Health Consultation

Evaluation of Surface Soil and Mulch Sampling Results

Claxton Community Park and Playground

Claxton, Anderson County, Tennessee

EDGEMOOR ROAD

CLAXTON, ANDERSON COUNTY, TENNESSEE

Prepared by the Tennessee Department of Health

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Foreword

This document summarizes an environmental public health investigation performed by the State of Tennessee Department of Health's Environmental Epidemiology Program. Our work is conducted under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry. The process to answer an environmental public health question includes many steps, including the following:

Evaluate exposure: Tennessee health assessors begin by reviewing available information about environmental conditions at a site. We interpret environmental data, review site reports, and talk with environmental officials. Usually, we do not collect our own environmental sampling data. We rely on information provided by the Tennessee Department of Environment and Conservation, U.S. Environmental Protection Agency, other government agencies, businesses, and the public. We work to understand how much contamination might be present, where it is located on a site, and how people might be exposed to it. We look for evidence that people might have been, are being, or in the future could be exposed to harmful substances.

Evaluate health effects: If people could be exposed to contamination, then health assessors take steps to determine if it could be harmful to human health. We base our health conclusions on routes of exposure, risk assessments, toxicology, clean-up actions, and the scientific literature.

Make recommendations: Based on our conclusions, we will recommend that any potential health hazard posed by a site be reduced or eliminated. These actions will prevent possible harmful health effects. Environmental Epidemiology serves as an advisor in dealing with hazardous waste sites. Often, our recommendations will be action items for other agencies. However, the Tennessee Department of Health can issue a public health advisory warning people of the danger of an urgent public health hazard and will work with other agencies to resolve the problem.

If you have questions or comments about this report, we encourage you to contact us.

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Glossary of Terms and Acronyms

acute exposure: Contact with a substance that occurs over a time period of 0 to 14 days.

adverse health effect: A change in body function or cell structure that might lead to disease or health problems

ATSDR: Agency for Toxic Substances and Disease Registry.

background level: An average or expected amount of a substance in a specific environment, or typical amounts of substances that occur naturally in an environment.

cancer: Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

cancer risk: The theoretical excess risk for having cancer if exposed to a substance every day for 78 years (a lifetime exposure). The true risk might be lower. The excess cancer risk is often expressed as $1x10^{-6}$ for one excess cancer in 1 million people. This risk is in addition to the normal risk of people having cancer in their lifetime.

chronic exposure: Contact with a substance that occurs over a long time (more than 1 year).

coal ash: Ashy material left over from burning coal.

comparison value (CV): Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

concentration: The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

contaminant: A substance that is present in an environment where it does not belong.

detection limit: The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

EPA: United States Environmental Protection Agency.

Epidemiology: The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

exposure: Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term (acute exposure), of intermediate duration, or long-term (chronic exposure).

exposure pathway: The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: 1) a source of contamination (such as an abandoned business), 2) an environmental media and transport mechanism (such as movement through ground water), 3) a point of exposure (such as a private well), 4) a route of exposure (eating, drinking, breathing, or

touching), and 5) a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

hazard quotient: A calculation to evaluate a non-cancer health effect. A hazard quotient can be calculated by dividing the concentration of the by its reference concentration.

health consultation: A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue.

intermediate duration exposure: Contact with a substance that occurs for more than 14 days and less than a year.

metalloid: A metalloid is an element that has properties that are intermediate between those of metals and nonmetals. Common metalloids include boron, arsenic, and antimony.

minimal risk level (MRL): An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects.

ppm: parts per million.

RSL: U.S. Environmental Protection Agency Regional Screening Level. RSLs are risk-based screening levels which are derived from equations combining exposure assumptions with chemical-specific toxicity values.

risk: The probability that something will cause injury or harm.

route of exposure: The way people come into contact with a hazardous substance. Three routes of exposure are breathing (inhalation), eating or drinking (ingestion), or contact with the skin (dermal contact).

sample: A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population. An environmental sample, such as a small amount of soil or water, might be collected to measure contamination in the environment at a specific location.

TDH EEP: Tennessee Department of Health, Environmental Epidemiology Program

TDEC: Tennessee Department of Environment and Conservation.

Toxicology: The study of the harmful effects of substances on humans or animals.

TVA: Tennessee Valley Authority

Summary: Responding to a Community Concern

Anderson County Commissioners (ACC) were concerned about coal ash at the Claxton Community Park and Playground. Following an independent study conducted by Duke University researchers that reported the presence of fly ash in a Claxton community park, the Anderson County Board of Commissioners passed Resolution Number 21-08-885 asking both the Tennessee Department of Health (TDH) and the Tennessee Department of Environment and Conservation (TDEC) to test soils on the Claxton Community Park property leased from the Tennessee Valley Authority (TVA) by Anderson County government. The Claxton Community Park and Playground is commonly used for recreation by local residences,

In order to evaluate the ACC's concerns, two matters needed to be investigated (1) was coal ash present or absent at the park and playground, and (2) were amounts of metals, metalloids, or radionuclides present above naturally occurring background surface soil amounts and current health comparison values provided by the Agency for Toxic Substances and Disease Registry (ATSDR) and U.S. Environmental Protection Agency (USEPA) Regional Screening Levels.

TDEC and TDH prepared a work plan for sampling surface soil and mulch at the playground. It was reviewed by both the ACC and TVA. The work plan was a prudent and cautious approach to collect environmental data.

TDEC contracted Civil & Environmental Consultants, Inc. (CEC) to perform the surface soil, mulch, and sand sampling at the park and playground. CEC field staff followed the work plan and collected surface soil, mulch, and sand samples from 15 locations, one of which was duplicated, for a total of 16 samples. One background surface soil sample from another nearby park was also collected.

Surface soil, mulch, and sand samples were made up of 5-point composite samples. Depending on location, some samples were collected with four subsamples collected around a central sample point while others were collected as 5 linear subsamples, e.g., beneath the swings. The 5 subsamples were then mixed together to form the composite sample. Surface soil, mulch, and sand samples were generally collected from the 0 to 3-inch deep layer as this layer represents the layer of soil children might be exposed to if running, digging, sliding, or otherwise playing.

All 16 surface soil, mulch, and sand samples collected from the playground locations were tested for percent coal ash, metals, metalloids, radionuclides, and general chemistry properties. The background surface soil sample was collected from another park nearby at a similar depth and tested only for percent coal ash.

A Civil and Environmental Consultants staff member collects surface soil at the playground at the Claxton Community Park and Playground (Source: TDH, December 1, 2021).

Summary of Findings and Recommendations

- Fourteen of sixteen surface soil, mulch, and sand samples tested from the park and playground were 98% to 100% coal ash free. One sample from the playground had a coal ash amount of 6% and another had an amount of 9% coal ash.

- We looked at materials present in the surface soil, mulch, and sand in the park and playground other than coal ash, such as metals, metalloids, and radionuclides. Our evaluation of the concentrations found showed there is not a risk of children having harmful health effects from using the park and playground.

- TDH EEP's recommendation is to repair areas where the deeper soils were exposed in the playground and to add a new, thicker mulch layer over the entire playground.

- TDH EEP also recommends Anderson County Parks prepare and follow an operations and maintenance plan to regularly inspect the playground, repair damaged areas, and add additional mulch to areas where the mulch has been worn away.

Conclusion

The Tennessee Department of Health's Environmental Epidemiology Program reached one important conclusion about the Claxton Community Park and Playground.

Conclusion	There is not a risk of children having harmful health effects from using the park and playground. Surface soils, mulch, and sand were tested to protect the children who play at the park and playground. The percent of coal ash, metals, metalloids, radionuclides, and general chemical properties were tested for each of sixteen five-point composite soil samples. Fourteen of sixteen samples from the playground area were 98% to 100% coal ash free. The Claxton Community Park has normal soil, mulch, and sand on the surface of the ground. This is appropriate for a place where children often play. There were a few places where the soil was worn away in the playground and the underlying geofiber layers were torn. The soil samples intentionally collected and tested from these worn areas were 94% to 91% coal ash free. Proper maintenance designed to keep any coal ash residuals below the geofiber layers and mulch will ensure that there is no exposure. The Claxton Community Park and Playground can continue to be a place for children to play and their families to enjoy.
Basis for Decision	An extensive amount of work was done to check for the presence of coal ash at the park and playground. There is intermittent mulch cover within the playground. The two locations with 6% and 9% coal ash were from beneath swings in the northeast and northwest areas of the playground. Worn areas have been created beneath the swings by normal use, exposing deeper soils below the geofiber layers and mulch. These deeper soils have a higher percentage of coal ash than surface soils and contain somewhat higher amounts of metals, metalloids, and radionuclides.
Next Steps	The Tennessee Department of Health as a prudent public health action and to eliminate any possibility of exposure, recommends repair of the areas of soil beneath the swings and the addition of new mulch over the entire playground. This will block the potential for future exposure to coal ash and metals, metalloids, and radionuclides by children using the playground. The Tennessee Department of Health also recommends Anderson County Parks prepare and follow an operations and maintenance plan to regularly inspect the playground, repair damaged areas, and add additional mulch to areas where the mulch has been worn away.

