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-107846-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 320829

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107846-1	GAF-GW-PHII-Bkt-HiCal-Sand-19R-t4	Total Recoverable	Water	3005A	
180-107846-2	GAF-GW-PHII-Bkt-HiCalCaCl2-Sand-19R-t4	Total Recoverable	Water	3005A	
180-107846-3	GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3	Total Recoverable	Water	3005A	
180-107846-4	GAF-GW-PHII-Bkt-Dolo-Sand-19R-t3	Total Recoverable	Water	3005A	
180-107846-5	GAF-GW-PHII-Bkt-Dolo-Sand-444a-t4	Total Recoverable	Water	3005A	
180-107846-6	GAF-GW-PHII-Bkt-Control-Sand-19R-t4	Total Recoverable	Water	3005A	
180-107846-7	GAF-GW-PHII-Bkt-FB22-Sand-19R-t4	Total Recoverable	Water	3005A	
MB 180-320829/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-320829/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-107308-D-2-C MS	Matrix Spike	Total Recoverable	Water	3005A	
180-107308-D-2-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 321088

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-107846-1	GAF-GW-PHII-Bkt-HiCal-Sand-19R-t4	Total Recoverable	Water	EPA 6020A	320829
180-107846-2	GAF-GW-PHII-Bkt-HiCalCaCl2-Sand-19R-t4	Total Recoverable	Water	EPA 6020A	320829
180-107846-3	GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3	Total Recoverable	Water	EPA 6020A	320829
180-107846-4	GAF-GW-PHII-Bkt-Dolo-Sand-19R-t3	Total Recoverable	Water	EPA 6020A	320829
180-107846-5	GAF-GW-PHII-Bkt-Dolo-Sand-444a-t4	Total Recoverable	Water	EPA 6020A	320829
180-107846-6	GAF-GW-PHII-Bkt-Control-Sand-19R-t4	Total Recoverable	Water	EPA 6020A	320829
180-107846-7	GAF-GW-PHII-Bkt-FB22-Sand-19R-t4	Total Recoverable	Water	EPA 6020A	320829
MB 180-320829/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	320829
LCS 180-320829/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	320829
180-107308-D-2-C MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	320829
180-107308-D-2-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	320829

# Chain of Custody Record 420752 eurofins

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

<b>Client Contact</b> Company Name: <u>Environmental Standards</u> City/State/Zip: <u>610.735.5577 x414</u> Phone: <u>610.735.5577 x414</u> Fax: Project Name: <u>TVA Gallatin EIP</u> Site: <u>GAF-NPS-Treatability</u> PO #		<b>Project Manager: Craig McNeil</b> Tel/Email: <u>Craig.McNeil@eurofins.com</u> Site Contact: <u>Francisco Berrios</u> Date: <u>7/11/2020</u> Lab Contact: <u>Rachel Watkins</u> Carrier:		COC No: _____ of _____ COGS Sampler: _____ For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.:			
<b>Analysis Turnaround Time</b> <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Filtered Sample (Y/N) <input type="checkbox"/> Perform MS/MSD (Y/N) <input type="checkbox"/>					
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Sample Specific Notes:	
GAF-GW-PHII-Bkt-H <sub>2</sub> O-Sand-19R-t4	7/11/20	1000	G	GW	1		
GAF-GW-PHII-Bkt-H <sub>2</sub> O-GO <sub>2</sub> -Sand-19R-t4							
GAF-GW-PHII-Bkt-NaOH-Sand-19R-t3							
GAF-GW-PHII-Bkt-Debo-Sand-19R-t3							
GAF-GW-PHII-Bkt-Debo-Sand-444u-t4							
GAF-GW-PHII-Bkt-Control-Sand-19R-t4							
GAF-GW-PHII-Bkt-FB2-Sand-19R-t4							
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: _____ Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.							
<input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown							
<b>Special Instructions/QC Requirements &amp; Comments:</b>							
Custody Seal No.: _____ Relinquished by: <u>Dawn Young</u>		Company: <u>AECOM</u> Date/Time: <u>7/10/20 1415</u>		Cooler Temp. (°C): _____ Obs'd: _____ Company: <u>Rachel Watkins</u>		Therm ID No.: _____ Date/Time: <u>7/11/20 1416</u>	
Relinquished by: <u>Rachel Watkins</u>		Company: <u>AECOM</u> Date/Time: <u>7/11/20 1000</u>		Received by: <u>Rachel Watkins</u>		Company: <u>AECOM</u>	
Relinquished by: _____		Company: _____ Date/Time: _____		Received in Laboratory by: _____		Company: _____ Date/Time: <u>7-20 8:30</u>	



- 1
- 2
- 3
- 4
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Environment Testing  
TestAmerica



ORIGIN ID:PHDA (512) 454-4797  
FRANCISCO BARAJAS  
AECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACTWTG: 10.00 LB MAN  
CAD: 0562071/CAFE3311

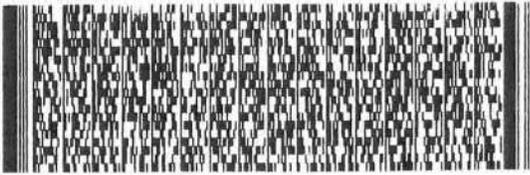
TO

**EUROFINS TESTAMERICA PITTSBURGH**  
**301 ALPHA DRIVE**  
**RIDC PARK**  
**PITTSBURGH PA 152382907**

(412) 963-7058

REF: S180-58932

RMA: ||| ||| |||



FedEx  
Express



FedEx

TRK#  
0221 1680 3500 0806

RETURNS MON-SAT  
THU - 02 JUL 10:30A  
PRIORITY OVERNIGHT

**XH AGCA**

**15238**  
PA-US  
PIT

Uncorrected temp 11.0 °C  
Thermometer ID 19

CF 0 No Ice Initials JS

PT-WI-SR-001 effective 7/26/13

FID 5060232 01JUL20 MMRA 568C2/1787/05A2  
FID: 1711129 01Jul2020 MMRA 568C2/1787/05A2

## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-107846-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 107846**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-108130-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA GAF EIP  
Revision: 1

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 9:10:50 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-108130-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative**  
**180-108130-1**

**Revised Report**

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

**Receipt**

The samples were received on 7/10/2020 9:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.4° C.

**Receipt Exceptions**

The Field Sampler was not listed on the Chain of Custody.

**Metals**

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	07-21-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-108130-2	GAF-GW-PHII-BKT-DOLO-SAND-444U-T5	Water	07/08/20 13:00	07/10/20 09:00	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T5**

**Lab Sample ID: 180-108130-2**

**Date Collected: 07/08/20 13:00**

**Matrix: Water**

**Date Received: 07/10/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	321541	07/14/20 08:05	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			321761	07/14/20 22:36	RSK	TAL PIT

Instrument ID: A

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

TJO = Tyler Oliver

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T5**

**Lab Sample ID: 180-108130-2**

Date Collected: 07/08/20 13:00

Matrix: Water

Date Received: 07/10/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		07/14/20 08:05	07/14/20 22:36	1
Beryllium	ND		1.00	0.182	ug/L		07/14/20 08:05	07/14/20 22:36	1
<b>Nickel</b>	<b>2.03</b>		1.00	0.336	ug/L		07/14/20 08:05	07/14/20 22:36	1
<b>Lithium</b>	<b>5.38</b>		5.00	3.39	ug/L		07/14/20 08:05	07/14/20 22:36	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-321541/1-A**  
**Matrix: Water**  
**Analysis Batch: 321761**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 321541**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		07/14/20 08:05	07/14/20 21:40	1
Beryllium	ND		1.00	0.182	ug/L		07/14/20 08:05	07/14/20 21:40	1
Nickel	ND		1.00	0.336	ug/L		07/14/20 08:05	07/14/20 21:40	1
Lithium	ND		5.00	3.39	ug/L		07/14/20 08:05	07/14/20 21:40	1

**Lab Sample ID: LCS 180-321541/2-A**  
**Matrix: Water**  
**Analysis Batch: 321761**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 321541**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	500	489.1		ug/L		98	80 - 120
Beryllium	500	478.9		ug/L		96	80 - 120
Nickel	500	501.5		ug/L		100	80 - 120
Lithium	500	484.3		ug/L		97	80 - 120

**Lab Sample ID: 180-107974-C-4-B MS**  
**Matrix: Water**  
**Analysis Batch: 321761**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 321541**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	ND		500	481.1		ug/L		96	75 - 125
Beryllium	ND		500	485.1		ug/L		97	75 - 125
Nickel	2.33		500	524.1		ug/L		104	75 - 125
Lithium	ND		500	463.4		ug/L		93	75 - 125

**Lab Sample ID: 180-107974-C-4-C MSD**  
**Matrix: Water**  
**Analysis Batch: 321761**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 321541**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Cadmium	ND		500	486.7		ug/L		97	75 - 125	1	20
Beryllium	ND		500	485.4		ug/L		97	75 - 125	0	20
Nickel	2.33		500	516.3		ug/L		103	75 - 125	2	20
Lithium	ND		500	469.1		ug/L		94	75 - 125	1	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-108130-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 321541

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108130-2	GAF-GW-PHII-BKT-DOLO-SAND-444U-T5	Total Recoverable	Water	3005A	
MB 180-321541/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-321541/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-107974-C-4-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-107974-C-4-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 321761

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108130-2	GAF-GW-PHII-BKT-DOLO-SAND-444U-T5	Total Recoverable	Water	EPA 6020A	321541
MB 180-321541/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	321541
LCS 180-321541/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	321541
180-107974-C-4-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	321541
180-107974-C-4-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	321541

REV 1

7/15/20 PH  
Environment Testing  
TestAmerica

# Chain of Custody Record 420751 eurofins

TAL-9210

Regulatory Program:  DW  NPDES  RCRA  Other:

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Company Name: Environmental Standards  
Address: 6020 totals other \*  
City/State/Zip: W.C. 935.5577 x414  
Phone: 935.5577 x414  
Fax:  
Project Name: TWA Galvanic EFP  
Site: GAF - NES - treatability  
PO #

Client Contact: Rachael Watkins  
Project Manager: Craig MacPhee  
Tell/Email: Craig MacPhee @aecom.com  
Analysis Turnaround Time:  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below:  
 2 weeks  1 week  2 days  1 day

Site Contact: Francisco Baigal Date: 7/19/20  
Lab Contact: Rachael Watkins Carrier: 6020 A dissolved \*\*\*  
COC No: of COCs

Sampler:  
For Lab Use Only:  
Walk-in Client:  
Lab Sampling:  
Job / SDG No.:

Sample Specific Notes:  
7/15/20 PH  
Be, Cd, Li, Ni  
only  
7/15/20 PH

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	6020 totals other *	6020 totals - Be, Cd, Li, Ni	9050A - Cl, F, SO4	2320B - Alkalinity	TDS 2540C	353.2 NO2/NO3	4500 - phosphate	SM4500 - sulfate	5310C - TOC	351.2 - TKN	6020 A dissolved ***	
<del>GAF - GW - PHII - Bkt - Dolo - Sands - 19R-14</del>	<del>7/18/20</del>	<del>1300</del>	<del>G</del>	<del>GW</del>	<del>1</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>
<del>GAF - GW - PHII - Bkt - Dolo - Sands - 444u-15</del>	<del>7/18/20</del>	<del>1300</del>	<del>G</del>	<del>GW</del>	<del>1</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>
<del>GAF - GW - PHII - Bkt - Dolo - Sands - 19R-14</del>	<del>7/19/20</del>	<del>0830</del>	<del>G</del>	<del>GW</del>	<del>10</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>	<del>Y</del>

Barcode: 180-108130 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Zonal Acid/Alk/NaOH  
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments: 6020 totals other \* Sb, As, Ba, Cr, Co, Pb, Hg, Mo, Se, Ti, Cu, Ag, V, Zn, Al, Fe, Mn, Ca, Mg, K, Ni, B Alkalinity \*\*\* - Total, hydroxide, bicarbonate, carbonate \*\*\* Run all metals that were run for totals, dissolved filtered by AECOM

Custody Seal No.:  
Relinquished by: Rachael Watkins  
Company: AECOM  
Date/Time: 7/19/20 1200  
Relinquished by:  
Company:  
Date/Time:  
Relinquished by:  
Company:  
Date/Time:

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return to Client  Disposal by Lab  Archive for Months

Cooler Temp. (°C): Obs'd: Corr'd: Therm ID No.:  
Received by: Rachael Watkins  
Company: AECOM  
Date/Time: 7/19/20 9:00  
Received by:  
Company:  
Date/Time:  
Received in Laboratory by:  
Company:  
Date/Time:

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# Chain of Custody Record 420751

Environment Testing  
TestAmerica

TAL-8210

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

Regulatory Program:  DW  NPDES  RCRA  Other:

Company Name: Environmental Standards Address: City/State/Zip: W.O. 935.5577 x414 Phone: W.O. 935.5577 x414 Fax: Project Name: TWA Calibration EFP Site: GAF - NES - Availability P O #		Client Contact Project Manager: Craig MacPhie Tell/Email: Craig MacPhie @aecom.com Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Site Contact: Franciso Baigal Date: 7/19/20 Lab Contact: Rachel Watkins Carrier:		COC No: _____ of _____ COCs Sampler: _____ For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.: _____ Sample Specific Notes: Be, Cd, Li, Ni only	
Sample Identification Sample Date Sample Time Sample Type (C=Comp, G=Grab) Matrix # of Cont.		Filtered Sample (Y/N) Perform MS / MSD (Y/N) 6020 totals - Be, Cd, Li, Ni 6020 totals other 9056A - Cl, F, SO4 2520B - Alkali n: tyx TDS 2540C 353.2 NO2/NO3 4500 - phosphate SM4500 - sulfide 5310C - TOC 351.2 - TKN 6020A dissolved***		Date: 7/19/20 Time: 1300 Matrix: GW # of Cont: 1		Date: 7/19/20 Time: 1300 Matrix: GW # of Cont: 1	
GAF - GW - PHII - Bkt - NaOH - Sand - 19R-14 GAF - GW - PHII - Bkt - Dolo - Sand - 444u-15 GAF - GW - PHII - Bkt - Dolo - Sand - 19R-14		7/18/20 1300 GW 1 7/18/20 1300 GW 1 7/19/20 0830 GW 10		7/19/20 1300 GW 1 7/19/20 1300 GW 1 7/19/20 0830 GW 10		7/19/20 1300 GW 1 7/19/20 1300 GW 1 7/19/20 0830 GW 10	
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other Zinc Acetate / NaOH Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM	
Special Instructions/QC Requirements & Comments: Alkalinity*** - Total, hydroxide, bicarbonate, carbonate *** Run all metals that were run for totals, dissolved filtered by AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM	
Custy Seal No.: _____ Custy Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM	
Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM		Relinquished by: Rachel Watkins Date/Time: 7/19/20 1200 Company: AECOM	



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Use Using This Tag

RT 0  
FZ 0

Environment Testing  
TestAmerica

Part # 158470-434 RT2 EXP 0121

ORIGIN ID  
FRANCISCO  
RECON  
8400 AMBERL... AVENUE  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

0817  
07.10

4797

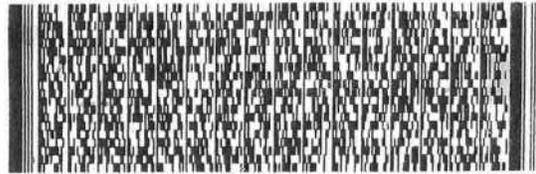
SHIP DATE: 28FEB20  
ACTWGT: 10.00 LB MAN  
CAD: 0562071/CAFE3311

TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058  
REF: \$180-58932

RMA: ||| ||| |||



FedEx

TRK# 1680 3500 0817  
0221

XH AGCA

RETURNS MON-SAT  
FRI - 10 JUL 10:30A  
PRIORITY OVERNIGHT

Uncorrected temp 14 °C  
Thermometer ID 14

15238  
PA-US  
PIT

CF 0 Initials B

PT-WI-SR-001 effective 7/26/13

FID: 5104832 09Jul2020 NWRA 56CG2/17B7/05A2



180-108130 Waybill

# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-108130-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 108130**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-108727-1

Laboratory Sample Delivery Group: GAF- NRS-Treatability  
Client Project/Site: TVA Gallatin EIP

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
8/5/2020 5:21:10 PM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

---

## Job ID: 180-108727-1

---

Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-108727-1

#### Receipt

The samples were received on 7/24/2020 8:45 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 3.2° C.

#### Receipt Exceptions

The Chain-of-Custody (COC) was incomplete as received. There is no relinquished by year listed on the COC, nor was the Field Sampler listed on the Chain of Custody.

#### Metals

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-108727-1	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T1	Water	07/23/20 14:00	07/24/20 08:45	
180-108727-2	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1	Water	07/23/20 14:00	07/24/20 08:45	
180-108727-3	GAF-GW-PHIII-BKT-HICAL-SAND-19R-T1	Water	07/23/20 14:00	07/24/20 08:45	
180-108727-4	GAF-GW-PHIII-BKT-HICAL-SAND-444U-T1	Water	07/23/20 14:00	07/24/20 08:45	
180-108727-5	GAF-GW-PHII-BKT-DOLO-SAND-444U-T6	Water	07/16/20 08:30	07/24/20 08:45	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T1**

**Lab Sample ID: 180-108727-1**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/24/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	323431	07/29/20 08:57	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			323857	07/30/20 22:49	NAM	TAL PIT
Instrument ID: A										

**Client Sample ID:**

**Lab Sample ID: 180-108727-2**

**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1**

**Matrix: Water**

**Date Collected: 07/23/20 14:00**

**Date Received: 07/24/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	323431	07/29/20 08:57	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			323857	07/30/20 22:52	NAM	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHIII-BKT-HICAL-SAND-19R-T1**

**Lab Sample ID: 180-108727-3**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/24/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	323431	07/29/20 08:57	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			323857	07/30/20 22:56	NAM	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHIII-BKT-HICAL-SAND-444U-T1**

**Lab Sample ID: 180-108727-4**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/24/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	323431	07/29/20 08:57	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			323857	07/30/20 22:59	NAM	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T6**

**Lab Sample ID: 180-108727-5**

**Date Collected: 07/16/20 08:30**

**Matrix: Water**

**Date Received: 07/24/20 08:45**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	323431	07/29/20 08:57	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			323857	07/30/20 23:03	NAM	TAL PIT
Instrument ID: A										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

**Analyst References:**

Lab: TAL PIT

Batch Type: Prep

TJO = Tyler Oliver

Batch Type: Analysis

NAM = Nicole Marfisi

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T1**

**Lab Sample ID: 180-108727-1**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/24/20 08:45

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.50		1.00	0.182	ug/L		07/29/20 08:57	07/30/20 22:49	1
Cadmium	2.26		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 22:49	1
Lithium	5.26		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 22:49	1
Nickel	71.5		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 22:49	1

**Client Sample ID:**

**Lab Sample ID: 180-108727-2**

**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1**

Matrix: Water

Date Collected: 07/23/20 14:00

Date Received: 07/24/20 08:45

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		07/29/20 08:57	07/30/20 22:52	1
Cadmium	2.12		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 22:52	1
Lithium	16.0		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 22:52	1
Nickel	58.3		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 22:52	1

**Client Sample ID: GAF-GW-PHIII-BKT-HICAL-SAND-19R-T1**

**Lab Sample ID: 180-108727-3**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/24/20 08:45

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		07/29/20 08:57	07/30/20 22:56	1
Cadmium	ND		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 22:56	1
Lithium	ND		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 22:56	1
Nickel	42.9		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 22:56	1

**Client Sample ID: GAF-GW-PHIII-BKT-HICAL-SAND-444U-T1**

**Lab Sample ID: 180-108727-4**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/24/20 08:45

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		07/29/20 08:57	07/30/20 22:59	1
Cadmium	ND		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 22:59	1
Lithium	ND		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 22:59	1
Nickel	62.7		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 22:59	1

**Client Sample ID: GAF-GW-PHII-BKT-DOLO-SAND-444U-T6**

**Lab Sample ID: 180-108727-5**

Date Collected: 07/16/20 08:30

Matrix: Water

Date Received: 07/24/20 08:45

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.588	J	1.00	0.182	ug/L		07/29/20 08:57	07/30/20 23:03	1
Cadmium	2.84		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 23:03	1
Lithium	12.4		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 23:03	1
Nickel	134		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 23:03	1

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-323431/1-A**  
**Matrix: Water**  
**Analysis Batch: 323857**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 323431**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		07/29/20 08:57	07/30/20 22:42	1
Cadmium	ND		1.00	0.217	ug/L		07/29/20 08:57	07/30/20 22:42	1
Lithium	ND		5.00	3.39	ug/L		07/29/20 08:57	07/30/20 22:42	1
Nickel	ND		1.00	0.336	ug/L		07/29/20 08:57	07/30/20 22:42	1

**Lab Sample ID: LCS 180-323431/2-A**  
**Matrix: Water**  
**Analysis Batch: 323857**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 323431**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	500	504.9		ug/L		101	80 - 120
Cadmium	500	513.9		ug/L		103	80 - 120
Lithium	500	484.0		ug/L		97	80 - 120
Nickel	500	498.5		ug/L		100	80 - 120

**Lab Sample ID: 180-108781-I-1-E MS**  
**Matrix: Water**  
**Analysis Batch: 323857**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 323431**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		500	493.9		ug/L		99	75 - 125
Cadmium	ND		500	521.6		ug/L		104	75 - 125
Lithium	ND		500	501.7		ug/L		100	75 - 125
Nickel	4.15		500	493.0		ug/L		98	75 - 125

**Lab Sample ID: 180-108781-I-1-F MSD**  
**Matrix: Water**  
**Analysis Batch: 323857**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 323431**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		500	493.4		ug/L		99	75 - 125	0	20
Cadmium	ND		500	519.6		ug/L		104	75 - 125	0	20
Lithium	ND		500	506.1		ug/L		101	75 - 125	1	20
Nickel	4.15		500	495.1		ug/L		98	75 - 125	0	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-108727-1  
SDG: GAF- NRS-Treatability

## Metals

### Prep Batch: 323431

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108727-1	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T1	Total Recoverable	Water	3005A	
180-108727-2	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1	Total Recoverable	Water	3005A	
180-108727-3	GAF-GW-PHIII-BKT-HICAL-SAND-19R-T1	Total Recoverable	Water	3005A	
180-108727-4	GAF-GW-PHIII-BKT-HICAL-SAND-444U-T1	Total Recoverable	Water	3005A	
180-108727-5	GAF-GW-PHII-BKT-DOLO-SAND-444U-T6	Total Recoverable	Water	3005A	
MB 180-323431/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-323431/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-108781-I-1-E MS	Matrix Spike	Total Recoverable	Water	3005A	
180-108781-I-1-F MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 323857

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108727-1	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T1	Total Recoverable	Water	EPA 6020A	323431
180-108727-2	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1	Total Recoverable	Water	EPA 6020A	323431
180-108727-3	GAF-GW-PHIII-BKT-HICAL-SAND-19R-T1	Total Recoverable	Water	EPA 6020A	323431
180-108727-4	GAF-GW-PHIII-BKT-HICAL-SAND-444U-T1	Total Recoverable	Water	EPA 6020A	323431
180-108727-5	GAF-GW-PHII-BKT-DOLO-SAND-444U-T6	Total Recoverable	Water	EPA 6020A	323431
MB 180-323431/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	323431
LCS 180-323431/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	323431
180-108781-I-1-E MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	323431
180-108781-I-1-F MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	323431

301 Alpha Dr.  
Pittsburgh, PA 15228

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

Client Contact  
 Company Name: Environmental Standards  
 Address:  
 City/State/Zip:  
 Phone: 610.335.5577 x 4114  
 Fax:  
 Project Name: TVA Gallatin EIP  
 Site: EAF-NRS-Treatability  
 P.O.#

Project Manager: Craig MacPhee  
 Tel/Email: Craig.MacPhee@eurofins.com, craig.m@eurofins.com  
 Site Contact: Francisco Becijas  
 Date: 7/23/2020  
 Carrier: Rachel Watkins

Analyst Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes
GAF-GW-PHIII-Bkt-Dolo-Sand-19R-t1	7/23/20	1400	G	GW	1	N	N	Be, Ca, Li, Ni only
GAF-GW-PHIII-Bkt-Control-Sand-19R-t1	7/23/20	1400	G	GW	1	N	N	
GAF-GW-PHIII-Bkt-Hi-Cal-Sand-19R-t1	7/23/20	1400	G	GW	1	N	N	
GAF-GW-PHIII-Bkt-Hi-Cal-Sand-444a-t1	7/23/20	1400	G	GW	1	N	N	
GAF-GW-PHIII-Bkt-Dolo-Sand-444a-t6	7/16/20	0830	G	GW	1	N	N	



Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other \_\_\_\_\_  
 Possible Hazard Identification: \_\_\_\_\_  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Therm ID No.: \_\_\_\_\_  
 Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_  
 Received by: Ad Schauer  
 Date/Time: 7/23 1400  
 Company: AECOM  
 Received by: Michelle Watkins  
 Date/Time: 7-24-20 8:15  
 Company: EAFNRS  
 Received in Laboratory by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Company: \_\_\_\_\_



eur RT 97  
FZ

1 10:30 A  
0828  
07.24 Testing  
America

Post # 150470-434 012 EXP 01/21

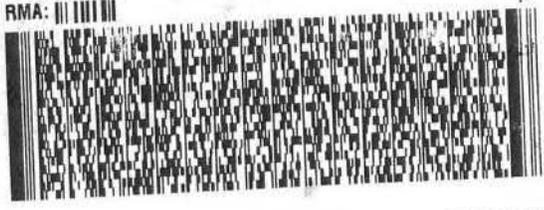
ORIGIN ID: 100A (512) 454-4797  
FRANCISCO BRAJAS  
RECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WT: 10.00 LB MAN  
CAD: 0562071/CAFE3311

TO  
EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058  
REF: S180-58932

RMA: III III III



FedEx  
TRK# 1680 3500.0828  
0221

RETURNS MON SAT  
FRI - 24 JUL 10:30A  
PRIORITY OVERNIGHT

XP ACCA  
Uncorrected temp  
Thermometer ID

3.2 °C  
14

15238  
PA-US  
PIT

CF  Initials *My*

PT-WI-SR-001 effective 7/26/13



FID: 1711129 23Jul2020 MRA 66C63/C6A6/05A2

- 1
- 2
- 3
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- 13

## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-108727-1  
SDG Number: GAF- NRS-Treatability

**Login Number: 108727**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-108987-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: GAF-NRS-Treatability  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

9/4/2020 2:10:53 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Job ID: 180-108987-1

### Laboratory: Eurofins TestAmerica, Pittsburgh

#### Narrative

#### Job Narrative 180-108987-1

#### Revised Report

This report was revised to correct the metals MS/MSD reporting. This replaces the previous final report.

#### Receipt

The samples were received on 7/31/2020 10:30 AM; the samples arrived in good condition. The temperatures of the 2 coolers at receipt time were 14.4° C and 18.5° C.

#### Receipt Exceptions

The all samples were received at the laboratory outside the required temperature criteria. The client was contacted regarding this issue, and the laboratory was instructed to cancel analysis for 2540C, 351.2, 353.2, 4500\_P\_E, 5310C, 9056A and 4500S2F.

The Field Sampler was not listed on the Chain of Custody.

The container received for GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1 (180-108987-3) and GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2 (180-108987-5). The COC lists dissolved metals; however the label does not have dissolved written on it.

#### Metals

Method 3005A: A deviation from the Standard Operating Procedure (SOP) occurred. Due to limited sample volume, GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1 (180-108987-1), GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1 (180-108987-2), GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1 (180-108987-3) and GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1 (180-108987-4) were digested for metals analysis 25ml to 25ml so as to avoid any elevated reporting limits (RL).

Method 7470A: A deviation from the Standard Operating Procedure (SOP) occurred. Due to severely limited sample provided by the client for analysis, samples GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1 (180-108987-1), GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1 (180-108987-2), GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1 (180-108987-3) and GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1 (180-108987-4) were prepped and digested for mercury analysis 25ml to 25ml so as to avoid any elevated reporting limits (RL). All reagents were reduced appropriately and the digestion time was carefully monitored so as not to cook the samples dry.

Method 6020A: The serial dilution performed for GAF-GW-PHIII-BKT-SAND (180-108987-9) associated with batch 180-325523 was outside control limits for arsenic and Barium.

Method 6020A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 180-324566 and analytical batch 180-325523 were outside control limits for aluminum and silicon. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 6020A: GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2 (180-108987-5) and GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2 (180-108987-6) have some analytes that higher in the dissolved sample than the total. The results were confirmed by scanning the raw sample.

Method 6020A: Boron was not reported for the matrix spike and matrix spike duplicate due to the ending CCV recovery above the control limits. The sample chosen for the batch QC had a short list of elements reported which did not include boron; therefore the sample was not reanalyzed for boron. GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2 (180-108987-8)

#### General Chemistry

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### Metals

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

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Water	07/23/20 14:00	07/31/20 10:30	
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Water	07/23/20 14:00	07/31/20 10:30	
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Water	07/23/20 14:00	07/31/20 10:30	
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Water	07/23/20 14:00	07/31/20 10:30	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Water	07/30/20 12:00	07/31/20 10:30	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Water	07/30/20 12:00	07/31/20 10:30	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Water	07/30/20 12:00	07/31/20 10:30	
180-108987-8	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Water	07/30/20 12:00	07/31/20 10:30	
180-108987-9	GAF-GW-PHIII-BKT-SAND	Solid	07/30/20 12:00	07/31/20 10:30	
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Solid	07/30/20 12:00	07/31/20 10:30	
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Solid	07/30/20 12:00	07/31/20 10:30	
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Solid	07/30/20 12:00	07/31/20 10:30	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
EPA 7470A	Mercury (CVAA)	SW846	TAL PIT
EPA 7471B	Mercury (CVAA)	SW846	TAL PIT
2540G	SM 2540G	SM22	TAL PIT
SM2320 B	Alkalinity, Total	SM18	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT
3050B	Preparation, Metals	SW846	TAL PIT
7470A	Preparation, Mercury	SW846	TAL PIT
7471B	Preparation, Mercury	SW846	TAL PIT

#### Protocol References:

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SM22 = Standard Methods For The Examination Of Water And Wastewater, 22nd Edition

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

#### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T1**

**Lab Sample ID: 180-108987-1**

**Date Collected: 07/23/20 14:00**  
**Date Received: 07/31/20 10:30**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			25 mL	25 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 13:51	RSK	TAL PIT
Instrument ID: DORY										
Dissolved	Prep	7470A			25 mL	25 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:19	RJR	TAL PIT
Instrument ID: HGZ										
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 11:35	AVS	TAL PIT
Instrument ID: PCTITRATOR										

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1**

**Lab Sample ID: 180-108987-2**

**Date Collected: 07/23/20 14:00**  
**Date Received: 07/31/20 10:30**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			25 mL	25 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 13:54	RSK	TAL PIT
Instrument ID: DORY										
Dissolved	Prep	7470A			25 mL	25 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:20	RJR	TAL PIT
Instrument ID: HGZ										
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 11:50	AVS	TAL PIT
Instrument ID: PCTITRATOR										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1**

**Lab Sample ID: 180-108987-3**

**Date Collected: 07/23/20 14:00**  
**Date Received: 07/31/20 10:30**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			25 mL	25 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 13:58	RSK	TAL PIT
Instrument ID: DORY										
Dissolved	Prep	7470A			25 mL	25 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:21	RJR	TAL PIT
Instrument ID: HGZ										
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 11:58	AVS	TAL PIT
Instrument ID: PCTITRATOR										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1**

**Lab Sample ID: 180-108987-4**

**Date Collected: 07/23/20 14:00**  
**Date Received: 07/31/20 10:30**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			25 mL	25 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 14:01	RSK	TAL PIT
Instrument ID: DORY										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1**

**Lab Sample ID: 180-108987-4**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	7470A			25 mL	25 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:22	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 12:05	AVS	TAL PIT
		Instrument ID: PCTITRATOR								

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-**

**Lab Sample ID: 180-108987-5**

**T2**

**Date Collected: 07/30/20 12:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 14:08	RSK	TAL PIT
		Instrument ID: DORY								
Total Recoverable	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325682	08/14/20 14:05	RSK	TAL PIT
		Instrument ID: DORY								
Dissolved	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:09	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A		1			324894	08/10/20 13:12	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 12:12	AVS	TAL PIT
		Instrument ID: PCTITRATOR								

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-6**

**Date Collected: 07/30/20 12:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 14:18	RSK	TAL PIT
		Instrument ID: DORY								
Total Recoverable	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325682	08/14/20 14:12	RSK	TAL PIT
		Instrument ID: DORY								
Dissolved	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:10	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A		1			324894	08/10/20 13:13	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 12:20	AVS	TAL PIT
		Instrument ID: PCTITRATOR								

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-7**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325682	08/14/20 14:39	RSK	TAL PIT
Instrument ID: DORY										
Dissolved	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			325932	08/15/20 12:19	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325682	08/14/20 14:35	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325932	08/15/20 12:15	RSK	TAL PIT
Instrument ID: DORY										
Dissolved	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Dissolved	Analysis	EPA 7470A		1			324894	08/10/20 13:11	RJR	TAL PIT
Instrument ID: HGZ										
Total/NA	Prep	7470A			50 mL	50 mL	324610	08/07/20 06:29	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A		1			324894	08/10/20 13:13	RJR	TAL PIT
Instrument ID: HGZ										
Total/NA	Analysis	SM2320 B		1			324222	08/04/20 12:27	AVS	TAL PIT
Instrument ID: PCTITRATOR										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2**

**Lab Sample ID: 180-108987-8**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	324292	08/05/20 10:35	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325682	08/14/20 14:42	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**

**Lab Sample ID: 180-108987-9**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			324359	08/05/20 18:26	PMH	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**

**Lab Sample ID: 180-108987-9**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 96.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.18 g	100 mL	324566	08/06/20 16:45	TJO	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325523	08/13/20 18:22	RSK	TAL PIT
Instrument ID: NEMO										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**

**Lab Sample ID: 180-108987-9**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

**Percent Solids: 96.9**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471B			0.60 g	100 mL	325293	08/13/20 05:03	RJR	TAL PIT
Total/NA	Analysis	EPA 7471B		1			325604	08/14/20 10:44	RJR	TAL PIT
Instrument ID: HGZ										

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-10**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			324359	08/05/20 18:26	PMH	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-10**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

**Percent Solids: 85.3**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.38 g	100 mL	324566	08/06/20 16:45	TJO	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325523	08/13/20 18:35	RSK	TAL PIT
Instrument ID: NEMO										
Total/NA	Prep	7471B			0.60 g	100 mL	325293	08/13/20 05:03	RJR	TAL PIT
Total/NA	Analysis	EPA 7471B		1			325604	08/14/20 10:47	RJR	TAL PIT
Instrument ID: HGZ										

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T2**

**Lab Sample ID: 180-108987-11**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			324359	08/05/20 18:26	PMH	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T2**

**Lab Sample ID: 180-108987-11**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

**Percent Solids: 85.4**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.24 g	100 mL	324566	08/06/20 16:45	TJO	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325523	08/13/20 18:38	RSK	TAL PIT
Instrument ID: NEMO										
Total/NA	Prep	7471B			0.61 g	100 mL	325293	08/13/20 05:03	RJR	TAL PIT
Total/NA	Analysis	EPA 7471B		1			325604	08/14/20 10:48	RJR	TAL PIT
Instrument ID: HGZ										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-12**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			324359	08/05/20 18:26	PMH	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-12**

**Date Collected: 07/30/20 12:00**

**Matrix: Solid**

**Date Received: 07/31/20 10:30**

**Percent Solids: 83.6**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.27 g	100 mL	324566	08/06/20 16:45	TJO	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325523	08/13/20 18:41	RSK	TAL PIT
Instrument ID: NEMO										
Total/NA	Prep	7471B			0.74 g	100 mL	325293	08/13/20 05:03	RJR	TAL PIT
Total/NA	Analysis	EPA 7471B		1			325604	08/14/20 10:49	RJR	TAL PIT
Instrument ID: HGZ										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

**Analyst References:**

Lab: TAL PIT

Batch Type: Prep

KEM = Kimberly Mahoney

RJR = Ron Rosenbaum

TJO = Tyler Oliver

Batch Type: Analysis

AVS = Abbey Smith

PMH = Paloma Hoelzle

RJR = Ron Rosenbaum

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-**

**Lab Sample ID: 180-108987-1**

**T1**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>0.0271</b>	<b>J</b>	0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 13:51	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Arsenic</b>	<b>0.000608</b>	<b>J</b>	0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Barium</b>	<b>0.0649</b>		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 13:51	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Boron</b>	<b>2.68</b>		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Cadmium</b>	<b>0.00281</b>		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Calcium</b>	<b>760</b>		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 13:51	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Cobalt</b>	<b>0.00163</b>		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Copper</b>	<b>0.000713</b>	<b>J</b>	0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 13:51	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Lead</b>	<b>0.000290</b>	<b>J</b>	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Lithium</b>	<b>0.0189</b>		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Magnesium</b>	<b>88.7</b>		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Manganese</b>	<b>7.39</b>		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 13:51	1
Molybdenum	ND		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Nickel</b>	<b>0.0647</b>		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Potassium</b>	<b>20.5</b>		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 13:51	1
Selenium	ND		0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Silicon</b>	<b>8.50</b>		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 13:51	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Sodium</b>	<b>12.7</b>		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Strontium</b>	<b>1.73</b>		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Thallium</b>	<b>0.000592</b>	<b>J</b>	0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 13:51	1
Vanadium	ND		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 13:51	1
<b>Zinc</b>	<b>0.0561</b>		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 13:51	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:19	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Alkalinity as CaCO3 to pH 4.5</b>	<b>176</b>		5.00	5.00	mg/L			08/04/20 11:35	1
<b>Bicarbonate Alkalinity as CaCO3</b>	<b>176</b>		5.00	5.00	mg/L			08/04/20 11:35	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 11:35	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/04/20 11:35	1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1**

**Lab Sample ID: 180-108987-2**

**Date Collected: 07/23/20 14:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>0.0518</b>		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 13:54	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Arsenic</b>	<b>0.00308</b>		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Barium</b>	<b>0.132</b>		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 13:54	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1**

**Lab Sample ID: 180-108987-2**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Boron</b>	<b>0.319</b>		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 13:54	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Calcium</b>	<b>642</b>		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Chromium</b>	<b>0.00444</b>		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Cobalt</b>	<b>0.00421</b>		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Copper</b>	<b>0.102</b>		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 13:54	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Lead</b>	<b>0.000202</b>	J	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 13:54	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Magnesium</b>	<b>0.229</b>	J	0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Manganese</b>	<b>0.00302</b>	J	0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Molybdenum</b>	<b>0.0242</b>		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Nickel</b>	<b>0.0470</b>		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Potassium</b>	<b>23.4</b>		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Selenium</b>	<b>0.00462</b>	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Silicon</b>	<b>2.06</b>		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 13:54	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Sodium</b>	<b>6.46</b>		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Strontium</b>	<b>0.977</b>		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Thallium</b>	<b>0.000199</b>	J	0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Vanadium</b>	<b>0.00326</b>		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 13:54	1
<b>Zinc</b>	<b>0.00394</b>	J	0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 13:54	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:20	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Alkalinity as CaCO3 to pH 4.5</b>	<b>234</b>		5.00	5.00	mg/L			08/04/20 11:50	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 11:50	1
<b>Carbonate Alkalinity as CaCO3</b>	<b>61.6</b>		5.00	5.00	mg/L			08/04/20 11:50	1
<b>Hydroxide Alkalinity</b>	<b>172</b>		5.00	5.00	mg/L			08/04/20 11:50	1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1**

**Lab Sample ID: 180-108987-3**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 13:58	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Arsenic</b>	<b>0.00365</b>		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Barium</b>	<b>0.104</b>		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 13:58	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Boron</b>	<b>0.687</b>		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 13:58	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Calcium</b>	<b>655</b>		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Chromium</b>	<b>0.00258</b>		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 13:58	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1**

**Lab Sample ID: 180-108987-3**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Cobalt</b>	<b>0.00430</b>		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Copper</b>	<b>0.0522</b>		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 13:58	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 13:58	1
Lead	ND		0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 13:58	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Magnesium</b>	<b>0.901</b>		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 13:58	1
Manganese	ND		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Molybdenum</b>	<b>0.0211</b>		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Nickel</b>	<b>0.0338</b>		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Potassium</b>	<b>5.16</b>		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Selenium</b>	<b>0.00322</b>	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Silicon</b>	<b>2.02</b>		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 13:58	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Sodium</b>	<b>12.7</b>		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Strontium</b>	<b>1.07</b>		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 13:58	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Vanadium</b>	<b>0.00370</b>		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 13:58	1
<b>Zinc</b>	<b>0.00495</b>	J	0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 13:58	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:21	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Alkalinity as CaCO3 to pH 4.5</b>	<b>164</b>		5.00	5.00	mg/L			08/04/20 11:58	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 11:58	1
<b>Carbonate Alkalinity as CaCO3</b>	<b>45.9</b>		5.00	5.00	mg/L			08/04/20 11:58	1
<b>Hydroxide Alkalinity</b>	<b>118</b>		5.00	5.00	mg/L			08/04/20 11:58	1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1**

**Lab Sample ID: 180-108987-4**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>0.239</b>		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:01	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Arsenic</b>	<b>0.00311</b>		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Barium</b>	<b>0.107</b>		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:01	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Boron</b>	<b>0.318</b>		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 14:01	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Calcium</b>	<b>514</b>		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Chromium</b>	<b>0.00539</b>		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Cobalt</b>	<b>0.0101</b>		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Copper</b>	<b>0.0958</b>		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:01	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:01	1
<b>Lead</b>	<b>0.000201</b>	J	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:01	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:01	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1**

**Lab Sample ID: 180-108987-4**

Date Collected: 07/23/20 14:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Magnesium	ND		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:01	1
Manganese	0.000952	J	0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:01	1
Molybdenum	0.0322		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:01	1
Nickel	0.0569		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:01	1
Potassium	5.23		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:01	1
Selenium	0.00418	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:01	1
Silicon	2.51		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:01	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:01	1
Sodium	29.2		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:01	1
Strontium	0.898		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:01	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:01	1
Vanadium	0.00373		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:01	1
Zinc	0.00365	J	0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:01	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000139	J	0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:22	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	333		5.00	5.00	mg/L			08/04/20 12:05	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 12:05	1
Carbonate Alkalinity as CaCO3	68.3		5.00	5.00	mg/L			08/04/20 12:05	1
Hydroxide Alkalinity	264		5.00	5.00	mg/L			08/04/20 12:05	1

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-**

**Lab Sample ID: 180-108987-5**

**T2**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.0503		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:05	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:05	1
Arsenic	0.000378	J	0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:05	1
Barium	0.0582		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:05	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:05	1
Boron	3.16		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 14:05	1
Cadmium	0.00397		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:05	1
Calcium	773		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:05	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:05	1
Cobalt	0.0225		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:05	1
Copper	0.000659	J	0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:05	1
Iron	0.0387	J	0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:05	1
Lead	0.000197	J	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:05	1
Lithium	0.0364		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:05	1
Magnesium	100		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:05	1
Manganese	17.6		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:05	1
Molybdenum	ND		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:05	1
Nickel	0.134		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:05	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-**

**Lab Sample ID: 180-108987-5**

**T2**

**Date Collected: 07/30/20 12:00**

**Matrix: Water**

**Date Received: 07/31/20 10:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Potassium</b>	<b>11.1</b>		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:05	1
Selenium	ND		0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:05	1
<b>Silicon</b>	<b>12.1</b>		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:05	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:05	1
<b>Sodium</b>	<b>12.1</b>		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:05	1
<b>Strontium</b>	<b>1.72</b>		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:05	1
<b>Thallium</b>	<b>0.000223</b>	<b>J</b>	0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:05	1
Vanadium	ND		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:05	1
<b>Zinc</b>	<b>0.0960</b>		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:05	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>0.0271</b>	<b>J</b>	0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:08	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:08	1
Arsenic	ND		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Barium</b>	<b>0.0596</b>		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:08	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Boron</b>	<b>3.26</b>		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Cadmium</b>	<b>0.00567</b>		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Calcium</b>	<b>758</b>		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:08	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Cobalt</b>	<b>0.0277</b>		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:08	1
Copper	ND		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:08	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:08	1
Lead	ND		0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Lithium</b>	<b>0.0450</b>		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Magnesium</b>	<b>98.7</b>		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Manganese</b>	<b>22.0</b>		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:08	1
Molybdenum	ND		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Nickel</b>	<b>0.170</b>		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Potassium</b>	<b>11.9</b>		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:08	1
Selenium	ND		0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Silicon</b>	<b>13.1</b>		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:08	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Sodium</b>	<b>11.6</b>		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Strontium</b>	<b>1.73</b>		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Thallium</b>	<b>0.000264</b>	<b>J</b>	0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:08	1
Vanadium	ND		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:08	1
<b>Zinc</b>	<b>0.139</b>		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:08	1

**Method: EPA 7470A - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:12	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:09	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T2**

**Lab Sample ID: 180-108987-5**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	151		5.00	5.00	mg/L			08/04/20 12:12	1
Bicarbonate Alkalinity as CaCO3	151		5.00	5.00	mg/L			08/04/20 12:12	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 12:12	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/04/20 12:12	1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T2**

**Lab Sample ID: 180-108987-6**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

## Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:12	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:12	1
Arsenic	0.00139		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:12	1
Barium	0.165		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:12	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:12	1
Boron	0.815		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 14:12	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:12	1
Calcium	790		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:12	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:12	1
Cobalt	0.00244		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:12	1
Copper	0.0336		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:12	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:12	1
Lead	ND		0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:12	1
Lithium	0.00602		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:12	1
Magnesium	12.6		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:12	1
Manganese	0.00509		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:12	1
Molybdenum	0.0139		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:12	1
Nickel	0.0217		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:12	1
Potassium	11.0		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:12	1
Selenium	0.00252	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:12	1
Silicon	2.36		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:12	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:12	1
Sodium	8.99		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:12	1
Strontium	1.27		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:12	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:12	1
Vanadium	0.00343		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:12	1
Zinc	0.00346	J	0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:12	1

## Method: EPA 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.179		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:18	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:18	1
Arsenic	0.00298		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:18	1
Barium	0.162		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:18	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:18	1
Boron	0.592		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 14:18	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:18	1
Calcium	811		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:18	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-6**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	0.00172	J	0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:18	1
Cobalt	0.00261		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:18	1
Copper	0.0431		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:18	1
Iron	0.121		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:18	1
Lead	0.000349	J	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:18	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:18	1
Magnesium	17.5		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:18	1
Manganese	0.0140		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:18	1
Molybdenum	0.0175		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:18	1
Nickel	0.0282		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:18	1
Potassium	10.3		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:18	1
Selenium	0.00303	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:18	1
Silicon	3.13		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:18	1
Silver	0.000370	J	0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:18	1
Sodium	9.18		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:18	1
Strontium	1.27		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:18	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:18	1
Vanadium	0.00473		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:18	1
Zinc	ND		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:18	1

**Method: EPA 7470A - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:13	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000301		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:10	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	95.4		5.00	5.00	mg/L			08/04/20 12:20	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 12:20	1
Carbonate Alkalinity as CaCO3	55.1		5.00	5.00	mg/L			08/04/20 12:20	1
Hydroxide Alkalinity	40.3		5.00	5.00	mg/L			08/04/20 12:20	1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-7**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.103		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:35	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:35	1
Arsenic	0.00348		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:35	1
Barium	0.150		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:35	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:35	1
Boron	1.28		0.0800	0.0386	mg/L		08/05/20 10:35	08/15/20 12:15	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:35	1
Calcium	781		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:35	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:35	1
Cobalt	0.00282		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:35	1

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-7**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	0.0264		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:35	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:35	1
Lead	0.000245	J	0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:35	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:35	1
Magnesium	4.63		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:35	1
Manganese	0.00649		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:35	1
Molybdenum	0.0149		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:35	1
Nickel	0.0195		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:35	1
Potassium	8.89		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:35	1
Selenium	0.00209	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:35	1
Silicon	2.76		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:35	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:35	1
Sodium	23.8		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:35	1
Strontium	1.32		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:35	1
Thallium	0.000257	J	0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:35	1
Vanadium	0.00473		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:35	1
Zinc	ND		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:35	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 14:39	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 14:39	1
Arsenic	0.00246		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 14:39	1
Barium	0.144		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 14:39	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:39	1
Boron	1.42		0.0800	0.0386	mg/L		08/05/20 10:35	08/15/20 12:19	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:39	1
Calcium	751		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 14:39	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 14:39	1
Cobalt	0.00264		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 14:39	1
Copper	0.0215		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 14:39	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 14:39	1
Lead	ND		0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 14:39	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:39	1
Magnesium	4.88		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 14:39	1
Manganese	ND		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 14:39	1
Molybdenum	0.0125		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 14:39	1
Nickel	0.0168		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:39	1
Potassium	8.93		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 14:39	1
Selenium	0.00206	J	0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 14:39	1
Silicon	2.74		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 14:39	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 14:39	1
Sodium	22.9		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 14:39	1
Strontium	1.27		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 14:39	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 14:39	1
Vanadium	0.00444		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 14:39	1
Zinc	ND		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 14:39	1

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-7**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 7470A - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:13	1

**Method: EPA 7470A - Mercury (CVAA) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 13:11	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Total Alkalinity as CaCO3 to pH 4.5</b>	<b>100</b>		5.00	5.00	mg/L			08/04/20 12:27	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 12:27	1
<b>Carbonate Alkalinity as CaCO3</b>	<b>35.7</b>		5.00	5.00	mg/L			08/04/20 12:27	1
<b>Hydroxide Alkalinity</b>	<b>64.3</b>		5.00	5.00	mg/L			08/04/20 12:27	1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2**

**Lab Sample ID: 180-108987-8**

Date Collected: 07/30/20 12:00

Matrix: Water

Date Received: 07/31/20 10:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 14:42	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 14:42	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 14:42	1
<b>Nickel</b>	<b>0.0345</b>		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 14:42	1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**

**Lab Sample ID: 180-108987-9**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 96.9

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>1280</b>	<b>F1</b>	5.25	5.08	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Antimony</b>	<b>0.0410</b>	<b>J</b>	0.175	0.0376	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Arsenic</b>	<b>2.54</b>		0.0874	0.0280	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Barium</b>	<b>18.9</b>		0.874	0.112	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Beryllium</b>	<b>0.129</b>		0.0874	0.0621	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Boron</b>	<b>4.56</b>	<b>J</b>	7.00	1.18	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Cadmium</b>	<b>0.110</b>	<b>B</b>	0.0874	0.0149	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Calcium</b>	<b>1130</b>		43.7	6.66	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Chromium</b>	<b>3.15</b>		0.175	0.0726	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Cobalt</b>	<b>3.35</b>		0.0437	0.0114	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Copper</b>	<b>1.22</b>		0.262	0.179	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Iron</b>	<b>5260</b>		4.37	4.18	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Lead</b>	<b>2.58</b>		0.0874	0.0874	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Lithium</b>	<b>1.69</b>		0.437	0.348	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Magnesium</b>	<b>678</b>		43.7	13.7	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Manganese</b>	<b>242</b>		0.437	0.375	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Molybdenum</b>	<b>0.233</b>	<b>J</b>	0.437	0.143	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Nickel</b>	<b>7.68</b>		0.0874	0.0813	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Potassium</b>	<b>145</b>		43.7	35.2	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
Selenium	ND		0.437	0.107	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1
<b>Silicon</b>	<b>119</b>	<b>F1</b>	43.7	14.5	mg/Kg	✱	08/06/20 16:45	08/13/20 18:22	1

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**

**Lab Sample ID: 180-108987-9**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 96.9

**Method: EPA 6020A - Metals (ICP/MS) (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.0874	0.0236	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1
<b>Sodium</b>	<b>33.8</b>	<b>J</b>	43.7	17.4	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1
<b>Strontium</b>	<b>3.26</b>		0.437	0.0472	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1
Thallium	ND		0.0874	0.0603	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1
<b>Vanadium</b>	<b>4.22</b>		0.0874	0.0813	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1
<b>Zinc</b>	<b>16.7</b>		0.437	0.421	mg/Kg	☼	08/06/20 16:45	08/13/20 18:22	1

**Method: EPA 7471B - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0341	0.0219	mg/Kg	☼	08/13/20 05:03	08/14/20 10:44	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Percent Moisture</b>	<b>3.1</b>		0.1	0.1	%			08/05/20 18:26	1
<b>Percent Solids</b>	<b>96.9</b>		0.1	0.1	%			08/05/20 18:26	1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-10**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 85.3

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>1400</b>		5.10	4.94	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Antimony</b>	<b>0.0777</b>	<b>J</b>	0.170	0.0365	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Arsenic</b>	<b>3.87</b>		0.0850	0.0272	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Barium</b>	<b>23.5</b>		0.850	0.109	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Beryllium</b>	<b>0.168</b>		0.0850	0.0603	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Boron</b>	<b>7.77</b>		6.80	1.15	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Cadmium</b>	<b>0.120</b>	<b>B</b>	0.0850	0.0144	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Calcium</b>	<b>1310</b>		42.5	6.47	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Chromium</b>	<b>3.99</b>		0.170	0.0705	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Cobalt</b>	<b>4.24</b>		0.0425	0.0110	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Copper</b>	<b>1.46</b>		0.255	0.174	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Iron</b>	<b>6740</b>		4.25	4.06	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Lead</b>	<b>2.98</b>		0.0850	0.0850	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Lithium</b>	<b>2.08</b>		0.425	0.338	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Magnesium</b>	<b>1160</b>		42.5	13.3	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Manganese</b>	<b>321</b>		0.425	0.364	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Molybdenum</b>	<b>0.266</b>	<b>J</b>	0.425	0.138	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Nickel</b>	<b>9.40</b>		0.0850	0.0790	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Potassium</b>	<b>156</b>		42.5	34.2	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
Selenium	ND		0.425	0.104	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Silicon</b>	<b>118</b>		42.5	14.1	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
Silver	ND		0.0850	0.0229	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Sodium</b>	<b>35.2</b>	<b>J</b>	42.5	16.9	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Strontium</b>	<b>3.68</b>		0.425	0.0459	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Thallium</b>	<b>0.0637</b>	<b>J</b>	0.0850	0.0586	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Vanadium</b>	<b>4.48</b>		0.0850	0.0790	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1
<b>Zinc</b>	<b>19.6</b>		0.425	0.409	mg/Kg	☼	08/06/20 16:45	08/13/20 18:35	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2**

**Lab Sample ID: 180-108987-10**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 85.3

**Method: EPA 7471B - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0387	0.0249	mg/Kg	☼	08/13/20 05:03	08/14/20 10:47	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14.7		0.1	0.1	%			08/05/20 18:26	1
Percent Solids	85.3		0.1	0.1	%			08/05/20 18:26	1

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2**

**Lab Sample ID: 180-108987-11**

**T2**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 85.4

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1610		5.67	5.49	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Antimony	0.0568	J	0.189	0.0406	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Arsenic	2.72		0.0944	0.0302	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Barium	15.1		0.944	0.121	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Beryllium	0.155		0.0944	0.0670	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Boron	5.11	J	7.55	1.27	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Cadmium	0.102	B	0.0944	0.0161	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Calcium	842		47.2	7.20	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Chromium	4.67		0.189	0.0784	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Cobalt	4.34		0.0472	0.0123	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Copper	1.47		0.283	0.194	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Iron	7160		4.72	4.51	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Lead	2.73		0.0944	0.0944	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Lithium	2.24		0.472	0.376	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Magnesium	961		47.2	14.8	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Manganese	200		0.472	0.405	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Molybdenum	0.250	J	0.472	0.154	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Nickel	9.91		0.0944	0.0878	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Potassium	162		47.2	38.1	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Selenium	ND		0.472	0.115	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Silicon	174		47.2	15.7	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Silver	ND		0.0944	0.0255	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Sodium	35.4	J	47.2	18.8	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Strontium	3.00		0.472	0.0510	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Thallium	ND		0.0944	0.0652	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Vanadium	5.72		0.0944	0.0878	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1
Zinc	18.9		0.472	0.455	mg/Kg	☼	08/06/20 16:45	08/13/20 18:38	1

**Method: EPA 7471B - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0380	0.0244	mg/Kg	☼	08/13/20 05:03	08/14/20 10:48	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14.6		0.1	0.1	%			08/05/20 18:26	1
Percent Solids	85.4		0.1	0.1	%			08/05/20 18:26	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2**

**Lab Sample ID: 180-108987-12**

Date Collected: 07/30/20 12:00

Matrix: Solid

Date Received: 07/31/20 10:30

Percent Solids: 83.6

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1660		5.65	5.47	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Antimony	0.0664	J	0.188	0.0405	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Arsenic	3.89		0.0942	0.0301	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Barium	22.0		0.942	0.121	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Beryllium	0.170		0.0942	0.0669	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Boron	6.06	J	7.53	1.27	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Cadmium	0.127	B	0.0942	0.0160	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Calcium	1610		47.1	7.18	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Chromium	6.81		0.188	0.0782	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Cobalt	5.22		0.0471	0.0122	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Copper	1.81		0.283	0.193	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Iron	8060		4.71	4.50	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Lead	2.93		0.0942	0.0942	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Lithium	2.41		0.471	0.375	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Magnesium	971		47.1	14.8	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Manganese	301		0.471	0.404	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Molybdenum	0.384	J	0.471	0.153	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Nickel	11.7		0.0942	0.0876	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Potassium	167		47.1	37.9	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Selenium	ND		0.471	0.115	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Silicon	161		47.1	15.6	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Silver	ND		0.0942	0.0254	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Sodium	50.5		47.1	18.7	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Strontium	4.72		0.471	0.0509	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Thallium	ND		0.0942	0.0650	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Vanadium	6.43		0.0942	0.0876	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1
Zinc	23.2		0.471	0.454	mg/Kg	✱	08/06/20 16:45	08/13/20 18:41	1

**Method: EPA 7471B - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0320	0.0206	mg/Kg	✱	08/13/20 05:03	08/14/20 10:49	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	16.4		0.1	0.1	%			08/05/20 18:26	1
Percent Solids	83.6		0.1	0.1	%			08/05/20 18:26	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-324566/1-A**  
**Matrix: Solid**  
**Analysis Batch: 325523**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 324566**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Aluminum	ND		6.00	5.81	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Antimony	ND		0.200	0.0430	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Arsenic	ND		0.100	0.0320	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Barium	ND		1.00	0.128	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Beryllium	ND		0.100	0.0710	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Boron	ND		8.00	1.35	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Cadmium	0.03700	J	0.100	0.0170	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Calcium	ND		50.0	7.62	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Chromium	ND		0.200	0.0830	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Cobalt	ND		0.0500	0.0130	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Copper	ND		0.300	0.205	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Iron	ND		5.00	4.78	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Lead	ND		0.100	0.100	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Lithium	ND		0.500	0.398	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Magnesium	ND		50.0	15.7	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Manganese	ND		0.500	0.429	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Molybdenum	ND		0.500	0.163	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Nickel	ND		0.100	0.0930	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Potassium	ND		50.0	40.3	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Selenium	ND		0.500	0.122	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Silicon	ND		50.0	16.6	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Silver	ND		0.100	0.0270	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Sodium	ND		50.0	19.9	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Strontium	ND		0.500	0.0540	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Thallium	ND		0.100	0.0690	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Vanadium	ND		0.100	0.0930	mg/Kg		08/06/20 16:45	08/13/20 18:17	1
Zinc	ND		0.500	0.482	mg/Kg		08/06/20 16:45	08/13/20 18:17	1

**Lab Sample ID: LCS 180-324566/2-A**  
**Matrix: Solid**  
**Analysis Batch: 325523**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 324566**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
							Limits
Aluminum	500	494.3		mg/Kg		99	80 - 120
Antimony	25.0	25.73		mg/Kg		103	80 - 120
Arsenic	100	100.1		mg/Kg		100	80 - 120
Barium	100	101.1		mg/Kg		101	80 - 120
Beryllium	50.0	49.71		mg/Kg		99	80 - 120
Boron	125	122.9		mg/Kg		98	80 - 120
Cadmium	50.0	52.28		mg/Kg		105	80 - 120
Calcium	2500	2574		mg/Kg		103	80 - 120
Chromium	50.0	48.89		mg/Kg		98	80 - 120
Cobalt	50.0	49.17		mg/Kg		98	80 - 120
Copper	50.0	49.21		mg/Kg		98	80 - 120
Iron	500	528.5		mg/Kg		106	80 - 120
Lead	50.0	51.58		mg/Kg		103	80 - 120
Lithium	50.0	48.34		mg/Kg		97	80 - 120
Magnesium	2500	2562		mg/Kg		102	80 - 120
Manganese	50.0	47.56		mg/Kg		95	80 - 120

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 180-324566/2-A**  
**Matrix: Solid**  
**Analysis Batch: 325523**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 324566**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Molybdenum	50.0	51.45		mg/Kg		103	80 - 120
Nickel	50.0	48.56		mg/Kg		97	80 - 120
Potassium	2500	2463		mg/Kg		99	80 - 120
Selenium	100	100.6		mg/Kg		101	80 - 120
Silicon	100	94.54		mg/Kg		95	80 - 120
Silver	25.0	24.84		mg/Kg		99	80 - 120
Sodium	2500	2527		mg/Kg		101	80 - 120
Strontium	50.0	47.89		mg/Kg		96	80 - 120
Thallium	100	103.8		mg/Kg		104	80 - 120
Vanadium	50.0	49.20		mg/Kg		98	80 - 120
Zinc	25.0	24.33		mg/Kg		97	80 - 120

**Lab Sample ID: 180-108987-9 MS**  
**Matrix: Solid**  
**Analysis Batch: 325523**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**  
**Prep Type: Total/NA**  
**Prep Batch: 324566**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	1280	F1	437	1970	F1	mg/Kg	✱	158	75 - 125
Antimony	0.0410	J	21.9	19.60		mg/Kg	✱	89	75 - 125
Arsenic	2.54		87.4	83.91		mg/Kg	✱	93	75 - 125
Barium	18.9		87.4	97.39		mg/Kg	✱	90	75 - 125
Beryllium	0.129		43.7	39.38		mg/Kg	✱	90	75 - 125
Boron	4.56	J	109	99.79		mg/Kg	✱	87	75 - 125
Cadmium	0.110	B	43.7	41.80		mg/Kg	✱	95	75 - 125
Calcium	1130		2190	3467		mg/Kg	✱	107	75 - 125
Chromium	3.15		43.7	43.96		mg/Kg	✱	93	75 - 125
Cobalt	3.35		43.7	43.94		mg/Kg	✱	93	75 - 125
Copper	1.22		43.7	40.84		mg/Kg	✱	91	75 - 125
Iron	5260		437	6564	4	mg/Kg	✱	298	75 - 125
Lead	2.58		43.7	43.86		mg/Kg	✱	94	75 - 125
Lithium	1.69		43.7	40.80		mg/Kg	✱	89	75 - 125
Magnesium	678		2190	2974		mg/Kg	✱	105	75 - 125
Manganese	242		43.7	352.7	4	mg/Kg	✱	252	75 - 125
Molybdenum	0.233	J	43.7	40.65		mg/Kg	✱	92	75 - 125
Nickel	7.68		43.7	47.78		mg/Kg	✱	92	75 - 125
Potassium	145		2190	2131		mg/Kg	✱	91	75 - 125
Selenium	ND		87.4	77.77		mg/Kg	✱	89	75 - 125
Silicon	119	F1	87.4	173.1	F1	mg/Kg	✱	62	75 - 125
Silver	ND		21.9	20.22		mg/Kg	✱	92	75 - 125
Sodium	33.8	J	2190	2066		mg/Kg	✱	93	75 - 125
Strontium	3.26		43.7	42.69		mg/Kg	✱	90	75 - 125
Thallium	ND		87.4	81.73		mg/Kg	✱	93	75 - 125
Vanadium	4.22		43.7	43.39		mg/Kg	✱	90	75 - 125
Zinc	16.7		21.9	37.86		mg/Kg	✱	97	75 - 125

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 180-108987-9 MSD

Matrix: Solid

Analysis Batch: 325523

Client Sample ID: GAF-GW-PHIII-BKT-SAND

Prep Type: Total/NA

Prep Batch: 324566

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
	Result	Qualifier	Added	Result	Qualifier						
Aluminum	1280	F1	445	2420	F1	mg/Kg	☼	256	75 - 125	20	20
Antimony	0.0410	J	22.2	19.73		mg/Kg	☼	89	75 - 125	1	20
Arsenic	2.54		89.0	86.34		mg/Kg	☼	94	75 - 125	3	20
Barium	18.9		89.0	100.2		mg/Kg	☼	91	75 - 125	3	20
Beryllium	0.129		44.5	39.69		mg/Kg	☼	89	75 - 125	1	20
Boron	4.56	J	111	103.1		mg/Kg	☼	89	75 - 125	3	20
Cadmium	0.110	B	44.5	43.14		mg/Kg	☼	97	75 - 125	3	20
Calcium	1130		2220	3874		mg/Kg	☼	123	75 - 125	11	20
Chromium	3.15		44.5	44.51		mg/Kg	☼	93	75 - 125	1	20
Cobalt	3.35		44.5	45.11		mg/Kg	☼	94	75 - 125	3	20
Copper	1.22		44.5	42.21		mg/Kg	☼	92	75 - 125	3	20
Iron	5260		445	7593	4	mg/Kg	☼	524	75 - 125	15	20
Lead	2.58		44.5	44.92		mg/Kg	☼	95	75 - 125	2	20
Lithium	1.69		44.5	41.89		mg/Kg	☼	90	75 - 125	3	20
Magnesium	678		2220	3117		mg/Kg	☼	110	75 - 125	5	20
Manganese	242		44.5	306.5	4	mg/Kg	☼	144	75 - 125	14	20
Molybdenum	0.233	J	44.5	41.45		mg/Kg	☼	93	75 - 125	2	20
Nickel	7.68		44.5	50.88		mg/Kg	☼	97	75 - 125	6	20
Potassium	145		2220	2187		mg/Kg	☼	92	75 - 125	3	20
Selenium	ND		89.0	79.88		mg/Kg	☼	90	75 - 125	3	20
Silicon	119	F1	89.0	205.4		mg/Kg	☼	97	75 - 125	17	20
Silver	ND		22.2	20.78		mg/Kg	☼	93	75 - 125	3	20
Sodium	33.8	J	2220	2082		mg/Kg	☼	92	75 - 125	1	20
Strontium	3.26		44.5	42.53		mg/Kg	☼	88	75 - 125	0	20
Thallium	ND		89.0	83.23		mg/Kg	☼	94	75 - 125	2	20
Vanadium	4.22		44.5	44.77		mg/Kg	☼	91	75 - 125	3	20
Zinc	16.7		22.2	41.91		mg/Kg	☼	113	75 - 125	10	20

Lab Sample ID: MB 180-324292/1-A

Matrix: Water

Analysis Batch: 325682

Client Sample ID: Method Blank

Prep Type: Total Recoverable

Prep Batch: 324292

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Aluminum	ND		0.0300	0.0125	mg/L		08/05/20 10:35	08/14/20 13:44	1
Antimony	ND		0.00200	0.000378	mg/L		08/05/20 10:35	08/14/20 13:44	1
Arsenic	ND		0.00100	0.000313	mg/L		08/05/20 10:35	08/14/20 13:44	1
Barium	ND		0.0100	0.00160	mg/L		08/05/20 10:35	08/14/20 13:44	1
Beryllium	ND		0.00100	0.000182	mg/L		08/05/20 10:35	08/14/20 13:44	1
Boron	ND		0.0800	0.0386	mg/L		08/05/20 10:35	08/14/20 13:44	1
Cadmium	ND		0.00100	0.000217	mg/L		08/05/20 10:35	08/14/20 13:44	1
Calcium	ND		0.500	0.127	mg/L		08/05/20 10:35	08/14/20 13:44	1
Chromium	ND		0.00200	0.00153	mg/L		08/05/20 10:35	08/14/20 13:44	1
Cobalt	ND		0.000500	0.000134	mg/L		08/05/20 10:35	08/14/20 13:44	1
Copper	ND		0.00200	0.000627	mg/L		08/05/20 10:35	08/14/20 13:44	1
Iron	ND		0.0500	0.0195	mg/L		08/05/20 10:35	08/14/20 13:44	1
Lead	ND		0.00100	0.000128	mg/L		08/05/20 10:35	08/14/20 13:44	1
Lithium	ND		0.00500	0.00339	mg/L		08/05/20 10:35	08/14/20 13:44	1
Magnesium	ND		0.500	0.0827	mg/L		08/05/20 10:35	08/14/20 13:44	1
Manganese	ND		0.00500	0.000866	mg/L		08/05/20 10:35	08/14/20 13:44	1

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 180-324292/1-A**  
**Matrix: Water**  
**Analysis Batch: 325682**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 324292**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Molybdenum	ND		0.00500	0.000610	mg/L		08/05/20 10:35	08/14/20 13:44	1
Nickel	ND		0.00100	0.000336	mg/L		08/05/20 10:35	08/14/20 13:44	1
Potassium	ND		0.500	0.156	mg/L		08/05/20 10:35	08/14/20 13:44	1
Selenium	ND		0.00500	0.00151	mg/L		08/05/20 10:35	08/14/20 13:44	1
Silicon	ND		0.500	0.133	mg/L		08/05/20 10:35	08/14/20 13:44	1
Silver	ND		0.00100	0.000177	mg/L		08/05/20 10:35	08/14/20 13:44	1
Sodium	ND		0.500	0.348	mg/L		08/05/20 10:35	08/14/20 13:44	1
Strontium	ND		0.00500	0.000931	mg/L		08/05/20 10:35	08/14/20 13:44	1
Thallium	ND		0.00100	0.000148	mg/L		08/05/20 10:35	08/14/20 13:44	1
Vanadium	ND		0.00100	0.000991	mg/L		08/05/20 10:35	08/14/20 13:44	1
Zinc	ND		0.00500	0.00322	mg/L		08/05/20 10:35	08/14/20 13:44	1

**Lab Sample ID: LCS 180-324292/2-A**  
**Matrix: Water**  
**Analysis Batch: 325682**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 324292**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5.00	4.814		mg/L		96	80 - 120
Antimony	0.250	0.2700		mg/L		108	80 - 120
Arsenic	1.00	1.053		mg/L		105	80 - 120
Barium	1.00	1.046		mg/L		105	80 - 120
Beryllium	0.500	0.5132		mg/L		103	80 - 120
Boron	1.25	1.163		mg/L		93	80 - 120
Cadmium	0.500	0.5277		mg/L		106	80 - 120
Calcium	25.0	27.83		mg/L		111	80 - 120
Chromium	0.500	0.5170		mg/L		103	80 - 120
Cobalt	0.500	0.5275		mg/L		105	80 - 120
Copper	0.500	0.5288		mg/L		106	80 - 120
Iron	5.00	4.929		mg/L		99	80 - 120
Lead	0.500	0.5319		mg/L		106	80 - 120
Lithium	0.500	0.5087		mg/L		102	80 - 120
Magnesium	25.0	24.80		mg/L		99	80 - 120
Manganese	0.500	0.5095		mg/L		102	80 - 120
Molybdenum	0.500	0.5316		mg/L		106	80 - 120
Nickel	0.500	0.5228		mg/L		105	80 - 120
Potassium	25.0	24.41		mg/L		98	80 - 120
Selenium	1.00	1.051		mg/L		105	80 - 120
Silicon	1.00	1.028		mg/L		103	80 - 120
Silver	0.250	0.2403		mg/L		96	80 - 120
Sodium	25.0	23.74		mg/L		95	80 - 120
Strontium	0.500	0.5107		mg/L		102	80 - 120
Thallium	1.00	1.043		mg/L		104	80 - 120
Vanadium	0.500	0.5344		mg/L		107	80 - 120
Zinc	0.250	0.2407		mg/L		96	80 - 120

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: 180-108987-8 MS**  
**Matrix: Water**  
**Analysis Batch: 325682**

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2**  
**Prep Type: Total Recoverable**  
**Prep Batch: 324292**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Aluminum	0.0641		5.00	5.024		mg/L		99	75 - 125
Antimony	ND		0.250	0.2759		mg/L		110	75 - 125
Arsenic	0.00300		1.00	1.077		mg/L		107	75 - 125
Barium	0.154		1.00	1.238		mg/L		108	75 - 125
Beryllium	ND		0.500	0.5266		mg/L		105	75 - 125
Cadmium	ND		0.500	0.5437		mg/L		109	75 - 125
Calcium	595		25.0	652.6	4	mg/L		231	75 - 125
Chromium	0.00197	J	0.500	0.5408		mg/L		108	75 - 125
Cobalt	0.00619		0.500	0.5487		mg/L		109	75 - 125
Copper	0.0466		0.500	0.6077		mg/L		112	75 - 125
Iron	ND		5.00	4.988		mg/L		100	75 - 125
Lead	ND		0.500	0.5391		mg/L		108	75 - 125
Lithium	ND		0.500	0.5215		mg/L		104	75 - 125
Magnesium	6.80		25.0	33.08		mg/L		105	75 - 125
Manganese	0.00670		0.500	0.5246		mg/L		104	75 - 125
Molybdenum	0.0197		0.500	0.5768		mg/L		111	75 - 125
Nickel	0.0345		0.500	0.5709		mg/L		107	75 - 125
Potassium	7.31		25.0	31.80		mg/L		98	75 - 125
Selenium	0.00228	J	1.00	1.079		mg/L		108	75 - 125
Silicon	3.20		1.00	4.426		mg/L		123	75 - 125
Silver	ND		0.250	0.2449		mg/L		98	75 - 125
Sodium	43.1		25.0	69.09		mg/L		104	75 - 125
Strontium	1.04		0.500	1.619		mg/L		116	75 - 125
Thallium	ND		1.00	1.084		mg/L		108	75 - 125
Vanadium	0.00528		0.500	0.5481		mg/L		109	75 - 125
Zinc	ND		0.250	0.2331		mg/L		93	75 - 125

**Lab Sample ID: 180-108987-8 MSD**  
**Matrix: Water**  
**Analysis Batch: 325682**

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2**  
**Prep Type: Total Recoverable**  
**Prep Batch: 324292**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Aluminum	0.0641		5.00	5.023		mg/L		99	75 - 125	0	20
Antimony	ND		0.250	0.2746		mg/L		110	75 - 125	0	20
Arsenic	0.00300		1.00	1.058		mg/L		105	75 - 125	2	20
Barium	0.154		1.00	1.215		mg/L		106	75 - 125	2	20
Beryllium	ND		0.500	0.5176		mg/L		104	75 - 125	2	20
Cadmium	ND		0.500	0.5335		mg/L		107	75 - 125	2	20
Calcium	595		25.0	657.0	4	mg/L		248	75 - 125	1	20
Chromium	0.00197	J	0.500	0.5489		mg/L		109	75 - 125	1	20
Cobalt	0.00619		0.500	0.5396		mg/L		107	75 - 125	2	20
Copper	0.0466		0.500	0.6015		mg/L		111	75 - 125	1	20
Iron	ND		5.00	4.887		mg/L		98	75 - 125	2	20
Lead	ND		0.500	0.5353		mg/L		107	75 - 125	1	20
Lithium	ND		0.500	0.5146		mg/L		103	75 - 125	1	20
Magnesium	6.80		25.0	33.56		mg/L		107	75 - 125	1	20
Manganese	0.00670		0.500	0.5265		mg/L		104	75 - 125	0	20
Molybdenum	0.0197		0.500	0.5697		mg/L		110	75 - 125	1	20
Nickel	0.0345		0.500	0.5597		mg/L		105	75 - 125	2	20

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: 180-108987-8 MSD**  
**Matrix: Water**  
**Analysis Batch: 325682**

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2**  
**Prep Type: Total Recoverable**  
**Prep Batch: 324292**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Potassium	7.31		25.0	31.87		mg/L		98	75 - 125	0	20
Selenium	0.00228	J	1.00	1.068		mg/L		107	75 - 125	1	20
Silicon	3.20		1.00	4.404		mg/L		121	75 - 125	0	20
Silver	ND		0.250	0.2427		mg/L		97	75 - 125	1	20
Sodium	43.1		25.0	68.25		mg/L		100	75 - 125	1	20
Strontium	1.04		0.500	1.636		mg/L		119	75 - 125	1	20
Thallium	ND		1.00	1.082		mg/L		108	75 - 125	0	20
Vanadium	0.00528		0.500	0.5369		mg/L		106	75 - 125	2	20
Zinc	ND		0.250	0.2318		mg/L		93	75 - 125	1	20

## Method: EPA 7470A - Mercury (CVAA)

**Lab Sample ID: MB 180-324610/1-A**  
**Matrix: Water**  
**Analysis Batch: 324894**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 324610**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/07/20 06:29	08/10/20 12:59	1

**Lab Sample ID: LCS 180-324610/2-A**  
**Matrix: Water**  
**Analysis Batch: 324894**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 324610**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00250	0.002611		mg/L		104	80 - 120

**Lab Sample ID: 180-108986-E-3-C MS**  
**Matrix: Water**  
**Analysis Batch: 324894**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 324610**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	ND		0.00100	0.001015		mg/L		102	75 - 125

**Lab Sample ID: 180-108986-E-3-D MSD**  
**Matrix: Water**  
**Analysis Batch: 324894**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 324610**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00100	0.001012		mg/L		101	75 - 125	0	20

## Method: EPA 7471B - Mercury (CVAA)

**Lab Sample ID: MB 180-325293/1-A**  
**Matrix: Solid**  
**Analysis Batch: 325604**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 325293**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0330	0.0212	mg/Kg		08/13/20 05:03	08/14/20 10:42	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Method: EPA 7471B - Mercury (CVAA) (Continued)

**Lab Sample ID: LCS 180-325293/2-A**  
**Matrix: Solid**  
**Analysis Batch: 325604**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 325293**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.417	0.4458		mg/Kg		107	80 - 120

**Lab Sample ID: 180-108987-9 MS**  
**Matrix: Solid**  
**Analysis Batch: 325604**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**  
**Prep Type: Total/NA**  
**Prep Batch: 325293**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Mercury	ND		0.159	0.1700		mg/Kg	✱	107	80 - 120

**Lab Sample ID: 180-108987-9 MSD**  
**Matrix: Solid**  
**Analysis Batch: 325604**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND**  
**Prep Type: Total/NA**  
**Prep Batch: 325293**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Mercury	ND		0.159	0.1699		mg/Kg	✱	107	80 - 120	0	20

## Method: 2540G - SM 2540G

**Lab Sample ID: 180-108975-A-2 DU**  
**Matrix: Solid**  
**Analysis Batch: 324359**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Percent Moisture	60.3		59.2		%		2	10
Percent Solids	39.7		40.8		%		3	10

## Method: SM2320 B - Alkalinity, Total

**Lab Sample ID: MB 180-324222/5**  
**Matrix: Water**  
**Analysis Batch: 324222**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	ND		5.00	5.00	mg/L			08/04/20 10:21	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 10:21	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/04/20 10:21	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/04/20 10:21	1

**Lab Sample ID: LCS 180-324222/4**  
**Matrix: Water**  
**Analysis Batch: 324222**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Total Alkalinity as CaCO3 to pH 4.5	250	229.7		mg/L		92	90 - 110

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
 SDG: GAF-NRS-Treatability

## Method: SM2320 B - Alkalinity, Total (Continued)

Lab Sample ID: 180-108987-1 DU  
 Matrix: Water  
 Analysis Batch: 324222

Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Alkalinity as CaCO3 to pH 4.5	176		172.8		mg/L		2	20
Bicarbonate Alkalinity as CaCO3	176		172.8		mg/L		2	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Hydroxide Alkalinity	ND		ND		mg/L		NC	20

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 324292

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Dissolved	Water	3005A	
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Dissolved	Water	3005A	
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Dissolved	Water	3005A	
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Dissolved	Water	3005A	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Dissolved	Water	3005A	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total Recoverable	Water	3005A	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Dissolved	Water	3005A	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total Recoverable	Water	3005A	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Dissolved	Water	3005A	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total Recoverable	Water	3005A	
180-108987-8	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	3005A	
MB 180-324292/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-324292/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-108987-8 MS	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	3005A	
180-108987-8 MSD	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	3005A	

### Prep Batch: 324566

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-9	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	3050B	
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Solid	3050B	
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Solid	3050B	
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Solid	3050B	
MB 180-324566/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 180-324566/2-A	Lab Control Sample	Total/NA	Solid	3050B	
180-108987-9 MS	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	3050B	
180-108987-9 MSD	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	3050B	

### Prep Batch: 324610

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Dissolved	Water	7470A	
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Dissolved	Water	7470A	
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Dissolved	Water	7470A	
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Dissolved	Water	7470A	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Dissolved	Water	7470A	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Water	7470A	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Dissolved	Water	7470A	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Water	7470A	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Dissolved	Water	7470A	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Water	7470A	
MB 180-324610/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-324610/2-A	Lab Control Sample	Total/NA	Water	7470A	
180-108986-E-3-C MS	Matrix Spike	Total/NA	Water	7470A	
180-108986-E-3-D MSD	Matrix Spike Duplicate	Total/NA	Water	7470A	

### Analysis Batch: 324894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Dissolved	Water	EPA 7470A	324610
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Dissolved	Water	EPA 7470A	324610
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Dissolved	Water	EPA 7470A	324610
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Dissolved	Water	EPA 7470A	324610
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Dissolved	Water	EPA 7470A	324610

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Metals (Continued)

### Analysis Batch: 324894 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Water	EPA 7470A	324610
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Dissolved	Water	EPA 7470A	324610
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Water	EPA 7470A	324610
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Dissolved	Water	EPA 7470A	324610
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Water	EPA 7470A	324610
MB 180-324610/1-A	Method Blank	Total/NA	Water	EPA 7470A	324610
LCS 180-324610/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	324610
180-108986-E-3-C MS	Matrix Spike	Total/NA	Water	EPA 7470A	324610
180-108986-E-3-D MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 7470A	324610

### Prep Batch: 325293

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-9	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	7471B	
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Solid	7471B	
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Solid	7471B	
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Solid	7471B	
MB 180-325293/1-A	Method Blank	Total/NA	Solid	7471B	
LCS 180-325293/2-A	Lab Control Sample	Total/NA	Solid	7471B	
180-108987-9 MS	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	7471B	
180-108987-9 MSD	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	7471B	

### Analysis Batch: 325523

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-9	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 6020A	324566
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Solid	EPA 6020A	324566
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Solid	EPA 6020A	324566
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Solid	EPA 6020A	324566
MB 180-324566/1-A	Method Blank	Total/NA	Solid	EPA 6020A	324566
LCS 180-324566/2-A	Lab Control Sample	Total/NA	Solid	EPA 6020A	324566
180-108987-9 MS	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 6020A	324566
180-108987-9 MSD	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 6020A	324566

### Analysis Batch: 325604

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-9	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 7471B	325293
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Solid	EPA 7471B	325293
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Solid	EPA 7471B	325293
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Solid	EPA 7471B	325293
MB 180-325293/1-A	Method Blank	Total/NA	Solid	EPA 7471B	325293
LCS 180-325293/2-A	Lab Control Sample	Total/NA	Solid	EPA 7471B	325293
180-108987-9 MS	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 7471B	325293
180-108987-9 MSD	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	EPA 7471B	325293

### Analysis Batch: 325682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Dissolved	Water	EPA 6020A	324292
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Dissolved	Water	EPA 6020A	324292
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Dissolved	Water	EPA 6020A	324292
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Dissolved	Water	EPA 6020A	324292
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Dissolved	Water	EPA 6020A	324292
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total Recoverable	Water	EPA 6020A	324292

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-108987-1  
SDG: GAF-NRS-Treatability

## Metals (Continued)

### Analysis Batch: 325682 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Dissolved	Water	EPA 6020A	324292
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total Recoverable	Water	EPA 6020A	324292
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Dissolved	Water	EPA 6020A	324292
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total Recoverable	Water	EPA 6020A	324292
180-108987-8	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	EPA 6020A	324292
MB 180-324292/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	324292
LCS 180-324292/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	324292
180-108987-8 MS	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	EPA 6020A	324292
180-108987-8 MSD	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T2	Total Recoverable	Water	EPA 6020A	324292

### Analysis Batch: 325932

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Dissolved	Water	EPA 6020A	324292
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total Recoverable	Water	EPA 6020A	324292

## General Chemistry

### Analysis Batch: 324222

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Total/NA	Water	SM2320 B	
180-108987-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T1	Total/NA	Water	SM2320 B	
180-108987-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T1	Total/NA	Water	SM2320 B	
180-108987-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U- T1	Total/NA	Water	SM2320 B	
180-108987-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Water	SM2320 B	
180-108987-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Water	SM2320 B	
180-108987-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Water	SM2320 B	
MB 180-324222/5	Method Blank	Total/NA	Water	SM2320 B	
LCS 180-324222/4	Lab Control Sample	Total/NA	Water	SM2320 B	
180-108987-1 DU	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T1	Total/NA	Water	SM2320 B	

### Analysis Batch: 324359

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-108987-9	GAF-GW-PHIII-BKT-SAND	Total/NA	Solid	2540G	
180-108987-10	GAF-GW-PHIII-BKT-DOLO-SAND-19R- T2	Total/NA	Solid	2540G	
180-108987-11	GAF-GW-PHIII-BKT-CONTROL-SAND-19R- T2	Total/NA	Solid	2540G	
180-108987-12	GAF-GW-PHIII-BKT-HI CAL-SAND-19R- T2	Total/NA	Solid	2540G	
180-108975-A-2 DU	Duplicate	Total/NA	Solid	2540G	

# Chain of Custody Record 420749

Environment Testir  
TestAmerica

TAL-8210

Address: 301 Alpha Dr. Pittsburgh

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Client Contact  
Company Name: AECOM  
Address: 9400 Ambler Blvd  
City/State/Zip: Aust., TX 78729  
Phone: 512-872-0579  
Fax: \_\_\_\_\_  
Project Name: TVA Gallatin Treatability Study  
Site: GAF-NPS-Treatability  
P O # \_\_\_\_\_

Project Manager: Craig MacPhee  
Tel/Email: craig\_macphee@aec.com  
Site Contact: Francisco Barajas  
Lab Contact: Rachel Watkins  
Date: 7/30/2020  
COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below  
 2 weeks  1 week  2 days  1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)		Perform MS/MSD (Y/N)		Sample Specific Notes:
						6020 totals*	6020 d:ssolved**	6020 totals-BE, Cd, Cr, Ni, Mn	9056A-Cl, F, SO <sub>4</sub>	
GAF-GW-PH111-Bkt-Control-Sand-19R-t1	7/23/20	1400	G	GV	7					6020A/174718
GAF-GW-PH111-Bkt-Dolo-Sand-19R-t1	7/23/20	1400			7					3512-TKN
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-t1	7/23/20	1400			7					5310C-TOC
GAF-GW-PH111-Bkt-Hi.Cal-Sand-444u-t1	7/23/20	1400			7					SM4500-Su.Hf.Dr
GAF-GW-PH111-Bkt-Control-Sand-19R-t2	7/30/20	1200			9					4500-Phosphate
GAF-GW-PH111-Bkt-Dolo-Sand-19R-t2	7/30/20	1200			9					353.2 ND2/ND3
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-t2	7/30/20	1200			9					TDS 2540C
GAF-GW-PH111-Bkt-Hi.Cal-Sand-444u-t2	7/30/20	1200			1					2320B-Alkalinity***
GAF-GW-PH111-Bkt-Sand	7/30/20	1200			1					9056A-Cl, F, SO <sub>4</sub>
GAF-GW-PH111-Bkt-Dolo-Sand-19R-t2	7/30/20	1200	G	S	1					6020 d:ssolved**
GAF-GW-PH111-Bkt-Hi.Cal-Control-Sand-19R-t2	7/30/20	1200		S	1					6020 totals*
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-t2	7/30/20	1200		S	1					6020 totals-BE, Cd, Cr, Ni, Mn



Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments: \*TOTALS 6020 = Sb, As, Ba, Cr, Co, Pb, Hg, Mn, Se, Ti, Cu, Ag, V, Be, Ca, Li, Ni, Zn, Al, Fe, Mn, Co, Mg, K, Na, B, P, H470A  
 \*\*Dissolved 6020 were filtered by AECOM w/o 2um filter. No other splits were f. Heads  
 \*\*\*Alkalinity = total, hydroxide, carbonate bicarbonate  
 Preservation Used: 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Custody Seal No.: \_\_\_\_\_  
 Relinquished by: Rachel Watkins  
 Relinquished by: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_

Received by: Michelle Wilson  
 Received by: \_\_\_\_\_  
 Received in Laboratory by: \_\_\_\_\_

Date/Time: 7/30/20 1400  
 Date/Time: 7/31/20  
 Date/Time: 7/30/20 17:30

Company: AECOM  
 Company: \_\_\_\_\_  
 Company: \_\_\_\_\_



# Chain of Custody Record

420749 eurofins

Environment Test  
TestAmerica

TAL-821

Address: 301 Alpha Dr. Pittsburgh

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Client Contact  
Company Name: AECOM  
Address: 9400 Amberley Blvd  
City/State/Zip: Austin, TX 78729  
Phone: 512-872-0579  
Fax: \_\_\_\_\_  
Project Name: TVA Gallatin Treatability Study  
Site: GAF-NFS-Treatability  
P.O.# \_\_\_\_\_

Project Manager: Craig MacPhee  
Tel/Email: craig.macphee@aec.com  
Site Contact: Francisco Barral  
Lab Contact: Rachel Watkins  
Date: 7/30/2020  
COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs  
Carrier: \_\_\_\_\_

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	6020 totals * Be, Cd, Cr, Ni, Mn	6020 d. ss lead **	9056A Cl, F, SO4	2320B - Alkalinity ***	TDS 2540C	353-2 NO2/NO3	4500 Phosphate	SM4500 - SU/HR	351.2 - TN	6020A/17471B
GAF-GW-PH111-Bkt-Control-Sand-19R-T1	7/23/20	1400	G	GV	7	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Dolo-Sand-19R-T1	7/23/20	1400	G		7	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-T1	7/23/20	1400	G		7	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Sand-444u-T1	7/23/20	1400	G		7	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Control-Sand-19R-T2	7/30/20	1200	G		9	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Dolo-Sand-19R-T2	7/30/20	1200	G		9	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-T2	7/30/20	1200	G		9	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Sand-444u-T2	7/30/20	1200	G		1	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Sand	7/30/20	1200	G		1	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Dolo-Sand-19R-T2	7/30/20	1200	G		1	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Control-Sand-19R-T2	7/30/20	1200	G		1	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GAF-GW-PH111-Bkt-Hi.Cal-Sand-19R-T2	7/30/20	1200	G		1	N	N	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months  
 Non-Hazardous  Flammable  Skin Irritant  Poison B  Unknown

Possible Hazard Identification:  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Preservation Used: 1=Ice, 2=HCl; 3=H2SO4; 4=HNO3; 5=NaOH; 6=Other

Special Instructions/QC Requirements & Comments:  
 \* Totals 6020 = Sb, As, Ba, Cr, Co, Pb, Hg, Mo, Se, Ti, Cu, Ag, V, Be, Cd, Ni, Zn, Al, Fe, Mn, Ca, Mg, K, Na, B  
 \*\* D. Solved 6020 were filtered by AECOM w/0.2um filter, no other splits were for head bicarbonate  
 \*\*\* Alkalinity = Total, Hydroxide, carbonate

Custody Seal No.: \_\_\_\_\_  
 Company: AECOM  
 Date/Time: 7/30/20 1400  
 Relinquished by: Rachel Watkins  
 Received by: Rachel Watkins  
 Date/Time: 7/30/20 10:30  
 Company: \_\_\_\_\_  
 Received in Laboratory by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Company: \_\_\_\_\_

Rev-1 August 7, 2020 Pat Hual - remove all analyses except alkalinity & metals

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- 13



<b>Client Information (Sub Contract Lab)</b> Company: TestAmerica Laboratories, Inc. Address: 3355 McLemore Drive, Pensacola, FL 32514 Phone: 850-474-1001(Tel) 850-478-2671(Fax) Email:		Sampler: Rumble, Jennifer L. Lab P/N: Jennifer.Rumble@Eurofins.com E-Mail:		Carrier Tracking No(s): 180-405717.1 State of Origin: Tennessee Page 1 of 1	
Shipping/Receiving Company: TestAmerica Laboratories, Inc. Address: 3355 McLemore Drive, Pensacola, FL 32514 Phone: 850-474-1001(Tel) 850-478-2671(Fax) Email:		Due Date Requested: 8/12/2020 TAT Requested (days):		Job #: 180-108987-1 Preservation Codes: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO3 S - H2SO4 G - Amchlor H - Ascorbic Acid I - Ice J - DI Water V - MCAA W - pH 4-5 L - EDA Other:	
Project Name: GAF-NRS-Treatability Site:		Accreditations Required (See note): 351,2/351.2, Prep NRS Treatability TKN		Total Number of Containers:	
Sample Identification - Client ID (Lab ID)		Field Filtered Sample (Yes or No)		Special Instructions/Note:	
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +1 (180-108987-1)	7/23/20	14:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-DOLO-SAND-19R- +1 (180-108987-2)	7/23/20	14:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +1 (180-108987-3)	7/23/20	14:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-444U- +1 (180-108987-4)	7/23/20	14:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +2 (180-108987-5)	7/30/20	12:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-DOLO-SAND-19R- +2 (180-108987-6)	7/30/20	12:00 Central	Water	X	1 Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +2 (180-108987-7)	7/30/20	12:00 Central	Water	X	1 Analysis Must follow TVA Protocol

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins TestAmerica.

**Possible Hazard Identification**  
 Unconfirmed  
 Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2  
 Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: 8/12/20 12:00 Company: Company  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: Company  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: Company  
 Custody Seals Intact: \_\_\_\_\_ Custody Seal No.: \_\_\_\_\_  
 Cooler Temperature(s) °C and Other Remarks:





159470-434 RIT2 EXP 01/21



ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARRAJAS  
REC'D  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78728  
UNITED STATES US

SHIP DATE: 28FEB20  
ACTWGT: 10.00 LB MAN  
CAD: 058207/C/AF3311

TO

EUROFINS TESTAMERICA  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 15238

(412) 963-7068  
REF: \$180-58932

RMA: |||||



FedEx  
TRK# 1680 3500 0839  
0221

FRI - 31 JUL 10:30A  
PRIORITY OVERNIGHT

XH AGCA

Uncorrected temp  
Thermometer ID

CF 0 Initials MY

PT-WI-SR-001 effective 11/8/18

FD: 1711129 30Jul2020 MHRA 56C63/C6A6/05A2

Blue box

70-434 RIT2 EXP 01/21



ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARRAJAS  
REC'D  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78728  
UNITED STATES US

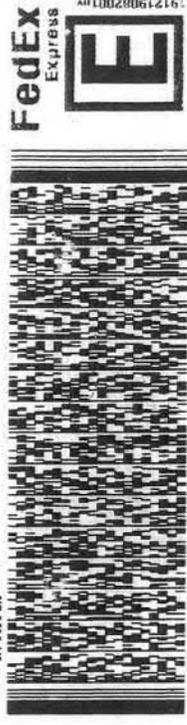
SHIP DATE:  
ACTWGT:  
CAD:

TO

EUROFINS TESTAMERICA  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7068  
REF: \$180-58932

RMA: |||||



FRI - 31 JUL 10:30A  
PRIORITY OVERNIGHT

FedEx  
TRK# 1680 3500 0840  
0221

XH AGCA

Uncorrected temp  
Thermometer ID

CF 0 Initials MY

PT-WI-SR-001 effective 11/8/18

FD: 1711129 30Jul2020 MHRA 56C63/C6A6/05A2

Blue box

**Chain of Custody Record**



<b>Client Information (Sub Contract Lab)</b>		Sampler:	Lab PM:	Carrier Tracking No(s):	COC No:
Client Contact: Shipping/Receiving		Phone:	Rumble, Jennifer L	State of Origin: Tennessee	180-405720.1
Company: TestAmerica Laboratories, Inc.		E-Mail: Jennifer.Rumble@Eurofins.com	Jennifer.Rumble@Eurofins.com	Page 1 of 1	
Address: 4101 Shuffel Street NW,		Accreditations Required (See note):		Job #:	180-108987-1
City: North Canton	Due Date Requested: 8/13/2020	<b>Analysis Requested</b>		Preservation Codes:	M - Hexane N - None O - AsNaO2 P - Na2CO4S Q - NaHSO4 R - Na2S2O3 S - HZSO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)
State, Zip: OH, 44720	TAT Requested (days):	Perform M/MSD (Yes or No)		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Antichlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
PO #:	PO #:	Field Filtered Sample (Yes or No)		Total Number of Containers	
WO #:	WO #:	4500 P.E./NRS Treatability P04		W91	
Project #: 18022206	Project #: 18022206	Preservation Code:		Special Instructions/Note:	
Site: GAF-NRS-Treatability	Site: SSOW#:	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=soil, AT=Tissue, A=Air)
Sample Identification - Client ID (Lab ID)		7/23/20	14:00 Central	Water	Water
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +1 (180-108987-1)		7/23/20	14:00 Central	Water	Water
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +1 (180-108987-2)		7/23/20	14:00 Central	Water	Water
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +1 (180-108987-3)		7/23/20	14:00 Central	Water	Water
GAF-GW-PH111-BKT-HI CAL-SAND-444U- +1 (180-108987-4)		7/30/20	12:00 Central	Water	Water
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +2 (180-108987-5)		7/30/20	12:00 Central	Water	Water
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +2 (180-108987-6)		7/30/20	12:00 Central	Water	Water
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +2 (180-108987-7)		7/30/20	12:00 Central	Water	Water

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins TestAmerica.

**Possible Hazard Identification**  
Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

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

Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_

Relinquished by: \_\_\_\_\_ Date/Time: 8/13/20 17:00 Company: \_\_\_\_\_ Received by: \_\_\_\_\_ Date/Time: 8-5-20 P20 Company: ETA

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_ Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Custody Seals Intact: \_\_\_\_\_ Custody Seal No.: \_\_\_\_\_  
 Δ Yes Δ No

Cooler Temperature(s) °C and Other Remarks:



1  
2  
3  
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12  
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<b>Eurofins TestAmerica Canton Sample Receipt Form/Narrative</b>		Login # : _____
<b>Canton Facility</b>		
Client <u>FJA Pittsburgh</u>	Site Name _____	Cooler unpacked by: <u>Math Snuder</u>
Cooler Received on <u>8-5-20</u>	Opened on <u>8-5-20</u>	
FedEx: 1 <sup>st</sup> Grd <input checked="" type="checkbox"/> Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____		
<b>Receipt After-hours: Drop-off Date/Time</b>		<b>Storage Location</b>
TestAmerica Cooler # <u>JA</u>	Foam Box _____	Client Cooler _____
Packing material used: <u>Bubble Wrap</u>	Foam _____	Plastic Bag _____
COOLANT: <u>Wet Ice</u>	Blue Ice _____	Dry Ice _____
1. Cooler temperature upon receipt		<input type="checkbox"/> See Multiple Cooler Form
IR GUN# IR-10 (CF +0.7 °C)	Observed Cooler Temp. _____ °C	Corrected Cooler Temp. _____ °C
IR GUN #IR-11 (CF +0.9 °C)	Observed Cooler Temp. <u>3.8</u> °C	Corrected Cooler Temp. <u>4.4</u> °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity <u>1</u>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
-Were the seals on the outside of the cooler(s) signed & dated?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
-Were tamper/custody seals intact and uncompromised?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
3. Shippers' packing slip attached to the cooler(s)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
4. Did custody papers accompany the sample(s)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
5. Were the custody papers relinquished & signed in the appropriate place?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
6. Was/were the person(s) who collected the samples clearly identified on the COC?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
7. Did all bottles arrive in good condition (Unbroken)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <u>ms 8-5-20</u>	
8. Could all bottle labels be reconciled with the COC?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
9. Were correct bottle(s) used for the test(s) indicated?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
10. Sufficient quantity received to perform indicated analyses?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
11. Are these work share samples?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
If yes, Questions 12-16 have been checked at the originating laboratory.		
12. Were all preserved sample(s) at the correct pH upon receipt?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	pH Strip Lot# <u>HC911298</u>
13. Were VOAs on the COC?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
14. Were air bubbles >6 mm in any VOA vials?  Larger than this.	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
16. Was a LL Hg or Me Hg trip blank present? _____	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other _____		
Concerning _____		

Tests that are not checked for pH by Receiving:

VOAs  
Oil and Grease  
TOC

<b>17. CHAIN OF CUSTODY &amp; SAMPLE DISCREPANCIES</b>	Samples processed by: <u>Math C</u>
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
<b>18. SAMPLE CONDITION</b>	
Sample(s) _____ were received after the recommended holding time had expired.	
Sample(s) _____ were received in a broken container.	
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)	
<b>19. SAMPLE PRESERVATION</b>	
Sample(s) _____ were further preserved in the laboratory.	
Time preserved: _____ Preservative(s) added/Lot number(s): _____	
VOA Sample Preservation - Date/Time VOAs Frozen: _____	

**Chain of Custody Record**



<b>Client Information (Sub Contract Lab)</b>		Sampler: Rumble, Jennifer L		Carrier Tracking No(s): 180-405717.1				
Client Contact: Shipping/Receiving		Phone: Jennifer.Rumble@Eurofinset.com		Page: Page 1 of 1				
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 180-108987-1				
Address: 3355 McLemore Drive, Pensacola, FL 32514		Due Date Requested: 8/12/2020		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)		TAT Requested (days):		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)				
Email:		PO #:						
Project #: 18022206		WO #:						
Site: GAF-NRS-Treatability		Project Name:						
		SSOW#:						
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Water, Solid, Other)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Total Number of Containers	Special Instructions/Note:
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +1 (180-108987-1)	7/23/20	14:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-DOLO-SAND-19R- +1 (180-108987-2)	7/23/20	14:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +1 (180-108987-3)	7/23/20	14:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-444U- +1 (180-108987-4)	7/23/20	14:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-CONTROL-SAND-19R- +2 (180-108987-5)	7/30/20	12:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-DOLO-SAND-19R- +2 (180-108987-6)	7/30/20	12:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol
GAF-GW-PH111-BKT-HI CAL-SAND-19R- +2 (180-108987-7)	7/30/20	12:00 Central	Water	Water	X	X	1	Analysis Must follow TVA Protocol

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins TestAmerica.

**Possible Hazard Identification**

Unconfirmed  
Deliverable Requested: I, II, III, IV, Other (specify) \_\_\_\_\_  
Primary Deliverable Rank: 2

Empty Kit Relinquished by: \_\_\_\_\_ Date: 8/12/2020  
Relinquished by: \_\_\_\_\_ Date/Time: 8/12/2020 12:00  
Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Received by: \_\_\_\_\_ Date/Time: 8/12/2020 9:18  
Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Company: \_\_\_\_\_  
Company: \_\_\_\_\_  
Company: \_\_\_\_\_

Method of Shipment: \_\_\_\_\_  
Cooler Temperature(s) °C and Other Remarks: 2.5°C

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

Special Instructions/OC Requirements: \_\_\_\_\_



## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-108987-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 108987**

**List Number: 1**

**Creator: Abernathy, Eric**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

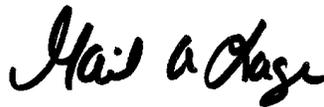
Laboratory Job ID: 180-109312-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: GAF-NRS-Treatability  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

9/14/2020 5:17:50 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through

**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Job ID: 180-109312-1**

**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

### Job Narrative 180-109312-1

#### Revised Report

This report was revised to correct the metals MS/MSD reporting. This replaces the previous final report.

#### Receipt

The samples were received on 8/7/2020 8:30 AM; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 2.8° C and 3.3° C.

#### GC Semi VOA

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

#### Metals

Method 6020A: The serial dilution performed for the following sample associated with batch 180-325932 was outside control limits for multiple analytes: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3 (180-109312-4)

Method 6020A: The following sample was diluted to bring the concentration of target analytes within the calibration range: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (180-109312-1). Elevated reporting limits (RLs) are provided.

#### General Chemistry

Method SM 4500 S2 F: The following samples were diluted due to the nature of the sample matrix:

GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (180-109312-1) and GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3 (180-109312-2). Elevated reporting limits (RLs) are provided. Sample appeared to react with the Iodine that was being added when sample was not diluted.

Method 353.2: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for Analytical Batch 180-325380 were outside control limits, high. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 353.2: The native sample, matrix spike, and matrix spike duplicate (MS/MSD) associated with analytical batch 180-325380 were performed at the same dilution. Due to the additional level of analyte present in the spiked samples, the concentration of Nitrate Nitrite in the MS/MSD was above the instrument calibration range. The data have been reported.

Method SM 5310C: The RPD between the duplicate analyses was >10%. The difference between the results was less than the reporting limit; therefore the results are reported with this NCM. GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (180-109312-1)

Method SM 5310C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batch 180-325492. LCS/LCSD analyzed.

Method SM 4500 S2 F: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3 (180-109312-3) was diluted due to the nature of the sample matrix. Elevated reporting limits (RLs) are provided. When sample was run originally undiluted the results had a negative value greater than the RL (> -3 mg/L).

Method 351.2: The method blank for preparation batch 400-500216 and analytical batch 400-500432 contained Nitrogen, Kjeldahl above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method 351.2: The matrix spike duplicate (MSD) recoveries for preparation batch 400-500216 and analytical batch 400-500432 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 351.2: The matrix spike duplicate (MSD) recoveries for preparation batch 400-500691 and analytical batch 400-500931 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

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## Job ID: 180-109312-1 (Continued)

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### Laboratory: Eurofins TestAmerica, Pittsburgh (Continued)

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Qualifiers

### HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

### Metals

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

### General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-23-21
Connecticut	State	PH-0590	12-31-21
Florida	NELAP	E87225	06-30-21
Georgia	State	4062	02-23-21
Illinois	NELAP	004498	07-31-20 *
Iowa	State	421	06-01-21
Kansas	NELAP	E-10336	04-30-21
Kentucky (UST)	State	112225	02-23-21
Kentucky (WW)	State	KY98016	12-31-20
Minnesota	NELAP	OH00048	12-31-20
Minnesota (Petrofund)	State	3506	08-01-21
New Jersey	NELAP	OH001	06-30-21
New York	NELAP	10975	03-31-21
Ohio VAP	State	CL0024	06-05-21
Oregon	NELAP	4062	02-24-21
Pennsylvania	NELAP	68-00340	08-31-20
Texas	NELAP	T104704517-18-10	08-31-20
USDA	US Federal Programs	P330-18-00281	09-17-21
Virginia	NELAP	010101	09-14-20
Washington	State	C971	01-12-21
West Virginia DEP	State	210	12-31-20

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pensacola

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

Authority	Program	Identification Number	Expiration Date
Alabama	State	40150	06-30-21
ANAB	ISO/IEC 17025	L2471	02-23-23
Arizona	State	AZ0710	01-13-21
Arkansas DEQ	State	88-0689	09-01-20
California	State	2510	06-30-21
Florida	NELAP	E81010	06-30-21
Georgia	State	E81010(FL)	06-30-21
Illinois	NELAP	004586	10-09-20
Iowa	State	367	08-01-21
Kansas	NELAP	E-10253	10-31-20
Kentucky (UST)	State	53	06-30-21
Kentucky (WW)	State	KY98030	12-31-20
Louisiana	NELAP	30976	06-30-21
Louisiana (DW)	State	LA017	12-31-20
Maryland	State	233	09-30-20
Massachusetts	State	M-FL094	06-30-21
Michigan	State	9912	06-30-21
Minnesota	NELAP	012-999-481	12-31-20
New Jersey	NELAP	FL006	06-30-21
New York	NELAP	12115	04-01-21
North Carolina (WW/SW)	State	314	12-31-20
Oklahoma	State	9810-186	08-31-20
Pennsylvania	NELAP	68-00467	01-31-21
Rhode Island	State	LAO00307	12-30-20
South Carolina	State	96026002	06-30-21
Tennessee	State	TN02907	06-30-21
Texas	NELAP	T104704286	09-30-20
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-18-00148	05-17-21
Virginia	NELAP	460166	06-14-21
Washington	State	C915	05-15-21
West Virginia DEP	State	136	09-30-20



# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Water	08/06/20 11:00	08/07/20 08:30	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Water	08/06/20 11:00	08/07/20 08:30	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Water	08/06/20 11:00	08/07/20 08:30	
180-109312-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Water	08/06/20 11:00	08/07/20 08:30	
180-109312-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 08:30	
180-109312-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 08:30	
180-109312-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 08:30	
180-109312-8	GAF-GW-PHIII-BKT-SAND-T3	Solid	08/06/20 11:00	08/07/20 08:30	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 9056A	Anions, Ion Chromatography	SW846	TAL PIT
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
EPA 7470A	Mercury (CVAA)	SW846	TAL PIT
2540G	SM 2540G	SM22	TAL PIT
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL PEN
EPA 353.2	Nitrogen, Nitrate-Nitrite	EPA	TAL PIT
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL PIT
SM 5310C	Total Organic Carbon	SM	TAL PIT
SM2320 B	Alkalinity, Total	SM18	TAL PIT
SM4500 P E-2011	Phosphorus	SM	TAL CAN
SM4500-S-2 F.	Sulfide	SM21	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT
3050B	Preparation, Metals	SW846	TAL PIT
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL PEN
7470A	Preparation, Mercury	SW846	TAL PIT

## Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SM21 = Standard Methods For The Examination Of Water And Wastewater, 21st Edition

SM22 = Standard Methods For The Examination Of Water And Wastewater, 22nd Edition

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

## Laboratory References:

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-1**

**Date Collected: 08/06/20 11:00**

**Matrix: Water**

**Date Received: 08/07/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		2.5			325093	08/12/20 06:43	EPS	TAL PIT
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		25			325093	08/12/20 06:59	EPS	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A Instrument ID: DORY		1			325932	08/15/20 15:25	RSK	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A Instrument ID: DORY		1			326139	08/18/20 13:48	RSK	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A Instrument ID: DORY		10			326139	08/18/20 13:51	RSK	TAL PIT
Total/NA	Prep	7470A			50 mL	50 mL	324942	08/11/20 05:59	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A Instrument ID: HGZ		1			325094	08/11/20 14:18	RJR	TAL PIT
Total/NA	Prep	351.2			25 mL	25 mL	500216	08/13/20 12:08	KJR	TAL PEN
Total/NA	Analysis	351.2 Instrument ID: Lachat 2		1			500432	08/14/20 18:40	KJR	TAL PEN
Total/NA	Analysis	EPA 353.2 Instrument ID: ASTORIA2		1	8 mL	8 mL	325380	08/13/20 10:02	CAK	TAL PIT
Total/NA	Analysis	SM 2540C Instrument ID: NOEQUIP		1	50 mL	100 mL	324746	08/08/20 06:31	AVS	TAL PIT
Total/NA	Analysis	SM 5310C Instrument ID: TOC1030		1			325492	08/13/20 04:54	TAM	TAL PIT
Total/NA	Analysis	SM2320 B Instrument ID: PCTITRATOR		1			325108	08/11/20 13:19	AVS	TAL PIT
Total/NA	Analysis	SM4500 P E-2011 Instrument ID: ERNIE		1	5 mL	5 mL	446944	08/13/20 08:42	TPH	TAL CAN
Total/NA	Analysis	SM4500-S-2 F. Instrument ID: NOEQUIP		1	10 mL	50 mL	325234	08/12/20 14:01	CMR	TAL PIT

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-2**

**Date Collected: 08/06/20 11:00**

**Matrix: Water**

**Date Received: 08/07/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		2.5			325093	08/12/20 07:15	EPS	TAL PIT
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		25			325093	08/12/20 07:32	EPS	TAL PIT
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A Instrument ID: DORY		1			325932	08/15/20 15:29	RSK	TAL PIT

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-2**

**Date Collected: 08/06/20 11:00**

**Matrix: Water**

**Date Received: 08/07/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			326139	08/18/20 13:55	RSK	TAL PIT
		Instrument ID: DORY								
Total/NA	Prep	7470A			50 mL	50 mL	324942	08/11/20 05:59	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A		1			325094	08/11/20 14:21	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Prep	351.2			25 mL	25 mL	500216	08/13/20 12:08	KJR	TAL PEN
Total/NA	Analysis	351.2		1			500432	08/14/20 18:41	KJR	TAL PEN
		Instrument ID: Lachat 2								
Total/NA	Analysis	EPA 353.2		1	8 mL	8 mL	325380	08/13/20 10:06	CAK	TAL PIT
		Instrument ID: ASTORIA2								
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	324746	08/08/20 06:31	AVS	TAL PIT
		Instrument ID: NOEQUIP								
Total/NA	Analysis	SM 5310C		1			325492	08/13/20 05:12	TAM	TAL PIT
		Instrument ID: TOC1030								
Total/NA	Analysis	SM2320 B		1			325108	08/11/20 13:26	AVS	TAL PIT
		Instrument ID: PCTITRATOR								
Total/NA	Analysis	SM4500 P E-2011		1	5 mL	5 mL	446944	08/13/20 08:49	TPH	TAL CAN
		Instrument ID: ERNIE								
Total/NA	Analysis	SM4500-S-2 F.		1	10 mL	50 mL	325234	08/12/20 14:08	CMR	TAL PIT
		Instrument ID: NOEQUIP								

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-3**

**Date Collected: 08/06/20 11:00**

**Matrix: Water**

**Date Received: 08/07/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A		2.5			325093	08/12/20 07:48	EPS	TAL PIT
		Instrument ID: CHICS2100B								
Total/NA	Analysis	EPA 9056A		25			325093	08/12/20 08:05	EPS	TAL PIT
		Instrument ID: CHICS2100B								
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			325932	08/15/20 15:32	RSK	TAL PIT
		Instrument ID: DORY								
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			326139	08/18/20 13:59	RSK	TAL PIT
		Instrument ID: DORY								
Total/NA	Prep	7470A			50 mL	50 mL	324942	08/11/20 05:59	RJR	TAL PIT
Total/NA	Analysis	EPA 7470A		1			325094	08/11/20 14:22	RJR	TAL PIT
		Instrument ID: HGZ								
Total/NA	Prep	351.2			25 mL	25 mL	500691	08/18/20 11:21	KJR	TAL PEN
Total/NA	Analysis	351.2		1			500931	08/19/20 16:02	KJR	TAL PEN
		Instrument ID: Lachat 2								
Total/NA	Analysis	EPA 353.2		1	8 mL	8 mL	325380	08/13/20 10:07	CAK	TAL PIT
		Instrument ID: ASTORIA2								

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-3**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	50 mL	100 mL	324746	08/08/20 06:31	AVS	TAL PIT
Total/NA	Analysis	SM 5310C Instrument ID: TOC1030		1			325492	08/13/20 05:31	TAM	TAL PIT
Total/NA	Analysis	SM2320 B Instrument ID: PCTITRATOR		1			325108	08/11/20 13:33	AVS	TAL PIT
Total/NA	Analysis	SM4500 P E-2011 Instrument ID: ERNIE		1	5 mL	5 mL	446944	08/13/20 08:56	TPH	TAL CAN
Total/NA	Analysis	SM4500-S-2 F. Instrument ID: NOEQUIP		1	10 mL	50 mL	325454	08/13/20 13:46	CMR	TAL PIT

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3**

**Lab Sample ID: 180-109312-4**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	325018	08/11/20 11:45	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A Instrument ID: DORY		1			325932	08/15/20 15:36	RSK	TAL PIT

**Client Sample ID:  
GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-5**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G Instrument ID: NOEQUIP		1			325073	08/11/20 16:49	TAM	TAL PIT

**Client Sample ID:  
GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-5**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 84.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.50 g	100 mL	325164	08/12/20 09:03	KEM	TAL PIT
Total/NA	Analysis	EPA 6020A Instrument ID: DORY		1			325932	08/15/20 19:32	RSK	TAL PIT

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-6**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G Instrument ID: NOEQUIP		1			325073	08/11/20 16:49	TAM	TAL PIT

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-6**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 86.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.65 g	100 mL	325164	08/12/20 09:03	KEM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325932	08/15/20 19:49	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-7**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			325073	08/11/20 16:49	TAM	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-7**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 84.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.44 g	100 mL	325164	08/12/20 09:03	KEM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325932	08/15/20 19:53	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 180-109312-8**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			325073	08/11/20 16:49	TAM	TAL PIT
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 180-109312-8**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 97.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.47 g	100 mL	325164	08/12/20 09:03	KEM	TAL PIT
Total/NA	Analysis	EPA 6020A		1			325932	08/15/20 19:56	RSK	TAL PIT
Instrument ID: DORY										

**Laboratory References:**

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Analyst References:

Lab: TAL CAN

Batch Type: Analysis

TPH = Tom Harshman

Lab: TAL PEN

Batch Type: Prep

KJR = Kimberly Reicht

Batch Type: Analysis

KJR = Kimberly Reicht

Lab: TAL PIT

Batch Type: Prep

KEM = Kimberly Mahoney

RJR = Ron Rosenbaum

Batch Type: Analysis

AVS = Abbey Smith

CAK = Chuck Kieda

CMR = Carl Reagle

EPS = Evan Scheuer

RJR = Ron Rosenbaum

RSK = Robert Kurtz

TAM = Tessa Mastalski

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-1**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

### Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.60		2.50	0.800	mg/L			08/12/20 06:43	2.5
Fluoride	0.230	J	0.250	0.0658	mg/L			08/12/20 06:43	2.5
Sulfate	2240		25.0	9.51	mg/L			08/12/20 06:59	25

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.580		0.0300	0.0125	mg/L		08/11/20 11:45	08/15/20 15:25	1
Antimony	ND		0.00200	0.000378	mg/L		08/11/20 11:45	08/15/20 15:25	1
Arsenic	0.000635	J	0.00100	0.000313	mg/L		08/11/20 11:45	08/15/20 15:25	1
Barium	0.0664		0.0100	0.00160	mg/L		08/11/20 11:45	08/15/20 15:25	1
Beryllium	0.000328	J	0.00100	0.000182	mg/L		08/11/20 11:45	08/15/20 15:25	1
Boron	3.83		0.0800	0.0386	mg/L		08/11/20 11:45	08/18/20 13:48	1
Cadmium	0.00821		0.00100	0.000217	mg/L		08/11/20 11:45	08/15/20 15:25	1
Calcium	749		0.500	0.127	mg/L		08/11/20 11:45	08/15/20 15:25	1
Chromium	ND		0.00200	0.00153	mg/L		08/11/20 11:45	08/15/20 15:25	1
Cobalt	0.278		0.000500	0.000134	mg/L		08/11/20 11:45	08/15/20 15:25	1
Copper	0.00133	J	0.00200	0.000627	mg/L		08/11/20 11:45	08/15/20 15:25	1
Iron	0.420		0.0500	0.0195	mg/L		08/11/20 11:45	08/15/20 15:25	1
Lead	0.000606	J	0.00100	0.000128	mg/L		08/11/20 11:45	08/15/20 15:25	1
Lithium	0.0374		0.00500	0.00339	mg/L		08/11/20 11:45	08/15/20 15:25	1
Magnesium	99.4		0.500	0.0827	mg/L		08/11/20 11:45	08/15/20 15:25	1
Manganese	43.5		0.0500	0.00866	mg/L		08/11/20 11:45	08/18/20 13:51	10
Molybdenum	ND		0.00500	0.000610	mg/L		08/11/20 11:45	08/15/20 15:25	1
Nickel	0.294		0.00100	0.000336	mg/L		08/11/20 11:45	08/15/20 15:25	1
Potassium	13.5		0.500	0.156	mg/L		08/11/20 11:45	08/15/20 15:25	1
Selenium	ND		0.00500	0.00151	mg/L		08/11/20 11:45	08/15/20 15:25	1
Silicon	12.2		0.500	0.133	mg/L		08/11/20 11:45	08/15/20 15:25	1
Silver	ND		0.00100	0.000177	mg/L		08/11/20 11:45	08/15/20 15:25	1
Sodium	25.8		0.500	0.348	mg/L		08/11/20 11:45	08/15/20 15:25	1
Strontium	1.68		0.00500	0.000931	mg/L		08/11/20 11:45	08/15/20 15:25	1
Thallium	0.000451	J	0.00100	0.000148	mg/L		08/11/20 11:45	08/15/20 15:25	1
Vanadium	ND		0.00100	0.000991	mg/L		08/11/20 11:45	08/15/20 15:25	1
Zinc	0.302		0.00500	0.00322	mg/L		08/11/20 11:45	08/15/20 15:25	1

### Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/11/20 05:59	08/11/20 14:18	1

### General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	1.02	B	0.500	0.260	mg/L		08/13/20 12:08	08/14/20 18:40	1
Nitrate Nitrite Nitrogen	2.89	F1	0.100	0.0650	mg/L			08/13/20 10:02	1
Total Dissolved Solids	2180		20.0	20.0	mg/L			08/08/20 06:31	1
Total Organic Carbon - Duplicates	2.58		1.00	0.508	mg/L			08/13/20 04:54	1
Total Alkalinity as CaCO3 to pH 4.5	99.8		5.00	5.00	mg/L			08/11/20 13:19	1
Bicarbonate Alkalinity as CaCO3	99.8		5.00	5.00	mg/L			08/11/20 13:19	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/11/20 13:19	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/11/20 13:19	1
Phosphate as PO4	ND		0.307	0.114	mg/L			08/13/20 08:42	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-1**

**Date Collected: 08/06/20 11:00**

**Matrix: Water**

**Date Received: 08/07/20 08:30**

## General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		15.0	6.70	mg/L			08/12/20 14:01	1

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-2**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

### Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.21		2.50	0.800	mg/L			08/12/20 07:15	2.5
Fluoride	0.134	J	0.250	0.0658	mg/L			08/12/20 07:15	2.5
Sulfate	2100		25.0	9.51	mg/L			08/12/20 07:32	25

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.0626		0.0300	0.0125	mg/L		08/11/20 11:45	08/15/20 15:29	1
Antimony	ND		0.00200	0.000378	mg/L		08/11/20 11:45	08/15/20 15:29	1
Arsenic	0.00192		0.00100	0.000313	mg/L		08/11/20 11:45	08/15/20 15:29	1
Barium	0.156		0.0100	0.00160	mg/L		08/11/20 11:45	08/15/20 15:29	1
Beryllium	ND		0.00100	0.000182	mg/L		08/11/20 11:45	08/15/20 15:29	1
Boron	1.50		0.0800	0.0386	mg/L		08/11/20 11:45	08/18/20 13:55	1
Cadmium	ND		0.00100	0.000217	mg/L		08/11/20 11:45	08/15/20 15:29	1
Calcium	803		0.500	0.127	mg/L		08/11/20 11:45	08/15/20 15:29	1
Chromium	ND		0.00200	0.00153	mg/L		08/11/20 11:45	08/15/20 15:29	1
Cobalt	0.00151		0.000500	0.000134	mg/L		08/11/20 11:45	08/15/20 15:29	1
Copper	0.0185		0.00200	0.000627	mg/L		08/11/20 11:45	08/15/20 15:29	1
Iron	0.0353	J	0.0500	0.0195	mg/L		08/11/20 11:45	08/15/20 15:29	1
Lead	ND		0.00100	0.000128	mg/L		08/11/20 11:45	08/15/20 15:29	1
Lithium	0.00842		0.00500	0.00339	mg/L		08/11/20 11:45	08/15/20 15:29	1
Magnesium	45.3		0.500	0.0827	mg/L		08/11/20 11:45	08/15/20 15:29	1
Manganese	0.184		0.00500	0.000866	mg/L		08/11/20 11:45	08/15/20 15:29	1
Molybdenum	0.0123		0.00500	0.000610	mg/L		08/11/20 11:45	08/15/20 15:29	1
Nickel	0.0125		0.00100	0.000336	mg/L		08/11/20 11:45	08/15/20 15:29	1
Potassium	12.7		0.500	0.156	mg/L		08/11/20 11:45	08/15/20 15:29	1
Selenium	0.00173	J	0.00500	0.00151	mg/L		08/11/20 11:45	08/15/20 15:29	1
Silicon	3.41		0.500	0.133	mg/L		08/11/20 11:45	08/15/20 15:29	1
Silver	ND		0.00100	0.000177	mg/L		08/11/20 11:45	08/15/20 15:29	1
Sodium	25.9		0.500	0.348	mg/L		08/11/20 11:45	08/15/20 15:29	1
Strontium	1.33		0.00500	0.000931	mg/L		08/11/20 11:45	08/15/20 15:29	1
Thallium	ND		0.00100	0.000148	mg/L		08/11/20 11:45	08/15/20 15:29	1
Vanadium	0.00476		0.00100	0.000991	mg/L		08/11/20 11:45	08/15/20 15:29	1
Zinc	ND		0.00500	0.00322	mg/L		08/11/20 11:45	08/15/20 15:29	1

### Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/11/20 05:59	08/11/20 14:21	1

### General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	2.46	B	0.500	0.260	mg/L		08/13/20 12:08	08/14/20 18:41	1
Nitrate Nitrite Nitrogen	3.91		0.100	0.0650	mg/L			08/13/20 10:06	1
Total Dissolved Solids	2840		20.0	20.0	mg/L			08/08/20 06:31	1
Total Organic Carbon - Duplicates	5.34		1.00	0.508	mg/L			08/13/20 05:12	1
Total Alkalinity as CaCO3 to pH 4.5	57.2		5.00	5.00	mg/L			08/11/20 13:26	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/11/20 13:26	1
Carbonate Alkalinity as CaCO3	36.6		5.00	5.00	mg/L			08/11/20 13:26	1
Hydroxide Alkalinity	20.6		5.00	5.00	mg/L			08/11/20 13:26	1
Phosphate as PO4	ND		0.307	0.114	mg/L			08/13/20 08:49	1
Sulfide	ND		15.0	6.70	mg/L			08/12/20 14:08	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-3**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

### Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.39		2.50	0.800	mg/L			08/12/20 07:48	2.5
Fluoride	0.182	J	0.250	0.0658	mg/L			08/12/20 07:48	2.5
Sulfate	2040		25.0	9.51	mg/L			08/12/20 08:05	25

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.0526		0.0300	0.0125	mg/L		08/11/20 11:45	08/15/20 15:32	1
Antimony	ND		0.00200	0.000378	mg/L		08/11/20 11:45	08/15/20 15:32	1
Arsenic	0.00204		0.00100	0.000313	mg/L		08/11/20 11:45	08/15/20 15:32	1
Barium	0.167		0.0100	0.00160	mg/L		08/11/20 11:45	08/15/20 15:32	1
Beryllium	ND		0.00100	0.000182	mg/L		08/11/20 11:45	08/15/20 15:32	1
Boron	2.63		0.0800	0.0386	mg/L		08/11/20 11:45	08/18/20 13:59	1
Cadmium	ND		0.00100	0.000217	mg/L		08/11/20 11:45	08/15/20 15:32	1
Calcium	780		0.500	0.127	mg/L		08/11/20 11:45	08/15/20 15:32	1
Chromium	ND		0.00200	0.00153	mg/L		08/11/20 11:45	08/15/20 15:32	1
Cobalt	0.00247		0.000500	0.000134	mg/L		08/11/20 11:45	08/15/20 15:32	1
Copper	0.0123		0.00200	0.000627	mg/L		08/11/20 11:45	08/15/20 15:32	1
Iron	ND		0.0500	0.0195	mg/L		08/11/20 11:45	08/15/20 15:32	1
Lead	ND		0.00100	0.000128	mg/L		08/11/20 11:45	08/15/20 15:32	1
Lithium	ND		0.00500	0.00339	mg/L		08/11/20 11:45	08/15/20 15:32	1
Magnesium	22.7		0.500	0.0827	mg/L		08/11/20 11:45	08/15/20 15:32	1
Manganese	7.00		0.00500	0.000866	mg/L		08/11/20 11:45	08/15/20 15:32	1
Molybdenum	0.00874		0.00500	0.000610	mg/L		08/11/20 11:45	08/15/20 15:32	1
Nickel	0.0107		0.00100	0.000336	mg/L		08/11/20 11:45	08/15/20 15:32	1
Potassium	11.8		0.500	0.156	mg/L		08/11/20 11:45	08/15/20 15:32	1
Selenium	ND		0.00500	0.00151	mg/L		08/11/20 11:45	08/15/20 15:32	1
Silicon	3.48		0.500	0.133	mg/L		08/11/20 11:45	08/15/20 15:32	1
Silver	ND		0.00100	0.000177	mg/L		08/11/20 11:45	08/15/20 15:32	1
Sodium	38.8		0.500	0.348	mg/L		08/11/20 11:45	08/15/20 15:32	1
Strontium	1.44		0.00500	0.000931	mg/L		08/11/20 11:45	08/15/20 15:32	1
Thallium	ND		0.00100	0.000148	mg/L		08/11/20 11:45	08/15/20 15:32	1
Vanadium	0.00298		0.00100	0.000991	mg/L		08/11/20 11:45	08/15/20 15:32	1
Zinc	ND		0.00500	0.00322	mg/L		08/11/20 11:45	08/15/20 15:32	1

### Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/11/20 05:59	08/11/20 14:22	1

### General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	1.88		0.500	0.260	mg/L		08/18/20 11:21	08/19/20 16:02	1
Nitrate Nitrite Nitrogen	1.01		0.100	0.0650	mg/L			08/13/20 10:07	1
Total Dissolved Solids	2010		20.0	20.0	mg/L			08/08/20 06:31	1
Total Organic Carbon - Duplicates	3.94		1.00	0.508	mg/L			08/13/20 05:31	1
Total Alkalinity as CaCO3 to pH 4.5	33.4		5.00	5.00	mg/L			08/11/20 13:33	1
Bicarbonate Alkalinity as CaCO3	6.49		5.00	5.00	mg/L			08/11/20 13:33	1
Carbonate Alkalinity as CaCO3	26.9		5.00	5.00	mg/L			08/11/20 13:33	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/11/20 13:33	1
Phosphate as PO4	ND		0.307	0.114	mg/L			08/13/20 08:56	1
Sulfide	ND		15.0	6.70	mg/L			08/13/20 13:46	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3**

**Lab Sample ID: 180-109312-4**

Date Collected: 08/06/20 11:00

Matrix: Water

Date Received: 08/07/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		08/11/20 11:45	08/15/20 15:36	1
Beryllium	ND		0.00100	0.000182	mg/L		08/11/20 11:45	08/15/20 15:36	1
<b>Nickel</b>	<b>0.0281</b>		0.00100	0.000336	mg/L		08/11/20 11:45	08/15/20 15:36	1
Lithium	ND		0.00500	0.00339	mg/L		08/11/20 11:45	08/15/20 15:36	1

# Client Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 180-109312-5**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 84.8

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0429	J	0.0786	0.0134	mg/Kg	☆	08/12/20 09:03	08/15/20 19:32	1
Beryllium	0.177		0.0786	0.0558	mg/Kg	☆	08/12/20 09:03	08/15/20 19:32	1
Nickel	10.3		0.0786	0.0731	mg/Kg	☆	08/12/20 09:03	08/15/20 19:32	1
Lithium	2.38		0.393	0.313	mg/Kg	☆	08/12/20 09:03	08/15/20 19:32	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	15.2		0.1	0.1	%			08/11/20 16:49	1
Percent Solids	84.8		0.1	0.1	%			08/11/20 16:49	1

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# Client Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 180-109312-6**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 86.9

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0884		0.0697	0.0119	mg/Kg	☼	08/12/20 09:03	08/15/20 19:49	1
Beryllium	0.181		0.0697	0.0495	mg/Kg	☼	08/12/20 09:03	08/15/20 19:49	1
Nickel	11.5		0.0697	0.0649	mg/Kg	☼	08/12/20 09:03	08/15/20 19:49	1
Lithium	2.57		0.349	0.278	mg/Kg	☼	08/12/20 09:03	08/15/20 19:49	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13.1		0.1	0.1	%			08/11/20 16:49	1
Percent Solids	86.9		0.1	0.1	%			08/11/20 16:49	1



# Client Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 180-109312-7**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 84.5

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0832		0.0822	0.0140	mg/Kg	☼	08/12/20 09:03	08/15/20 19:53	1
Beryllium	0.161		0.0822	0.0584	mg/Kg	☼	08/12/20 09:03	08/15/20 19:53	1
Nickel	10.0		0.0822	0.0765	mg/Kg	☼	08/12/20 09:03	08/15/20 19:53	1
Lithium	2.28		0.411	0.327	mg/Kg	☼	08/12/20 09:03	08/15/20 19:53	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	15.5		0.1	0.1	%			08/11/20 16:49	1
Percent Solids	84.5		0.1	0.1	%			08/11/20 16:49	1



# Client Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
 SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 180-109312-8**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 08:30

Percent Solids: 97.4

**Method: EPA 6020A - Metals (ICP/MS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0930		0.0698	0.0119	mg/Kg	☼	08/12/20 09:03	08/15/20 19:56	1
Beryllium	0.150		0.0698	0.0496	mg/Kg	☼	08/12/20 09:03	08/15/20 19:56	1
Nickel	9.37		0.0698	0.0649	mg/Kg	☼	08/12/20 09:03	08/15/20 19:56	1
Lithium	2.05		0.349	0.278	mg/Kg	☼	08/12/20 09:03	08/15/20 19:56	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	2.6		0.1	0.1	%			08/11/20 16:49	1
Percent Solids	97.4		0.1	0.1	%			08/11/20 16:49	1



# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: EPA 9056A - Anions, Ion Chromatography

**Lab Sample ID: MB 180-325093/6**  
**Matrix: Water**  
**Analysis Batch: 325093**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.00	0.320	mg/L			08/12/20 05:38	1
Fluoride	ND		0.100	0.0263	mg/L			08/12/20 05:38	1
Sulfate	ND		1.00	0.380	mg/L			08/12/20 05:38	1

**Lab Sample ID: LCS 180-325093/5**  
**Matrix: Water**  
**Analysis Batch: 325093**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.11		mg/L		100	80 - 120
Fluoride	2.50	2.453		mg/L		98	80 - 120
Sulfate	50.0	49.93		mg/L		100	80 - 120

**Lab Sample ID: 180-108986-A-2 MS**  
**Matrix: Water**  
**Analysis Batch: 325093**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1.75		50.0	51.49		mg/L		99	80 - 120
Fluoride	0.0497	J	2.50	2.466		mg/L		97	80 - 120
Sulfate	14.5		50.0	63.94		mg/L		99	80 - 120

**Lab Sample ID: 180-108986-A-2 MSD**  
**Matrix: Water**  
**Analysis Batch: 325093**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	1.75		50.0	51.48		mg/L		99	80 - 120	0	15
Fluoride	0.0497	J	2.50	2.483		mg/L		97	80 - 120	1	15
Sulfate	14.5		50.0	63.90		mg/L		99	80 - 120	0	15

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-325164/1-A**  
**Matrix: Solid**  
**Analysis Batch: 325932**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 325164**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.100	0.0170	mg/Kg		08/12/20 09:03	08/15/20 19:25	1
Beryllium	ND		0.100	0.0710	mg/Kg		08/12/20 09:03	08/15/20 19:25	1
Nickel	ND		0.100	0.0930	mg/Kg		08/12/20 09:03	08/15/20 19:25	1
Lithium	ND		0.500	0.398	mg/Kg		08/12/20 09:03	08/15/20 19:25	1

**Lab Sample ID: LCS 180-325164/2-A**  
**Matrix: Solid**  
**Analysis Batch: 325932**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 325164**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	50.0	51.47		mg/Kg		103	80 - 120
Beryllium	50.0	52.96		mg/Kg		106	80 - 120

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 180-325164/2-A**  
**Matrix: Solid**  
**Analysis Batch: 325932**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 325164**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nickel	50.0	50.69		mg/Kg		101	80 - 120
Lithium	50.0	50.28		mg/Kg		101	80 - 120

**Lab Sample ID: 180-109312-5 MS**  
**Matrix: Solid**  
**Analysis Batch: 325932**

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**  
**Prep Type: Total/NA**  
**Prep Batch: 325164**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0429	J	40.4	38.60		mg/Kg	⊛	96	75 - 125
Beryllium	0.177		40.4	40.02		mg/Kg	⊛	99	75 - 125
Nickel	10.3		40.4	49.51		mg/Kg	⊛	97	75 - 125
Lithium	2.38		40.4	40.12		mg/Kg	⊛	93	75 - 125

**Lab Sample ID: 180-109312-5 MSD**  
**Matrix: Solid**  
**Analysis Batch: 325932**

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**  
**Prep Type: Total/NA**  
**Prep Batch: 325164**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.0429	J	40.4	36.78		mg/Kg	⊛	91	75 - 125	5	20
Beryllium	0.177		40.4	38.75		mg/Kg	⊛	96	75 - 125	3	20
Nickel	10.3		40.4	49.72		mg/Kg	⊛	98	75 - 125	0	20
Lithium	2.38		40.4	39.32		mg/Kg	⊛	92	75 - 125	2	20

**Lab Sample ID: MB 180-325018/1-A**  
**Matrix: Water**  
**Analysis Batch: 325932**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		08/11/20 11:45	08/15/20 15:18	1
Antimony	ND		0.00200	0.000378	mg/L		08/11/20 11:45	08/15/20 15:18	1
Arsenic	ND		0.00100	0.000313	mg/L		08/11/20 11:45	08/15/20 15:18	1
Barium	ND		0.0100	0.00160	mg/L		08/11/20 11:45	08/15/20 15:18	1
Calcium	ND		0.500	0.127	mg/L		08/11/20 11:45	08/15/20 15:18	1
Chromium	ND		0.00200	0.00153	mg/L		08/11/20 11:45	08/15/20 15:18	1
Cobalt	ND		0.000500	0.000134	mg/L		08/11/20 11:45	08/15/20 15:18	1
Copper	ND		0.00200	0.000627	mg/L		08/11/20 11:45	08/15/20 15:18	1
Iron	ND		0.0500	0.0195	mg/L		08/11/20 11:45	08/15/20 15:18	1
Lead	ND		0.00100	0.000128	mg/L		08/11/20 11:45	08/15/20 15:18	1
Magnesium	ND		0.500	0.0827	mg/L		08/11/20 11:45	08/15/20 15:18	1
Manganese	ND		0.00500	0.000866	mg/L		08/11/20 11:45	08/15/20 15:18	1
Molybdenum	ND		0.00500	0.000610	mg/L		08/11/20 11:45	08/15/20 15:18	1
Potassium	ND		0.500	0.156	mg/L		08/11/20 11:45	08/15/20 15:18	1
Selenium	ND		0.00500	0.00151	mg/L		08/11/20 11:45	08/15/20 15:18	1
Silicon	ND		0.500	0.133	mg/L		08/11/20 11:45	08/15/20 15:18	1
Silver	ND		0.00100	0.000177	mg/L		08/11/20 11:45	08/15/20 15:18	1
Sodium	ND		0.500	0.348	mg/L		08/11/20 11:45	08/15/20 15:18	1
Strontium	ND		0.00500	0.000931	mg/L		08/11/20 11:45	08/15/20 15:18	1
Thallium	ND		0.00100	0.000148	mg/L		08/11/20 11:45	08/15/20 15:18	1
Vanadium	ND		0.00100	0.000991	mg/L		08/11/20 11:45	08/15/20 15:18	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 180-325018/1-A**  
**Matrix: Water**  
**Analysis Batch: 325932**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.00500	0.00322	mg/L		08/11/20 11:45	08/15/20 15:18	1
Cadmium	ND		0.00100	0.000217	mg/L		08/11/20 11:45	08/15/20 15:18	1
Beryllium	ND		0.00100	0.000182	mg/L		08/11/20 11:45	08/15/20 15:18	1
Nickel	ND		0.00100	0.000336	mg/L		08/11/20 11:45	08/15/20 15:18	1
Lithium	ND		0.00500	0.00339	mg/L		08/11/20 11:45	08/15/20 15:18	1

**Lab Sample ID: MB 180-325018/1-A**  
**Matrix: Water**  
**Analysis Batch: 326139**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.0800	0.0386	mg/L		08/11/20 11:45	08/18/20 13:30	1

**Lab Sample ID: LCS 180-325018/2-A**  
**Matrix: Water**  
**Analysis Batch: 325932**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Aluminum	5.00	4.780		mg/L		96	80 - 120
Antimony	0.250	0.2674		mg/L		107	80 - 120
Arsenic	1.00	1.070		mg/L		107	80 - 120
Barium	1.00	1.052		mg/L		105	80 - 120
Boron	1.25	1.175 ^		mg/L		94	80 - 120
Calcium	25.0	28.45		mg/L		114	80 - 120
Chromium	0.500	0.5225		mg/L		105	80 - 120
Cobalt	0.500	0.5276		mg/L		106	80 - 120
Copper	0.500	0.5161		mg/L		103	80 - 120
Iron	5.00	5.029		mg/L		101	80 - 120
Lead	0.500	0.5362		mg/L		107	80 - 120
Magnesium	25.0	24.89		mg/L		100	80 - 120
Manganese	0.500	0.5184		mg/L		104	80 - 120
Molybdenum	0.500	0.5386		mg/L		108	80 - 120
Potassium	25.0	24.39		mg/L		98	80 - 120
Selenium	1.00	1.085		mg/L		109	80 - 120
Silicon	1.00	1.082		mg/L		108	80 - 120
Silver	0.250	0.2430		mg/L		97	80 - 120
Sodium	25.0	23.71		mg/L		95	80 - 120
Strontium	0.500	0.5285		mg/L		106	80 - 120
Thallium	1.00	1.084		mg/L		108	80 - 120
Vanadium	0.500	0.5292		mg/L		106	80 - 120
Zinc	0.250	0.2428		mg/L		97	80 - 120
Cadmium	0.500	0.5171		mg/L		103	80 - 120
Beryllium	0.500	0.5322		mg/L		106	80 - 120
Nickel	0.500	0.5166		mg/L		103	80 - 120
Lithium	0.500	0.5087		mg/L		102	80 - 120

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 180-325018/2-A**  
**Matrix: Water**  
**Analysis Batch: 326139**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Boron	1.25	1.151		mg/L		92	80 - 120

**Lab Sample ID: 180-109312-4 MS**  
**Matrix: Water**  
**Analysis Batch: 325932**

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Aluminum	0.0233	J	5.00	4.876		mg/L		97	75 - 125
Antimony	ND		0.250	0.2749		mg/L		110	75 - 125
Arsenic	0.00257		1.00	1.096		mg/L		109	75 - 125
Barium	0.190		1.00	1.264		mg/L		107	75 - 125
Boron	2.10	^	1.25	3.125		mg/L		82	75 - 125
Calcium	715		25.0	721.0	4	mg/L		23	75 - 125
Chromium	0.00179	J	0.500	0.5304		mg/L		106	75 - 125
Cobalt	0.00516		0.500	0.5458		mg/L		108	75 - 125
Copper	0.0341		0.500	0.5642		mg/L		106	75 - 125
Iron	ND		5.00	5.052		mg/L		101	75 - 125
Lead	ND		0.500	0.5347		mg/L		107	75 - 125
Magnesium	16.0		25.0	40.82		mg/L		99	75 - 125
Manganese	1.02		0.500	1.522		mg/L		101	75 - 125
Molybdenum	0.0152		0.500	0.5668		mg/L		110	75 - 125
Potassium	10.1		25.0	34.06		mg/L		96	75 - 125
Selenium	0.00154	J	1.00	1.081		mg/L		108	75 - 125
Silicon	4.01		1.00	5.095	4	mg/L		109	75 - 125
Silver	ND		0.250	0.2426		mg/L		97	75 - 125
Sodium	53.6		25.0	75.77		mg/L		89	75 - 125
Strontium	1.29		0.500	1.792		mg/L		100	75 - 125
Thallium	ND		1.00	1.086		mg/L		109	75 - 125
Vanadium	0.00531		0.500	0.5511		mg/L		109	75 - 125
Zinc	ND		0.250	0.2408		mg/L		96	75 - 125
Cadmium	ND		0.500	0.5302		mg/L		106	75 - 125
Beryllium	ND		0.500	0.5386		mg/L		108	75 - 125
Nickel	0.0281		0.500	0.5574		mg/L		106	75 - 125
Lithium	ND		0.500	0.5235		mg/L		105	75 - 125

**Lab Sample ID: 180-109312-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 325932**

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3**  
**Prep Type: Total Recoverable**  
**Prep Batch: 325018**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Aluminum	0.0233	J	5.00	4.802		mg/L		96	75 - 125	2	20
Antimony	ND		0.250	0.2707		mg/L		108	75 - 125	2	20
Arsenic	0.00257		1.00	1.090		mg/L		109	75 - 125	1	20
Barium	0.190		1.00	1.239		mg/L		105	75 - 125	2	20
Boron	2.10	^	1.25	3.184		mg/L		87	75 - 125	2	20
Calcium	715		25.0	710.1	4	mg/L		-21	75 - 125	2	20
Chromium	0.00179	J	0.500	0.5357		mg/L		107	75 - 125	1	20
Cobalt	0.00516		0.500	0.5404		mg/L		107	75 - 125	1	20
Copper	0.0341		0.500	0.5572		mg/L		105	75 - 125	1	20

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 180-109312-4 MSD  
Matrix: Water  
Analysis Batch: 325932

Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3  
Prep Type: Total Recoverable  
Prep Batch: 325018

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Iron	ND		5.00	5.017		mg/L		100	75 - 125	1	20
Lead	ND		0.500	0.5323		mg/L		106	75 - 125	0	20
Magnesium	16.0		25.0	40.72		mg/L		99	75 - 125	0	20
Manganese	1.02		0.500	1.504		mg/L		98	75 - 125	1	20
Molybdenum	0.0152		0.500	0.5657		mg/L		110	75 - 125	0	20
Potassium	10.1		25.0	33.91		mg/L		95	75 - 125	0	20
Selenium	0.00154	J	1.00	1.069		mg/L		107	75 - 125	1	20
Silicon	4.01		1.00	4.991	4	mg/L		98	75 - 125	2	20
Silver	ND		0.250	0.2419		mg/L		97	75 - 125	0	20
Sodium	53.6		25.0	76.41		mg/L		91	75 - 125	1	20
Strontium	1.29		0.500	1.772		mg/L		96	75 - 125	1	20
Thallium	ND		1.00	1.073		mg/L		107	75 - 125	1	20
Vanadium	0.00531		0.500	0.5403		mg/L		107	75 - 125	2	20
Zinc	ND		0.250	0.2367		mg/L		95	75 - 125	2	20
Cadmium	ND		0.500	0.5213		mg/L		104	75 - 125	2	20
Beryllium	ND		0.500	0.5316		mg/L		106	75 - 125	1	20
Nickel	0.0281		0.500	0.5481		mg/L		104	75 - 125	2	20
Lithium	ND		0.500	0.5189		mg/L		104	75 - 125	1	20

## Method: EPA 7470A - Mercury (CVAA)

Lab Sample ID: MB 180-324942/1-A  
Matrix: Water  
Analysis Batch: 325094

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 324942

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000130	mg/L		08/11/20 05:59	08/11/20 14:16	1

Lab Sample ID: LCS 180-324942/2-A  
Matrix: Water  
Analysis Batch: 325094

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 324942

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00250	0.002498		mg/L		100	80 - 120

Lab Sample ID: 180-109312-1 MS  
Matrix: Water  
Analysis Batch: 325094

Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3  
Prep Type: Total/NA  
Prep Batch: 324942

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	ND		0.00100	0.0009950		mg/L		100	75 - 125

Lab Sample ID: 180-109312-1 MSD  
Matrix: Water  
Analysis Batch: 325094

Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3  
Prep Type: Total/NA  
Prep Batch: 324942

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00100	0.0009900		mg/L		99	75 - 125	1	20

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: 2540G - SM 2540G

Lab Sample ID: 180-109219-B-1 DU  
Matrix: Solid  
Analysis Batch: 325073

Client Sample ID: Duplicate  
Prep Type: Total/NA

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Percent Moisture	9.0		10		%		10	10
Percent Solids	91.0		90.0		%		1	10

## Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 400-500216/1-A  
Matrix: Water  
Analysis Batch: 500432

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 500216

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Nitrogen, Kjeldahl	0.2859	J	0.500	0.260	mg/L		08/13/20 12:08	08/14/20 18:04	1

Lab Sample ID: LCS 400-500216/2-A  
Matrix: Water  
Analysis Batch: 500432

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 500216

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits

Lab Sample ID: 400-191717-C-1-B MS  
Matrix: Water  
Analysis Batch: 500432

Client Sample ID: Matrix Spike  
Prep Type: Total/NA  
Prep Batch: 500216

Analyte	Sample	Sample	Spike Added	MS	MS	Unit	D	%Rec	%Rec. Limits
	Result	Qualifier		Result	Qualifier				
Nitrogen, Kjeldahl	8.42	F1 B	4.00	12.48		mg/L		101	90 - 110

Lab Sample ID: 400-191717-C-1-C MSD  
Matrix: Water  
Analysis Batch: 500432

Client Sample ID: Matrix Spike Duplicate  
Prep Type: Total/NA  
Prep Batch: 500216

Analyte	Sample	Sample	Spike Added	MSD	MSD	Unit	D	%Rec	%Rec. Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Nitrogen, Kjeldahl	8.42	F1 B	4.00	12.94	F1	mg/L		113	90 - 110	4	22

Lab Sample ID: MRL 400-500432/12  
Matrix: Water  
Analysis Batch: 500432

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

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits

Lab Sample ID: MB 400-500691/1-A  
Matrix: Water  
Analysis Batch: 500931

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 500691

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Nitrogen, Kjeldahl	ND		0.500	0.260	mg/L		08/18/20 11:21	08/19/20 15:55	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

**Lab Sample ID: LCS 400-500691/2-A**  
**Matrix: Water**  
**Analysis Batch: 500931**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 500691**  
**%Rec.**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Nitrogen, Kjeldahl	10.0	9.899		mg/L		99	90 - 110

**Lab Sample ID: 400-191968-A-2-B MS**  
**Matrix: Water**  
**Analysis Batch: 500931**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 500691**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Nitrogen, Kjeldahl	7.77	F1	4.00	11.59		mg/L		95	90 - 110

**Lab Sample ID: 400-191968-A-2-C MSD**  
**Matrix: Water**  
**Analysis Batch: 500931**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 500691**  
**%Rec.**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Nitrogen, Kjeldahl	7.77	F1	4.00	12.74	F1	mg/L		124	90 - 110	9	22

## Method: EPA 353.2 - Nitrogen, Nitrate-Nitrite

**Lab Sample ID: MB 180-325380/21**  
**Matrix: Water**  
**Analysis Batch: 325380**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate Nitrite Nitrogen	ND		0.100	0.0650	mg/L			08/13/20 10:00	1

**Lab Sample ID: LCS 180-325380/20**  
**Matrix: Water**  
**Analysis Batch: 325380**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Nitrate Nitrite Nitrogen	2.00	2.013		mg/L		101	90 - 110

**Lab Sample ID: 180-109312-1 MS**  
**Matrix: Water**  
**Analysis Batch: 325380**

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Nitrate Nitrite Nitrogen	2.89	F1	2.00	5.180	F1	mg/L		115	90 - 110

**Lab Sample ID: 180-109312-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 325380**

**Client Sample ID: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Nitrate Nitrite Nitrogen	2.89	F1	2.00	5.335	F1	mg/L		122	90 - 110	3	20

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 180-324746/2  
Matrix: Water  
Analysis Batch: 324746

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0	10.0	mg/L			08/08/20 06:31	1

Lab Sample ID: LCS 180-324746/1  
Matrix: Water  
Analysis Batch: 324746

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	567	514.0		mg/L		91	80 - 120

Lab Sample ID: 180-109297-A-2 DU  
Matrix: Water  
Analysis Batch: 324746

Client Sample ID: Duplicate  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	331		324.0		mg/L		2	10

## Method: SM 5310C - Total Organic Carbon

Lab Sample ID: MB 180-325492/6  
Matrix: Water  
Analysis Batch: 325492

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon - Duplicates	ND		1.00	0.508	mg/L			08/12/20 23:40	1

Lab Sample ID: LCS 180-325492/4  
Matrix: Water  
Analysis Batch: 325492

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon - Duplicates	20.0	18.93		mg/L		95	85 - 115

Lab Sample ID: LCSD 180-325492/5  
Matrix: Water  
Analysis Batch: 325492

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

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon - Duplicates	20.0	20.57		mg/L		103	85 - 115	8	20

## Method: SM2320 B - Alkalinity, Total

Lab Sample ID: MB 180-325108/29  
Matrix: Water  
Analysis Batch: 325108

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	ND		5.00	5.00	mg/L			08/11/20 12:46	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/11/20 12:46	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			08/11/20 12:46	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: SM2320 B - Alkalinity, Total (Continued)

**Lab Sample ID: MB 180-325108/29**  
**Matrix: Water**  
**Analysis Batch: 325108**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			08/11/20 12:46	1

**Lab Sample ID: LCS 180-325108/28**  
**Matrix: Water**  
**Analysis Batch: 325108**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Alkalinity as CaCO3 to pH 4.5	250	233.3		mg/L		93	90 - 110

**Lab Sample ID: 180-109297-B-2 DU**  
**Matrix: Water**  
**Analysis Batch: 325108**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Alkalinity as CaCO3 to pH 4.5	205		205.3		mg/L		0.3	20
Bicarbonate Alkalinity as CaCO3	205		205.3		mg/L		0.3	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Hydroxide Alkalinity	ND		ND		mg/L		NC	20

## Method: SM4500 P E-2011 - Phosphorus

**Lab Sample ID: MB 240-446944/3**  
**Matrix: Water**  
**Analysis Batch: 446944**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phosphate as PO4	ND		0.307	0.114	mg/L			08/13/20 07:11	1

**Lab Sample ID: LCS 240-446944/4**  
**Matrix: Water**  
**Analysis Batch: 446944**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phosphate as PO4	1.46	1.499		mg/L		103	77 - 120

**Lab Sample ID: 240-134494-R-1 MS**  
**Matrix: Water**  
**Analysis Batch: 446944**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Phosphate as PO4	0.528		1.54	2.203		mg/L		109	38 - 156

**Lab Sample ID: 240-134494-R-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 446944**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phosphate as PO4	0.528		1.54	2.027		mg/L		98	38 - 156	8	29

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Method: SM4500-S-2 F. - Sulfide

**Lab Sample ID: MB 180-325234/3**  
**Matrix: Water**  
**Analysis Batch: 325234**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		3.00	1.34	mg/L			08/12/20 13:23	1

**Lab Sample ID: LCS 180-325234/4**  
**Matrix: Water**  
**Analysis Batch: 325234**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	13.7	13.47		mg/L		98	90 - 110

**Lab Sample ID: 180-109271-K-1 MS**  
**Matrix: Water**  
**Analysis Batch: 325234**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	ND		13.7	13.39		mg/L		98	75 - 125

**Lab Sample ID: 180-109271-K-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 325234**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Sulfide	ND		13.7	13.09		mg/L		95	75 - 125	2	20

**Lab Sample ID: MB 180-325454/3**  
**Matrix: Water**  
**Analysis Batch: 325454**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		3.00	1.34	mg/L			08/13/20 13:43	1

**Lab Sample ID: LCS 180-325454/4**  
**Matrix: Water**  
**Analysis Batch: 325454**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	13.3	13.05		mg/L		98	90 - 110

**Lab Sample ID: 180-109500-H-6 MS**  
**Matrix: Water**  
**Analysis Batch: 325454**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	ND		66.4	61.82		mg/L		93	75 - 125

**Lab Sample ID: 180-109500-H-6 MSD**  
**Matrix: Water**  
**Analysis Batch: 325454**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Sulfide	ND		66.4	61.06		mg/L		92	75 - 125	1	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## HPLC/IC

### Analysis Batch: 325093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 9056A	
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 9056A	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	EPA 9056A	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	EPA 9056A	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	EPA 9056A	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	EPA 9056A	
MB 180-325093/6	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-325093/5	Lab Control Sample	Total/NA	Water	EPA 9056A	
180-108986-A-2 MS	Matrix Spike	Total/NA	Water	EPA 9056A	
180-108986-A-2 MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 9056A	

## Metals

### Prep Batch: 324942

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	7470A	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	7470A	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	7470A	
MB 180-324942/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-324942/2-A	Lab Control Sample	Total/NA	Water	7470A	
180-109312-1 MS	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	7470A	
180-109312-1 MSD	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	7470A	

### Prep Batch: 325018

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total Recoverable	Water	3005A	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total Recoverable	Water	3005A	
180-109312-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	3005A	
MB 180-325018/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-325018/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-109312-4 MS	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	3005A	
180-109312-4 MSD	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	3005A	

### Analysis Batch: 325094

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 7470A	324942
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	EPA 7470A	324942
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	EPA 7470A	324942
MB 180-324942/1-A	Method Blank	Total/NA	Water	EPA 7470A	324942
LCS 180-324942/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	324942
180-109312-1 MS	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 7470A	324942
180-109312-1 MSD	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 7470A	324942

### Prep Batch: 325164

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	3050B	
180-109312-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	3050B	
180-109312-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	3050B	
180-109312-8	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	3050B	
MB 180-325164/1-A	Method Blank	Total/NA	Solid	3050B	

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## Metals (Continued)

### Prep Batch: 325164 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-325164/2-A	Lab Control Sample	Total/NA	Solid	3050B	
180-109312-5 MS	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	3050B	
180-109312-5 MSD	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	3050B	

### Analysis Batch: 325932

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-4	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	EPA 6020A	325164
180-109312-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	EPA 6020A	325164
180-109312-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	EPA 6020A	325164
180-109312-8	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	EPA 6020A	325164
MB 180-325018/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	325018
MB 180-325164/1-A	Method Blank	Total/NA	Solid	EPA 6020A	325164
LCS 180-325018/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	325018
LCS 180-325164/2-A	Lab Control Sample	Total/NA	Solid	EPA 6020A	325164
180-109312-4 MS	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-4 MSD	GAF-GW-PHIII-BKT-HI CAL-SAND-444U-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-5 MS	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	EPA 6020A	325164
180-109312-5 MSD	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	EPA 6020A	325164

### Analysis Batch: 326139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total Recoverable	Water	EPA 6020A	325018
MB 180-325018/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	325018
LCS 180-325018/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	325018

## General Chemistry

### Analysis Batch: 324746

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	SM 2540C	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	SM 2540C	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	SM 2540C	
MB 180-324746/2	Method Blank	Total/NA	Water	SM 2540C	
LCS 180-324746/1	Lab Control Sample	Total/NA	Water	SM 2540C	
180-109297-A-2 DU	Duplicate	Total/NA	Water	SM 2540C	

### Analysis Batch: 325073

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-5	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	2540G	
180-109312-6	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	2540G	
180-109312-7	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	2540G	
180-109312-8	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	2540G	
180-109219-B-1 DU	Duplicate	Total/NA	Solid	2540G	

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## General Chemistry

### Analysis Batch: 325108

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	SM2320 B	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	SM2320 B	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	SM2320 B	
MB 180-325108/29	Method Blank	Total/NA	Water	SM2320 B	
LCS 180-325108/28	Lab Control Sample	Total/NA	Water	SM2320 B	
180-109297-B-2 DU	Duplicate	Total/NA	Water	SM2320 B	

### Analysis Batch: 325234

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	SM4500-S-2 F.	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	SM4500-S-2 F.	
MB 180-325234/3	Method Blank	Total/NA	Water	SM4500-S-2 F.	
LCS 180-325234/4	Lab Control Sample	Total/NA	Water	SM4500-S-2 F.	
180-109271-K-1 MS	Matrix Spike	Total/NA	Water	SM4500-S-2 F.	
180-109271-K-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM4500-S-2 F.	

### Analysis Batch: 325380

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 353.2	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	EPA 353.2	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	EPA 353.2	
MB 180-325380/21	Method Blank	Total/NA	Water	EPA 353.2	
LCS 180-325380/20	Lab Control Sample	Total/NA	Water	EPA 353.2	
180-109312-1 MS	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 353.2	
180-109312-1 MSD	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	EPA 353.2	

### Analysis Batch: 325454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	SM4500-S-2 F.	
MB 180-325454/3	Method Blank	Total/NA	Water	SM4500-S-2 F.	
LCS 180-325454/4	Lab Control Sample	Total/NA	Water	SM4500-S-2 F.	
180-109500-H-6 MS	Matrix Spike	Total/NA	Water	SM4500-S-2 F.	
180-109500-H-6 MSD	Matrix Spike Duplicate	Total/NA	Water	SM4500-S-2 F.	