For More Information

If you have any questions or concerns about your health, contact your healthcare provider.

For more information about this health report, please call the TDH Environmental Epidemiology Program at 615-741-7247 or 1-800-404-3006 during normal business hours. You can also email the TDH Environmental Epidemiology Program at eep.health@tn.gov.

For environmental reports for or environmental questions about the Tennessee Valley Authority Bull Run Fossil Plant, call the Tennessee Department of Environment and Conservation toll free at 615-532-0900.

Statement of Issues and Background

The Tennessee Department of Health's (TDH) Environmental Epidemiology Program (EEP) evaluated the soil at the Claxton Community Park and Playground for the presence of coal ash. The Claxton Community Playground will be referred to simply as the playground in this Health Consultation. TDH EEP prepared this public health consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), a federal program that protects the public from harmful health exposures at environmental sites throughout the United States.

In the July 20, 2021, issue of *Environmental Science & Technology*, an article was published entitled "Evaluation and Integration of Geochemical Indicators for Detecting Trace Levels of Coal Fly Ash in Soils." The study presents a novel approach for detecting the presence of trace levels of coal fly ash particles in surface soils near two coal-fired power plants; one in North Carolina and one in Tennessee. The study, conducted by researchers at Duke University in Durham, North Carolina, reported the presence of fly ash particles in surface soils downwind of the Tennessee Valley Authority's (TVA's) Bull Run Fossil Plant (BRF) in a community park in Claxton.

In 2019, TDH's Environmental Epidemiology Program (EEP) partnered with TDEC on a similar site. We worked with TDEC to sample the Roane County Athletic and Festival Fields for fly ash, metals, metalloids, and radionuclides from the TVA's Kingston Power Plant at the request of the Roane County Environmental Review Board through the Roane County Mayor. Similarly, the Anderson County Commission, through Mayor Frank, requested that TDEC and TDH conduct independent sampling of the Claxton Community Park and Playground given its location adjacent to TVA's BRF and the reported results from the published Duke University study.

Site Location and Details

The playground is located on the TVA's BRF property, on Edgemoor Road in the Claxton Community. The park contains a playground known as the Kids Palace Playground with various playground equipment, including slides, swings, sandboxes, and monkey bars. In the grassy area surrounding the playground, there are two covered pavilions with picnic tables and grills for families to enjoy. The park has been used by local families for birthday parties, recreation, and exercise.

TVA owns the land where the park and playground is located. Anderson County manages the use of the park and playground under a 30-year easement.

Construction of the playground occurred in 2000. According to a WATE television story on August 11, 2021, "In 2000, TVA collaborated with the Claxton Optimist Club on the construction of the Claxton Community Playground. As part of the project, TVA prepared the site and provided fill materials, mainly comprised of soil but which also included a small portion of bottom ash, while the Claxton Optimist Club provided the remaining materials, including multiple layers of geofibers, gravel, and mulch on top" [WATE 2021].

On October 21, 2002, the Anderson County Commission unanimously approved an agreement between the Tennessee Valley Authority (TVA) and Anderson County for a recreational easement for the Claxton Community Park and Playground.

Photo 1. The Kids Palace Playground at Claxton Community Park. The red flag (within circle) marks a sample location. (Source: TDH, December 1, 2021).

Photo 2. One of the swing set areas, located in the northeastern portion of the playground. Areas where composite samples were collected are denoted by the red flags (within circles) in the center foreground and in the worn area beneath of the swings. (Source: TDH, November 30, 2021).

Surface Soil, Mulch, and Sand Sampling Methods, Locations, and Collection

TDEC and TDH prepared a work plan for soil sampling at the Playground [TDEC/TDH 2021]. A TDEC environmental contractor, Civil & Environmental Consultants, Inc. (CEC), carried out the work plan, collected the soil, mulch, and sand samples, and facilitated lab analysis. CEC also prepared a detailed report about the soil sampling. It presents how the field sampling occurred, includes location coordinates for the samples, and provides pictures documenting the field work. CEC's report is in Appendix A.

TVA reviewed the work plan to understand how samples were to be collected and tested. TVA provided access to the area for the CEC field sampling team. Anderson County Parks provided access to the playground. Anderson County Parks closed the playground for two days to accommodate the sampling.

Fifteen, five-point composite surface soil, mulch, and sand samples were collected on December 1, 2021 from 0 to 3 inches in depth, along with a duplicate, for a total of 16 samples. The 16 samples were collected from in and around the playground, including the duplicate sample. One background sample was collected from an undisturbed area of nearby Haw Ridge Park for coal ash content comparison purposes. The 0 to 3-inch layer represents the layer of surface soil, mulch, or sand children might be exposed to at the playground, doing things like running, sliding, swinging, or otherwise playing.

Depending on location, some samples were collected with subsamples around a central sample point while others were collected as 5 linear subsamples, e.g., beneath the swings. The 5 subsamples of equal amount were then mixed together to form the composite sample and to obtain the amount of material needed for submittal to the testing laboratories for both TDEC and TVA.

Samples SL-PGOUT-11 to SL-PGOUT-15 were collected outside of the playground. These samples were collected from locations where the grass was worn, from an area at the wooden bridge over a drainage, and from areas near the pavilions at the park. Sample SL-PGOUT-15 was duplicated as a quality assurance and quality control (QA/QC) sample.

Samples SL-PGIN-11 to SL-PGIN-16 were 5-point composite surface soil and mulch mixture samples collected within the playground. Samples SL-PGIN-17 and SL-PGIN-18 were 5-point composite samples collected from the two sandboxes in the playground. Samples MLCH-PGIN-11 and MLCH-PGIN-12 were 5-point composite samples of mulch in more open areas of the playground.

One 5-point composite sample, SL-PGOUT-16, was collected as a background sample from nearby Haw Ridge Park. This sample was only tested for percent coal ash and not metals, metalloids, radionuclides, or general chemistry parameters.

CEC staff performed the soil sampling field work during one day on December 1, 2021. Representatives from TVA, TDH EEP's Nashville Central Office, TDEC's Nashville Central Office and Knoxville Field Office, and the Anderson County Mayor all observed the sampling activities.

Soil was collected from under the sod, organic, or grass layer at a depth from 0 to 3-inches in the grassy areas outside of the playground itself. These samples were collected where families and

children may walk to the playground, congregate around pavilions, cross a wooden bridge, or generally play. For samples collected inside the playground, the surface soil, mulch, or sand was collected from 0 to 3-inches in depth when possible.

The surface samples inside the playground were not chosen completely at random as there was a focus on areas with little mulch cover, places where children swing, play in sand, heavily trafficked areas around playground equipment, and places where families congregate.

Global Positioning System (GPS) coordinates of the general middle of each area where a composite sample was collected were recorded. This information, along with a map of sample locations, can be found in CEC's report in Appendix A. Photos 3 through 6 show how the soil samples were collected and managed.

Photo 3. CEC staff collecting a surface soil sample inside the playground, in the central area near the playground entrance where children would play or run to other playground equipment. TVA staff observe the sampling process. (Source: TDH, December 1, 2021).

TVA split soil samples with TDEC. A large portion of soil was collected from five distinct points at each location. After the sample was mixed thoroughly, TDEC took a portion of soil for testing and TVA was given another portion for testing. TDEC and TVA each sent the metals, metalloids, and radionuclide samples to their own separate, contracted laboratories. TDEC and TVA used the same laboratory for coal ash testing; however, the samples were named differently to not identify samples coming from the same location. TDEC and TDH analyzed and evaluated the soil sample results separately from TVA. TDH EEP did not include or evaluate TVA soil sample results in this health consultation.

Photo 4. CEC and TVA staff at the sample management station underneath the larger pavilion at the playground. (Source: TDH, December 1, 2021).

Photo 5. CEC Compositing the 5 subsamples or aliquots for each mixed sample. (Source: TDH, December 1, 2021).

Photo 6. CEC transferring the surface soil samples to laboratory-supplied sample containers. Samples were split into separate containers for TDEC and for TVA. (Source: TDH, December 1, 2021).