### Analysis Batch: 325492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	SM 5310C	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	SM 5310C	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	SM 5310C	
MB 180-325492/6	Method Blank	Total/NA	Water	SM 5310C	
LCS 180-325492/4	Lab Control Sample	Total/NA	Water	SM 5310C	
LCSD 180-325492/5	Lab Control Sample Dup	Total/NA	Water	SM 5310C	

### Analysis Batch: 446944

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	SM4500 P E-2011	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	SM4500 P E-2011	
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	SM4500 P E-2011	

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-109312-1  
SDG: GAF-NRS-Treatability

## General Chemistry (Continued)

### Analysis Batch: 446944 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 240-446944/3	Method Blank	Total/NA	Water	SM4500 P E-2011	
LCS 240-446944/4	Lab Control Sample	Total/NA	Water	SM4500 P E-2011	
240-134494-R-1 MS	Matrix Spike	Total/NA	Water	SM4500 P E-2011	
240-134494-R-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM4500 P E-2011	

### Prep Batch: 500216

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	351.2	
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	351.2	
MB 400-500216/1-A	Method Blank	Total/NA	Water	351.2	
LCS 400-500216/2-A	Lab Control Sample	Total/NA	Water	351.2	
400-191717-C-1-B MS	Matrix Spike	Total/NA	Water	351.2	
400-191717-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	

### Analysis Batch: 500432

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Water	351.2	500216
180-109312-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Water	351.2	500216
MB 400-500216/1-A	Method Blank	Total/NA	Water	351.2	500216
LCS 400-500216/2-A	Lab Control Sample	Total/NA	Water	351.2	500216
MRL 400-500432/12	Lab Control Sample	Total/NA	Water	351.2	
400-191717-C-1-B MS	Matrix Spike	Total/NA	Water	351.2	500216
400-191717-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	500216

### Prep Batch: 500691

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	351.2	
MB 400-500691/1-A	Method Blank	Total/NA	Water	351.2	
LCS 400-500691/2-A	Lab Control Sample	Total/NA	Water	351.2	
400-191968-A-2-B MS	Matrix Spike	Total/NA	Water	351.2	
400-191968-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	

### Analysis Batch: 500931

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-109312-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Water	351.2	500691
MB 400-500691/1-A	Method Blank	Total/NA	Water	351.2	500691
LCS 400-500691/2-A	Lab Control Sample	Total/NA	Water	351.2	500691
400-191968-A-2-B MS	Matrix Spike	Total/NA	Water	351.2	500691
400-191968-A-2-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	500691



Spectrum Analytical

# CHAIN OF CUSTODY RECORD

Special Handling:

5-day TAT

TAT - Date Needed:

All TATs subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Report To: Francisco Barajas

AECOM  
9400 Amberglen Blvd  
Austin, TX 78729

Telephone #: 978-905-2299

Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee

AECOM  
250 Apollo Dr.  
Chelmsford, MA 01824

P.O. No.: \_\_\_\_\_ Quote #: \_\_\_\_\_

Project No: TVA Gallatin EIP

Site Name: GAF-NRS-Treatability

Location: \_\_\_\_\_ State: \_\_\_\_\_

Sampler(s): Rachel Watkins

Craig Kattic

F=Field Filtered 1=Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=Deionized Water 10=H<sub>2</sub>PO<sub>4</sub> 11= \_\_\_\_\_ 12= Zinc + NaOH

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas

X1= \_\_\_\_\_ X2= \_\_\_\_\_

List Preservative Code below:

4 3 3 3 3 3 3

### Containers

# of VOA Vials \_\_\_\_\_  
# of Amber Glass \_\_\_\_\_  
# of Clear Glass \_\_\_\_\_  
# of Plastic \_\_\_\_\_

### Analysis

6020 Totals - Be, Cd, Li, Pb, Sb, As, Ba, Cr, Co, Ni, Hg (7470A), Mo, Se, TL, Cu, Ag, V, Zn, Al, Fe, Mn, Ca, Mg, K, Na, B  
9056A - Cl, F, SO<sub>4</sub>  
2320B - Alkalinity (Total hydroxide, bicarbonate, carbonate)  
2420C - TDS  
353.2 NO<sub>2</sub>/NO<sub>3</sub>  
4500 - Phosphate  
SM4500 - Sulfide  
5310C - TOC  
351.2 - TKN

QA/QC Reporting Notes:

QA/QC Reporting Level  
 Level I  Level II  
 Level III  Level IV  
Other: \_\_\_\_\_  
State-specific reporting standards: \_\_\_\_\_

Lab ID:	Sample ID:	Date:	Time:	Type	Matrix	Received by:		Date:	Time:	Temp °C
						Relinquished by:	Received by:			
	GAF-GW-PHIII-Bkt-Control-sand-19R-t3	8/6/2020	11:00 AM	G	GW	1	8	8/6/20	1500	
	GAF-GW-PHIII-Bkt-Dolo-sand-19R-t3	8/6/2020	11:00 AM	G	GW	1	8	8-7-20	8:30	
	GAF-GW-PHIII-Bkt-Hi Cal-sand-19R-t3	8/6/2020	11:00 AM	G	GW	1	1			
	GAF-GW-PHIII-Bkt-Hi Cal-sand-444u-t3	8/6/2020	11:00 AM	G	GW	1	1			
	GAF-GW-PHIII-Bkt-Control-sand-19R-t3	8/6/2020	11:00 AM	G	S	1	1			
	GAF-GW-PHIII-Bkt-Dolo-sand-19R-t3	8/6/2020	11:00 AM	G	S	1	1			
	GAF-GW-PHIII-Bkt-Hi Cal-sand-19R-t3	8/6/2020	11:00 AM	G	S	1	1			
	GAF-GW-PHIII-Bkt-sand-t3	8/6/2020	11:00 AM	G	S	1	1			

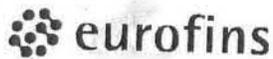


180-109312 Chain of Custody

EDD format: \_\_\_\_\_  
E-mail to: \_\_\_\_\_

Condition upon receipt:  Ambient  Iced  Refrigerated  DI VOA Frozen  Soil Jar Frozen  
Custody Seals:  Present  Intact  Broken





Environment Testing  
TestAmerica

Part # 158470-004 F012E EXP 01/21

ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARAJAS  
ACOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

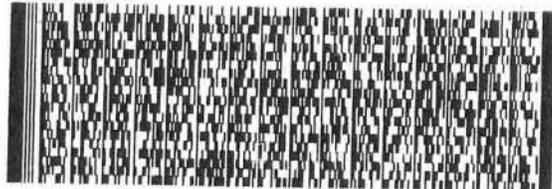
SHIP DATE: 28FEB20  
ACTWGT: 10.00 LB MAN  
CAD: 0562071/CAFE3311

TO

**EUROFINS TESTAMERICA PITTSBURGH**  
**301 ALPHA DRIVE**  
**RIDC PARK**  
**PITTSBURGH PA 152382907**

(412) 963-7068  
REF: S180-58932

RMA: ||| ||| ||| |||



FedEx  
Express



15101219082907

RETURN TO MAIL BOX

FedEx

TRK# 1680 3500 0850  
0221

**FRI - 07 AUG 10:30A**  
**PRIORITY OVERNIGHT**

**XH AGCA**

**15238**  
PA-US  
**PIT**

Thermometer ID

3.8  
14 °C

CF Initials

Handwritten initials

PT-WI-SR-00 effective 11/8/18

FID: 1711129 06Aug2020 MMRA 66CG2/7709/06A2



180-109312 Waybill

**FedEx**

**eurofins**

ment Testing  
America

DATE  
08.07

ORIGIN ID: PHDA (512) 454-4787  
FRANCISCO BARAJAS  
AECOM  
8400 AMBERCEN BOULEVARD  
BUILDING 1  
AUSTIN, TX 78728  
UNITED STATES US

SHIP DATE: 28/18  
ACTWTG: 10.00 LB MIN  
CAD: 0562071/CAFE3311

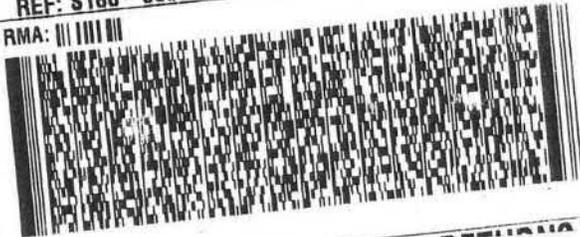
1C2/049E/05A2

TO

**EUROFINS TESTAMERICA PITTSBURGH**  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7058  
REF: S180-58932

RMA: ||| ||| |||



**FedEx**  
Express



1191219082001A

**FedEx**

TRACKING 1680 3500 0861

**FRI - 07 AUG 10:30A**  
**PRIORITY OVERNIGHT**

**XH AGCA**

Uncorrected temp  
Thermometer ID

3.8  
14

CF 0 Initials *W*

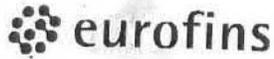
**15238**  
PA-US  
**PIT**



PT-WI-SR-001 effective 11/8/18

FID: 1711129 06Aug2020 MMRA 66CG2/7709/05A2

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13



Environment Testing  
TestAmerica

Part # 159470-004 RITE EXP 01/01/18

ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARAJAS  
RECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACTWGT: 10.00 LB MAN  
CAD: 0562071/CAFE3311

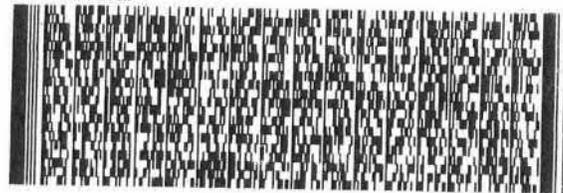
TO

**EUROFINS TESTAMERICA PITTSBURGH**  
**301 ALPHA DRIVE**  
**RIDC PARK**  
**PITTSBURGH PA 152382907**

(412) 963-7068

REF: S180-58932

RMA: ||| ||| |||



FedEx  
Express



2850/26/1/1/23595

RETURN TO MAIL BOX



TRK# 1680 3500 0850  
0221

**FRI - 07 AUG 10:30A**  
**PRIORITY OVERNIGHT**

**XH AGCA**

**15238**  
PA-US  
PIT

Indicated temp  
Thermometer ID

3.7  
14

CF Initials

*[Handwritten signature]*

PT-WI-SR-05 effective 11/8/18



FID: 1711129 06Aug2020 MMRA 56CG2/7709/05A2



180-109312 Waybill



Eurofins TestAmerica Canton Sample Receipt Form/Narrative

Login # : \_\_\_\_\_

Canton Facility

Client TA PITHSBURGH Site Name VAATow  
Cooler Received on 8-12-20 Opened on 8-12-20  
FedEx: 1<sup>st</sup> Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other

Cooler unpacked by:  
SDE

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

TestAmerica Cooler # \_\_\_\_\_ Foam Box Client Cooler Box \_\_\_\_\_ Other \_\_\_\_\_  
Packing material used: Bubble Wrap Foam Plastic Bag None \_\_\_\_\_ Other \_\_\_\_\_  
COOLANT: Wet Ice Blue Ice Dry Ice Water None

- Cooler temperature upon receipt  See Multiple Cooler Form  
IR GUN# IR-10 (CF +0.7°C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C  
IR GUN #IR-11 (CF +0.9°C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
- Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 4  

Yes	No
Yes	No NA
Yes	No
Yes	No NA

  - Were the seals on the outside of the cooler(s) signed & dated?
  - Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?
  - Were tamper/custody seals intact and uncompromised?
- Shippers' packing slip attached to the cooler(s)?  Yes  No
- Did custody papers accompany the sample(s)?  Yes  No
- Were the custody papers relinquished & signed in the appropriate place?  Yes  No
- Was/were the person(s) who collected the samples clearly identified on the COC?  Yes  No
- Did all bottles arrive in good condition (Unbroken)?  Yes  No
- Could all bottle labels be reconciled with the COC?  Yes  No
- Were correct bottle(s) used for the test(s) indicated?  Yes  No
- Sufficient quantity received to perform indicated analyses?  Yes  No
- Are these work share samples?  
If yes, Questions 12-16 have been checked at the originating laboratory.
- Were all preserved sample(s) at the correct pH upon receipt?  Yes  No  NA pH Strip Lot# HC911298
- Were VOAs on the COC?  Yes  No
- Were air bubbles >6 mm in any VOA vials?  Yes  No  NA  Larger than this.
- Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_  Yes  No
- Was a LL Hg or Me Hg trip blank present? \_\_\_\_\_  Yes  No

Tests that are not checked for pH by Receiving:  
VOAs  
Oil and Grease  
TOC

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other

Concerning \_\_\_\_\_

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. SAMPLE CONDITION

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.  
Sample(s) \_\_\_\_\_ were received in a broken container.  
Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.  
Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_

VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



**Chain of Custody Record**



<b>Client Information (Sub Contract Lab)</b> Company: TestAmerica Laboratories, Inc. Address: 3355 McLemore Drive, City: Pensacola State, Zip: FL, 32514 Phone: 850-474-1001(Tel) 850-478-2671(Fax) Email: Project Name: GAF-NRS-Treatability Site:		Lab P/M: Rumble, Jennifer L E-Mail: Jennifer.Rumble@Eurofins.com State of Origin: Tennessee Carrier Tracking No(s): Page: Page 1 of 1 Job #: 180-109312-1 Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other: M - Hexane N - None O - AsNaO2 P - Na2OAS Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)	
Due Date Requested: 8/13/2020 TAT Requested (days):		Accreditations Required (See note):	
Sampler:		Analysis Requested	
Phone:		Total Number of containers	
PO #:		Field Filtered Sample (Yes or No)	
WO #:		Perform MS/MSD (Yes or No)	
Project #: 18022206 SSOW#:		351.2/351.2 Prep NRS Treatability TKN	
Sample Date		Sample Time	
Sample Type (C=Comp, G=grab)		Matrix (W=water, S=solid, O=wast/oil, BT=Trace, A=As)	
Sample Identification - Client ID (Lab ID)		Preservation Code:	
GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (180-109312-1)	8/6/20	11:00 Central	Water
GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3 (180-109312-2)	8/6/20	11:00 Central	Water
GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3 (180-109312-3)	8/6/20	11:00 Central	Water
Special Instructions/Note: Analysis Must follow TVA Protocol Analysis Must follow TVA Protocol Analysis Must follow TVA Protocol		Special Instructions/Note: Analysis Must follow TVA Protocol Analysis Must follow TVA Protocol Analysis Must follow TVA Protocol	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins TestAmerica.

**Possible Hazard Identification**  
 Return To Client  Disposal By Lab  Archive For \_\_\_\_\_ Months  
 Special Instructions/QC Requirements:

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)  
 Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Empty Kit Relinquished by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished by: *[Signature]* Date/Time: 08/11/2020 1700 Company: ETA-PIT  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Received by: *[Signature]* Date/Time: 8/26 9:26 Company: APE  
 Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_  
 Received by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Company: \_\_\_\_\_

Custody Seals Intact:  Yes  No  
 Cooler Temperature(s) °C and Other Remarks: 0.6°C TRJ



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-109312-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 109312**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-109312-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 109312**

**List Number: 3**

**Creator: Gore, Beija K**

**List Source: Eurofins TestAmerica, Pensacola**

**List Creation: 08/12/20 04:51 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.6 °C IR 7
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

**Project name:**  
NRS Treatability Study

**Project ref:**  
60621225

**From:**  
Craig McPhee, AECOM

**Date:**  
October 1, 2020

**To:**  
Jason Curtsinger, TVA

**CC:**  
Scott Veenstra, AECOM  
David Skeggs, AECOM  
Patrick Haskell, AECOM

**DRAFT**

# Memo

**Subject:** Minerals Analysis of Microcosm Samples

The purpose of this memorandum is to provide context for the mineralogical testing results conducted as part of the Non-Registered Site (NRS) treatability testing being completed by AECOM at TVA's Gallatin Fossil Plant (GAF). Observations and discussions are preliminary and have not been fully developed and reviewed.

## 1. Procedure

Mineral analysis samples were collected from the Phase III microcosm buckets as follows:

**AECOM-Sand - 073020:** This material is sand without addition of any reagents or any dosing with site groundwater. The sand is a natural material with limited processing (water washed and sieved to meet ASTM standards for concrete sand). The material was produced by Pine Bluff Materials Company and was provided by a supplier in the Gallatin area (Garrot Brothers).

**AECOM- CONTROL +2 – 073020:** This material is sand from the same source as **AECOM-Sand** that has been dosed twice with water from well 19R. The process was to dose the sand with site groundwater, wait one week, drain the water out, and repeat the dose a second time, wait one week, drain it again, and then collect a sample of sand from the approximate center of the test vessel (bucket).

**AECOM-DOLO - +2 – 073020:** This material is sand from the same source as **AECOM-Sand**, which has been amended with 0.2% by weight of sand dolomitic fines (dolo). The amended sand was then subjected to dosing with well 19R water and sampling as described for **AECOM-CONTROL +2**.

**AECOM-Hi CAL +2 – 073020:** This material is sand from the same source as **AECOM-Sand** which has been amended with 0.1% by weight of sand of high calcium fines (Hi CAL). The amended sand was then subjected to dosing with well 19R water and sampling as described for **AECOM-CONTROL +2**.

Well 19R water used for the dosing has a low pH (<4) and contains Be (approx. 13 micrograms per liter [ug/L]), Cd (approximately 6 ug/L), Li (approximately 140 ug/L) and Ni (approximately 200 ug/L).

**DELIBERATIVE AND PRE-DECISIONAL**

The samples were sent to DCM Science Laboratory, Inc. (DCM) in Wheat Ridge, Colorado. DCM conducted the following tests:

- Semi-Quantitative X-Ray Diffraction (XRD)
- X-Ray Fluorescence (XRF)
- Scanning Electron Microscopy (SEM)

The nature of the samples and purpose of the study were discussed with DCM prior to analysis. In addition to standard analysis, DCM was asked to focus on the following:

- Calcite (present in the HiCal and Dolo fines)
- Dolomite
- Quartzite
- Illite and Kaolinite
- Iron  $\text{Fe}(\text{OOH})_x$ , pyrite, other iron minerals
- Al
- Cadmium –  $\text{CdCO}_3$  (otavite)  $\text{CdS}$  (greenockite or hawleyite),  $\text{Cd}(\text{OH})_2$
- Beryllium (not detectable by XRF) –  $\text{BeO}$ ,  $\text{Be}(\text{OH})_2$
- Nickel –  $\text{NiS}$  (millerite),  $\text{NiS}_2$  (vaesite)  $\text{Ni}_3\text{S}_2$  (heazlewoodite),  $\text{Fe}_5\text{NiS}_8/(\text{FeNi})_9\text{S}_8$  (greigite,/pentandite),  $(\text{Fe}, \text{Ni})\text{O}(\text{OH})$  (limonite),  $\text{Mg}, \text{Ni})_3(\text{OH})_4(\text{Si}_2\text{O}_5)$  (garnerite)
- Lithium (not detectable XRF) - Li minerals can be divided into three groups: silicates (spodumene- $\text{LiAlSi}_2\text{O}_6$ , petalite- $\text{LiAlSi}_4\text{O}_{10}$ ); micas (lepidolite- $[\text{Li}, \text{Al}]_3[\text{Al}, \text{Si}]_4\text{O}_{10}[\text{F}, \text{OH}]_2$ , zinnwaldite- $[\text{Li}, \text{Al}, \text{Fe}]_3[\text{Al}, \text{Si}]_4\text{O}_{10}[\text{F}, \text{OH}]_2$  and phosphates (mainly amblygonite -  $[\text{Li}, \text{Na}]\text{Al}[\text{F}, \text{OH}]$ ).

## 2. Preliminary Evaluation of Results

### 2.1 XRD

The results of the XRD testing is provided in **Attachment A**. All four samples were found to be predominantly quartz and silicate minerals (amphibole, K-feldspar, and plagioclase). These results are consistent with the sand that forms the base material for all four samples. Enrichment of calcite is not apparent because only 0.1 to 0.2% of calcium bearing amendments were added. Enrichment of minerals associated with the target metals was not observable by XRD, because the amount deposited by dosing with 19R groundwater is very low (parts per billion).

### 2.2 XRF

The results of the XRF testing is provided in **Attachment B**. As with XRD, the sensitivity of XRF makes it difficult to draw distinctions between the four samples tested.  $\text{MgO}$  appears slightly enriched in the AECOM-DOLO sample, consistent with the presence of  $\text{MgO}$  in dolomitic fines. Similarly,  $\text{CaO}$  may be slightly enriched in the amended samples. XRF results for Ni were essentially the same for all four samples. For the AECOM-DOLO and AECOM-Hi Cal samples, enrichment of nickel would be expected as nickel is removed from the groundwater during each dose and added to the sand. However, two doses of groundwater can only deposit a maximum of approximately 0.1 parts per million (ppm) of nickel. Thus, nickel enrichment from two doses of groundwater is not observable by XRF (10-15% precision/accuracy on the 1-100 ppm range).

#### DELIBERATIVE AND PRE-DECISIONAL

## 2.3 SEM

The results of the SEM testing is provided in **Attachment C**. The sample with no amendments and no dosing with groundwater (AECOM-Sand) shows trace amounts of calcite, dolomite, apatite and iron minerals. This finding explains why the unamended sand is providing a degree of groundwater treatment. These trace minerals are consistent with sand from a marine environment (calcite/dolomite from shell fragments, apatite from remains of fish bones).

The observation by SEM of calcite/dolomite fragments with primary and secondary coatings provides some insight into the mechanisms behind removal of the target metals from groundwater.

## 3. Conclusion and Preliminary Recommendations

The mineralogy of amended sand and unamended sand are very similar. This is consistent with the relatively small doses of amendments that have been applied, the similarity of the amendments to minerals naturally present in the sand, and the low concentration of target analytes being treated in the microcosms. As anticipated in the Workplan, the mineral analysis does not have the resolution to observe the small amount of target metals deposited by application of site groundwater. It is also difficult to observe the amendments because the amount of amendments applied is very low.

These mineral results will be further considered in the context of the sequential extraction results and other site data.

Further mineral analysis with samples taken to failure (dosed with groundwater until breakthrough) or with much higher amendment doses (>1%) might provide clearer results. However, additional mineralogical testing is unlikely to change amendment selection or dosing. At this time, the practical value of further mineralogical testing seems minimal, and therefore, no further mineralogical testing is proposed.

## Appendix A XRD



12421 W. 49th Avenue, Unit #6  
 Wheat Ridge, CO 80033 (303) 463-8270

**Semi-Quantitative X-Ray Diffraction Analysis**

Page 1 of 1

Client:	Analysis Date:	9-4-20
AECOM	Reporting Date:	9-4-20
9400 Amberglen Blvd.	Receipt Date:	7-31-20
Austin, TX 78729	Client Job No.:	None Given
	Client Project:	TVA - NRS Gallatin
	DCMSL Project:	AECOM6

Client Sample No.:	AECOM-SAND	AECOM-DOLO-+2	AECOM-CONTROL-+2	AECOM-HI CAL-+2
	<b>073020</b>	<b>073020</b>	<b>073020</b>	<b>073020</b>
<u>Phase</u>				
Amphibole	1	2	1	3
Calcite	<2*	<2*	-	-
Chlorite	4	2	4	3
K-Feldspar	12	11	11	13
Mica	4	4	4	4
Plagioclase	14	17	15	14
Quartz	63	61	63	61
Gypsum	-	-	<2*	-
Unaccounted	<5	<5	<5	<5

\*May be present

The sample(s) was/were prepared for x-ray diffraction analysis and scanned over a range of 3° to 45° 2θ Cu radiation, 40kV, 25mA. Mineral phases were identified with the aid of computer-assisted programs accessing a powder diffraction database. Estimates of mineral concentrations are based on relative peak heights and reference intensity ratios (RIR) measured in-house.

All information provided by clients, including sample results, is considered proprietary and confidential. Client results and other information will not be released to anyone but the client except by client request. When the laboratory is required by law or authorized by contractual arrangement to release confidential information, the client or individual concerned shall, unless prohibited by law, be notified of the information provided.

Jason Barnes, Analyst



12421 W. 49<sup>th</sup> Avenue, Unit #6  
Wheat Ridge, CO 80033

(303) 463-8270/(800) 852-7340  
(303) 463-8267 - fax

Date/Time Received \_\_\_\_\_ DCMSL Group No. 2020 DCMSL Log No. AECOM6

Field Data Sheet/Chain of Custody

Samples Submitted By:

Company: AECOM  
Address: 9400 Amberglen Blvd  
Austin, TX 78729

Job/P.O. # \_\_\_\_\_

Project Title TVA - NRS Gallatin

Contact: Francisco Barajas  
Phone: 512-419-6474  
Cell: \_\_\_\_\_  
Email: Francisco.Barajas@aecom.com

Archive: Asbestos samples are archived for 6 months unless other arrangements are made. All other samples are archived for 3 months.

Turnaround Time Requested:

- Standard (3 to 5 Business Days)
- 24 Hour Rush
- 2 Hour Rush (Asbestos Only)
- Other \_\_\_\_\_

Procedure Requested:

ASBESTOS

- Bulk  Standard EPA
- Progressive
- Point Count
- Other
- Air  NIOSH 7400
- OSHA ID-160
- Other

DUST & SILICA

- Silica - Air NIOSH 7500
- Silica - Bulk
- Silica - Bulk Respirable
- Dust - NIOSH 0500/0600

Other Analysis: XRF, XRD

OTHER SERVICES

- Optical Microscopy
- X-ray Diffraction - Scan/Search
- X-ray Diffraction - Clay/Bulk
- SEM

Polished Thin Section

Client Sample No.:	Sample Date	Air Volume	Other Information
<u>1 AECOM - Sand - 073020</u>	<u>7/30/20</u>	_____	_____
<u>2 AECOM - D010-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>3 AECOM - Control-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>4 AECOM - Hi, Cal-t2-073020</u>	<u>7/30/20</u>	_____	_____
<u>5</u>	_____	_____	_____
<u>6</u>	_____	_____	_____
<u>7</u>	_____	_____	_____
<u>8</u>	_____	_____	_____
<u>9</u>	_____	_____	_____
<u>10</u>	_____	_____	_____

Relinquished By: Recht Wetters Date/Time: 7/30/20 1400 Received By: D Downey Date/Time: 7/31/20 9:42

## Appendix B XRF

August 4, 2020  
Lab no. 220181

Mr. Ron Schott  
DCM Science Laboratory, Inc.  
12421 W. 49<sup>th</sup> Avenue, Unit #6  
Wheat Ridge, Colorado 80033

Dear Mr. Schott:

Enclosed are the x-ray fluorescence (XRF) analytical results for, "073020" samples received with your PO no. 2021. This report will be mailed and emailed to you.

A representative portion of each sample was ground to approximately -400 mesh in a steel swing mill and then analyzed by our standard XRF procedure for 31 major, minor and trace elements. The relative precision/accuracy for this procedure is ~5–10% for major–minor elements and ~10–15% for trace elements (those elements listed in ppm) at levels greater than twice the detection limit in samples of average geologic composition. A replicate sample and a standard reference material ("GSP-2", a USGS standard rock) was analyzed with the samples to demonstrate analytical reproducibility for your samples and analytical accuracy for a geologic standard, respectively. The accepted ("known") values for the quality control standard are listed with the XRF results.

Thank you for the opportunity to be of continuing service to DCM Science Laboratory.

Sincerely,

Joy Maes

IDENT	Wt %												
	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	S	Cl	K <sub>2</sub> O	CaO	TiO <sub>2</sub>	MnO	Fe <sub>2</sub> O <sub>3</sub>	BaO
SAND	1.17	0.39	4.38	85.8	0.09	< 0.05	< 0.02	1.10	0.73	0.18	0.06	1.56	0.04
DOLO+2	1.17	0.51	4.47	87.6	0.14	< 0.05	< 0.02	1.15	0.89	0.15	0.07	1.53	0.03
CONTROL+2	1.10	0.32	4.18	84.8	0.08	< 0.05	< 0.02	1.19	0.55	0.14	0.06	1.66	0.04
HICAL+2	1.40	0.40	4.62	84.4	0.10	< 0.05	< 0.02	1.14	0.71	0.14	0.06	1.55	0.03
<b>Quality Control - Replicate (R) sample and standard reference material (GSP-2) analyzed with samples</b>													
SAND(R)	1.16	0.38	4.39	85.8	0.09	< 0.05	< 0.02	1.10	0.73	0.18	0.06	1.55	0.03
GSP-2-XRF	3.16	1.11	14.7	65.7	0.33	0.07	0.06	5.48	2.16	0.60	0.04	4.24	0.14
GSP-2-known	2.78	0.96	14.9	66.6	0.29	----	----	5.38	2.10	0.66	0.04	4.90	0.15

IDENT	PPM										
	V	Cr	Ni	Cu	Zn	As	Sn	Pb	Mo	Sr	U
SAND	13	< 10	14	< 10	27	< 20	< 20	< 10	< 10	90	< 10
DOLO+2	16	< 10	13	< 10	30	< 20	< 20	< 10	< 10	92	< 10
CONTROL+2	15	< 10	14	12	27	< 20	< 20	< 10	< 10	108	< 10
HICAL+2	17	11	14	< 10	30	< 20	< 20	< 10	< 10	98	< 10
<b>Quality Control</b>											
SAND(R)	19	< 10	15	< 10	28	< 20	< 20	< 10	< 10	93	< 10
GSP-2-XRF	46	18	11	44	106	< 20	< 20	34	< 10	218	< 10
GSP-2-known	52	20	17	43	120	--	--	42	--	240	2

Ident	PPM				
	Th	Nb	Zr	Rb	Y
SAND	< 10	< 10	113	20	11
DOLO+2	< 10	< 10	90	24	12
CONTROL+2	< 10	< 10	99	24	< 10
HICAL+2	< 10	< 10	101	25	10
<b>Quality Control</b>					
SAND(R)	< 10	< 10	112	22	11
GSP-2-XRF	102	22	529	215	33
GSP-2-known	105	27	550	245	28

Initial \_\_\_\_\_

Date \_\_\_\_\_

Analysis Performed By The Mineral Lab, Inc



September 21, 2020

Mr. Francisco Barajas  
AECOM  
9400 Amberglen Blvd.  
Austin, TX 78729

Dear Mr. Barajas:

We have performed scanning electron microscopy on your four sand samples (client samples no. **AECOM-SAND – 073020, AECOM-DOLO - +2 – 073020, AECOM-CONTROL -+2 – 073020** and **AECOM-Hi CAL -+2 – 073020**).

Thank you for the opportunity to provide this service. If you have any questions, please call.

Sincerely,

A handwritten signature in black ink that reads "Ron Schott". The signature is written in a cursive style with a large initial "R".

Ron Schott  
Analyst

## Appendix C SEM



12421 W. 49<sup>th</sup> Avenue, Unit #6  
Wheat Ridge, CO 80033 - (303) 463-8270

## Scanning Electron Microscopy Analysis

Page 1 of 26

Client:	Analysis Date:	9-17-20
AECOM	Reporting Date:	9-21-20
9400 Amberglen Blvd	Receipt Date:	7-31-20
Austin, TX 78729	Client Job No.:	None Given
	Project Title:	TVA-NRS Gallatin
	DCMSL Project:	AECOM8

The purpose of this project is to confirm the bulk mineralogy of four sand samples and determine if additional minerals have formed as coatings/rinds on major phases as a result of groundwater treatment in four sand samples (client samples no. **AECOM-SAND – 073020**, **AECOM-DOLO - +2 – 073020**, **AECOM-CONTROL -+2 – 073020** and **AECOM-Hi CAL -+2 – 073020**) by field emission scanning electron microscopy (FE-SEM) equipped with an energy dispersive system (EDS). Each sample was prepared as a standard polished thin section and carbon coated. FE-SEM/EDS analyses were performed at magnifications ranging from 100X to 20,000X, 20keV. FE-SEM images and EDS spectra are included for documentation.

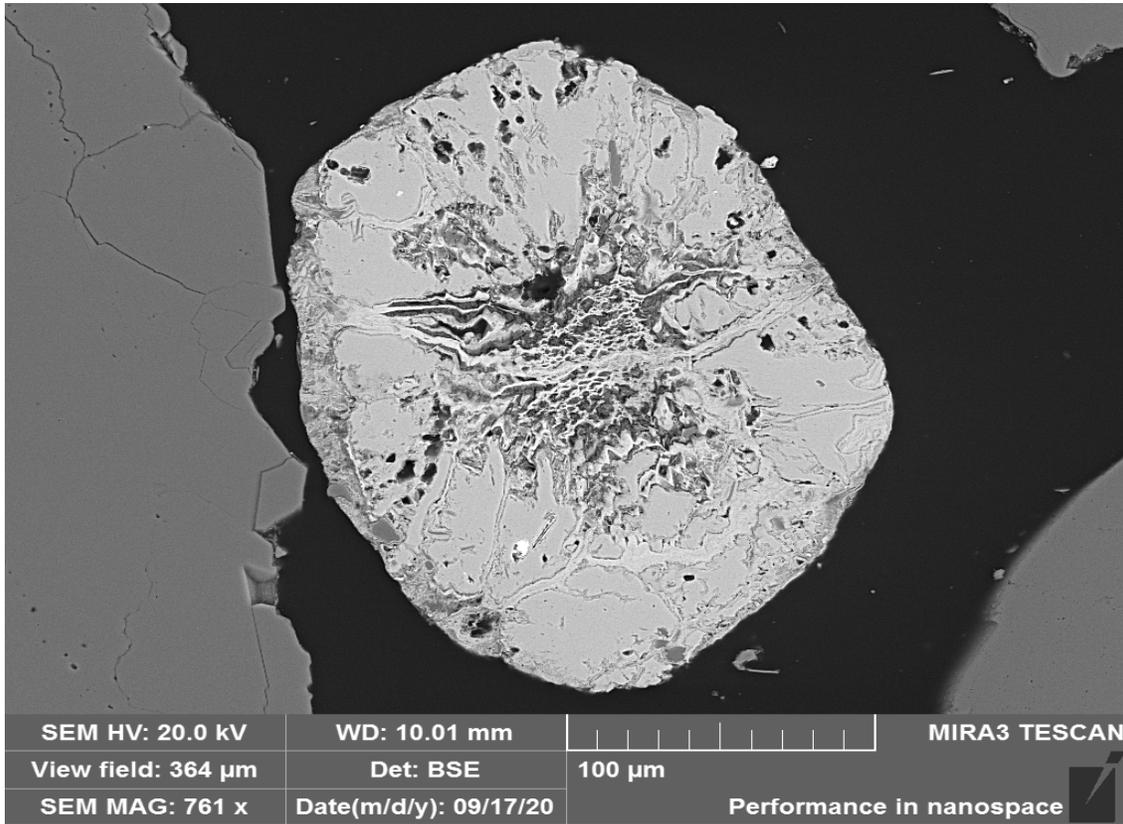
Client Sample No.: **AECOM-SAND – 073020**

*Major Mineralogy by XRD: Quartz 63%, Plagioclase 14% K-spar 12% Mica 4%  
Chlorite 4% Amphibole 1%*

*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Pyrite*

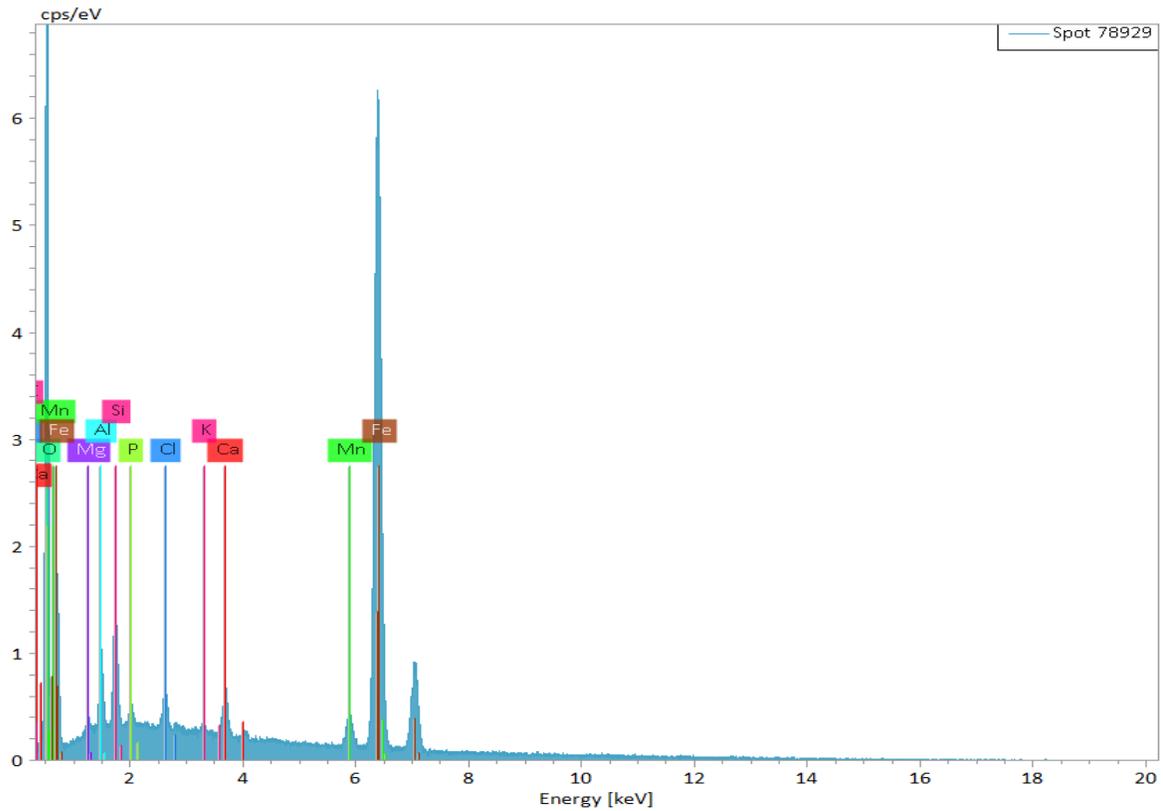
### Microscopic Description by FE-SEM

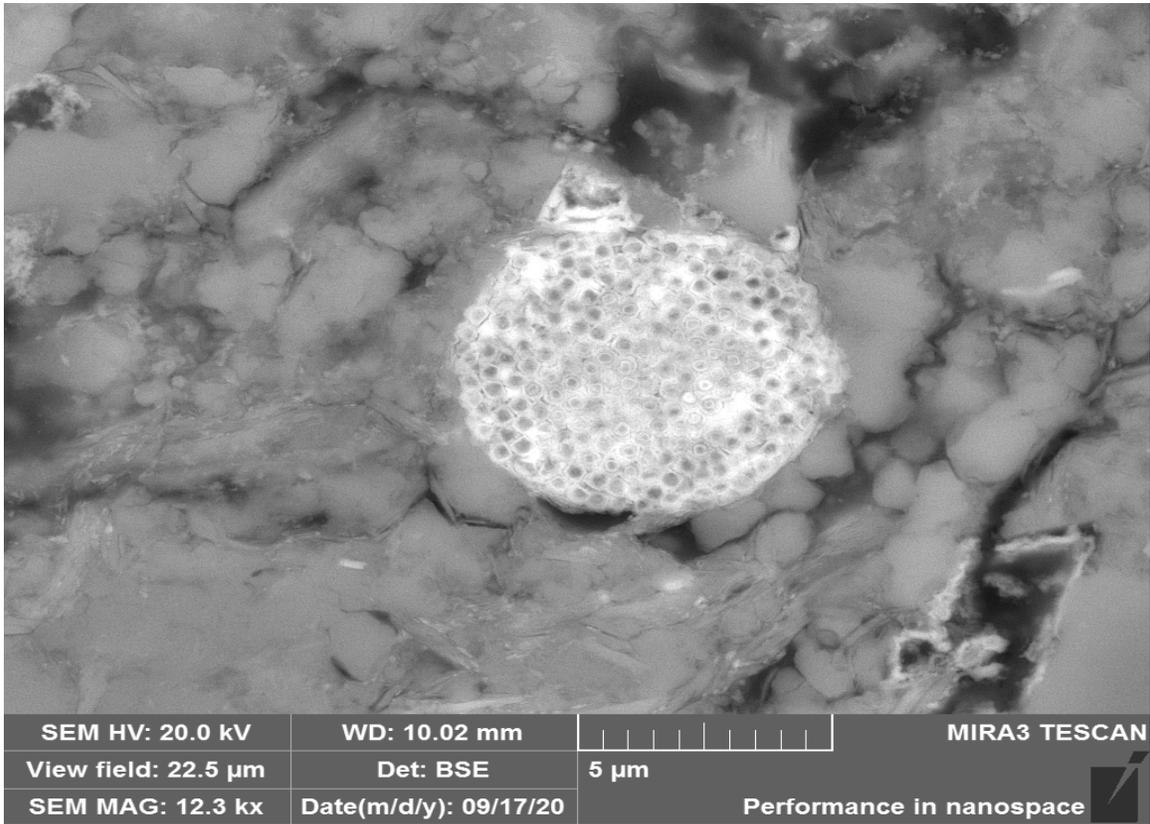
In hand specimen this sample is a brown colored fine, to coarse grained unconsolidated sand. XRD and FE-SEM indicate the sand is primarily composed of subrounded to rounded quartz, feldspar and lesser amounts of mica/chlorite and some amphibole. In thin section individual grains show little in the way of secondary coatings, however, there are a few silicate and carbonate grains that have some attachments of clay or thin rinds of iron oxide. Calcite/dolomite tends to show the most evidence of secondary alteration/coatings composed primarily of Mn. Although uncertain, the coating may represent Mn oxide or secondary Mn carbonate. Iron oxide with significant Mn content is also present as large rounded fragments and as goethite pseudomorphs after pyrite cubes and pyrite framboids. Although sulfides are rare, one small relict grain was identified in a mass of iron oxide.



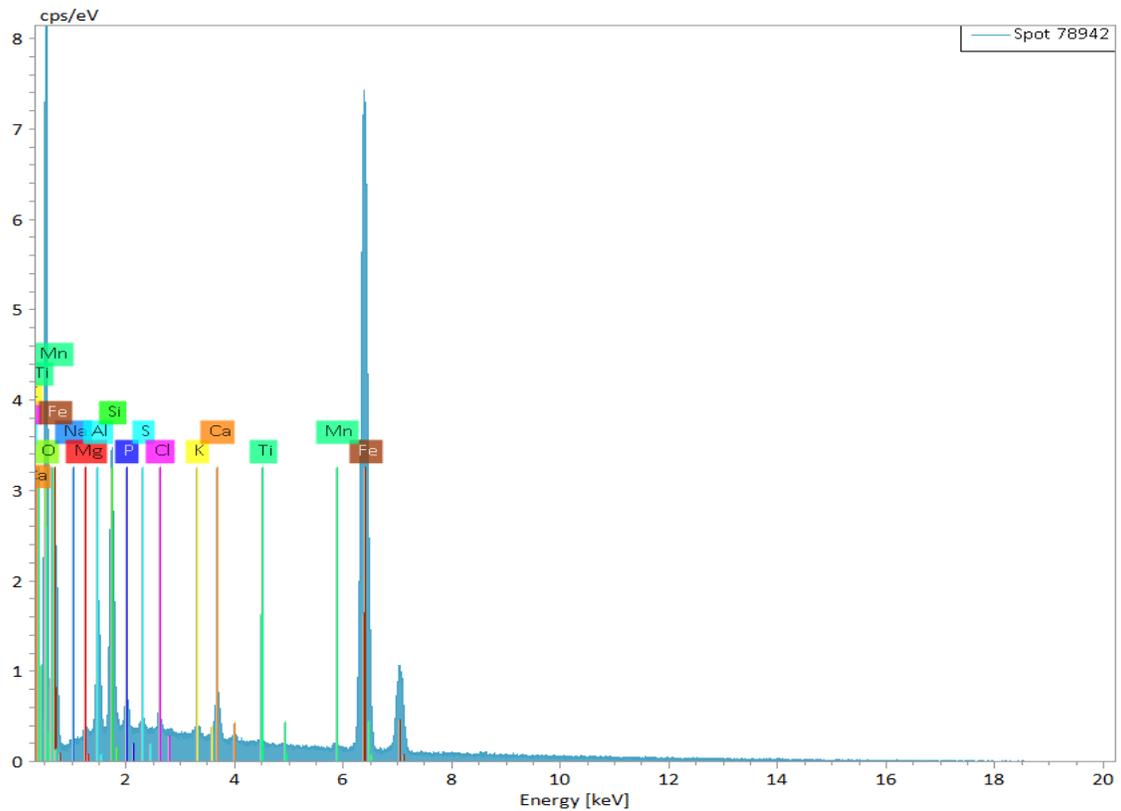
Client Sample No.: **AECOM-SAND – 073020**

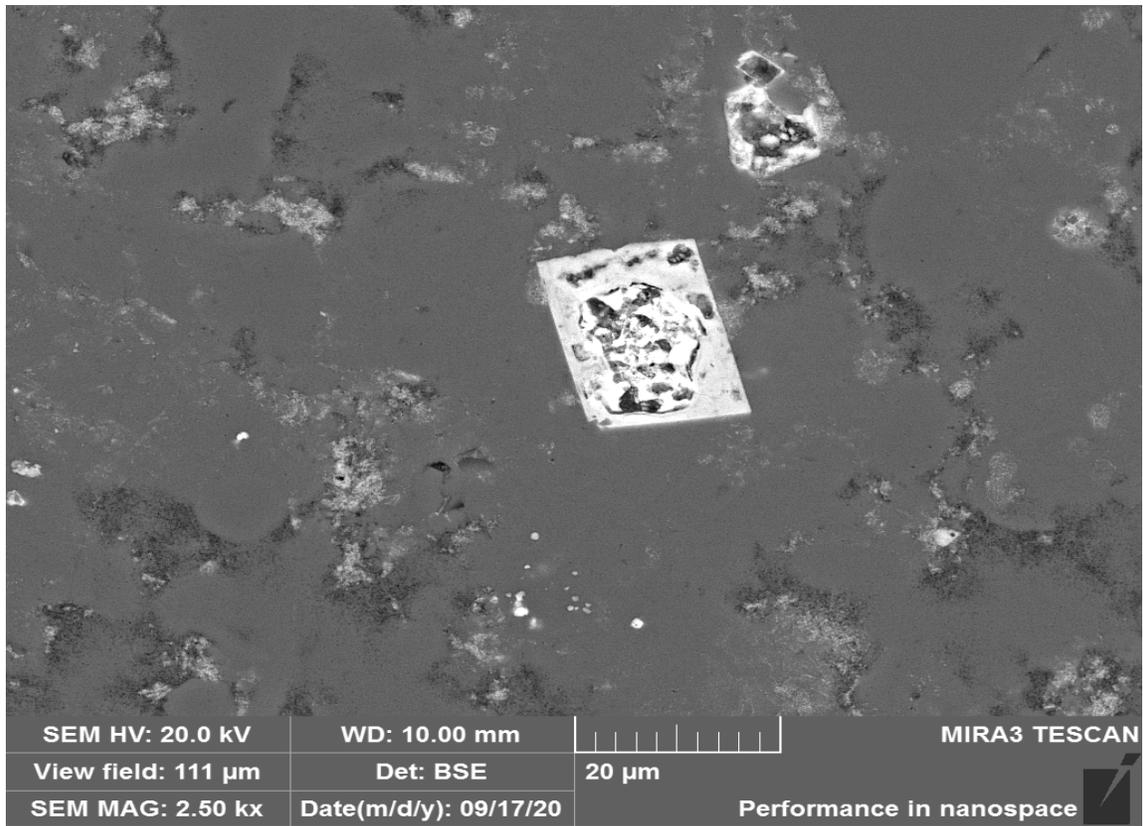
Backscatter image of a large rounded grain of iron oxide with a bright grain of pyrite in lower left – 761X



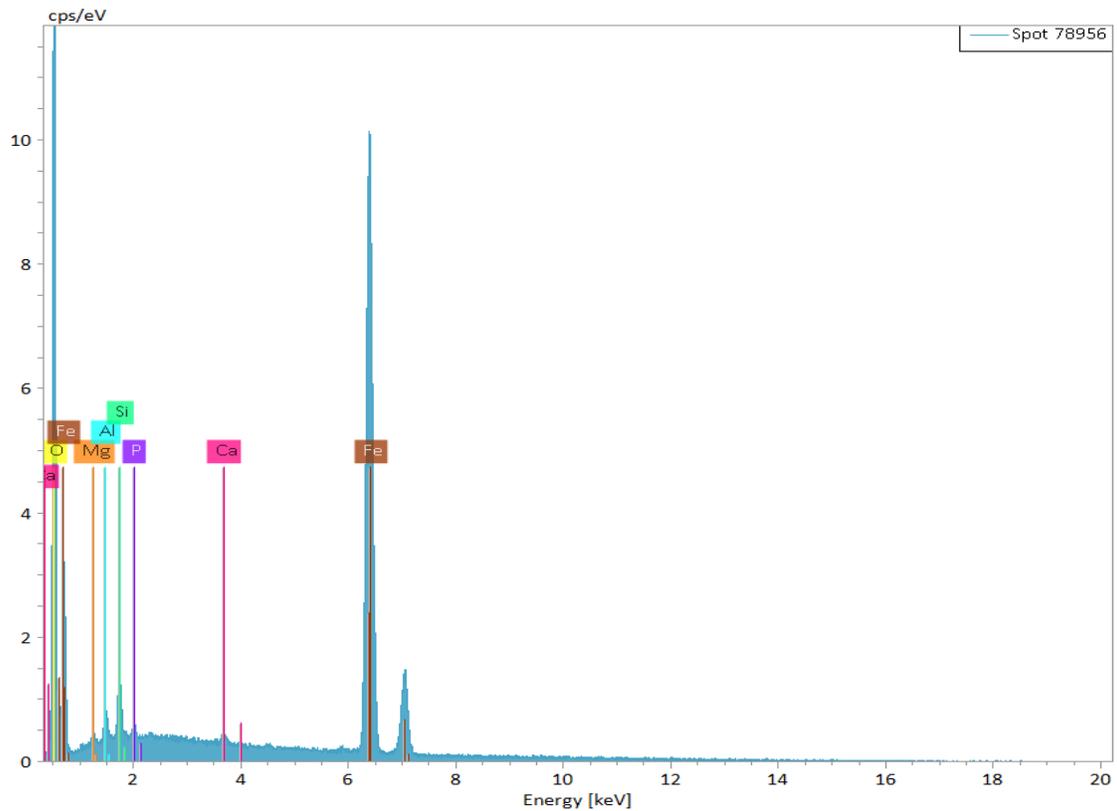


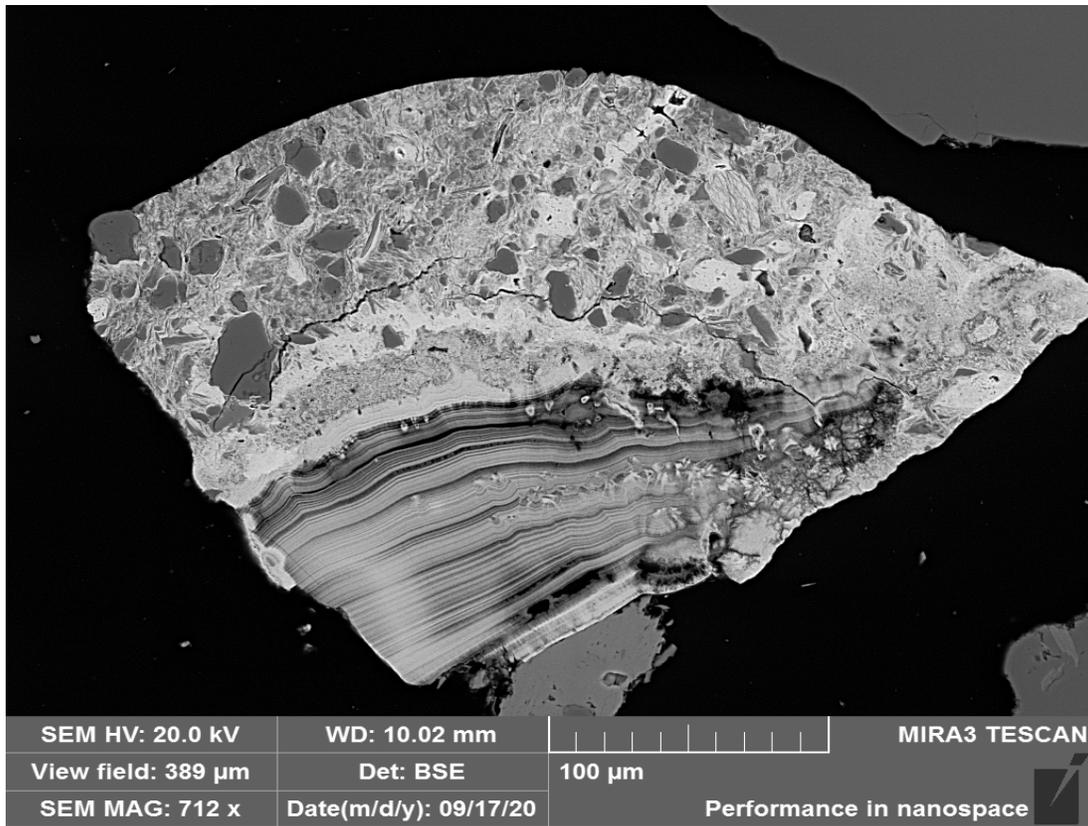
Client Sample No.: **AECOM-SAND – 073020**  
 Backscatter image of a goethite pseudomorph after a pyrite framboid – 12,300X



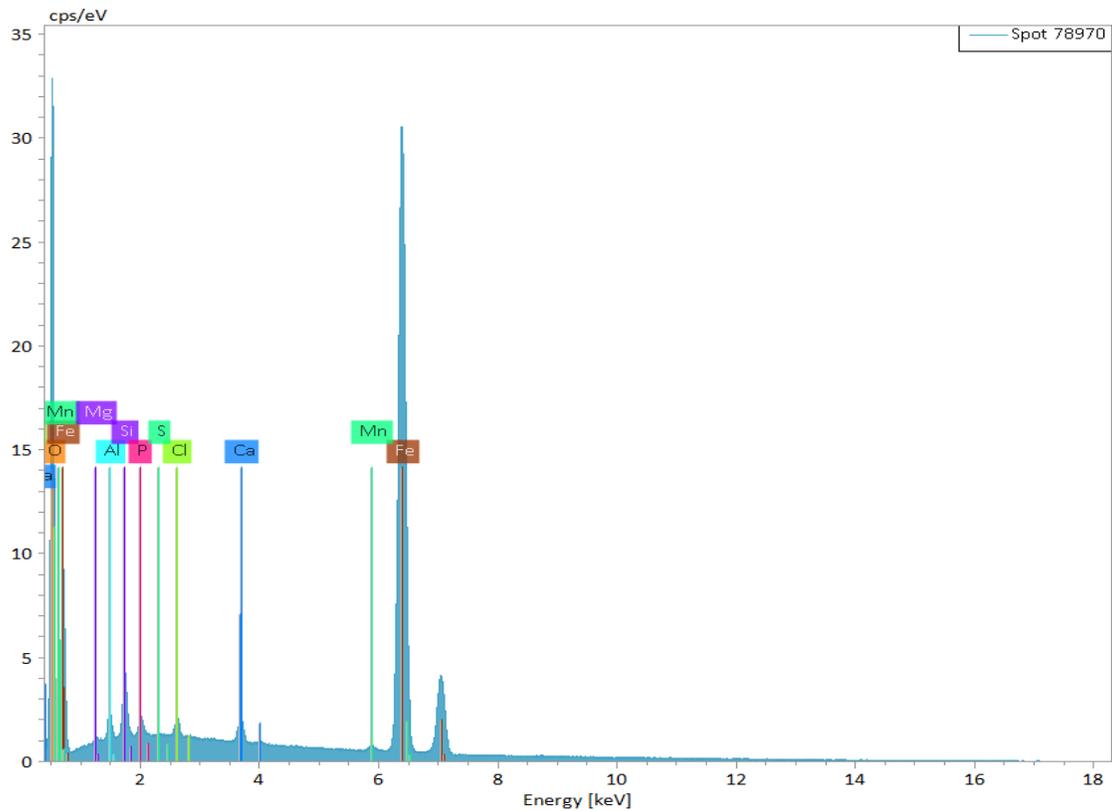


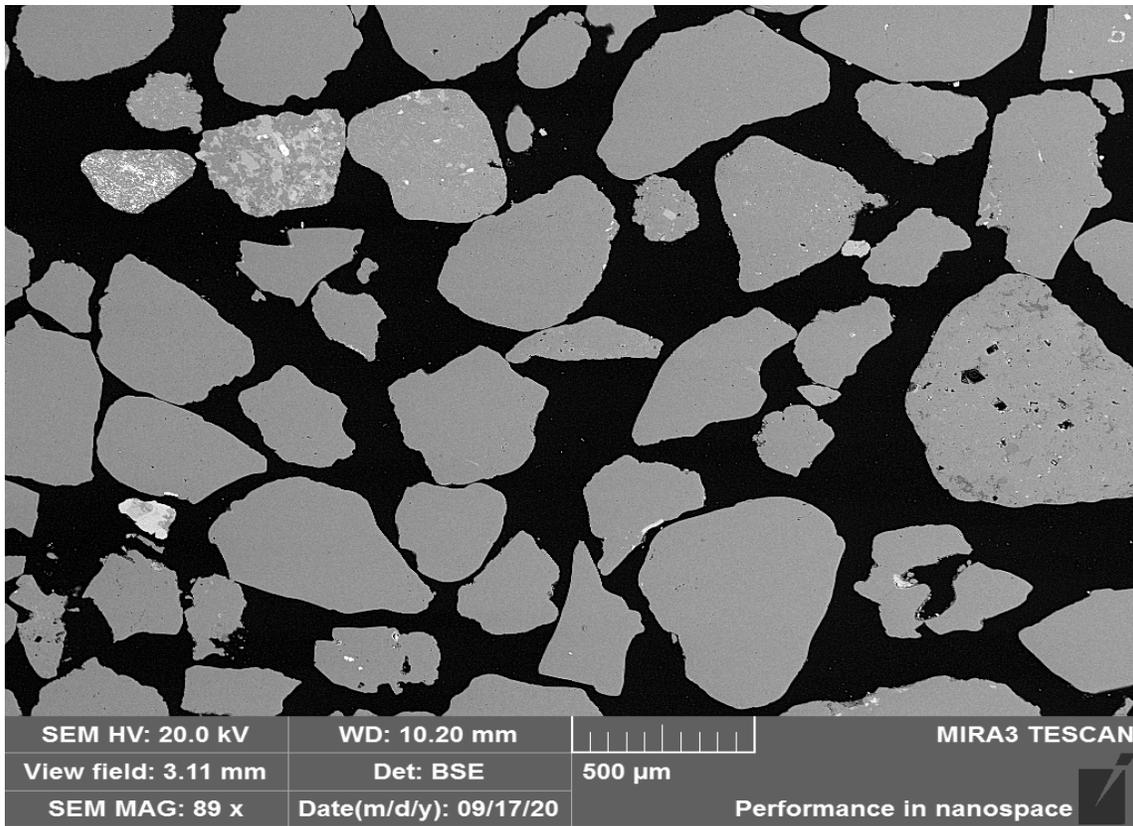
Client Sample No.: **AECOM-SAND – 073020**  
Backscatter image of goethite pseudomorph after pyrite in quartz – 2,500X





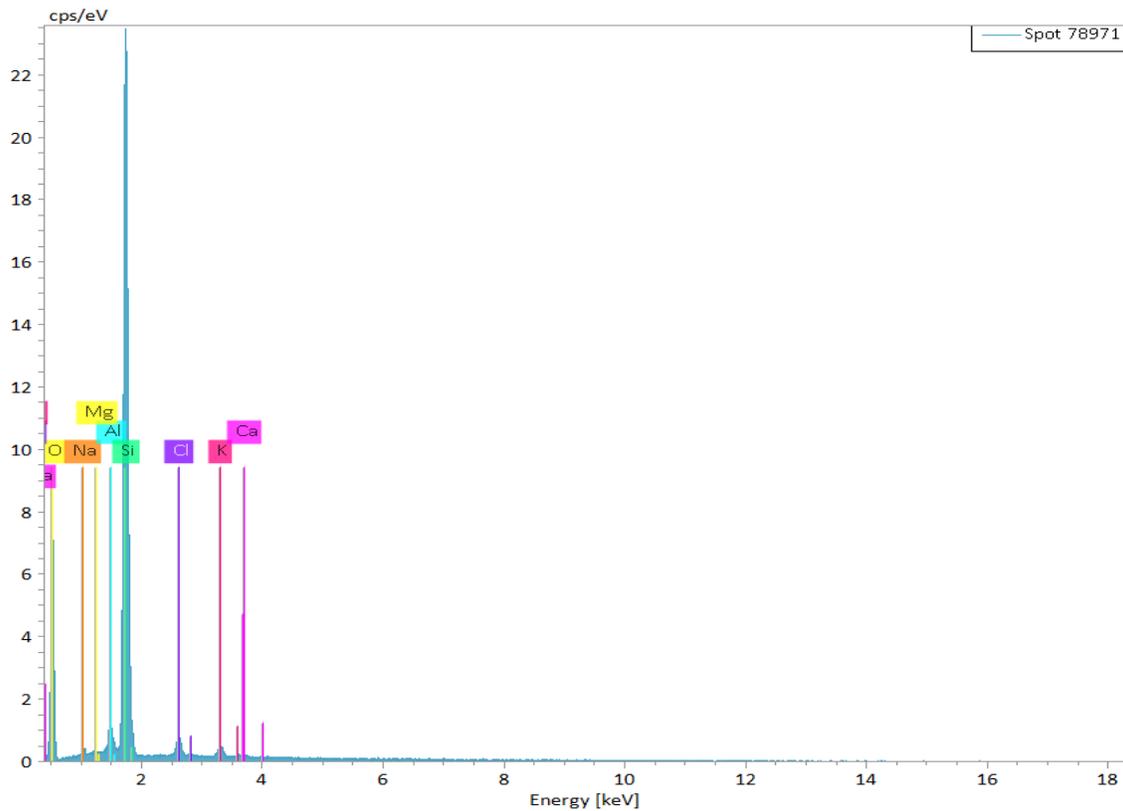
Client Sample No.: **AECOM-SAND – 073020**  
Backscatter image of iron oxide cementing small rock fragments – 712X

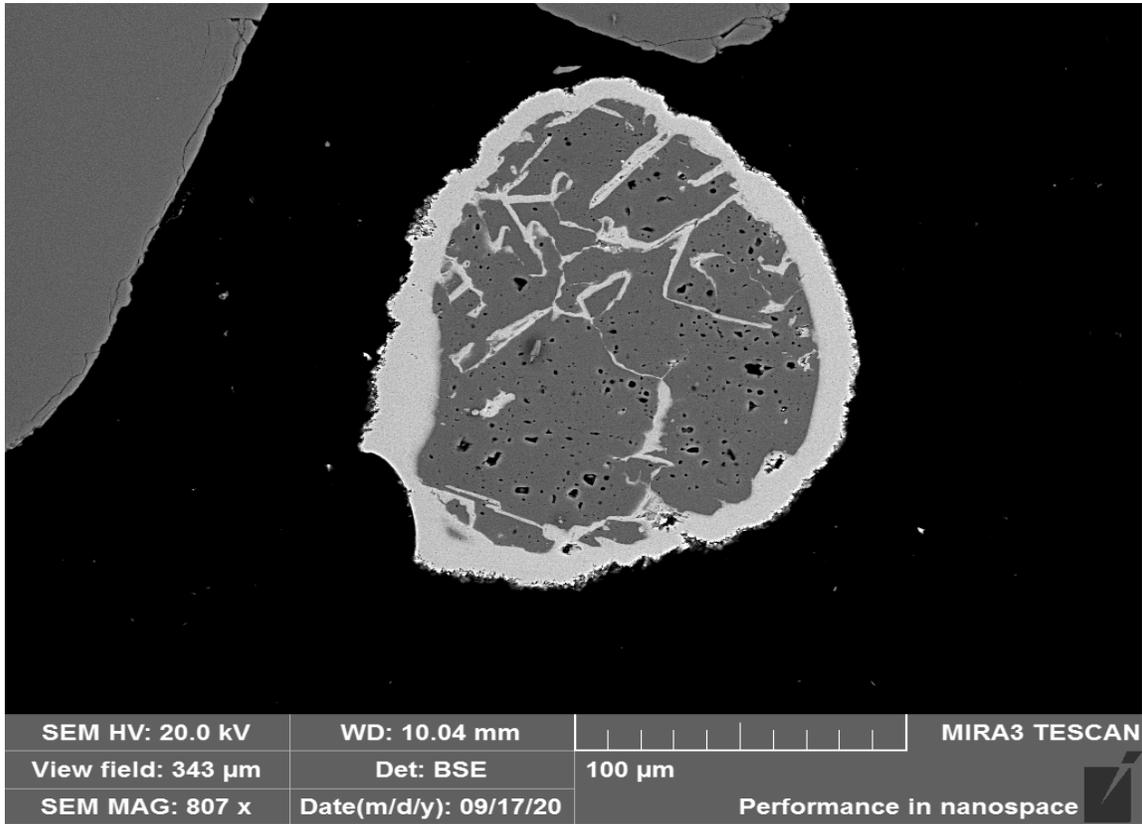




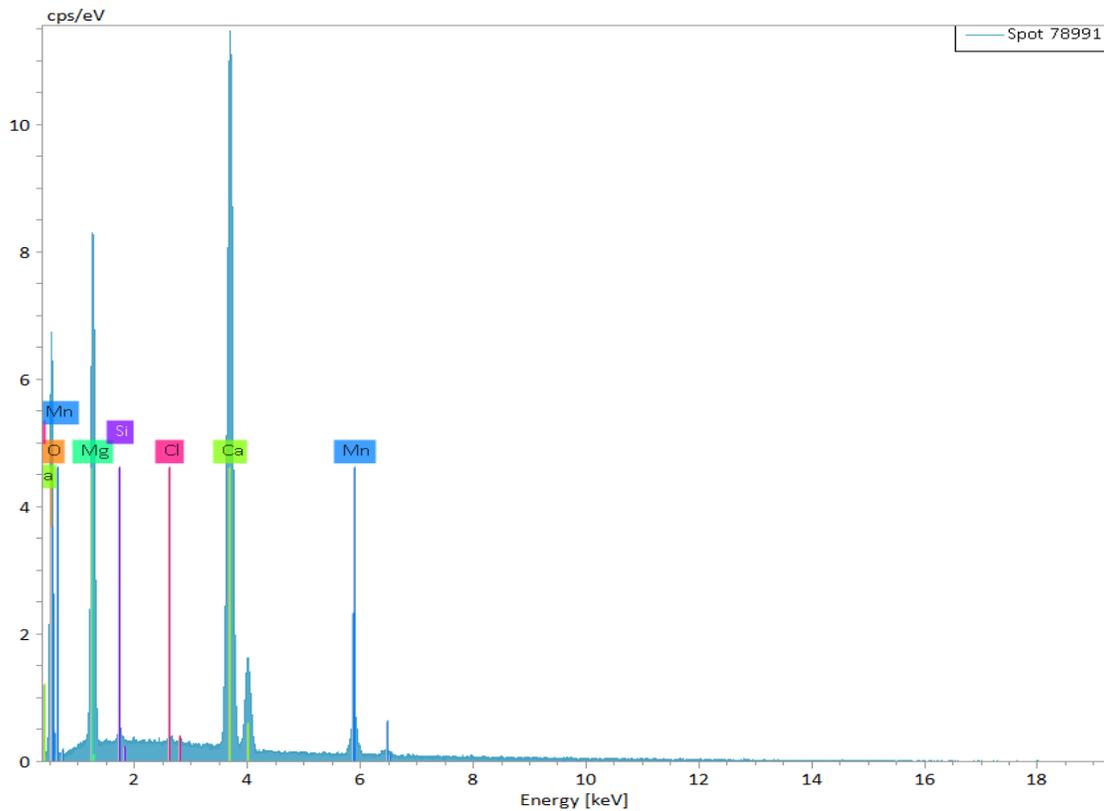
Client Sample No.: **AECOM-SAND – 073020**

Low magnification backscatter image showing grain morphology and size variation – 89X





Client Sample No.: **AECOM-SAND – 073020**  
Backscatter image of a rounded grain of dolomite with a bright Mn rich rind – 807X



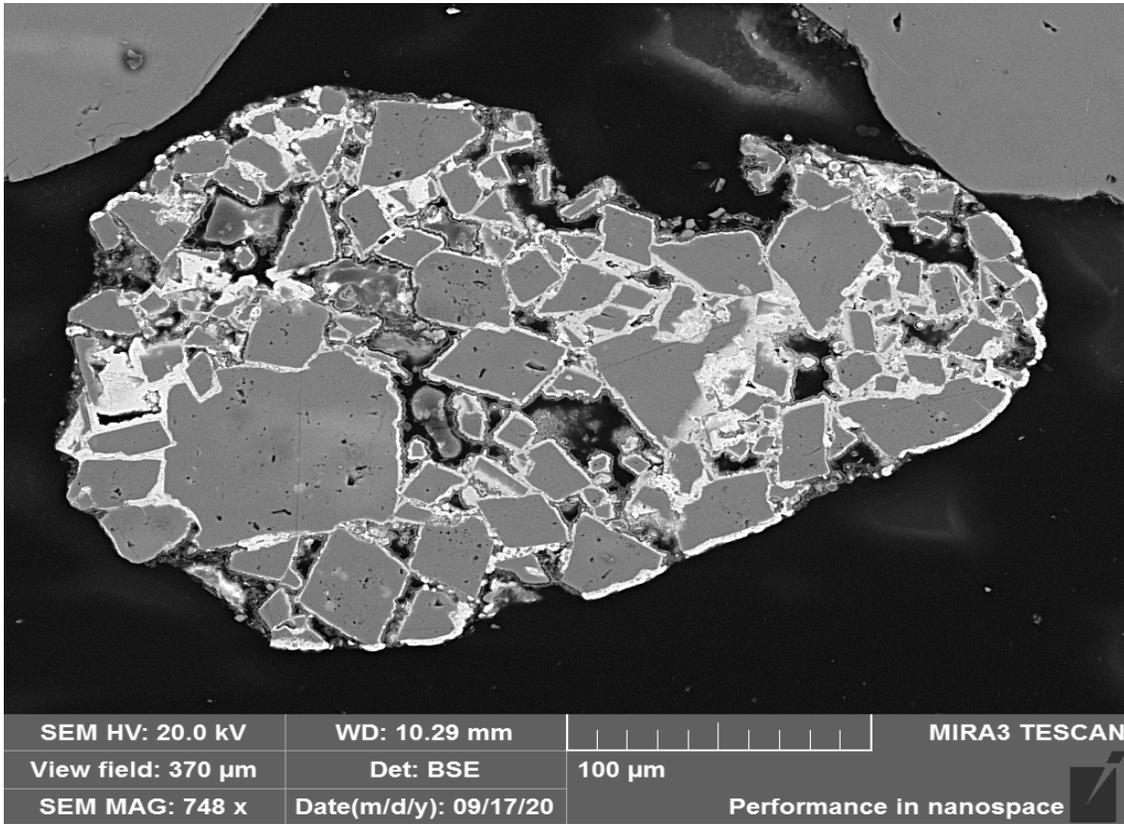
Client Sample No.: **AECOM-DOLO - +2 – 073020**

*Major Mineralogy by XRD: Quartz 61%, Plagioclase 17% K-spar 11% Mica 4%  
Chlorite 2% Amphibole 2%*

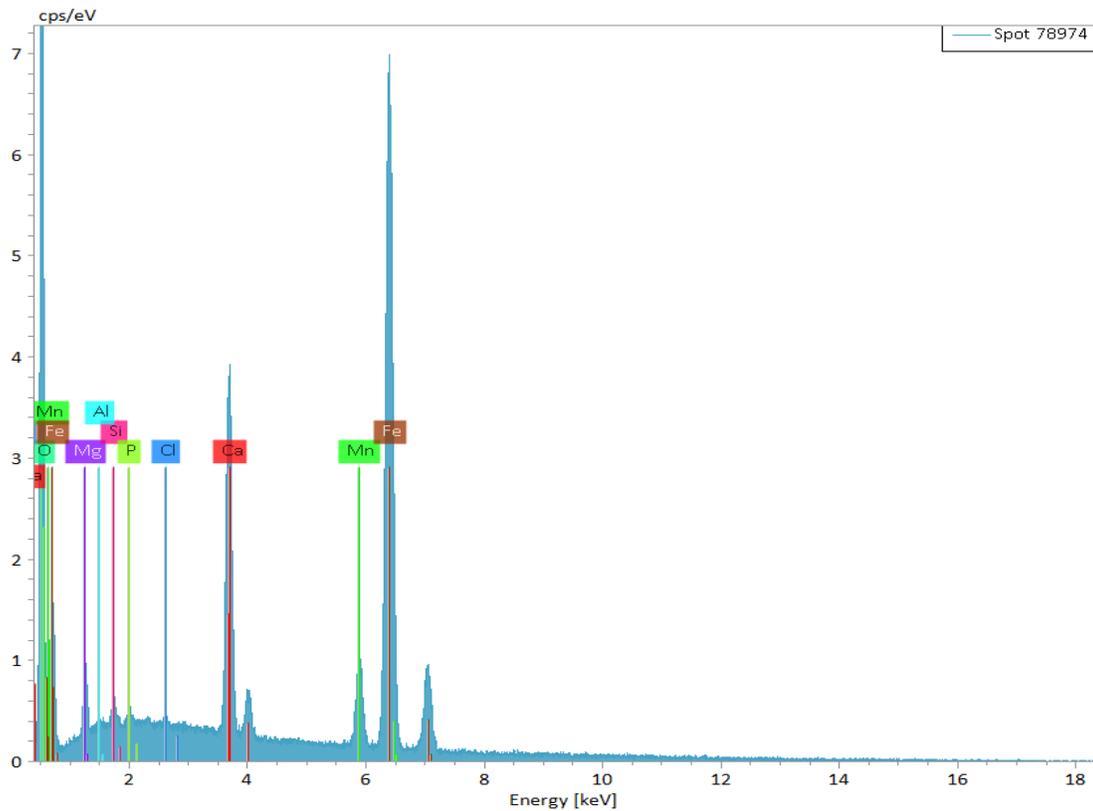
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Pyrite*

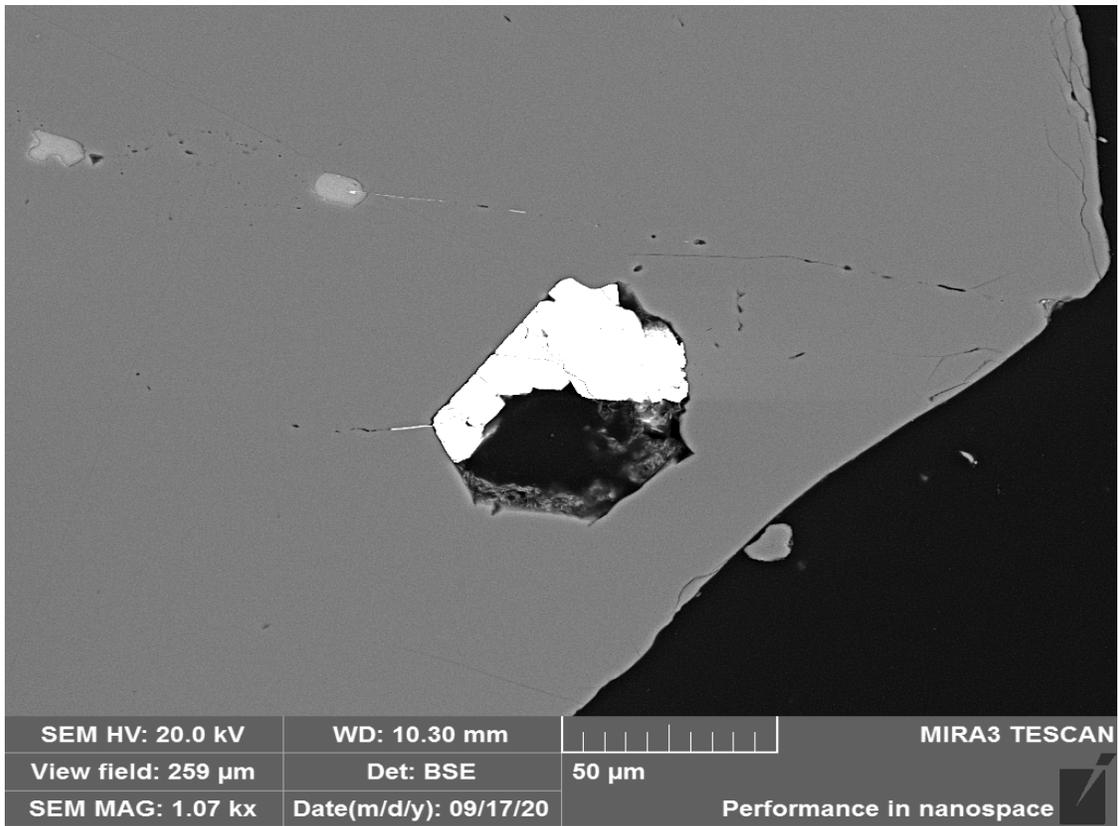
Microscopic Description by FE-SEM

This sample is a brown colored, fine to coarse unconsolidated sand. FE-SEM and XRD confirm the sample is composed mainly of subrounded to rounded quartz/feldspar with lesser amounts of mica and amphibole. A small population of grains shows some minor banding and coatings of secondary iron oxide. Calcite/dolomite fragments show the greatest degree of secondary coatings. Iron oxide with significant Mn content is commonly seen cementing and banding euhedral grains of carbonate. When associated with silicates, iron oxide is seen filling small exterior pits and as occasional thin bands around grains. Iron oxide also occurs as goethite pseudomorphs after pyrite cubes and small pyrite framboids associated with clay. Unaltered pyrite is present as a trace in quartz.

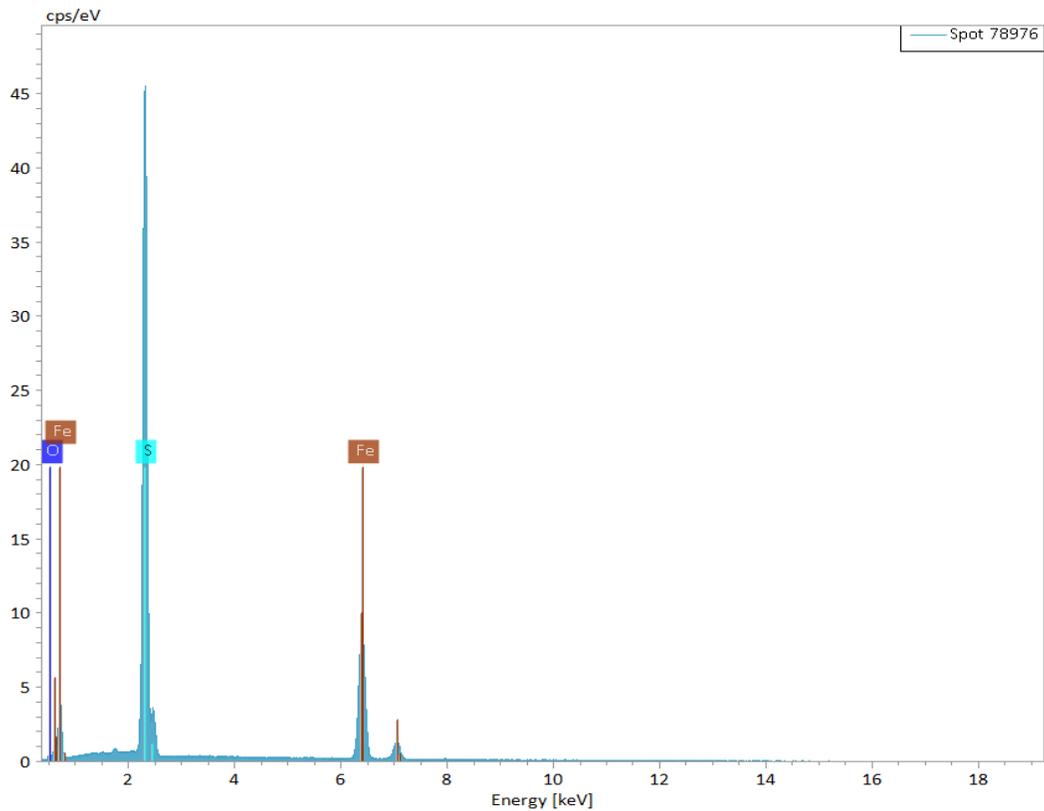


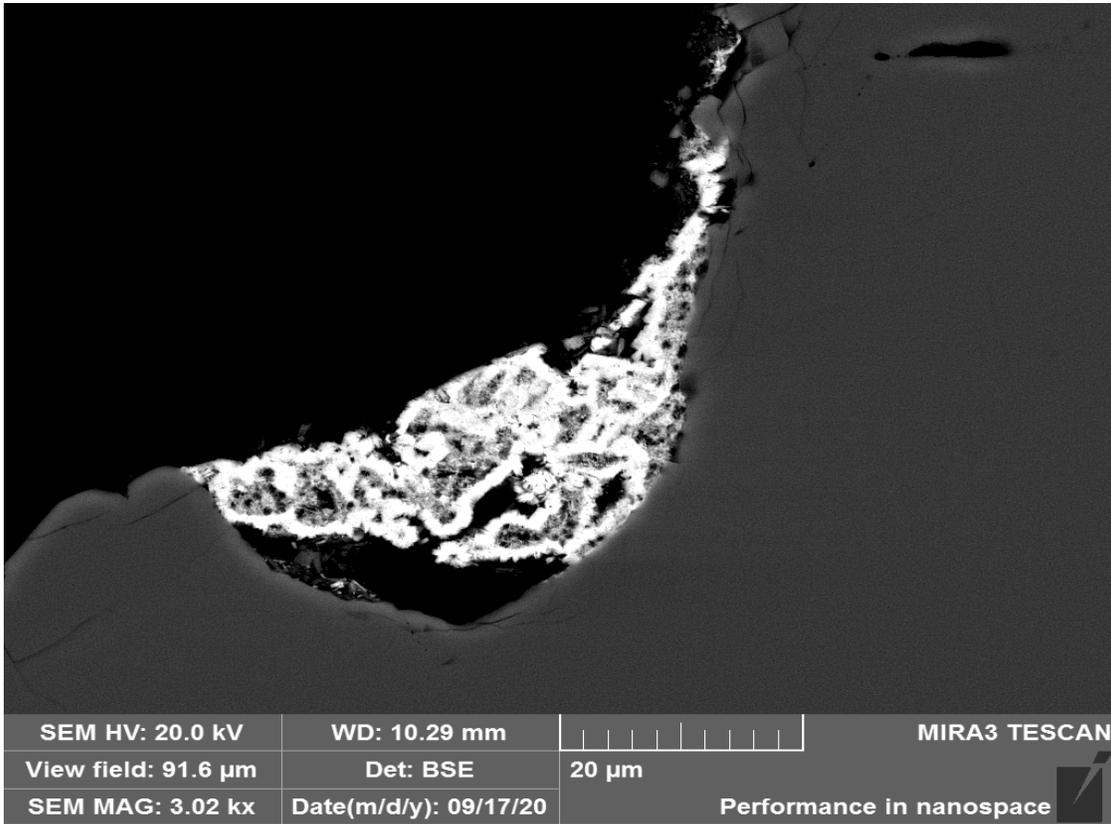
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
Backscatter image of dolomite grains cemented and rimmed with iron oxide – 748X





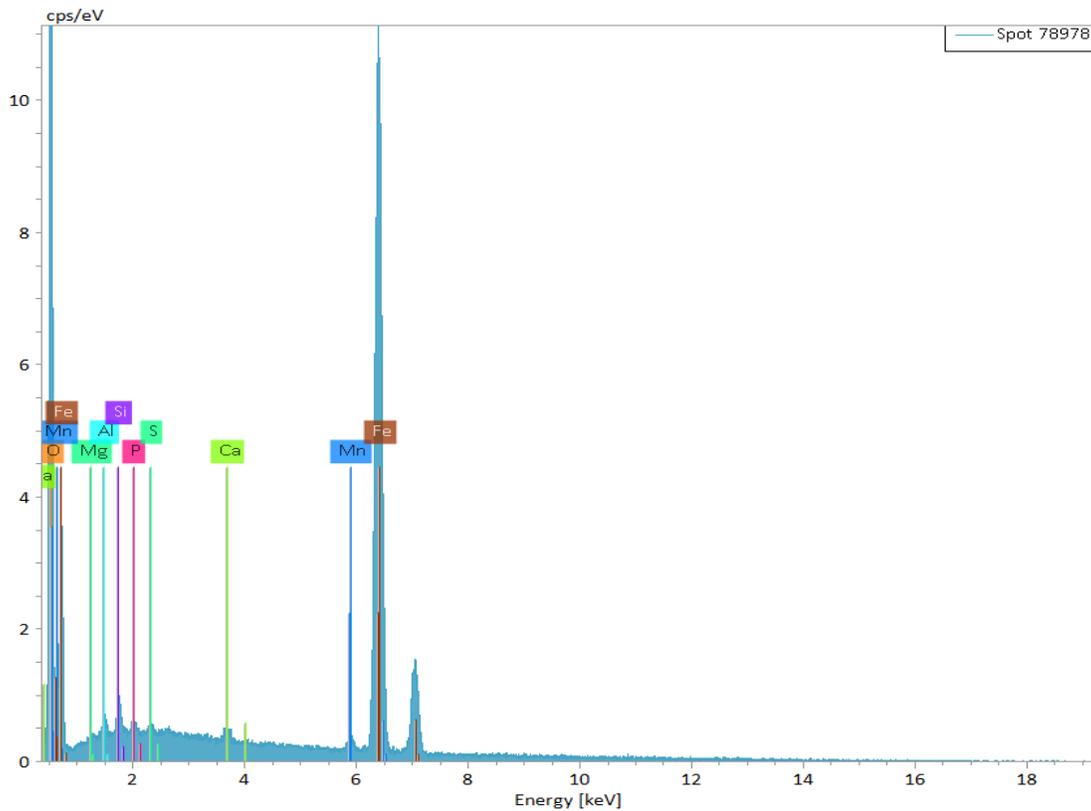
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
Backscatter image of quartz with inclusion of pyrite – 1,070X

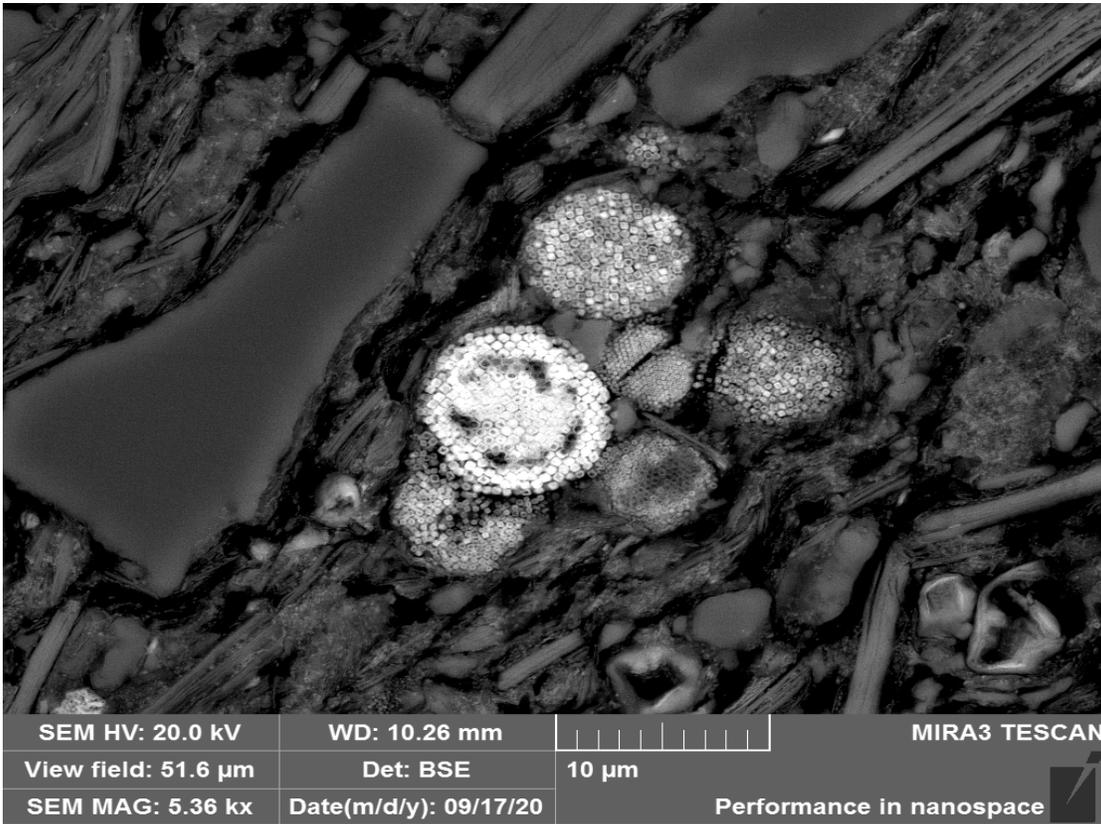




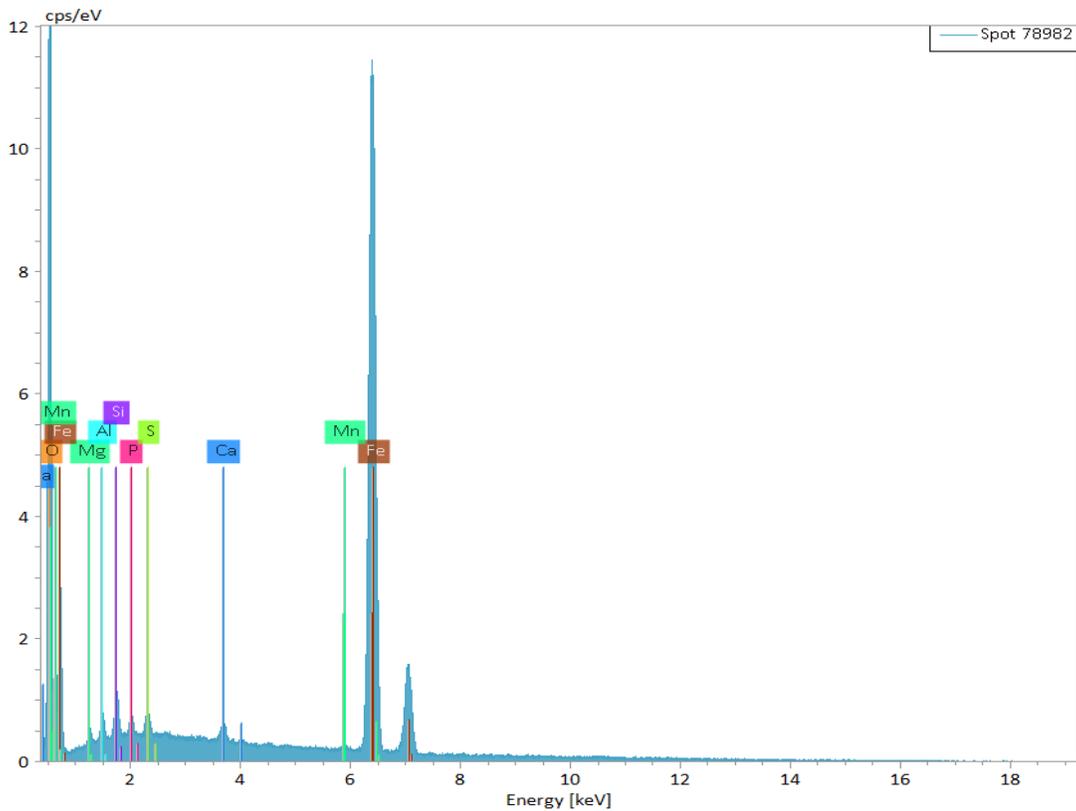
Client Sample No.: **AECOM-DOLO - +2 - 073020**

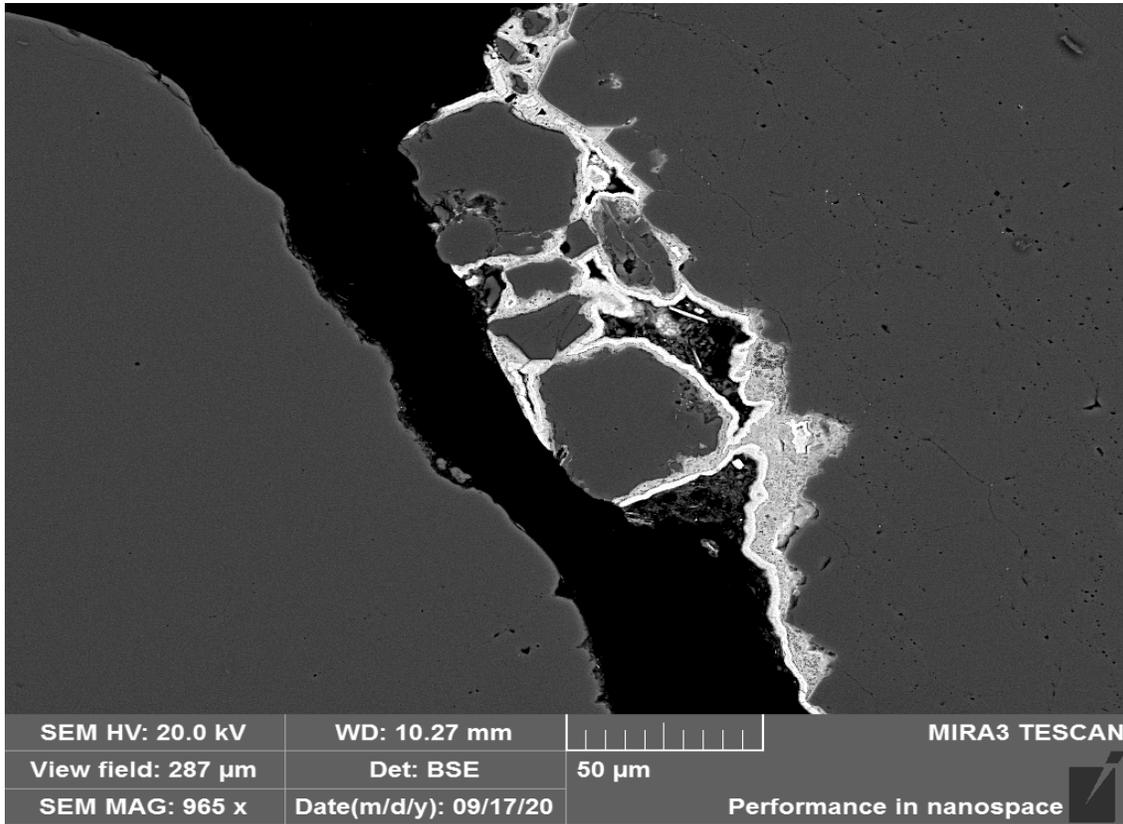
Backscatter image of a small pit on the exterior of a quartz grain filled with iron oxide – 3,020X





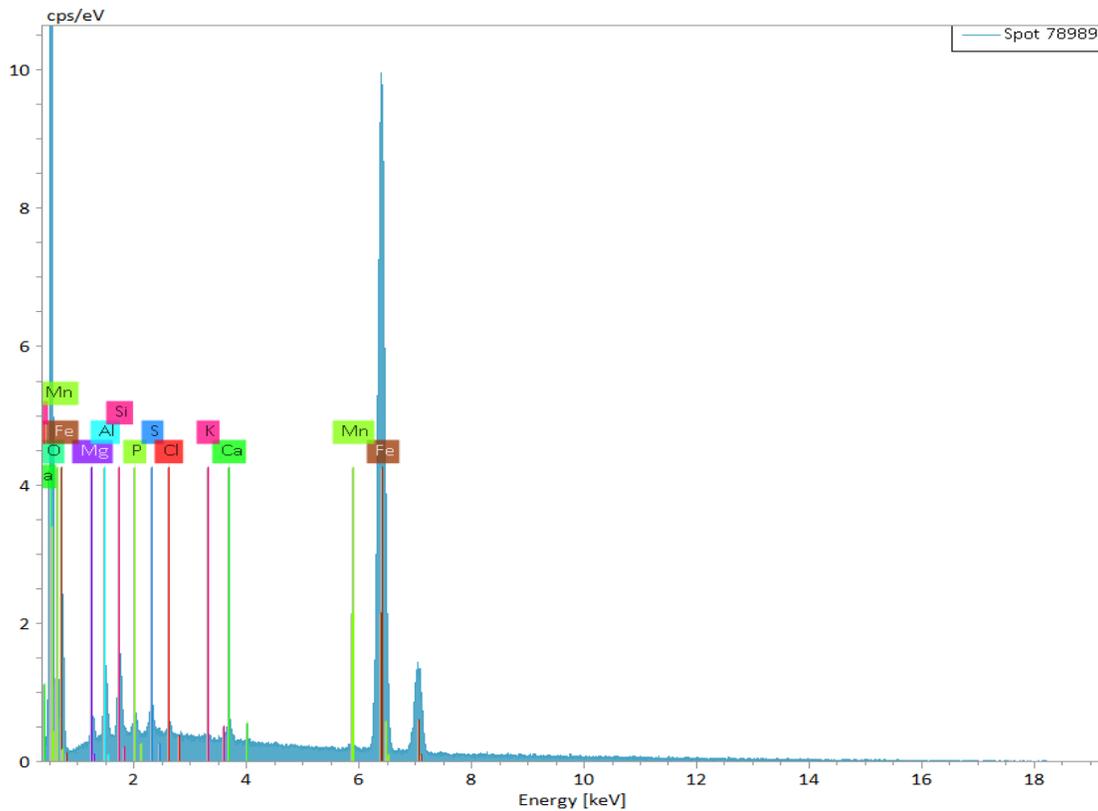
Client Sample No.: **AECOM-DOLO - +2 - 073020**  
 Backscatter image of goethite pseudomorphs after pyrite framboids – 5,360X

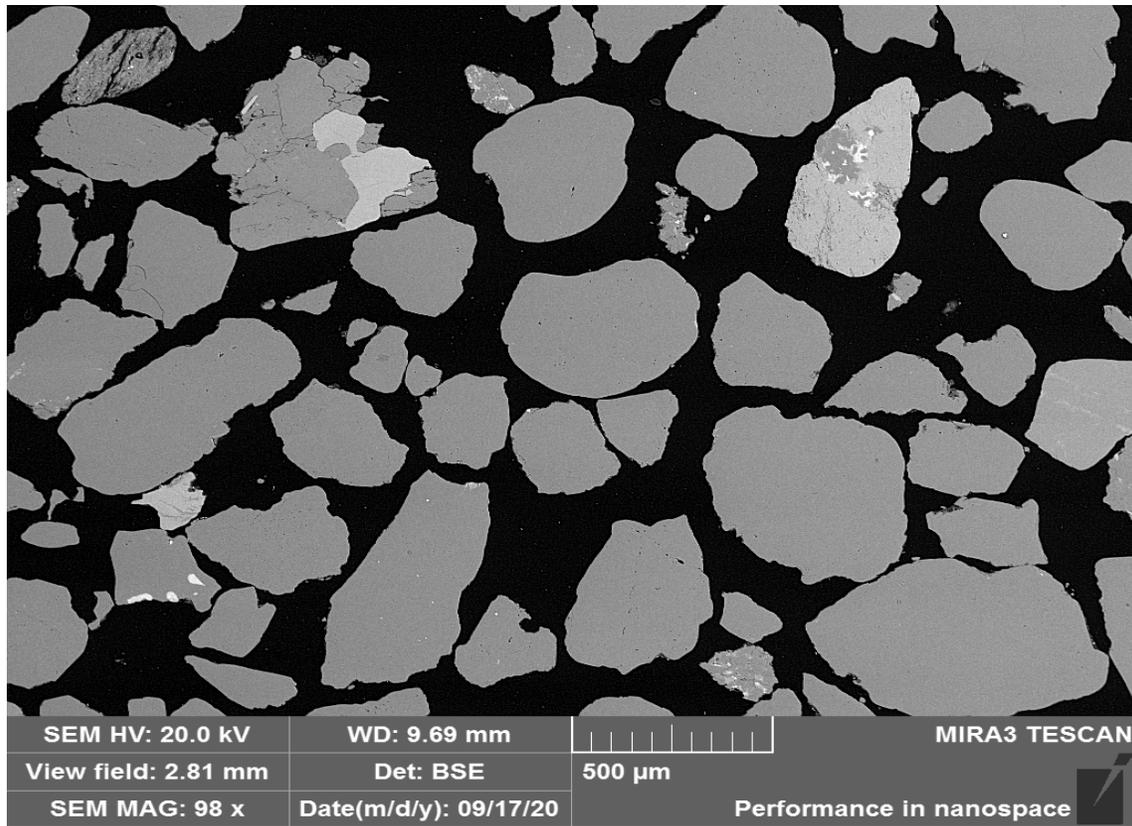




Client Sample No.: **AECOM-DOLO - +2 - 073020**

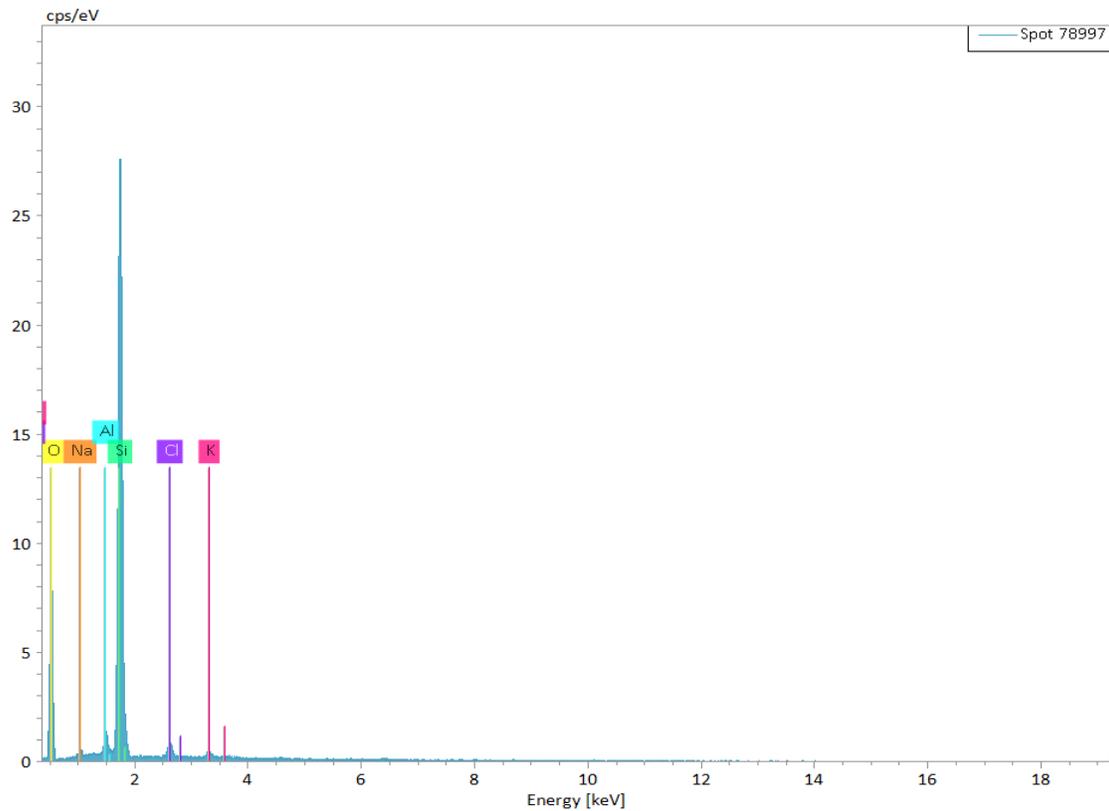
Backscatter image of bright iron oxide rimming and cementing quartz fragments – 965X





Client Sample No.: **AECOM-DOLO - +2 - 073020**

Low magnification backscatter image showing grain morphology and size variation – 98X



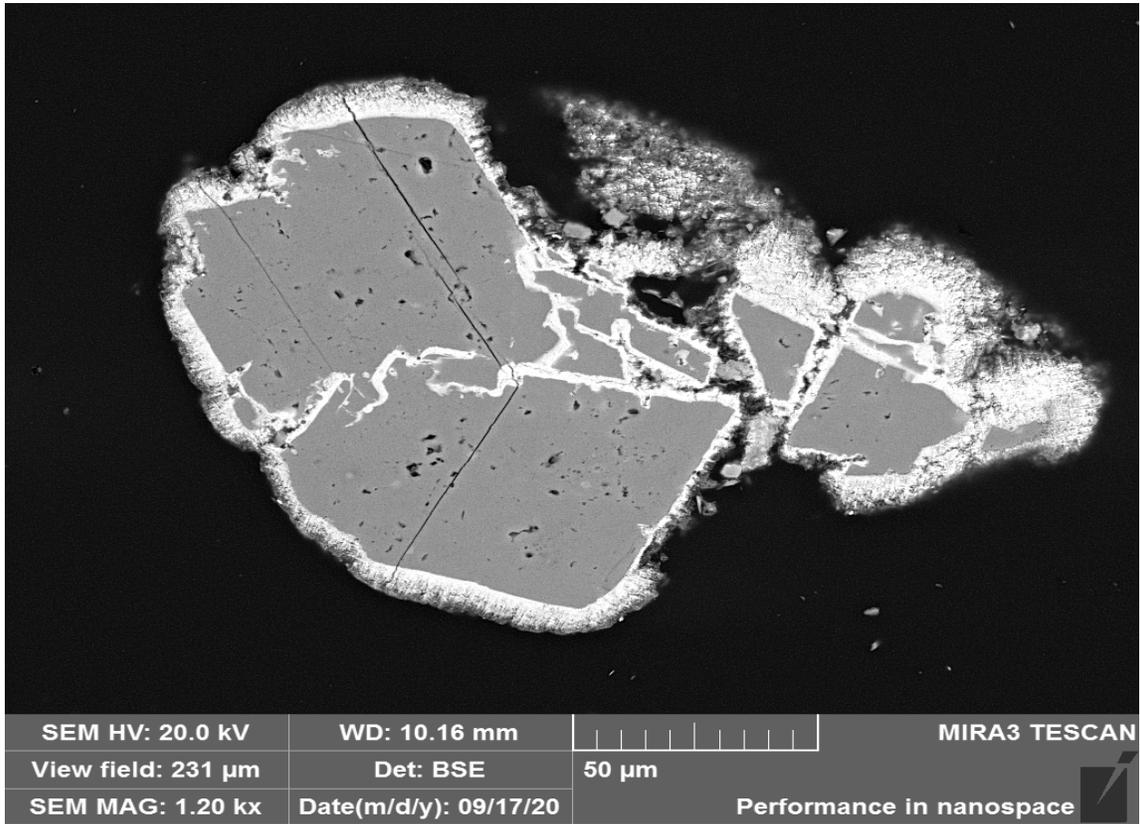
Client Sample No.: **AECOM-CONTROL -+2 – 073020**

*Major Mineralogy by XRD: Quartz 63%, Plagioclase 15% K-spar 11% Mica 4%  
Chlorite 4% Amphibole 1%*

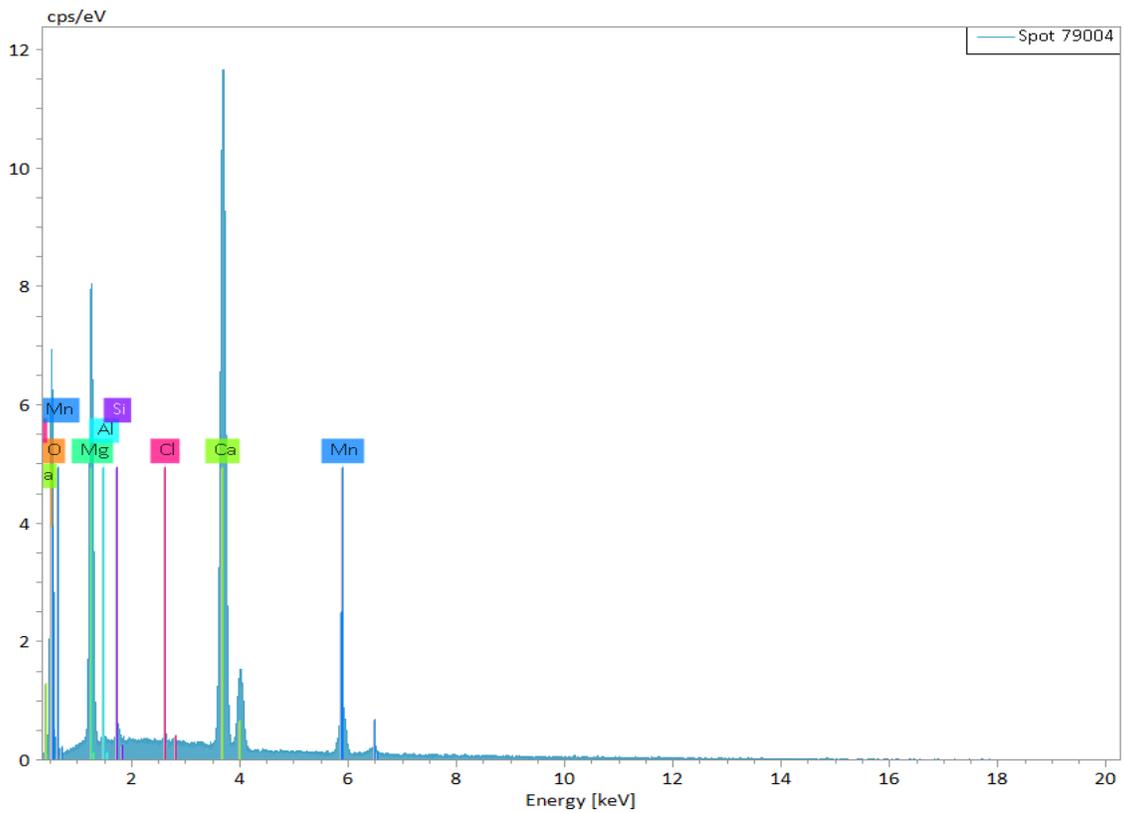
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite*

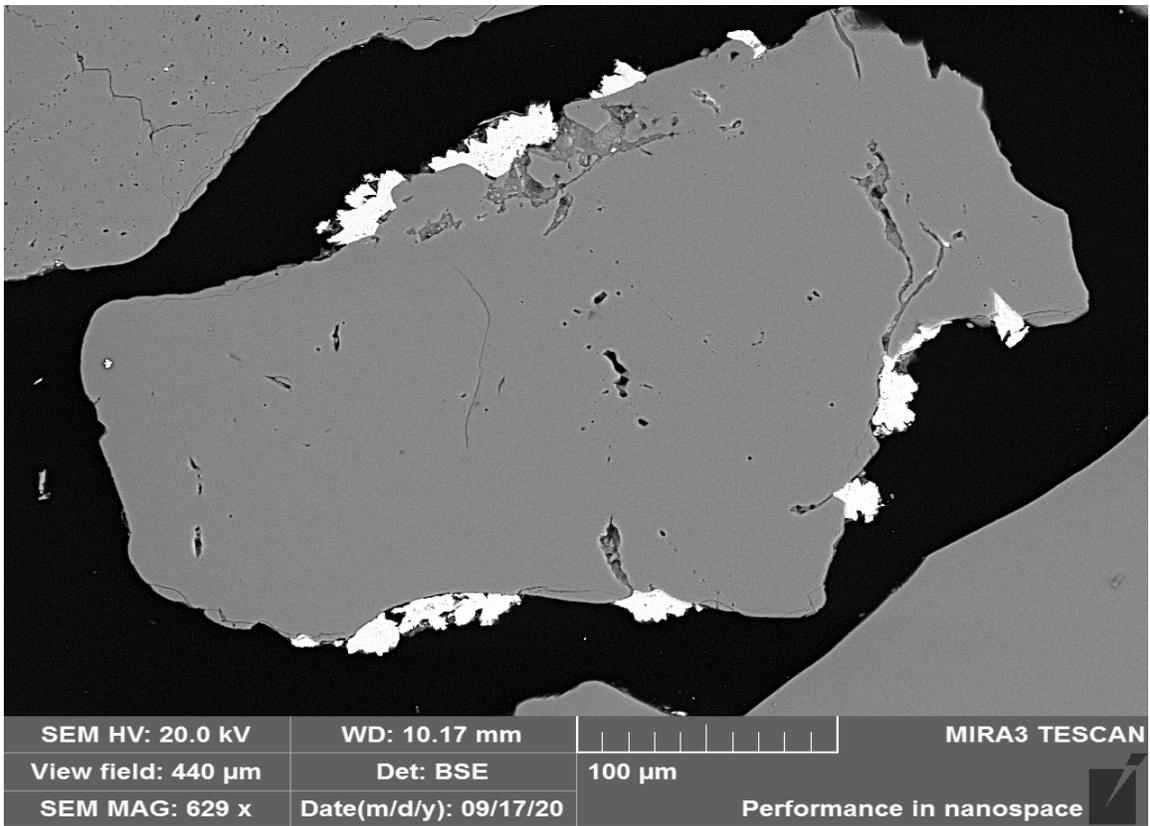
Microscopic Description by FE-SEM

This sample is a brown colored, fine to coarse sand composed primarily of subrounded to rounded quartz/feldspar and lesser amounts of mica and amphibole. A small population of the clasts show secondary coatings composed primarily of Fe/Mn oxide. Calcite/dolomite is commonly seen with Mn rich bands along crystal boundaries and fractures. Although uncertain, the bands may be an oxide or a secondary Mn carbonate. Some silicate grains have small exterior pits and grain boundaries coated with thin skins of secondary Fe oxide. Contained in rock fragments with significant clay content are goethite pseudomorphs after pyrite framboids. In rounded grains of quartz, goethite pseudomorphs after pyrite cubes occur as a trace.

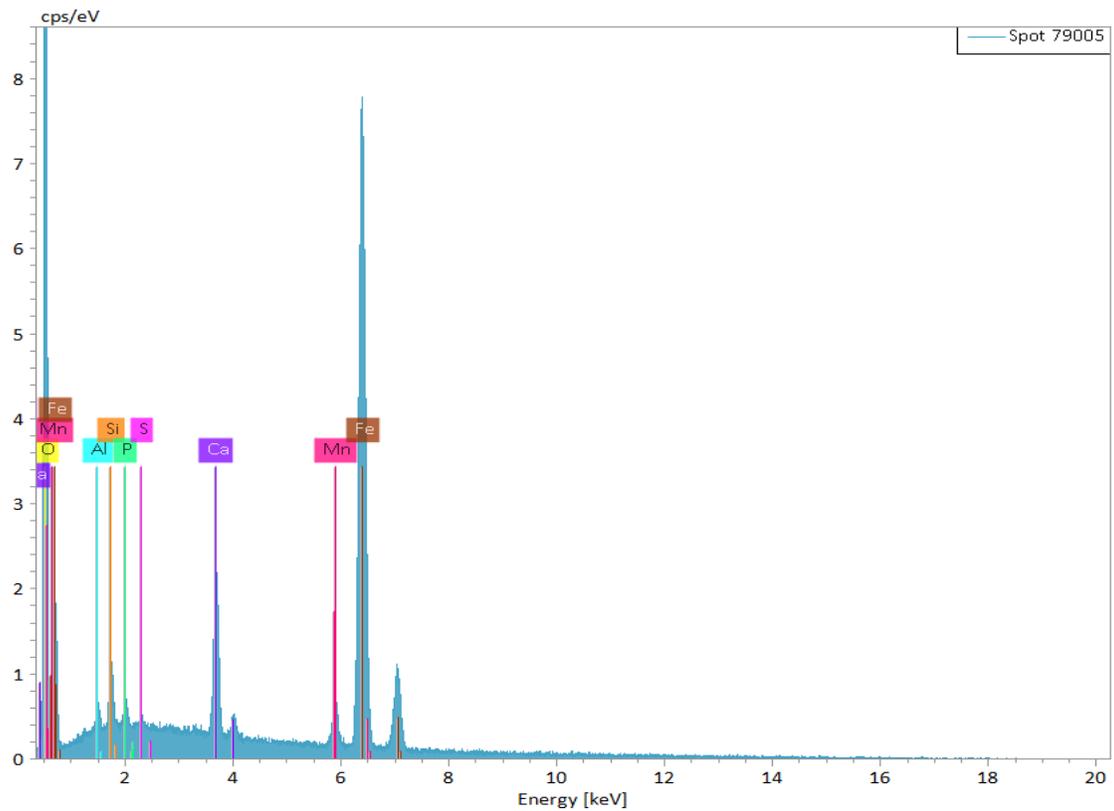


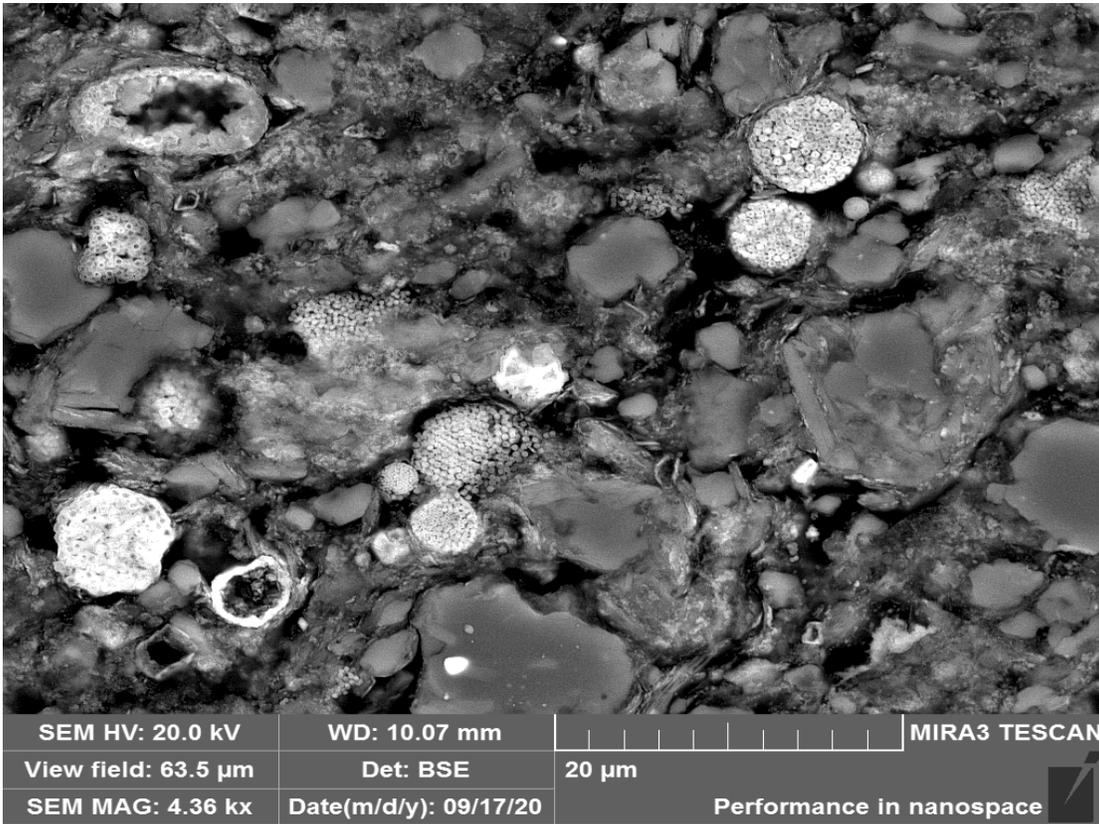
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
Backscatter image of dolomite with bright Mn rich rinds – 1,200X



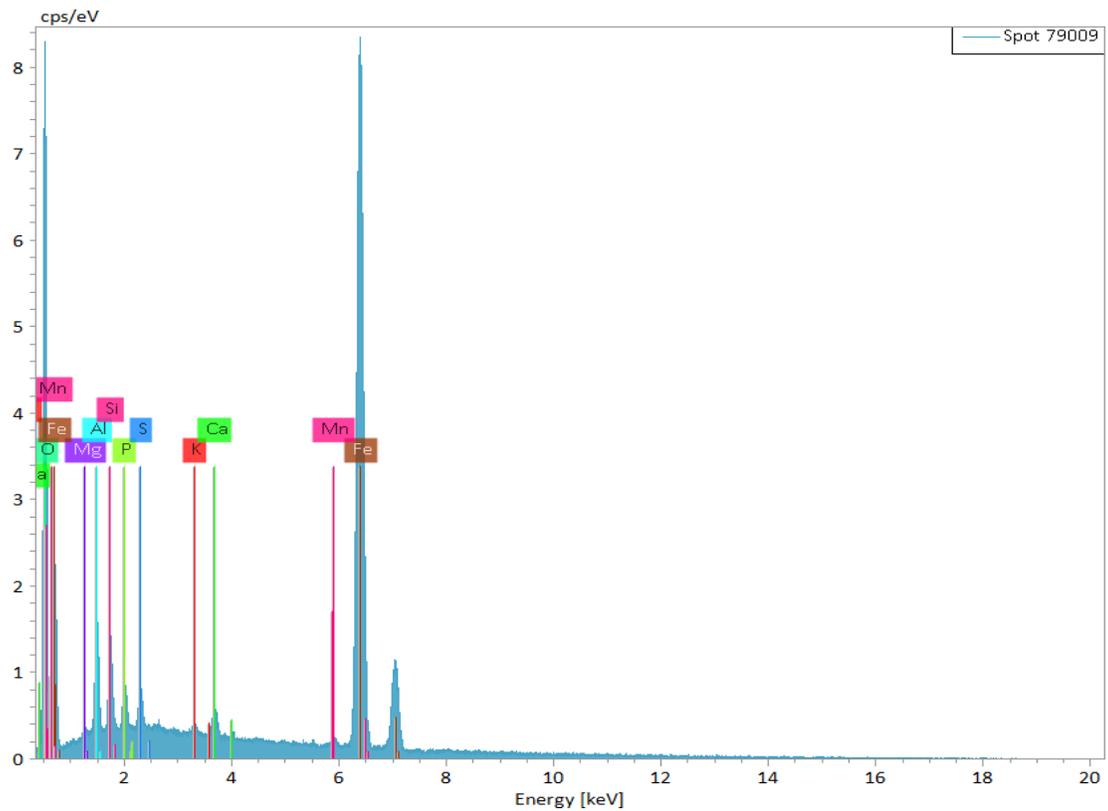


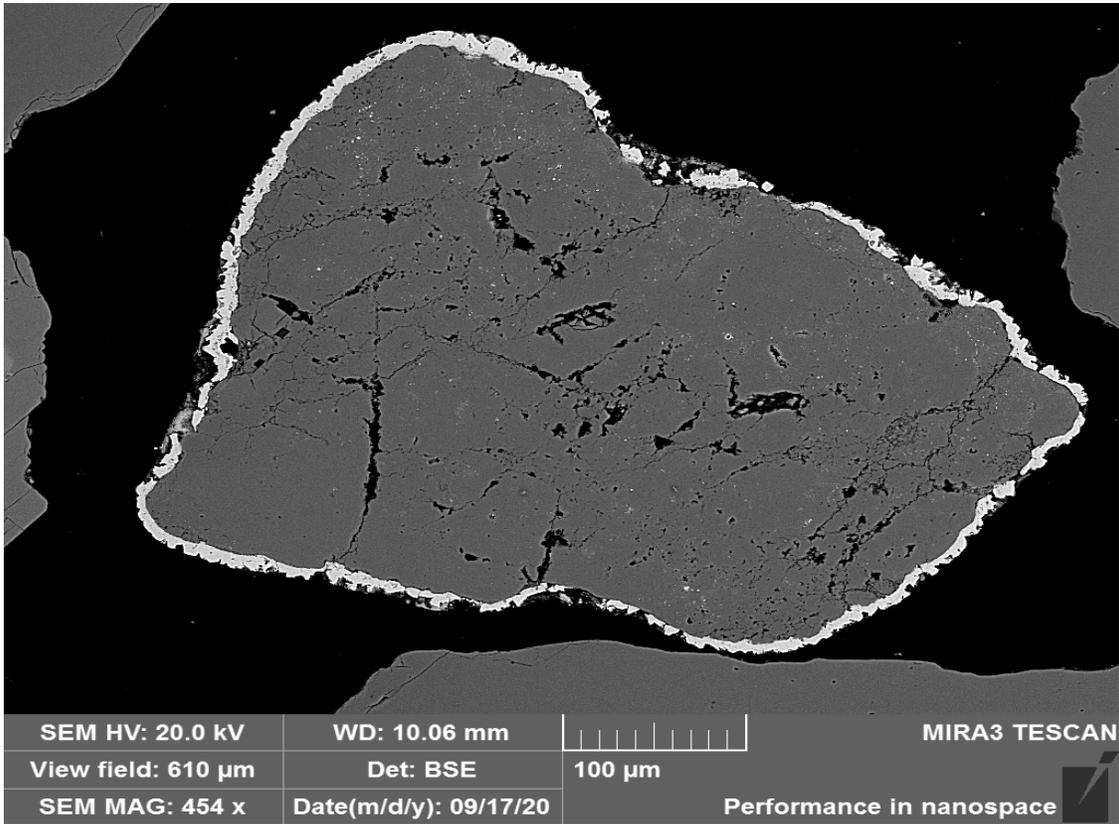
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
Backscatter image of bright iron oxide attached to quartz – 629X





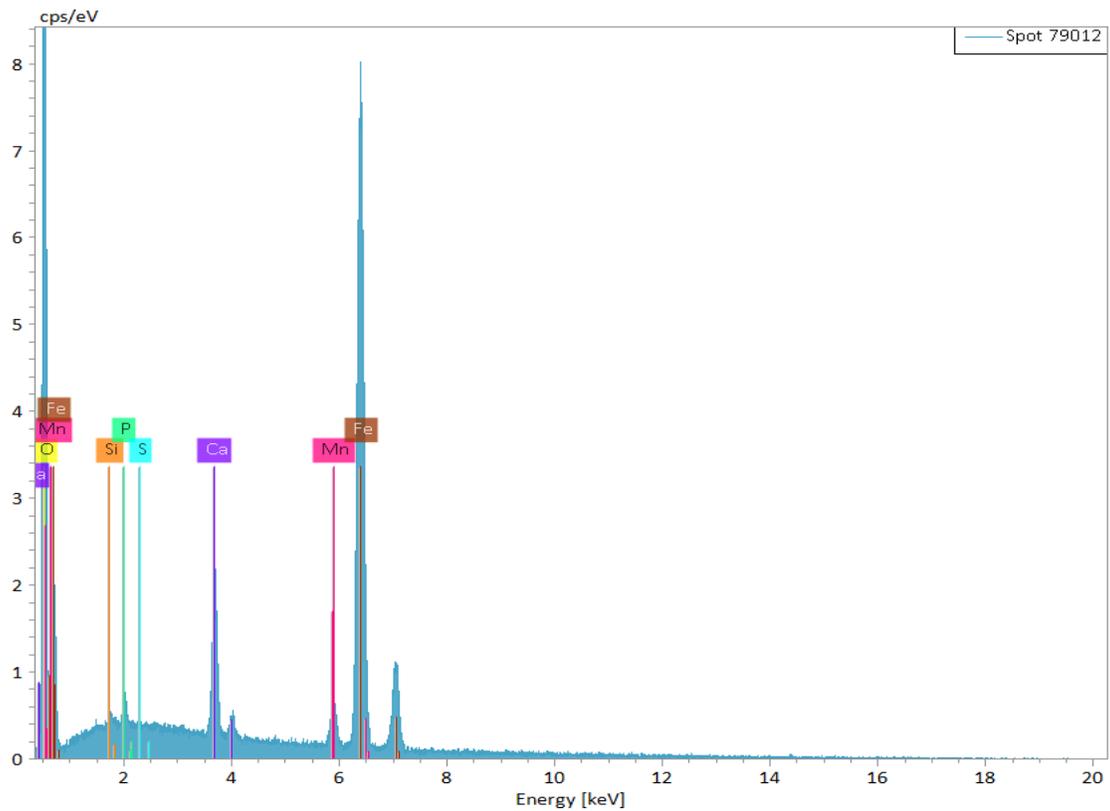
Client Sample No.: **AECOM-CONTROL -+2 – 073020**  
 Backscatter image of goethite replaced pyrite framboids – 4,360X

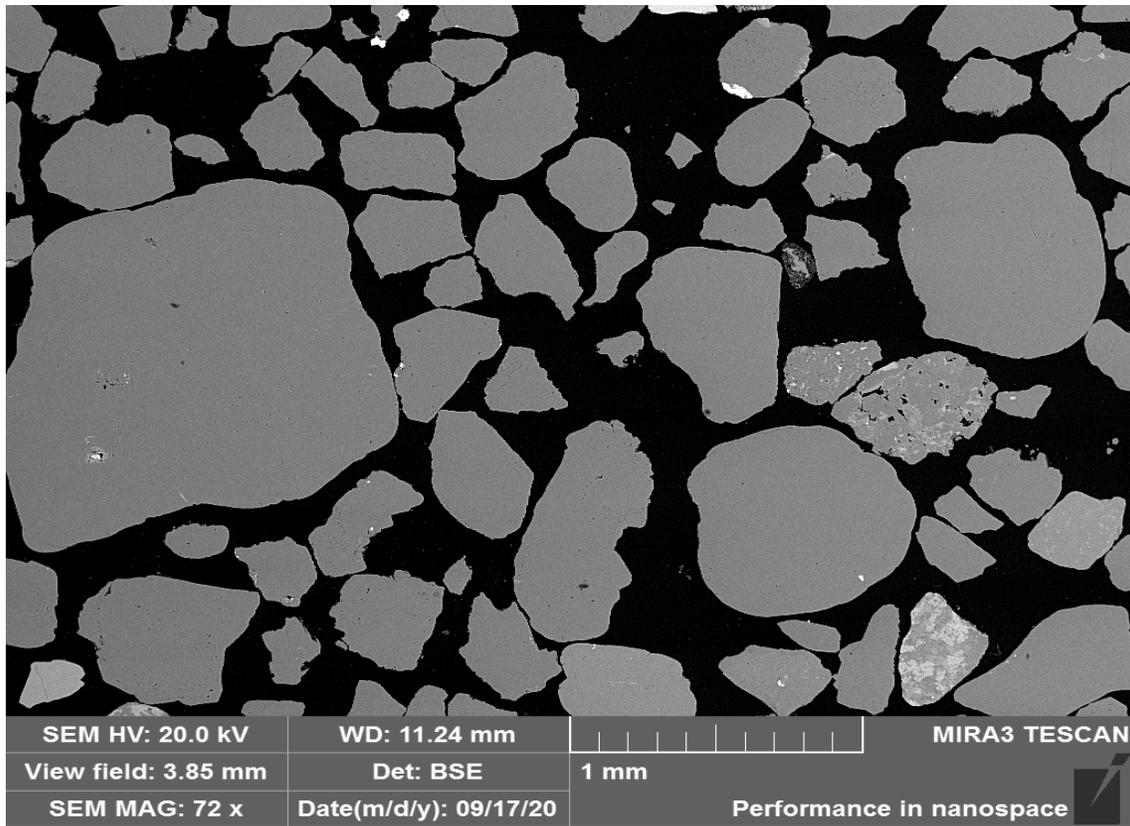




Client Sample No.: **AECOM-CONTROL -+2 – 073020**

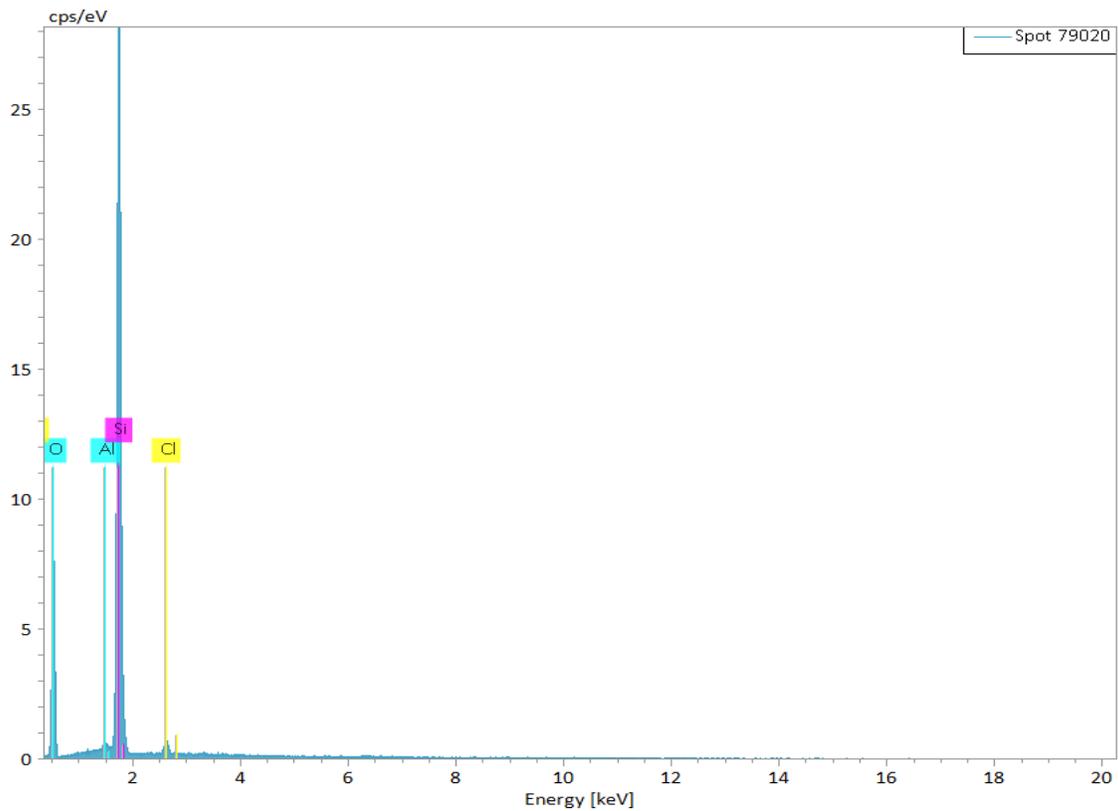
Backscatter image of a quartz grain with continuous rind of iron oxide – 454X





Client Sample No.: **AECOM-CONTROL -+2 – 073020**

Low magnification backscatter image showing grain morphology and size variation – 72X



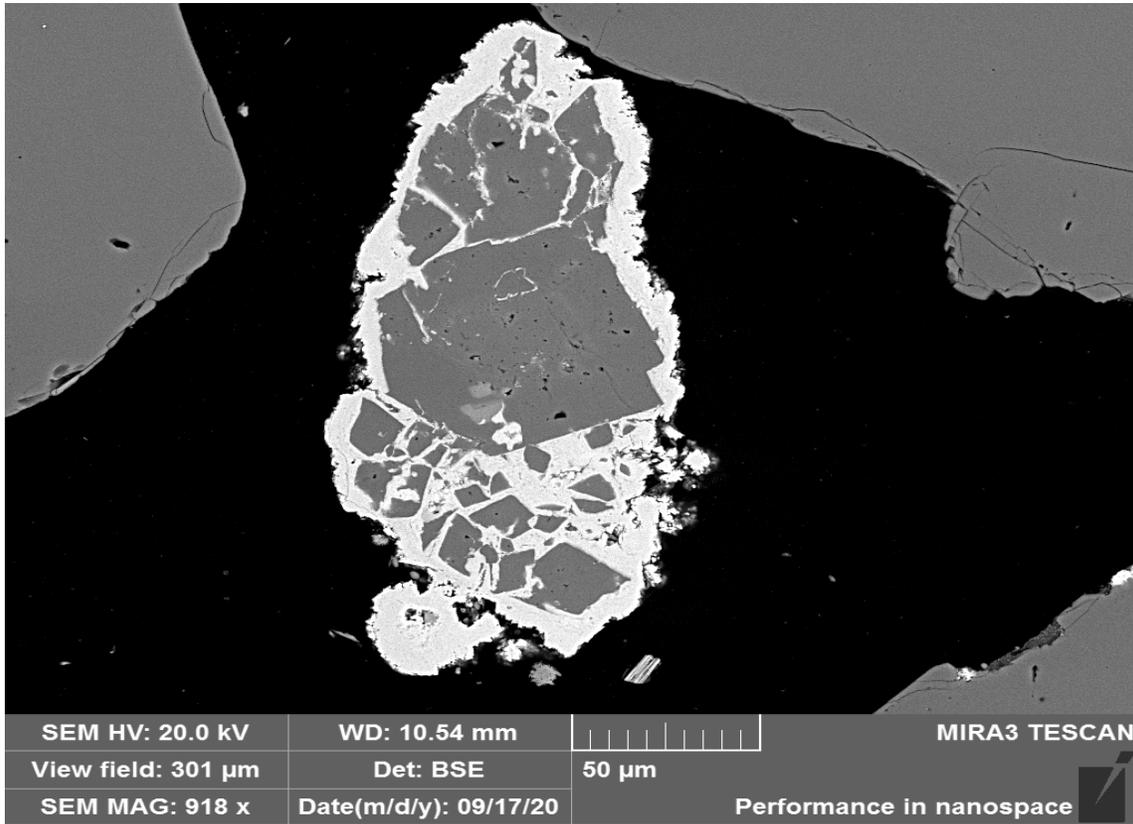
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**

*Major Mineralogy by XRD: Quartz 61%, Plagioclase 14% K-spar 13% Mica 4%  
Chlorite 3% Amphibole 3%*

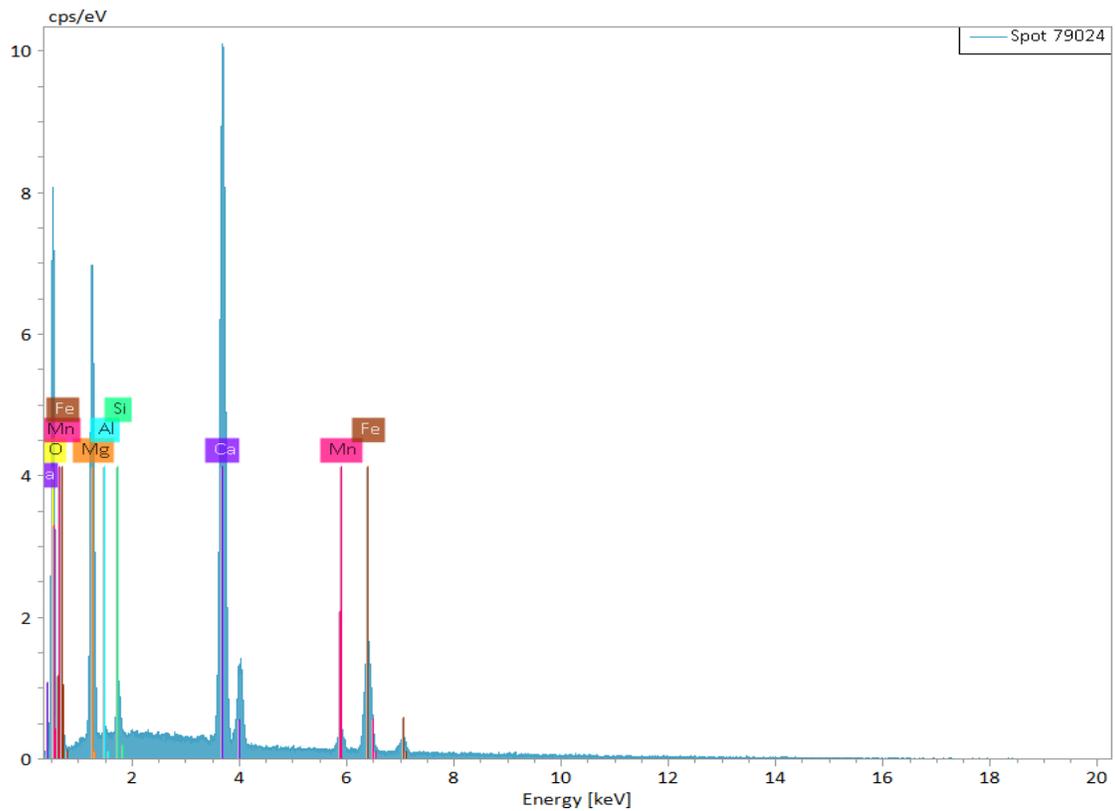
*Trace Mineralogy by FE-SEM: Goethite/Hematite, Zircon, Rare Earth Phosphates, Apatite,  
Calcite/Dolomite, Apatite, Zircon, Clay (undifferentiated)  
Rutile, Ilmenite, Magnetite, Gypsum*

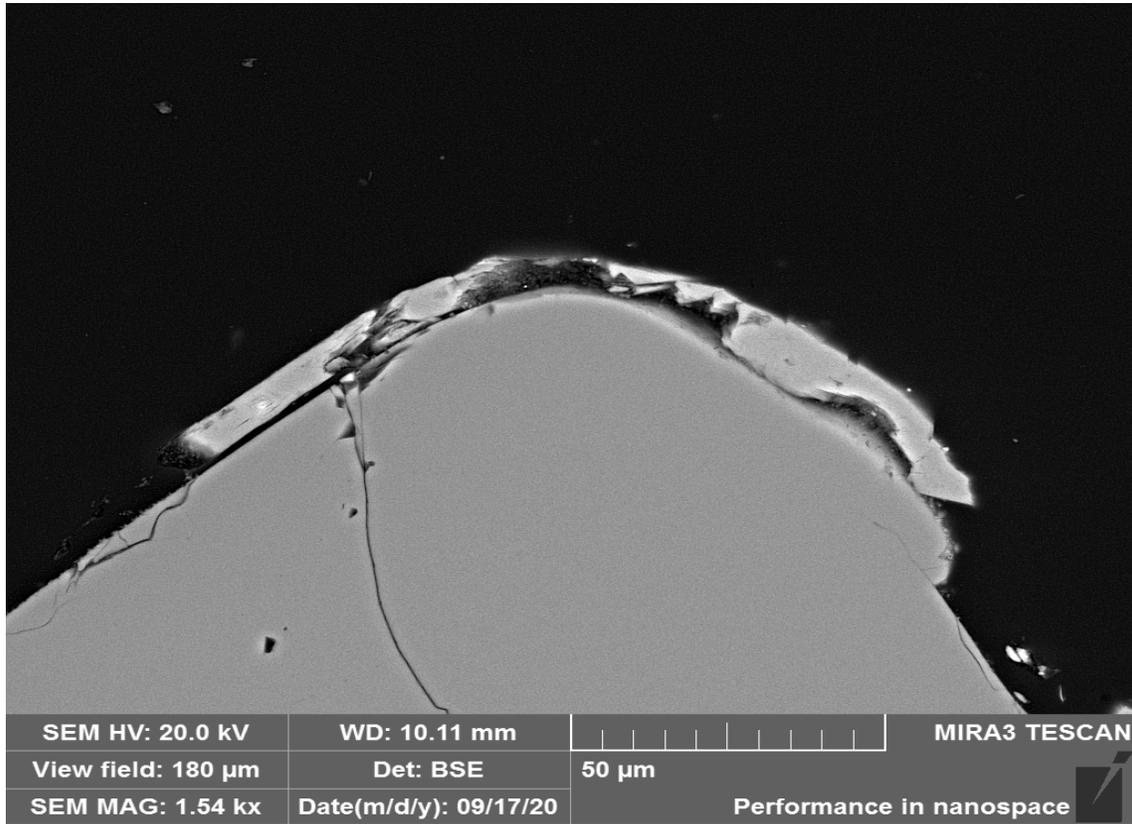
Microscopic Description by FE-SEM

This sample a fine to coarse grained, brown colored unconsolidated sand and is essentially the same as the previous samples. XRD and FE-SEM identify the main phases as subrounded to rounded quartz/feldspar with lesser amounts of mica and amphibole. In thin section a minor population of the clasts shows coatings of secondary phases. Most common is calcite/dolomite with fairly thick coats of iron oxide. Iron oxide also occurs as thin coats on silicates and as liberated masses. In rock fragments with significant clay content, goethite pseudomorphs after pyrite cubes and pyrite frambooids are common. A few rare quartz grains show discontinuous rinds of secondary gypsum.

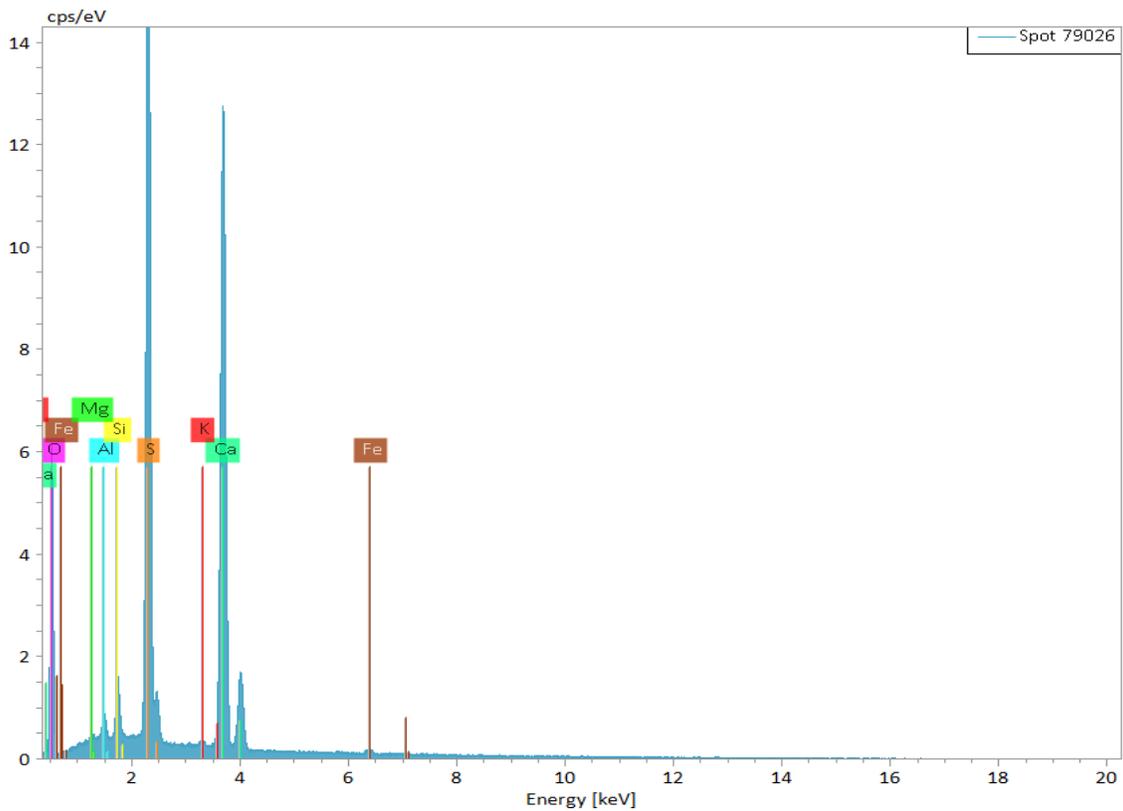


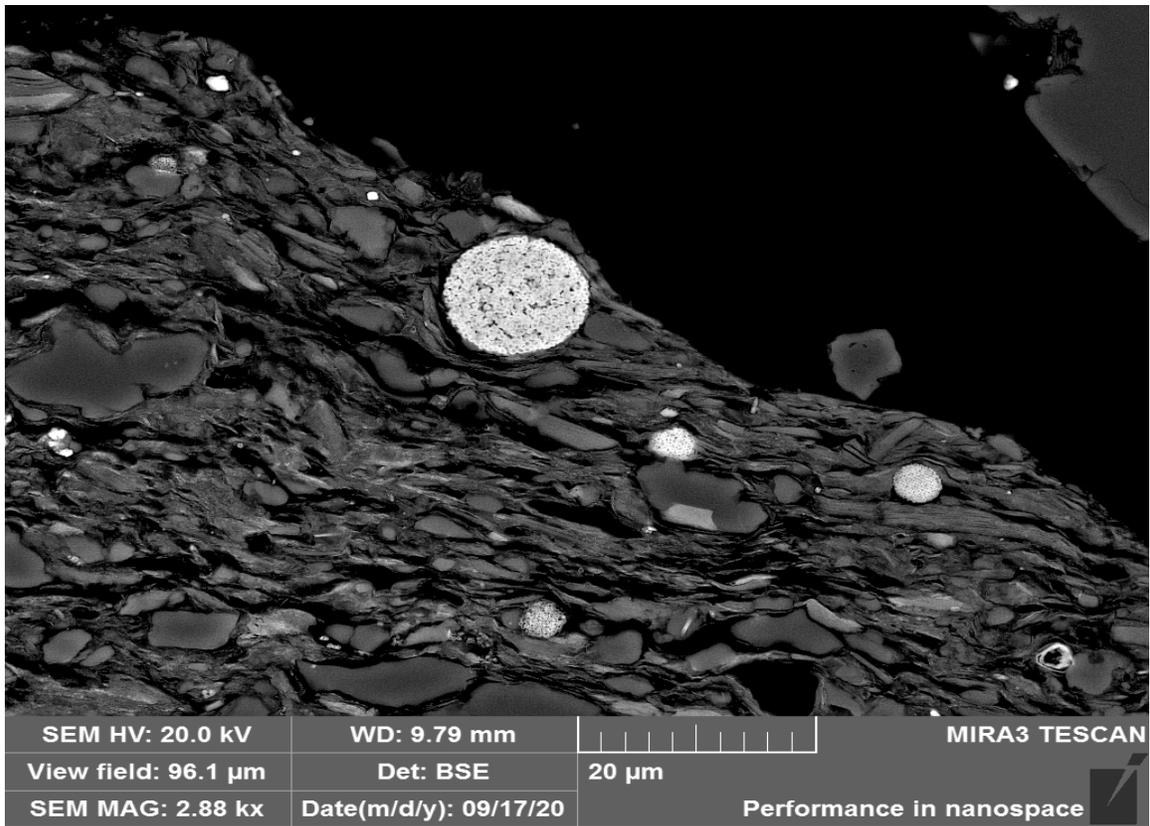
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of dolomite cemented by secondary iron oxide – 918X



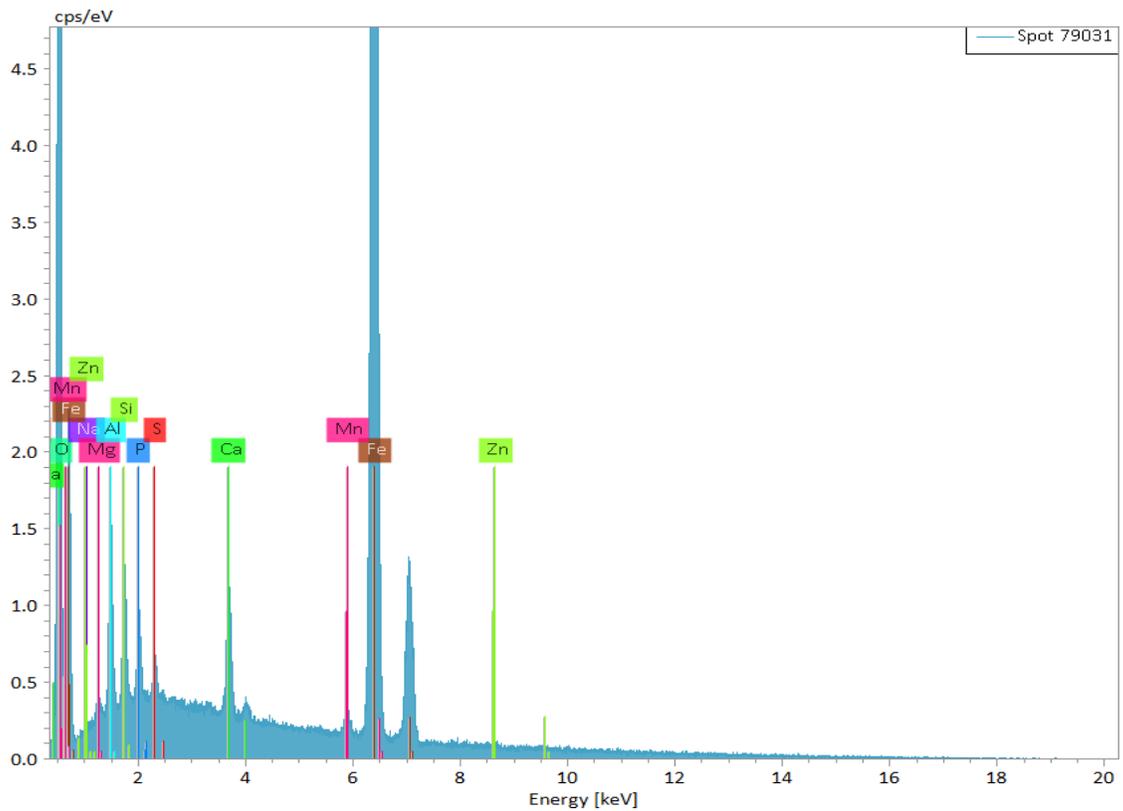


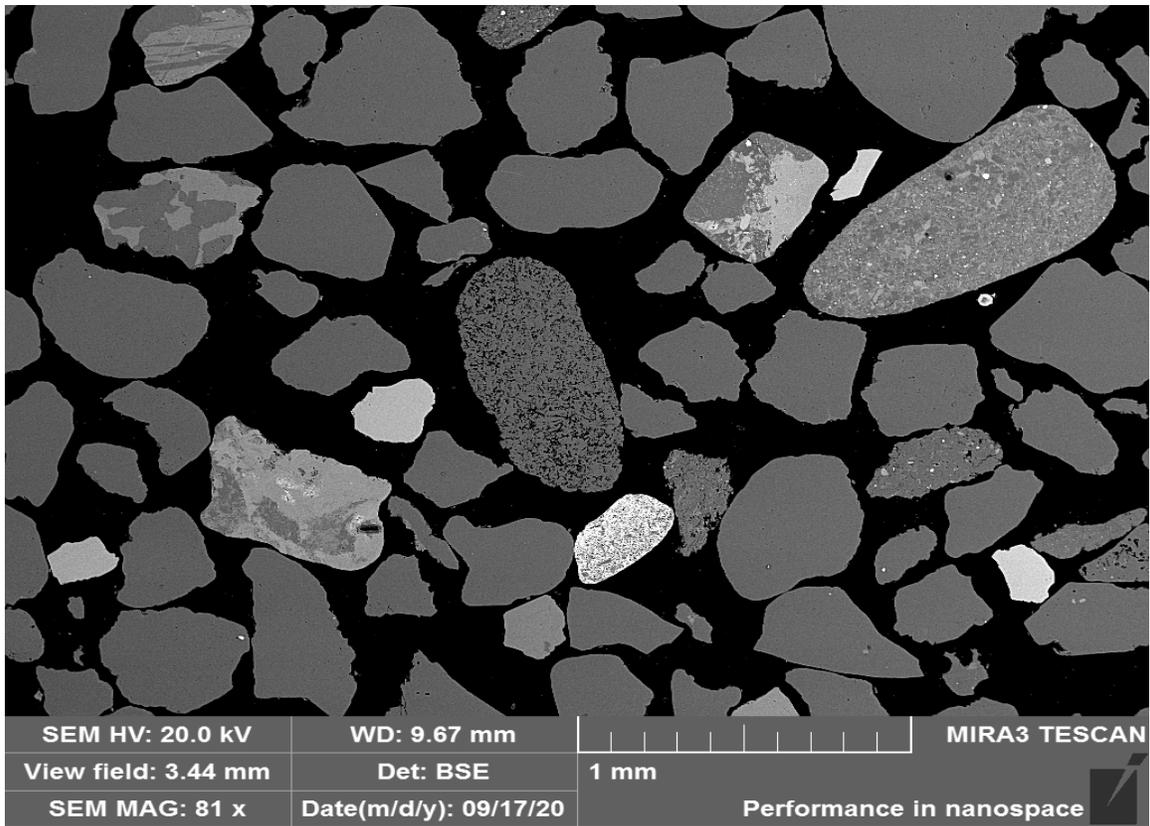
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of quartz with a rind of secondary gypsum – 1,540X





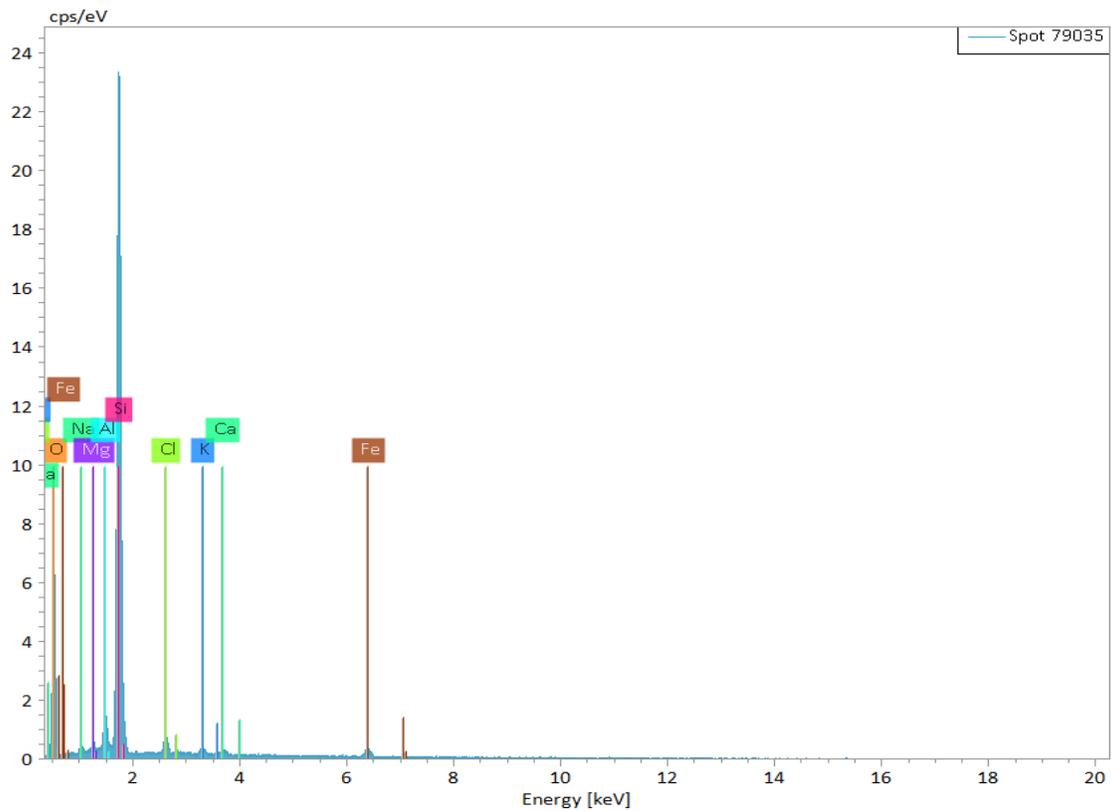
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of goethite replaced pyrite framboids – 2,880X

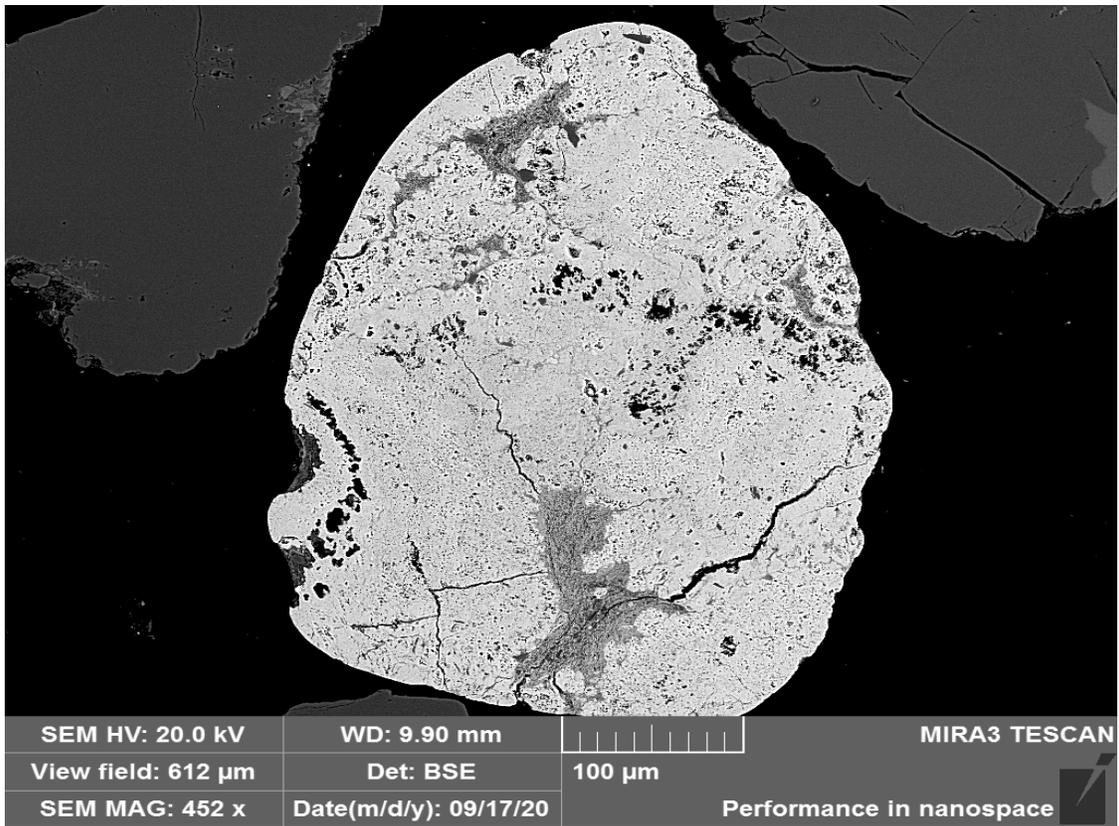




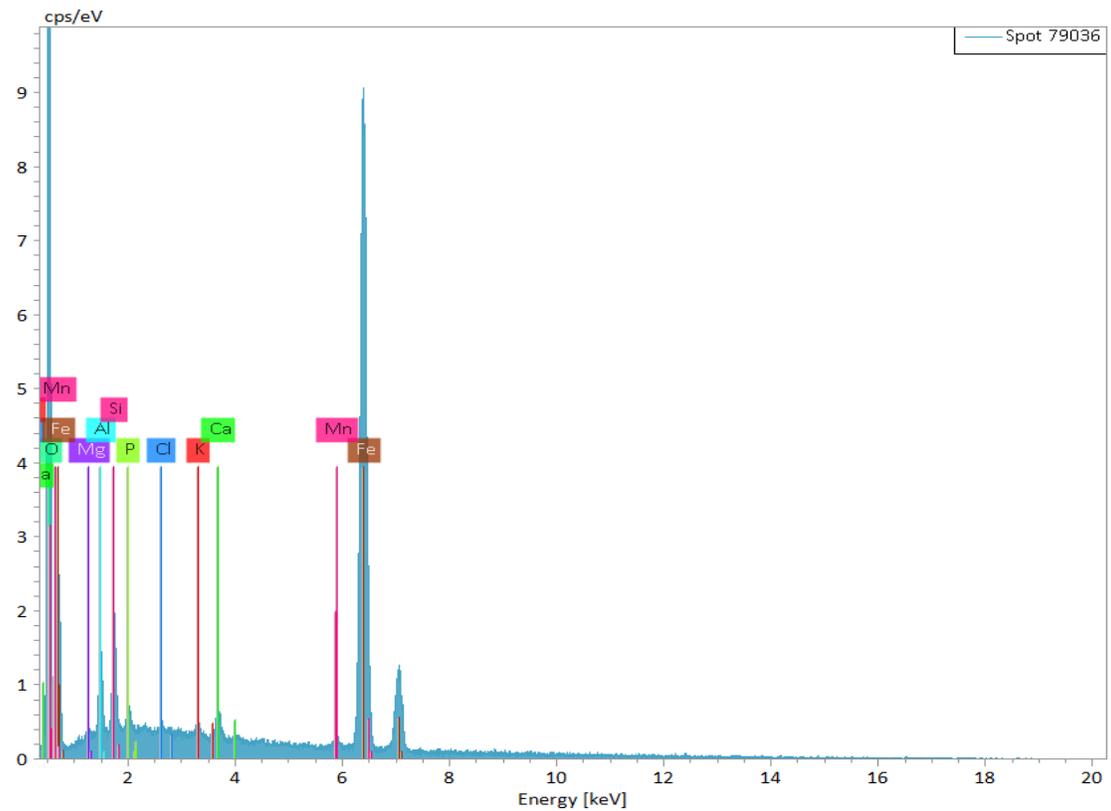
Client Sample No.: **AECOM-Hi CAL -+2 – 073020**

Low magnification backscatter image showing grain morphology and size variation – 81X





Client Sample No.: **AECOM-Hi CAL -+2 – 073020**  
Backscatter image of a large iron oxide mass – 452X





12421 W. 49th Avenue, Unit #6  
Wheat Ridge, CO 80033 (303) 463-8270

**Semi-Quantitative X-Ray Diffraction Analysis**

Page 1 of 2

Client:  
AECOM  
1600 Perimeter Park Drive, Suite 400  
Morrisville, NC 27560

Analysis Date: 3-20-20  
Reporting Date: 4-10-20  
Receipt Date: 3-17-20  
Client Job No.: 60621225  
Project Title: NRS Treatability Study  
DCMSL Project: AECOM5

Client Sample No.:    **GAF-SB-NRS069-40-50-03092020**    **GAF-SB-NRS070-50-60-03102020**    **GAF-SB-NRS068-40-58-03122020**

Bulk Sample

Quartz	48	43	26
Goethite	<2*	<2*	<2*
K-Feldspar	-	-	<2*
Total Clay	52	57	74
Illite	33	37	53
Kaolinite	19	20	21
Chlorite	<2*	<2*	<2*

\*May be present

The bulk sample(s) was/were spiked with corundum, prepared for x-ray diffraction analysis and scanned over a range of 3° to 40° 2θ Cu Kα radiation, 40kV, 25mA. Mineral phases were identified with the aid of computer-assisted programs accessing a powder diffraction database. Estimates of mineral concentrations are based on relative peak heights and reference intensity ratios (RIR) measured in-house.



12421 W. 49th Avenue, Unit #6  
Wheat Ridge, CO 80033 (303) 463-8270

**Semi-Quantitative X-Ray Diffraction Analysis**

Page 2 of 2

Client:	Analysis Date:	3-20-20
AECOM	Reporting Date:	4-10-20
1600 Perimeter Park Drive, Suite 400	Receipt Date:	3-17-20
Morrisville, NC 27560	Client Job No.:	60621225
	Project Title:	NRS Treatability Study
	DCMSL Project:	AECOM5

Client Sample No.:	<b>GAF-SB-NRS069-</b>	<b>GAF-SB-NRS070-</b>	<b>GAF-SB-NRS068-</b>
	<b>40-50-03092020</b>	<b>50-60-03102020</b>	<b>40-58-03122020</b>

Clay Fraction <2µm

Illite	63	65	71
Kaolinite	37	35	29
Chlorite	<2*	<2*	<2*

\*May be present

An oriented clay mount (<2µm) was prepared for x-ray diffraction analysis and scanned over a range of 3° to 40° 2θ Cu Ka radiation, 40kV, 25mA. The mount was analyzed air-dried (RH ~25%) and glycolated. Clay concentrations are based on peak areas and intensity factors measured in-house on known standards or computer calculated.

Jason Barnes, Analyst



12421 W. 49th Avenue, Unit #6  
Wheat Ridge, CO 80033

(303) 463-8270/(800) 852-7340  
(303) 463-8267 - fax

Petro  
inclu

Date/Time Received \_\_\_\_\_ DCMSL Group No. 0817 DCMSL Log No. AECOM5

Field Data Sheet/Chain of Custody

Samples Submitted By:

Company: AECOM  
Address: 1600 PERIMETER PARK DRIVE  
SUITE 400  
MORRISVILLE, NC 27560

Job/P.O. # 60621225

Project Title NRS TREATABILITY STUDY

Contact: MARY STAUFFER/MICHELLE FRIEDMAN  
Phone: ~~GAF-SB-NRS~~ MARY - 303-941-3756  
Cell: MICHELLE - 919-461-1422  
Email: ~~GAF-SB-NRS~~ MARY, ~~STAUFFER~~ STAUFFER@AECOM.COM

Archive: Asbestos samples are archived for 6 months  
unless other arrangements are made. All other samples  
are archived for 3 months.

Turnaround Time Requested: MICHELLE.FRIEDMAN@AECOM.COM

- Standard (3 to 5 Business Days)  2 Hour Rush (Asbestos Only)
- 24 Hour Rush  Other \_\_\_\_\_

Procedure Requested:

ASBESTOS

- Bulk  Standard EPA
- Progressive
- Point Count
- Other
- Air  NIOSH 7400
- OSHA ID-160
- Other

DUST & SILICA

- Silica - Air NIOSH 7500
- Silica - Bulk
- Silica - Bulk Respirable
- Dust - NIOSH 0500/0600

OTHER SERVICES

- Optical Microscopy
- X-ray Diffraction - Scan/Search
- X-ray Diffraction - Clay/Bulk
- SEM

Other Analysis: \_\_\_\_\_

Client Sample No.:	Sample Date	Air Volume	Other Information
1 <u>GAF-SB-NRS069-40-50-03092020</u>	<u>3/9/20</u>	_____	_____
2 <u>GAF-SB-NRS070-50-60-03102020</u>	<u>3/10/20</u>	_____	_____
3 <u>GAF-SB-NRS068-40-58-03122020</u>	<u>3/12/20</u>	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____

Relinquished By: \_\_\_\_\_

Date/Time

3/13/20 1000

Received By: \_\_\_\_\_

Date/Time

3/17/20 11:30

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-110724-1

Laboratory Sample Delivery Group: GAF-NRS-Treatability  
Client Project/Site: TVA Gallatin EIP

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
9/18/2020 10:07:04 AM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



# Table of Contents

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

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**Job ID: 180-110724-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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**Job Narrative**  
**180-110724-1**

## Receipt

The sample was received on 9/10/2020 9:30 AM; the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 4.5° C.