Introduction to Chemical Exposure

To determine whether persons have been or are likely to be exposed to chemicals, TDH EEP evaluates pathways that could lead to human exposure. Chemicals released into the environment have the potential to cause harmful health effects. Nevertheless, a release of a chemical does not always result in exposure. People can only be exposed to a chemical if they come into contact with it. If no one comes into contact with a chemical, no exposure occurs, and no health effects occur.

The five elements to consider when deciding if a person could be exposed to a chemical are:

1. Where is the chemical coming from (source)?
2. What in a person's environment has been contaminated (environmental medium)?
3. Is there a way a person might come into contact with the chemical (exposure point)?
4. How they might come into contact with the chemical (exposure route)?
5. Who might be exposed to the chemical (exposed population)?

An exposure pathway is the way a person can be exposed. Exposure can happen through inhalation (breathing) of a chemical, from ingesting (eating or drinking) a chemical, or by dermal contact (touching) a chemical. An exposure pathway is considered complete if there is evidence that all five of the elements above have been, are, or will be present. An exposure pathway is considered incomplete if one of the five elements above is missing. A potentially completed exposure pathway is when all five elements might have occurred in the past or might occur in the future.

The source of contamination would be the place where the coal ash was present. For the playground, the source for possible coal ash would be the deeper soils below the surface mulch, soil, and geofiber layers that form a barrier between the sub-base of the playground and these surface materials.

Certain population groups might have a different or enhanced response to hazardous chemicals than will most persons exposed to the same amount of hazardous chemicals in the environment. Reasons for this sensitivity might include genetic makeup, age, gender, health and nutritional status, and exposure to other toxic substances. In general, the young, with immature and developing organs, are more vulnerable to toxic substances than are healthy adults. The health of children who use the playground for recreational opportunities was the main focus of this health consultation. TDH EEP used cautious, protective estimates for the amount of time and length of exposure to any contamination found in the soil.

Potential Exposure Pathways

Contact with onsite soils, mulch, and sand is the possible point of exposure for this site. Table 1 shows the possible exposure pathways at the site. Children who use the playground are the potentially exposed population. Children playing on the playground could come into contact with particles from the shallow soil, mulch, and sand.

Table 1. Potential exposure pathways for children at the Claxton Community Park Playground

Source	Environmental Medium	Exposure Point	Exposure Route	Potentially Exposed Population	Time Frame	Exposure Pathway
Coal Ash	Soil Mulch Sand	Contact with particles	Ingestion, or Dermal contact	Children using the playground	Past	Incomplete
					Present	Complete
					Future	Incomplete*

Incomplete = indicates at least one element of the exposure was or is not present

Potential = indicates all five elements of the exposure pathway might have occurred in the past or might occur in the future.

Complete = indicates all five elements of the exposure pathway are either occurring or are expected to occur in the future.

Incomplete* = Future exposure would be incomplete if our recommendations to repair areas and develop a maintenance plan were adopted.

Anderson County Parks groundskeepers could be exposed to soil particles while performing normal activities such as grass mowing and other above ground playground maintenance activities. Parents supervising children may potentially come into contact with soil particles but less frequently than children participating in active play at the playground. The exposure frequency and duration for groundskeepers and parents would be less than a child and therefore the results of our evaluation for children would adequately protect them as well.

Health Comparison Values (CVs) Explained

TDH evaluated the test results of the shallow, composited soil, mulch, and sand samples from the playground. TDH EEP does this routinely for sites throughout Tennessee. TDH EEP evaluates environmental contamination through a two-tiered approach: (1) a screening analysis and (2) a more in-depth analysis to determine public health implications of site-specific exposures [ATSDR 2005]. First, the highest amount of a detected chemical is compared to media-specific environmental guideline comparison values (CVs) [ATSDR 2022a]. This is a cautious, protective approach because the highest amount of a chemical would unlikely be distributed evenly throughout the site. CVs are concentrations of a substance in air, water, or soil that is unlikely to cause harmful health effects in exposed people. If concentrations of a chemical exceed its CV, the chemical is evaluated further to find out if the chemical could harm the health of exposed or potentially exposed people. If chemical amounts are found above environmental guideline CVs, it does not mean harmful health effects will occur.

Several health CVs are available for screening environmental contaminants to determine if an additional in-depth analysis is needed [ATSDR 2005]. These include ATSDR environmental media evaluation guides (EMEGs) and reference dose media evaluation guides (RMEGs). EMEGs are estimated levels of chemicals to which humans might be exposed to over a certain period without experiencing adverse non-cancer health effects, based on ATSDR's minimal risk level (MRL). A MRL is an ATSDR estimate of daily human exposure to a hazardous substance at or below which the substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. Exposure might be for up to 2 weeks (acute), 15 days to 364 days (intermediate), or more than 365 days (chronic). RMEGs represent the amount of a chemical in water or soil at which a chronic human exposure is not likely to result in adverse non-carcinogenic effects, based on the U.S. Environmental Protection Agency's (EPA's) reference dose. A reference dose is an EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans. EPA also uses a hazard quotient (HQ) to understand non-carcinogenic effects. The HQ is calculated by dividing the concentration of the chemical found by the EPA Reference concentration for the chemical. If the calculated HQ is less than 1, it is determined the concentration of the chemical will not pose noncancerous health effects.

If the substance is a known or a probable carcinogen, ATSDR's cancer risk evaluation guides (CREGs) were considered as CVs. CREGs are estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million persons exposed during their lifetime (78 years). The background lifetime risk for cancer from all cancer sites, as measured from 2016 to 2018, is one in two for men and one in three for women [ACS 2022]. All cancer risk values we used express the additional chance of developing cancer above this normal cancer risk baseline. If chemical amounts are found above environmental guideline CVs, it does not mean adverse health effects will occur.

If there were no ATSDR CVs established for a chemical, then the EPA Regional Screening Levels (RSLs) for a residential exposure scenario were used as the CV [EPA 2022a]. These screening levels were calculated by EPA using the latest toxicity values, default exposure assumptions, and physical and chemical properties. For radium-226+228, a screening level of 8 picoCuries per gram (pCi/g) was established by adding the TVA Bull Run site-specific background threshold value of 3 pCi/g [Haley and Aldrich 2019] to the EPA's allowable 5 pCi/g total radioactivity amount above site background [EPA 1998]. USEPA's Preliminary Remediation Goals for Radionuclides

calculator was also used to estimate excess risk based on site-specific information such as the size of the area where the radionuclides were found, amount of time children would be playing at the playground, and other factors [EPA 2022b].

Discussion of Surface Soil, Mulch, and Sand Results

Sample Testing, Results Discussion, and Evaluation

Each soil sample collected was tested for percent coal ash (% ash), 20 different metals and metalloids, five general chemical properties, and two radionuclides. The 20 metals and metalloids are discussed below. The five general chemical properties included pH, three anions: chloride, fluoride, sulfate, and total solids. The two radionuclides included radium-226 and radium-228.

Numerous metals, metalloids, and radionuclides occur naturally in soil. Soil is made up of minerals that can contain various metals, metalloids, organic matter, and small fragments of rock that also contain these compounds. Typically, the type and amount of each metal, metalloid, and radionuclide present in soil is related to its original rock type. Amounts of metals, metalloids, and radionuclides vary within a county, state, or region.

General Chemistry Properties Test Results and Evaluation

The pH of and amounts of chloride, fluoride, and sulfate in the surface soil, mulch, and sand were tested by Pace Analytical of Mount Juliet, Tennessee. The pH is typically tested to understand its acidity or alkalinity and is a characteristic of the soils in an area. The pH is measured on a scale of 1 to 14 with 7 as the neutral mark. Any reading below 7 is considered acidic and any above 7 is considered alkaline. Many plants grow best when the pH is between 6 and 7 because most nutrients are available to them in this range [SUNY 2019]. The pH values reported in all surface soil, mulch, and sand samples were within the range between 5.91 (a mulch sample) and 7.71 (a surface soil sample from outside the playground) pH units.

Chloride, fluoride and sulfate are all anions that can be an indication of soil health. The amounts of these anions are dependent on pH levels, clay content, and calcium content. These anions occur naturally in the soil and are released from the slow natural breakdown of minerals in the parent rock. The amounts of these anions in soil can also be used to understand if soil has been impacted by environmental contamination such as coal ash. The highest amounts of chloride and sulfate were found in the composite sample from the southeast portion of the playground.

The lowest and highest values for each of these general chemistry properties are reported in Table 2. There are no corresponding health-based comparison values for these parameters as they are simply a measure of the acidity and chemical characteristics of the soil. These general chemistry properties provide evidence for much of the surface soil, mulch, and sand in the playground being mostly normal soil, mulch, or sand.