## Metals

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-14-21
West Virginia DEP	State	142	02-01-21

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-110724-1	GAF-GW-COL1-GW-BL	Water	09/09/20 14:00	09/10/20 09:30	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

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# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-COL1-GW-BL**

**Lab Sample ID: 180-110724-1**

**Date Collected: 09/09/20 14:00**

**Matrix: Water**

**Date Received: 09/10/20 09:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	329718	09/15/20 09:28	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			330131	09/17/20 02:09	DSH	TAL PIT

Instrument ID: DORY

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

KHM = Kyle Mucroski

Batch Type: Analysis

DSH = David Heakin

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

**Client Sample ID: GAF-GW-COL1-GW-BL**

**Lab Sample ID: 180-110724-1**

Date Collected: 09/09/20 14:00

Matrix: Water

Date Received: 09/10/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00419		0.00100	0.000217	mg/L		09/15/20 09:28	09/17/20 02:09	1
Beryllium	0.0125		0.00100	0.000182	mg/L		09/15/20 09:28	09/17/20 02:09	1
Nickel	0.148		0.00100	0.000336	mg/L		09/15/20 09:28	09/17/20 02:09	1
Lithium	0.131		0.00500	0.00339	mg/L		09/15/20 09:28	09/17/20 02:09	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-329718/1-A**  
**Matrix: Water**  
**Analysis Batch: 330131**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 329718**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cadmium	ND		0.00100	0.000217	mg/L		09/15/20 09:28	09/17/20 02:02	1
Beryllium	ND		0.00100	0.000182	mg/L		09/15/20 09:28	09/17/20 02:02	1
Nickel	ND		0.00100	0.000336	mg/L		09/15/20 09:28	09/17/20 02:02	1
Lithium	ND		0.00500	0.00339	mg/L		09/15/20 09:28	09/17/20 02:02	1

**Lab Sample ID: LCS 180-329718/2-A**  
**Matrix: Water**  
**Analysis Batch: 330131**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 329718**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.500	0.5243		mg/L		105	80 - 120
Nickel	0.500	0.5072		mg/L		101	80 - 120
Lithium	0.500	0.5017		mg/L		100	80 - 120

**Lab Sample ID: 180-110724-1 MS**  
**Matrix: Water**  
**Analysis Batch: 330131**

**Client Sample ID: GAF-GW-COL1-GW-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 329718**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.0125		0.500	0.5488		mg/L		107	75 - 125
Nickel	0.148		0.500	0.6723		mg/L		105	75 - 125
Lithium	0.131		0.500	0.6479		mg/L		103	75 - 125

**Lab Sample ID: 180-110724-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 330131**

**Client Sample ID: GAF-GW-COL1-GW-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 329718**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Beryllium	0.0125		0.500	0.5381		mg/L		105	75 - 125	2	20
Nickel	0.148		0.500	0.6578		mg/L		102	75 - 125	2	20
Lithium	0.131		0.500	0.6406		mg/L		102	75 - 125	1	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-110724-1  
SDG: GAF-NRS-Treatability

## Metals

### Prep Batch: 329718

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-110724-1	GAF-GW-COL1-GW-BL	Total Recoverable	Water	3005A	
MB 180-329718/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-329718/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-110724-1 MS	GAF-GW-COL1-GW-BL	Total Recoverable	Water	3005A	
180-110724-1 MSD	GAF-GW-COL1-GW-BL	Total Recoverable	Water	3005A	

### Analysis Batch: 330131

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-110724-1	GAF-GW-COL1-GW-BL	Total Recoverable	Water	EPA 6020A	329718
MB 180-329718/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	329718
LCS 180-329718/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	329718
180-110724-1 MS	GAF-GW-COL1-GW-BL	Total Recoverable	Water	EPA 6020A	329718
180-110724-1 MSD	GAF-GW-COL1-GW-BL	Total Recoverable	Water	EPA 6020A	329718

Address: 301 Alpha Dr.  
Pittsburgh, PA 15238

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

Project Manager: Chris MacPhail Date: 9/19/20 COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs

Tell/Email: cmacphail@eurofins.com Site Contact: Francisco Bernal Carrier: \_\_\_\_\_

Lab Contact: Rachel Watkins

Analysis Turnaround Time:  CALENDAR DAYS  WORKING DAYS

TAT if different from Below: \_\_\_\_\_

2 weeks  1 week  2 days  1 day

Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	Sample Specific Notes:
GAF-GW-COL1-GW-BL	9/19/20 1400	G	GW	1	N	N	Be, Cd, Li, Ni, only
 180-110724 Chain of Custody							
Preservation Used: 1 = Ice, 2 = HCl; 3 = H2SO4; 4 = HNO3; 5 = NaOH; 6 = Other _____							
Possible Hazard Identification: _____ Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.							
Special Instructions/QC Requirements & Comments: _____							
Custody Seal No.: _____							
Relinquished by: <u>Rachel Watkins</u> Company: <u>AE COM</u> Date/Time: <u>9/19/20 1600</u>							
Relinquished by: _____ Company: _____ Date/Time: _____							
Relinquished by: _____ Company: _____ Date/Time: _____							
Received by: _____ Company: <u>AE COM</u> Date/Time: <u>9/19/20 9:30</u>							
Received by: _____ Company: _____ Date/Time: _____							
Received in Laboratory by: _____ Company: _____ Date/Time: _____							

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_ Therm ID No.: \_\_\_\_\_

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)





Environment Testing  
TestAmerica

E: 28FEB20  
10.00 LB MAN  
071/CAF13311  
1570  
1570

ORIGIN ID: PHDA (512)  
FRANCISCO BARRAJON  
REC'D AMBERGLE  
8400 RING RD  
AUSTIN, TX 787  
UNITED STATES  
TO

EUROFINS FZ 0  
301 ALPHA L  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7056  
REF: \$160 - 58963  
RMA: |||||

FedEx  
Expres  
E  
[Barcode]

FedEx  
TRK# 1680 3500 1570  
0221  
THU - 10 SEP 10:30  
PRIORITY OVERNIGHT  
15238  
PAY-UK  
PIT

XH AGCA  
PT-WI-SR-001 effective 7/26/13

Uncorrected temp  
Thermometer ID  
CF 0 Initials JB  
4.5 / 14 °C

[Barcode]

FID: 1711129 89 Sep 2020 MIRA 56066/1545/MSZ

180-110724 Waybill  
[Barcode]

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## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-110724-1  
SDG Number: GAF-NRS-Treatability

**Login Number: 110724**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-112598-1

Laboratory Sample Delivery Group: GAF NRS Treatability  
Client Project/Site: TVA GAF EIP

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
10/29/2020 11:19:32 AM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

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**Job ID: 180-112598-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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**Job Narrative**  
**180-112598-1**

## Receipt

The sample was received on 10/21/2020 9:00 AM; the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 2.6° C.

## Metals

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20 *
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-14-21
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-21

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pittsburgh

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-112598-1	GAF-GW-HICAL-STAGE 1-PV4-68-70HRS	Water	09/12/20 14:00	10/21/20 09:00	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

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# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-HICAL-STAGE 1-PV4-68-70HRS**

**Lab Sample ID: 180-112598-1**

**Date Collected: 09/12/20 14:00**

**Matrix: Water**

**Date Received: 10/21/20 09:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	334405	10/22/20 15:33	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			335021	10/27/20 11:12	RSK	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	334405	10/22/20 15:33	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			334776	10/26/20 13:46	RJR	TAL PIT
Instrument ID: NEMO										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

TJO = Tyler Oliver

Batch Type: Analysis

RJR = Ron Rosenbaum

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-HICAL-STAGE 1-PV4-68-70HRS**

**Lab Sample ID: 180-112598-1**

Date Collected: 09/12/20 14:00

Matrix: Water

Date Received: 10/21/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000362	J	0.00100	0.000217	mg/L		10/22/20 15:33	10/26/20 13:46	1
Beryllium	0.000280	J	0.00100	0.000182	mg/L		10/22/20 15:33	10/26/20 13:46	1
Nickel	0.00589		0.00100	0.000336	mg/L		10/22/20 15:33	10/26/20 13:46	1
Lithium	0.0151		0.00500	0.00339	mg/L		10/22/20 15:33	10/27/20 11:12	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-334405/1-A**  
**Matrix: Water**  
**Analysis Batch: 334776**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		10/22/20 15:33	10/26/20 13:39	1
Beryllium	ND		0.00100	0.000182	mg/L		10/22/20 15:33	10/26/20 13:39	1
Nickel	ND		0.00100	0.000336	mg/L		10/22/20 15:33	10/26/20 13:39	1

**Lab Sample ID: MB 180-334405/1-A**  
**Matrix: Water**  
**Analysis Batch: 335021**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		0.00500	0.00339	mg/L		10/22/20 15:33	10/27/20 11:02	1

**Lab Sample ID: LCS 180-334405/2-A**  
**Matrix: Water**  
**Analysis Batch: 334776**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.500	0.5108		mg/L		102	80 - 120
Beryllium	0.500	0.4728		mg/L		95	80 - 120
Nickel	0.500	0.4723		mg/L		94	80 - 120

**Lab Sample ID: LCS 180-334405/2-A**  
**Matrix: Water**  
**Analysis Batch: 335021**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.500	0.4958		mg/L		99	80 - 120

**Lab Sample ID: LCSD 180-334405/3-A**  
**Matrix: Water**  
**Analysis Batch: 334776**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	0.500	0.5197		mg/L		104	80 - 120	2	20
Beryllium	0.500	0.4921		mg/L		98	80 - 120	4	20
Nickel	0.500	0.4821		mg/L		96	80 - 120	2	20

**Lab Sample ID: LCSD 180-334405/3-A**  
**Matrix: Water**  
**Analysis Batch: 335021**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total Recoverable**  
**Prep Batch: 334405**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	0.500	0.4984		mg/L		100	80 - 120	1	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF EIP

Job ID: 180-112598-1  
SDG: GAF NRS Treatability

## Metals

### Prep Batch: 334405

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-112598-1	GAF-GW-HICAL-STAGE 1-PV4-68-70HRS	Total Recoverable	Water	3005A	
MB 180-334405/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-334405/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
LCSD 180-334405/3-A	Lab Control Sample Dup	Total Recoverable	Water	3005A	

### Analysis Batch: 334776

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-112598-1	GAF-GW-HICAL-STAGE 1-PV4-68-70HRS	Total Recoverable	Water	EPA 6020A	334405
MB 180-334405/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	334405
LCS 180-334405/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	334405
LCSD 180-334405/3-A	Lab Control Sample Dup	Total Recoverable	Water	EPA 6020A	334405

### Analysis Batch: 335021

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-112598-1	GAF-GW-HICAL-STAGE 1-PV4-68-70HRS	Total Recoverable	Water	EPA 6020A	334405
MB 180-334405/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	334405
LCS 180-334405/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	334405
LCSD 180-334405/3-A	Lab Control Sample Dup	Total Recoverable	Water	EPA 6020A	334405



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REF: 60621225

180-112598 Waybill




201019110501

TRK# 4842 0860 0669

WED - 21 OCT 10:30A

PRIORITY OVERNIGHT

**XH AGCA**

PA - US

15238

PIT

Uncorrected temp \_\_\_\_\_ °C

Thermometer ID 14

CF 0 Initials BS

PT-WI-SR-001 effective 7/26/13



## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-112598-1  
SDG Number: GAF NRS Treatability

**Login Number: 112598**

**List Number: 1**

**Creator: Watson, Debbie**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-113231-1  
Client Project/Site: GAF-NRS-Treatability  
Revision: 2

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
11/24/2020 12:26:05 PM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

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**Job ID: 180-113231-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative  
180-113231-1**

This report was revised to update a sample ID.

**Receipt**

The samples were received on 11/5/2020 8:30 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 7.3° C.

**Metals**

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20 *
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	12-31-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-14-21
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-21

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-113231-1	GAF-GW-COL2-4.6PV	Water	10/30/20 12:40	11/05/20 08:30	
180-113231-2	GAF-GW-COL2-5.6PV	Water	10/31/20 07:20	11/05/20 08:30	
180-113231-3	GAF-GW-COL2-6.6PV	Water	11/01/20 01:00	11/05/20 08:30	
180-113231-4	GAF-GW-COL2-8PV	Water	11/01/20 18:20	11/05/20 08:30	
180-113231-5	GAF-GW-COL2-8.7PV	Water	11/02/20 14:30	11/05/20 08:30	
180-113231-6	GAF-GW-COL2-9.8PV	Water	11/03/20 06:00	11/05/20 08:30	
180-113231-7	GAF-GW-COL2-PV10	Water	11/02/20 21:10	11/05/20 08:30	
180-113231-8	GAF-GW-COL2-10.3PV	Water	11/03/20 16:30	11/05/20 08:30	
180-113231-9	GAF-GW-COL2-11PV	Water	11/03/20 23:40	11/05/20 08:30	
180-113231-10	GAF-GW-COL2-11.9PV	Water	11/04/20 10:40	11/05/20 08:30	
180-113231-11	GAF-GW-COL1-PV10	Water	11/02/20 21:10	11/05/20 08:30	
180-113231-12	GAF-GW-COL1-10.3PV	Water	11/03/20 06:00	11/05/20 08:30	
180-113231-13	GAF-GW-COL1-10.8PV	Water	11/03/20 16:30	11/05/20 08:30	
180-113231-14	GAF-GW-COL1-11.4PV	Water	11/03/20 23:40	11/05/20 08:30	
180-113231-15	GAF-GW-COL1-11.9PV	Water	11/04/20 10:40	11/05/20 08:30	
180-113231-16	GAF-GW-COL2-BL	Water	10/27/20 14:00	11/05/20 08:30	
180-113231-17	GAF-GW-COL2-PV0	Water	10/27/20 16:00	11/05/20 08:30	
180-113231-18	GAF-GW-COL2-PV1	Water	10/28/20 09:03	11/05/20 08:30	
180-113231-19	GAF-GW-COL2-PV2	Water	10/28/20 23:05	11/05/20 08:30	
180-113231-20	GAF-GW-COL2-PV3	Water	10/29/20 17:00	11/05/20 08:30	
180-113231-21	GAF-GW-COL1-BL	Water	10/27/20 14:00	11/05/20 08:30	
180-113231-22	GAF-GW-COL1-PV0	Water	10/27/20 16:00	11/05/20 08:30	
180-113231-23	GAF-GW-COL1-PV1	Water	10/28/20 09:03	11/05/20 08:30	
180-113231-24	GAF-GW-COL1-PV2	Water	10/28/20 23:05	11/05/20 08:30	
180-113231-25	GAF-GW-COL1-PV3.2	Water	10/29/20 17:00	11/05/20 08:30	
180-113231-26	GAF-GW-COL1-4.6PV	Water	10/30/20 12:40	11/05/20 08:30	
180-113231-27	GAF-GW-COL1-5.8PV	Water	10/31/20 07:20	11/05/20 08:30	
180-113231-28	GAF-GW-COL1-6.9PV	Water	11/01/20 01:00	11/05/20 08:30	
180-113231-29	GAF-GW-COL1-PV8.0	Water	11/01/20 18:40	11/05/20 08:30	
180-113231-30	GAF-GW-COL1-9.2PV	Water	11/02/20 13:56	11/05/20 08:30	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-4.6PV**

**Lab Sample ID: 180-113231-1**

Date Collected: 10/30/20 12:40

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:23	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-5.6PV**

**Lab Sample ID: 180-113231-2**

Date Collected: 10/31/20 07:20

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:26	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-6.6PV**

**Lab Sample ID: 180-113231-3**

Date Collected: 11/01/20 01:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:28	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-8.7PV**

**Lab Sample ID: 180-113231-4**

Date Collected: 11/01/20 18:20

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:31	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-8.7PV**

**Lab Sample ID: 180-113231-5**

Date Collected: 11/02/20 14:30

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:34	RJR	TAL PIT
Instrument ID: NEMO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-9.8PV**

**Lab Sample ID: 180-113231-6**

Date Collected: 11/03/20 06:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:36	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-PV10**

**Lab Sample ID: 180-113231-7**

Date Collected: 11/02/20 21:10

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:39	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-10.3PV**

**Lab Sample ID: 180-113231-8**

Date Collected: 11/03/20 16:30

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:41	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-11PV**

**Lab Sample ID: 180-113231-9**

Date Collected: 11/03/20 23:40

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:49	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL2-11.9PV**

**Lab Sample ID: 180-113231-10**

Date Collected: 11/04/20 10:40

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:51	RJR	TAL PIT
Instrument ID: NEMO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV10**

**Lab Sample ID: 180-113231-11**

Date Collected: 11/02/20 21:10

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:54	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-10.3PV**

**Lab Sample ID: 180-113231-12**

Date Collected: 11/03/20 06:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:57	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-10.8PV**

**Lab Sample ID: 180-113231-13**

Date Collected: 11/03/20 16:30

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 13:59	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-11.4PV**

**Lab Sample ID: 180-113231-14**

Date Collected: 11/03/20 23:40

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:02	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-11.9PV**

**Lab Sample ID: 180-113231-15**

Date Collected: 11/04/20 10:40

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:04	RJR	TAL PIT
Instrument ID: NEMO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Client Sample ID: GAF-GW-COL2-BL

Lab Sample ID: 180-113231-16

Date Collected: 10/27/20 14:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:07	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL2-PV0

Lab Sample ID: 180-113231-17

Date Collected: 10/27/20 16:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:09	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL2-PV1

Lab Sample ID: 180-113231-18

Date Collected: 10/28/20 09:03

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:12	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL2-PV2

Lab Sample ID: 180-113231-19

Date Collected: 10/28/20 23:05

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:30	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL2-PV3

Lab Sample ID: 180-113231-20

Date Collected: 10/29/20 17:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336146	11/06/20 07:56	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:32	RJR	TAL PIT
Instrument ID: NEMO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Client Sample ID: GAF-GW-COL1-BL

Lab Sample ID: 180-113231-21

Date Collected: 10/27/20 14:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:40	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL1-PV0

Lab Sample ID: 180-113231-22

Date Collected: 10/27/20 16:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 14:58	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL1-PV1

Lab Sample ID: 180-113231-23

Date Collected: 10/28/20 09:03

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:00	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL1-PV2

Lab Sample ID: 180-113231-24

Date Collected: 10/28/20 23:05

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:03	RJR	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-COL1-PV3.2

Lab Sample ID: 180-113231-25

Date Collected: 10/29/20 17:00

Matrix: Water

Date Received: 11/05/20 08:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:06	RJR	TAL PIT
Instrument ID: NEMO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-4.6PV**

**Lab Sample ID: 180-113231-26**

**Date Collected: 10/30/20 12:40**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:08	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-5.8PV**

**Lab Sample ID: 180-113231-27**

**Date Collected: 10/31/20 07:20**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:11	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-6.9PV**

**Lab Sample ID: 180-113231-28**

**Date Collected: 11/01/20 01:00**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:16	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-PV8.0**

**Lab Sample ID: 180-113231-29**

**Date Collected: 11/01/20 18:40**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:24	RJR	TAL PIT
Instrument ID: NEMO										

**Client Sample ID: GAF-GW-COL1-9.2PV**

**Lab Sample ID: 180-113231-30**

**Date Collected: 11/02/20 13:56**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	336147	11/06/20 07:59	KHM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			336494	11/09/20 15:26	RJR	TAL PIT
Instrument ID: NEMO										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Analyst References:**

Lab: TAL PIT

Batch Type: Prep

KHM = Kyle Mucroski

Batch Type: Analysis

RJR = Ron Rosenbaum

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-4.6PV**

**Lab Sample ID: 180-113231-1**

Date Collected: 10/30/20 12:40

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000296	J	0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:23	1
Beryllium	0.000492	J	0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:23	1
Nickel	0.00231		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:23	1
Lithium	0.0542		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:23	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-5.6PV**

**Lab Sample ID: 180-113231-2**

Date Collected: 10/31/20 07:20

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000248	J	0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:26	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:26	1
Nickel	0.0375		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:26	1
Lithium	0.104		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:26	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-6.6PV**

**Lab Sample ID: 180-113231-3**

Date Collected: 11/01/20 01:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00189		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:28	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:28	1
Nickel	0.184		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:28	1
Lithium	0.123		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:28	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-8PV**

**Lab Sample ID: 180-113231-4**

Date Collected: 11/01/20 18:20

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00321		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:31	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:31	1
Nickel	0.283		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:31	1
Lithium	0.128		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:31	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-8.7PV**

**Lab Sample ID: 180-113231-5**

Date Collected: 11/02/20 14:30

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00368		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:34	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:34	1
Nickel	0.339		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:34	1
Lithium	0.116		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:34	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-9.8PV**

**Lab Sample ID: 180-113231-6**

Date Collected: 11/03/20 06:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00340		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:36	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:36	1
Nickel	0.349		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:36	1
Lithium	0.110		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:36	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-PV10**

**Lab Sample ID: 180-113231-7**

Date Collected: 11/02/20 21:10

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00360		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:39	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:39	1
Nickel	0.349		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:39	1
Lithium	0.111		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:39	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-10.3PV**

**Lab Sample ID: 180-113231-8**

Date Collected: 11/03/20 16:30

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00363		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:41	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:41	1
Nickel	0.376		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:41	1
Lithium	0.109		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:41	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-11PV**

**Lab Sample ID: 180-113231-9**

Date Collected: 11/03/20 23:40

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00306		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:49	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:49	1
Nickel	0.373		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:49	1
Lithium	0.108		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:49	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-11.9PV**

**Lab Sample ID: 180-113231-10**

Date Collected: 11/04/20 10:40

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00304		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:51	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:51	1
Nickel	0.395		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:51	1
Lithium	0.107		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:51	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV10**

**Lab Sample ID: 180-113231-11**

**Date Collected: 11/02/20 21:10**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:54	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:54	1
<b>Nickel</b>	<b>0.000985</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:54	1
<b>Lithium</b>	<b>0.0951</b>		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:54	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-10.3PV**

**Lab Sample ID: 180-113231-12**

Date Collected: 11/03/20 06:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:57	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:57	1
<b>Nickel</b>	<b>0.000931</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:57	1
<b>Lithium</b>	<b>0.108</b>		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:57	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-10.8PV**

**Lab Sample ID: 180-113231-13**

Date Collected: 11/03/20 16:30

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:59	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:59	1
<b>Nickel</b>	<b>0.000727</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:59	1
<b>Lithium</b>	<b>0.125</b>		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:59	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-11.4PV**

**Lab Sample ID: 180-113231-14**

**Date Collected: 11/03/20 23:40**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:02	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:02	1
<b>Nickel</b>	<b>0.000676</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:02	1
<b>Lithium</b>	<b>0.127</b>		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:02	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-11.9PV**

**Lab Sample ID: 180-113231-15**

**Date Collected: 11/04/20 10:40**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:04	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:04	1
<b>Nickel</b>	<b>0.000477</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:04	1
<b>Lithium</b>	<b>0.132</b>		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:04	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-BL**

**Lab Sample ID: 180-113231-16**

Date Collected: 10/27/20 14:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00377		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:07	1
Beryllium	0.0109		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:07	1
Nickel	0.121		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:07	1
Lithium	0.123		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:07	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-PV0**

**Lab Sample ID: 180-113231-17**

**Date Collected: 10/27/20 16:00**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:09	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:09	1
<b>Nickel</b>	<b>0.00992</b>		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:09	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:09	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-PV1**

**Lab Sample ID: 180-113231-18**

Date Collected: 10/28/20 09:03

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:12	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:12	1
<b>Nickel</b>	<b>0.0257</b>		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:12	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:12	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-PV2**

**Lab Sample ID: 180-113231-19**

Date Collected: 10/28/20 23:05

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000314	J	0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:30	1
Beryllium	0.000563	J	0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:30	1
Nickel	0.00936		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:30	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:30	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL2-PV3**

**Lab Sample ID: 180-113231-20**

Date Collected: 10/29/20 17:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 14:32	1
<b>Beryllium</b>	<b>0.000214</b>	<b>J</b>	0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 14:32	1
<b>Nickel</b>	<b>0.00326</b>		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 14:32	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 14:32	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

Client Sample ID: GAF-GW-COL1-BL

Lab Sample ID: 180-113231-21

Date Collected: 10/27/20 14:00

Matrix: Water

Date Received: 11/05/20 08:30

## Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00434		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 14:40	1
Beryllium	0.0118		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 14:40	1
Nickel	0.137		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 14:40	1
Lithium	0.119		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 14:40	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV0**

**Lab Sample ID: 180-113231-22**

Date Collected: 10/27/20 16:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000289	J	0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 14:58	1
Beryllium	0.000659	J	0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 14:58	1
Nickel	0.00679		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 14:58	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 14:58	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV1**

**Lab Sample ID: 180-113231-23**

Date Collected: 10/28/20 09:03

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.000219	J	0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:00	1
Beryllium	0.000362	J	0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:00	1
Nickel	0.0130		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:00	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:00	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV2**

**Lab Sample ID: 180-113231-24**

**Date Collected: 10/28/20 23:05**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:03	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:03	1
<b>Nickel</b>	<b>0.00707</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:03	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:03	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV3.2**

**Lab Sample ID: 180-113231-25**

Date Collected: 10/29/20 17:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:06	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:06	1
<b>Nickel</b>	<b>0.00440</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:06	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:06	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-4.6PV**

**Lab Sample ID: 180-113231-26**

**Date Collected: 10/30/20 12:40**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:08	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:08	1
<b>Nickel</b>	<b>0.00263</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:08	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:08	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-5.8PV**

**Lab Sample ID: 180-113231-27**

**Date Collected: 10/31/20 07:20**

**Matrix: Water**

**Date Received: 11/05/20 08:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:11	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:11	1
<b>Nickel</b>	<b>0.00174</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:11	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:11	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-6.9PV**

**Lab Sample ID: 180-113231-28**

Date Collected: 11/01/20 01:00

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:16	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:16	1
<b>Nickel</b>	<b>0.00128</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:16	1
<b>Lithium</b>	<b>0.0115</b>		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:16	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-PV8.0**

**Lab Sample ID: 180-113231-29**

Date Collected: 11/01/20 18:40

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:24	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:24	1
<b>Nickel</b>	<b>0.00138</b>		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:24	1
<b>Lithium</b>	<b>0.0434</b>		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:24	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

**Client Sample ID: GAF-GW-COL1-9.2PV**

**Lab Sample ID: 180-113231-30**

Date Collected: 11/02/20 13:56

Matrix: Water

Date Received: 11/05/20 08:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 15:26	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 15:26	1
<b>Nickel</b>	<b>0.000877</b>	<b>J</b>	0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 15:26	1
<b>Lithium</b>	<b>0.0795</b>		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 15:26	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-336146/1-A**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336146**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:56	11/09/20 13:18	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:56	11/09/20 13:18	1
Nickel	ND		0.00100	0.000336	mg/L		11/06/20 07:56	11/09/20 13:18	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:56	11/09/20 13:18	1

**Lab Sample ID: LCS 180-336146/2-A**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336146**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.500	0.5117		mg/L		102	80 - 120
Beryllium	0.500	0.4759		mg/L		95	80 - 120
Nickel	0.500	0.4751		mg/L		95	80 - 120
Lithium	0.500	0.5042		mg/L		101	80 - 120

**Lab Sample ID: 180-113231-18 MS**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: GAF-GW-COL2-PV1**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336146**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		0.500	0.4928		mg/L		99	75 - 125
Beryllium	ND		0.500	0.4681		mg/L		94	75 - 125
Nickel	0.0257		0.500	0.4667		mg/L		88	75 - 125
Lithium	ND		0.500	0.4895		mg/L		98	75 - 125

**Lab Sample ID: 180-113231-18 MSD**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: GAF-GW-COL2-PV1**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336146**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.500	0.4863		mg/L		97	75 - 125	1	20
Beryllium	ND		0.500	0.4693		mg/L		94	75 - 125	0	20
Nickel	0.0257		0.500	0.4691		mg/L		89	75 - 125	1	20
Lithium	ND		0.500	0.4955		mg/L		99	75 - 125	1	20

**Lab Sample ID: MB 180-336147/1-A**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336147**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/06/20 07:59	11/09/20 14:35	1
Beryllium	ND		0.00100	0.000182	mg/L		11/06/20 07:59	11/09/20 14:35	1
Nickel	ND		0.00100	0.000336	mg/L		11/06/20 07:59	11/09/20 14:35	1
Lithium	ND		0.00500	0.00339	mg/L		11/06/20 07:59	11/09/20 14:35	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 180-336147/2-A**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336147**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.500	0.5134		mg/L		103	80 - 120
Beryllium	0.500	0.5085		mg/L		102	80 - 120
Nickel	0.500	0.4603		mg/L		92	80 - 120
Lithium	0.500	0.5088		mg/L		102	80 - 120

**Lab Sample ID: 180-113231-21 MS**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: GAF-GW-COL1-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336147**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.00434		0.500	0.5146		mg/L		102	75 - 125
Beryllium	0.0118		0.500	0.4832		mg/L		94	75 - 125
Nickel	0.137		0.500	0.5694		mg/L		86	75 - 125
Lithium	0.119		0.500	0.6037		mg/L		97	75 - 125

**Lab Sample ID: 180-113231-21 MSD**  
**Matrix: Water**  
**Analysis Batch: 336494**

**Client Sample ID: GAF-GW-COL1-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 336147**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	0.00434		0.500	0.5204		mg/L		103	75 - 125	1	20
Beryllium	0.0118		0.500	0.4760		mg/L		93	75 - 125	1	20
Nickel	0.137		0.500	0.5711		mg/L		87	75 - 125	0	20
Lithium	0.119		0.500	0.6145		mg/L		99	75 - 125	2	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Metals

### Prep Batch: 336146

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-113231-1	GAF-GW-COL2-4.6PV	Total Recoverable	Water	3005A	
180-113231-2	GAF-GW-COL2-5.6PV	Total Recoverable	Water	3005A	
180-113231-3	GAF-GW-COL2-6.6PV	Total Recoverable	Water	3005A	
180-113231-4	GAF-GW-COL2-8PV	Total Recoverable	Water	3005A	
180-113231-5	GAF-GW-COL2-8.7PV	Total Recoverable	Water	3005A	
180-113231-6	GAF-GW-COL2-9.8PV	Total Recoverable	Water	3005A	
180-113231-7	GAF-GW-COL2-PV10	Total Recoverable	Water	3005A	
180-113231-8	GAF-GW-COL2-10.3PV	Total Recoverable	Water	3005A	
180-113231-9	GAF-GW-COL2-11PV	Total Recoverable	Water	3005A	
180-113231-10	GAF-GW-COL2-11.9PV	Total Recoverable	Water	3005A	
180-113231-11	GAF-GW-COL1-PV10	Total Recoverable	Water	3005A	
180-113231-12	GAF-GW-COL1-10.3PV	Total Recoverable	Water	3005A	
180-113231-13	GAF-GW-COL1-10.8PV	Total Recoverable	Water	3005A	
180-113231-14	GAF-GW-COL1-11.4PV	Total Recoverable	Water	3005A	
180-113231-15	GAF-GW-COL1-11.9PV	Total Recoverable	Water	3005A	
180-113231-16	GAF-GW-COL2-BL	Total Recoverable	Water	3005A	
180-113231-17	GAF-GW-COL2-PV0	Total Recoverable	Water	3005A	
180-113231-18	GAF-GW-COL2-PV1	Total Recoverable	Water	3005A	
180-113231-19	GAF-GW-COL2-PV2	Total Recoverable	Water	3005A	
180-113231-20	GAF-GW-COL2-PV3	Total Recoverable	Water	3005A	
MB 180-336146/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-336146/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-113231-18 MS	GAF-GW-COL2-PV1	Total Recoverable	Water	3005A	
180-113231-18 MSD	GAF-GW-COL2-PV1	Total Recoverable	Water	3005A	

### Prep Batch: 336147

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-113231-21	GAF-GW-COL1-BL	Total Recoverable	Water	3005A	
180-113231-22	GAF-GW-COL1-PV0	Total Recoverable	Water	3005A	
180-113231-23	GAF-GW-COL1-PV1	Total Recoverable	Water	3005A	
180-113231-24	GAF-GW-COL1-PV2	Total Recoverable	Water	3005A	
180-113231-25	GAF-GW-COL1-PV3.2	Total Recoverable	Water	3005A	
180-113231-26	GAF-GW-COL1-4.6PV	Total Recoverable	Water	3005A	
180-113231-27	GAF-GW-COL1-5.8PV	Total Recoverable	Water	3005A	
180-113231-28	GAF-GW-COL1-6.9PV	Total Recoverable	Water	3005A	
180-113231-29	GAF-GW-COL1-PV8.0	Total Recoverable	Water	3005A	
180-113231-30	GAF-GW-COL1-9.2PV	Total Recoverable	Water	3005A	
MB 180-336147/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-336147/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-113231-21 MS	GAF-GW-COL1-BL	Total Recoverable	Water	3005A	
180-113231-21 MSD	GAF-GW-COL1-BL	Total Recoverable	Water	3005A	

### Analysis Batch: 336494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-113231-1	GAF-GW-COL2-4.6PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-2	GAF-GW-COL2-5.6PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-3	GAF-GW-COL2-6.6PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-4	GAF-GW-COL2-8PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-5	GAF-GW-COL2-8.7PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-6	GAF-GW-COL2-9.8PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-7	GAF-GW-COL2-PV10	Total Recoverable	Water	EPA 6020A	336146

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-113231-1

## Metals (Continued)

### Analysis Batch: 336494 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-113231-8	GAF-GW-COL2-10.3PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-9	GAF-GW-COL2-11PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-10	GAF-GW-COL2-11.9PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-11	GAF-GW-COL1-PV10	Total Recoverable	Water	EPA 6020A	336146
180-113231-12	GAF-GW-COL1-10.3PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-13	GAF-GW-COL1-10.8PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-14	GAF-GW-COL1-11.4PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-15	GAF-GW-COL1-11.9PV	Total Recoverable	Water	EPA 6020A	336146
180-113231-16	GAF-GW-COL2-BL	Total Recoverable	Water	EPA 6020A	336146
180-113231-17	GAF-GW-COL2-PV0	Total Recoverable	Water	EPA 6020A	336146
180-113231-18	GAF-GW-COL2-PV1	Total Recoverable	Water	EPA 6020A	336146
180-113231-19	GAF-GW-COL2-PV2	Total Recoverable	Water	EPA 6020A	336146
180-113231-20	GAF-GW-COL2-PV3	Total Recoverable	Water	EPA 6020A	336146
180-113231-21	GAF-GW-COL1-BL	Total Recoverable	Water	EPA 6020A	336147
180-113231-22	GAF-GW-COL1-PV0	Total Recoverable	Water	EPA 6020A	336147
180-113231-23	GAF-GW-COL1-PV1	Total Recoverable	Water	EPA 6020A	336147
180-113231-24	GAF-GW-COL1-PV2	Total Recoverable	Water	EPA 6020A	336147
180-113231-25	GAF-GW-COL1-PV3.2	Total Recoverable	Water	EPA 6020A	336147
180-113231-26	GAF-GW-COL1-4.6PV	Total Recoverable	Water	EPA 6020A	336147
180-113231-27	GAF-GW-COL1-5.8PV	Total Recoverable	Water	EPA 6020A	336147
180-113231-28	GAF-GW-COL1-6.9PV	Total Recoverable	Water	EPA 6020A	336147
180-113231-29	GAF-GW-COL1-PV8.0	Total Recoverable	Water	EPA 6020A	336147
180-113231-30	GAF-GW-COL1-9.2PV	Total Recoverable	Water	EPA 6020A	336147
MB 180-336146/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	336146
MB 180-336147/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	336147
LCS 180-336146/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	336146
LCS 180-336147/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	336147
180-113231-18 MS	GAF-GW-COL2-PV1	Total Recoverable	Water	EPA 6020A	336146
180-113231-18 MSD	GAF-GW-COL2-PV1	Total Recoverable	Water	EPA 6020A	336146
180-113231-21 MS	GAF-GW-COL1-BL	Total Recoverable	Water	EPA 6020A	336147
180-113231-21 MSD	GAF-GW-COL1-BL	Total Recoverable	Water	EPA 6020A	336147



Spectrum Analytical

# CHAIN OF CUSTODY RECORD

Almgren Drive  
Agawam, MA 01001  
(413) 789-9018

646 Camp Avenue  
N. Kingstown, RI 02852  
(401) 732-3400

Special Handling:

TAT - Date Needed: 3-day  
5-day-TAT

All TATs subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Report To: Francisco Barajas  
AECOM  
9400 Amberglenn Blvd  
Austin, TX 78729  
Telephone #: 978-905-2299  
Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee  
AECOM  
250 Apollo Dr.  
Chelmsford, MA 01824  
P.O. No.: \_\_\_\_\_ Quote #: \_\_\_\_\_

Project No: TVA Gallatin EIP  
Site Name: GAF-NRS-Treatability  
Location: Rachel Watkins  
Sampler(s): Craig Kaitkic  
State: \_\_\_\_\_

F=Field Filtered 1=N<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=Deionized Water 10=H<sub>3</sub>PO<sub>4</sub> 11=Zinc + NaOH 12=

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas

X1= \_\_\_\_\_ X2= \_\_\_\_\_

List Preservative Code below:

QA/QC Reporting Level  
 Level I  Level II  
 Level III  Level IV  
 Other: \_\_\_\_\_  
 State-specific reporting standards: \_\_\_\_\_

QA/QC Reporting Notes:

Containers	Analysis
# of VOA Vials	6020 Totals -Be, Cd, Li, Ni only
# of Amber Glass	
# of Clear Glass	
# of Plastic	

Lab ID:	Sample ID:	Date:	Time:	Received by:	Relinquished by:	Matrix	Type
	GAF-GW-Col2-4.6PV	10/30/2020	12:40 PM			GW	G
	GAF-GW-Col2-5.6PV	10/31/2020	7:20 AM			GW	G
	GAF-GW-Col2-6.6PV	11/1/2020	1:00 AM			GW	G
	GAF-GW-Col2-8PV	11/1/2020	6:20 PM			GW	G
	GAF-GW-Col2-8.7PV	11/2/2020	2:30 PM			GW	G
	GAF-GW-Col2-9.8PV	11/3/2020	6:00 AM			GW	G
	GAF-GW-Col2-PV10	11/2/2020	9:10 PM			GW	G
	GAF-GW-Col2-10.3PV	11/3/2020	4:30 PM			GW	G
	GAF-GW-Col2-11PV	11/3/2020	11:40 PM			GW	G
	GAF-GW-Col2-11.9PV	11/4/2020	10:40 AM			GW	G

Date:	Time:	Temp °C
11/4/20	1600	Observed
11-5-20	8:30	Collection Filter
		Carved
		IR ID #



Relinquished by: Rachel Watkins  
 Received by: Duane Bateman  
 Date: 11/4/20  
 Time: 1600  
 Temp °C: Observed

Condition upon receipt:  
 Ambient  Iced  Refrigerated  DI VOA Frozen  Soil Jar Frozen  
 Present  Intact  Broken  
 Custody Seals: \_\_\_\_\_  
 E-mail to: \_\_\_\_\_  
 EDD format: \_\_\_\_\_





Spectrum Analytical

# CHAIN OF CUSTODY RECORD

Special Handling:

TAT - Date Needed: 3-day  
5-day TAT

All TAT's subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Report To: Francisco Barajas

AECOM

9400 Amberglenn Blvd

Austin, TX 78729

Telephone #: 978-905-2299

Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee

AECOM

250 Apollo Dr.

Chelmsford, MA 01824

P.O. No.: \_\_\_\_\_ Quote #: \_\_\_\_\_

F=Field Filtered I= $\text{Na}_2\text{S}_2\text{O}_3$  2=HCl 3= $\text{H}_2\text{SO}_4$  4= $\text{HNO}_3$  5=NaOH 6=Ascorbic Acid  
7= $\text{CH}_3\text{OH}$  8= $\text{NaHSO}_4$  9=Deionized Water 10= $\text{H}_3\text{PO}_4$  11= \_\_\_\_\_ 12=Zinc + NaOH

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas  
X1= \_\_\_\_\_ X2= \_\_\_\_\_

Matrix

Lab ID:	Sample ID:	C=Composite		Date:	Time:	Type
		G=Grab	Matrix			
	GAF-GW-Col1-PV10		GW	11/2/2020	9:10 PM	G
	GAF-GW-Col1-10.3PV		GW	11/3/2020	6:00 AM	G
	GAF-GW-Col1-10.8PV		GW	11/3/2020	4:30 PM	G
	GAF-GW-Col1-11.4PV		GW	11/3/2020	11:40 PM	G
	GAF-GW-Col1-11.9PV		GW	11/4/2020	10:40 AM	G
	GAF-GW-Col2-BL		GW	10/27/2020	2:00 PM	G
	GAF-GW-Col2-PV0		GW	10/27/2020	4:00 PM	G
	GAF-GW-Col2-PV1		GW	10/28/2020	9:03 AM	G
	GAF-GW-Col2-PV2		GW	10/28/2020	11:05 PM	G
	GAF-GW-Col2-PV3		GW	10/29/2020	5:00 PM	G

Relinquished by: Rachel Watkins

Received by: Rachel Watkins  
FAP.H

Date: 11/4/20 Time: 1600

Date: 11-5-20 Time: 8:30

Project No: TVA Gallatin EIP

Site Name: GAF-NRS-Treatability

Location: \_\_\_\_\_

Samplers(s): Rachel Watkins

State: \_\_\_\_\_

List Preservative Code below:

Analysis

4									
---	--	--	--	--	--	--	--	--	--

QA/QC Reporting Notes:

QA/QC Reporting Level  
 Level I  Level II  
 Level III  Level IV  
 Other: \_\_\_\_\_

State-specific reporting standards:

EDD format: \_\_\_\_\_

E-mail to: \_\_\_\_\_

Temp °C

Other vol

Corrosion Factor

Corrected

IR ID #

Condition upon receipt:

Custody Seals:  Present  Intact  Broken

Ambient  Ice  Refrigerated  DI/VOA Frozen  Soil Jar Frozen





Spectrum Analytical

# CHAIN OF CUSTODY RECORD

Special Handling:

PAT - Date Needed: 3-day 5-day TAT

All TATs subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Report To: Francisco Barajas  
AECOM  
9400 Amberglen Blvd  
Austin, TX 78729  
Telephone #: 978-905-2299  
Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee  
AECOM  
250 Apollo Dr.  
Chelmsford, MA 01824  
P.O. No.:  
Quote #:

Project No: TVA Gallatin EIP  
Site Name: GAF-NRS-Treatability  
Location: Flachel Watkins  
Sampler(s): Craig Kaitic  
State:

F=Field Filtered 1=Na<sub>2</sub>SO<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=Deionized Water 10=H<sub>2</sub>PO<sub>4</sub> 11=  
12= Zinc + NaOH

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas  
X1= X2=

List Preservative Code below:

QA/QC Reporting Notes:

Lab ID:	Sample ID:	Date:	Time:	Type	Containers			Temp °C	Date:	Time:	Received by:	Relinquished by:
					# of VOA Vials	# of Amber Glass	# of Clear Glass					
	GAF-GW-Col1-BL	10/27/2020	2:00 PM	G			1					
	GAF-GW-Col1-PV1	10/27/2020	4:00 PM	G			1					
	GAF-GW-Col1-PV1	10/28/2020	9:03 AM	G			1					
	GAF-GW-Col1-PV2	10/28/2020	11:05 PM	G			1					
	GAF-GW-Col1-PV3.2	10/29/2020	5:00 PM	G			1					
	GAF-GW-Col1-4.6PV	10/30/2020	12:40 PM	G			1					
	GAF-GW-Col1-5.8PV	10/31/2020	7:20 AM	G			1					
	GAF-GW-Col1-6.9PV	11/1/2020	1:00 AM	G			1					
	GAF-GW-Col1-PV8.0	11/1/2020	6:40 PM	G			1					
	GAF-GW-Col1-9.2PV	11/2/2020	1:56 PM	G			1					









Spectrum Analytical

# CHAIN OF CUSTODY RECORD

Page 3 of 4

Special Handling: Rev 1  
 TAT - Date Needed: 3 days  
5 day TAT

11-11-2020

All TATs subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Almgren Drive  
Agawam, MA 01001  
(413) 789-9018

646 Camp Avenue  
N. Kingstown, RI 02852  
(401) 732-3400

Report To: Francisco Barajas

AECOM  
9400 Amberglen Blvd  
Austin, TX 78729

Telephone #: 978-905-2299  
Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee

AECOM  
250 Apollo Dr.  
Chelmsford, MA 01824

P.O. No.: \_\_\_\_\_  
Quote #: \_\_\_\_\_

Project No: TVA Gallatin EIP

Site Name: GAF-NRS-Treatability

Location: \_\_\_\_\_  
Sampler(s): Rachel Watkins  
Craig Katkic  
State: \_\_\_\_\_

F=Field Filtered 1=Na<sub>2</sub>SO<sub>4</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=Deionized Water 10=H<sub>2</sub>PO<sub>4</sub> 11= \_\_\_\_\_ 12= Zinc + NaOH

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas

X1= \_\_\_\_\_ X2= \_\_\_\_\_

List Preservative Code below:

QA/QC Reporting Notes:

Analysis

Containers

Matrix

Lab ID	Sample ID	Date	Time	Type	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Temp °C	Condition upon receipt:
	GAF-GW-Coll-BL	10/27/2020	2:00 PM	GW	1	1	1	1	6020 Totals - Re. Cd, Li, Ni only	<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-PV1	10/27/2020	4:00 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-PV1	10/28/2020	9:03 AM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-PV2	10/28/2020	11:05 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-PV3.2	10/29/2020	5:00 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-4.6PV	10/30/2020	12:40 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-5.8PV	10/31/2020	7:20 AM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-6.9PV	11/1/2020	1:00 AM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-PV8.0	11/1/2020	6:40 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken
	GAF-GW-Coll-9.2PV	11/2/2020	1:56 PM	GW	1	1	1	1		<input type="checkbox"/> Present <input type="checkbox"/> Intact <input type="checkbox"/> Broken

Relinquished by: Rachel Watkins Received by: Douglas Watson Date: 11/4/20 Time: 10:00 Temp °C: \_\_\_\_\_

EDD format: \_\_\_\_\_ E-mail to: \_\_\_\_\_

Condition upon receipt:  Ambient  Ice  Refrigerated  DI VOA Frozen  Soil Jar Frozen



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-113231-1

**Login Number: 113231**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Watson, Debbie**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-114024-1  
Client Project/Site: GAF-NRS-Treatability

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
11/30/2020 11:58:49 AM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

---

**Job ID: 180-114024-1**

---

**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

---

**Job Narrative**  
**180-114024-1**

## Receipt

The samples were received on 11/24/2020 9:30 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 3.2° C.

## Metals

Method 6020A: The following samples were diluted due to the nature of the sample matrix: GAF-GW-COL 3-BL (180-114024-1), (180-114024-A-1-B MS ^5), (180-114024-A-1-C MSD ^5), (180-114024-A-1-A PDS ^5) and (180-114024-A-1-A SD ^25). Elevated reporting limits (RLs) are provided.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-21
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20 *
Florida	NELAP	E871008	06-30-21
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-21
Kansas	NELAP	E-10350	01-31-21
Kentucky (UST)	State	162013	04-30-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-21
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-21
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-21
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	12-31-21
North Dakota	State	R-227	04-30-21
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-21
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-21
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-21
Virginia	NELAP	10043	09-14-21
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-21

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.



# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-114024-1	GAF-GW-COL 3-BL	Water	11/09/20 00:00	11/24/20 09:30	
180-114024-2	GAF-GW-COL 3-PV0	Water	11/09/20 16:00	11/24/20 09:30	
180-114024-3	GAF-GW-COL 3-PV2	Water	11/10/20 20:30	11/24/20 09:30	
180-114024-4	GAF-GW-COL 3-PV3	Water	11/12/20 01:15	11/24/20 09:30	
180-114024-5	GAF-GW-COL 3-PV4	Water	11/13/20 06:00	11/24/20 09:30	
180-114024-6	GAF-GW-COL 3-PV5	Water	11/14/20 10:30	11/24/20 09:30	
180-114024-7	GAF-GW-COL 3-PV6	Water	11/15/20 15:20	11/24/20 09:30	
180-114024-8	GAF-GW-COL 3-PV7	Water	11/16/20 20:00	11/24/20 09:30	
180-114024-9	GAF-GW-COL 3-PV8	Water	11/17/20 10:25	11/24/20 09:30	



# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Client Sample ID: GAF-GW-COL 3-BL

## Lab Sample ID: 180-114024-1

Date Collected: 11/09/20 00:00

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		5			338736	11/27/20 19:19	RSK	TAL PIT
Instrument ID: A										

## Client Sample ID: GAF-GW-COL 3-PV0

## Lab Sample ID: 180-114024-2

Date Collected: 11/09/20 16:00

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 19:36	RSK	TAL PIT
Instrument ID: A										

## Client Sample ID: GAF-GW-COL 3-PV2

## Lab Sample ID: 180-114024-3

Date Collected: 11/10/20 20:30

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 19:40	RSK	TAL PIT
Instrument ID: A										

## Client Sample ID: GAF-GW-COL 3-PV3

## Lab Sample ID: 180-114024-4

Date Collected: 11/12/20 01:15

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 19:43	RSK	TAL PIT
Instrument ID: A										

## Client Sample ID: GAF-GW-COL 3-PV4

## Lab Sample ID: 180-114024-5

Date Collected: 11/13/20 06:00

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 19:47	RSK	TAL PIT
Instrument ID: A										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Client Sample ID: GAF-GW-COL 3-PV5

Lab Sample ID: 180-114024-6

Date Collected: 11/14/20 10:30

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 19:57	RSK	TAL PIT

Instrument ID: A

## Client Sample ID: GAF-GW-COL 3-PV6

Lab Sample ID: 180-114024-7

Date Collected: 11/15/20 15:20

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 20:01	RSK	TAL PIT

Instrument ID: A

## Client Sample ID: GAF-GW-COL 3-PV7

Lab Sample ID: 180-114024-8

Date Collected: 11/16/20 20:00

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 20:04	RSK	TAL PIT

Instrument ID: A

## Client Sample ID: GAF-GW-COL 3-PV8

Lab Sample ID: 180-114024-9

Date Collected: 11/17/20 10:25

Matrix: Water

Date Received: 11/24/20 09:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	338568	11/25/20 14:41	TJO	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			338736	11/27/20 20:08	RSK	TAL PIT

Instrument ID: A

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

TJO = Tyler Oliver

Batch Type: Analysis

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-BL**

**Lab Sample ID: 180-114024-1**

Date Collected: 11/09/20 00:00

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00399	J	0.00500	0.00109	mg/L		11/25/20 14:41	11/27/20 19:19	5
Beryllium	0.0128		0.00500	0.000910	mg/L		11/25/20 14:41	11/27/20 19:19	5
Nickel	0.131		0.00500	0.00168	mg/L		11/25/20 14:41	11/27/20 19:19	5
Lithium	0.122		0.0250	0.0170	mg/L		11/25/20 14:41	11/27/20 19:19	5

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV0**

**Lab Sample ID: 180-114024-2**

**Date Collected: 11/09/20 16:00**

**Matrix: Water**

**Date Received: 11/24/20 09:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:36	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:36	1
<b>Nickel</b>	<b>0.0676</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:36	1
Lithium	ND		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:36	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV2**

**Lab Sample ID: 180-114024-3**

**Date Collected: 11/10/20 20:30**

**Matrix: Water**

**Date Received: 11/24/20 09:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:40	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:40	1
<b>Nickel</b>	<b>0.102</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:40	1
Lithium	ND		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:40	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV3**

**Lab Sample ID: 180-114024-4**

Date Collected: 11/12/20 01:15

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:43	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:43	1
<b>Nickel</b>	<b>0.0311</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:43	1
Lithium	ND		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:43	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV4**

**Lab Sample ID: 180-114024-5**

**Date Collected: 11/13/20 06:00**

**Matrix: Water**

**Date Received: 11/24/20 09:30**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:47	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:47	1
<b>Nickel</b>	<b>0.00880</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:47	1
<b>Lithium</b>	<b>0.00888</b>		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:47	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV5**

**Lab Sample ID: 180-114024-6**

Date Collected: 11/14/20 10:30

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:57	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:57	1
<b>Nickel</b>	<b>0.00862</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:57	1
<b>Lithium</b>	<b>0.0174</b>		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:57	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV6**

**Lab Sample ID: 180-114024-7**

Date Collected: 11/15/20 15:20

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 20:01	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 20:01	1
<b>Nickel</b>	<b>0.00586</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 20:01	1
<b>Lithium</b>	<b>0.0432</b>		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 20:01	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV7**

**Lab Sample ID: 180-114024-8**

Date Collected: 11/16/20 20:00

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 20:04	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 20:04	1
<b>Nickel</b>	<b>0.00461</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 20:04	1
<b>Lithium</b>	<b>0.0717</b>		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 20:04	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

**Client Sample ID: GAF-GW-COL 3-PV8**

**Lab Sample ID: 180-114024-9**

Date Collected: 11/17/20 10:25

Matrix: Water

Date Received: 11/24/20 09:30

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 20:08	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 20:08	1
<b>Nickel</b>	<b>0.00543</b>		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 20:08	1
<b>Lithium</b>	<b>0.0933</b>		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 20:08	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-338568/1-A**  
**Matrix: Water**  
**Analysis Batch: 338736**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 338568**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		11/25/20 14:41	11/27/20 19:02	1
Beryllium	ND		0.00100	0.000182	mg/L		11/25/20 14:41	11/27/20 19:02	1
Nickel	ND		0.00100	0.000336	mg/L		11/25/20 14:41	11/27/20 19:02	1
Lithium	ND		0.00500	0.00339	mg/L		11/25/20 14:41	11/27/20 19:02	1

**Lab Sample ID: LCS 180-338568/2-A**  
**Matrix: Water**  
**Analysis Batch: 338736**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 338568**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.500	0.4697		mg/L		94	80 - 120
Beryllium	0.500	0.4811		mg/L		96	80 - 120
Nickel	0.500	0.4631		mg/L		93	80 - 120
Lithium	0.500	0.4717		mg/L		94	80 - 120

**Lab Sample ID: 180-114024-1 MS**  
**Matrix: Water**  
**Analysis Batch: 338736**

**Client Sample ID: GAF-GW-COL 3-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 338568**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.00399	J	0.500	0.4747		mg/L		94	75 - 125
Beryllium	0.0128		0.500	0.5305		mg/L		104	75 - 125
Nickel	0.131		0.500	0.6074		mg/L		95	75 - 125
Lithium	0.122		0.500	0.6330		mg/L		102	75 - 125

**Lab Sample ID: 180-114024-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 338736**

**Client Sample ID: GAF-GW-COL 3-BL**  
**Prep Type: Total Recoverable**  
**Prep Batch: 338568**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Cadmium	0.00399	J	0.500	0.4711		mg/L		93	75 - 125	1	20
Beryllium	0.0128		0.500	0.5323		mg/L		104	75 - 125	0	20
Nickel	0.131		0.500	0.5999		mg/L		94	75 - 125	1	20
Lithium	0.122		0.500	0.6335		mg/L		102	75 - 125	0	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-114024-1

## Metals

### Prep Batch: 338568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-114024-1	GAF-GW-COL 3-BL	Total Recoverable	Water	3005A	
180-114024-2	GAF-GW-COL 3-PV0	Total Recoverable	Water	3005A	
180-114024-3	GAF-GW-COL 3-PV2	Total Recoverable	Water	3005A	
180-114024-4	GAF-GW-COL 3-PV3	Total Recoverable	Water	3005A	
180-114024-5	GAF-GW-COL 3-PV4	Total Recoverable	Water	3005A	
180-114024-6	GAF-GW-COL 3-PV5	Total Recoverable	Water	3005A	
180-114024-7	GAF-GW-COL 3-PV6	Total Recoverable	Water	3005A	
180-114024-8	GAF-GW-COL 3-PV7	Total Recoverable	Water	3005A	
180-114024-9	GAF-GW-COL 3-PV8	Total Recoverable	Water	3005A	
MB 180-338568/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-338568/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-114024-1 MS	GAF-GW-COL 3-BL	Total Recoverable	Water	3005A	
180-114024-1 MSD	GAF-GW-COL 3-BL	Total Recoverable	Water	3005A	

### Analysis Batch: 338736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-114024-1	GAF-GW-COL 3-BL	Total Recoverable	Water	EPA 6020A	338568
180-114024-2	GAF-GW-COL 3-PV0	Total Recoverable	Water	EPA 6020A	338568
180-114024-3	GAF-GW-COL 3-PV2	Total Recoverable	Water	EPA 6020A	338568
180-114024-4	GAF-GW-COL 3-PV3	Total Recoverable	Water	EPA 6020A	338568
180-114024-5	GAF-GW-COL 3-PV4	Total Recoverable	Water	EPA 6020A	338568
180-114024-6	GAF-GW-COL 3-PV5	Total Recoverable	Water	EPA 6020A	338568
180-114024-7	GAF-GW-COL 3-PV6	Total Recoverable	Water	EPA 6020A	338568
180-114024-8	GAF-GW-COL 3-PV7	Total Recoverable	Water	EPA 6020A	338568
180-114024-9	GAF-GW-COL 3-PV8	Total Recoverable	Water	EPA 6020A	338568
MB 180-338568/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	338568
LCS 180-338568/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	338568
180-114024-1 MS	GAF-GW-COL 3-BL	Total Recoverable	Water	EPA 6020A	338568
180-114024-1 MSD	GAF-GW-COL 3-BL	Total Recoverable	Water	EPA 6020A	338568



Invoice To: Craig MacPhee  
 AECOM  
 250 Apollo Dr  
 Chelmsford, MA 01824  
 P.O. No. \_\_\_\_\_  
 Quote # \_\_\_\_\_

Project No: IYA Gallatin EIP  
 Site Name: GAF-NRS-Treatability  
 Location: \_\_\_\_\_  
 Sampler(s): Sangho Bang  
Craig Kalkic  
 State: \_\_\_\_\_

=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
 =H<sub>3</sub>PO<sub>4</sub> 1= \_\_\_\_\_ 12= \_\_\_\_\_

SW-Surface Water WW-Waste Water  
 /Ambient Air SG=Soil Gas

Date:	Time:	Type	Matrix	Containers				Temp °C	Analysis	QA/QC Reporting Notes:
				# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic			
11/9/2020	N/A (du)	G	GW					6020 Totals -Be, Cd, Li, Ni	QA/QC Reporting Level <input type="checkbox"/> Level I <input type="checkbox"/> Level II <input type="checkbox"/> Level III <input type="checkbox"/> Level IV <input type="checkbox"/> Other _____ State-specific reporting standards  No sample time recorded (du)	
11/9/2020	4:00 PM	G	GW							
11/10/2020	8:30 PM	G	GW							
11/12/2020	1:15 AM	G	GW							
11/13/2020	6:00 AM	G	GW							
11/14/2020	10:30 AM	G	GW							
11/15/2020	3:20 PM	G	GW							
11/16/2020	8:00 PM	G	GW							
11/17/2020	10:25 AM	G	GW							
11/23/20	3:30pm									



Received by: Erinn Date: 11/23/20 Time: 3:30pm

Temp °C: \_\_\_\_\_

Condition upon receipt:  Ambient  Iced  Refrigerated  DV VOA Frozen  Soil Jar Frozen

Custody Seals:  Present  Intact  Broken

FDD format: \_\_\_\_\_

F-mail to: \_\_\_\_\_

# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-114024-1

**Login Number: 114024**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Say, Thomas C**

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



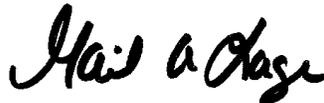
## ANALYTICAL REPORT

Eurofins TestAmerica, Knoxville  
5815 Middlebrook Pike  
Knoxville, TN 37921  
Tel: (865)291-3000

Laboratory Job ID: 140-19962-1  
Client Project/Site: GAF-NRSTreatability  
Revision: 1

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
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### LINKS

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*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
*1	LCS/LCSD RPD exceeds control limits.
B	Compound was found in the blank and sample.
F3	Duplicate RPD exceeds the control limit
F5	Duplicate RPD exceeds limit, and one or both sample results are less than 5 times RL.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Job ID: 140-19962-1**

**Laboratory: Eurofins TestAmerica, Knoxville**

## Narrative

**Job Narrative  
140-19962-1**

### Revised Report

This report was revised to update the sample IDs to match the chain of custody. This replaces the previous final report.

### Receipt

The samples were received on 8/7/2020 10:00 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.4° C.

### Metals

7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0008, "7 Step Sequential Extraction Procedure". SW-846 Method 6010B as incorporated in Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analyses.

An aliquot of each sample was sequentially extracted using the steps listed below:

- Step 1 - Exchangeable Fraction: A 5 gram aliquot of sample was extracted with 25 mL of 1M magnesium sulfate (MgSO<sub>4</sub>), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 2 - Carbonate Fraction: The sample residue from step 1 was extracted with 25 mL of 1M sodium acetate/acetic acid (NaOAc/HOAc) at pH 5, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 3 - Non-crystalline Materials Fraction: The sample residue from step 2 was extracted with 25 mL of 0.2M ammonium oxalate (pH 3), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 4 - Metal Hydroxide Fraction: The sample residue from step 3 was extracted with 25 mL of 1M hydroxylamine hydrochloride solution in 25% v/v acetic acid, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 5 - Organic-bound Fraction: The sample residue from step 4 was extracted three times with 25 mL of 5% sodium hypochlorite (NaClO) at pH 9.5, centrifuged and filtered. The resulting leachates were combined and 5 mL were digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 6 - Acid/Sulfide Fraction: The sample residue from step 5 was extracted with 25 mL of a 3:1:2 v/v solution of HCl-HNO<sub>3</sub>-H<sub>2</sub>O, centrifuged and filtered. 5 mL of the resulting leachate was diluted to 50 mL with reagent water and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 7 - Residual Fraction: A 1.0 g aliquot of the sample residue from step 6 was digested using HF, HNO<sub>3</sub>, HCl and H<sub>3</sub>BO<sub>3</sub>. The digestate was analyzed by ICP using method 6010B. Results are reported in mg/kg on a dry weight basis.

In addition, a 1.0 g aliquot of the original sample was digested using HF, HNO<sub>3</sub>, HCl and H<sub>3</sub>BO<sub>3</sub>. The digestate was analyzed by ICP using method 6010B. Total metal results are reported in mg/kg on a dry weight basis.

Results were calculated using the following equation:

$$\text{Result, } \mu\text{g/g or mg/Kg, dry weight} = (C \times V \times V1 \times D) / (W \times S \times V2)$$

Where:

C = Concentration from instrument readout,  $\mu\text{g/mL}$

V = Final volume of digestate, mL

D = Instrument dilution factor

V1 = Total volume of leachate, mL

V2 = Volume of leachate digested, mL

W = Wet weight of sample, g

S = Percent solids/100

# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

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## Job ID: 140-19962-1 (Continued)

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### Laboratory: Eurofins TestAmerica, Knoxville (Continued)

A method blank, laboratory control sample and laboratory control sample duplicate were prepared and analyzed with each SEP step in order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of interest from the extraction solutions. Results outside of laboratory QC limits do not reflect out of control performance, but rather the effect of the extraction solution upon the analyte.

A laboratory sample duplicate was prepared and analyzed with each batch of samples in order to provide information regarding the reproducibility of the procedure.

#### SEP Report Notes:

The final report lists the results for each step, the result for the total digestion of the sample, and a sum of the results of steps 1 through 7 by element.

The digestates for steps 1, 2 and 5 were analyzed at a dilution due to instrument problems caused by the high solids content of the digestates. The reporting limits were adjusted accordingly.

Methods 6010B, 6010B SEP: The sample duplicate (DUP) precision for preparation batch 140-42166 and 140-42471 and analytical batch 140-42568 was outside control limits. Sample non-homogeneity is suspected.

Method 6010B: The serial dilution performed for the following sample associated with batch 140-42568 was outside control limits: (140-19962-A-4-A SD ^5)

Methods 6010B, 6010B SEP: The following samples were diluted due to the presence of silicon which interferes with Nickel: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (140-19962-1), GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3 (140-19962-2), GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3 (140-19962-3), GAF-GW-PHIII-BKT-SAND-T3 (140-19962-4) and (140-19962-A-4-Z DU). Elevated reporting limits (RLs) are provided.

Methods 6010B, 6010B SEP: The following samples were diluted due to the nature of the sample matrix: GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3 (140-19962-1), GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3 (140-19962-2), GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3 (140-19962-3), GAF-GW-PHIII-BKT-SAND-T3 (140-19962-4), (140-19962-A-4-B DU ^10) and (140-19962-A-4-Z DU ^10). Elevated reporting limits (RLs) are provided. The diluted analysis result was greater than the undiluted result for Aluminum and Iron.

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

#### General Chemistry

% Moisture: The samples were analyzed for percent moisture using SOP number KNOX-WC-0012 (based on Modified MCAWW 160.3 and SM2540B and on the percent moisture determinations described in methods 3540C and 3550B).

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

# Detection Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	0.351	J	9.50	0.323	mg/Kg	4	✳	6010B SEP	Step 1
Iron	25.8	B * *1	17.8	10.3	mg/Kg	3	✳	6010B SEP	Step 2
Nickel	0.191	J	7.12	0.178	mg/Kg	3	✳	6010B SEP	Step 2
Aluminum	14.1	J * *1	35.6	5.70	mg/Kg	3	✳	6010B SEP	Step 2
Beryllium	0.0374	J	0.297	0.0178	mg/Kg	1	✳	6010B SEP	Step 3
Cadmium	0.0795	J B *	0.297	0.0131	mg/Kg	1	✳	6010B SEP	Step 3
Iron	675		5.94	3.44	mg/Kg	1	✳	6010B SEP	Step 3
Nickel	0.807	J	2.37	0.0997	mg/Kg	1	✳	6010B SEP	Step 3
Aluminum	86.2		11.9	2.49	mg/Kg	1	✳	6010B SEP	Step 3
Beryllium	0.0801	J	0.297	0.0190	mg/Kg	1	✳	6010B SEP	Step 4
Cadmium	0.0594	J	0.297	0.0131	mg/Kg	1	✳	6010B SEP	Step 4
Iron	2820		5.94	3.44	mg/Kg	1	✳	6010B SEP	Step 4
Lithium	1.02	J	2.97	0.178	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	5.77		2.37	0.0463	mg/Kg	1	✳	6010B SEP	Step 4
Aluminum	521		11.9	1.90	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	1.13	J	35.6	1.07	mg/Kg	5	✳	6010B SEP	Step 5
Aluminum	101	J B * *1	178	27.9	mg/Kg	5	✳	6010B SEP	Step 5
Beryllium	0.0404	J	0.297	0.0142	mg/Kg	1	✳	6010B SEP	Step 6
Iron	2780		5.94	3.44	mg/Kg	1	✳	6010B SEP	Step 6
Lithium	1.06	J	2.97	0.178	mg/Kg	1	✳	6010B SEP	Step 6
Nickel	2.19	J	2.37	0.0629	mg/Kg	1	✳	6010B SEP	Step 6
Aluminum	627		11.9	1.90	mg/Kg	1	✳	6010B SEP	Step 6
Beryllium	0.346		0.297	0.00890	mg/Kg	1	✳	6010B SEP	Step 7
Cadmium	0.0315	J	0.297	0.0131	mg/Kg	1	✳	6010B SEP	Step 7
Iron	2180		59.4	48.7	mg/Kg	10	✳	6010B SEP	Step 7
Lithium	3.68		2.97	0.178	mg/Kg	1	✳	6010B SEP	Step 7
Nickel	0.966	J	4.75	0.135	mg/Kg	2	✳	6010B SEP	Step 7
Aluminum	18500		119	19.0	mg/Kg	10	✳	6010B SEP	Step 7
Beryllium	0.504		0.250	0.00750	mg/Kg	1		6010B SEP	Sum of
Cadmium	0.170	J	0.250	0.0110	mg/Kg	1		6010B SEP	Steps 1-7
Iron	8480		5.00	4.10	mg/Kg	1		6010B SEP	Sum of
Lithium	5.77		2.50	0.150	mg/Kg	1		6010B SEP	Steps 1-7
Nickel	11.4		2.00	0.0280	mg/Kg	1		6010B SEP	Sum of
Aluminum	19900		10.0	1.60	mg/Kg	1		6010B SEP	Steps 1-7
Beryllium	0.610		0.297	0.00890	mg/Kg	1	✳	6010B	Total/NA
Cadmium	0.0344	J	0.297	0.0131	mg/Kg	1	✳	6010B	Total/NA
Iron	18400		59.4	48.7	mg/Kg	10	✳	6010B	Total/NA
Lithium	8.60		2.97	0.178	mg/Kg	1	✳	6010B	Total/NA
Nickel	18.2		2.37	0.0677	mg/Kg	1	✳	6010B	Total/NA
Aluminum	18700		119	19.0	mg/Kg	10	✳	6010B	Total/NA

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.0584	J	0.885	0.0390	mg/Kg	3	✳	6010B SEP	Step 2
Iron	138	B * *1	17.7	10.3	mg/Kg	3	✳	6010B SEP	Step 2

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

# Detection Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**  
(Continued)

**Lab Sample ID: 140-19962-2**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	0.666	J	7.08	0.177	mg/Kg	3	✳	6010B SEP	Step 2
Aluminum	49.6	**1	35.4	5.67	mg/Kg	3	✳	6010B SEP	Step 2
Beryllium	0.0484	J	0.295	0.0177	mg/Kg	1	✳	6010B SEP	Step 3
Cadmium	0.0744	J B *	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 3
Iron	736		5.90	3.42	mg/Kg	1	✳	6010B SEP	Step 3
Nickel	1.58	J	2.36	0.0992	mg/Kg	1	✳	6010B SEP	Step 3
Aluminum	101		11.8	2.48	mg/Kg	1	✳	6010B SEP	Step 3
Beryllium	0.0803	J	0.295	0.0189	mg/Kg	1	✳	6010B SEP	Step 4
Cadmium	0.0744	J	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 4
Iron	2740		5.90	3.42	mg/Kg	1	✳	6010B SEP	Step 4
Lithium	0.920	J	2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	5.40		2.36	0.0460	mg/Kg	1	✳	6010B SEP	Step 4
Aluminum	450		11.8	1.89	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	1.33	J	35.4	1.06	mg/Kg	5	✳	6010B SEP	Step 5
Aluminum	106	J B **1	177	27.7	mg/Kg	5	✳	6010B SEP	Step 5
Beryllium	0.0531	J	0.295	0.0142	mg/Kg	1	✳	6010B SEP	Step 6
Iron	3090		5.90	3.42	mg/Kg	1	✳	6010B SEP	Step 6
Lithium	1.05	J	2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 6
Nickel	2.43		2.36	0.0626	mg/Kg	1	✳	6010B SEP	Step 6
Aluminum	631		11.8	1.89	mg/Kg	1	✳	6010B SEP	Step 6
Beryllium	0.324		0.295	0.00885	mg/Kg	1	✳	6010B SEP	Step 7
Cadmium	0.0248	J	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 7
Iron	1880		59.0	48.4	mg/Kg	10	✳	6010B SEP	Step 7
Lithium	3.46		2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 7
Nickel	0.821	J	4.72	0.135	mg/Kg	2	✳	6010B SEP	Step 7
Aluminum	18600		118	18.9	mg/Kg	10	✳	6010B SEP	Step 7
Beryllium	0.506		0.250	0.00750	mg/Kg	1		6010B SEP	Sum of
Cadmium	0.232	J	0.250	0.0110	mg/Kg	1		6010B SEP	Steps 1-7
Iron	8590		5.00	4.10	mg/Kg	1		6010B SEP	Sum of
Lithium	5.43		2.50	0.150	mg/Kg	1		6010B SEP	Steps 1-7
Nickel	12.2		2.00	0.0280	mg/Kg	1		6010B SEP	Sum of
Aluminum	20000		10.0	1.60	mg/Kg	1		6010B SEP	Steps 1-7
Beryllium	0.545		0.295	0.00885	mg/Kg	1	✳	6010B	Total/NA
Cadmium	0.0832	J	0.295	0.0130	mg/Kg	1	✳	6010B	Total/NA
Iron	10500		59.0	48.4	mg/Kg	10	✳	6010B	Total/NA
Lithium	6.69		2.95	0.177	mg/Kg	1	✳	6010B	Total/NA
Nickel	12.6		4.72	0.135	mg/Kg	2	✳	6010B	Total/NA
Aluminum	21300		118	18.9	mg/Kg	10	✳	6010B	Total/NA

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 140-19962-3**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.0442	J	0.884	0.0389	mg/Kg	3	✳	6010B SEP	Step 2
Iron	69.7	B **1	17.7	10.3	mg/Kg	3	✳	6010B SEP	Step 2
Nickel	0.624	J	7.07	0.177	mg/Kg	3	✳	6010B SEP	Step 2
Aluminum	30.7	J **1	35.4	5.66	mg/Kg	3	✳	6010B SEP	Step 2

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

# Detection Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**  
(Continued)

**Lab Sample ID: 140-19962-3**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Beryllium	0.0519	J	0.295	0.0177	mg/Kg	1	✳	6010B SEP	Step 3
Cadmium	0.0778	J B *	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 3
Iron	733		5.89	3.42	mg/Kg	1	✳	6010B SEP	Step 3
Nickel	1.85	J	2.36	0.0990	mg/Kg	1	✳	6010B SEP	Step 3
Aluminum	102		11.8	2.48	mg/Kg	1	✳	6010B SEP	Step 3
Beryllium	0.0872	J	0.295	0.0189	mg/Kg	1	✳	6010B SEP	Step 4
Cadmium	0.0796	J	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 4
Iron	2950		5.89	3.42	mg/Kg	1	✳	6010B SEP	Step 4
Lithium	1.09	J	2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	6.79		2.36	0.0460	mg/Kg	1	✳	6010B SEP	Step 4
Aluminum	515		11.8	1.89	mg/Kg	1	✳	6010B SEP	Step 4
Iron	104	B **1	88.4	51.9	mg/Kg	5	✳	6010B SEP	Step 5
Nickel	1.42	J	35.4	1.06	mg/Kg	5	✳	6010B SEP	Step 5
Aluminum	101	J B **1	177	27.7	mg/Kg	5	✳	6010B SEP	Step 5
Beryllium	0.0495	J	0.295	0.0141	mg/Kg	1	✳	6010B SEP	Step 6
Iron	3570		5.89	3.42	mg/Kg	1	✳	6010B SEP	Step 6
Lithium	1.51	J	2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 6
Nickel	2.94		2.36	0.0625	mg/Kg	1	✳	6010B SEP	Step 6
Aluminum	832		11.8	1.89	mg/Kg	1	✳	6010B SEP	Step 6
Beryllium	0.329		0.295	0.00884	mg/Kg	1	✳	6010B SEP	Step 7
Cadmium	0.0383	J	0.295	0.0130	mg/Kg	1	✳	6010B SEP	Step 7
Iron	3300		58.9	48.3	mg/Kg	10	✳	6010B SEP	Step 7
Lithium	4.38		2.95	0.177	mg/Kg	1	✳	6010B SEP	Step 7
Nickel	1.63	J	4.72	0.134	mg/Kg	2	✳	6010B SEP	Step 7
Aluminum	18600		118	18.9	mg/Kg	10	✳	6010B SEP	Step 7
Beryllium	0.518		0.250	0.00750	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cadmium	0.240	J	0.250	0.0110	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	10700		5.00	4.10	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lithium	6.98		2.50	0.150	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Nickel	15.3		2.00	0.0280	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	20200		10.0	1.60	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.569		0.295	0.00884	mg/Kg	1	✳	6010B	Total/NA
Cadmium	0.0696	J	0.295	0.0130	mg/Kg	1	✳	6010B	Total/NA
Iron	10800		58.9	48.3	mg/Kg	10	✳	6010B	Total/NA
Lithium	6.01		2.95	0.177	mg/Kg	1	✳	6010B	Total/NA
Nickel	12.8		2.36	0.0672	mg/Kg	1	✳	6010B	Total/NA
Aluminum	22600		118	18.9	mg/Kg	10	✳	6010B	Total/NA

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.0431	J	0.770	0.0339	mg/Kg	3	✳	6010B SEP	Step 2
Iron	18.7	B **1	15.4	8.93	mg/Kg	3	✳	6010B SEP	Step 2
Nickel	0.337	J	6.16	0.154	mg/Kg	3	✳	6010B SEP	Step 2
Aluminum	6.45	J **1	30.8	4.93	mg/Kg	3	✳	6010B SEP	Step 2
Beryllium	0.0416	J	0.257	0.0154	mg/Kg	1	✳	6010B SEP	Step 3

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

# Detection Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3 (Continued)**

**Lab Sample ID: 140-19962-4**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.0549	J B *	0.257	0.0113	mg/Kg	1	✳	6010B SEP	Step 3
Iron	405		5.13	2.98	mg/Kg	1	✳	6010B SEP	Step 3
Nickel	1.66	J	2.05	0.0863	mg/Kg	1	✳	6010B SEP	Step 3
Aluminum	57.2		10.3	2.16	mg/Kg	1	✳	6010B SEP	Step 3
Beryllium	0.0765	J	0.257	0.0164	mg/Kg	1	✳	6010B SEP	Step 4
Cadmium	0.0719	J	0.257	0.0113	mg/Kg	1	✳	6010B SEP	Step 4
Iron	2520		5.13	2.98	mg/Kg	1	✳	6010B SEP	Step 4
Lithium	0.949	J	2.57	0.154	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	5.43		2.05	0.0401	mg/Kg	1	✳	6010B SEP	Step 4
Aluminum	435		10.3	1.64	mg/Kg	1	✳	6010B SEP	Step 4
Nickel	1.36	J	30.8	0.924	mg/Kg	5	✳	6010B SEP	Step 5
Aluminum	102	J B * *1	154	24.1	mg/Kg	5	✳	6010B SEP	Step 5
Beryllium	0.0426	J	0.257	0.0123	mg/Kg	1	✳	6010B SEP	Step 6
Iron	2990		5.13	2.98	mg/Kg	1	✳	6010B SEP	Step 6
Lithium	1.02	J	2.57	0.154	mg/Kg	1	✳	6010B SEP	Step 6
Nickel	2.34		2.05	0.0544	mg/Kg	1	✳	6010B SEP	Step 6
Aluminum	591		10.3	1.64	mg/Kg	1	✳	6010B SEP	Step 6
Beryllium	0.305		0.257	0.00770	mg/Kg	1	✳	6010B SEP	Step 7
Cadmium	0.0524	J	0.257	0.0113	mg/Kg	1	✳	6010B SEP	Step 7
Iron	2220		51.3	42.1	mg/Kg	10	✳	6010B SEP	Step 7
Lithium	3.34		2.57	0.154	mg/Kg	1	✳	6010B SEP	Step 7
Nickel	0.912	J	4.11	0.117	mg/Kg	2	✳	6010B SEP	Step 7
Aluminum	15100		103	16.4	mg/Kg	10	✳	6010B SEP	Step 7
Beryllium	0.466		0.250	0.00750	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Cadmium	0.222	J	0.250	0.0110	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Iron	8150		5.00	4.10	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Lithium	5.31		2.50	0.150	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Nickel	12.0		2.00	0.0280	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Aluminum	16300		10.0	1.60	mg/Kg	1		6010B SEP	Sum of Steps 1-7
Beryllium	0.463		0.257	0.00770	mg/Kg	1	✳	6010B	Total/NA
Cadmium	0.0539	J	0.257	0.0113	mg/Kg	1	✳	6010B	Total/NA
Iron	8570		51.3	42.1	mg/Kg	10	✳	6010B	Total/NA
Lithium	5.42		2.57	0.154	mg/Kg	1	✳	6010B	Total/NA
Nickel	10.0		2.05	0.0585	mg/Kg	1	✳	6010B	Total/NA
Aluminum	20200		103	16.4	mg/Kg	10	✳	6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.2

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47.5	7.60	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4
Beryllium	ND		1.19	0.366	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4
Cadmium	ND		1.19	0.0760	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4
Iron	ND		23.7	13.8	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4
Lithium	ND		11.9	0.712	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4
<b>Nickel</b>	<b>0.351</b>	<b>J</b>	9.50	0.323	mg/Kg	✱	08/28/20 08:00	09/03/20 11:04	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.890	0.0570	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3
Cadmium	ND		0.890	0.0392	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3
<b>Iron</b>	<b>25.8</b>	<b>B **1</b>	17.8	10.3	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3
Lithium	ND		8.90	0.534	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3
<b>Nickel</b>	<b>0.191</b>	<b>J</b>	7.12	0.178	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3
<b>Aluminum</b>	<b>14.1</b>	<b>J *1</b>	35.6	5.70	mg/Kg	✱	08/31/20 08:00	09/03/20 11:56	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0374</b>	<b>J</b>	0.297	0.0178	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1
<b>Cadmium</b>	<b>0.0795</b>	<b>J B *</b>	0.297	0.0131	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1
<b>Iron</b>	<b>675</b>		5.94	3.44	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1
Lithium	ND		2.97	0.178	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1
<b>Nickel</b>	<b>0.807</b>	<b>J</b>	2.37	0.0997	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1
<b>Aluminum</b>	<b>86.2</b>		11.9	2.49	mg/Kg	✱	09/01/20 08:00	09/03/20 12:49	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0801</b>	<b>J</b>	0.297	0.0190	mg/Kg	✱	09/02/20 08:00	09/03/20 13:42	1
<b>Cadmium</b>	<b>0.0594</b>	<b>J</b>	0.297	0.0131	mg/Kg	✱	09/02/20 08:00	09/03/20 13:42	1
<b>Iron</b>	<b>2820</b>		5.94	3.44	mg/Kg	✱	09/02/20 08:00	09/08/20 10:53	1
<b>Lithium</b>	<b>1.02</b>	<b>J</b>	2.97	0.178	mg/Kg	✱	09/02/20 08:00	09/03/20 13:42	1
<b>Nickel</b>	<b>5.77</b>		2.37	0.0463	mg/Kg	✱	09/02/20 08:00	09/03/20 13:42	1
<b>Aluminum</b>	<b>521</b>		11.9	1.90	mg/Kg	✱	09/02/20 08:00	09/03/20 13:42	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.45	0.374	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5
Cadmium	ND		4.45	0.190	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5
Iron	ND	**1	89.0	52.2	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5
Lithium	ND		44.5	2.61	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5
<b>Nickel</b>	<b>1.13</b>	<b>J</b>	35.6	1.07	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5
<b>Aluminum</b>	<b>101</b>	<b>J B *1</b>	178	27.9	mg/Kg	✱	09/04/20 08:00	09/08/20 11:46	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0404</b>	<b>J</b>	0.297	0.0142	mg/Kg	✱	09/03/20 11:45	09/08/20 12:39	1
Cadmium	ND		0.297	0.0131	mg/Kg	✱	09/03/20 11:45	09/08/20 12:39	1
<b>Iron</b>	<b>2780</b>		5.94	3.44	mg/Kg	✱	09/03/20 11:45	09/08/20 12:39	1
<b>Lithium</b>	<b>1.06</b>	<b>J</b>	2.97	0.178	mg/Kg	✱	09/03/20 11:45	09/08/20 12:39	1

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.2

**Method: 6010B SEP - SEP Metals (ICP) - Step 6 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	2.19	J	2.37	0.0629	mg/Kg	☆	09/03/20 11:45	09/08/20 12:39	1
Aluminum	627		11.9	1.90	mg/Kg	☆	09/03/20 11:45	09/08/20 12:39	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.346		0.297	0.00890	mg/Kg	☆	09/04/20 08:00	09/09/20 12:40	1
Cadmium	0.0315	J	0.297	0.0131	mg/Kg	☆	09/04/20 08:00	09/09/20 12:40	1
Iron	2180		59.4	48.7	mg/Kg	☆	09/04/20 08:00	09/09/20 11:25	10
Lithium	3.68		2.97	0.178	mg/Kg	☆	09/04/20 08:00	09/09/20 12:40	1
Nickel	0.966	J	4.75	0.135	mg/Kg	☆	09/04/20 08:00	09/09/20 13:58	2
Aluminum	18500		119	19.0	mg/Kg	☆	09/04/20 08:00	09/09/20 11:25	10

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.504		0.250	0.00750	mg/Kg			09/11/20 13:59	1
Cadmium	0.170	J	0.250	0.0110	mg/Kg			09/11/20 13:59	1
Iron	8480		5.00	4.10	mg/Kg			09/11/20 13:59	1
Lithium	5.77		2.50	0.150	mg/Kg			09/11/20 13:59	1
Nickel	11.4		2.00	0.0280	mg/Kg			09/11/20 13:59	1
Aluminum	19900		10.0	1.60	mg/Kg			09/11/20 13:59	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.610		0.297	0.00890	mg/Kg	☆	08/27/20 08:00	09/09/20 13:08	1
Cadmium	0.0344	J	0.297	0.0131	mg/Kg	☆	08/27/20 08:00	09/09/20 13:08	1
Iron	18400		59.4	48.7	mg/Kg	☆	08/27/20 08:00	09/09/20 12:02	10
Lithium	8.60		2.97	0.178	mg/Kg	☆	08/27/20 08:00	09/09/20 13:08	1
Nickel	18.2		2.37	0.0677	mg/Kg	☆	08/27/20 08:00	09/09/20 13:08	1
Aluminum	18700		119	19.0	mg/Kg	☆	08/27/20 08:00	09/09/20 12:02	10

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.7

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47.2	7.56	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4
Beryllium	ND		1.18	0.364	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4
Cadmium	ND		1.18	0.0756	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4
Iron	ND		23.6	13.7	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4
Lithium	ND		11.8	0.708	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4
Nickel	ND		9.44	0.321	mg/Kg	☆	08/28/20 08:00	09/03/20 11:08	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.885	0.0567	mg/Kg	☆	08/31/20 08:00	09/03/20 12:01	3
Cadmium	0.0584	J	0.885	0.0390	mg/Kg	☆	08/31/20 08:00	09/03/20 12:01	3
Iron	138	B * *1	17.7	10.3	mg/Kg	☆	08/31/20 08:00	09/03/20 12:01	3
Lithium	ND		8.85	0.531	mg/Kg	☆	08/31/20 08:00	09/03/20 12:01	3
Nickel	0.666	J	7.08	0.177	mg/Kg	☆	08/31/20 08:00	09/03/20 12:01	3

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.7

### Method: 6010B SEP - SEP Metals (ICP) - Step 2 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	49.6	**1	35.4	5.67	mg/Kg	☼	08/31/20 08:00	09/03/20 12:01	3

### Method: 6010B SEP - SEP Metals (ICP) - Step 3

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0484	J	0.295	0.0177	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1
Cadmium	0.0744	J B *	0.295	0.0130	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1
Iron	736		5.90	3.42	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1
Lithium	ND		2.95	0.177	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1
Nickel	1.58	J	2.36	0.0992	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1
Aluminum	101		11.8	2.48	mg/Kg	☼	09/01/20 08:00	09/03/20 12:54	1

### Method: 6010B SEP - SEP Metals (ICP) - Step 4

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0803	J	0.295	0.0189	mg/Kg	☼	09/02/20 08:00	09/03/20 13:46	1
Cadmium	0.0744	J	0.295	0.0130	mg/Kg	☼	09/02/20 08:00	09/03/20 13:46	1
Iron	2740		5.90	3.42	mg/Kg	☼	09/02/20 08:00	09/08/20 10:58	1
Lithium	0.920	J	2.95	0.177	mg/Kg	☼	09/02/20 08:00	09/03/20 13:46	1
Nickel	5.40		2.36	0.0460	mg/Kg	☼	09/02/20 08:00	09/03/20 13:46	1
Aluminum	450		11.8	1.89	mg/Kg	☼	09/02/20 08:00	09/03/20 13:46	1

### Method: 6010B SEP - SEP Metals (ICP) - Step 5

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.43	0.372	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5
Cadmium	ND		4.43	0.189	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5
Iron	ND	**1	88.5	51.9	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5
Lithium	ND		44.3	2.60	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5
Nickel	1.33	J	35.4	1.06	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5
Aluminum	106	J B **1	177	27.7	mg/Kg	☼	09/04/20 08:00	09/08/20 11:51	5

### Method: 6010B SEP - SEP Metals (ICP) - Step 6

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0531	J	0.295	0.0142	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1
Cadmium	ND		0.295	0.0130	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1
Iron	3090		5.90	3.42	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1
Lithium	1.05	J	2.95	0.177	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1
Nickel	2.43		2.36	0.0626	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1
Aluminum	631		11.8	1.89	mg/Kg	☼	09/03/20 11:45	09/08/20 12:44	1

### Method: 6010B SEP - SEP Metals (ICP) - Step 7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.324		0.295	0.00885	mg/Kg	☼	09/04/20 08:00	09/09/20 12:45	1
Cadmium	0.0248	J	0.295	0.0130	mg/Kg	☼	09/04/20 08:00	09/09/20 12:45	1
Iron	1880		59.0	48.4	mg/Kg	☼	09/04/20 08:00	09/09/20 11:29	10
Lithium	3.46		2.95	0.177	mg/Kg	☼	09/04/20 08:00	09/09/20 12:45	1
Nickel	0.821	J	4.72	0.135	mg/Kg	☼	09/04/20 08:00	09/09/20 14:02	2
Aluminum	18600		118	18.9	mg/Kg	☼	09/04/20 08:00	09/09/20 11:29	10

### Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.506		0.250	0.00750	mg/Kg			09/11/20 13:59	1
Cadmium	0.232	J	0.250	0.0110	mg/Kg			09/11/20 13:59	1

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.7

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	8590		5.00	4.10	mg/Kg			09/11/20 13:59	1
Lithium	5.43		2.50	0.150	mg/Kg			09/11/20 13:59	1
Nickel	12.2		2.00	0.0280	mg/Kg			09/11/20 13:59	1
Aluminum	20000		10.0	1.60	mg/Kg			09/11/20 13:59	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.545		0.295	0.00885	mg/Kg	✱	08/27/20 08:00	09/09/20 13:13	1
Cadmium	0.0832	J	0.295	0.0130	mg/Kg	✱	08/27/20 08:00	09/09/20 13:13	1
Iron	10500		59.0	48.4	mg/Kg	✱	08/27/20 08:00	09/09/20 12:07	10
Lithium	6.69		2.95	0.177	mg/Kg	✱	08/27/20 08:00	09/09/20 13:13	1
Nickel	12.6		4.72	0.135	mg/Kg	✱	08/27/20 08:00	09/09/20 14:26	2
Aluminum	21300		118	18.9	mg/Kg	✱	08/27/20 08:00	09/09/20 12:07	10

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 140-19962-3**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.8

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		47.2	7.55	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4
Beryllium	ND		1.18	0.363	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4
Cadmium	ND		1.18	0.0755	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4
Iron	ND		23.6	13.7	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4
Lithium	ND		11.8	0.707	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4
Nickel	ND		9.43	0.321	mg/Kg	✱	08/28/20 08:00	09/03/20 11:13	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.884	0.0566	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3
Cadmium	0.0442	J	0.884	0.0389	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3
Iron	69.7	B **1	17.7	10.3	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3
Lithium	ND		8.84	0.531	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3
Nickel	0.624	J	7.07	0.177	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3
Aluminum	30.7	J **1	35.4	5.66	mg/Kg	✱	08/31/20 08:00	09/03/20 12:06	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0519	J	0.295	0.0177	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1
Cadmium	0.0778	J B *	0.295	0.0130	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1
Iron	733		5.89	3.42	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1
Lithium	ND		2.95	0.177	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1
Nickel	1.85	J	2.36	0.0990	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1
Aluminum	102		11.8	2.48	mg/Kg	✱	09/01/20 08:00	09/03/20 12:59	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0872	J	0.295	0.0189	mg/Kg	✱	09/02/20 08:00	09/03/20 13:51	1
Cadmium	0.0796	J	0.295	0.0130	mg/Kg	✱	09/02/20 08:00	09/03/20 13:51	1
Iron	2950		5.89	3.42	mg/Kg	✱	09/02/20 08:00	09/08/20 11:03	1
Lithium	1.09	J	2.95	0.177	mg/Kg	✱	09/02/20 08:00	09/03/20 13:51	1

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 140-19962-3**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 84.8

**Method: 6010B SEP - SEP Metals (ICP) - Step 4 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	6.79		2.36	0.0460	mg/Kg	☆	09/02/20 08:00	09/03/20 13:51	1
Aluminum	515		11.8	1.89	mg/Kg	☆	09/02/20 08:00	09/03/20 13:51	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.42	0.371	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5
Cadmium	ND		4.42	0.189	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5
Iron	104	B * *1	88.4	51.9	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5
Lithium	ND		44.2	2.59	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5
Nickel	1.42	J	35.4	1.06	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5
Aluminum	101	J B * *1	177	27.7	mg/Kg	☆	09/04/20 08:00	09/08/20 11:56	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0495	J	0.295	0.0141	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1
Cadmium	ND		0.295	0.0130	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1
Iron	3570		5.89	3.42	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1
Lithium	1.51	J	2.95	0.177	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1
Nickel	2.94		2.36	0.0625	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1
Aluminum	832		11.8	1.89	mg/Kg	☆	09/03/20 11:45	09/08/20 12:49	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.329		0.295	0.00884	mg/Kg	☆	09/04/20 08:00	09/09/20 12:49	1
Cadmium	0.0383	J	0.295	0.0130	mg/Kg	☆	09/04/20 08:00	09/09/20 12:49	1
Iron	3300		58.9	48.3	mg/Kg	☆	09/04/20 08:00	09/09/20 11:43	10
Lithium	4.38		2.95	0.177	mg/Kg	☆	09/04/20 08:00	09/09/20 12:49	1
Nickel	1.63	J	4.72	0.134	mg/Kg	☆	09/04/20 08:00	09/09/20 14:07	2
Aluminum	18600		118	18.9	mg/Kg	☆	09/04/20 08:00	09/09/20 11:43	10

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.518		0.250	0.00750	mg/Kg			09/11/20 13:59	1
Cadmium	0.240	J	0.250	0.0110	mg/Kg			09/11/20 13:59	1
Iron	10700		5.00	4.10	mg/Kg			09/11/20 13:59	1
Lithium	6.98		2.50	0.150	mg/Kg			09/11/20 13:59	1
Nickel	15.3		2.00	0.0280	mg/Kg			09/11/20 13:59	1
Aluminum	20200		10.0	1.60	mg/Kg			09/11/20 13:59	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.569		0.295	0.00884	mg/Kg	☆	08/27/20 08:00	09/09/20 13:18	1
Cadmium	0.0696	J	0.295	0.0130	mg/Kg	☆	08/27/20 08:00	09/09/20 13:18	1
Iron	10800		58.9	48.3	mg/Kg	☆	08/27/20 08:00	09/09/20 12:12	10
Lithium	6.01		2.95	0.177	mg/Kg	☆	08/27/20 08:00	09/09/20 13:18	1
Nickel	12.8		2.36	0.0672	mg/Kg	☆	08/27/20 08:00	09/09/20 13:18	1
Aluminum	22600		118	18.9	mg/Kg	☆	08/27/20 08:00	09/09/20 12:12	10

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 97.4

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		41.1	6.57	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4
Beryllium	ND		1.03	0.316	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4
Cadmium	ND		1.03	0.0657	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4
Iron	ND		20.5	11.9	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4
Lithium	ND		10.3	0.616	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4
Nickel	ND		8.22	0.279	mg/Kg	☼	08/28/20 08:00	09/03/20 11:18	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.770	0.0493	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3
Cadmium	0.0431	J	0.770	0.0339	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3
Iron	18.7	B **1	15.4	8.93	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3
Lithium	ND		7.70	0.462	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3
Nickel	0.337	J	6.16	0.154	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3
Aluminum	6.45	J **1	30.8	4.93	mg/Kg	☼	08/31/20 08:00	09/03/20 12:11	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0416	J	0.257	0.0154	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1
Cadmium	0.0549	J B *	0.257	0.0113	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1
Iron	405		5.13	2.98	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1
Lithium	ND		2.57	0.154	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1
Nickel	1.66	J	2.05	0.0863	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1
Aluminum	57.2		10.3	2.16	mg/Kg	☼	09/01/20 08:00	09/03/20 13:04	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0765	J	0.257	0.0164	mg/Kg	☼	09/02/20 08:00	09/03/20 13:56	1
Cadmium	0.0719	J	0.257	0.0113	mg/Kg	☼	09/02/20 08:00	09/03/20 13:56	1
Iron	2520		5.13	2.98	mg/Kg	☼	09/02/20 08:00	09/08/20 11:08	1
Lithium	0.949	J	2.57	0.154	mg/Kg	☼	09/02/20 08:00	09/03/20 13:56	1
Nickel	5.43		2.05	0.0401	mg/Kg	☼	09/02/20 08:00	09/03/20 13:56	1
Aluminum	435		10.3	1.64	mg/Kg	☼	09/02/20 08:00	09/03/20 13:56	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	3.85	0.323	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5
Cadmium	ND		3.85	0.164	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5
Iron	ND	**1	77.0	45.2	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5
Lithium	ND		38.5	2.26	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5
Nickel	1.36	J	30.8	0.924	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5
Aluminum	102	J B **1	154	24.1	mg/Kg	☼	09/04/20 08:00	09/08/20 12:01	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0426	J	0.257	0.0123	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1
Cadmium	ND		0.257	0.0113	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1
Iron	2990		5.13	2.98	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1
Lithium	1.02	J	2.57	0.154	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1
Nickel	2.34		2.05	0.0544	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1
Aluminum	591		10.3	1.64	mg/Kg	☼	09/03/20 11:45	09/08/20 12:54	1

Eurofins TestAmerica, Knoxville

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 97.4

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.305		0.257	0.00770	mg/Kg	☼	09/04/20 08:00	09/09/20 12:54	1
Cadmium	0.0524	J	0.257	0.0113	mg/Kg	☼	09/04/20 08:00	09/09/20 12:54	1
Iron	2220		51.3	42.1	mg/Kg	☼	09/04/20 08:00	09/09/20 11:48	10
Lithium	3.34		2.57	0.154	mg/Kg	☼	09/04/20 08:00	09/09/20 12:54	1
Nickel	0.912	J	4.11	0.117	mg/Kg	☼	09/04/20 08:00	09/09/20 14:12	2
Aluminum	15100		103	16.4	mg/Kg	☼	09/04/20 08:00	09/09/20 11:48	10

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.466		0.250	0.00750	mg/Kg			09/11/20 13:59	1
Cadmium	0.222	J	0.250	0.0110	mg/Kg			09/11/20 13:59	1
Iron	8150		5.00	4.10	mg/Kg			09/11/20 13:59	1
Lithium	5.31		2.50	0.150	mg/Kg			09/11/20 13:59	1
Nickel	12.0		2.00	0.0280	mg/Kg			09/11/20 13:59	1
Aluminum	16300		10.0	1.60	mg/Kg			09/11/20 13:59	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.463		0.257	0.00770	mg/Kg	☼	08/27/20 08:00	09/09/20 13:23	1
Cadmium	0.0539	J	0.257	0.0113	mg/Kg	☼	08/27/20 08:00	09/09/20 13:23	1
Iron	8570		51.3	42.1	mg/Kg	☼	08/27/20 08:00	09/09/20 12:16	10
Lithium	5.42		2.57	0.154	mg/Kg	☼	08/27/20 08:00	09/09/20 13:23	1
Nickel	10.0		2.05	0.0585	mg/Kg	☼	08/27/20 08:00	09/09/20 13:23	1
Aluminum	20200		103	16.4	mg/Kg	☼	08/27/20 08:00	09/09/20 12:16	10

# Default Detection Limits

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) - Step 1

Prep: 3010A

SEP: Exchangeable

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.0770	mg/Kg
Cadmium	0.250	0.0160	mg/Kg
Iron	5.00	2.90	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0680	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Step 2

Prep: 3010A

SEP: Carbonate

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.0160	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	2.90	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0500	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Step 3

Prep: 3010A

SEP: Non-Crystalline

Analyte	RL	MDL	Units
Aluminum	10.0	2.10	mg/Kg
Beryllium	0.250	0.0150	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	2.90	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0840	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Step 4

Prep: 3010A

SEP: Metal Hydroxide

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.0160	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	2.90	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0390	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Step 5

Prep: 3010A

SEP: Organic-Bound

Analyte	RL	MDL	Units
Aluminum	30.0	4.70	mg/Kg
Beryllium	0.750	0.0630	mg/Kg
Cadmium	0.750	0.0320	mg/Kg
Iron	15.0	8.80	mg/Kg
Lithium	7.50	0.440	mg/Kg
Nickel	6.00	0.180	mg/Kg

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# Default Detection Limits

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) - Step 6

### SEP: Acid/Sulfide

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.0120	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	2.90	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0530	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Step 7

### Prep: Residual

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.00750	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	4.10	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0570	mg/Kg

## Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.00750	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	4.10	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0280	mg/Kg

## Method: 6010B - SEP Metals (ICP) - Total

### Prep: Total

Analyte	RL	MDL	Units
Aluminum	10.0	1.60	mg/Kg
Beryllium	0.250	0.00750	mg/Kg
Cadmium	0.250	0.0110	mg/Kg
Iron	5.00	4.10	mg/Kg
Lithium	2.50	0.150	mg/Kg
Nickel	2.00	0.0570	mg/Kg

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B - SEP Metals (ICP) - Total

**Lab Sample ID: MB 140-42166/8-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 42166**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.00750	mg/Kg		08/27/20 08:00	09/09/20 11:01	1
Cadmium	ND		0.250	0.0110	mg/Kg		08/27/20 08:00	09/09/20 11:01	1
Iron	ND		5.00	4.10	mg/Kg		08/27/20 08:00	09/09/20 11:01	1
Lithium	ND		2.50	0.150	mg/Kg		08/27/20 08:00	09/09/20 11:01	1
Nickel	ND		2.00	0.0570	mg/Kg		08/27/20 08:00	09/09/20 11:01	1
Aluminum	ND		10.0	1.60	mg/Kg		08/27/20 08:00	09/09/20 11:01	1

**Lab Sample ID: LCS 140-42166/9-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 42166**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.572		mg/Kg		103	75 - 125
Cadmium	2.50	2.617		mg/Kg		105	75 - 125
Iron	50.0	52.73		mg/Kg		105	75 - 125
Lithium	5.00	5.103		mg/Kg		102	75 - 125
Nickel	25.0	26.07		mg/Kg		104	75 - 125
Aluminum	100	99.23		mg/Kg		99	75 - 125

**Lab Sample ID: LCSD 140-42166/10-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 42166**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.539		mg/Kg		102	75 - 125	1	30
Cadmium	2.50	2.596		mg/Kg		104	75 - 125	1	30
Iron	50.0	52.54		mg/Kg		105	75 - 125	0	30
Lithium	5.00	5.112		mg/Kg		102	75 - 125	0	30
Nickel	25.0	25.93		mg/Kg		104	75 - 125	1	30
Aluminum	100	98.63		mg/Kg		99	75 - 125	1	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Total/NA**  
**Prep Batch: 42166**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	8570		11970	F3	mg/Kg	⊛	33	30
Aluminum	20200		22440		mg/Kg	⊛	11	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Total/NA**  
**Prep Batch: 42166**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.463		0.5905		mg/Kg	⊛	24	30
Cadmium	0.0539	J	0.07959	J F5	mg/Kg	⊛	38	30
Lithium	5.42		6.411		mg/Kg	⊛	17	30
Nickel	10.0		12.99		mg/Kg	⊛	26	30

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP)

**Lab Sample ID: MB 140-42168/8-B ^4**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 1**  
**Prep Batch: 42218**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.308	mg/Kg		08/28/20 08:00	09/03/20 10:50	4
Cadmium	ND		1.00	0.0640	mg/Kg		08/28/20 08:00	09/03/20 10:50	4
Iron	ND		20.0	11.6	mg/Kg		08/28/20 08:00	09/03/20 10:50	4
Lithium	ND		10.0	0.600	mg/Kg		08/28/20 08:00	09/03/20 10:50	4
Nickel	ND		8.00	0.272	mg/Kg		08/28/20 08:00	09/03/20 10:50	4
Aluminum	ND		40.0	6.40	mg/Kg		08/28/20 08:00	09/03/20 10:50	4

**Lab Sample ID: LCS 140-42168/9-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 1**  
**Prep Batch: 42218**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.470		mg/Kg		99	75 - 125
Cadmium	2.50	2.405		mg/Kg		96	75 - 125
Iron	50.0	47.18		mg/Kg		94	75 - 125
Lithium	5.00	5.390	J	mg/Kg		108	75 - 125
Nickel	25.0	23.30		mg/Kg		93	75 - 125
Aluminum	100	90.97		mg/Kg		91	75 - 125

**Lab Sample ID: LCSD 140-42168/10-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 1**  
**Prep Batch: 42218**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.528		mg/Kg		101	75 - 125	2	30
Cadmium	2.50	2.445		mg/Kg		98	75 - 125	2	30
Iron	50.0	49.52		mg/Kg		99	75 - 125	5	30
Lithium	5.00	5.095	J	mg/Kg		102	75 - 125	6	30
Nickel	25.0	23.70		mg/Kg		95	75 - 125	2	30
Aluminum	100	91.03		mg/Kg		91	75 - 125	0	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 1**  
**Prep Batch: 42218**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	ND		ND		mg/Kg	⊛	NC	30
Cadmium	ND		ND		mg/Kg	⊛	NC	30
Iron	ND		ND		mg/Kg	⊛	NC	30
Lithium	ND		ND		mg/Kg	⊛	NC	30
Nickel	ND		ND		mg/Kg	⊛	NC	30
Aluminum	ND		ND		mg/Kg	⊛	NC	30

**Lab Sample ID: MB 140-42219/8-B ^3**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 2**  
**Prep Batch: 42267**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.750	0.0480	mg/Kg		08/31/20 08:00	09/03/20 11:42	3

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: MB 140-42219/8-B ^3**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 2**  
**Prep Batch: 42267**

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cadmium	ND		0.750	0.0330	mg/Kg		08/31/20 08:00	09/03/20 11:42	3
Iron	10.20	J	15.0	8.70	mg/Kg		08/31/20 08:00	09/03/20 11:42	3
Lithium	ND		7.50	0.450	mg/Kg		08/31/20 08:00	09/03/20 11:42	3
Nickel	ND		6.00	0.150	mg/Kg		08/31/20 08:00	09/03/20 11:42	3
Aluminum	ND		30.0	4.80	mg/Kg		08/31/20 08:00	09/03/20 11:42	3

**Lab Sample ID: LCS 140-42219/9-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 2**  
**Prep Batch: 42267**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	
							Result	Qualifier
Beryllium	2.50	1.355	*	mg/Kg		54	75 - 125	
Cadmium	2.50	2.493		mg/Kg		100	75 - 125	
Iron	50.0	ND	*	mg/Kg		6	75 - 125	
Lithium	5.00	5.140	J	mg/Kg		103	75 - 125	
Nickel	25.0	23.67		mg/Kg		95	75 - 125	
Aluminum	100	ND	*	mg/Kg		-4	75 - 125	

**Lab Sample ID: LCSD 140-42219/10-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 2**  
**Prep Batch: 42267**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD Limit	
							Result	Qualifier	RPD	Limit
Beryllium	2.50	1.310	*	mg/Kg		52	75 - 125	3	30	
Cadmium	2.50	2.423		mg/Kg		97	75 - 125	3	30	
Iron	50.0	ND	**1	mg/Kg		4	75 - 125	40	30	
Lithium	5.00	5.078	J	mg/Kg		102	75 - 125	1	30	
Nickel	25.0	23.03		mg/Kg		92	75 - 125	3	30	
Aluminum	100	ND	**1	mg/Kg		-0.4	75 - 125	165	30	

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 2**  
**Prep Batch: 42267**

Analyte	Sample Sample		DU DU		Unit	D	RPD	RPD Limit	
	Result	Qualifier	Result	Qualifier				RPD	Limit
Beryllium	ND	*	ND	*	mg/Kg	⊛	NC	30	
Cadmium	0.0431	J	0.04005	J	mg/Kg	⊛	7	30	
Iron	18.7	B **1	19.84	**1	mg/Kg	⊛	6	30	
Lithium	ND		ND		mg/Kg	⊛	NC	30	
Nickel	0.337	J	0.2973	J	mg/Kg	⊛	13	30	
Aluminum	6.45	J **1	5.208	J **1	mg/Kg	⊛	21	30	

**Lab Sample ID: MB 140-42268/6-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 3**  
**Prep Batch: 42349**

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Beryllium	ND		0.250	0.0150	mg/Kg		09/01/20 08:00	09/03/20 12:35	1
Cadmium	0.07300	J	0.250	0.0110	mg/Kg		09/01/20 08:00	09/03/20 12:35	1
Iron	ND		5.00	2.90	mg/Kg		09/01/20 08:00	09/03/20 12:35	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: MB 140-42268/6-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 3**  
**Prep Batch: 42349**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	ND		2.50	0.150	mg/Kg		09/01/20 08:00	09/03/20 12:35	1
Nickel	ND		2.00	0.0840	mg/Kg		09/01/20 08:00	09/03/20 12:35	1
Aluminum	ND		10.0	2.10	mg/Kg		09/01/20 08:00	09/03/20 12:35	1

**Lab Sample ID: LCS 140-42268/7-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 3**  
**Prep Batch: 42349**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.515		mg/Kg		101	75 - 125
Cadmium	2.50	0.8610	*	mg/Kg		34	75 - 125
Iron	50.0	45.23		mg/Kg		90	75 - 125
Lithium	5.00	5.258		mg/Kg		105	75 - 125
Nickel	25.0	23.69		mg/Kg		95	75 - 125
Aluminum	100	91.17		mg/Kg		91	75 - 125

**Lab Sample ID: LCSD 140-42268/8-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 3**  
**Prep Batch: 42349**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.553		mg/Kg		102	75 - 125	2	30
Cadmium	2.50	0.9660	*	mg/Kg		39	75 - 125	11	30
Iron	50.0	46.10		mg/Kg		92	75 - 125	2	30
Lithium	5.00	5.355		mg/Kg		107	75 - 125	2	30
Nickel	25.0	24.16		mg/Kg		97	75 - 125	2	30
Aluminum	100	91.81		mg/Kg		92	75 - 125	1	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 3**  
**Prep Batch: 42349**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.0416	J	0.03954	J	mg/Kg	☼	5	30
Cadmium	0.0549	J B *	0.05340	J *	mg/Kg	☼	3	30
Iron	405		446.1		mg/Kg	☼	10	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Nickel	1.66	J	1.595	J	mg/Kg	☼	4	30
Aluminum	57.2		58.10		mg/Kg	☼	2	30

**Lab Sample ID: MB 140-42350/6-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Method Blank**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.0160	mg/Kg		09/02/20 08:00	09/03/20 13:28	1
Cadmium	ND		0.250	0.0110	mg/Kg		09/02/20 08:00	09/03/20 13:28	1
Lithium	ND		2.50	0.150	mg/Kg		09/02/20 08:00	09/03/20 13:28	1
Nickel	ND		2.00	0.0390	mg/Kg		09/02/20 08:00	09/03/20 13:28	1
Aluminum	ND		10.0	1.60	mg/Kg		09/02/20 08:00	09/03/20 13:28	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP)

**Lab Sample ID: MB 140-42350/6-B**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Method Blank**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.0160	mg/Kg		09/02/20 08:00	09/08/20 10:39	1
Cadmium	ND		0.250	0.0110	mg/Kg		09/02/20 08:00	09/08/20 10:39	1
Iron	ND		5.00	2.90	mg/Kg		09/02/20 08:00	09/08/20 10:39	1
Lithium	ND		2.50	0.150	mg/Kg		09/02/20 08:00	09/08/20 10:39	1
Nickel	ND		2.00	0.0390	mg/Kg		09/02/20 08:00	09/08/20 10:39	1
Aluminum	ND		10.0	1.60	mg/Kg		09/02/20 08:00	09/08/20 10:39	1

**Lab Sample ID: LCS 140-42350/7-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.589		mg/Kg		104	75 - 125
Cadmium	2.50	2.525		mg/Kg		101	75 - 125
Lithium	5.00	5.451		mg/Kg		109	75 - 125
Nickel	25.0	24.17		mg/Kg		97	75 - 125
Aluminum	100	90.59		mg/Kg		91	75 - 125

**Lab Sample ID: LCS 140-42350/7-B**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.631		mg/Kg		105	75 - 125
Cadmium	2.50	2.546		mg/Kg		102	75 - 125
Iron	50.0	49.83		mg/Kg		100	75 - 125
Lithium	5.00	5.092		mg/Kg		102	75 - 125
Nickel	25.0	24.45		mg/Kg		98	75 - 125
Aluminum	100	96.88		mg/Kg		97	75 - 125

**Lab Sample ID: LCSD 140-42350/8-B**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.589		mg/Kg		104	75 - 125	0	30
Cadmium	2.50	2.534		mg/Kg		101	75 - 125	0	30
Lithium	5.00	5.486		mg/Kg		110	75 - 125	1	30
Nickel	25.0	24.22		mg/Kg		97	75 - 125	0	30
Aluminum	100	90.30		mg/Kg		90	75 - 125	0	30

**Lab Sample ID: LCSD 140-42350/8-B**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.668		mg/Kg		107	75 - 125	1	30
Cadmium	2.50	2.577		mg/Kg		103	75 - 125	1	30
Iron	50.0	51.35		mg/Kg		103	75 - 125	3	30

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCSD 140-42350/8-B**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	5.00	5.159		mg/Kg		103	75 - 125	1	30
Nickel	25.0	24.73		mg/Kg		99	75 - 125	1	30
Aluminum	100	100.1		mg/Kg		100	75 - 125	3	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42475**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.0765	J	0.08729	J	mg/Kg	⊛	13	30
Cadmium	0.0719	J	0.08729	J	mg/Kg	⊛	19	30
Lithium	0.949	J	1.124	J	mg/Kg	⊛	17	30
Nickel	5.43		6.239		mg/Kg	⊛	14	30
Aluminum	435		517.6		mg/Kg	⊛	17	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 4**  
**Prep Batch: 42391**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	2520		3013		mg/Kg	⊛	18	30

**Lab Sample ID: MB 140-42393/6-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Method Blank**  
**Prep Type: Step 5**  
**Prep Batch: 42458**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		3.75	0.315	mg/Kg		09/04/20 08:00	09/08/20 11:32	5
Cadmium	ND		3.75	0.160	mg/Kg		09/04/20 08:00	09/08/20 11:32	5
Iron	48.24	J	75.0	44.0	mg/Kg		09/04/20 08:00	09/08/20 11:32	5
Lithium	ND		37.5	2.20	mg/Kg		09/04/20 08:00	09/08/20 11:32	5
Nickel	ND		30.0	0.900	mg/Kg		09/04/20 08:00	09/08/20 11:32	5
Aluminum	28.00	J	150	23.5	mg/Kg		09/04/20 08:00	09/08/20 11:32	5

**Lab Sample ID: LCS 140-42393/7-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 5**  
**Prep Batch: 42458**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	7.50	3.998	*	mg/Kg		53	75 - 125
Cadmium	7.50	7.718		mg/Kg		103	75 - 125
Iron	150	ND	*	mg/Kg		2	75 - 125
Lithium	15.0	17.87	J	mg/Kg		119	75 - 125
Nickel	75.0	56.90		mg/Kg		76	75 - 125
Aluminum	300	ND	*	mg/Kg		2	75 - 125

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCSD 140-42393/8-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 5**  
**Prep Batch: 42458**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Beryllium	7.50	4.163	*	mg/Kg		56	75 - 125	4	30	
Cadmium	7.50	8.018		mg/Kg		107	75 - 125	4	30	
Iron	150	ND	**1	mg/Kg		3	75 - 125	54	30	
Lithium	15.0	17.80	J	mg/Kg		119	75 - 125	0	30	
Nickel	75.0	60.80		mg/Kg		81	75 - 125	7	30	
Aluminum	300	ND	**1	mg/Kg		4	75 - 125	44	30	

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 5**  
**Prep Batch: 42458**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Cadmium	ND		ND		mg/Kg	☼	NC	30
Iron	ND	**1	ND	**1	mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Nickel	1.36	J	1.617	J	mg/Kg	☼	17	30
Aluminum	102	J B **1	128.3	J **1	mg/Kg	☼	23	30

**Lab Sample ID: MB 140-42459/6-A**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Method Blank**  
**Prep Type: Step 6**  
**Prep Batch: 42459**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.250	0.0110	mg/Kg		09/03/20 11:45	09/08/20 12:25	1
Iron	ND		5.00	2.90	mg/Kg		09/03/20 11:45	09/08/20 12:25	1
Lithium	ND		2.50	0.150	mg/Kg		09/03/20 11:45	09/08/20 12:25	1
Nickel	ND		2.00	0.0530	mg/Kg		09/03/20 11:45	09/08/20 12:25	1
Aluminum	ND		10.0	1.60	mg/Kg		09/03/20 11:45	09/08/20 12:25	1

**Lab Sample ID: LCS 140-42459/7-A**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 6**  
**Prep Batch: 42459**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.	
							Limits	RPD
Beryllium	2.50	2.499		mg/Kg		100	75 - 125	
Cadmium	2.50	2.453		mg/Kg		98	75 - 125	
Iron	50.0	44.76		mg/Kg		90	75 - 125	
Lithium	5.00	5.007		mg/Kg		100	75 - 125	
Nickel	25.0	23.26		mg/Kg		93	75 - 125	
Aluminum	100	91.09		mg/Kg		91	75 - 125	

**Lab Sample ID: LCSD 140-42459/8-A**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 6**  
**Prep Batch: 42459**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Beryllium	2.50	2.558		mg/Kg		102	75 - 125	2	30	

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCSD 140-42459/8-A**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 6**  
**Prep Batch: 42459**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	2.50	2.504		mg/Kg		100	75 - 125	2	30
Iron	50.0	45.44		mg/Kg		91	75 - 125	2	30
Lithium	5.00	5.064		mg/Kg		101	75 - 125	1	30
Nickel	25.0	23.72		mg/Kg		95	75 - 125	2	30
Aluminum	100	92.41		mg/Kg		92	75 - 125	1	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42539**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 6**  
**Prep Batch: 42459**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.0426	J	0.04981	J	mg/Kg	☼	16	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Iron	2990		3364		mg/Kg	☼	12	30
Lithium	1.02	J	1.071	J	mg/Kg	☼	5	30
Nickel	2.34		2.684		mg/Kg	☼	14	30
Aluminum	591		647.3		mg/Kg	☼	9	30

**Lab Sample ID: MB 140-42471/6-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Method Blank**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.00750	mg/Kg		09/04/20 08:00	09/09/20 10:46	1
Cadmium	ND		0.250	0.0110	mg/Kg		09/04/20 08:00	09/09/20 10:46	1
Iron	ND		5.00	4.10	mg/Kg		09/04/20 08:00	09/09/20 10:46	1
Lithium	ND		2.50	0.150	mg/Kg		09/04/20 08:00	09/09/20 10:46	1
Nickel	ND		2.00	0.0570	mg/Kg		09/04/20 08:00	09/09/20 10:46	1
Aluminum	ND		10.0	1.60	mg/Kg		09/04/20 08:00	09/09/20 10:46	1

**Lab Sample ID: LCS 140-42471/7-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.576		mg/Kg		103	75 - 125
Cadmium	2.50	2.621		mg/Kg		105	75 - 125
Iron	50.0	52.54		mg/Kg		105	75 - 125
Lithium	5.00	5.119		mg/Kg		102	75 - 125
Nickel	25.0	25.74		mg/Kg		103	75 - 125
Aluminum	100	99.37		mg/Kg		99	75 - 125

**Lab Sample ID: LCSD 140-42471/8-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.566		mg/Kg		103	75 - 125	0	30
Cadmium	2.50	2.619		mg/Kg		105	75 - 125	0	30
Iron	50.0	52.02		mg/Kg		104	75 - 125	1	30

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCSD 140-42471/8-A**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	5.00	5.173		mg/Kg		103	75 - 125	1	30
Nickel	25.0	25.79		mg/Kg		103	75 - 125	0	30
Aluminum	100	98.88		mg/Kg		99	75 - 125	0	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Iron	2220		2698		mg/Kg	⊛	19	30
Aluminum	15100		17780		mg/Kg	⊛	16	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.305		0.3014		mg/Kg	⊛	1	30
Cadmium	0.0524	J	0.03800	J F5	mg/Kg	⊛	32	30
Lithium	3.34		3.115		mg/Kg	⊛	7	30

**Lab Sample ID: 140-19962-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 42568**

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**  
**Prep Type: Step 7**  
**Prep Batch: 42471**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nickel	0.912	J	2.100	J F5	mg/Kg	⊛	79	30

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Metals

### Prep Batch: 42166

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	Total	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	Total	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	Total	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	Total	
MB 140-42166/8-A	Method Blank	Total/NA	Solid	Total	
LCS 140-42166/9-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-42166/10-A	Lab Control Sample Dup	Total/NA	Solid	Total	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	Total	

### SEP Batch: 42168

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 1	Solid	Exchangeable	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 1	Solid	Exchangeable	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 1	Solid	Exchangeable	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	Exchangeable	
MB 140-42168/8-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-42168/9-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-42168/10-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	Exchangeable	

### Prep Batch: 42218

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 1	Solid	3010A	42168
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 1	Solid	3010A	42168
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 1	Solid	3010A	42168
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	3010A	42168
MB 140-42168/8-B ^4	Method Blank	Step 1	Solid	3010A	42168
LCS 140-42168/9-B ^5	Lab Control Sample	Step 1	Solid	3010A	42168
LCSD 140-42168/10-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	42168
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	3010A	42168

### SEP Batch: 42219

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 2	Solid	Carbonate	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 2	Solid	Carbonate	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 2	Solid	Carbonate	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	Carbonate	
MB 140-42219/8-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-42219/9-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-42219/10-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	Carbonate	

### Prep Batch: 42267

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 2	Solid	3010A	42219
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 2	Solid	3010A	42219
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 2	Solid	3010A	42219
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	3010A	42219
MB 140-42219/8-B ^3	Method Blank	Step 2	Solid	3010A	42219
LCS 140-42219/9-B ^5	Lab Control Sample	Step 2	Solid	3010A	42219
LCSD 140-42219/10-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	42219

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Metals (Continued)

### Prep Batch: 42267 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	3010A	42219

### SEP Batch: 42268

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 3	Solid	Non-Crystalline	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 3	Solid	Non-Crystalline	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 3	Solid	Non-Crystalline	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	Non-Crystalline	
MB 140-42268/6-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-42268/7-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-42268/8-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	Non-Crystalline	

### Prep Batch: 42349

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 3	Solid	3010A	42268
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 3	Solid	3010A	42268
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 3	Solid	3010A	42268
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	3010A	42268
MB 140-42268/6-B	Method Blank	Step 3	Solid	3010A	42268
LCS 140-42268/7-B	Lab Control Sample	Step 3	Solid	3010A	42268
LCSD 140-42268/8-B	Lab Control Sample Dup	Step 3	Solid	3010A	42268
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	3010A	42268

### SEP Batch: 42350

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 4	Solid	Metal Hydroxide	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 4	Solid	Metal Hydroxide	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 4	Solid	Metal Hydroxide	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	Metal Hydroxide	
MB 140-42350/6-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-42350/7-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-42350/8-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	Metal Hydroxide	

### Prep Batch: 42391

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 4	Solid	3010A	42350
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 4	Solid	3010A	42350
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 4	Solid	3010A	42350
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	3010A	42350
MB 140-42350/6-B	Method Blank	Step 4	Solid	3010A	42350
LCS 140-42350/7-B	Lab Control Sample	Step 4	Solid	3010A	42350
LCSD 140-42350/8-B	Lab Control Sample Dup	Step 4	Solid	3010A	42350
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	3010A	42350

### SEP Batch: 42393

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 5	Solid	Organic-Bound	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 5	Solid	Organic-Bound	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 5	Solid	Organic-Bound	

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Metals (Continued)

### SEP Batch: 42393 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	Organic-Bound	
MB 140-42393/6-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-42393/7-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-42393/8-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	Organic-Bound	

### Prep Batch: 42458

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 5	Solid	3010A	42393
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 5	Solid	3010A	42393
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 5	Solid	3010A	42393
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	3010A	42393
MB 140-42393/6-B ^5	Method Blank	Step 5	Solid	3010A	42393
LCS 140-42393/7-B ^5	Lab Control Sample	Step 5	Solid	3010A	42393
LCSD 140-42393/8-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	42393
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	3010A	42393

### SEP Batch: 42459

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 6	Solid	Acid/Sulfide	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 6	Solid	Acid/Sulfide	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 6	Solid	Acid/Sulfide	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 6	Solid	Acid/Sulfide	
MB 140-42459/6-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-42459/7-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-42459/8-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 6	Solid	Acid/Sulfide	

### Prep Batch: 42471

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 7	Solid	Residual	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 7	Solid	Residual	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 7	Solid	Residual	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	Residual	
MB 140-42471/6-A	Method Blank	Step 7	Solid	Residual	
LCS 140-42471/7-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-42471/8-A	Lab Control Sample Dup	Step 7	Solid	Residual	
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	Residual	

### Analysis Batch: 42475

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 1	Solid	6010B SEP	42218
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 2	Solid	6010B SEP	42267
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 3	Solid	6010B SEP	42349
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 1	Solid	6010B SEP	42218
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 2	Solid	6010B SEP	42267
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 3	Solid	6010B SEP	42349
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 1	Solid	6010B SEP	42218
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 2	Solid	6010B SEP	42267

Eurofins TestAmerica, Knoxville

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Metals (Continued)

### Analysis Batch: 42475 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 3	Solid	6010B SEP	42349
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	6010B SEP	42218
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	6010B SEP	42267
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	6010B SEP	42349
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	6010B SEP	42391
MB 140-42168/8-B ^4	Method Blank	Step 1	Solid	6010B SEP	42218
MB 140-42219/8-B ^3	Method Blank	Step 2	Solid	6010B SEP	42267
MB 140-42268/6-B	Method Blank	Step 3	Solid	6010B SEP	42349
MB 140-42350/6-B	Method Blank	Step 4	Solid	6010B SEP	42391
LCS 140-42168/9-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	42218
LCS 140-42219/9-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	42267
LCS 140-42268/7-B	Lab Control Sample	Step 3	Solid	6010B SEP	42349
LCS 140-42350/7-B	Lab Control Sample	Step 4	Solid	6010B SEP	42391
LCSD 140-42168/10-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	42218
LCSD 140-42219/10-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	42267
LCSD 140-42268/8-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	42349
LCSD 140-42350/8-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	42391
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 1	Solid	6010B SEP	42218
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 2	Solid	6010B SEP	42267
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 3	Solid	6010B SEP	42349
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	6010B SEP	42391

### Analysis Batch: 42539

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 5	Solid	6010B SEP	42458
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 6	Solid	6010B SEP	42459
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 5	Solid	6010B SEP	42458
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 6	Solid	6010B SEP	42459
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 4	Solid	6010B SEP	42391
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 5	Solid	6010B SEP	42458
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 6	Solid	6010B SEP	42459
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	6010B SEP	42391
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	6010B SEP	42458
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 6	Solid	6010B SEP	42459
MB 140-42350/6-B	Method Blank	Step 4	Solid	6010B SEP	42391
MB 140-42393/6-B ^5	Method Blank	Step 5	Solid	6010B SEP	42458
MB 140-42459/6-A	Method Blank	Step 6	Solid	6010B SEP	42459
LCS 140-42350/7-B	Lab Control Sample	Step 4	Solid	6010B SEP	42391
LCS 140-42393/7-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	42458
LCS 140-42459/7-A	Lab Control Sample	Step 6	Solid	6010B SEP	42459
LCSD 140-42350/8-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	42391
LCSD 140-42393/8-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	42458
LCSD 140-42459/8-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	42459
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 4	Solid	6010B SEP	42391
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 5	Solid	6010B SEP	42458
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 6	Solid	6010B SEP	42459

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Metals

### Analysis Batch: 42568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Step 7	Solid	6010B SEP	42471
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	6010B	42166
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	6010B	42166
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	6010B	42166
MB 140-42166/8-A	Method Blank	Total/NA	Solid	6010B	42166
MB 140-42471/6-A	Method Blank	Step 7	Solid	6010B SEP	42471
LCS 140-42166/9-A	Lab Control Sample	Total/NA	Solid	6010B	42166
LCS 140-42471/7-A	Lab Control Sample	Step 7	Solid	6010B SEP	42471
LCSD 140-42166/10-A	Lab Control Sample Dup	Total/NA	Solid	6010B	42166
LCSD 140-42471/8-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	42471
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Step 7	Solid	6010B SEP	42471
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	6010B	42166
140-19962-4 DU	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	6010B	42166

### Analysis Batch: 42657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Sum of Steps 1-7	Solid	6010B SEP	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Sum of Steps 1-7	Solid	6010B SEP	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Sum of Steps 1-7	Solid	6010B SEP	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Sum of Steps 1-7	Solid	6010B SEP	

## General Chemistry

### Analysis Batch: 41773

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	Moisture	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Total/NA	Solid	Moisture	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Total/NA	Solid	Moisture	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Total/NA	Solid	Moisture	
140-19962-1 DU	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Total/NA	Solid	Moisture	

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			42657	09/11/20 13:59	DKW	TAL KNX
		Instrument ID: NOEQUIP								
Total/NA	Analysis	Moisture		1			41773	08/12/20 14:49	KW1	TAL KNX
		Instrument ID: NOEQUIP								

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 84.2**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			42568	09/09/20 12:02	KNC	TAL KNX
		Instrument ID: DUO								
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 13:08	KNC	TAL KNX
		Instrument ID: DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 11:04	KNC	TAL KNX
		Instrument ID: DUO								
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 11:56	KNC	TAL KNX
		Instrument ID: DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:49	KNC	TAL KNX
		Instrument ID: DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:42	KNC	TAL KNX
		Instrument ID: DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 10:53	KNC	TAL KNX
		Instrument ID: DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:46	KNC	TAL KNX
		Instrument ID: DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:39	KNC	TAL KNX
		Instrument ID: DUO								

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID:**  
**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

**Lab Sample ID: 140-19962-1**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 84.2**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			42568	09/09/20 11:25	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 12:40	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			42568	09/09/20 13:58	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			42657	09/11/20 13:59	DKW	TAL KNX
Instrument ID: NOEQUIP										
Total/NA	Analysis	Moisture		1			41773	08/12/20 14:49	KW1	TAL KNX
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 84.7**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			42568	09/09/20 12:07	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 13:13	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		2			42568	09/09/20 14:26	KNC	TAL KNX
Instrument ID: DUO										
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 11:08	KNC	TAL KNX
Instrument ID: DUO										
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 12:01	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3**

**Lab Sample ID: 140-19962-2**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 84.7**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:54	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:46	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 10:58	KNC	TAL KNX
Instrument ID: DUO										
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:51	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:44	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			42568	09/09/20 11:29	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 12:45	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			42568	09/09/20 14:02	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 140-19962-3**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			42657	09/11/20 13:59	DKW	TAL KNX
Instrument ID: NOEQUIP										
Total/NA	Analysis	Moisture		1			41773	08/12/20 14:49	KW1	TAL KNX
Instrument ID: NOEQUIP										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3**

**Lab Sample ID: 140-19962-3**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 84.8**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			42568	09/09/20 12:12	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 13:18	KNC	TAL KNX
Instrument ID: DUO										
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 11:13	KNC	TAL KNX
Instrument ID: DUO										
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 12:06	KNC	TAL KNX
Instrument ID: DUO										
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:59	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:51	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 11:03	KNC	TAL KNX
Instrument ID: DUO										
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:56	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:49	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			42568	09/09/20 11:43	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 12:49	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			42568	09/09/20 14:07	KNC	TAL KNX
Instrument ID: DUO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Sum of Steps 1-7	Analysis	6010B SEP		1			42657	09/11/20 13:59	DKW	TAL KNX
		Instrument ID: NOEQUIP								
Total/NA	Analysis	Moisture		1			41773	08/12/20 14:49	KW1	TAL KNX
		Instrument ID: NOEQUIP								

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 97.4**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			42568	09/09/20 12:16	KNC	TAL KNX
		Instrument ID: DUO								
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 13:23	KNC	TAL KNX
		Instrument ID: DUO								
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 11:18	KNC	TAL KNX
		Instrument ID: DUO								
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 12:11	KNC	TAL KNX
		Instrument ID: DUO								
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 13:04	KNC	TAL KNX
		Instrument ID: DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:56	KNC	TAL KNX
		Instrument ID: DUO								
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 11:08	KNC	TAL KNX
		Instrument ID: DUO								
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 12:01	KNC	TAL KNX
		Instrument ID: DUO								
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:54	KNC	TAL KNX
		Instrument ID: DUO								
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			42568	09/09/20 11:48	KNC	TAL KNX
		Instrument ID: DUO								

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 97.4**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 12:54	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			42568	09/09/20 14:12	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42166/8-A**

**Date Collected: N/A**

**Matrix: Solid**

**Date Received: N/A**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 11:01	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42168/8-B ^4**

**Date Collected: N/A**

**Matrix: Solid**

**Date Received: N/A**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 10:50	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42219/8-B ^3**

**Date Collected: N/A**

**Matrix: Solid**

**Date Received: N/A**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 11:42	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42268/6-B**

**Date Collected: N/A**

**Matrix: Solid**

**Date Received: N/A**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:35	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42350/6-B**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:28	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 10:39	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42393/6-B ^5**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:32	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42459/6-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:25	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Method Blank**

**Lab Sample ID: MB 140-42471/6-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 10:46	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample**

**Lab Sample ID: LCS 140-42166/9-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 11:06	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-42168/9-B ^5

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			42475	09/03/20 10:54	KNC	TAL KNX
Instrument ID: DUO										

## Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-42219/9-B ^5

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			42475	09/03/20 11:47	KNC	TAL KNX
Instrument ID: DUO										

## Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-42268/7-B

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:40	KNC	TAL KNX
Instrument ID: DUO										

## Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-42350/7-B

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:32	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 10:44	KNC	TAL KNX
Instrument ID: DUO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: Lab Control Sample**

**Lab Sample ID: LCS 140-42393/7-B ^5**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:36	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample**

**Lab Sample ID: LCS 140-42459/7-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:30	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample**

**Lab Sample ID: LCS 140-42471/7-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 10:51	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42166/10-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 11:10	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42168/10-B ^5**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		5			42475	09/03/20 10:59	KNC	TAL KNX
Instrument ID: DUO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42219/10-B ^5**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		5			42475	09/03/20 11:52	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42268/8-B**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 12:45	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42350/8-B**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 13:37	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 10:49	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42393/8-B ^5**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 11:41	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42459/8-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:35	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: Lab Control Sample Dup**

**Lab Sample ID: LCSD 140-42471/8-A**

Date Collected: N/A

Matrix: Solid

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 10:56	KNC	TAL KNX
Instrument ID: DUO										

**Client Sample ID:**

**Lab Sample ID: 140-19962-1 DU**

**GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			41773	08/12/20 14:49	KW1	TAL KNX
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4 DU**

Date Collected: 08/06/20 11:00

Matrix: Solid

Date Received: 08/07/20 10:00

Percent Solids: 97.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		10			42568	09/09/20 12:21	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1 g	50 mL	42166	08/27/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			42568	09/09/20 13:37	KNC	TAL KNX
Instrument ID: DUO										
Step 1	SEP	Exchangeable			5.000 g	25 mL	42168	08/27/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	42218	08/28/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			42475	09/03/20 11:23	KNC	TAL KNX
Instrument ID: DUO										
Step 2	SEP	Carbonate			5 g	25 mL	42219	08/28/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	42267	08/31/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			42475	09/03/20 12:16	KNC	TAL KNX
Instrument ID: DUO										
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	42268	08/31/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	42349	09/01/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			42475	09/03/20 13:08	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42475	09/03/20 14:01	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	42350	09/01/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	42391	09/02/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			42539	09/08/20 11:12	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Knoxville

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

**Client Sample ID: GAF-GW-PHIII-BKT-SAND-T3**

**Lab Sample ID: 140-19962-4 DU**

**Date Collected: 08/06/20 11:00**

**Matrix: Solid**

**Date Received: 08/07/20 10:00**

**Percent Solids: 97.4**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 5	SEP	Organic-Bound			5.000 g	75 mL	42393	09/02/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	42458	09/04/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			42539	09/08/20 12:06	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	42459	09/03/20 11:45	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			42539	09/08/20 12:59	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		10			42568	09/09/20 11:53	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			42568	09/09/20 12:59	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	42471	09/04/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		2			42568	09/09/20 14:17	KNC	TAL KNX
Instrument ID: DUO										

**Laboratory References:**

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000



# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

## Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-17-21
California	State	2423	06-30-21
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	07-01-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	LA110001	12-31-12 *
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-21
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	07-01-21
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-21
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-21
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-21
Virginia	NELAP	460176	09-14-20
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-21

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	TAL KNX
6010B SEP	SEP Metals (ICP)	SW846	TAL KNX
Moisture	Percent Moisture	EPA	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	TAL KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	TAL KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	TAL KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	TAL KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	TAL KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	TAL KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	TAL KNX
Total	Preparation, Total Material	TAL-KNOX	TAL KNX

#### Protocol References:

EPA = US Environmental Protection Agency

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

TAL-KNOX = TestAmerica Laboratories, Knoxville, Facility Standard Operating Procedure.

#### Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRSTreatability

Job ID: 140-19962-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-19962-1	GAF-GW-PHIII-BKT-CONTROL-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 10:00	
140-19962-2	GAF-GW-PHIII-BKT-DOLO-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 10:00	
140-19962-3	GAF-GW-PHIII-BKT-HI CAL-SAND-19R-T3	Solid	08/06/20 11:00	08/07/20 10:00	
140-19962-4	GAF-GW-PHIII-BKT-SAND-T3	Solid	08/06/20 11:00	08/07/20 10:00	

- 1
- 2
- 3
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- 5
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- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14



Spectrum Analytical

# CHAIN OF CUSTODY RECORD

646 Camp Avenue  
N. Kingstown, RI 02852  
(401) 732-3400

Special Handling:

TAT - Date Needed: 5-day TAT *Extra Sep*

All TATs subject to laboratory approval  
Min. 24-hr notification needed for rushes  
Samples disposed after 30 days unless otherwise instructed.

Report To: Francisca Barajas  
AECOM  
9400 Amberglen Blvd  
Austin, TX 78729  
Telephone #: 978-905-2299  
Project Mgr: Craig MacPhee

Invoice To: Craig MacPhee  
AECOM  
250 Apollo Dr.  
Chelmsford, MA 01824  
P.O. No.: \_\_\_\_\_  
Quote #: \_\_\_\_\_

Project No: TVA Gallatin EIP  
Site Name: GAF-NRS-Treatability  
Location: \_\_\_\_\_  
Sampler(s): Rachel Watkins  
State: \_\_\_\_\_  
Craig Katkic

F=Field Filtered 1=N<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=Ascorbic Acid  
7=CH<sub>3</sub>OH 8=NaHSO<sub>4</sub> 9=Deionized Water 10=H<sub>3</sub>PO<sub>4</sub> 11= \_\_\_\_\_ 12= \_\_\_\_\_

DW=Drinking Water GW=Groundwater SW=Surface Water WW=Waste Water  
O=Oil SO=Soil SL=Sludge A=Indoor/Ambient Air SG=Soil Gas

X1= \_\_\_\_\_ X2= \_\_\_\_\_

List Preservative Code below:

QA/QC Reporting Notes:

Containers: # of Amber Glass, # of Clear Glass, # of Plastic

QA/QC Reporting Level  
 Level I  Level II  
 Level III  Level IV  
 Other: \_\_\_\_\_  
State-specific reporting standards: \_\_\_\_\_

Lab ID:	Sample ID:	Date:	Time:	Type	Matrix	Containers			Analysis	QA/QC Reporting Level
						# of Amber Glass	# of Clear Glass	# of Plastic		
	GAF-GW-PHIII-Bkt-Control-sand-19R-t3	8/6/2020	11:00 AM	G	S	2	2	2	Sequential extraction & analysis SW-846 3010D/6010D	Analysis of Be, Cd, Li, Ni, Al, Fe
	GAF-GW-PHIII-Bkt-Dolo-sand-19R-t3	8/6/2020	11:00 AM	G	S	2	2	2		Analysis of Be, Cd, Li, Ni, Al, Fe
	GAF-GW-PHIII-Bkt-Hi Cal-sand-19R-t3	8/6/2020	11:00 AM	G	S	2	2	2		Analysis of Be, Cd, Li, Ni, Al, Fe
	GAF-GW-PHIII-Bkt-sand-t3	8/6/2020	11:00 AM	G	S	2	2	2		Analysis of Be, Cd, Li, Ni, Al, Fe
	RT: 1.4°C CT: 1.4°C, 1 cooler Fedex for Custody seal intact TK# 9842 0859 7496 KLW 8/7/20									



140-19962 Chain of Custody

Relinquished by:	Received by:	Date:	Time:	Temp °C
Rachel Watkins	Ken Zalk	8/6/20	1500	1.4°C
		8/7/20	1000	1.4°C
				0.0

Condition upon receipt: Custody Seals  Present  Intract  Broken  
 Ambient  Iced  Refrigerated  DI VOA Frozen  Soil Jar Frozen

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Are the shipping containers intact?	/			<input type="checkbox"/> Containers, Broken	
2. Were ambient air containers received intact?				<input type="checkbox"/> Checked in lab	
3. The coolers/containers custody seal if present, is it intact?	/			<input type="checkbox"/> Yes <input type="checkbox"/> NA	
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID : <u>5668</u> Correction factor: <u>0.9</u>	/			<input type="checkbox"/> Cooler Out of Temp, Client Contacted, Proceed/Cancel <input type="checkbox"/> Cooler Out of Temp, Same Day Receipt	
5. Were all of the sample containers received intact?	/			<input type="checkbox"/> Containers, Broken	
6. Were samples received in appropriate containers?	/			<input type="checkbox"/> Containers, Improper; Client Contacted; Proceed/Cancel	
7. Do sample container labels match COC? (IDs, Dates, Times)	/			<input type="checkbox"/> COC & Samples Do Not Match <input type="checkbox"/> COC Incorrect/Incomplete <input type="checkbox"/> COC Not Received	
8. Were all of the samples listed on the COC received?	/			<input type="checkbox"/> Sample Received, Not on COC <input type="checkbox"/> Sample on COC, Not Received	
9. Is the date/time of sample collection noted?	/			<input type="checkbox"/> COC; No Date/Time; Client Contacted	Labeling Verified by: _____ Date: _____
10. Was the sampler identified on the COC?	/			<input type="checkbox"/> Sampler Not Listed on COC	
11. Is the client and project name/# identified?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
12. Are tests/parameters listed for each sample?	/			<input type="checkbox"/> COC No tests on COC	pH test strip lot number: _____
13. Is the matrix of the samples noted?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
14. Was COC relinquished? (Signed/Dated/Timed)	/			<input type="checkbox"/> COC Incorrect/Incomplete	Box 16A: pH Preservation Box 18A: Residual Chlorine
15. Were samples received within holding time?	/			<input type="checkbox"/> Holding Time - Receipt	Preservative: _____
16. Were samples received with correct chemical preservative (excluding Encore)?	/			<input type="checkbox"/> pH Adjusted, pH Included (See box 16A) <input type="checkbox"/> Incorrect Preservative	Lot Number: _____ Exp Date: _____ Analyst: _____
17. Were VOA samples received without headspace?	/			<input type="checkbox"/> Headspace (VOA only)	Date: _____
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number: _____	/			<input type="checkbox"/> Residual Chlorine	Time: _____
19. For 1613B water samples is pH<9?	/			<input type="checkbox"/> If no, notify lab to adjust	
20. For rad samples was sample activity info. Provided?	/			<input type="checkbox"/> Project missing info	
Project #: <u>18022206</u> PM Instructions: _____					

Sample Receiving Associate: Ken White Date: 8/7/20



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-103583-2  
Laboratory Sample Delivery Group: SEP Metals  
Client Project/Site: GAF-2020-03092259

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
4/22/2020 9:04:41 PM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Job ID: 180-103583-2

### Laboratory: Eurofins TestAmerica, Pittsburgh

#### Narrative

#### Job Narrative 180-103583-2

#### Receipt

The samples were received on 3/14/2020 10:15 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 1.5° C.

#### Metals

##### 7 Step Sequential Extraction Procedure

These soil samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0008, "7 Step Sequential Extraction Procedure". SW-846 Method 6010B as incorporated in Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analyses.

An aliquot of each sample was sequentially extracted using the steps listed below:

- Step 1 - Exchangeable Fraction: A 5 gram aliquot of sample was extracted with 25 mL of 1M magnesium sulfate (MgSO<sub>4</sub>), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 2 - Carbonate Fraction: The sample residue from step 1 was extracted with 25 mL of 1M sodium acetate/acetic acid (NaOAc/HOAc) at pH 5, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 3 - Non-crystalline Materials Fraction: The sample residue from step 2 was extracted with 25 mL of 0.2M ammonium oxalate (pH 3), centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 4 - Metal Hydroxide Fraction: The sample residue from step 3 was extracted with 25 mL of 1M hydroxylamine hydrochloride solution in 25% v/v acetic acid, centrifuged and filtered. 5 mL of the resulting leachate was digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 5 - Organic-bound Fraction: The sample residue from step 4 was extracted three times with 25 mL of 5% sodium hypochlorite (NaClO) at pH 9.5, centrifuged and filtered. The resulting leachates were combined and 5 mL were digested using method 3010A and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 6 - Acid/Sulfide Fraction: The sample residue from step 5 was extracted with 25 mL of a 3:1:2 v/v solution of HCl-HNO<sub>3</sub>-H<sub>2</sub>O, centrifuged and filtered. 5 mL of the resulting leachate was diluted to 50 mL with reagent water and analyzed by method 6010B. Results are reported in mg/kg on a dry weight basis.
- Step 7 - Residual Fraction: A 1.0 g aliquot of the sample residue from step 6 was digested using HF, HNO<sub>3</sub>, HCl and H<sub>3</sub>BO<sub>3</sub>. The digestate was analyzed by ICP using method 6010B. Results are reported in mg/kg on a dry weight basis.

In addition, a 1.0 g aliquot of the original sample was digested using HF, HNO<sub>3</sub>, HCl and H<sub>3</sub>BO<sub>3</sub>. The digestate was analyzed by ICP using method 6010B. Total metal results are reported in mg/kg on a dry weight basis.

Results were calculated using the following equation:

$$\text{Result, } \mu\text{g/g or mg/Kg, dry weight} = (C \times V \times V1 \times D) / (W \times S \times V2)$$

Where:

- C = Concentration from instrument readout,  $\mu\text{g/mL}$
- V = Final volume of digestate, mL
- D = Instrument dilution factor
- V1 = Total volume of leachate, mL
- V2 = Volume of leachate digested, mL
- W = Wet weight of sample, g
- S = Percent solids/100

A method blank, laboratory control sample and laboratory control sample duplicate were prepared and analyzed with each SEP step in order to provide information about both the presence of elements of interest in the extraction solutions, and the recovery of elements of

## Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

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### Job ID: 180-103583-2 (Continued)

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#### Laboratory: Eurofins TestAmerica, Pittsburgh (Continued)

interest from the extraction solutions. Results outside of laboratory QC limits do not reflect out of control performance, but rather the effect of the extraction solution upon the analyte.

A laboratory sample duplicate was prepared and analyzed with each batch of samples in order to provide information regarding the reproducibility of the procedure.

#### SEP Report Notes:

The final report lists the results for each step, the result for the total digestion of the sample, and a sum of the results of steps 1 through 7 by element.

The digestates for steps 1, 2 and 5 were analyzed at a dilution due to instrument problems caused by the high solids content of the digestates. The reporting limits were adjusted accordingly.

Method 6010B: The following samples were diluted due to the presence of silicon which interferes with Nickel:

GAF-SB-NRS070-50-60-03102020 ~ NRS070 (180-103583-4) and GAF-SB-NRS068-40-58-03122020 ~ NRS068 (180-103583-5).  
Elevated reporting limits (RLs) are provided.

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Qualifiers

### Metals

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
*1	LCS/LCSD RPD exceeds control limits.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-16-20
California	State	2423	06-30-20
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	06-30-20
Georgia (DW)	State	906	04-13-20 *
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	83979	06-30-20
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-20
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	06-30-20
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-20
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	08-28-20
Oklahoma	State	9415	09-01-20
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-20
Virginia	NELAP	460176	09-15-20
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	04-30-20
Wisconsin	State	998044300	08-31-20

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Solid	03/09/20 14:20	03/14/20 10:15	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Solid	03/10/20 17:40	03/14/20 10:15	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Solid	03/12/20 09:50	03/14/20 10:15	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

Method	Method Description	Protocol	Laboratory
6010B	SEP Metals (ICP) - Total	SW846	TAL KNX
6010B SEP	SEP Metals (ICP)	SW846	TAL KNX
3010A	Preparation, Total Metals	SW846	TAL KNX
Acid/Sulfide	Sequential Extraction Procedure, Acid/Sulfide Fraction	TAL-KNOX	TAL KNX
Carbonate	Sequential Extraction Procedure, Carbonate Fraction	TAL-KNOX	TAL KNX
Exchangeable	Sequential Extraction Procedure, Exchangeable Fraction	TAL-KNOX	TAL KNX
Metal Hydroxide	Sequential Extraction Procedure, Metal Hydroxide Fraction	TAL-KNOX	TAL KNX
Non-Crystalline	Sequential Extraction Procedure, Non-crystalline Materials	TAL-KNOX	TAL KNX
Organic-Bound	Sequential Extraction Procedure, Organic Bound Fraction	TAL-KNOX	TAL KNX
Residual	Sequential Extraction Procedure, Residual Fraction	TAL-KNOX	TAL KNX
Total	Preparation, Total Material	TAL-KNOX	TAL KNX

#### Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.  
TAL-KNOX = TestAmerica Laboratories, Knoxville, Facility Standard Operating Procedure.

#### Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**

**Lab Sample ID: 180-103583-1**

**Date Collected: 03/09/20 14:20**

**Matrix: Solid**

**Date Received: 03/14/20 10:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	38881	04/06/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			39150	04/17/20 12:41	KNC	TAL KNX
Instrument ID: DUO										
Step 1	SEP	Exchangeable			5.000 g	25 mL	38882	04/06/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	38913	04/07/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			39000	04/09/20 12:49	KNC	TAL KNX
Instrument ID: DUO										
Step 2	SEP	Carbonate			5.000 g	25 mL	38914	04/07/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	38928	04/08/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			39023	04/10/20 11:47	KNC	TAL KNX
Instrument ID: DUO										
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	38930	04/08/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	38965	04/09/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			39065	04/14/20 11:15	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	38966	04/09/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	39002	04/10/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			39065	04/14/20 12:43	KNC	TAL KNX
Instrument ID: DUO										
Step 5	SEP	Organic-Bound			5.000 g	75 mL	39003	04/10/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	39041	04/14/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			39087	04/15/20 11:13	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	39042	04/14/20 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			39087	04/15/20 12:42	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	39055	04/15/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			39126	04/16/20 12:56	KNC	TAL KNX
Instrument ID: DUO										
Sum of Steps 1-7	Analysis	6010B SEP		1			39247	04/22/20 14:10	DKW	TAL KNX
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-SB-NRS070-50-60-03102020 ~ NRS070**

**Lab Sample ID: 180-103583-4**

**Date Collected: 03/10/20 17:40**

**Matrix: Solid**

**Date Received: 03/14/20 10:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	38881	04/06/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		5			39150	04/17/20 11:30	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1.000 g	50 mL	38881	04/06/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			39150	04/17/20 12:52	KNC	TAL KNX
Instrument ID: DUO										

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS070-50-60-03102020 ~ NRS070**

**Lab Sample ID: 180-103583-4**

**Date Collected: 03/10/20 17:40**

**Matrix: Solid**

**Date Received: 03/14/20 10:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 1	SEP	Exchangeable			5.000 g	25 mL	38882	04/06/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	38913	04/07/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			39000	04/09/20 12:59	KNC	TAL KNX
Instrument ID: DUO										
Step 2	SEP	Carbonate			5.000 g	25 mL	38914	04/07/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	38928	04/08/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			39023	04/10/20 11:58	KNC	TAL KNX
Instrument ID: DUO										
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	38930	04/08/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	38965	04/09/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			39065	04/14/20 11:25	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	38966	04/09/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	39002	04/10/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			39065	04/14/20 13:08	KNC	TAL KNX
Instrument ID: DUO										
Step 5	SEP	Organic-Bound			5.000 g	75 mL	39003	04/10/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	39041	04/14/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			39087	04/15/20 11:24	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	39042	04/14/20 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			39087	04/15/20 13:07	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	39055	04/15/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			39126	04/16/20 13:06	KNC	TAL KNX
Instrument ID: DUO										
Sum of Steps 1-7	Analysis	6010B SEP		1			39247	04/22/20 14:10	DKW	TAL KNX
Instrument ID: NOEQUIP										

**Client Sample ID: GAF-SB-NRS068-40-58-03122020 ~ NRS068**

**Lab Sample ID: 180-103583-5**

**Date Collected: 03/12/20 09:50**

**Matrix: Solid**

**Date Received: 03/14/20 10:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Total			1.000 g	50 mL	38881	04/06/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		5			39150	04/17/20 11:35	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	Total			1.000 g	50 mL	38881	04/06/20 08:00	KNC	TAL KNX
Total/NA	Analysis	6010B		1			39150	04/17/20 12:57	KNC	TAL KNX
Instrument ID: DUO										
Step 1	SEP	Exchangeable			5.000 g	25 mL	38882	04/06/20 08:00	KNC	TAL KNX
Step 1	Prep	3010A			5 mL	50 mL	38913	04/07/20 08:00	KNC	TAL KNX
Step 1	Analysis	6010B SEP		4			39000	04/09/20 13:04	KNC	TAL KNX
Instrument ID: DUO										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS068-40-58-03122020 ~ NRS068**

**Lab Sample ID: 180-103583-5**

**Date Collected: 03/12/20 09:50**

**Matrix: Solid**

**Date Received: 03/14/20 10:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Step 2	SEP	Carbonate			5.000 g	25 mL	38914	04/07/20 08:00	KNC	TAL KNX
Step 2	Prep	3010A			5 mL	50 mL	38928	04/08/20 08:00	KNC	TAL KNX
Step 2	Analysis	6010B SEP		3			39023	04/10/20 12:03	KNC	TAL KNX
Instrument ID: DUO										
Step 3	SEP	Non-Crystalline			5.000 g	25 mL	38930	04/08/20 08:00	KNC	TAL KNX
Step 3	Prep	3010A			5 mL	50 mL	38965	04/09/20 08:00	KNC	TAL KNX
Step 3	Analysis	6010B SEP		1			39065	04/14/20 11:31	KNC	TAL KNX
Instrument ID: DUO										
Step 4	SEP	Metal Hydroxide			5.000 g	25 mL	38966	04/09/20 08:00	KNC	TAL KNX
Step 4	Prep	3010A			5 mL	50 mL	39002	04/10/20 08:00	KNC	TAL KNX
Step 4	Analysis	6010B SEP		1			39065	04/14/20 13:13	KNC	TAL KNX
Instrument ID: DUO										
Step 5	SEP	Organic-Bound			5.000 g	75 mL	39003	04/10/20 08:00	KNC	TAL KNX
Step 5	Prep	3010A			5 mL	50 mL	39041	04/14/20 08:00	KNC	TAL KNX
Step 5	Analysis	6010B SEP		5			39087	04/15/20 11:29	KNC	TAL KNX
Instrument ID: DUO										
Step 6	SEP	Acid/Sulfide			5.000 g	250 mL	39042	04/14/20 08:00	KNC	TAL KNX
Step 6	Analysis	6010B SEP		1			39087	04/15/20 13:13	KNC	TAL KNX
Instrument ID: DUO										
Step 7	Prep	Residual			1.000 g	50 mL	39055	04/15/20 08:00	KNC	TAL KNX
Step 7	Analysis	6010B SEP		1			39126	04/16/20 13:26	KNC	TAL KNX
Instrument ID: DUO										
Sum of Steps 1-7	Analysis	6010B SEP		1			39247	04/22/20 14:10	DKW	TAL KNX
Instrument ID: NOEQUIP										

**Laboratory References:**

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

**Analyst References:**

Lab: TAL KNX

Batch Type: SEP

KNC = Kerry Collins

Batch Type: Prep

KNC = Kerry Collins

Batch Type: Analysis

DKW = Donna Wilburn

KNC = Kerry Collins

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**

**Lab Sample ID: 180-103583-1**

Date Collected: 03/09/20 14:20

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.23	0.378	mg/Kg	☼	04/07/20 08:00	04/09/20 12:49	4
Cadmium	ND		1.23	0.0785	mg/Kg	☼	04/07/20 08:00	04/09/20 12:49	4
<b>Iron</b>	<b>999</b>		24.5	14.2	mg/Kg	☼	04/07/20 08:00	04/09/20 12:49	4
Lithium	ND		12.3	0.736	mg/Kg	☼	04/07/20 08:00	04/09/20 12:49	4
<b>Nickel</b>	<b>0.365</b>	<b>J</b>	9.81	0.334	mg/Kg	☼	04/07/20 08:00	04/09/20 12:49	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.920	0.0589	mg/Kg	☼	04/08/20 08:00	04/10/20 11:47	3
Cadmium	ND		0.920	0.0405	mg/Kg	☼	04/08/20 08:00	04/10/20 11:47	3
<b>Iron</b>	<b>91.6</b>	*	18.4	10.7	mg/Kg	☼	04/08/20 08:00	04/10/20 11:47	3
Lithium	ND		9.20	0.552	mg/Kg	☼	04/08/20 08:00	04/10/20 11:47	3
Nickel	ND		7.36	0.184	mg/Kg	☼	04/08/20 08:00	04/10/20 11:47	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0533</b>	<b>J</b>	0.307	0.0184	mg/Kg	☼	04/09/20 08:00	04/14/20 11:15	1
<b>Cadmium</b>	<b>0.0454</b>	<b>J B *</b>	0.307	0.0135	mg/Kg	☼	04/09/20 08:00	04/14/20 11:15	1
<b>Iron</b>	<b>993</b>		6.13	3.56	mg/Kg	☼	04/09/20 08:00	04/14/20 11:15	1
Lithium	ND		3.07	0.184	mg/Kg	☼	04/09/20 08:00	04/14/20 11:15	1
Nickel	ND		2.45	0.103	mg/Kg	☼	04/09/20 08:00	04/14/20 11:15	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.278</b>	<b>J</b>	0.307	0.0196	mg/Kg	☼	04/10/20 08:00	04/14/20 12:43	1
<b>Cadmium</b>	<b>0.0208</b>	<b>J</b>	0.307	0.0135	mg/Kg	☼	04/10/20 08:00	04/14/20 12:43	1
<b>Iron</b>	<b>12900</b>		6.13	3.56	mg/Kg	☼	04/10/20 08:00	04/14/20 12:43	1
<b>Lithium</b>	<b>0.917</b>	<b>J</b>	3.07	0.184	mg/Kg	☼	04/10/20 08:00	04/14/20 12:43	1
<b>Nickel</b>	<b>4.50</b>		2.45	0.0478	mg/Kg	☼	04/10/20 08:00	04/14/20 12:43	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.60	0.386	mg/Kg	☼	04/14/20 08:00	04/15/20 11:13	5
Cadmium	ND		4.60	0.196	mg/Kg	☼	04/14/20 08:00	04/15/20 11:13	5
Iron	ND	**1	92.0	54.0	mg/Kg	☼	04/14/20 08:00	04/15/20 11:13	5
Lithium	ND		46.0	2.70	mg/Kg	☼	04/14/20 08:00	04/15/20 11:13	5
Nickel	ND		36.8	1.10	mg/Kg	☼	04/14/20 08:00	04/15/20 11:13	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.128</b>	<b>J</b>	0.307	0.0147	mg/Kg	☼	04/14/20 08:00	04/15/20 12:42	1
Cadmium	ND		0.307	0.0135	mg/Kg	☼	04/14/20 08:00	04/15/20 12:42	1
<b>Iron</b>	<b>5130</b>		6.13	3.56	mg/Kg	☼	04/14/20 08:00	04/15/20 12:42	1
<b>Lithium</b>	<b>2.91</b>	<b>J</b>	3.07	0.184	mg/Kg	☼	04/14/20 08:00	04/15/20 12:42	1
<b>Nickel</b>	<b>3.30</b>		2.45	0.0650	mg/Kg	☼	04/14/20 08:00	04/15/20 12:42	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.586</b>		0.307	0.00920	mg/Kg	☼	04/15/20 08:00	04/16/20 12:56	1
Cadmium	ND		0.307	0.0135	mg/Kg	☼	04/15/20 08:00	04/16/20 12:56	1
<b>Iron</b>	<b>3700</b>		6.13	5.03	mg/Kg	☼	04/15/20 08:00	04/16/20 12:56	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**

**Lab Sample ID: 180-103583-1**

Date Collected: 03/09/20 14:20

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	13.7		3.07	0.184	mg/Kg	☼	04/15/20 08:00	04/16/20 12:56	1
Nickel	7.02		2.45	0.0343	mg/Kg	☼	04/15/20 08:00	04/16/20 12:56	1

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.04		0.250	0.00750	mg/Kg			04/22/20 14:10	1
Cadmium	0.0662	J	0.250	0.0110	mg/Kg			04/22/20 14:10	1
Iron	23800		5.00	4.10	mg/Kg			04/22/20 14:10	1
Lithium	17.5		2.50	0.150	mg/Kg			04/22/20 14:10	1
Nickel	15.2		2.00	0.0280	mg/Kg			04/22/20 14:10	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.04		0.307	0.00920	mg/Kg	☼	04/06/20 08:00	04/17/20 12:41	1
Cadmium	0.441		0.307	0.0135	mg/Kg	☼	04/06/20 08:00	04/17/20 12:41	1
Iron	23200		6.13	5.03	mg/Kg	☼	04/06/20 08:00	04/17/20 12:41	1
Lithium	18.3		3.07	0.184	mg/Kg	☼	04/06/20 08:00	04/17/20 12:41	1
Nickel	15.1		2.45	0.0343	mg/Kg	☼	04/06/20 08:00	04/17/20 12:41	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS070-50-60-03102020 ~ NRS070**

**Lab Sample ID: 180-103583-4**

Date Collected: 03/10/20 17:40

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.23	0.379	mg/Kg	☼	04/07/20 08:00	04/09/20 12:59	4
Cadmium	ND		1.23	0.0789	mg/Kg	☼	04/07/20 08:00	04/09/20 12:59	4
Iron	ND		24.6	14.3	mg/Kg	☼	04/07/20 08:00	04/09/20 12:59	4
Lithium	ND		12.3	0.739	mg/Kg	☼	04/07/20 08:00	04/09/20 12:59	4
Nickel	ND		9.86	0.335	mg/Kg	☼	04/07/20 08:00	04/09/20 12:59	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.924	0.0591	mg/Kg	☼	04/08/20 08:00	04/10/20 11:58	3
Cadmium	ND		0.924	0.0407	mg/Kg	☼	04/08/20 08:00	04/10/20 11:58	3
Iron	ND	*	18.5	10.7	mg/Kg	☼	04/08/20 08:00	04/10/20 11:58	3
Lithium	ND		9.24	0.554	mg/Kg	☼	04/08/20 08:00	04/10/20 11:58	3
Nickel	ND		7.39	0.185	mg/Kg	☼	04/08/20 08:00	04/10/20 11:58	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0727</b>	<b>J</b>	0.308	0.0185	mg/Kg	☼	04/09/20 08:00	04/14/20 11:25	1
<b>Cadmium</b>	<b>0.0875</b>	<b>J B *</b>	0.308	0.0136	mg/Kg	☼	04/09/20 08:00	04/14/20 11:25	1
<b>Iron</b>	<b>509</b>		6.16	3.57	mg/Kg	☼	04/09/20 08:00	04/14/20 11:25	1
Lithium	ND		3.08	0.185	mg/Kg	☼	04/09/20 08:00	04/14/20 11:25	1
<b>Nickel</b>	<b>0.271</b>	<b>J</b>	2.46	0.103	mg/Kg	☼	04/09/20 08:00	04/14/20 11:25	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.278</b>	<b>J</b>	0.308	0.0197	mg/Kg	☼	04/10/20 08:00	04/14/20 13:08	1
<b>Cadmium</b>	<b>0.0271</b>	<b>J</b>	0.308	0.0136	mg/Kg	☼	04/10/20 08:00	04/14/20 13:08	1
<b>Iron</b>	<b>7700</b>		6.16	3.57	mg/Kg	☼	04/10/20 08:00	04/14/20 13:08	1
<b>Lithium</b>	<b>1.22</b>	<b>J</b>	3.08	0.185	mg/Kg	☼	04/10/20 08:00	04/14/20 13:08	1
<b>Nickel</b>	<b>4.79</b>		2.46	0.0481	mg/Kg	☼	04/10/20 08:00	04/14/20 13:08	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.62	0.388	mg/Kg	☼	04/14/20 08:00	04/15/20 11:24	5
Cadmium	ND		4.62	0.197	mg/Kg	☼	04/14/20 08:00	04/15/20 11:24	5
Iron	ND	**1	92.4	54.2	mg/Kg	☼	04/14/20 08:00	04/15/20 11:24	5
Lithium	ND		46.2	2.71	mg/Kg	☼	04/14/20 08:00	04/15/20 11:24	5
Nickel	ND		37.0	1.11	mg/Kg	☼	04/14/20 08:00	04/15/20 11:24	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.109</b>	<b>J</b>	0.308	0.0148	mg/Kg	☼	04/14/20 08:00	04/15/20 13:07	1
Cadmium	ND		0.308	0.0136	mg/Kg	☼	04/14/20 08:00	04/15/20 13:07	1
<b>Iron</b>	<b>2680</b>		6.16	3.57	mg/Kg	☼	04/14/20 08:00	04/15/20 13:07	1
<b>Lithium</b>	<b>1.98</b>	<b>J</b>	3.08	0.185	mg/Kg	☼	04/14/20 08:00	04/15/20 13:07	1
<b>Nickel</b>	<b>2.63</b>		2.46	0.0653	mg/Kg	☼	04/14/20 08:00	04/15/20 13:07	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.615</b>		0.308	0.00924	mg/Kg	☼	04/15/20 08:00	04/16/20 13:06	1
Cadmium	ND		0.308	0.0136	mg/Kg	☼	04/15/20 08:00	04/16/20 13:06	1
<b>Iron</b>	<b>3340</b>		6.16	5.05	mg/Kg	☼	04/15/20 08:00	04/16/20 13:06	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS070-50-60-03102020 ~ NRS070**

**Lab Sample ID: 180-103583-4**

Date Collected: 03/10/20 17:40

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	19.6		3.08	0.185	mg/Kg	☼	04/15/20 08:00	04/16/20 13:06	1
Nickel	10.0		2.46	0.0345	mg/Kg	☼	04/15/20 08:00	04/16/20 13:06	1