Percent Coal Ash Test Results and Evaluation

The R.J. Lee Group laboratory of Monroeville, PA, tested the soil samples for coal ash using polarized light microscopy (PLM) to determine if coal ash was present. The laboratory reported most samples were at least 98% free of coal ash (Table 2). Two samples had a coal ash content of 6% and 9%. Because the majority of surface soil, mulch, and sand at the playground is at least

98% free of coal ash suggests normal, clean surface soil, mulch, and sand is present throughout the playground.

The two samples with coal ash at 6% and 9% were found in the composite samples collected beneath swings in the northeast and northwest areas of the playground. These locations were where worn areas beneath the swings were observed. These worn areas have exposed deeper soils beneath the top layers of mulch, soil, and torn and worn geofabric material used to cover the deeper soil sub-base of the playground. It was noted during sample collection the geofiber layers were worn away in areas beneath the swings.

The one background sample from nearby Haw Ridge Park was tested only for coal ash content. According to R.J. Lee, the sample did not have any coal ash and the result was reported as non-detect (Table 2).

Metals and Metalloids Test Results and Evaluation

In addition to testing for coal ash, the surface soil, mulch, and sand samples were tested for other chemicals that might have been present. The samples were tested for 20 different metals and metalloids:

antimony	cadmium	lead	selenium
arsenic	calcium	lithium	silver
barium	chromium	molybdenum	thallium
beryllium	cobalt	mercury	vanadium
boron	copper	nickel	zinc

Samples had comparably very low to low amounts of these 20 metals and metalloids. All results are reported in milligrams of the metal per kilograms of soil (mg/kg). Pace Analytical of Mount Juliet, Tennessee provided the analytical testing services for metals and metalloids.

Concentrations of these 20 metals and metalloids were evaluated assuming children using the playground could have either an acute, intermediate, or chronic exposure. An example of an acute exposure would be if a child played one or two days over a two week timeframe, during a year. An example of an intermediate exposure would be if a child played in the playground between 15 and 364 days per year. An example of a chronic exposure would be greater than 365 days, such as if children played at the playground a number of days over a number of years.

In some areas of the playground there is thick mulch cover over the surface soils and geofabric preventing exposure to underlying soil. In other areas the mulch layer is thin or in specific areas, such as beneath the swings, absent.

Overall, the playground is mostly normal soil and mulch. The sand is also normal. Amounts of metals and metalloids found are mainly those of typical soil background levels that have been published and documented by various investigators in Tennessee. Most of the sample results we found matched well with typical Tennessee soil background levels.

Table 2.. Summary of Claxton Community Park and Playground surface soil, mulch, and sand testing results. Results are for radionuclides, total metals, metalloids, and general chemistry properties in 16 samples. The highest levels for each radionuclide and metal measured were compared to background or naturally occurring levels and health comparison values published by the Agency for Toxic Substances and Disease Registry (ATSDR) and U.S. Environmental Protection Agency (EPA).

Chemical in Soil	Minimum Concentration	Maximum Concentration	Location of Maximum Concentration	Tennessee Background Level[1]	Bull Run Soil Background Threshold Values[2]	Selected Health Comparison Value (CV)	Source of Selected CV	Number of Locations at or above CV	Warrants Additional Investigation
Radionuclides reported in picocuries per gram (pCi/g)									
radium-226	0.0366 ± 0.114U	3.65 ± 0.472	SL-PGIN-14	1.1*	1	Background + 5 pCi/g	EPA+	0/16	No
radium-228	0.0425 ± 0.453U	2.33 ± 0.557	SL-PGIN-14	NL	2	Background + 5 pCi/g	EPA+	0/16	No
combined radium 226+228	0.265 ± 0.294U	5.97 ± 1.03	SL-PGIN-14-	1.1*	3	Background + 5 pCi/g	EPA+	0/16	No
Metals and metalloids reported in milligrams per kilogram (mg/kg)									
antimony	0.254 J	< 13 U	SL-PGIN-15	6.2	0.7	21	ATSDR Chronic RMEG (c)	0/16	No
arsenic	1.66 J	35.6	SL-PGIN-14	10	11	16	ATSDR Chronic EMEG (c)	4/16	Yes
barium	1.72 J	118	SL-PGOUT-15	144	219	10,000	ATSDR Chronic EMEG (c)	0/16	No
beryllium	0.404 J	<10.8 U	SL-PGIN-15	1.0	3	100	ATSDR Chronic EMEG (c)	0/16	No
boron	<53.1	<216 U	SL-PGIN-15	55*	6	10,000	ATSDR Chronic RMEG (c)	0/16	No
cadmium	0.152 J	<4.32 U	SL-PGIN-15	1.0	4	5.2	ATSDR Chronic EMEG (c)	0/16	No
calcium	<531 U	62,300	SL-PGIN-16	NL	179,000	NA	(calcium is a requirement for the human body)	0/16	No
chromium	1.79 J	21.6	SL-PGIN-15	20	52	78,000	ATSDR Cr^{+6} Chronic RMEG (c)	0/16	No

Table 2 continued. **Summary of Claxton Community Park and Playground surface soil, mulch, and sand testing results.** Results are for radionuclides, total metals, metalloids, and general chemistry properties in 16 samples. The highest levels for each radionuclide and metal measured were compared to background or naturally occurring levels and health comparison values published by the Agency for Toxic Substances and Disease Registry (ATSDR) and U.S. Environmental Protection Agency (EPA).

Chemical in Soil	Minimum Concentration	Maximum Concentration	Location of Maximum Concentration	Tennessee Background Level[1]	Bull Run Soil Background Threshold Values[2]	Selected Comparison Value (CV)	Source of Selected CV	Number of Locations at or above CV	Warrants Additional Investigation
Metals and metalloids reported in mg/kg (continued)									
cobalt	0.421 J	10.8	SL-PGOUT-13	13	42	520	ATSDR Interm. EMEG (c)	0/16	No
copper	2.87 J	44.9	SL-PGIN-15	25	43	520	ATSDR Interm. EMEG (c)	0/16	No
lead	1.29	14.9	SL-PGOUT-15	45	72	400	EPA Residential RSL	0/16	No
lithium	0.25 J	8.59	SL-PGOUT-13	30*	36	16	EPA Residential RSL	0/16	No
molybdenum	0.239 J	<9.56 U	MLCH-PGIN-12	0.79*	0.9	260	ATSDR Chronic EMEG (c)	0/16	No
mercury	0.0294 J	0.173 U	SL-PGIN-15	0.18	0.1	1.1	EPA Residential RSL	0/16	No
nickel	0.412 J	13.2	SL-PGOUT-12	18	69	1,000	ATSDR Chronic RMEG (c)	0/16	No
selenium	0.334 J	<10.8 U	SL-PGIN-15	1.2	2	260	ATSDR Chronic EMEG (c)	0/16	No
silver	<0.531 U	<2.16 U	SL-PGIN-15	1.2	0.1	260	ATSDR Chronic RMEG (c)	0/16	No
thallium	0.108 J	<8.65 U	SL-PGIN-15	1.9	0.3	0.078	EPA Residential RSL	0/16	No
vanadium	0.574 J	17.7	SL-PGOUT-13	31.8	39	520	ATSDR Interm. EMEG (c)	0/16	No
zinc	3.52 J	56.1	SL-PGIN-13	94	841	16,000	ATSDR Chronic EMEG (c)	0/16	No

Table 2 continued. **Summary of Claxton Community Park and Playground surface soil, mulch, and sand testing results.** Results are for radionuclides, total metals, metalloids, and general chemistry properties in 16 samples. The highest levels for each radionuclide and metal measured were compared to background or naturally occurring levels and health comparison values published by the Agency for Toxic Substances and Disease Registry (ATSDR) and U.S. Environmental Protection Agency (EPA).

Chemical in Soil	Minimum Concentration	Maximum Concentration	Location of Maximum Concentration	Tennessee Background Level[1]	Bull Run Soil Background Threshold Values[2]	Selected Comparison Value (CV)	Source of Selected CV	Number of Locations at or above CV	Warrants Additional Investigation
General Chemistry Properties (mg/kg)									
pH	5.91	7.71	SL-PGOUT-11	NA	9	NA	NA	NA	No
chloride	<21.2 U	<86.5 U	SL-PGIN-15	NA	10	NA	NA	NA	No
fluoride	1.47 J	<8.65 U	SL-PGIN-15	NA	7	NA	NA	NA	No
sulfate	21.9 J	<216 U	SL-PGIN-15	NA	279	NA	NA	NA	No

Notes:

ATSDR EMEG = Agency for Toxic Substances and Disease Registry Environmental Media Evaluation Guide (ATSDR 2022a). Chronic non-cancer exposure comparison values for an exposure greater than 365 days used to determine if chemical concentrations warrant further health-based screening.

ATSDR CREG = Estimated contaminant concentrations that would be expected to cause no more than one excess cancer in one million persons exposed during their lifetime (ATSDR 2022a). CREGs are calculated from EPA's cancer slope factors for oral exposures in this case. These values are based on EPA evaluations and assumptions about hypothetical cancer risks at low levels of exposure.

ATSDR RMEG = Reference Dose Media Evaluation Guide (ATSDR 2022a); ATSDR RMEG used as there was no Chronic EMEG available for the chemical.`

ATSDR Environmental Media Evaluation Guide (EMEG) and CREG for Hexavalent Chromium (Cr^{+6}) used to be cautious.

EPA Residential RSL = EPA residential Regional Screening Level for non-cancer hazard index of 1 and lifetime excess cancer risk of 1 in 1 million (EPA 2022a).

(c) = RMEG or EMEG represents that for a child exposure.

pCi/g = picoCuries per gram

mg/kg = milligrams per kilogram, equivalent to parts per million in soil

NA = not applicable

[1] = Tennessee naturally occurring background level as reported in Kopp 2001, Hazardous Trace Elements in Tennessee Soils. Values designated with * are mean of background soil values of compound in Tennessee soils from Dragun and Chekiri 2005, Elements in North American Soils 2nd Edition.

[2] = Soil Background Values from Soil Background Threshold Values for the TVA Bull Run Fossil Plant, Claxton, Tennessee, Haley & Aldridge, August 2019

<2.16 U = result is less than the detection limit (shown) of the test

J = estimated concentration of chemical

However, to be cautious, we thoroughly evaluated the metals and metalloids to make sure children using the playground were protected. The lowest and highest amounts found for each metal are reported in Table 2. The table also includes the naturally occurring amounts for Tennessee of each metal tested [Kopp 2001], Bull Run facility background threshold values [Haley and Aldrich 2019] for radium 226+228, and the corresponding health-based comparison value for each metal or metalloid [ATSDR 2022a, EPA 2022a]. We found arsenic above its background level and health CV in 4 of 16 samples. We will provide further discussion of our more in-depth evaluation of arsenic below.

Arsenic Evaluation

Arsenic is naturally occurring in soil and rocks throughout Tennessee. A total of 11 of the 16 samples were below the Tennessee arsenic background level for soil of 10 mg/kg [Kopp 2001]. Measured amounts of arsenic in 12 of the 16 samples were below ATSDR's non-cancer comparison value of 16 mg/kg for a chronic exposure of more than 365 days [ATSDR 2022a]. The four samples with measured amounts above ATSDR's non-cancer comparison value of 16 mg/kg ranged from 19.5 to 35.6 mg/kg.

Since studies have identified effects due to arsenic exposure on every organ or tissue in the body [ATSDR 2007], we evaluated the arsenic results further using ATSDR's Public Health Assessment Tool PHAST [ATSDR 2022b]. TDH EEP used PHAST to calculate the non-cancer health effects hazard quotient and the excess cancer risk for accidental ingestion or coming into contact with the highest measured amount of arsenic found at the playground of 35.6 milligrams per kilogram (mg/kg), even though this result was found only in the area beneath the swings in the northeast portion of the playground. TDH EEP used PHAST to model an exposure of a child, accidentally ingesting and contacting soil containing arsenic while visiting the playground for 2 hours per day, 2 days per week, for 10 years. These visits and timeframes were used based on a National Recreation and Parks Association report [NRPA 2021] which cites 92% of Americans visit a park or playground less than 50 times per year (2 days a week equals 52 visits a year). This timeframe is a conservative protective estimation of the time children would be anywhere in the park. Using this very cautious approach, we found the highest non-cancer exposure HQ of a child accidentally ingesting soil or contacting soil containing arsenic is 0.04. An HQ of less than 1 (HQ = <1) shows there should not be non-cancer health effects connected to the highest amount of arsenic found at the playground.

Additionally, arsenic has a published chronic dose Minimal Risk Level (MRL) of 0.0003 milligrams per kilogram per day (mg/kg/day) [ATSDR 2022c]. TDH EEP again used the highest arsenic amount of 35.6 mg/kg again to calculate an estimated dose of 0.00001 mg/kg/day, or about ten times lower than the chronic dose MRL established by ATSDR. This also indicates non-cancer health effects are not expected from ingesting or contacting soil with the highest amount of arsenic found at the playground.

Arsenic in all areas was above ATSDR's CREG of 0.26 mg/kg for one lifetime excess cancer in one million people. Naturally occurring arsenic in Tennessee soils measure above the ATSDR CREG. Again, a CREG is a cancer screening value and not used to identify health outcomes. The arsenic CREG value is based on a continuous, daily, lifetime exposure. This exposure is not a realistic situation for the children using the playground as children would be at the playground a certain number of days each week over a certain number of years.

To further evaluate a more realistic excess cancer risk for children playing at the playground, we evaluated an average exposure to the highest amount of arsenic found in the soils at the playground – 35.6 mg/kg. An estimated excess cancer risk was calculated for a child playing in the area of the highest arsenic amount for 2 hours a day, 2 days per week, for 10 years. Again, the number of visits and timeframes used were the same for the non-cancer health effects estimate.

The most conservative excess cancer risk was about two excess cancers in one million children (expressed exponentially as $2x10^{-6}$). This small estimated excess cancer risk is in addition to the normal cancer risk of people of 1 in 2 for males, or 50 in 100 males, and 1 in 3 for females, or 33.3 in 100 females in their lifetime [ACS 2022]. The total calculated risk with the additional risk from the maximum level of arsenic would be 50.0002 per 100 males and 33.3002 per 100 females. This estimated excess cancer risk should not result in a significant increased excess risk of cancer to children playing at the playground and there should be no harmful health effects from amounts of arsenic found in the soils of the park or playground.

Antimony Evaluation

There were 13 samples in which antimony was not detected that had a reporting limit higher than its EPA's RSL. The reporting limits for these 13 samples were all below ATSDR's CV (Table 2). In three samples where antimony was detected, the concentration was estimated because it was above the method detection limit but below the reporting limit. The estimated concentrations were below background values, ATSDR's CV for antimony, and EPA's RSL. Therefore, antimony was not evaluated further. There is not a health concern from concentrations of antimony found at the park or playground.

Cobalt Evaluation

There were 11 samples with concentrations of the metal cobalt higher than EPA's RSL. Concentrations found in these 11 samples were below naturally occurring background levels and ATSDR's CV (Table 2). Therefore, cobalt was not evaluated further. There is not a health concern from concentrations of cobalt found at the park or playground.

Thallium Evaluation

There were 9 samples where thallium was not detected that had a reporting limit higher than EPA's RSL for thallium. The method detection limits of these 9 samples, however, were all below the Tennessee background value for thallium, and reported as not-detected (Table 2). In 7 samples, where thallium was detected, the concentration was estimated because it was above the method detection limit but below the reporting limit. The estimated concentrations were all greater than EPA's RSL but below at least one of the thallium background values and were therefore considered below naturally occurring background levels of thallium in Tennessee. Thallium was not evaluated further and there is not a health concern from concentrations of thallium at the park or playground.

Radium-226/228 Evaluation

Each sample was also tested for isotopes of radium commonly found in coal ash. Coal and some soils contain naturally occurring radionuclides. Burning coal for power leaves behind significant amounts of coal ash. Radium-226 and radium-228, common radionuclides in coal, can become concentrated in coal ash. The lowest and highest activity value found for radium-226 and radium-

228 is reported in Table 2. All radium-226+228 activity values were reported as a number in picocuries per gram (pCi/g).

Because of concerns about excess radiation people can have, we evaluated the reported amounts of radium-226 and -228 further.

Total Radium-226+228

All test results at the playground were below the 5 pCi/g total radioactivity level plus site background, in accordance with Code of Federal Regulations 40 CFR 192 which is used to regulate radium and thorium concentrations at mill and mining sites under the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, Uranium Mill Tailings Radiation Control Act [EPA 1998]. EPA uses this method of evaluating sites across the country. The Bull Run site-specific background threshold value for radium 226+228 was established at 3 pCi/g [Haley and Aldrich 2019]. The Bull Run background threshold value of 3 pCi/g plus the 5 pCi/g total radioactivity greater than site background provides for a combined radium screening value in soil of 8 pCi/g. All combined radium 226+228 results at the playground are below this screening value. There should be no harmful health effects from amounts of radium-226+228 found in the soils of the park or playground.