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.08		0.250	0.00750	mg/Kg			04/22/20 14:10	1
Cadmium	0.115	J	0.250	0.0110	mg/Kg			04/22/20 14:10	1
Iron	14200		5.00	4.10	mg/Kg			04/22/20 14:10	1
Lithium	22.8		2.50	0.150	mg/Kg			04/22/20 14:10	1
Nickel	17.7		2.00	0.0280	mg/Kg			04/22/20 14:10	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.21		0.308	0.00924	mg/Kg	☼	04/06/20 08:00	04/17/20 12:52	1
Cadmium	0.506		0.308	0.0136	mg/Kg	☼	04/06/20 08:00	04/17/20 12:52	1
Iron	19400		6.16	5.05	mg/Kg	☼	04/06/20 08:00	04/17/20 12:52	1
Lithium	18.9		3.08	0.185	mg/Kg	☼	04/06/20 08:00	04/17/20 12:52	1
Nickel	20.3		12.3	0.172	mg/Kg	☼	04/06/20 08:00	04/17/20 11:30	5

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS068-40-58-03122020 ~ NRS068**

**Lab Sample ID: 180-103583-5**

Date Collected: 03/12/20 09:50

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 1**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.20	0.368	mg/Kg	☼	04/07/20 08:00	04/09/20 13:04	4
Cadmium	ND		1.20	0.0765	mg/Kg	☼	04/07/20 08:00	04/09/20 13:04	4
<b>Iron</b>	<b>265</b>		23.9	13.9	mg/Kg	☼	04/07/20 08:00	04/09/20 13:04	4
Lithium	ND		12.0	0.717	mg/Kg	☼	04/07/20 08:00	04/09/20 13:04	4
Nickel	ND		9.56	0.325	mg/Kg	☼	04/07/20 08:00	04/09/20 13:04	4

**Method: 6010B SEP - SEP Metals (ICP) - Step 2**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	0.897	0.0574	mg/Kg	☼	04/08/20 08:00	04/10/20 12:03	3
Cadmium	ND		0.897	0.0395	mg/Kg	☼	04/08/20 08:00	04/10/20 12:03	3
<b>Iron</b>	<b>28.9</b>	*	17.9	10.4	mg/Kg	☼	04/08/20 08:00	04/10/20 12:03	3
Lithium	ND		8.97	0.538	mg/Kg	☼	04/08/20 08:00	04/10/20 12:03	3
Nickel	ND		7.17	0.179	mg/Kg	☼	04/08/20 08:00	04/10/20 12:03	3

**Method: 6010B SEP - SEP Metals (ICP) - Step 3**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.0640</b>	<b>J</b>	0.299	0.0179	mg/Kg	☼	04/09/20 08:00	04/14/20 11:31	1
<b>Cadmium</b>	<b>0.0442</b>	<b>J B *</b>	0.299	0.0132	mg/Kg	☼	04/09/20 08:00	04/14/20 11:31	1
<b>Iron</b>	<b>1940</b>		5.98	3.47	mg/Kg	☼	04/09/20 08:00	04/14/20 11:31	1
Lithium	ND		2.99	0.179	mg/Kg	☼	04/09/20 08:00	04/14/20 11:31	1
Nickel	ND		2.39	0.100	mg/Kg	☼	04/09/20 08:00	04/14/20 11:31	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 4**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.299</b>		0.299	0.0191	mg/Kg	☼	04/10/20 08:00	04/14/20 13:13	1
<b>Cadmium</b>	<b>0.0197</b>	<b>J</b>	0.299	0.0132	mg/Kg	☼	04/10/20 08:00	04/14/20 13:13	1
<b>Iron</b>	<b>15100</b>		5.98	3.47	mg/Kg	☼	04/10/20 08:00	04/14/20 13:13	1
<b>Lithium</b>	<b>1.57</b>	<b>J</b>	2.99	0.179	mg/Kg	☼	04/10/20 08:00	04/14/20 13:13	1
<b>Nickel</b>	<b>6.26</b>		2.39	0.0466	mg/Kg	☼	04/10/20 08:00	04/14/20 13:13	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 5**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND	*	4.48	0.377	mg/Kg	☼	04/14/20 08:00	04/15/20 11:29	5
Cadmium	ND		4.48	0.191	mg/Kg	☼	04/14/20 08:00	04/15/20 11:29	5
Iron	ND	**1	89.7	52.6	mg/Kg	☼	04/14/20 08:00	04/15/20 11:29	5
<b>Lithium</b>	<b>2.81</b>	<b>J</b>	44.8	2.63	mg/Kg	☼	04/14/20 08:00	04/15/20 11:29	5
Nickel	ND		35.9	1.08	mg/Kg	☼	04/14/20 08:00	04/15/20 11:29	5

**Method: 6010B SEP - SEP Metals (ICP) - Step 6**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.105</b>	<b>J</b>	0.299	0.0143	mg/Kg	☼	04/14/20 08:00	04/15/20 13:13	1
Cadmium	ND		0.299	0.0132	mg/Kg	☼	04/14/20 08:00	04/15/20 13:13	1
<b>Iron</b>	<b>4240</b>		5.98	3.47	mg/Kg	☼	04/14/20 08:00	04/15/20 13:13	1
<b>Lithium</b>	<b>2.43</b>	<b>J</b>	2.99	0.179	mg/Kg	☼	04/14/20 08:00	04/15/20 13:13	1
<b>Nickel</b>	<b>4.00</b>		2.39	0.0634	mg/Kg	☼	04/14/20 08:00	04/15/20 13:13	1

**Method: 6010B SEP - SEP Metals (ICP) - Step 7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Beryllium</b>	<b>0.566</b>		0.299	0.00897	mg/Kg	☼	04/15/20 08:00	04/16/20 13:26	1
Cadmium	ND		0.299	0.0132	mg/Kg	☼	04/15/20 08:00	04/16/20 13:26	1
<b>Iron</b>	<b>3470</b>		5.98	4.90	mg/Kg	☼	04/15/20 08:00	04/16/20 13:26	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

**Client Sample ID: GAF-SB-NRS068-40-58-03122020 ~ NRS068**

**Lab Sample ID: 180-103583-5**

Date Collected: 03/12/20 09:50

Matrix: Solid

Date Received: 03/14/20 10:15

**Method: 6010B SEP - SEP Metals (ICP) - Step 7 (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	14.3		2.99	0.179	mg/Kg	☼	04/15/20 08:00	04/16/20 13:26	1
Nickel	10.7		2.39	0.0335	mg/Kg	☼	04/15/20 08:00	04/16/20 13:26	1

**Method: 6010B SEP - SEP Metals (ICP) - Sum of Steps 1-7**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.03		0.250	0.00750	mg/Kg			04/22/20 14:10	1
Cadmium	0.0640	J	0.250	0.0110	mg/Kg			04/22/20 14:10	1
Iron	25000		5.00	4.10	mg/Kg			04/22/20 14:10	1
Lithium	21.1		2.50	0.150	mg/Kg			04/22/20 14:10	1
Nickel	21.0		2.00	0.0280	mg/Kg			04/22/20 14:10	1

**Method: 6010B - SEP Metals (ICP) - Total**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.01		0.299	0.00897	mg/Kg	☼	04/06/20 08:00	04/17/20 12:57	1
Cadmium	0.444		0.299	0.0132	mg/Kg	☼	04/06/20 08:00	04/17/20 12:57	1
Iron	21400		5.98	4.90	mg/Kg	☼	04/06/20 08:00	04/17/20 12:57	1
Lithium	22.3		2.99	0.179	mg/Kg	☼	04/06/20 08:00	04/17/20 12:57	1
Nickel	21.9		12.0	0.167	mg/Kg	☼	04/06/20 08:00	04/17/20 11:35	5

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B - SEP Metals (ICP) - Total

**Lab Sample ID: MB 140-38881/12-A**  
**Matrix: Solid**  
**Analysis Batch: 39150**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 38881**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.00750	mg/Kg		04/06/20 08:00	04/17/20 10:54	1
Cadmium	ND		0.250	0.0110	mg/Kg		04/06/20 08:00	04/17/20 10:54	1
Iron	ND		5.00	4.10	mg/Kg		04/06/20 08:00	04/17/20 10:54	1
Lithium	ND		2.50	0.150	mg/Kg		04/06/20 08:00	04/17/20 10:54	1
Nickel	ND		2.00	0.0280	mg/Kg		04/06/20 08:00	04/17/20 10:54	1

**Lab Sample ID: LCS 140-38881/13-A**  
**Matrix: Solid**  
**Analysis Batch: 39150**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 38881**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.517		mg/Kg		101	75 - 125
Cadmium	2.50	2.574		mg/Kg		103	75 - 125
Iron	50.0	51.57		mg/Kg		103	75 - 125
Lithium	5.00	4.929		mg/Kg		99	75 - 125
Nickel	25.0	26.28		mg/Kg		105	75 - 125

**Lab Sample ID: LCSD 140-38881/14-A**  
**Matrix: Solid**  
**Analysis Batch: 39150**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 38881**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.535		mg/Kg		101	75 - 125	1	30
Cadmium	2.50	2.582		mg/Kg		103	75 - 125	0	30
Iron	50.0	51.70		mg/Kg		103	75 - 125	0	30
Lithium	5.00	4.947		mg/Kg		99	75 - 125	0	30
Nickel	25.0	26.24		mg/Kg		105	75 - 125	0	30

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39150**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Total/NA**  
**Prep Batch: 38881**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	1.04		1.050		mg/Kg	☼	0.6	30
Cadmium	0.441		0.4604		mg/Kg	☼	4	30
Iron	23200		22890		mg/Kg	☼	1	30
Lithium	18.3		18.31		mg/Kg	☼	0	30
Nickel	15.1		15.02		mg/Kg	☼	0.2	30

## Method: 6010B SEP - SEP Metals (ICP)

**Lab Sample ID: MB 140-38882/12-B ^4**  
**Matrix: Solid**  
**Analysis Batch: 39000**

**Client Sample ID: Method Blank**  
**Prep Type: Step 1**  
**Prep Batch: 38913**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.308	mg/Kg		04/07/20 08:00	04/09/20 12:33	4
Cadmium	ND		1.00	0.0640	mg/Kg		04/07/20 08:00	04/09/20 12:33	4
Iron	ND		20.0	11.6	mg/Kg		04/07/20 08:00	04/09/20 12:33	4
Lithium	ND		10.0	0.600	mg/Kg		04/07/20 08:00	04/09/20 12:33	4

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: MB 140-38882/12-B ^4**  
**Matrix: Solid**  
**Analysis Batch: 39000**

**Client Sample ID: Method Blank**  
**Prep Type: Step 1**  
**Prep Batch: 38913**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nickel	ND		8.00	0.272	mg/Kg		04/07/20 08:00	04/09/20 12:33	4

**Lab Sample ID: LCS 140-38882/13-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39000**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 1**  
**Prep Batch: 38913**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.563		mg/Kg		103	75 - 125
Cadmium	2.50	2.388		mg/Kg		96	75 - 125
Iron	50.0	50.40		mg/Kg		101	75 - 125
Lithium	5.00	5.245	J	mg/Kg		105	75 - 125
Nickel	25.0	24.65		mg/Kg		99	75 - 125

**Lab Sample ID: LCSD 140-38882/14-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39000**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 1**  
**Prep Batch: 38913**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.648		mg/Kg		106	75 - 125	3	30
Cadmium	2.50	2.495		mg/Kg		100	75 - 125	4	30
Iron	50.0	50.07		mg/Kg		100	75 - 125	1	30
Lithium	5.00	5.268	J	mg/Kg		105	75 - 125	0	30
Nickel	25.0	25.83		mg/Kg		103	75 - 125	5	30

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39000**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 1**  
**Prep Batch: 38913**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	ND		ND		mg/Kg	⊛	NC	30
Cadmium	ND		ND		mg/Kg	⊛	NC	30
Iron	999		995.3		mg/Kg	⊛	0.4	30
Lithium	ND		ND		mg/Kg	⊛	NC	30
Nickel	0.365	J	0.3899	J	mg/Kg	⊛	6	30

**Lab Sample ID: MB 140-38914/12-B ^3**  
**Matrix: Solid**  
**Analysis Batch: 39023**

**Client Sample ID: Method Blank**  
**Prep Type: Step 2**  
**Prep Batch: 38928**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.750	0.0480	mg/Kg		04/08/20 08:00	04/10/20 11:32	3
Cadmium	ND		0.750	0.0330	mg/Kg		04/08/20 08:00	04/10/20 11:32	3
Iron	ND		15.0	8.70	mg/Kg		04/08/20 08:00	04/10/20 11:32	3
Lithium	ND		7.50	0.450	mg/Kg		04/08/20 08:00	04/10/20 11:32	3
Nickel	ND		6.00	0.150	mg/Kg		04/08/20 08:00	04/10/20 11:32	3

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCS 140-38914/13-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39023**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 2**  
**Prep Batch: 38928**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	1.325	*	mg/Kg		53	75 - 125
Cadmium	2.50	2.413		mg/Kg		97	75 - 125
Iron	50.0	ND	*	mg/Kg		4	75 - 125
Lithium	5.00	4.988	J	mg/Kg		100	75 - 125
Nickel	25.0	24.80		mg/Kg		99	75 - 125

**Lab Sample ID: LCSD 140-38914/14-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39023**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 2**  
**Prep Batch: 38928**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	1.343	*	mg/Kg		54	75 - 125	1	30
Cadmium	2.50	2.435		mg/Kg		97	75 - 125	1	30
Iron	50.0	ND	*	mg/Kg		4	75 - 125	4	30
Lithium	5.00	4.863	J	mg/Kg		97	75 - 125	3	30
Nickel	25.0	25.21		mg/Kg		101	75 - 125	2	30

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39023**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 2**  
**Prep Batch: 38928**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	ND	*	ND	*	mg/Kg	☼	NC	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Iron	91.6	*	79.54	*	mg/Kg	☼	14	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Nickel	ND		ND		mg/Kg	☼	NC	30

**Lab Sample ID: MB 140-38930/12-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Method Blank**  
**Prep Type: Step 3**  
**Prep Batch: 38965**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.0150	mg/Kg		04/09/20 08:00	04/14/20 11:00	1
Cadmium	0.08300	J	0.250	0.0110	mg/Kg		04/09/20 08:00	04/14/20 11:00	1
Iron	ND		5.00	2.90	mg/Kg		04/09/20 08:00	04/14/20 11:00	1
Lithium	ND		2.50	0.150	mg/Kg		04/09/20 08:00	04/14/20 11:00	1
Nickel	ND		2.00	0.0840	mg/Kg		04/09/20 08:00	04/14/20 11:00	1

**Lab Sample ID: LCS 140-38930/13-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 3**  
**Prep Batch: 38965**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.514		mg/Kg		101	75 - 125
Cadmium	2.50	0.6875	*	mg/Kg		28	75 - 125
Iron	50.0	48.86		mg/Kg		98	75 - 125
Lithium	5.00	4.761		mg/Kg		95	75 - 125
Nickel	25.0	25.07		mg/Kg		100	75 - 125

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCSD 140-38930/14-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 3**  
**Prep Batch: 38965**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Beryllium	2.50	2.689		mg/Kg		108	75 - 125	7	30	
Cadmium	2.50	0.7735	*	mg/Kg		31	75 - 125	12	30	
Iron	50.0	51.87		mg/Kg		104	75 - 125	6	30	
Lithium	5.00	4.985		mg/Kg		100	75 - 125	5	30	
Nickel	25.0	26.89		mg/Kg		108	75 - 125	7	30	

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 3**  
**Prep Batch: 38965**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Beryllium	0.0533	J	0.05947	J	mg/Kg	☼	11	30
Cadmium	0.0454	J B *	0.04659	J *	mg/Kg	☼	3	30
Iron	993		936.5		mg/Kg	☼	6	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Nickel	ND		ND		mg/Kg	☼	NC	30

**Lab Sample ID: MB 140-38966/12-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Method Blank**  
**Prep Type: Step 4**  
**Prep Batch: 39002**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.0160	mg/Kg		04/10/20 08:00	04/14/20 12:28	1
Cadmium	ND		0.250	0.0110	mg/Kg		04/10/20 08:00	04/14/20 12:28	1
Iron	ND		5.00	2.90	mg/Kg		04/10/20 08:00	04/14/20 12:28	1
Lithium	ND		2.50	0.150	mg/Kg		04/10/20 08:00	04/14/20 12:28	1
Nickel	ND		2.00	0.0390	mg/Kg		04/10/20 08:00	04/14/20 12:28	1

**Lab Sample ID: LCS 140-38966/13-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 4**  
**Prep Batch: 39002**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Beryllium	2.50	2.600		mg/Kg		104	75 - 125			
Cadmium	2.50	2.688		mg/Kg		108	75 - 125			
Iron	50.0	50.59		mg/Kg		101	75 - 125			
Lithium	5.00	5.061		mg/Kg		101	75 - 125			
Nickel	25.0	27.05		mg/Kg		108	75 - 125			

**Lab Sample ID: LCSD 140-38966/14-B**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 4**  
**Prep Batch: 39002**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec.		RPD	Limit
							Limits	RPD		
Beryllium	2.50	2.600		mg/Kg		104	75 - 125	0	30	
Cadmium	2.50	2.723		mg/Kg		109	75 - 125	1	30	
Iron	50.0	50.08		mg/Kg		100	75 - 125	1	30	
Lithium	5.00	5.108		mg/Kg		102	75 - 125	1	30	
Nickel	25.0	27.36		mg/Kg		109	75 - 125	1	30	

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39065**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 4**  
**Prep Batch: 39002**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Beryllium	0.278	J	0.3010	J	mg/Kg	☼	8	30
Cadmium	0.0208	J	0.01717	J	mg/Kg	☼	19	30
Iron	12900		13430		mg/Kg	☼	4	30
Lithium	0.917	J	0.8945	J	mg/Kg	☼	2	30
Nickel	4.50		4.672		mg/Kg	☼	4	30

**Lab Sample ID: MB 140-39003/12-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Method Blank**  
**Prep Type: Step 5**  
**Prep Batch: 39041**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Beryllium	ND		3.75	0.315	mg/Kg		04/14/20 08:00	04/15/20 10:57	5
Cadmium	ND		3.75	0.160	mg/Kg		04/14/20 08:00	04/15/20 10:57	5
Iron	ND		75.0	44.0	mg/Kg		04/14/20 08:00	04/15/20 10:57	5
Lithium	ND		37.5	2.20	mg/Kg		04/14/20 08:00	04/15/20 10:57	5
Nickel	ND		30.0	0.900	mg/Kg		04/14/20 08:00	04/15/20 10:57	5

**Lab Sample ID: LCS 140-39003/13-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 5**  
**Prep Batch: 39041**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	
							RPD	Limit
Beryllium	7.50	4.238	*	mg/Kg		57	75 - 125	
Cadmium	7.50	7.710		mg/Kg		103	75 - 125	
Iron	150	ND	*	mg/Kg		1	75 - 125	
Lithium	15.0	16.87	J	mg/Kg		112	75 - 125	
Nickel	75.0	59.14		mg/Kg		79	75 - 125	

**Lab Sample ID: LCSD 140-39003/14-B ^5**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 5**  
**Prep Batch: 39041**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD	Limit
							RPD	Limit		
Beryllium	7.50	4.275	*	mg/Kg		57	75 - 125	1	30	
Cadmium	7.50	7.958		mg/Kg		106	75 - 125	3	30	
Iron	150	ND	**1	mg/Kg		3	75 - 125	111	30	
Lithium	15.0	18.25	J	mg/Kg		122	75 - 125	8	30	
Nickel	75.0	63.92		mg/Kg		85	75 - 125	8	30	

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 5**  
**Prep Batch: 39041**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Beryllium	ND	*	ND	*	mg/Kg	☼	NC	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Iron	ND	**1	ND	**1	mg/Kg	☼	NC	30
Lithium	ND		ND		mg/Kg	☼	NC	30
Nickel	ND		ND		mg/Kg	☼	NC	30

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: MB 140-39042/12-A**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Method Blank**  
**Prep Type: Step 6**  
**Prep Batch: 39042**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.0120	mg/Kg		04/14/20 08:00	04/15/20 12:27	1
Cadmium	ND		0.250	0.0110	mg/Kg		04/14/20 08:00	04/15/20 12:27	1
Iron	ND		5.00	2.90	mg/Kg		04/14/20 08:00	04/15/20 12:27	1
Lithium	ND		2.50	0.150	mg/Kg		04/14/20 08:00	04/15/20 12:27	1
Nickel	ND		2.00	0.0530	mg/Kg		04/14/20 08:00	04/15/20 12:27	1

**Lab Sample ID: LCS 140-39042/13-A**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 6**  
**Prep Batch: 39042**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.641		mg/Kg		106	75 - 125
Cadmium	2.50	2.535		mg/Kg		101	75 - 125
Iron	50.0	49.39		mg/Kg		99	75 - 125
Lithium	5.00	4.811		mg/Kg		96	75 - 125
Nickel	25.0	25.80		mg/Kg		103	75 - 125

**Lab Sample ID: LCSD 140-39042/14-A**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 6**  
**Prep Batch: 39042**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.604		mg/Kg		104	75 - 125	1	30
Cadmium	2.50	2.525		mg/Kg		101	75 - 125	0	30
Iron	50.0	49.26		mg/Kg		99	75 - 125	0	30
Lithium	5.00	4.810		mg/Kg		96	75 - 125	0	30
Nickel	25.0	25.62		mg/Kg		102	75 - 125	1	30

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39087**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 6**  
**Prep Batch: 39042**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.128	J	0.1122	J	mg/Kg	☼	13	30
Cadmium	ND		ND		mg/Kg	☼	NC	30
Iron	5130		4589		mg/Kg	☼	11	30
Lithium	2.91	J	2.503	J	mg/Kg	☼	15	30
Nickel	3.30		2.992		mg/Kg	☼	10	30

**Lab Sample ID: MB 140-39055/12-A**  
**Matrix: Solid**  
**Analysis Batch: 39126**

**Client Sample ID: Method Blank**  
**Prep Type: Step 7**  
**Prep Batch: 39055**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.250	0.00750	mg/Kg		04/15/20 08:00	04/16/20 12:35	1
Cadmium	ND		0.250	0.0110	mg/Kg		04/15/20 08:00	04/16/20 12:35	1
Iron	ND		5.00	4.10	mg/Kg		04/15/20 08:00	04/16/20 12:35	1
Lithium	ND		2.50	0.150	mg/Kg		04/15/20 08:00	04/16/20 12:35	1
Nickel	ND		2.00	0.0280	mg/Kg		04/15/20 08:00	04/16/20 12:35	1

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Method: 6010B SEP - SEP Metals (ICP) (Continued)

**Lab Sample ID: LCS 140-39055/13-A**  
**Matrix: Solid**  
**Analysis Batch: 39126**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Step 7**  
**Prep Batch: 39055**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	2.50	2.577		mg/Kg		103	75 - 125
Cadmium	2.50	2.647		mg/Kg		106	75 - 125
Iron	50.0	51.91		mg/Kg		104	75 - 125
Lithium	5.00	4.986		mg/Kg		100	75 - 125
Nickel	25.0	26.68		mg/Kg		107	75 - 125

**Lab Sample ID: LCSD 140-39055/14-A**  
**Matrix: Solid**  
**Analysis Batch: 39126**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Step 7**  
**Prep Batch: 39055**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	2.50	2.610		mg/Kg		104	75 - 125	1	30
Cadmium	2.50	2.677		mg/Kg		107	75 - 125	1	30
Iron	50.0	55.53		mg/Kg		111	75 - 125	7	30
Lithium	5.00	5.083		mg/Kg		102	75 - 125	2	30
Nickel	25.0	26.92		mg/Kg		108	75 - 125	1	30

**Lab Sample ID: 180-103583-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 39126**

**Client Sample ID: GAF-SB-NRS069-40-50-03092020 ~ NRS069**  
**Prep Type: Step 7**  
**Prep Batch: 39055**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	0.586		0.5763		mg/Kg	⊛	2	30
Cadmium	ND		ND		mg/Kg	⊛	NC	30
Iron	3700		3568		mg/Kg	⊛	4	30
Lithium	13.7		14.30		mg/Kg	⊛	5	30
Nickel	7.02		6.890		mg/Kg	⊛	2	30

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Metals

### Prep Batch: 38881

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Total/NA	Solid	Total	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Total/NA	Solid	Total	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Total/NA	Solid	Total	
MB 140-38881/12-A	Method Blank	Total/NA	Solid	Total	
LCS 140-38881/13-A	Lab Control Sample	Total/NA	Solid	Total	
LCSD 140-38881/14-A	Lab Control Sample Dup	Total/NA	Solid	Total	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Total/NA	Solid	Total	

### SEP Batch: 38882

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	Exchangeable	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 1	Solid	Exchangeable	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 1	Solid	Exchangeable	
MB 140-38882/12-B ^4	Method Blank	Step 1	Solid	Exchangeable	
LCS 140-38882/13-B ^5	Lab Control Sample	Step 1	Solid	Exchangeable	
LCSD 140-38882/14-B ^5	Lab Control Sample Dup	Step 1	Solid	Exchangeable	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	Exchangeable	

### Prep Batch: 38913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	3010A	38882
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 1	Solid	3010A	38882
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 1	Solid	3010A	38882
MB 140-38882/12-B ^4	Method Blank	Step 1	Solid	3010A	38882
LCS 140-38882/13-B ^5	Lab Control Sample	Step 1	Solid	3010A	38882
LCSD 140-38882/14-B ^5	Lab Control Sample Dup	Step 1	Solid	3010A	38882
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	3010A	38882

### SEP Batch: 38914

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	Carbonate	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 2	Solid	Carbonate	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 2	Solid	Carbonate	
MB 140-38914/12-B ^3	Method Blank	Step 2	Solid	Carbonate	
LCS 140-38914/13-B ^5	Lab Control Sample	Step 2	Solid	Carbonate	
LCSD 140-38914/14-B ^5	Lab Control Sample Dup	Step 2	Solid	Carbonate	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	Carbonate	

### Prep Batch: 38928

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	3010A	38914
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 2	Solid	3010A	38914
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 2	Solid	3010A	38914
MB 140-38914/12-B ^3	Method Blank	Step 2	Solid	3010A	38914
LCS 140-38914/13-B ^5	Lab Control Sample	Step 2	Solid	3010A	38914
LCSD 140-38914/14-B ^5	Lab Control Sample Dup	Step 2	Solid	3010A	38914
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	3010A	38914

### SEP Batch: 38930

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	Non-Crystalline	

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Metals (Continued)

### SEP Batch: 38930 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 3	Solid	Non-Crystalline	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 3	Solid	Non-Crystalline	
MB 140-38930/12-B	Method Blank	Step 3	Solid	Non-Crystalline	
LCS 140-38930/13-B	Lab Control Sample	Step 3	Solid	Non-Crystalline	
LCSD 140-38930/14-B	Lab Control Sample Dup	Step 3	Solid	Non-Crystalline	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	Non-Crystalline	

### Prep Batch: 38965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	3010A	38930
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 3	Solid	3010A	38930
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 3	Solid	3010A	38930
MB 140-38930/12-B	Method Blank	Step 3	Solid	3010A	38930
LCS 140-38930/13-B	Lab Control Sample	Step 3	Solid	3010A	38930
LCSD 140-38930/14-B	Lab Control Sample Dup	Step 3	Solid	3010A	38930
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	3010A	38930

### SEP Batch: 38966

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	Metal Hydroxide	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 4	Solid	Metal Hydroxide	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 4	Solid	Metal Hydroxide	
MB 140-38966/12-B	Method Blank	Step 4	Solid	Metal Hydroxide	
LCS 140-38966/13-B	Lab Control Sample	Step 4	Solid	Metal Hydroxide	
LCSD 140-38966/14-B	Lab Control Sample Dup	Step 4	Solid	Metal Hydroxide	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	Metal Hydroxide	

### Analysis Batch: 39000

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	6010B SEP	38913
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 1	Solid	6010B SEP	38913
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 1	Solid	6010B SEP	38913
MB 140-38882/12-B ^4	Method Blank	Step 1	Solid	6010B SEP	38913
LCS 140-38882/13-B ^5	Lab Control Sample	Step 1	Solid	6010B SEP	38913
LCSD 140-38882/14-B ^5	Lab Control Sample Dup	Step 1	Solid	6010B SEP	38913
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 1	Solid	6010B SEP	38913

### Prep Batch: 39002

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	3010A	38966
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 4	Solid	3010A	38966
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 4	Solid	3010A	38966
MB 140-38966/12-B	Method Blank	Step 4	Solid	3010A	38966
LCS 140-38966/13-B	Lab Control Sample	Step 4	Solid	3010A	38966
LCSD 140-38966/14-B	Lab Control Sample Dup	Step 4	Solid	3010A	38966
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	3010A	38966

### SEP Batch: 39003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	Organic-Bound	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 5	Solid	Organic-Bound	

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Metals (Continued)

### SEP Batch: 39003 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 5	Solid	Organic-Bound	
MB 140-39003/12-B ^5	Method Blank	Step 5	Solid	Organic-Bound	
LCS 140-39003/13-B ^5	Lab Control Sample	Step 5	Solid	Organic-Bound	
LCSD 140-39003/14-B ^5	Lab Control Sample Dup	Step 5	Solid	Organic-Bound	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	Organic-Bound	

### Analysis Batch: 39023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	6010B SEP	38928
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 2	Solid	6010B SEP	38928
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 2	Solid	6010B SEP	38928
MB 140-38914/12-B ^3	Method Blank	Step 2	Solid	6010B SEP	38928
LCS 140-38914/13-B ^5	Lab Control Sample	Step 2	Solid	6010B SEP	38928
LCSD 140-38914/14-B ^5	Lab Control Sample Dup	Step 2	Solid	6010B SEP	38928
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 2	Solid	6010B SEP	38928

### Prep Batch: 39041

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	3010A	39003
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 5	Solid	3010A	39003
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 5	Solid	3010A	39003
MB 140-39003/12-B ^5	Method Blank	Step 5	Solid	3010A	39003
LCS 140-39003/13-B ^5	Lab Control Sample	Step 5	Solid	3010A	39003
LCSD 140-39003/14-B ^5	Lab Control Sample Dup	Step 5	Solid	3010A	39003
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	3010A	39003

### SEP Batch: 39042

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 6	Solid	Acid/Sulfide	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 6	Solid	Acid/Sulfide	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 6	Solid	Acid/Sulfide	
MB 140-39042/12-A	Method Blank	Step 6	Solid	Acid/Sulfide	
LCS 140-39042/13-A	Lab Control Sample	Step 6	Solid	Acid/Sulfide	
LCSD 140-39042/14-A	Lab Control Sample Dup	Step 6	Solid	Acid/Sulfide	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 6	Solid	Acid/Sulfide	

### Prep Batch: 39055

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 7	Solid	Residual	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 7	Solid	Residual	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 7	Solid	Residual	
MB 140-39055/12-A	Method Blank	Step 7	Solid	Residual	
LCS 140-39055/13-A	Lab Control Sample	Step 7	Solid	Residual	
LCSD 140-39055/14-A	Lab Control Sample Dup	Step 7	Solid	Residual	
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 7	Solid	Residual	

### Analysis Batch: 39065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	6010B SEP	38965
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	6010B SEP	39002
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 3	Solid	6010B SEP	38965

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Metals (Continued)

### Analysis Batch: 39065 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 4	Solid	6010B SEP	39002
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 3	Solid	6010B SEP	38965
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 4	Solid	6010B SEP	39002
MB 140-38930/12-B	Method Blank	Step 3	Solid	6010B SEP	38965
MB 140-38966/12-B	Method Blank	Step 4	Solid	6010B SEP	39002
LCS 140-38930/13-B	Lab Control Sample	Step 3	Solid	6010B SEP	38965
LCS 140-38966/13-B	Lab Control Sample	Step 4	Solid	6010B SEP	39002
LCSD 140-38930/14-B	Lab Control Sample Dup	Step 3	Solid	6010B SEP	38965
LCSD 140-38966/14-B	Lab Control Sample Dup	Step 4	Solid	6010B SEP	39002
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 3	Solid	6010B SEP	38965
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 4	Solid	6010B SEP	39002

### Analysis Batch: 39087

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	6010B SEP	39041
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 6	Solid	6010B SEP	39042
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 5	Solid	6010B SEP	39041
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 6	Solid	6010B SEP	39042
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 5	Solid	6010B SEP	39041
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 6	Solid	6010B SEP	39042
MB 140-39003/12-B ^5	Method Blank	Step 5	Solid	6010B SEP	39041
MB 140-39042/12-A	Method Blank	Step 6	Solid	6010B SEP	39042
LCS 140-39003/13-B ^5	Lab Control Sample	Step 5	Solid	6010B SEP	39041
LCS 140-39042/13-A	Lab Control Sample	Step 6	Solid	6010B SEP	39042
LCSD 140-39003/14-B ^5	Lab Control Sample Dup	Step 5	Solid	6010B SEP	39041
LCSD 140-39042/14-A	Lab Control Sample Dup	Step 6	Solid	6010B SEP	39042
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 5	Solid	6010B SEP	39041
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 6	Solid	6010B SEP	39042

### Analysis Batch: 39126

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 7	Solid	6010B SEP	39055
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Step 7	Solid	6010B SEP	39055
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Step 7	Solid	6010B SEP	39055
MB 140-39055/12-A	Method Blank	Step 7	Solid	6010B SEP	39055
LCS 140-39055/13-A	Lab Control Sample	Step 7	Solid	6010B SEP	39055
LCSD 140-39055/14-A	Lab Control Sample Dup	Step 7	Solid	6010B SEP	39055
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Step 7	Solid	6010B SEP	39055

### Analysis Batch: 39150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Total/NA	Solid	6010B	38881
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Total/NA	Solid	6010B	38881
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Total/NA	Solid	6010B	38881
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Total/NA	Solid	6010B	38881
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Total/NA	Solid	6010B	38881
MB 140-38881/12-A	Method Blank	Total/NA	Solid	6010B	38881
LCS 140-38881/13-A	Lab Control Sample	Total/NA	Solid	6010B	38881
LCSD 140-38881/14-A	Lab Control Sample Dup	Total/NA	Solid	6010B	38881
180-103583-1 DU	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Total/NA	Solid	6010B	38881

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-2020-03092259

Job ID: 180-103583-2  
SDG: SEP Metals

## Metals

### Analysis Batch: 39247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103583-1	GAF-SB-NRS069-40-50-03092020 ~ NRS069	Sum of Steps 1-7	Solid	6010B SEP	
180-103583-4	GAF-SB-NRS070-50-60-03102020 ~ NRS070	Sum of Steps 1-7	Solid	6010B SEP	
180-103583-5	GAF-SB-NRS068-40-58-03122020 ~ NRS068	Sum of Steps 1-7	Solid	6010B SEP	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

Page: 1 of 2  
Cooler #: 2 coolers

COC # GAF-2020-03092259

Task NRS Field Investigation  
Desc

Required Ship to Lab:		Required Project Information:		Required Sampler Information:		TAT: Standard		Rush	Mark One										
Lab Name:	TestAmerica Pittsburgh	Site ID #:	Gallatin Fossil Plant	Sampler:	Ethan House														
Address:	301 Alpha Drive Pittsburgh, PA 15238	Project #:	NRS Field Investigation	Sampling Company:	AECOM														
Lab PM:	Gail Lage	Site Address:	1499 Steam Plant Rd	Address:	1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27580														
Phone/Fax:	(615)301-5741	City:	Gallatin	City/State:	Morrisville, NC 27580														
Lab PM email:	Gail.Lage@testamericainc.com	State, Zip:	TN, 37066	Reimbursement project?:															
Applicable Lab Quote #:		Site PM Name:	Mary Stauffer	Non-reimbursement project?:															
		Phone/Fax:	1-919-461-1468	Send EDD to:	TVA DELIVERABLES@envstsd.com														
		Site PM Email:	mary.stauffer@aecom.com	CC Hardcopy report to:															
				CC Hardcopy report to:															
ITEM #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G-GRAB C-COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	#OF CONTAINERS	Comments/Lab Sample I.D.	Analysis	DATE	TIME	Sample Receipt Conditions	Sample	infect?	in OC	Blank?
1	GAF-SB-NRS069-40-50-03092020	NRS069			S	G	N	3/9/20	1420	1		Loyd_Kahn - TC / TOC	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
2	GAF-SB-NRS069-40-50-03092020	NRS069			S	G	N	3/9/20	1430	2		Sequential Extraction	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
3	GAF-AQ-703-03092020	DUP			S	G	N	3/9/20		2		Mercury	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
4	GAF-SB-NRS069-40-50-03092020	NRS069-MS			S	G	N	3/9/20	1420	2		6020A - (MOD) Custom Metal	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
5	GAF-SB-NRS069-40-50-03092020	NRS069-MSD			S	G	N	3/9/20	1420	2		Loyd_Kahn - TC / TOC	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
6	GAF-AQ-902-03092020	EB			W	G	N	3/9/20	1430	5		None	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
7	GAF-SB-NRS070-50-60-03102020	NRS70			S	G	N	3/10/20	1740	1		None	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
8	GAF-SB-NRS070-50-60-03102020	NRS70			S	G	N	3/10/20	1740	2		None	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
9	GAF-SB-NRS068-40-50-03122020	NRS068			S	G	N	3/12/20	0950	1		None	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
10	GAF-SB-NRS068-40-50-03122020	NRS068			S	G	N	3/12/20	0950	2		None	3/11/20	10:15	Y/N	Y/N	Y/N	Y/N	Y/N
11																			
12																			

Additional Comments/Special Instructions:

NRS Soil Blanks:  
Metals preserved w/ HNO3 to pH<2; TOC preserved w/ H2SO4 to pH<2  
SEQUENTIAL - RUN METALS BE, CA, LI, NI, FE ONLY  
ADD PHOSPHOROUS TESTING TO SOIL SAMPLES!  
CALL MARY IF NEEDED.

RELINQUISHED BY / AFFILIATION: Ethan House / AECOM

DATE: 3/11/20

TIME: 10:15

ACCEPTED BY / AFFILIATION: Mary Stauffer

DATE: 3/11/20

TIME: 10:15

Sample Receipt Conditions

Sample in OC: Y/N

Sample infect?: Y/N

Blank?: Y/N

Shipping Method: Fedex

Sampler Name and Signature: Ethan House



180-103583 Chain of Custody





### CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Task Desc  
NRS

Required Ship to Lab:		Required Project Information:		Required Sampler Information:		TAT: Stan				
Lab Name:	301 Alpha Drive Pittsburgh, PA 15238	Site ID #:	Gallatin Fossil Plant	Sampler:	Ethan House	Analysts:	None			
Address:		Project #:	NRS Field Investigation	Sampling Company:	AECOM	Preserve:	None			
Lab P/N:	Gail Laga	Site Address:	1489 Steam Plant Rd	City/State:	Marrieville, NC 27560	Phone #:	1-919-461-1100			
Phone/Fax:	(615)301-5741	City:	Gallatin	Reimbursement project?:		Non-reimbursement project?:	Mark one			
Lab P/N email:	Gail.Laga@lestamericainc.com	State, Zip:	TN, 37066	Send EDD to:	TVA DELIVERABLES@emustid.com					
Applicable Lab Quote #:		Site P/N Name:	Mary Stauffer	OC Hardcopy report to:						
		Site P/N Email:	mary.stauffer@aecom.com	OC Hardcopy report to:						
ITEM #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth		MATRIX CODE	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	#OF CONTAINERS	Comments/Lab Sample ID.
			Start Depth	End Depth						
1	CAF-SB-NRS069-4A-50-0309 1020	NRS069			S G N	G N	3/19/20	1420	13	
2	<del>CAF-SB-NRS069-4A-50-0309 1020</del>	<del>NRS069</del>			S G N	G N	3/19/20	1430	2	
3	CAF-38-103-0309 2020	DUP			S G N	G N	3/19/20		2	
4	CAF-SB-NRS069-4A-50-0309 2020	NRS069-MS			S G N	G N	3/19/20	1420	2	
5	CAF-SB-NRS069-4A-50-0309 2020	NRS069-MS			S G N	G N	3/19/20	1420	2	
6	CAF-AG-102-0309 2020	EB			S G N	G N	3/19/20	1430	5	
7	CAF-SB-NRS070-50-60-0310 2020	NRS70			S G N	G N	3/10/20	1740	13	
8	<del>CAF-SB-NRS070-50-60-0310 2020</del>	<del>NRS70</del>			S G N	G N	3/10/20	1740	2	
9	CAF-SB-NRS068-4A-58-0312 2020	NRS068			S G N	G N	3/12/20	0950	13	
10	<del>CAF-SB-NRS068-4A-58-0312 2020</del>	<del>NRS068</del>			S G N	G N	3/12/20	0950	2	

Additional Comments/Special Instructions:  
 NRS Soil Blanks:  
 Metals preserved w/ HNO3 to pH<2; TOC preserved w/ H2SO4 to pH<2  
 SEQUENTIAL - RUN METALS Be, Cd, Li, Ni, Fe ONLY  
 Add PHOSPHORO TESTING TO SOL SAMPLES,  
 CALL MARY IF NEEDED  
 Revised by: Mary Stauffer 3/19/20

REMOVED BY / AFFILIATION	DATE / TIME	ACCEPTED BY / AFFILIATION
Ethan House / AECOM	3/19/20 10:20 AM	[Signature]

SHIPPER'S METHOD (mark as applicable)  
 FedEx



Ethan House

eurofins



Environment Testir  
TestAmerica

ORIGIN ID: MIFA (919) 461-1429  
URS SHIPPING AND RECEIVING/ JOEY KI  
TVA GALLATIN FOSSIL PLANT  
1488 STEAM PLANT ROAD  
GALLATIN, IN 37066  
UNITED STATES US

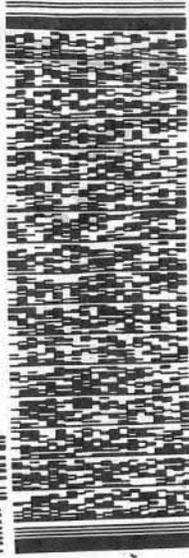
SHIP DATE: OSMAR:  
ACTWGT: 10.00 LB  
CAD: 592545/CAFE

TP

**EUROFINS TESTAMERICA PITTSBURG**  
**301 ALPHA DRIVE**  
**RIDC PARK**  
**PITTSBURGH PA 152382907**

(412) 968-7068  
REF: 8180-89137  
DEPT: BOTTLES

RMA: IIIIIII



Study Seal



**FedEx**  
TRK# 1685 4439 2891  
0221

**XO AGCA**

15238  
PA-US PIT

Uncorrected temp  
Thermometer ID

CF 0 Initials JJ

PT-WI-SR-001 effective 11/8/18



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EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Are the shipping containers intact?	/			<input type="checkbox"/> Containers, Broken	
2. Were ambient air containers received intact?	/			<input type="checkbox"/> Checked in lab	
3. The coolers/containers custody seal if present, is it intact?	/			<input type="checkbox"/> Yes <input type="checkbox"/> NA	
4. Is the cooler temperature within limits? (> freezing temp. of water to 6°C, VOST: 10°C) Thermometer ID: <u>CC68</u> Correction factor: <u>0.1</u>	/			<input type="checkbox"/> Cooler Out of Temp, Client Contacted, Proceed/Cancel <input type="checkbox"/> Cooler Out of Temp, Same Day Receipt	
5. Were all of the sample containers received intact?	/			<input type="checkbox"/> Containers, Broken	
6. Were samples received in appropriate containers?	/			<input type="checkbox"/> Containers, Improper; Client Contacted; Proceed/Cancel	
7. Do sample container labels match COC? (IDs, Dates, Times)	/			<input type="checkbox"/> COC & Samples Do Not Match <input type="checkbox"/> COC Incorrect/Incomplete <input type="checkbox"/> COC Not Received	
8. Were all of the samples listed on the COC received?	/			<input type="checkbox"/> Sample Received, Not on COC <input type="checkbox"/> Sample on COC, Not Received	
9. Is the date/time of sample collection noted?	/			<input type="checkbox"/> COC; No Date/Time; Client Contacted	Labeling Verified by: _____ Date: _____
10. Was the sampler identified on the COC?	/			<input type="checkbox"/> Sampler Not Listed on COC	pH test strip lot number: _____
11. Is the client and project name/# identified?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
12. Are tests/parameters listed for each sample?	/			<input type="checkbox"/> COC No tests on COC	
13. Is the matrix of the samples noted?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
14. Was COC relinquished? (Signed/Dated/Timed)	/			<input type="checkbox"/> COC Incorrect/Incomplete	Box 16A: pH Preservation Box 18A: Residual Chlorine
15. Were samples received within holding time?	/			<input type="checkbox"/> Holding Time - Receipt	Preservative: _____
16. Were samples received with correct chemical preservative (excluding Encore)?	/			<input type="checkbox"/> pH Adjusted, pH Included (See box 16A) <input type="checkbox"/> Incorrect Preservative	Lot Number: _____ Exp Date: _____ Analyst: _____
17. Were VOA samples received without headspace?	/			<input type="checkbox"/> Headspace (VOA only)	Date: _____ Time: _____
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number: _____	/			<input type="checkbox"/> Residual Chlorine	
19. For 1613B water samples is pH<9?	/			<input type="checkbox"/> If no, notify lab to adjust	
20. For rad samples was sample activity info. Provided?	/			<input type="checkbox"/> Project missing info	
Project #: _____ PM Instructions: _____					

QA026R32.doc, 062719

Sample Receiving Associate: [Signature] Date: 7/18/20



## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-103583-2

SDG Number: SEP Metals

**Login Number: 103583**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-103681-1  
Client Project/Site: GAF NRS Treatability

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
4/1/2020 11:34:51 AM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

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**Job ID: 180-103681-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

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**Narrative**

**Job Narrative  
180-103681-1**

**Receipt**

The samples were received on 3/18/2020 10:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 1.8° C.

**Receipt Exceptions**

The Field Sampler was not listed on the Chain of Custody.

**GC Semi VOA**

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

**General Chemistry**

Method 365.4: The method blank for preparation batch 400-483212 and analytical batch 400-483998 contained Phosphorus, Total above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Qualifiers

### General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Laboratory: Eurofins TestAmerica, Canton

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

Authority	Program	Identification Number	Expiration Date
California	State	2927	02-23-21
Connecticut	State	PH-0590	12-31-21
Florida	NELAP	E87225	06-30-20
Georgia	State	4062	02-23-20 *
Illinois	NELAP	004498	07-31-20
Iowa	State	421	06-01-21
Kansas	NELAP	E-10336	04-30-20
Kentucky (WW)	State	KY98016	12-31-20
Minnesota	NELAP	OH00048	12-31-20
Minnesota (Petrofund)	State	3506	08-01-21
New Jersey	NELAP	OH001	06-30-20
New York	NELAP	10975	03-31-20
Ohio VAP	State	CL0024	06-05-21
Oregon	NELAP	4062	02-24-21
Pennsylvania	NELAP	68-00340	08-31-20
Texas	NELAP	T104704517-18-10	08-31-20
USDA	US Federal Programs	P330-16-00404	12-28-19 *
Virginia	NELAP	010101	09-14-20
Washington	State	C971	01-12-21
West Virginia DEP	State	210	12-31-20

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Pittsburgh

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Laboratory: Eurofins TestAmerica, Pensacola

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

Authority	Program	Identification Number	Expiration Date
Alabama	State	40150	07-01-20
ANAB	ISO/IEC 17025	L2471	02-23-23
Arizona	State	AZ0710	01-13-21
Arkansas DEQ	State	88-0689	09-01-20
California	State	2510	07-01-20
Florida	NELAP	E81010	06-30-20
Georgia	State	E81010(FL)	06-30-20
Illinois	NELAP	004586	10-09-20
Iowa	State	367	08-01-20
Kansas	NELAP	E-10253	08-16-20
Kentucky (UST)	State	53	06-30-20
Kentucky (WW)	State	KY98030	12-31-20
Louisiana	NELAP	30976	06-30-20
Louisiana (DW)	State	LA017	12-31-20
Maryland	State	233	09-30-20
Massachusetts	State	M-FL094	06-30-20
Michigan	State	9912	05-06-20
Minnesota	NELAP	012-999-481	12-31-20
New Jersey	NELAP	FL006	06-30-20
New York	NELAP	12115	03-31-20
New York	NELAP Secondary AB	12115	04-01-20
North Carolina (WW/SW)	State	314	12-31-20
Oklahoma	State	9810-186	08-31-20
Pennsylvania	NELAP	68-00467	01-31-21
Rhode Island	State	LAO00307	12-30-20
South Carolina	State	96026002	06-30-20
Tennessee	State	TN02907	06-30-20
Texas	NELAP	T104704286	09-30-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-18-00148	05-17-21
Virginia	NELAP	460166	06-14-20
Washington	State	C915	05-15-20
West Virginia DEP	State	136	06-30-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-103681-5	GAF-GW-FERROBLACK	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-6	GAF-GW-DOLO FINES-444U	Water	03/17/20 13:00	03/18/20 10:00	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

Method	Method Description	Protocol	Laboratory
EPA 9056A	Anions, Ion Chromatography	SW846	TAL PIT
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL PEN
365.4	Phosphorus, Total	EPA	TAL PEN
EPA 353.2	Nitrogen, Nitrate-Nitrite	EPA	TAL PIT
SM 2310B	Acidity	SM	TAL PIT
SM 5310C	Total Organic Carbon	SM	TAL PIT
SM2320 B	Alkalinity, Total	SM18	TAL PIT
SM4500 P E-2011	Phosphorus	SM	TAL CAN
SM4500-S-2 F.	Sulfide	SM21	TAL PIT
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL PEN
365.2/365.3/365	Phosphorus, Total	MCAWW	TAL PEN

#### Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SM21 = Standard Methods For The Examination Of Water And Wastewater, 21st Edition

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

#### Laboratory References:

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

**Client Sample ID: GAF-GW-FERROBLACK**

**Lab Sample ID: 180-103681-5**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		10			311491	03/30/20 20:27	SAC	TAL PIT
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		100			311491	03/30/20 20:43	SAC	TAL PIT
Total/NA	Prep	351.2			25 mL	25 mL	483211	03/23/20 13:54	HES	TAL PEN
Total/NA	Analysis	351.2 Instrument ID: Lachat 3		1			484005	03/27/20 17:47	RRC	TAL PEN
Total/NA	Prep	365.2/365.3/365			25 mL	25 mL	483212	03/23/20 13:57	HES	TAL PEN
Total/NA	Analysis	365.4 Instrument ID: Lachat 2		1	10 mL	10 mL	483998	03/27/20 15:46	RRC	TAL PEN
Total/NA	Analysis	EPA 353.2 Instrument ID: ASTORIA2		1	8 mL	8 mL	310580	03/20/20 09:33	CAK	TAL PIT
Total/NA	Analysis	SM 2310B Instrument ID: NOEQUIP		1	50 mL	50 mL	311136	03/25/20 17:48	ELS	TAL PIT
Total/NA	Analysis	SM 5310C Instrument ID: TOC1030		1			310863	03/23/20 10:28	TAM	TAL PIT
Total/NA	Analysis	SM2320 B Instrument ID: PCTITRATOR		1			310659	03/20/20 20:16	AVS	TAL PIT
Total/NA	Analysis	SM4500 P E-2011 Instrument ID: ERNIE		1	5 mL	5 mL	428529	03/27/20 05:32	TPH	TAL CAN
Total/NA	Analysis	SM4500-S-2 F. Instrument ID: NOEQUIP		1	50 mL	50 mL	310684	03/21/20 10:25	CMR	TAL PIT

**Client Sample ID: GAF-GW-DOLO FINES-444U**

**Lab Sample ID: 180-103681-6**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		2.5			311491	03/30/20 22:33	SAC	TAL PIT
Total/NA	Analysis	EPA 9056A Instrument ID: CHICS2100B		25			311491	03/30/20 22:49	SAC	TAL PIT
Total/NA	Prep	351.2			25 mL	25 mL	483211	03/23/20 13:54	HES	TAL PEN
Total/NA	Analysis	351.2 Instrument ID: Lachat 3		1			484005	03/27/20 17:48	RRC	TAL PEN
Total/NA	Prep	365.2/365.3/365			25 mL	25 mL	483212	03/23/20 13:57	HES	TAL PEN
Total/NA	Analysis	365.4 Instrument ID: Lachat 2		1	10 mL	10 mL	483998	03/27/20 15:47	RRC	TAL PEN
Total/NA	Analysis	EPA 353.2 Instrument ID: ASTORIA2		1	8 mL	8 mL	310580	03/20/20 09:39	CAK	TAL PIT
Total/NA	Analysis	SM 2310B Instrument ID: NOEQUIP		1	50 mL	50 mL	311136	03/25/20 17:48	ELS	TAL PIT
Total/NA	Analysis	SM 5310C Instrument ID: TOC1030		1			310863	03/23/20 10:43	TAM	TAL PIT

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
 Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

**Client Sample ID: GAF-GW-DOLO FINES-444U**

**Lab Sample ID: 180-103681-6**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM2320 B		1			310659	03/20/20 16:20	AVS	TAL PIT
Total/NA	Analysis	SM4500 P E-2011 Instrument ID: ERNIE		1	5 mL	5 mL	428529	03/27/20 05:36	TPH	TAL CAN
Total/NA	Analysis	SM4500-S-2 F. Instrument ID: NOEQUIP		1	50 mL	50 mL	310684	03/21/20 10:28	CMR	TAL PIT

**Laboratory References:**

TAL CAN = Eurofins TestAmerica, Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

**Analyst References:**

Lab: TAL CAN

Batch Type: Analysis

TPH = Tom Harshman

Lab: TAL PEN

Batch Type: Prep

HES = Hans Schroeder

Batch Type: Analysis

RRC = Rebecca Chandler

Lab: TAL PIT

Batch Type: Analysis

AVS = Abbey Smith

CAK = Chuck Kieda

CMR = Carl Reagle

ELS = Edwin Shireman

SAC = Shawn Clemente

TAM = Tessa Mastalski

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

**Client Sample ID: GAF-GW-FERROBLACK**

**Lab Sample ID: 180-103681-5**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 9056A - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3560		100	32.0	mg/L			03/30/20 20:43	100
Fluoride	ND		1.00	0.263	mg/L			03/30/20 20:27	10
Sulfate	2130		100	38.0	mg/L			03/30/20 20:43	100

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	5.48		0.500	0.260	mg/L		03/23/20 13:54	03/27/20 17:47	1
Phosphorus, Total	0.0937	J B	0.100	0.0320	mg/L		03/23/20 13:57	03/27/20 15:46	1
Nitrate Nitrite Nitrogen	0.157		0.100	0.0650	mg/L			03/20/20 09:33	1
Acidity as CaCO3 to pH 8.3	682		5.00	5.00	mg/L			03/25/20 17:48	1
Total Organic Carbon - Duplicates	37.0		1.00	0.508	mg/L			03/23/20 10:28	1
Total Alkalinity as CaCO3 to pH 4.5	ND		5.00	5.00	mg/L			03/20/20 20:16	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 20:16	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 20:16	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			03/20/20 20:16	1
Phosphate as PO4	0.175	J	0.307	0.114	mg/L			03/27/20 05:32	1
Sulfide	ND		3.00	1.34	mg/L			03/21/20 10:25	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

**Client Sample ID: GAF-GW-DOLO FINES-444U**

**Lab Sample ID: 180-103681-6**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 9056A - Anions, Ion Chromatography**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	71.9		2.50	0.800	mg/L			03/30/20 22:33	2.5
Fluoride	0.612		0.250	0.0658	mg/L			03/30/20 22:33	2.5
Sulfate	2050		25.0	9.51	mg/L			03/30/20 22:49	25

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	1.06		0.500	0.260	mg/L		03/23/20 13:54	03/27/20 17:48	1
Phosphorus, Total	0.131	B	0.100	0.0320	mg/L		03/23/20 13:57	03/27/20 15:47	1
Nitrate Nitrite Nitrogen	0.0680	J	0.100	0.0650	mg/L			03/20/20 09:39	1
Acidity as CaCO3 to pH 8.3	- 36.1		5.00	5.00	mg/L			03/25/20 17:48	1
Total Organic Carbon - Duplicates	34.1		1.00	0.508	mg/L			03/23/20 10:43	1
Total Alkalinity as CaCO3 to pH 4.!	35.8		5.00	5.00	mg/L			03/20/20 16:20	1
Bicarbonate Alkalinity as CaCO3	15.5		5.00	5.00	mg/L			03/20/20 16:20	1
Carbonate Alkalinity as CaCO3	20.4		5.00	5.00	mg/L			03/20/20 16:20	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			03/20/20 16:20	1
Phosphate as PO4	ND		0.307	0.114	mg/L			03/27/20 05:36	1
Sulfide	ND		3.00	1.34	mg/L			03/21/20 10:28	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: EPA 9056A - Anions, Ion Chromatography

**Lab Sample ID: MB 180-311491/37**  
**Matrix: Water**  
**Analysis Batch: 311491**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.00	0.320	mg/L			03/30/20 14:40	1
Fluoride	ND		0.100	0.0263	mg/L			03/30/20 14:40	1
Sulfate	ND		1.00	0.380	mg/L			03/30/20 14:40	1

**Lab Sample ID: LCS 180-311491/36**  
**Matrix: Water**  
**Analysis Batch: 311491**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	48.12		mg/L		96	80 - 120
Fluoride	2.50	2.329		mg/L		93	80 - 120
Sulfate	50.0	47.60		mg/L		95	80 - 120

**Lab Sample ID: 180-103680-D-1 MS**  
**Matrix: Water**  
**Analysis Batch: 311491**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	23.6		25.0	48.04		mg/L		98	80 - 120
Fluoride	0.0316	J	1.25	1.230		mg/L		96	80 - 120
Sulfate	7.06		25.0	30.57		mg/L		94	80 - 120

**Lab Sample ID: 180-103680-D-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 311491**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	23.6		25.0	48.24		mg/L		99	80 - 120	0	15
Fluoride	0.0316	J	1.25	1.213		mg/L		95	80 - 120	1	15
Sulfate	7.06		25.0	29.45		mg/L		90	80 - 120	4	15

## Method: 351.2 - Nitrogen, Total Kjeldahl

**Lab Sample ID: MB 400-483211/1-A**  
**Matrix: Water**  
**Analysis Batch: 484005**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 483211**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	ND		0.500	0.260	mg/L		03/23/20 13:54	03/27/20 17:18	1

**Lab Sample ID: LCS 400-483211/2-A**  
**Matrix: Water**  
**Analysis Batch: 484005**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 483211**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrogen, Kjeldahl	10.0	10.98		mg/L		110	90 - 110

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# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

**Lab Sample ID: 180-103763-A-1-B MS**  
**Matrix: Water**  
**Analysis Batch: 484005**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 483211**  
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Nitrogen, Kjeldahl	ND		4.00	4.005		mg/L		100	90 - 110

**Lab Sample ID: 180-103763-A-1-C MSD**  
**Matrix: Water**  
**Analysis Batch: 484005**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 483211**  
%Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Nitrogen, Kjeldahl	ND		4.00	4.103		mg/L		103	90 - 110	2	22

**Lab Sample ID: MRL 400-484005/2**  
**Matrix: Water**  
**Analysis Batch: 484005**

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

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	Limits
Nitrogen, Kjeldahl	0.500	0.6350		mg/L		127	50 - 150

## Method: 365.4 - Phosphorus, Total

**Lab Sample ID: MB 400-483212/1-A**  
**Matrix: Water**  
**Analysis Batch: 483998**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 483212**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phosphorus, Total	0.09320	J	0.100	0.0320	mg/L		03/23/20 13:57	03/27/20 15:15	1

**Lab Sample ID: LCS 400-483212/2-A**  
**Matrix: Water**  
**Analysis Batch: 483998**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 483212**  
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Phosphorus, Total	2.00	2.031		mg/L		102	75 - 113

**Lab Sample ID: 180-103763-A-1-E MS**  
**Matrix: Water**  
**Analysis Batch: 483998**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 483212**  
%Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Phosphorus, Total	0.154	B	0.400	0.5497		mg/L		99	72 - 120

**Lab Sample ID: 180-103763-A-1-F MSD**  
**Matrix: Water**  
**Analysis Batch: 483998**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 483212**  
%Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Phosphorus, Total	0.154	B	0.400	0.5878		mg/L		108	72 - 120	7	27

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: 365.4 - Phosphorus, Total (Continued)

Lab Sample ID: MRL 400-483998/11  
Matrix: Water  
Analysis Batch: 483998

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

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Phosphorus, Total	0.100	0.1433		mg/L		143	50 - 150

## Method: EPA 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 180-310580/56  
Matrix: Water  
Analysis Batch: 310580

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate Nitrite Nitrogen	ND		0.100	0.0650	mg/L			03/20/20 09:22	1

Lab Sample ID: LCS 180-310580/52  
Matrix: Water  
Analysis Batch: 310580

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite Nitrogen	2.00	1.817		mg/L		91	90 - 110

Lab Sample ID: 180-102906-D-1 MS  
Matrix: Water  
Analysis Batch: 310580

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite Nitrogen	ND	F1	2.00	2.364	F1	mg/L		118	90 - 110

Lab Sample ID: 180-102906-D-1 MSD  
Matrix: Water  
Analysis Batch: 310580

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Nitrate Nitrite Nitrogen	ND	F1	2.00	2.330	F1	mg/L		117	90 - 110	1	20

## Method: SM 2310B - Acidity

Lab Sample ID: MB 180-311136/2  
Matrix: Water  
Analysis Batch: 311136

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity as CaCO3 to pH 8.3	ND		5.00	5.00	mg/L			03/25/20 17:42	1

Lab Sample ID: LCS 180-311136/1  
Matrix: Water  
Analysis Batch: 311136

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acidity as CaCO3 to pH 8.3	250	253.4		mg/L		101	90 - 110

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: SM 2310B - Acidity (Continued)

Lab Sample ID: 180-103680-D-1 DU  
Matrix: Water  
Analysis Batch: 311136

Client Sample ID: Duplicate  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Acidity as CaCO3 to pH 8.3	- 226		- 228		mg/L		NC	20

## Method: SM 5310C - Total Organic Carbon

Lab Sample ID: MB 180-310863/33  
Matrix: Water  
Analysis Batch: 310863

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon - Duplicates	ND		1.00	0.508	mg/L			03/23/20 04:05	1

Lab Sample ID: LCS 180-310863/31  
Matrix: Water  
Analysis Batch: 310863

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon - Duplicates	20.0	20.12		mg/L		101	85 - 115

Lab Sample ID: LCSD 180-310863/32  
Matrix: Water  
Analysis Batch: 310863

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

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon - Duplicates	20.0	20.10		mg/L		101	85 - 115	0	20

Lab Sample ID: 180-103581-F-1 MSD  
Matrix: Water  
Analysis Batch: 310863

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon - Duplicates	0.708	J	10.0	10.43		mg/L		97	75 - 125	5	20

Lab Sample ID: 180-103581-I-1 MS  
Matrix: Water  
Analysis Batch: 310863

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon - Duplicates	0.708	J	10.0	10.97		mg/L		103	75 - 125

## Method: SM2320 B - Alkalinity, Total

Lab Sample ID: MB 180-310659/63  
Matrix: Water  
Analysis Batch: 310659

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Alkalinity as CaCO3 to pH 4.5	ND		5.00	5.00	mg/L			03/20/20 14:36	1

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: SM2320 B - Alkalinity, Total (Continued)

**Lab Sample ID: MB 180-310659/63**  
**Matrix: Water**  
**Analysis Batch: 310659**

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

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 14:36	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 14:36	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			03/20/20 14:36	1

**Lab Sample ID: MB 180-310659/87**  
**Matrix: Water**  
**Analysis Batch: 310659**

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

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Total Alkalinity as CaCO3 to pH 4.5	ND		5.00	5.00	mg/L			03/20/20 17:38	1
Bicarbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 17:38	1
Carbonate Alkalinity as CaCO3	ND		5.00	5.00	mg/L			03/20/20 17:38	1
Hydroxide Alkalinity	ND		5.00	5.00	mg/L			03/20/20 17:38	1

**Lab Sample ID: LCS 180-310659/62**  
**Matrix: Water**  
**Analysis Batch: 310659**

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

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Total Alkalinity as CaCO3 to pH 4.5	250	232.3		mg/L		93	90 - 110

**Lab Sample ID: LCS 180-310659/86**  
**Matrix: Water**  
**Analysis Batch: 310659**

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

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Total Alkalinity as CaCO3 to pH 4.5	250	224.6		mg/L		90	90 - 110

**Lab Sample ID: 180-103658-C-3 DU**  
**Matrix: Water**  
**Analysis Batch: 310659**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD
	Result	Qualifier	Result	Qualifier				Limit
Total Alkalinity as CaCO3 to pH 4.5	28.7		28.45		mg/L		0.9	20
Bicarbonate Alkalinity as CaCO3	28.7		28.45		mg/L		0.9	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Hydroxide Alkalinity	ND		ND		mg/L		NC	20

**Lab Sample ID: 180-103680-D-1 DU**  
**Matrix: Water**  
**Analysis Batch: 310659**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU	DU	Unit	D	RPD	RPD
	Result	Qualifier	Result	Qualifier				Limit
Total Alkalinity as CaCO3 to pH 4.5	266		262.6		mg/L		1	20
Bicarbonate Alkalinity as CaCO3	266		262.6		mg/L		1	20
Carbonate Alkalinity as CaCO3	ND		ND		mg/L		NC	20
Hydroxide Alkalinity	ND		ND		mg/L		NC	20

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: SM4500 P E-2011 - Phosphorus

**Lab Sample ID: MB 240-428529/3**  
**Matrix: Water**  
**Analysis Batch: 428529**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phosphate as PO4	ND		0.307	0.114	mg/L			03/27/20 05:13	1

**Lab Sample ID: LCS 240-428529/4**  
**Matrix: Water**  
**Analysis Batch: 428529**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phosphate as PO4	0.416	0.4884		mg/L		117	77 - 120

**Lab Sample ID: 240-127784-B-1 MS**  
**Matrix: Water**  
**Analysis Batch: 428529**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Phosphate as PO4	1.18		1.54	2.729		mg/L		101	38 - 156

**Lab Sample ID: 240-127784-B-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 428529**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phosphate as PO4	1.18		1.54	2.677		mg/L		97	38 - 156	2	29

## Method: SM4500-S-2 F. - Sulfide

**Lab Sample ID: MB 180-310684/3**  
**Matrix: Water**  
**Analysis Batch: 310684**

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		3.00	1.34	mg/L			03/21/20 10:20	1

**Lab Sample ID: LCS 180-310684/4**  
**Matrix: Water**  
**Analysis Batch: 310684**

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	12.8	12.96		mg/L		101	90 - 110

**Lab Sample ID: 180-103763-J-11 MS**  
**Matrix: Water**  
**Analysis Batch: 310684**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	ND		12.8	13.12		mg/L		102	75 - 125

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## Method: SM4500-S-2 F. - Sulfide (Continued)

**Lab Sample ID: 180-103763-J-11 MSD**  
**Matrix: Water**  
**Analysis Batch: 310684**

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

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfide	ND		12.8	12.34		mg/L		96	75 - 125	6	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## HPLC/IC

### Analysis Batch: 311491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	EPA 9056A	
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	EPA 9056A	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	EPA 9056A	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	EPA 9056A	
MB 180-311491/37	Method Blank	Total/NA	Water	EPA 9056A	
LCS 180-311491/36	Lab Control Sample	Total/NA	Water	EPA 9056A	
180-103680-D-1 MS	Matrix Spike	Total/NA	Water	EPA 9056A	
180-103680-D-1 MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 9056A	

## General Chemistry

### Analysis Batch: 310580

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	EPA 353.2	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	EPA 353.2	
MB 180-310580/56	Method Blank	Total/NA	Water	EPA 353.2	
LCS 180-310580/52	Lab Control Sample	Total/NA	Water	EPA 353.2	
180-102906-D-1 MS	Matrix Spike	Total/NA	Water	EPA 353.2	
180-102906-D-1 MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 353.2	

### Analysis Batch: 310659

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	SM2320 B	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	SM2320 B	
MB 180-310659/63	Method Blank	Total/NA	Water	SM2320 B	
MB 180-310659/87	Method Blank	Total/NA	Water	SM2320 B	
LCS 180-310659/62	Lab Control Sample	Total/NA	Water	SM2320 B	
LCS 180-310659/86	Lab Control Sample	Total/NA	Water	SM2320 B	
180-103658-C-3 DU	Duplicate	Total/NA	Water	SM2320 B	
180-103680-D-1 DU	Duplicate	Total/NA	Water	SM2320 B	

### Analysis Batch: 310684

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	SM4500-S-2 F.	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	SM4500-S-2 F.	
MB 180-310684/3	Method Blank	Total/NA	Water	SM4500-S-2 F.	
LCS 180-310684/4	Lab Control Sample	Total/NA	Water	SM4500-S-2 F.	
180-103763-J-11 MS	Matrix Spike	Total/NA	Water	SM4500-S-2 F.	
180-103763-J-11 MSD	Matrix Spike Duplicate	Total/NA	Water	SM4500-S-2 F.	

### Analysis Batch: 310863

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	SM 5310C	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	SM 5310C	
MB 180-310863/33	Method Blank	Total/NA	Water	SM 5310C	
LCS 180-310863/31	Lab Control Sample	Total/NA	Water	SM 5310C	
LCSD 180-310863/32	Lab Control Sample Dup	Total/NA	Water	SM 5310C	
180-103581-F-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM 5310C	
180-103581-I-1 MS	Matrix Spike	Total/NA	Water	SM 5310C	

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## General Chemistry

### Analysis Batch: 311136

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	SM 2310B	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	SM 2310B	
MB 180-311136/2	Method Blank	Total/NA	Water	SM 2310B	
LCS 180-311136/1	Lab Control Sample	Total/NA	Water	SM 2310B	
180-103680-D-1 DU	Duplicate	Total/NA	Water	SM 2310B	

### Analysis Batch: 428529

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	SM4500 P E-2011	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	SM4500 P E-2011	
MB 240-428529/3	Method Blank	Total/NA	Water	SM4500 P E-2011	
LCS 240-428529/4	Lab Control Sample	Total/NA	Water	SM4500 P E-2011	
240-127784-B-1 MS	Matrix Spike	Total/NA	Water	SM4500 P E-2011	
240-127784-B-1 MSD	Matrix Spike Duplicate	Total/NA	Water	SM4500 P E-2011	

### Prep Batch: 483211

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	351.2	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	351.2	
MB 400-483211/1-A	Method Blank	Total/NA	Water	351.2	
LCS 400-483211/2-A	Lab Control Sample	Total/NA	Water	351.2	
180-103763-A-1-B MS	Matrix Spike	Total/NA	Water	351.2	
180-103763-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	

### Prep Batch: 483212

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	365.2/365.3/365	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	365.2/365.3/365	
MB 400-483212/1-A	Method Blank	Total/NA	Water	365.2/365.3/365	
LCS 400-483212/2-A	Lab Control Sample	Total/NA	Water	365.2/365.3/365	
180-103763-A-1-E MS	Matrix Spike	Total/NA	Water	365.2/365.3/365	
180-103763-A-1-F MSD	Matrix Spike Duplicate	Total/NA	Water	365.2/365.3/365	

### Analysis Batch: 483998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	365.4	483212
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	365.4	483212
MB 400-483212/1-A	Method Blank	Total/NA	Water	365.4	483212
LCS 400-483212/2-A	Lab Control Sample	Total/NA	Water	365.4	483212
MRL 400-483998/11	Lab Control Sample	Total/NA	Water	365.4	
180-103763-A-1-E MS	Matrix Spike	Total/NA	Water	365.4	483212
180-103763-A-1-F MSD	Matrix Spike Duplicate	Total/NA	Water	365.4	483212

### Analysis Batch: 484005

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	351.2	483211
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	351.2	483211

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-1

## General Chemistry (Continued)

### Analysis Batch: 484005 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 400-483211/1-A	Method Blank	Total/NA	Water	351.2	483211
LCS 400-483211/2-A	Lab Control Sample	Total/NA	Water	351.2	483211
MRL 400-484005/2	Lab Control Sample	Total/NA	Water	351.2	
180-103763-A-1-B MS	Matrix Spike	Total/NA	Water	351.2	483211
180-103763-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	351.2	483211

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# Chain of Custody Record 420760 eurofins

Environment Testing  
TestAmerica

Address: P. Pittsburgh, PA

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

**Client Contact**  
 Company Name: Jennifer Gables  
 Address: Environmental Standards, Inc.  
 City/State/Zip:  
 Phone: 610.935.5577 x414  
 Fax:  
 Project Name: TVA Gallatin EIP  
 Site: GAF - NRS - Treatability  
 P.O.#

**Project Manager:** Craig MacPhee  
 Tel/Email: Craig.MacPhee@com.com  
 Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day  
 see sample notes

**Site Contact:** Francisco Bernal  
 Lab Contact: Rachel Watkins  
 Date: 3/17/2020  
 Carrier: SM2310B-acidity  
 2320B-AIK  
 9056A DRG EM-280 STD  
 365.H Total P  
 351.2 TRN  
 5310C TOC  
 353.2 NO2/NH3  
 4560 - Phosphate  
 SM4500 - Sulfide  
 6020A - total - Sulfide  
 6020A - Dis - Be L. CAN  
 6020A - total - Be L. CAN

**COC No.:** \_\_\_\_\_ of \_\_\_\_\_ COCs  
**Sampler:** \_\_\_\_\_  
**For Lab Use Only:**  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_  
 Job / SDG No.: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Sample Specific Notes:
GAF - GW - Hi. Cal - CaCl2	3/17/20	1300	G	GW	2	N	N	One day TAT
GAF - GW - Dolo Fins - CaCl2					2	N	N	One day TAT
GAF - GW - Zeolite - CaCl2					2	N	N	One day TAT
GAF - GW - NaOH					1	N	N	One day TAT
GAF - GW - Ferroblack					9	N	N	One day on metals, std
GAF - GW - Dolo Fins - 444u					7	N	N	One day on metals, std TAT on metals, std TAT on nail else



180-103681 Chain of Custody

**Preservation Used:** 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other: Zinc Chloride / NaOH  
**Possible Hazard Identification:**  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

**Sample Disposal (A fee may be assessed if s...)**  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months  
 180-103681 Chain of Custody

**Special Instructions/QC Requirements & Comments:**

Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No	Cooler Temp. (°C): Obs'd: _____	Corrd: _____	Therm ID No.: _____
Relinquished by: Rachel Watkins	Company: AECOM	Received by: <u>Willie Dabney</u>	Company: <u>STAFF</u>
Relinquished by:	Company:	Received by:	Company:
Relinquished by:	Company:	Received by:	Company:
Date/Time: 3/17/2020 1:00	Date/Time: 3/18/20	Date/Time: 10:00	Date/Time:





Environment Testing  
TestAmerica

ORIGIN ID: PHDA (512) 454-4797  
FRANCISCO BARAJAS  
AECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WGT: 10.00 LB  
CRD: 0562071/CRPE3311

TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7050  
REF: \$180 - 58963

RMA: ||| ||| |||



WED - 18 MAR 10:30A  
PRIORITY OVERNIGHT

15238  
PA-US  
PIT

FedEx  
TRK# 1680 3500 1526  
0221

XH AGCA

Uncorrected temp  $17.8^{\circ}\text{C}$   
Thermometer ID 17

CF 0 Initials JS

PT-WI-SR-001 effective 11/6/16



FTD 3838365 17MAR20 MMRA 56BC2/64EV/65A2



180-103681 Waybill

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**Eurofins TestAmerica Canton Sample Receipt Form/Narrative**

Login # : \_\_\_\_\_

**Canton Facility**

Client EPA Pittsburgh Site Name \_\_\_\_\_  
 Cooler Received on 3-26-20 Opened on 3-26-20  
 FedEx: 1<sup>st</sup> Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other \_\_\_\_\_

Cooler unpacked by: \_\_\_\_\_

Receipt After-hours: Drop-off Date/Time \_\_\_\_\_ Storage Location \_\_\_\_\_

TestAmerica Cooler # TA Foam Box Client Cooler Box Other \_\_\_\_\_  
 Packing material used: Bubble Wrap Foam Plastic Bag None Other \_\_\_\_\_  
 COOLANT: Wet Ice Blue Ice Dry Ice Water None \_\_\_\_\_

1. Cooler temperature upon receipt  See Multiple Cooler Form  
 IR GUN# IR-10 (CF +0.7°C) Observed Cooler Temp. 2.7 °C Corrected Cooler Temp. 3.4 °C  
 IR GUN #IR-11 (CF +0.9°C) Observed Cooler Temp. \_\_\_\_\_ °C Corrected Cooler Temp. \_\_\_\_\_ °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity \_\_\_\_\_ Yes No  
 -Were the seals on the outside of the cooler(s) signed & dated? Yes No NA  
 -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No  
 -Were tamper/custody seals intact and uncompromised? Yes No NA
3. Shippers' packing slip attached to the cooler(s)? Yes No  
 4. Did custody papers accompany the sample(s)? Yes No  
 5. Were the custody papers relinquished & signed in the appropriate place? Yes No  
 6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No  
 7. Did all bottles arrive in good condition (Unbroken)? Yes No  
 8. Could all bottle labels be reconciled with the COC? Yes No  
 9. Were correct bottle(s) used for the test(s) indicated? Yes No  
 10. Sufficient quantity received to perform indicated analyses? Yes No  
 11. Are these work share samples? Yes No  
 If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC902937  
 13. Were VOAs on the COC? Yes No  
 14. Were air bubbles >6 mm in any VOA vials? Yes  Larger than this. Yes No NA  
 15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # \_\_\_\_\_ Yes No  
 16. Was a LL Hg or Me Hg trip blank present? \_\_\_\_\_ Yes No

Tests that are not checked for pH by Receiving:  
 VOAs  
 Oil and Grease  
 TOC

Contacted PM \_\_\_\_\_ Date \_\_\_\_\_ by \_\_\_\_\_ via Verbal Voice Mail Other \_\_\_\_\_

Concerning \_\_\_\_\_

**17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES**

Samples processed by: \_\_\_\_\_

**18. SAMPLE CONDITION**

Sample(s) \_\_\_\_\_ were received after the recommended holding time had expired.  
 Sample(s) \_\_\_\_\_ were received in a broken container.  
 Sample(s) \_\_\_\_\_ were received with bubble >6 mm in diameter. (Notify PM)

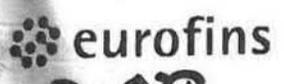
**19. SAMPLE PRESERVATION**

Sample(s) \_\_\_\_\_ were further preserved in the laboratory.  
 Time preserved: \_\_\_\_\_ Preservative(s) added/Lot number(s): \_\_\_\_\_  
 VOA Sample Preservation - Date/Time VOAs Frozen: \_\_\_\_\_



This Ta

Part # 159469-434 RITZ EXP 03/20



Environment Testing  
TestAmerica

*0.02*  
*JR9*  
*BKG*

ORIGIN ID:AGCA  
PITTSBURGH SAMPLE RECEIVING  
EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE

SHIP DATE: 19MAR20  
ACTWT: 45.00 LB MAN  
CAD: 741733/CAFE3312

PITTSBURGH, PA 152381330  
UNITED STATES US

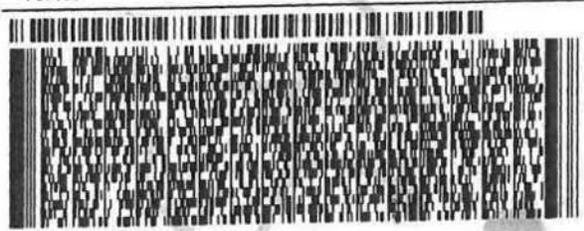
BILL SENDER

TO SHIPPING/RECEIVING  
TESTAMERICA LABORATORIES, INC.  
3355 MCLEMORE DRIVE

PENSACOLA FL 32514

(850) 474-1001  
PO: YES

REF: 6180-59531  
DEPT: SAMPLE/RECEIVING



FedEx  
Express



FRI - 20 MAR 10:30A  
PRIORITY OVERNIGHT

TRK# 1689 5099 8399  
0201

XH PNSA

32514  
FL-US BFM



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## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-103681-1

**Login Number: 103681**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Watson, Debbie**

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



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-103681-1

**Login Number: 103681**

**List Number: 2**

**Creator: Conrady, Hank W**

**List Source: Eurofins TestAmerica, Pensacola**

**List Creation: 03/20/20 06:37 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.0°C IR-9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-101827-1  
Client Project/Site: GAF - NRS - Treatability

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
2/18/2020 2:27:43 PM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

---

**Job ID: 180-101827-1**

---

**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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**Job Narrative**  
**180-101827-1**

## Receipt

The samples were received on 2/4/2020 9:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 2.9° C.

## Metals

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-20 *
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.



# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-101827-1	GAF-ENVIROBLEND	Water	01/31/20 15:00	02/04/20 09:00	
180-101827-2	GAF-KHCO3	Water	01/31/20 13:30	02/04/20 09:00	
180-101827-3	GAF-MAGOX 1%	Water	01/31/20 15:00	02/04/20 09:00	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

## Client Sample ID: GAF-ENVIROBLEND

Lab Sample ID: 180-101827-1

Date Collected: 01/31/20 15:00

Matrix: Water

Date Received: 02/04/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306264	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	307003	02/13/20 01:05	WTR	TAL PIT
Instrument ID: M										

## Client Sample ID: GAF-KHCO3

Lab Sample ID: 180-101827-2

Date Collected: 01/31/20 13:30

Matrix: Water

Date Received: 02/04/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306264	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	307003	02/13/20 01:10	WTR	TAL PIT
Instrument ID: M										

## Client Sample ID: GAF-MAGOX 1%

Lab Sample ID: 180-101827-3

Date Collected: 01/31/20 15:00

Matrix: Water

Date Received: 02/04/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306264	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1	1.0 mL	1.0 mL	307003	02/13/20 01:15	WTR	TAL PIT
Instrument ID: M										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

RJR = Ron Rosenbaum

Batch Type: Analysis

WTR = Bill Reinheimer

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

**Client Sample ID: GAF-ENVIROBLEND**

**Lab Sample ID: 180-101827-1**

Date Collected: 01/31/20 15:00

Matrix: Water

Date Received: 02/04/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	2.14		1.00	0.182	ug/L		02/06/20 11:30	02/13/20 01:05	1
Cadmium	1.67		1.00	0.217	ug/L		02/06/20 11:30	02/13/20 01:05	1
Lithium	150		5.00	3.39	ug/L		02/06/20 11:30	02/13/20 01:05	1
Nickel	83.7		1.00	0.336	ug/L		02/06/20 11:30	02/13/20 01:05	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

**Client Sample ID: GAF-KHCO3**

**Lab Sample ID: 180-101827-2**

Date Collected: 01/31/20 13:30

Matrix: Water

Date Received: 02/04/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	1.28		1.00	0.182	ug/L		02/06/20 11:30	02/13/20 01:10	1
Cadmium	0.979	J	1.00	0.217	ug/L		02/06/20 11:30	02/13/20 01:10	1
Lithium	122		5.00	3.39	ug/L		02/06/20 11:30	02/13/20 01:10	1
Nickel	90.8		1.00	0.336	ug/L		02/06/20 11:30	02/13/20 01:10	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

**Client Sample ID: GAF-MAGOX 1%**

**Lab Sample ID: 180-101827-3**

**Date Collected: 01/31/20 15:00**

**Matrix: Water**

**Date Received: 02/04/20 09:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	2.58		1.00	0.182	ug/L		02/06/20 11:30	02/13/20 01:15	1
Cadmium	2.51		1.00	0.217	ug/L		02/06/20 11:30	02/13/20 01:15	1
Lithium	138		5.00	3.39	ug/L		02/06/20 11:30	02/13/20 01:15	1
Nickel	110		1.00	0.336	ug/L		02/06/20 11:30	02/13/20 01:15	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-306264/1-A**  
**Matrix: Water**  
**Analysis Batch: 307003**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306264**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		02/06/20 11:30	02/12/20 23:11	1
Cadmium	ND		1.00	0.217	ug/L		02/06/20 11:30	02/12/20 23:11	1
Lithium	ND		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 23:11	1
Nickel	ND		1.00	0.336	ug/L		02/06/20 11:30	02/12/20 23:11	1

**Lab Sample ID: LCS 180-306264/2-A**  
**Matrix: Water**  
**Analysis Batch: 307003**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306264**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	500	524.9		ug/L		105	80 - 120
Cadmium	500	513.7		ug/L		103	80 - 120
Lithium	500	556.2		ug/L		111	80 - 120
Nickel	500	470.0		ug/L		94	80 - 120

**Lab Sample ID: 180-101790-B-5-A MS**  
**Matrix: Water**  
**Analysis Batch: 307003**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306264**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		500	530.7		ug/L		106	75 - 125
Cadmium	ND		500	504.2		ug/L		101	75 - 125
Lithium	ND		500	551.0		ug/L		110	75 - 125
Nickel	0.372	J	500	451.1		ug/L		90	75 - 125

**Lab Sample ID: 180-101790-B-5-B MSD**  
**Matrix: Water**  
**Analysis Batch: 307003**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306264**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		500	520.8		ug/L		104	75 - 125	2	20
Cadmium	ND		500	516.8		ug/L		103	75 - 125	2	20
Lithium	ND		500	549.8		ug/L		110	75 - 125	0	20
Nickel	0.372	J	500	448.7		ug/L		90	75 - 125	1	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF - NRS - Treatability

Job ID: 180-101827-1

## Metals

### Prep Batch: 306264

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101827-1	GAF-ENVIROBLEND	Total Recoverable	Water	3005A	
180-101827-2	GAF-KHCO3	Total Recoverable	Water	3005A	
180-101827-3	GAF-MAGOX 1%	Total Recoverable	Water	3005A	
MB 180-306264/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-306264/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-101790-B-5-A MS	Matrix Spike	Total Recoverable	Water	3005A	
180-101790-B-5-B MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 307003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101827-1	GAF-ENVIROBLEND	Total Recoverable	Water	EPA 6020A	306264
180-101827-2	GAF-KHCO3	Total Recoverable	Water	EPA 6020A	306264
180-101827-3	GAF-MAGOX 1%	Total Recoverable	Water	EPA 6020A	306264
MB 180-306264/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	306264
LCS 180-306264/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	306264
180-101790-B-5-A MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	306264
180-101790-B-5-B MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	306264



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-101827-1

**Login Number: 101827**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Say, Thomas C**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-103681-2  
Client Project/Site: GAF NRS Treatability

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
3/25/2020 1:20:02 PM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

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[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416

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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

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## Job ID: 180-103681-2

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Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-103681-2

#### Receipt

The samples were received on 3/18/2020 10:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 1.8° C.

#### Receipt Exceptions

The Field Sampler was not listed on the Chain of Custody.

#### Metals

Methods 6020A: The continuing calibration verification (CCV) associated with batch 180-310945 recovered above the upper control limit for selenium. The samples associated with this CCV were non-detects or less than the RL for the affected analytes; therefore, the data have been reported.

Method 6020A: The following samples were diluted due to the nature of the sample matrix: GAF-GW-HI CAL-CACL2 (180-103681-1), GAF-GW-DOLO FINES-CACL2 (180-103681-2), GAF-GW-ZEOLITE-CACL2 (180-103681-3) and GAF-GW-FERROBLACK (180-103681-5). Elevated reporting limits (RLs) are provided.

Method 6020A: The following samples were diluted due to the high concentration of calcium in the sample matrix: GAF-GW-HI CAL-CACL2 (180-103681-1), GAF-GW-DOLO FINES-CACL2 (180-103681-2) and GAF-GW-ZEOLITE-CACL2 (180-103681-3). Elevated reporting limits (RLs) are provided.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Qualifiers

### Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
B	Compound was found in the blank and sample.
F1	MS and/or MSD recovery exceeds control limits.
F7	MS/MSD RPD exceeds control limits. Sample size differs by <10%
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-103681-1	GAF-GW-HI CAL-CACL2	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-2	GAF-GW-DOLO FINES-CACL2	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-3	GAF-GW-ZEOLITE-CACL2	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-4	GAF-GW-NAOH	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-5	GAF-GW-FERROBLACK	Water	03/17/20 13:00	03/18/20 10:00	
180-103681-6	GAF-GW-DOLO FINES-444U	Water	03/17/20 13:00	03/18/20 10:00	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
EPA 7470A	Mercury (CVAA)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT
7470A	Preparation, Mercury	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Client Sample ID: GAF-GW-HI CAL-CACL2

Lab Sample ID: 180-103681-1

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Dissolved	Analysis	EPA 6020A		10			311056	03/24/20 16:59	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			311056	03/24/20 16:33	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-DOLO FINES-CACL2

Lab Sample ID: 180-103681-2

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Dissolved	Analysis	EPA 6020A		10			311056	03/24/20 17:01	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			311056	03/24/20 16:36	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-ZEOLITE-CACL2

Lab Sample ID: 180-103681-3

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Dissolved	Analysis	EPA 6020A		10			311056	03/24/20 17:04	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			311056	03/24/20 16:38	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GW-NAOH

Lab Sample ID: 180-103681-4

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			310945	03/23/20 20:50	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			311056	03/24/20 16:41	RSK	TAL PIT
Instrument ID: NEMO										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-FERROBLACK**

**Lab Sample ID: 180-103681-5**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Dissolved	Analysis	EPA 6020A		5			311056	03/24/20 17:06	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			311056	03/24/20 16:43	RSK	TAL PIT
Instrument ID: NEMO										
Total/NA	Prep	7470A			50 mL	50 mL	310482	03/19/20 14:38	NAM	TAL PIT
Total/NA	Analysis	EPA 7470A		1			310647	03/20/20 18:48	NAM	TAL PIT
Instrument ID: HGZ										

**Client Sample ID: GAF-GW-DOLO FINES-444U**

**Lab Sample ID: 180-103681-6**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			310945	03/23/20 20:55	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	310836	03/23/20 09:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			311056	03/24/20 16:46	RSK	TAL PIT
Instrument ID: NEMO										
Total/NA	Prep	7470A			50 mL	50 mL	310482	03/19/20 14:38	NAM	TAL PIT
Total/NA	Analysis	EPA 7470A		1			310647	03/20/20 18:49	NAM	TAL PIT
Instrument ID: HGZ										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

**Analyst References:**

Lab: TAL PIT

Batch Type: Prep

NAM = Nicole Marfisi

RJR = Ron Rosenbaum

Batch Type: Analysis

NAM = Nicole Marfisi

RSK = Robert Kurtz

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-HI CAL-CACL2**

**Lab Sample ID: 180-103681-1**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 16:33	10
Cadmium	ND		0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 16:33	10
Lithium	ND		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 16:33	10
Nickel	ND		0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 16:33	10

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 16:59	10
Cadmium	ND		0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 16:59	10
Lithium	0.141		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 16:59	10
Nickel	0.00378	J	0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 16:59	10

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-DOLO FINES-CACL2**

**Lab Sample ID: 180-103681-2**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 16:36	10
Cadmium	ND		0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 16:36	10
Lithium	0.143		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 16:36	10
Nickel	0.00407	J	0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 16:36	10

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00291	J B	0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 17:01	10
Cadmium	0.00741	J	0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 17:01	10
Lithium	0.198		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 17:01	10
Nickel	0.0109		0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 17:01	10



# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-ZEOLITE-CACL2**

**Lab Sample ID: 180-103681-3**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 16:38	10
Cadmium	ND		0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 16:38	10
<b>Lithium</b>	<b>0.184</b>		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 16:38	10
Nickel	ND		0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 16:38	10

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		03/23/20 09:30	03/24/20 17:04	10
<b>Cadmium</b>	<b>0.00266</b>	<b>J</b>	0.0100	0.00217	mg/L		03/23/20 09:30	03/24/20 17:04	10
<b>Lithium</b>	<b>0.238</b>		0.0500	0.0339	mg/L		03/23/20 09:30	03/24/20 17:04	10
<b>Nickel</b>	<b>0.0883</b>		0.0100	0.00336	mg/L		03/23/20 09:30	03/24/20 17:04	10



# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-NAOH**

**Lab Sample ID: 180-103681-4**

**Date Collected: 03/17/20 13:00**

**Matrix: Water**

**Date Received: 03/18/20 10:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00432	B	0.00100	0.000182	mg/L		03/23/20 09:30	03/24/20 16:41	1
Cadmium	0.00656		0.00100	0.000217	mg/L		03/23/20 09:30	03/23/20 20:50	1
Lithium	0.0330		0.00500	0.00339	mg/L		03/23/20 09:30	03/24/20 16:41	1
Nickel	0.590		0.00100	0.000336	mg/L		03/23/20 09:30	03/23/20 20:50	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-FERROBLACK**

**Lab Sample ID: 180-103681-5**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

### Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Aluminum</b>	<b>0.320</b>		0.0300	0.0125	mg/L		03/23/20 09:30	03/24/20 16:43	1
Antimony	ND		0.00200	0.000378	mg/L		03/23/20 09:30	03/24/20 16:43	1
Arsenic	ND		0.00100	0.000313	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Barium</b>	<b>0.00340</b>	<b>J</b>	0.0100	0.00160	mg/L		03/23/20 09:30	03/24/20 16:43	1
Beryllium	ND		0.00100	0.000182	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Boron</b>	<b>0.682</b>		0.0800	0.0386	mg/L		03/23/20 09:30	03/24/20 16:43	1
Cadmium	ND		0.00100	0.000217	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Calcium</b>	<b>107</b>		0.500	0.127	mg/L		03/23/20 09:30	03/24/20 16:43	1
Chromium	ND		0.00200	0.00153	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Cobalt</b>	<b>0.0131</b>		0.000500	0.000134	mg/L		03/23/20 09:30	03/24/20 16:43	1
Copper	ND		0.00200	0.000627	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Iron</b>	<b>75.8</b>	<b>B</b>	0.0500	0.0195	mg/L		03/23/20 09:30	03/24/20 16:43	1
Lead	ND		0.00100	0.000128	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Lithium</b>	<b>0.00732</b>		0.00500	0.00339	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Magnesium</b>	<b>4.70</b>		0.500	0.0827	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Manganese</b>	<b>2.88</b>	<b>B</b>	0.00500	0.000866	mg/L		03/23/20 09:30	03/24/20 16:43	1
Molybdenum	ND		0.00500	0.000610	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Nickel</b>	<b>0.00359</b>		0.00100	0.000336	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Potassium</b>	<b>20.3</b>		0.500	0.156	mg/L		03/23/20 09:30	03/24/20 16:43	1
Selenium	ND		0.00500	0.00151	mg/L		03/23/20 09:30	03/24/20 16:43	1
Silver	ND		0.00100	0.000177	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Sodium</b>	<b>442</b>		0.500	0.348	mg/L		03/23/20 09:30	03/24/20 16:43	1
Thallium	ND		0.00100	0.000148	mg/L		03/23/20 09:30	03/24/20 16:43	1
Vanadium	ND		0.00100	0.000991	mg/L		03/23/20 09:30	03/24/20 16:43	1
<b>Zinc</b>	<b>0.0143</b>		0.00500	0.00322	mg/L		03/23/20 09:30	03/24/20 16:43	1

### Method: EPA 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00500	0.000910	mg/L		03/23/20 09:30	03/24/20 17:06	5
Cadmium	ND		0.00500	0.00109	mg/L		03/23/20 09:30	03/24/20 17:06	5
<b>Lithium</b>	<b>0.0369</b>		0.0250	0.0170	mg/L		03/23/20 09:30	03/24/20 17:06	5
<b>Nickel</b>	<b>0.0166</b>		0.00500	0.00168	mg/L		03/23/20 09:30	03/24/20 17:06	5

### Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000101	mg/L		03/19/20 14:38	03/20/20 18:48	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

**Client Sample ID: GAF-GW-DOLO FINES-444U**

**Lab Sample ID: 180-103681-6**

Date Collected: 03/17/20 13:00

Matrix: Water

Date Received: 03/18/20 10:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1.91		0.0300	0.0125	mg/L		03/23/20 09:30	03/24/20 16:46	1
Antimony	ND		0.00200	0.000378	mg/L		03/23/20 09:30	03/23/20 20:55	1
Arsenic	0.00112		0.00100	0.000313	mg/L		03/23/20 09:30	03/23/20 20:55	1
Barium	0.0144		0.0100	0.00160	mg/L		03/23/20 09:30	03/23/20 20:55	1
Beryllium	0.00176	B	0.00100	0.000182	mg/L		03/23/20 09:30	03/24/20 16:46	1
Boron	4.04		0.0800	0.0386	mg/L		03/23/20 09:30	03/24/20 16:46	1
Cadmium	0.00139		0.00100	0.000217	mg/L		03/23/20 09:30	03/23/20 20:55	1
Calcium	628		0.500	0.127	mg/L		03/23/20 09:30	03/24/20 16:46	1
Chromium	ND		0.00200	0.00153	mg/L		03/23/20 09:30	03/23/20 20:55	1
Cobalt	0.191		0.000500	0.000134	mg/L		03/23/20 09:30	03/23/20 20:55	1
Copper	0.00162	J	0.00200	0.000627	mg/L		03/23/20 09:30	03/23/20 20:55	1
Iron	10.3		0.0500	0.0195	mg/L		03/23/20 09:30	03/23/20 20:55	1
Lead	0.000602	J	0.00100	0.000128	mg/L		03/23/20 09:30	03/23/20 20:55	1
Lithium	0.0342		0.00500	0.00339	mg/L		03/23/20 09:30	03/24/20 16:46	1
Magnesium	97.4		0.500	0.0827	mg/L		03/23/20 09:30	03/23/20 20:55	1
Manganese	10.9	B	0.00500	0.000866	mg/L		03/23/20 09:30	03/23/20 20:55	1
Molybdenum	ND		0.00500	0.000610	mg/L		03/23/20 09:30	03/23/20 20:55	1
Nickel	0.0783		0.00100	0.000336	mg/L		03/23/20 09:30	03/23/20 20:55	1
Potassium	85.1		0.500	0.156	mg/L		03/23/20 09:30	03/23/20 20:55	1
Selenium	ND		0.00500	0.00151	mg/L		03/23/20 09:30	03/23/20 20:55	1
Silver	0.0102		0.00100	0.000177	mg/L		03/23/20 09:30	03/23/20 20:55	1
Sodium	57.4		0.500	0.348	mg/L		03/23/20 09:30	03/23/20 20:55	1
Thallium	0.000185	J	0.00100	0.000148	mg/L		03/23/20 09:30	03/23/20 20:55	1
Vanadium	ND		0.00100	0.000991	mg/L		03/23/20 09:30	03/23/20 20:55	1
Zinc	0.131		0.00500	0.00322	mg/L		03/23/20 09:30	03/23/20 20:55	1

**Method: EPA 7470A - Mercury (CVAA)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000101	mg/L		03/19/20 14:38	03/20/20 18:49	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-310836/1-A**  
**Matrix: Water**  
**Analysis Batch: 310945**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.0300	0.0125	mg/L		03/23/20 09:30	03/23/20 19:28	1
Antimony	ND		0.00200	0.000378	mg/L		03/23/20 09:30	03/23/20 19:28	1
Arsenic	ND		0.00100	0.000313	mg/L		03/23/20 09:30	03/23/20 19:28	1
Barium	ND		0.0100	0.00160	mg/L		03/23/20 09:30	03/23/20 19:28	1
Beryllium	0.0002460	J	0.00100	0.000182	mg/L		03/23/20 09:30	03/23/20 19:28	1
Cadmium	ND		0.00100	0.000217	mg/L		03/23/20 09:30	03/23/20 19:28	1
Calcium	ND		0.500	0.127	mg/L		03/23/20 09:30	03/23/20 19:28	1
Chromium	ND		0.00200	0.00153	mg/L		03/23/20 09:30	03/23/20 19:28	1
Cobalt	ND		0.000500	0.000134	mg/L		03/23/20 09:30	03/23/20 19:28	1
Copper	ND		0.00200	0.000627	mg/L		03/23/20 09:30	03/23/20 19:28	1
Lead	ND		0.00100	0.000128	mg/L		03/23/20 09:30	03/23/20 19:28	1
Lithium	ND		0.00500	0.00339	mg/L		03/23/20 09:30	03/23/20 19:28	1
Magnesium	ND		0.500	0.0827	mg/L		03/23/20 09:30	03/23/20 19:28	1
Manganese	0.001912	J	0.00500	0.000866	mg/L		03/23/20 09:30	03/23/20 19:28	1
Molybdenum	ND		0.00500	0.000610	mg/L		03/23/20 09:30	03/23/20 19:28	1
Nickel	ND		0.00100	0.000336	mg/L		03/23/20 09:30	03/23/20 19:28	1
Potassium	ND		0.500	0.156	mg/L		03/23/20 09:30	03/23/20 19:28	1
Silver	ND		0.00100	0.000177	mg/L		03/23/20 09:30	03/23/20 19:28	1
Sodium	ND		0.500	0.348	mg/L		03/23/20 09:30	03/23/20 19:28	1
Thallium	ND		0.00100	0.000148	mg/L		03/23/20 09:30	03/23/20 19:28	1
Vanadium	ND		0.00100	0.000991	mg/L		03/23/20 09:30	03/23/20 19:28	1
Zinc	ND		0.00500	0.00322	mg/L		03/23/20 09:30	03/23/20 19:28	1

**Lab Sample ID: MB 180-310836/1-A**  
**Matrix: Water**  
**Analysis Batch: 311056**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.0800	0.0386	mg/L		03/23/20 09:30	03/24/20 18:23	1
Iron	0.04952	J	0.0500	0.0195	mg/L		03/23/20 09:30	03/24/20 18:23	1
Selenium	ND		0.00500	0.00151	mg/L		03/23/20 09:30	03/24/20 18:23	1

**Lab Sample ID: LCS 180-310836/2-A**  
**Matrix: Water**  
**Analysis Batch: 310945**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5.00	4.328		mg/L		87	80 - 120
Antimony	0.250	0.2058		mg/L		82	80 - 120
Arsenic	1.00	0.8409		mg/L		84	80 - 120
Barium	1.00	0.8734		mg/L		87	80 - 120
Beryllium	0.500	0.4630		mg/L		93	80 - 120
Boron	1.25	1.004		mg/L		80	80 - 120
Cadmium	0.500	0.4349		mg/L		87	80 - 120
Calcium	25.0	22.56		mg/L		90	80 - 120
Chromium	0.500	0.4323		mg/L		86	80 - 120
Cobalt	0.500	0.4549		mg/L		91	80 - 120
Copper	0.500	0.4398		mg/L		88	80 - 120
Lead	0.500	0.4260		mg/L		85	80 - 120

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: LCS 180-310836/2-A**  
**Matrix: Water**  
**Analysis Batch: 310945**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.500	0.4649		mg/L		93	80 - 120
Magnesium	25.0	22.21		mg/L		89	80 - 120
Manganese	0.500	0.4211		mg/L		84	80 - 120
Molybdenum	0.500	0.4467		mg/L		89	80 - 120
Nickel	0.500	0.4193		mg/L		84	80 - 120
Potassium	25.0	20.91		mg/L		84	80 - 120
Selenium	1.00	0.9737		mg/L		97	80 - 120
Silver	0.250	0.2037		mg/L		81	80 - 120
Sodium	25.0	23.15		mg/L		93	80 - 120
Thallium	1.00	0.8794		mg/L		88	80 - 120
Vanadium	0.500	0.4396		mg/L		88	80 - 120
Zinc	0.250	0.2044		mg/L		82	80 - 120

**Lab Sample ID: LCS 180-310836/2-A**  
**Matrix: Water**  
**Analysis Batch: 311056**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	5.00	5.181		mg/L		104	80 - 120

**Lab Sample ID: 180-103475-B-9-C MS**  
**Matrix: Water**  
**Analysis Batch: 310945**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	ND		5.00	4.842		mg/L		97	75 - 125
Antimony	ND		0.250	0.2564		mg/L		103	75 - 125
Arsenic	0.000716	J	1.00	1.044		mg/L		104	75 - 125
Barium	0.0485		1.00	1.095		mg/L		105	75 - 125
Cadmium	ND		0.500	0.5283		mg/L		106	75 - 125
Chromium	ND		0.500	0.5128		mg/L		103	75 - 125
Cobalt	ND		0.500	0.5166		mg/L		103	75 - 125
Copper	ND		0.500	0.5028		mg/L		101	75 - 125
Iron	7.02		5.00	12.11		mg/L		102	75 - 125
Lead	ND		0.500	0.5061		mg/L		101	75 - 125
Magnesium	29.2		25.0	55.51		mg/L		105	75 - 125
Manganese	2.39	B	0.500	3.018	4	mg/L		125	75 - 125
Molybdenum	0.00113	J	0.500	0.5510		mg/L		110	75 - 125
Nickel	ND		0.500	0.4968		mg/L		99	75 - 125
Potassium	1.32		25.0	25.64		mg/L		97	75 - 125
Selenium	ND		1.00	1.080		mg/L		108	75 - 125
Silver	ND		0.250	0.2569		mg/L		103	75 - 125
Sodium	35.6		25.0	64.34		mg/L		115	75 - 125
Thallium	ND		1.00	1.055		mg/L		106	75 - 125
Vanadium	ND		0.500	0.5270		mg/L		105	75 - 125
Zinc	ND		0.250	0.2359		mg/L		94	75 - 125

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: 180-103475-B-9-C MS**  
**Matrix: Water**  
**Analysis Batch: 311056**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Beryllium	ND	F1 ^	0.500	0.5508		mg/L		110	75 - 125		
Boron	0.324	^ F1	1.25	1.658		mg/L		107	75 - 125		
Calcium	208	^	25.0	243.8	4	mg/L		142	75 - 125		
Lithium	ND	F1 ^	0.500	0.5072		mg/L		101	75 - 125		

**Lab Sample ID: 180-103475-B-9-D MSD**  
**Matrix: Water**  
**Analysis Batch: 310945**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Aluminum	ND		5.00	4.921		mg/L		98	75 - 125	2	20
Antimony	ND		0.250	0.2521		mg/L		101	75 - 125	2	20
Arsenic	0.000716	J	1.00	1.025		mg/L		102	75 - 125	2	20
Barium	0.0485		1.00	1.085		mg/L		104	75 - 125	1	20
Cadmium	ND		0.500	0.5223		mg/L		104	75 - 125	1	20
Chromium	ND		0.500	0.5131		mg/L		103	75 - 125	0	20
Cobalt	ND		0.500	0.5100		mg/L		102	75 - 125	1	20
Copper	ND		0.500	0.4904		mg/L		98	75 - 125	2	20
Iron	7.02		5.00	12.09		mg/L		101	75 - 125	0	20
Lead	ND		0.500	0.5072		mg/L		101	75 - 125	0	20
Magnesium	29.2		25.0	55.97		mg/L		107	75 - 125	1	20
Manganese	2.39	B	0.500	2.960	4	mg/L		113	75 - 125	2	20
Molybdenum	0.00113	J	0.500	0.5355		mg/L		107	75 - 125	3	20
Nickel	ND		0.500	0.4919		mg/L		98	75 - 125	1	20
Potassium	1.32		25.0	25.57		mg/L		97	75 - 125	0	20
Selenium	ND		1.00	1.022		mg/L		102	75 - 125	5	20
Silver	ND		0.250	0.2504		mg/L		100	75 - 125	3	20
Sodium	35.6		25.0	63.82		mg/L		113	75 - 125	1	20
Thallium	ND		1.00	1.040		mg/L		104	75 - 125	1	20
Vanadium	ND		0.500	0.5239		mg/L		105	75 - 125	1	20
Zinc	ND		0.250	0.2276		mg/L		91	75 - 125	4	20

**Lab Sample ID: 180-103475-B-9-D MSD**  
**Matrix: Water**  
**Analysis Batch: 311056**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 310836**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Beryllium	ND	F1 ^	0.500	0.5556	F7	mg/L		111	75 - 125	56	20
Boron	0.324	^ F1	1.25	1.713	F7	mg/L		111	75 - 125	60	20
Calcium	208	^	25.0	243.1	4	mg/L		139	75 - 125	1	20
Lithium	ND	F1 ^	0.500	0.5100	F7	mg/L		102	75 - 125	54	20

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Method: EPA 7470A - Mercury (CVAA)

**Lab Sample ID: MB 180-310482/1-A**  
**Matrix: Water**  
**Analysis Batch: 310647**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 310482**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.000200	0.000101	mg/L		03/19/20 14:38	03/20/20 18:46	1

**Lab Sample ID: LCS 180-310482/2-A**  
**Matrix: Water**  
**Analysis Batch: 310647**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 310482**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	0.00250	0.002419		mg/L		97	80 - 120

**Lab Sample ID: 180-103475-B-9-A MS**  
**Matrix: Water**  
**Analysis Batch: 310647**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**  
**Prep Batch: 310482**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Mercury	ND	F1	0.00100	0.0006730	F1	mg/L		67	75 - 125

**Lab Sample ID: 180-103475-B-9-B MSD**  
**Matrix: Water**  
**Analysis Batch: 310647**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total/NA**  
**Prep Batch: 310482**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Mercury	ND	F1	0.00100	0.0006580	F1	mg/L		66	75 - 125	2	20

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Metals

### Prep Batch: 310482

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	7470A	
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	7470A	
MB 180-310482/1-A	Method Blank	Total/NA	Water	7470A	
LCS 180-310482/2-A	Lab Control Sample	Total/NA	Water	7470A	
180-103475-B-9-A MS	Matrix Spike	Total/NA	Water	7470A	
180-103475-B-9-B MSD	Matrix Spike Duplicate	Total/NA	Water	7470A	

### Analysis Batch: 310647

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Total/NA	Water	EPA 7470A	310482
180-103681-6	GAF-GW-DOLO FINES-444U	Total/NA	Water	EPA 7470A	310482
MB 180-310482/1-A	Method Blank	Total/NA	Water	EPA 7470A	310482
LCS 180-310482/2-A	Lab Control Sample	Total/NA	Water	EPA 7470A	310482
180-103475-B-9-A MS	Matrix Spike	Total/NA	Water	EPA 7470A	310482
180-103475-B-9-B MSD	Matrix Spike Duplicate	Total/NA	Water	EPA 7470A	310482

### Prep Batch: 310836

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-1	GAF-GW-HI CAL-CACL2	Dissolved	Water	3005A	
180-103681-1	GAF-GW-HI CAL-CACL2	Total Recoverable	Water	3005A	
180-103681-2	GAF-GW-DOLO FINES-CACL2	Dissolved	Water	3005A	
180-103681-2	GAF-GW-DOLO FINES-CACL2	Total Recoverable	Water	3005A	
180-103681-3	GAF-GW-ZEOLITE-CACL2	Dissolved	Water	3005A	
180-103681-3	GAF-GW-ZEOLITE-CACL2	Total Recoverable	Water	3005A	
180-103681-4	GAF-GW-NAOH	Total Recoverable	Water	3005A	
180-103681-5	GAF-GW-FERROBLACK	Dissolved	Water	3005A	
180-103681-5	GAF-GW-FERROBLACK	Total Recoverable	Water	3005A	
180-103681-6	GAF-GW-DOLO FINES-444U	Total Recoverable	Water	3005A	
MB 180-310836/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-310836/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-103475-B-9-C MS	Matrix Spike	Total Recoverable	Water	3005A	
180-103475-B-9-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 310945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-4	GAF-GW-NAOH	Total Recoverable	Water	EPA 6020A	310836
180-103681-6	GAF-GW-DOLO FINES-444U	Total Recoverable	Water	EPA 6020A	310836
MB 180-310836/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	310836
LCS 180-310836/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	310836
180-103475-B-9-C MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	310836
180-103475-B-9-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	310836

### Analysis Batch: 311056

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-1	GAF-GW-HI CAL-CACL2	Dissolved	Water	EPA 6020A	310836
180-103681-1	GAF-GW-HI CAL-CACL2	Total Recoverable	Water	EPA 6020A	310836
180-103681-2	GAF-GW-DOLO FINES-CACL2	Dissolved	Water	EPA 6020A	310836
180-103681-2	GAF-GW-DOLO FINES-CACL2	Total Recoverable	Water	EPA 6020A	310836
180-103681-3	GAF-GW-ZEOLITE-CACL2	Dissolved	Water	EPA 6020A	310836
180-103681-3	GAF-GW-ZEOLITE-CACL2	Total Recoverable	Water	EPA 6020A	310836
180-103681-4	GAF-GW-NAOH	Total Recoverable	Water	EPA 6020A	310836

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF NRS Treatability

Job ID: 180-103681-2

## Metals (Continued)

### Analysis Batch: 311056 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-103681-5	GAF-GW-FERROBLACK	Dissolved	Water	EPA 6020A	310836
180-103681-5	GAF-GW-FERROBLACK	Total Recoverable	Water	EPA 6020A	310836
180-103681-6	GAF-GW-DOLO FINES-444U	Total Recoverable	Water	EPA 6020A	310836
MB 180-310836/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	310836
LCS 180-310836/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	310836
180-103475-B-9-C MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	310836
180-103475-B-9-D MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	310836



# Chain of Custody Record 420760 eurofins

Environment Testing  
TestAmerica

Address: P. Atburgh, PA

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other: \_\_\_\_\_

**Client Contact**  
 Company Name: Jennifer Gables  
 Address: Environmental Standards, Inc.  
 City/State/Zip: \_\_\_\_\_  
 Phone: 610.935.5577 x414  
 Fax: \_\_\_\_\_  
 Project Name: TVA Gallatin EIP  
 Site: GAF - NRS - Treatability  
 P.O.# \_\_\_\_\_

**Project Manager:** Craig MacPhee  
 Tel/Email: Craig.MacPhee@com.com  
 Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below  
 2 weeks  
 1 week  
 2 days  
 1 day  
 see sample notes

**Site Contact:** Francisco Bernal  
 Lab Contact: Rachel Watkins  
 Date: 3/17/2020  
 Carrier: SM2310B-acidity  
 2320B-AIK  
 9056A DRG EM-280 STD  
 365.H Total P  
 351.2 TRN  
 5310C TOC  
 353.2 NO2/NH3  
 4560 - Phosphate  
 SM4500 - Sulfide  
 6020A - total - Sulfide  
 6020A - Dis - Be L. CAN  
 6020A - total - Be L. CAN

**COC No.:** \_\_\_\_\_ of \_\_\_\_\_ COCs  
**Sampler:** \_\_\_\_\_  
**For Lab Use Only:**  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_  
 Job / SDG No.: \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Sample Specific Notes:
GAF - GW - Hi. Cal - CaCl2	3/17/20	1300	G	GW	2	N	N	One day TAT
GAF - GW - Dolo Fins - CaCl2					2	N	N	One day TAT
GAF - GW - Zeolite - CaCl2					2	N	N	One day TAT
GAF - GW - NaOH					1	N	N	One day TAT
GAF - GW - Ferroblack					9	N	N	One day on metals, std
GAF - GW - Dolo Fins - 444u					7	N	N	One day on metals, std TAT on metals, std TAT on nail else



180-103681 Chain of Custody

**Preservation Used:** 1= Ice, 2= HCl; 3= H2SO4; 4= HNO3; 5= NaOH; 6= Other: Zinc Chloride / NaOH  
**Possible Hazard Identification:**  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.  
 Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

**Sample Disposal (A fee may be assessed if s...)**  
 Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months  
 180-103681 Chain of Custody

**Special Instructions/QC Requirements & Comments:**

Custody Seals Intact:  Yes  No  
 Relinquished by: Rachel Watkins  
 Relinquished by: \_\_\_\_\_  
 Relinquished by: \_\_\_\_\_

Custody Seal No.: \_\_\_\_\_  
 Company: AECOM  
 Date/Time: 3/17/2020 1:00  
 Company: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Cooler Temp. (°C): Obs'd: \_\_\_\_\_  
 Received by: Willie Dabney  
 Company: ETA  
 Date/Time: 3/18/20  
 Received by: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Date/Time: 10:00

Therm ID No.: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_





Environment Testing  
TestAmerica

ORIGIN ID: PHDA (512) 454-4797  
SAN FRANCISCO BARAJAS  
RECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

SHIP DATE: 28FEB20  
ACT WGT: 10.00 LB  
CRD: 0562071/CRPE3311

TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7050  
REF: \$180 - 58963

RMA: ||| ||| |||



WED - 18 MAR 10:30A  
PRIORITY OVERNIGHT

15238  
PA-US  
PIT

FedEx  
TRK# 1680 3500 1526  
0221

XH AGCA

Uncorrected temp  
Thermometer ID

CF 0 Initials JS

PT-WI-SR-001 effective 11/6/16



FTD 3838365 17MAR20 MMRA 56BC2/64EV/65A2



180-103681 Waybill

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## Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-103681-2

**Login Number: 103681**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Watson, Debbie**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-104513-1

Laboratory Sample Delivery Group: TVA NRS Treatability  
Client Project/Site: TVA Gallatin EIP  
Revision: 1

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



*Authorized for release by:  
5/12/2020 5:08:06 PM*

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

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**Job ID: 180-104513-1**

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**Laboratory: Eurofins TestAmerica, Pittsburgh**

## Narrative

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### Job Narrative 180-104513-1

This report was revised to include additional information in the narrative.

### Receipt

The samples were received on 4/10/2020 8:15 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 1.4° C.

### Metals

Method 6020A: Sample 180-104513-1 (GAF-GW-FB-DO-Total) was diluted to the large amount of sodium in the sample. The sample could not be run at 1x.

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

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# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-21
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-104513-1	GAF-GW-FB-DO-TOTAL	Water	04/09/20 13:30	04/10/20 08:15	
180-104513-2	GAF-GW-HICAL-CACL2-TOTAL	Water	04/09/20 13:30	04/10/20 08:15	
180-104513-3	GAF-GW-KOH-TOTAL	Water	04/09/20 13:30	04/10/20 08:15	
180-104513-4	GAF-GW-HICAL-CACL2-DISS	Water	04/09/20 13:30	04/10/20 08:15	
180-104513-5	GAF-GW-KOH-DISSOLVED	Water	04/09/20 13:30	04/10/20 08:15	

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# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-FB-DO-TOTAL**

**Lab Sample ID: 180-104513-1**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	312925	04/15/20 09:49	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			313332	04/18/20 19:02	WTR	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-HICAL-CACL2-TOTAL**

**Lab Sample ID: 180-104513-2**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	312925	04/15/20 09:49	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			313608	04/22/20 13:28	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-KOH-TOTAL**

**Lab Sample ID: 180-104513-3**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	312925	04/15/20 09:49	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			313608	04/22/20 13:31	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-HICAL-CACL2-DISS**

**Lab Sample ID: 180-104513-4**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	312925	04/15/20 09:49	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			313608	04/22/20 13:35	RSK	TAL PIT
Instrument ID: A										

**Client Sample ID: GAF-GW-KOH-DISSOLVED**

**Lab Sample ID: 180-104513-5**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	312925	04/15/20 09:49	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			313608	04/22/20 13:38	RSK	TAL PIT
Instrument ID: A										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

## Analyst References:

Lab: TAL PIT

Batch Type: Prep

KEM = Kimberly Mahoney

Batch Type: Analysis

RSK = Robert Kurtz

WTR = Bill Reinheimer

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-FB-DO-TOTAL**

**Lab Sample ID: 180-104513-1**

**Date Collected: 04/09/20 13:30**

**Matrix: Water**

**Date Received: 04/10/20 08:15**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.0100	0.00182	mg/L		04/15/20 09:49	04/18/20 19:02	10
Cadmium	ND		0.0100	0.00217	mg/L		04/15/20 09:49	04/18/20 19:02	10
Lithium	ND		0.0500	0.0339	mg/L		04/15/20 09:49	04/18/20 19:02	10
Nickel	ND		0.0100	0.00336	mg/L		04/15/20 09:49	04/18/20 19:02	10

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-HICAL-CACL2-TOTAL**

**Lab Sample ID: 180-104513-2**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		04/15/20 09:49	04/22/20 13:28	1
<b>Cadmium</b>	<b>0.000941</b>	<b>J</b>	0.00100	0.000217	mg/L		04/15/20 09:49	04/22/20 13:28	1
<b>Lithium</b>	<b>0.213</b>		0.00500	0.00339	mg/L		04/15/20 09:49	04/22/20 13:28	1
<b>Nickel</b>	<b>0.0349</b>		0.00100	0.000336	mg/L		04/15/20 09:49	04/22/20 13:28	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-KOH-TOTAL**

**Lab Sample ID: 180-104513-3**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000252	J	0.00100	0.000182	mg/L		04/15/20 09:49	04/22/20 13:31	1
Cadmium	0.00343		0.00100	0.000217	mg/L		04/15/20 09:49	04/22/20 13:31	1
Lithium	0.0290		0.00500	0.00339	mg/L		04/15/20 09:49	04/22/20 13:31	1
Nickel	0.218		0.00100	0.000336	mg/L		04/15/20 09:49	04/22/20 13:31	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-HICAL-CACL2-DISS**

**Lab Sample ID: 180-104513-4**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		04/15/20 09:49	04/22/20 13:35	1
<b>Cadmium</b>	<b>0.000969</b>	<b>J</b>	0.00100	0.000217	mg/L		04/15/20 09:49	04/22/20 13:35	1
<b>Lithium</b>	<b>0.212</b>		0.00500	0.00339	mg/L		04/15/20 09:49	04/22/20 13:35	1
<b>Nickel</b>	<b>0.0343</b>		0.00100	0.000336	mg/L		04/15/20 09:49	04/22/20 13:35	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

**Client Sample ID: GAF-GW-KOH-DISSOLVED**

**Lab Sample ID: 180-104513-5**

Date Collected: 04/09/20 13:30

Matrix: Water

Date Received: 04/10/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		04/15/20 09:49	04/22/20 13:38	1
<b>Cadmium</b>	<b>0.00320</b>		0.00100	0.000217	mg/L		04/15/20 09:49	04/22/20 13:38	1
<b>Lithium</b>	<b>0.0300</b>		0.00500	0.00339	mg/L		04/15/20 09:49	04/22/20 13:38	1
<b>Nickel</b>	<b>0.219</b>		0.00100	0.000336	mg/L		04/15/20 09:49	04/22/20 13:38	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-312925/1-A**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 312925**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		04/15/20 09:49	04/18/20 18:55	1
Cadmium	ND		0.00100	0.000217	mg/L		04/15/20 09:49	04/18/20 18:55	1
Lithium	ND		0.00500	0.00339	mg/L		04/15/20 09:49	04/18/20 18:55	1
Nickel	ND		0.00100	0.000336	mg/L		04/15/20 09:49	04/18/20 18:55	1

**Lab Sample ID: LCS 180-312925/2-A**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 312925**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.500	0.4948		mg/L		99	80 - 120
Cadmium	0.500	0.5120		mg/L		102	80 - 120
Lithium	0.500	0.4749		mg/L		95	80 - 120
Nickel	0.500	0.4881		mg/L		98	80 - 120

**Lab Sample ID: 180-104549-B-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 312925**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		0.500	0.4817		mg/L		96	75 - 125
Cadmium	0.000508	J	0.500	0.5118		mg/L		102	75 - 125
Lithium	0.0725		0.500	0.5544		mg/L		96	75 - 125
Nickel	0.0388		0.500	0.5333		mg/L		99	75 - 125

**Lab Sample ID: 180-104549-B-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 312925**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Beryllium	ND		0.500	0.4960		mg/L		99	75 - 125	3	20
Cadmium	0.000508	J	0.500	0.5300		mg/L		106	75 - 125	3	20
Lithium	0.0725		0.500	0.5532		mg/L		96	75 - 125	0	20
Nickel	0.0388		0.500	0.5428		mg/L		101	75 - 125	2	20

**Lab Sample ID: 180-104549-C-1-A MS**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Matrix Spike**  
**Prep Type: Dissolved**  
**Prep Batch: 312925**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		0.500	0.5039		mg/L		101	75 - 125
Cadmium	0.000545	J	0.500	0.5266		mg/L		105	75 - 125
Lithium	0.0728		0.500	0.5493		mg/L		95	75 - 125
Nickel	0.0387		0.500	0.5311		mg/L		98	75 - 125

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
 SDG: TVA NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: 180-104549-C-1-B MSD**  
**Matrix: Water**  
**Analysis Batch: 313332**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Dissolved**  
**Prep Batch: 312925**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Beryllium	ND		0.500	0.5077		mg/L		102	75 - 125	1	20
Cadmium	0.000545	J	0.500	0.5334		mg/L		107	75 - 125	1	20
Lithium	0.0728		0.500	0.5532		mg/L		96	75 - 125	1	20
Nickel	0.0387		0.500	0.5424		mg/L		101	75 - 125	2	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA Gallatin EIP

Job ID: 180-104513-1  
SDG: TVA NRS Treatability

## Metals

### Prep Batch: 312925

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-104513-1	GAF-GW-FB-DO-TOTAL	Total Recoverable	Water	3005A	
180-104513-2	GAF-GW-HICAL-CACL2-TOTAL	Total Recoverable	Water	3005A	
180-104513-3	GAF-GW-KOH-TOTAL	Total Recoverable	Water	3005A	
180-104513-4	GAF-GW-HICAL-CACL2-DISS	Dissolved	Water	3005A	
180-104513-5	GAF-GW-KOH-DISSOLVED	Dissolved	Water	3005A	
MB 180-312925/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-312925/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-104549-B-1-A MS	Matrix Spike	Total Recoverable	Water	3005A	
180-104549-B-1-B MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	
180-104549-C-1-A MS	Matrix Spike	Dissolved	Water	3005A	
180-104549-C-1-B MSD	Matrix Spike Duplicate	Dissolved	Water	3005A	

### Analysis Batch: 313332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-104513-1	GAF-GW-FB-DO-TOTAL	Total Recoverable	Water	EPA 6020A	312925
MB 180-312925/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	312925
LCS 180-312925/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	312925
180-104549-B-1-A MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	312925
180-104549-B-1-B MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	312925
180-104549-C-1-A MS	Matrix Spike	Dissolved	Water	EPA 6020A	312925
180-104549-C-1-B MSD	Matrix Spike Duplicate	Dissolved	Water	EPA 6020A	312925

### Analysis Batch: 313608

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-104513-2	GAF-GW-HICAL-CACL2-TOTAL	Total Recoverable	Water	EPA 6020A	312925
180-104513-3	GAF-GW-KOH-TOTAL	Total Recoverable	Water	EPA 6020A	312925
180-104513-4	GAF-GW-HICAL-CACL2-DISS	Dissolved	Water	EPA 6020A	312925
180-104513-5	GAF-GW-KOH-DISSOLVED	Dissolved	Water	EPA 6020A	312925

# Chain of Custody Record 420759

Environment Testing  
TestAmerica

Address: Pittsburgh, PA

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

Client Contact  
Company Name: Sennifer Gables  
Address: Environmental Standards Inc  
City/State/Zip: \_\_\_\_\_  
Phone: 610-935-5577 ec 414  
Fax: \_\_\_\_\_  
Project Name: TVA Gallatin EIP  
Site: GAF - NRS - Treatability  
PO # \_\_\_\_\_

Project Manager: Craig Macphree  
Tel/Email: Craig.Macphree@acem.com  
Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
TAT if different from Below \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Date	Carrier	COC No:	Sampler:	For Lab Use Only: Walk-in Client: Lab Sampling: Job / SDG No.:	Sample Specific Notes:
GAF-GW - FB-DO - Total	4/14/20	1330	G	GW	1	Y	Y						
GAF-GW - H <sub>2</sub> Cal - CaCl <sub>2</sub> - Total	↓	↓	↓	↓	1	Y	Y						
GAF-GW - KOH - Total	↓	↓	↓	↓	1	Y	Y						
GAF-GW - H <sub>2</sub> Cal - CaCl <sub>2</sub> - Dics	↓	↓	↓	↓	1	Y	Y						
GAF-GW - KOH - Dissolved	↓	↓	↓	↓	1	Y	Y						



Preservation Used: 1= Ice, 2= HCl; 3= H<sub>2</sub>SO<sub>4</sub>; 4=HNO<sub>3</sub>; 5=NaOH; 6= Other \_\_\_\_\_

Possible Hazard Identification: \_\_\_\_\_  
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:  
5-day TAT

Relinquished by: Craig Macphree  
Relinquished by: \_\_\_\_\_  
Relinquished by: \_\_\_\_\_

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Company	Date/Time	Received by:	Company	Date/Time	Received by:	Company	Date/Time	Received by:
<u>ACEM</u>	<u>4/14/20 1400</u>	<u>[Signature]</u>	<u>ACEM</u>	<u>4/10/20 815</u>	<u>[Signature]</u>	<u>ACEM</u>	<u>4/10/20 815</u>	<u>[Signature]</u>
Company:	Date/Time:	Received by:	Company:	Date/Time:	Received by:	Company:	Date/Time:	Received by:





Environment Testing  
TestAmerica

RT 0

1548

FZ 0

04.10

ORIGIN ID: PHDA (512) 454-4  
FRANCISCO BARRAJAS  
RECOM  
9400 AMBERGLEN BOULEVARD  
BUILDING D  
AUSTIN, TX 78729  
UNITED STATES US

USPS  
CAD: 0562071/CAFE3311

TO

EUROFINS TESTAMERICA PITTSBURGH  
301 ALPHA DRIVE  
RIDC PARK  
PITTSBURGH PA 152382907

(412) 963-7066  
REF: S180-68963

RMA:



FedEx  
Express



TRK# 1680 3500 1548  
0221

RETURNS MON-SAT  
PRIORITY OVERNIGHT

45028

FRI - 10 APR 10:30A  
PRIORITY OVERNIGHT

edExx.  
TRK# 1680 3500 1548  
0221

XH AGCA

15238  
PA-US  
PIT

Uncorrected temp  
Thermometer ID

1.4 °C  
17

CF  Initials JB

PT-WI-SR-001 effective 7/26/13



180-104513 Waybill

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-104513-1  
SDG Number: TVA NRS Treatability

**Login Number: 104513**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

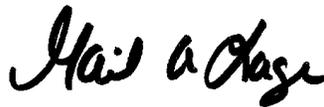
Laboratory Job ID: 180-105162-1

Laboratory Sample Delivery Group: GAF NRS Treatability  
Client Project/Site: TVA GAF AECOM Lab  
Revision: 2

**For:**

Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:

8/28/2020 8:17:05 PM

Gail Lage, Senior Project Manager  
(615)301-5741

[Gail.Lage@Eurofinset.com](mailto:Gail.Lage@Eurofinset.com)

Designee for

Jennifer Rumble, Project Manager I  
(412)963-7058

[Jennifer.Rumble@Eurofinset.com](mailto:Jennifer.Rumble@Eurofinset.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

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## Job ID: 180-105162-1

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Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-105162-1

#### Revised Report

This report was revised to update the sample IDs to change the + to T. This replaces the previous final report.

#### Receipt

The samples were received on 4/30/2020 8:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.2° C.

#### Metals

Method 3005A: The following samples were diluted due to the nature of the sample matrix: GAF-GW-BKT-PHI-FB22-T1 (180-105162-2), GAF-GW-BKT-PHI-SOILCONTROL-T1 (180-105162-8) and GAF-GW-BKT-PHI-FB22 SOIL-T1 (180-105162-9). Elevated reporting limits (RLs) are provided.

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



# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Qualifiers

### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-26-20
California	State	2891	04-30-21
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-21
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	01-31-21
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Maine	State	PA00164	03-06-22
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-05-21
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-21
North Carolina (WW/SW)	State	434	01-01-21
Oregon	NELAP	PA-2151	07-01-20
Pennsylvania	NELAP	02-00416	05-21-20
Rhode Island	State	LAO00362	12-31-20
Texas	NELAP	T104704528	03-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Water	04/27/20 14:00	04/30/20 08:15	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Water	04/29/20 12:00	04/30/20 08:15	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Water	04/29/20 12:00	04/30/20 08:15	

# Method Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:20	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:04	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:17	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 01:53	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:24	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:07	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:27	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:10	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:31	WTR	TAL PIT
Instrument ID: A										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-4**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:14	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-5**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:34	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:17	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-6**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:41	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:24	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:37	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:21	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**  
Date Collected: 04/27/20 14:00  
Date Received: 04/30/20 08:15

**Lab Sample ID: 180-105162-7**  
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 17:55	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:31	RSK	TAL PIT
Instrument ID: DORY										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

**Date Collected: 04/27/20 14:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:51	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:28	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:02	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:45	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 17:58	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:35	RSK	TAL PIT
Instrument ID: DORY										

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

**Date Collected: 04/29/20 12:00**

**Matrix: Water**

**Date Received: 04/30/20 08:15**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314621	05/02/20 18:09	WTR	TAL PIT
Instrument ID: A										
Dissolved	Prep	3005A			50 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Dissolved	Analysis	EPA 6020A		1			314781	05/06/20 02:52	RSK	TAL PIT
Instrument ID: DORY										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314621	05/02/20 18:05	WTR	TAL PIT
Instrument ID: A										
Total Recoverable	Prep	3005A			10 mL	50 mL	314367	05/01/20 08:37	KEM	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			314781	05/06/20 02:49	RSK	TAL PIT
Instrument ID: DORY										

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Analyst References:**

Lab: TAL PIT  
Batch Type: Prep  
    KEM = Kimberly Mahoney  
Batch Type: Analysis  
    RSK = Robert Kurtz  
    WTR = Bill Reinheimer

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# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-CONTROL-T1**

**Lab Sample ID: 180-105162-1**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000597	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:53	1
Cadmium	0.00257		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:17	1
Lithium	0.0219	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:53	1
Nickel	0.0834		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:17	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:04	1
Cadmium	0.00216		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:20	1
Lithium	0.0184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:04	1
Nickel	0.0639		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:20	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22-T1**

**Lab Sample ID: 180-105162-2**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:07	1
Cadmium	0.00263	J	0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:24	1
Lithium	0.0475	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:07	1
Nickel	0.0544		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:24	1

**Client Sample ID: GAF-GW-BKT-PHI-DOLO-T1**

**Lab Sample ID: 180-105162-3**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000991	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:10	1
Cadmium	0.000720	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:27	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:10	1
Nickel	0.0569		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:27	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-T1**

**Lab Sample ID: 180-105162-4**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000265	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:14	1
Cadmium	0.000390	J	0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:31	1
Lithium	0.0106	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:14	1
Nickel	0.0200		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:31	1

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.000562	J	0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:17	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-HICAL-CACL2-T1**

**Lab Sample ID: 180-105162-5**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable (Continued)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00747		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:34	1
Lithium	0.0283	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:17	1
Nickel	0.0543		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:34	1

**Client Sample ID: GAF-GW-WC-PHI-NAOH-ZEOLITE-T1**

**Lab Sample ID: 180-105162-6**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:21	1
Cadmium	0.00191		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:37	1
Lithium	0.286	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:21	1
Nickel	0.0674		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:37	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:24	1
Cadmium	0.00166		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:41	1
Lithium	0.300	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:24	1
Nickel	0.0697		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:41	1

**Client Sample ID: GAF-GW-WC-PHI-444U-T1**

**Lab Sample ID: 180-105162-7**

Date Collected: 04/27/20 14:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:28	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:51	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:28	1
Nickel	0.000603	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:51	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:31	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 17:55	1
Lithium	0.184	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:31	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 17:55	1

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.00808		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:35	1
Cadmium	0.0128		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 17:58	1
Lithium	0.0897	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:35	1
Nickel	0.323		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 17:58	1

Eurofins TestAmerica, Pittsburgh

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

**Client Sample ID: GAF-GW-BKT-PHI-SOILCONTROL-T1**

**Lab Sample ID: 180-105162-8**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:45	1
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:02	1
Lithium	0.0112	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:45	1
Nickel	0.000545	J	0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:02	1

**Client Sample ID: GAF-GW-BKT-PHI-FB22 SOIL-T1**

**Lab Sample ID: 180-105162-9**

Date Collected: 04/29/20 12:00

Matrix: Water

Date Received: 04/30/20 08:15

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0105		0.00500	0.000910	mg/L		05/01/20 08:37	05/06/20 02:49	1
Cadmium	0.0314		0.00500	0.00109	mg/L		05/01/20 08:37	05/02/20 18:05	1
Lithium	0.127	B	0.0250	0.0170	mg/L		05/01/20 08:37	05/06/20 02:49	1
Nickel	1.02		0.00500	0.00168	mg/L		05/01/20 08:37	05/02/20 18:05	1

**Method: EPA 6020A - Metals (ICP/MS) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.0145		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 02:52	1
Cadmium	0.0785		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 18:09	1
Lithium	0.150	B	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 02:52	1
Nickel	1.93		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 18:09	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100	0.000217	mg/L		05/01/20 08:37	05/02/20 16:28	1
Nickel	ND		0.00100	0.000336	mg/L		05/01/20 08:37	05/02/20 16:28	1

**Lab Sample ID: MB 180-314367/1-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.00100	0.000182	mg/L		05/01/20 08:37	05/06/20 01:04	1
Lithium	0.004190	J	0.00500	0.00339	mg/L		05/01/20 08:37	05/06/20 01:04	1

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cadmium	0.500	0.4964		mg/L		99	80 - 120
Nickel	0.500	0.4945		mg/L		99	80 - 120

**Lab Sample ID: LCS 180-314367/2-A**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Beryllium	0.500	0.4915		mg/L		98	80 - 120
Lithium	0.500	0.4770		mg/L		95	80 - 120

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cadmium	ND		0.500	0.5064		mg/L		101	75 - 125
Nickel	0.00138		0.500	0.4950		mg/L		99	75 - 125

**Lab Sample ID: 180-105129-C-3-B MS**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Beryllium	ND		0.500	0.4881		mg/L		98	75 - 125
Lithium	0.00497	J B	0.500	0.4746		mg/L		94	75 - 125

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314621**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Cadmium	ND		0.500	0.5022		mg/L		100	75 - 125	1	20
Nickel	0.00138		0.500	0.4921		mg/L		98	75 - 125	1	20

Eurofins TestAmerica, Pittsburgh

# QC Sample Results

Client: Environmental Standards Inc.  
 Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
 SDG: GAF NRS Treatability

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: 180-105129-C-3-C MSD**  
**Matrix: Water**  
**Analysis Batch: 314781**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 314367**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Beryllium	ND		0.500	0.4837		mg/L		97	75 - 125	1	20
Lithium	0.00497	J B	0.500	0.4660		mg/L		92	75 - 125	2	20

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# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals

### Prep Batch: 314367

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	3005A	
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	3005A	
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	3005A	
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	3005A	
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	3005A	
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	3005A	
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	3005A	
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	3005A	
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	3005A	
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	3005A	
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 314621

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367

### Analysis Batch: 314781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-1	GAF-GW-BKT-PHI-CONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-2	GAF-GW-BKT-PHI-FB22-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-3	GAF-GW-BKT-PHI-DOLO-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-4	GAF-GW-BKT-PHI-HICAL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-5	GAF-GW-BKT-PHI-HICAL-CACL2-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Dissolved	Water	EPA 6020A	314367
180-105162-6	GAF-GW-WC-PHI-NAOH-ZEOLITE-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-7	GAF-GW-WC-PHI-444U-T1	Dissolved	Water	EPA 6020A	314367

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: TVA GAF AECOM Lab

Job ID: 180-105162-1  
SDG: GAF NRS Treatability

## Metals (Continued)

### Analysis Batch: 314781 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-105162-7	GAF-GW-WC-PHI-444U-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-8	GAF-GW-BKT-PHI-SOILCONTROL-T1	Total Recoverable	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Dissolved	Water	EPA 6020A	314367
180-105162-9	GAF-GW-BKT-PHI-FB22 SOIL-T1	Total Recoverable	Water	EPA 6020A	314367
MB 180-314367/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	314367
LCS 180-314367/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	314367
180-105129-C-3-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	314367

# Chain of Custody Record 420758 eurofins

Environment Testing  
TestAmerica

Address: Pittsburgh, PA

TAL-8210

Regulatory Program:  DW  NPDES  RCRA  Other:

Client Contact Company Name: <u>Jennifer Gabrels</u> Address: <u>ENVIRONMENTAL STANDARDS, INC</u> City/State/Zip: <u>MD. 935.5577 x 414</u> Phone: <u>410.935.5577 x 414</u> Fax: _____ Project Name: <u>TVA Gallatin EIP</u> Site: <u>GAF-NRS-treatability</u> PO #: _____		Project Manager: <u>Greg MacPhee</u> Tel/Email: <u>Greg.MacPhee@acccon.com</u> Site Contact: <u>Fernando Benayas</u> Lab Contact: <u>Rachel Watkins</u> Date: <u>4/28/2020</u> Carrier: _____		COC No: _____ of _____ COCs Sampler: _____ For Lab Use Only: Walk-in Client: _____ Lab Sampling: _____ Job / SDG No.: _____	
Analysis Turnaround Time <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Perform MS/MSD (Y/N) _____ Filtered Sample (Y/N) _____ Sample Specific Notes: <u>Dissolved has been filtered</u> <u>Dissolved has been filtered</u> " " " " " "			
Sample Identification	Sample Date	Sample Time	Sample Type (C-Comp, G-Grab)	Matrix	# of Cont.
GAF-GW-Bkt-PHI-Control-+1	4/27/20	1400	G	GW	2
GAF-GW-Bkt-PHI-FB22-+1	4/27/20	1400	G		1
GAF-GW-Bkt-PHI-Dob-+1	4/27/20	1400	G		1
GAF-GW-Bkt-PHI-Hi.Cal-+1	4/27/20	1400	G		1
GAF-GW-Bkt-PHI-Hi.Cal-Calc2-+1	4/27/20	1400	G		1
GAF-GW-WC-PHI-NaOH-zeolite-+1	4/27/20	1400	G		2
GAF-GW-WC-PHI-444u-+1	4/27/20	1400	G	↓	2
GAF-GW-Bkt-PHI-Soil control-+1	4/27/20	1200	G	↓	2
GAF-GW-Bkt-PHI-FB22 Soil-+1	4/27/20	1200	G	↓	2
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other					
Possible Hazard Identification: _____ Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown					
Special Instructions/QC Requirements & Comments: <u>total bottles were not filtered</u>					
Custody Seal No.: _____ Relinquished by: <u>Rachel Watkins</u> Relinquished by: _____ Relinquished by: _____		Company: <u>AECON</u> Company: _____ Company: _____		Received by: <u>John</u> Date/Time: <u>4/28/20 1300</u> Received by: _____ Date/Time: _____ Received in Laboratory by: _____ Date/Time: _____	
Custody Seal No.: _____ Relinquished by: _____ Relinquished by: _____		Company: _____ Company: _____ Company: _____		Received by: _____ Date/Time: _____ Received in Laboratory by: _____ Date/Time: _____	



180-105162 Chain of Custody



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-105162-1  
SDG Number: GAF NRS Treatability

**Login Number: 105162**

**List Number: 1**

**Creator: Say, Thomas C**

**List Source: Eurofins TestAmerica, Pittsburgh**

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

## ANALYTICAL REPORT

Eurofins TestAmerica, Pittsburgh  
301 Alpha Drive  
RIDC Park  
Pittsburgh, PA 15238  
Tel: (412)963-7058

Laboratory Job ID: 180-101736-1  
Client Project/Site: GAF-NRS-Treatability

For:  
Environmental Standards Inc.  
1140 Valley Forge Road  
PO BOX 810  
Valley Forge, Pennsylvania 19482-0810

Attn: Jennifer N. Gable



Authorized for release by:  
2/17/2020 3:16:10 PM

Jennifer Rumble, Project Manager I  
(412)963-7058  
[jennifer.rumble@testamericainc.com](mailto:jennifer.rumble@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

PA Lab ID: 02-00416



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# Case Narrative

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

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## Job ID: 180-101736-1

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Laboratory: Eurofins TestAmerica, Pittsburgh

### Narrative

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#### Job Narrative 180-101736-1

#### Receipt

The samples were received on 1/30/2020 9:00 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 1.4° C.

#### Metals

Method 3005A: The following sample was prepped at a 10X dilution due to the nature of the sample matrix: GAF-HYDROXYAPATITE (180-101736-11). Elevated reporting limits (RLs) are provided.

Method 6020A: The following sample was diluted due to the nature of the sample matrix: GAF-GEOFORM EXTENED (180-101736-9). Elevated reporting limits (RLs) are provided.

Methods 6020, 6020A: The continuing calibration verification (CCV) associated with batch 180-306922 recovered above the upper control limit for boron. The samples associated with this CCV were non-detects or less than the RL for the affected analytes; therefore, the data have been reported.

Methods 6020, 6020A: The continuing calibration verification (CCB) associated with batch 180-306922 recovered above the upper control limit for sodium. The samples associated with this CCB were non-detects or less than the RL for the affected analytes; therefore, the data have been reported.

Method 6020A: The following sample was diluted due to the nature of the sample matrix: GAF-GEOFORM EXTENED (180-101736-9). Elevated reporting limits (RLs) are provided.

Method 6020A: The low level continuing calibration verification (CCVL) associated with batch 180-306922 recovered above the upper control limit for nickel. The samples associated with this CCVL were 10 times the RL for the affected analytes; therefore, the data have been reported.

Method 6020A: The following samples were diluted due to the nature of the sample matrix: GAF-1% CARB/BICARB (180-101736-5) and GAF-FERRIC BLACK 100% (180-101736-6). Elevated reporting limits (RLs) are provided.

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

# Definitions/Glossary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# Accreditation/Certification Summary

Client: Environmental Standards Inc.  
 Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Laboratory: Eurofins TestAmerica, Pittsburgh

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

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	19-033-0	06-27-20
California	State	2891	04-30-20
Connecticut	State	PH-0688	09-30-20
Florida	NELAP	E871008	06-30-20
Georgia	State	PA 02-00416	04-30-20
Illinois	NELAP	004375	06-30-20
Kansas	NELAP	E-10350	03-31-20
Kentucky (UST)	State	162013	04-30-20
Kentucky (WW)	State	KY98043	12-31-20
Louisiana	NELAP	04041	06-30-20
Minnesota	NELAP	042-999-482	12-31-20
Nevada	State	PA00164	07-31-20
New Hampshire	NELAP	2030	04-04-20
New Jersey	NELAP	PA005	06-30-20
New York	NELAP	11182	04-01-20
North Carolina (WW/SW)	State	434	01-01-21
North Dakota	State	R-227	04-30-20
Oregon	NELAP	PA-2151	02-06-20 *
Pennsylvania	NELAP	02-00416	04-30-20
Rhode Island	State	LAO00362	12-31-20
South Carolina	State	89014	04-30-20
Texas	NELAP	T104704528	03-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	Federal	P-Soil-01	06-26-22
USDA	US Federal Programs	P330-16-00211	06-26-22
Utah	NELAP	PA001462019-8	05-31-20
Virginia	NELAP	10043	09-15-20
West Virginia DEP	State	142	02-01-21
Wisconsin	State	998027800	08-31-20

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.



# Sample Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
180-101736-1	GAF-HI CAL LONGVIEW 1%	Water	01/27/20 16:25	01/30/20 09:00	
180-101736-2	GAF-NAOH 1%	Water	01/27/20 16:30	01/30/20 09:00	
180-101736-3	GAF-1% K2CO3	Water	01/28/20 12:30	01/30/20 09:00	
180-101736-4	GAF-1% DOLO FINES	Water	01/28/20 12:35	01/30/20 09:00	
180-101736-5	GAF-1% CARB/BICARB	Water	01/28/20 14:15	01/30/20 09:00	
180-101736-6	GAF-FERRIC BLACK 100%	Water	01/28/20 16:50	01/30/20 09:00	
180-101736-7	GAF-3% KOH	Water	01/28/20 16:55	01/30/20 09:00	
180-101736-8	GAF-TN VALLEY LS	Water	01/29/20 11:20	01/30/20 09:00	
180-101736-9	GAF-GEOFORM EXTENED	Water	01/29/20 11:25	01/30/20 09:00	
180-101736-10	GAF-PROVTECTUS IRMA SOLIDS	Water	01/29/20 15:30	01/30/20 09:00	
180-101736-11	GAF-HYDROXYAPATITE	Water	01/29/20 15:35	01/30/20 09:00	



# Method Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

Method	Method Description	Protocol	Laboratory
EPA 6020A	Metals (ICP/MS)	SW846	TAL PIT
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL PIT

**Protocol References:**

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

**Laboratory References:**

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058



# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Client Sample ID: GAF-HI CAL LONGVIEW 1%

Lab Sample ID: 180-101736-1

Date Collected: 01/27/20 16:25

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:11	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			307167	02/14/20 17:51	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-NAOH 1%

Lab Sample ID: 180-101736-2

Date Collected: 01/27/20 16:30

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:14	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			307167	02/14/20 17:54	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-1% K2CO3

Lab Sample ID: 180-101736-3

Date Collected: 01/28/20 12:30

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:16	RSK	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			307167	02/14/20 17:56	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-1% DOLO FINES

Lab Sample ID: 180-101736-4

Date Collected: 01/28/20 12:35

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306497	02/08/20 19:14	WTR	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:18	RSK	TAL PIT
Instrument ID: NEMO										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Client Sample ID: GAF-1% CARB/BICARB

Lab Sample ID: 180-101736-5

Date Collected: 01/28/20 14:15

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			307030	02/13/20 14:40	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-FERRIC BLACK 100%

Lab Sample ID: 180-101736-6

Date Collected: 01/28/20 16:50

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		10			307030	02/13/20 14:42	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-3% KOH

Lab Sample ID: 180-101736-7

Date Collected: 01/28/20 16:55

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306497	02/08/20 19:26	WTR	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:31	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-TN VALLEY LS

Lab Sample ID: 180-101736-8

Date Collected: 01/29/20 11:20

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306497	02/08/20 19:29	WTR	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:33	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-GEOFORM EXTENED

Lab Sample ID: 180-101736-9

Date Collected: 01/29/20 11:25

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		100			306497	02/08/20 19:31	WTR	TAL PIT
Instrument ID: NEMO										

Eurofins TestAmerica, Pittsburgh

# Lab Chronicle

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Client Sample ID: GAF-GEOFORM EXTENED

Lab Sample ID: 180-101736-9

Date Collected: 01/29/20 11:25

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		100			306922	02/12/20 16:36	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-PROVECTUS IRMA SOLIDS

Lab Sample ID: 180-101736-10

Date Collected: 01/29/20 15:30

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			50 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:38	RSK	TAL PIT
Instrument ID: NEMO										

## Client Sample ID: GAF-HYDROXYAPATITE

Lab Sample ID: 180-101736-11

Date Collected: 01/29/20 15:35

Matrix: Water

Date Received: 01/30/20 09:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			5 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306497	02/08/20 19:36	WTR	TAL PIT
Instrument ID: NEMO										
Total Recoverable	Prep	3005A			5 mL	50 mL	306245	02/06/20 11:30	RJR	TAL PIT
Total Recoverable	Analysis	EPA 6020A		1			306922	02/12/20 16:40	RSK	TAL PIT
Instrument ID: NEMO										

### Laboratory References:

TAL PIT = Eurofins TestAmerica, Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

### Analyst References:

Lab: TAL PIT

Batch Type: Prep

RJR = Ron Rosenbaum

Batch Type: Analysis

RSK = Robert Kurtz

WTR = Bill Reinheimer

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-HI CAL LONGVIEW 1%**

**Lab Sample ID: 180-101736-1**

**Date Collected: 01/27/20 16:25**

**Matrix: Water**

**Date Received: 01/30/20 09:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:11	1
<b>Cadmium</b>	<b>0.618</b>	<b>J</b>	1.00	0.217	ug/L		02/06/20 11:30	02/12/20 16:11	1
<b>Lithium</b>	<b>128</b>		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:11	1
<b>Nickel</b>	<b>4.35</b>	<b>B</b>	1.00	0.336	ug/L		02/06/20 11:30	02/14/20 17:51	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-NAOH 1%**

**Lab Sample ID: 180-101736-2**

Date Collected: 01/27/20 16:30

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:14	1
<b>Cadmium</b>	<b>1.31</b>		1.00	0.217	ug/L		02/06/20 11:30	02/12/20 16:14	1
<b>Lithium</b>	<b>128</b>		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:14	1
<b>Nickel</b>	<b>18.0</b>	<b>B</b>	1.00	0.336	ug/L		02/06/20 11:30	02/14/20 17:54	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-1% K2CO3**

**Lab Sample ID: 180-101736-3**

Date Collected: 01/28/20 12:30

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.236	J	1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:16	1
Cadmium	1.47		1.00	0.217	ug/L		02/06/20 11:30	02/12/20 16:16	1
Lithium	118		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:16	1
Nickel	74.8	B	1.00	0.336	ug/L		02/06/20 11:30	02/14/20 17:56	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-1% DOLO FINES**

**Lab Sample ID: 180-101736-4**

Date Collected: 01/28/20 12:35

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.187	J	1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:18	1
Cadmium	0.258	J	1.00	0.217	ug/L		02/06/20 11:30	02/08/20 19:14	1
Lithium	128		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:18	1
Nickel	2.91	B	1.00	0.336	ug/L		02/06/20 11:30	02/08/20 19:14	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-1% CARB/BICARB**

**Lab Sample ID: 180-101736-5**

**Date Collected: 01/28/20 14:15**

**Matrix: Water**

**Date Received: 01/30/20 09:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		10.0	1.82	ug/L		02/06/20 11:30	02/13/20 14:40	10
Cadmium	ND		10.0	2.17	ug/L		02/06/20 11:30	02/13/20 14:40	10
<b>Lithium</b>	<b>136</b>		50.0	33.9	ug/L		02/06/20 11:30	02/13/20 14:40	10
<b>Nickel</b>	<b>62.2</b>	<b>B</b>	10.0	3.36	ug/L		02/06/20 11:30	02/13/20 14:40	10

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-FERRIC BLACK 100%**

**Lab Sample ID: 180-101736-6**

**Date Collected: 01/28/20 16:50**

**Matrix: Water**

**Date Received: 01/30/20 09:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		10.0	1.82	ug/L		02/06/20 11:30	02/13/20 14:42	10
Cadmium	ND		10.0	2.17	ug/L		02/06/20 11:30	02/13/20 14:42	10
Lithium	ND		50.0	33.9	ug/L		02/06/20 11:30	02/13/20 14:42	10
Nickel	ND		10.0	3.36	ug/L		02/06/20 11:30	02/13/20 14:42	10

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-3% KOH**

**Lab Sample ID: 180-101736-7**

**Date Collected: 01/28/20 16:55**

**Matrix: Water**

**Date Received: 01/30/20 09:00**

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:31	1
Cadmium	ND		1.00	0.217	ug/L		02/06/20 11:30	02/08/20 19:26	1
<b>Lithium</b>	<b>128</b>		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:31	1
<b>Nickel</b>	<b>17.7</b>	<b>B</b>	1.00	0.336	ug/L		02/06/20 11:30	02/08/20 19:26	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-TN VALLEY LS**

**Lab Sample ID: 180-101736-8**

Date Collected: 01/29/20 11:20

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.964	J	1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:33	1
Cadmium	158		1.00	0.217	ug/L		02/06/20 11:30	02/08/20 19:29	1
Lithium	134		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:33	1
Nickel	169	B	1.00	0.336	ug/L		02/06/20 11:30	02/08/20 19:29	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-GEOFORM EXTENED**

**Lab Sample ID: 180-101736-9**

Date Collected: 01/29/20 11:25

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		100	18.2	ug/L		02/06/20 11:30	02/12/20 16:36	100
Cadmium	ND		100	21.7	ug/L		02/06/20 11:30	02/08/20 19:31	100
Lithium	367	J	500	339	ug/L		02/06/20 11:30	02/12/20 16:36	100
Nickel	1270	B	100	33.6	ug/L		02/06/20 11:30	02/08/20 19:31	100

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-PROVECTUS IRMA SOLIDS**

**Lab Sample ID: 180-101736-10**

Date Collected: 01/29/20 15:30

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	0.242	J	1.00	0.182	ug/L		02/06/20 11:30	02/12/20 16:38	1
Cadmium	0.476	J	1.00	0.217	ug/L		02/06/20 11:30	02/12/20 16:38	1
Lithium	110		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 16:38	1
Nickel	21.1	^	1.00	0.336	ug/L		02/06/20 11:30	02/12/20 16:38	1

# Client Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

**Client Sample ID: GAF-HYDROXYAPATITE**

**Lab Sample ID: 180-101736-11**

Date Collected: 01/29/20 15:35

Matrix: Water

Date Received: 01/30/20 09:00

**Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	4.26	J	10.0	1.82	ug/L		02/06/20 11:30	02/12/20 16:40	1
Cadmium	15.4		10.0	2.17	ug/L		02/06/20 11:30	02/08/20 19:36	1
Lithium	167		50.0	33.9	ug/L		02/06/20 11:30	02/12/20 16:40	1
Nickel	129	B	10.0	3.36	ug/L		02/06/20 11:30	02/08/20 19:36	1

# QC Sample Results

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Method: EPA 6020A - Metals (ICP/MS)

**Lab Sample ID: MB 180-306245/1-A**  
**Matrix: Water**  
**Analysis Batch: 306497**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		1.00	0.217	ug/L		02/06/20 11:30	02/08/20 18:16	1
Nickel	0.4680	J	1.00	0.336	ug/L		02/06/20 11:30	02/08/20 18:16	1

**Lab Sample ID: MB 180-306245/1-A**  
**Matrix: Water**  
**Analysis Batch: 306922**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		1.00	0.182	ug/L		02/06/20 11:30	02/12/20 15:22	1
Lithium	ND		5.00	3.39	ug/L		02/06/20 11:30	02/12/20 15:22	1

**Lab Sample ID: LCS 180-306245/2-A**  
**Matrix: Water**  
**Analysis Batch: 306497**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	500	537.3		ug/L		107	80 - 120
Nickel	500	458.6		ug/L		92	80 - 120

**Lab Sample ID: LCS 180-306245/2-A**  
**Matrix: Water**  
**Analysis Batch: 306922**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	500	494.3		ug/L		99	80 - 120
Lithium	500	500.7		ug/L		100	80 - 120

**Lab Sample ID: 180-101687-E-2-B MS**  
**Matrix: Water**  
**Analysis Batch: 306922**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	ND		500	527.2		ug/L		105	75 - 125
Lithium	6.11		500	505.6		ug/L		100	75 - 125

**Lab Sample ID: 180-101687-E-2-C MSD**  
**Matrix: Water**  
**Analysis Batch: 306497**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	ND		500	533.5		ug/L		107	75 - 125	1	20
Nickel	1.18	B	500	454.8		ug/L		91	75 - 125	3	20

**Lab Sample ID: 180-101687-E-2-C MSD**  
**Matrix: Water**  
**Analysis Batch: 306922**

**Client Sample ID: Matrix Spike Duplicate**  
**Prep Type: Total Recoverable**  
**Prep Batch: 306245**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	ND		500	534.8		ug/L		107	75 - 125	1	20
Lithium	6.11		500	528.6		ug/L		104	75 - 125	4	20

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Metals

### Prep Batch: 306245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-1	GAF-HI CAL LONGVIEW 1%	Total Recoverable	Water	3005A	
180-101736-2	GAF-NAOH 1%	Total Recoverable	Water	3005A	
180-101736-3	GAF-1% K2CO3	Total Recoverable	Water	3005A	
180-101736-4	GAF-1% DOLO FINES	Total Recoverable	Water	3005A	
180-101736-5	GAF-1% CARB/BICARB	Total Recoverable	Water	3005A	
180-101736-6	GAF-FERRIC BLACK 100%	Total Recoverable	Water	3005A	
180-101736-7	GAF-3% KOH	Total Recoverable	Water	3005A	
180-101736-8	GAF-TN VALLEY LS	Total Recoverable	Water	3005A	
180-101736-9	GAF-GEOFORM EXTENED	Total Recoverable	Water	3005A	
180-101736-10	GAF-PROVECTUS IRMA SOLIDS	Total Recoverable	Water	3005A	
180-101736-11	GAF-HYDROXYAPATITE	Total Recoverable	Water	3005A	
MB 180-306245/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 180-306245/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
180-101687-E-2-B MS	Matrix Spike	Total Recoverable	Water	3005A	
180-101687-E-2-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	3005A	

### Analysis Batch: 306497

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-4	GAF-1% DOLO FINES	Total Recoverable	Water	EPA 6020A	306245
180-101736-7	GAF-3% KOH	Total Recoverable	Water	EPA 6020A	306245
180-101736-8	GAF-TN VALLEY LS	Total Recoverable	Water	EPA 6020A	306245
180-101736-9	GAF-GEOFORM EXTENED	Total Recoverable	Water	EPA 6020A	306245
180-101736-11	GAF-HYDROXYAPATITE	Total Recoverable	Water	EPA 6020A	306245
MB 180-306245/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	306245
LCS 180-306245/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	306245
180-101687-E-2-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	306245

### Analysis Batch: 306922

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-1	GAF-HI CAL LONGVIEW 1%	Total Recoverable	Water	EPA 6020A	306245
180-101736-2	GAF-NAOH 1%	Total Recoverable	Water	EPA 6020A	306245
180-101736-3	GAF-1% K2CO3	Total Recoverable	Water	EPA 6020A	306245
180-101736-4	GAF-1% DOLO FINES	Total Recoverable	Water	EPA 6020A	306245
180-101736-7	GAF-3% KOH	Total Recoverable	Water	EPA 6020A	306245
180-101736-8	GAF-TN VALLEY LS	Total Recoverable	Water	EPA 6020A	306245
180-101736-9	GAF-GEOFORM EXTENED	Total Recoverable	Water	EPA 6020A	306245
180-101736-10	GAF-PROVECTUS IRMA SOLIDS	Total Recoverable	Water	EPA 6020A	306245
180-101736-11	GAF-HYDROXYAPATITE	Total Recoverable	Water	EPA 6020A	306245
MB 180-306245/1-A	Method Blank	Total Recoverable	Water	EPA 6020A	306245
LCS 180-306245/2-A	Lab Control Sample	Total Recoverable	Water	EPA 6020A	306245
180-101687-E-2-B MS	Matrix Spike	Total Recoverable	Water	EPA 6020A	306245
180-101687-E-2-C MSD	Matrix Spike Duplicate	Total Recoverable	Water	EPA 6020A	306245

### Analysis Batch: 307030

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-5	GAF-1% CARB/BICARB	Total Recoverable	Water	EPA 6020A	306245
180-101736-6	GAF-FERRIC BLACK 100%	Total Recoverable	Water	EPA 6020A	306245

### Analysis Batch: 307167

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-1	GAF-HI CAL LONGVIEW 1%	Total Recoverable	Water	EPA 6020A	306245

Eurofins TestAmerica, Pittsburgh

# QC Association Summary

Client: Environmental Standards Inc.  
Project/Site: GAF-NRS-Treatability

Job ID: 180-101736-1

## Metals (Continued)

### Analysis Batch: 307167 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-101736-2	GAF-NAOH 1%	Total Recoverable	Water	EPA 6020A	306245
180-101736-3	GAF-1% K2CO3	Total Recoverable	Water	EPA 6020A	306245

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13

# Chain of Custody Record



Regulatory Program:  DW  NPDES  RCRA  Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

COC No: \_\_\_\_\_ of \_\_\_\_\_ COCs

TALS Project #: 18016336  
 Sampler: \_\_\_\_\_

For Lab Use Only:  
 Walk-in Client: \_\_\_\_\_  
 Lab Sampling: \_\_\_\_\_

Job / SDG No.: \_\_\_\_\_

Sample Specific Notes:

Project Manager: Craig Macphee  
 Email: craig.macphee@aecom.com  
 Tel/Fax: 512-419-5447

Site Contact: Francisco Barajas  
 Lab Contact: Rachel Watkins  
 Date: 1/29/2020  
 Carrier: \_\_\_\_\_

Analysis Turnaround Time  
 CALENDAR DAYS  WORKING DAYS  
 TAT if different from Below \_\_\_\_\_  
 2 weeks  
 1 week  
 2 days  
 1 day

Filtered Sample (Y/N) \_\_\_\_\_  
 Perform MS / MSD (Y/N) \_\_\_\_\_  
 6020A (Mod) GAF, Groundwater, \_\_\_\_\_

Sample Date \_\_\_\_\_ Sample Time \_\_\_\_\_ Sample Type (C=Comp, G=Grab) \_\_\_\_\_ Matrix \_\_\_\_\_ # of Cont. \_\_\_\_\_

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.
GAF-Hi Cal Longview 1%	1/27/2020	16250	G	GW	1
GAF-NaOH 1%	1/27/2020	1630	G	GW	1
GAF-1% K2CO3	1/28/2020	1230	G	GW	1
GAF-1% Dolo Fines	1/28/2020	1235	G	GW	1
GAF-1% Carb/Bicarb	1/28/2020	1415	G	GW	1
GAF-Ferric Black 100%	1/28/2020	1650	G	GW	1
GAF-3% KOH	1/28/2020	1655	G	GW	1
GAF-TN Valley LS	1/29/2020	1120	G	GW	1
GAF-GeoForm Extended	1/29/2020	1125	G	GW	1
GAF-Provectus IRMa solids	1/29/2020	15:30	G	GW	1
GAF-Hydroxyapatite	1/29/2020	15:35	G	GW	1
					4

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification: \_\_\_\_\_  
 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Special Instructions/QC Requirements & Comments:

Custody Seal No.: \_\_\_\_\_  
 Company: AECOM

Relinquished by: Rachel Watkins  
 Date/Time: 1/29/20 16:00

Relinquished by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Relinquished by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Received by: \_\_\_\_\_  
 Date/Time: 1-30-20 9:00

Received by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Received in Laboratory by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_

Received in Laboratory by: \_\_\_\_\_  
 Date/Time: \_\_\_\_\_



180-101736 Chain of Custody

Return to Client  Disposal by Lab  Archive for \_\_\_\_\_ Months

Therm ID No.: \_\_\_\_\_  
 Cooler Temp. (°C): Obs'd: \_\_\_\_\_ Corrd: \_\_\_\_\_



# Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-101736-1

**Login Number: 101736**

**List Source: Eurofins TestAmerica, Pittsburgh**

**List Number: 1**

**Creator: Watson, Debbie**

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