Even though total radium-226+228 was below 8 pCi/g, as a prudent public health evaluation, we looked further at the highest individual radium-226 and radium-228 amounts found. TDH EEP estimated the additional cancer risk from these amounts using USEPA's Preliminary Remediation Goals for Radionuclides calculator [EPA 2022c]. This calculator also provided excess risk estimates for radium-226+228. The location where the highest radium-226 and radium-228 amounts were found was the same area beneath the swings in the northeastern area of the playground. This was where the highest coal ash percent and highest amount of arsenic were also found and where mulch, soil, and geofiber layers were worn and torn.

Radium-226 Evaluation

Radium-226 amounts measured in the 16 samples ranged from 0.0366 ± 0.114 pCi/g to 3.65 ± 0.472 pCi/g. Radium-228 amounts measured in the same 16 samples ranged from 0.0425 ± 0.453 pCi/g to 2.33 ± 0.557 pCi/g. All test results were compiled in Table 2.

Published naturally occurring background radium-226 amounts in Tennessee soils ranged between 0.65 to 1.4 pCi/g with a mean value of 1.1 pCi/g [Dragun and Chekiri 2005]. A radiation subject matter expert with ATSDR was consulted. Typical radium-226 amounts in soils are about 1 pCi/g [Charp 2019]. Because the highest concentration of radium-226 found at the playground exceeded the background amount, a further site-specific cancer risk evaluation was done.

An estimated excess cancer risk was calculated for a child playing in the area of the highest radium-226 amount found for 2 hours a day, 2 days a week, for 10 years. This timeframe is a conservative protective estimation of the time children would be anywhere in the park. The estimated excess risk for the highest radium-226 amount found is 2.8×10^{-6}, or about 3 additional excess cancers in one million people. This additional excess cancer risk is in addition to the normal risk of people developing cancer in their lifetime of 1 in 2 for males, or 50 in 100 males, and 1 in 3 for females, or 33.3 in 100 females [ACS 2022]. The total calculated risk with the additional risk from the maximum level of radium-226 would be 50.00028 per 100 males and 33.30028 per 100 females. This additional risk is very small, especially in comparison to the normal risk of people developing

cancer during their lifetime. Based on our evaluation, there should not be harmful health effects from exposure to the low amounts of radium-226 found at the park or playground.

Radium-228

Identical to our exposure estimate for radium 226, we used an exposure time of 2 hours a day, 2 days a week, for 10 years to find an estimated excess cancer risk for a child playing in the area of the highest concentration of radium-228. The estimated total excess risk for the highest Radium-228 amount is $8.2x10^{-7}$, or about 8 additional excess cancers in ten million people. This additional excess cancer risk is in addition to the normal risk of people developing cancer in their lifetime of 1 in 2 for males, or 50 in 100 males, and 1 in 3 for females, or 33.3 in 100 females [ACS 2022]. The total calculated risk with the additional risk from the maximum level of radium-228 would be 50.00008 per 100 males and 33.30008 per 100 females. There should not be harmful health effects from exposure to the low amounts of radium-228 found.

Therefore, the total risk for combined radium 226+228 would be estimated to be $3.6x10^{-6}$ or about 4 excess lifetime cancers in one million people (for a combined risk of 50.0004 per 100 males and 33.3004 per 100 females). Although this estimated additional excess cancer risk is not zero, the additional risk is very small, especially in comparison to the normal risk of people developing cancer during their lifetime. The combined radium-226+228 risk evaluation outlined above further shows children coming into contact with soil or accidently ingesting soil at the location with the highest radium-226+228 amount should not have harmful health effects.

Conclusion

The Tennessee Department of Health's Environmental Epidemiology Program reached one important conclusion about the Claxton Community Park and Playground:

There is not a risk of children having harmful health effects from using the park and playground. Surface soils, mulch, and sand were tested to protect the children who play at the park and playground. The percent of coal ash, metals, metalloids, radionuclides, and general chemical properties were tested for each of sixteen five-point composite soil samples. Fourteen of sixteen samples from the playground area were 98% to 100% coal ash free. The Claxton Community Park has normal soil, mulch, and sand on the surface of the ground. This is appropriate for a place where children often play. There were a few places where the soil was worn away in the playground and the underlying geofiber layers were torn. The soil samples intentionally collected and tested from these worn areas were 94% to 91% coal ash free. Proper maintenance designed to keep any coal ash residuals below the geofiber layers and mulch will ensure that there is no exposure. The Claxton Community Park and Playground can continue to be a place for children to play and their families to enjoy.

Recommendations

The Tennessee Department of Health's Environmental Epidemiology Program has two recommendations for the Claxton Community Park and Playground:

The Tennessee Department of Health, as a prudent public health action and to eliminate any possibility of exposure, recommends repair of the areas of soil beneath the swings and the

addition of new mulch over the entire playground area. This will block the potential for future exposure to coal ash and metals, metalloids, and radionuclides by children using the playground.

The Tennessee Department of Health also recommends Anderson County Parks prepare and follow an operations and maintenance plan to regularly inspect the playground, repair damaged areas, and add additional mulch to areas where the mulch has been worn away.

Public Health Action Plan

This public health action plan for the Claxton Community Park Playground contains a list of actions that have been or are planned to be taken by TDH EEP and other agencies. The purpose of the public health action plan is to offer a plan of action designed to mitigate and prevent harmful health effects that result from exposure to hazardous substances in the environment. Included is a commitment on the part of TDH EEP to follow up on this plan to ensure it is implemented.

TDH EEP Actions Completed:

- Partnered with the Tennessee Department of Environment and Conservation to perform the work requested by the Anderson County Commissioners to investigate the Claxton Community Park and Playground for the potential for coal ash to be in surface soil at the park and surface soil, mulch, and sand at the playground. Representatives from TDH and TDEC met several times to discuss ways to investigate the soil, mulch, and sand at the park and playground.

- Prepared a soil investigation work plan jointly with TDEC to find out if coal ash was present in surface soil, mulch, and sand at the Claxton Community Park and Playground.

- Prepared this health consultation to evaluate and explain surface soil, mulch, and sand test results from the Claxton Community Park and Playground. TDH EEP also evaluated the amounts of metals, metalloids, and radionuclides in the soil against health comparison values.

- We would like to thank Anderson County for already taking action to repair the worn areas beneath both sets of swings, and at the slides, tire swing, and monkey bar areas at the playground.

TDH EEP Actions Planned:

- Provide copies of this health consultation to the Anderson County citizens, the Anderson County Commissioners, TDEC, state and local governmental officials, and TVA.

- Be available to and maintain dialogue with Anderson County citizens, the Anderson County Commissioners, TDEC, the Anderson County Health Department, Anderson County public officials, and TVA should they have questions about this health consultation.

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REPORT PREPARATION

Prior to publication, this health consultation was reviewed and comments provided by staff in the Tennessee Department of Health listed below. Similarly, staff from the Tennessee Department of Environment and Conservation listed below reviewed and provided comments.

Neither the Tennessee Valley Authority nor the Anderson County Commissioners reviewed, provided input, or was given the opportunity to provide comments about this health consultation. We thank Anderson County Parks and Recreation for providing access to the playground for the soil sampling. We also thank TVA for allowing access to TDEC and TDH staff for the soil sampling and Civil and Environmental Consultants, Inc. for review of the work plan and providing personnel for the sampling activity.

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Appendix A

Claxton Community Park and Playground

Field Sampling Summary Report

CLAXTON COMMUNITY PARK AND PLAYGROUND
FIELD SAMPLING SUMMARY REPORT

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TN Department of Environment & Conservation

TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION
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Table 3 Claxton Community Park and Playground Soil Sampling Analytical Results

APPENDICES

Appendix A Photographic Documentation
Appendix B Split Sampling Forms
Appendix C Laboratory Analytical Reports

1.0 INTRODUCTION

The Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) retained Civil & Environmental Consultants, Inc. (CEC) to conduct surficial material sampling (i.e., soil, soil/mulch mix, sand, and mulch) at the Claxton Community Park and Playground (Project) in Claxton, Tennessee. The Project was performed per the request of Ms. Terry Frank, the Anderson County Mayor (Mayor Frank), to the Tennessee Department of Health's (TDH) Environmental Epidemiology Program (EEP) and the TDEC DoR, and in accordance with the *Claxton Community Park and Playground Sampling Work Plan* (Work Plan) prepared by TDH EEP and TDEC DoR, dated November 19, 2021. Mayor Frank's request was made following an independent study conducted by Duke University researchers that reported the presence of fly ash in the park. The Anderson County Board of Commissioners passed Resolution Number 21-08-885 asking both TDH and TDEC to test soils on the Claxton Community Park property leased from the Tennessee Valley Authority (TVA) by the Anderson County government.

The scope of this investigation included sampling and analysis of surface (0-3 inches in depth) soil and mulch, as well as a mixture of the two, collected from various locations at the Claxton Community Park and Playground. One background sampling location southwest of the park was sampled. Additionally, the surficial content of two sand boxes were also sampled. The purpose of the investigation was to assess surficial materials children could encounter at the Claxton Community Park and Playground for the presence or absence of coal combustion residuals (CCR), and to understand if there were levels of metals or metalloids present above naturally occurring background soil levels or current human health comparison values provided by the Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency (U.S. EPA) Regional Screening Levels. This report presents a summary of the performed sampling program, the laboratory analytical results, and discussion regarding the Project.

1.1 BACKGROUND

On October 21, 2002, the Anderson County Commission unanimously approved an agreement between the TVA and Anderson County for a recreational easement for the Claxton Community

Park and Playground. The park is located within the boundary of the Bull Run Fossil Plant (BRF), on Edgemoor Road in Claxton, Tennessee. The park contains a playground, known as the Kids Palace Playground, with various playground equipment including slides, swings, and monkey bars. In the grass area surrounding the playground, there are two covered pavilions with picnic tables and grills. Since the park has opened, it has been used by local families for birthday parties, recreation, and exercise.

In the July 20, 2021, journal issue of *Environmental Science and Technology*, a study was published entitled "Evaluation and Integration of Geochemical Indicators for Detecting Trace Levels of Coal Fly Ash in Soils". The study presents a new approach for detecting the presence of trace levels of coal fly ash particles in surface soils near two coal-fired power plants in North Carolina and Tennessee. The study, conducted by researchers at Duke University in Durham, North Carolina, reports the presence of fly ash particles in surface soils downwind of TVA's BRF in a community park in Claxton, Tennessee.

In 2019 TDEC and TDH partnered to sample the Roane County Athletic and Festival Fields for fly ash, metals, and metalloids from TVA's Kingston Plant at the request of the Roane County Environmental Review Board through the Roane County Mayor. Similarly, the Anderson County Commission, through Mayor Frank, requested that TDEC and TDH conduct independent sampling of the Claxton Community Park and Playground given its location adjacent to TVA's BRF and the reported results from the published study mentioned in the preceding paragraph.

1.2 SAMPLE LOCATION DESCRIPTION

Fourteen sample locations were identified by TDEC during the Project scope development; however, two additional locations were added during the kickoff meeting held at the Project on November 30, 2021, between TDEC, TDH, TVA, and CEC. The additional locations were added based upon field observations at the time of the meeting (i.e., highly trafficked areas where mulch had been displaced within the playground area). The table below provides sample identification, sample matrix, location, and the latitude and longitude from the center of the sampling area as documented in the field.

TABLE 1
Claxton Community Park and Playground Soil Sample Summary Table

Sample ID	Sample Matrix	Location	Sample Type	Latitude (°N)	Longitude (°E)
CLX-SL-PGOUT-11-120121	Surface Soil from Grass Area	Outside Playground	Composite	36.026146	-84.149345
CLX-SL-PGOUT-12-120121	Surface Soil from Grass Area	Outside Playground	Composite	36.026548	-84.149440
CLX-SL-PGOUT-13-120121	Surface Soil from Grass Area	Outside Playground	Composite	36.026385	-84.148906
CLX-SL-PGOUT-14-120121	Surface Soil from Grass Area	Outside Playground	Composite	36.026194	-84.149011
CLX-SL-PGOUT-15-120121	Surface Soil from Grass Area	Outside Playground	Composite	36.026065	-84.149001
CLX-SL-PGOUT-16-120121	Surface Soil (Background)	Haw Ridge Park	Composite	36.000772	-84.184459
CLX-SL-PGIN-11-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026277	-84.149178
CLX-SL-PGIN-12-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026307	-84.149288
CLX-SL-PGIN-13-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026405	-84.149376
CLX-SL-PGIN-14-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026455	-84.149190
CLX-SL-PGIN-15-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026296	-84.149043
CLX-SL-PGIN-16-120121	Playground Soil/Mulch Mix	Inside Playground	Composite	36.026210	-84.149117
CLX-SL-PGIN-17-120121	Sand (Sand Box)	Inside Playground	Composite	36.026249	-84.149317
CLX-SL-PGIN-18-120121	Sand (Sand Box)	Inside Playground	Composite	36.026374	-84.149273
CLX-SL-MLCH-11-120121	Mulch	Inside Playground	Composite	36.026372	-84.149352
CLX-SL-MLCH-12-120121	Mulch	Inside Playground	Composite	36.026401	-84.149159

Note: The sample suffix, "-120121" has been excluded from each sample name reference in the proceeding sections of the report.

Justification for each sampling location, as provided to CEC by TDEC, is outlined below:

1. **CLX-SL-PGOUT-11 thru CLX-SL-PGOUT-15 –** These locations were selected to assess the grass area surrounding the playground (i.e., outside of the playground). This area includes two pavilions, a foot bridge, and a parking lot. Samples were biased to locations with exposed and/or bare soil (i.e., areas of high traffic). Duplicate sample collected at location CLX-SL-PGOUT-15-120121 and named, "*CLX-SL-PGOUT-12012021*".
2. **CLX-SL-PGOUT-16 –** Background location located approximately 2.6 miles southwest of the Project in Haw Ridge Park. The collected soil sample was submitted for polarized light microscopy (PLM) analysis only to assess background soils for potential ash.
3. **CLX-SL-PGIN-11 thru CLX-SL-PGIN-16 –** Locations within the playground footprint biased to highly trafficked areas where mulch had been displaced. Sample areas included beneath swing sets, slides, and monkey bars.
4. **CLX-SL-PGIN-17 thru CLX-SL-PGIN-18 –** Sand box play area locations within the playground.
5. **CLX-SL-MLCH-11 thru CLX-SL-MLCH-12 –** Locations within the playground footprint where mulch was present and heavy foot traffic was not evident.

2.0 FIELD WORK SUMMARY

CEC provided field services in support of the Project sampling program as outlined in the Work Plan. The CEC team included two environmental personnel from its Knoxville Office to perform the sample location demarcation and collection activities. Anderson County closed the Claxton Community Park and Playground on November 30 and December 1, 2021, in support of Project activities. This section provides a description of the field work performed in association with the Project.

2.1 SAMPLE LOCATION DEMARCATION

As discussed in Section 1.2, TDEC, TDH, TVA, and CEC met at the Claxton Park and Playground on November 30, 2021, to review field conditions and identify the sampling locations prior to commencing sample collection activities. The sample locations, as described in the Work Plan and noted in Section 1.2, were selected based on field observations and spatial location information collected using a hand-held GPS unit. The sample locations were mutually agreeable to the parties in attendance. The center of each sample location was demarcated with a survey flag for reference.

2.2 MOBILIZATION

On December 1, 2021, TDEC, TDH, TVA, and CEC personnel mobilized to the Project to begin sampling activities. TVA was present to split samples with CEC and to perform an audit of field activities. CEC conducted an informal tailgate safety discussion to assist in identifying potential hazards associated with the sampling effort. Additionally, a sample processing area was established under the pavilion located near the southern boundary of the Project. The processing area consisted of a table lined with plastic sheeting. Clean stainless steel totes were placed on the plastic sheeting to serve as secondary containment during sample processing. Finally, all disposable PPE and sampling equipment were collected in trash bags after use within the processing area and disposed as municipal waste.

2.3 SAMPLE COLLECTION

Sampling and compositing activities were performed in general accordance with the U.S. EPA Region 4 Operating Procedure for Soil Sampling (effective date of June 11, 2020). Five point composite surface material samples were collected at each sample location. Each point (i.e., the sample aliquot) was advanced to three inches below grade using a dedicated stainless steel shovel. Using the shovel, a circular hole approximately 4 inches in diameter was established at each sampling point to generate the necessary aliquot volume. At several locations within the playground area, the geotextile fabric was encountered at less than three inches below grade. At these locations, the diameter of the sample location was widened to generate sufficient sample volume. These locations are noted on the attached Split Sampling Forms included in **Appendix B**. Care was taken to remove any non-target material (grass, sticks, rocks, etc.) from the aliquot and composite sample volume. Also, care was taken to avoid the geotextile liner[1] below the mulch layer within the playground. After the first sample aliquot was collected, it was placed in a clean, new, sealable plastic bag. Subsequent aliquots from the sample location were placed into the same sealable plastic bag after the volume/mass was estimated to be similar as the other aliquots. The combined sample was transferred to the sample processing area established under the pavilion. Sample processing involved homogenizing the composited aliquots by kneading the outside of the plastic bag, via gloved hand, until the physical appearance was consistent throughout. New nitrile gloves were donned after each sample was processed.

Pace Analytical Services (Mt. Juliet, Tennessee) supplied sample containers appropriate for the analyses and the containers were filled after homogenization. Additionally, CEC accepted sample containers from TVA for split sampling purposes. Split sampling is discussed in further detail below. The rim and threads of the sample containers were cleaned by wiping with a clean paper towel, and capped. A signed and dated custody seal was applied to the sample containers for the following analyses:

- Radiological parameters (EPA 901.1);
- Total metals, wet chemistry (EPA 6020A, 7471, 300.0, 9045D); and,

[1] Within the playground area, CEC observed that the geotextile liner had been compromised at several locations including: CLX-SL-PGIN-13 and CLX-SL-PGIN-14.

- Percent ash [Polarized Light Microscopy (PLM); RJ Lee SOP OPT23.02].

The samples, with the exception of those collected for PLM analysis, were immediately placed in a cooler and stored on ice under chain-of-custody protocol. The samples were overnighted to Pace Analytical (12065 Lebanon Road, Mt. Juliet, Tennessee 37122) via FedEx on December 2, 2021. Samples collected for PLM analysis were overnighted via FedEx to RJ Lee Group (350 Hochberg Road, Monroeville, Pennsylvania 15146). PLM samples did not require ice preservation. A photo log depicting representative tasks associated with sample collection has been provided in **Appendix A**.

Following sampling activities, CEC traversed the sample area with the hand-held GPS to capture the approximate area where the composite samples were collected (i.e., the traversed area encompassed each of the five aliquot locations creating a polygon).

2.4 SPLIT SAMPLING PROCEDURE

TVA elected to accept split, composite samples from each of the locations identified in **Table 1**. Split sampling was performed as follows:

- In advance of sampling activities at each location, TVA provided labeled laboratory-supplied sample containers from its selected laboratory;
- TVA sample containers were positioned in the sample process area alongside TDEC's sample containers and opened by CEC;
- After sample homogenization as described in Section 2.3, the split sampling process was initiated by filling TDEC and TVA laboratory-supplied sample containers in thirds in the following order:
    - Radiological parameters (EPA 901.1);
    - Total metals, wet chemistry, pH (EPA 6020A, 7471, 300.0, 9045D);
    - Moisture (ASTM D2974-87); and,
    - Percent ash (PLM; RJ Lee SOP OPT23.02).
- Sample jars were filled via gloved hands; and,
- Split sample jars were relinquished to TVA once filled and capped.

TDEC and TVA used different laboratories for each analytical method, with the exception of percent ash. The RJ Lee Group was selected by both TDEC and TVA for PLM analysis because an alternative lab that could perform PLM analysis according to a reviewable SOP, or other sufficient method documentation, could not be located. Since both sets of PLM samples went to the same lab, it became necessary as an added measure of data quality control to adjust the sample nomenclature so that TDEC and TVA samples could be analyzed by RJ Lee Group independently without directly correlating the paired samples by way of the sample identification. The attached sample summary logs provide TDEC's sample name along with the paired TVA sample ID (see **Appendix B**). Quality Assurance and Quality Control (QA/QC) split samples were collected in the same manner at the locations selected by TDEC.

2.5 QA/QC SAMPLES

QA/QC samples were collected as part of this investigation. QA/QC samples included one rinsate blank and one field duplicate. A summary of the collected QA/QC samples is provided in the table below. QA/QC results are included in the laboratory analytical reports provided in **Appendix C**.

TABLE 2
Claxton Community Park and Playground QA/QC Sample Summary Table

Sample ID	Sample Type	Description
CLX-EB	Rinsate Blank	One rinsate blank was collected by pouring laboratory provided water over an unused stainless steel shovel and collecting the water in laboratory provided containers. The purpose of the rinsate blank was to assess if any constituents of interest, as noted in Section 2.3, were present in the unused stainless steel shovel.
CLX-PGOUT	Field Duplicate	Field duplicate collected from sample location CLX-SL-PGOUT-15.

2.6 EQUIPMENT SELECTION

The sampling approach was developed to avoid the need to decontaminate sampling equipment between locations. This was accomplished by deploying a new, stainless steel shovel at each sampling location and homogenizing the collected soil in disposable, sealable plastic bags.

Additionally, all personal protective equipment (PPE) was disposable. Therefore, equipment and PPE decontamination was not necessary.

3.0 FINDINGS

As noted in Section 1.2, 16 samples and one duplicate sample were collected for laboratory analysis. Each collected sample was generated by compositing five individual aliquots of targeted surface material. Of the 16 samples, one sample (i.e., CLX-SL-PGOUT-16) was collected from Haw Ridge Park for background purposes (i.e., PLM background only)[2]. **Figure 1** has been provided depicting the general location of the Project and the sample location in Haw Ridge Park. **Figure 2** depicts the remaining sample locations within the Project.

Laboratory analytical results were compared to the following:

- U.S. EPA Regional Screening Levels (RSLs) for residential soil under direct contact exposure with target cancer risk of 10^{-6} and target hazard quotient of 0.1 (published November 2021).
- Agency for Toxic Substances and Disease Registry (ATSDR) Soil Ingestion Criteria (https://www.atsdr.cdc.gov/sites/brownfields/CVViewer.html).
- Tennessee Superfund's Background Inorganic Survey Statistical Summary, 3rd Quartile (May 1996).
- Soil Background Supplemental Data Set for the East Tennessee Technology Park (ETTP) prepared for the U.S. Department of Energy Office of Environmental Management (September 2003).
- Subpart B of 40 CFR 192 regarding the concentration criterion for Radium 226 in surface soil.

Provided in the following is a summary of the findings from this assessment. The discussion is broken down on an analyte-specific basis for clarity. A summary of the laboratory analytical results for all analytes is provided as **Table 3**. The laboratory analytical reports are included in **Appendix C**.

[2] In the results discussion section of this Report, the background sample (CLX-SL-PGOUT-16) is not included in the inorganics/wet chemistry, metals, or radium discussions when referencing the sample results as a whole. The background sample only included PLM analysis.

3.1 INORGANICS/WET CHEMISTRY

Samples were submitted to Pace Analytical for chloride, fluoride, and sulfate analysis via U.S. EPA Method 300.0. Sample prep for Method 300.0 included preparing 5 grams of sample in 50mL deionized water, vortexing the prepared sample for 15 minutes, centrifuging thereafter, and filtering via 0.2 micron filters before analysis.

Chloride was reported as non-detect while Sulfate was reported as either non-detect, or as an estimated value[3] (i.e., J qualifier) for all samples. Fluoride was reported as non-detect, or with a J qualifier, for all samples with exception of the results associated with CLX-SL-PGOUT-13 (2.52 mg/kg) and CLX-SL-PGOUT-15 (2.72 mg/kg). These fluoride quantifications are well below the U.S. EPA RSL (i.e. 310 mg/kg). Additionally, pH (via U.S. EPA Method 9045D) and total solids (via method 2540G-2011) were evaluated and are reported on **Table 3** for informational purposes.

3.2 METALS

Samples were submitted to Pace Analytical for metals analysis via U.S. EPA Method 6010. Metals samples were prepared via Method 3050B.

With the exception of arsenic, calcium, chromium, cobalt, and copper, all metal results were reported below all comparison criteria, or less than the laboratory reporting detection limit (RDL)[4]. Additionally, the laboratory RDL for antimony and thallium was reported higher than the U.S. EPA RSL in multiple samples. These instances have been highlighted in **Table 3**. Arsenic, calcium, chromium, cobalt, and copper results are discussed in more detail below. Laboratory analytical results for these constituents are also provided in **Table 3**.

- Arsenic

[3] Pace Analytical's laboratory report states that a J Qualifier signifies that the identification of an analyte is acceptable, but that the reported value is an estimate. J Qualifiers are utilized when the reported analyte is reported below the laboratory RDL, but above the method detection limit (MDL). The MDL is below the point of calibration which in turn leads to the J Qualifier.

[4] J qualifiers were reported for multiple metal analytes and are presented on Table 3.

- Arsenic was quantified above the U.S. EPA RSL (0.68 mg/kg) in each of the 16 samples, including the duplicate.
- Arsenic was quantified above the ATSDR Soil Ingestion Criteria (16 mg/kg) in four of the five soil/mulch mixture samples (i.e., CLX-SL-PGIN-13, -14, -15, and 16).
- Arsenic exceeded background concentrations from both presented background data sets in four soil/mulch mixture samples collected inside the playground area (i.e., CLX-SL-PGIN-13, -14, -15, and 16).
- Arsenic exceeded the most conservative of the presented background concentrations [i.e., 10 mg/kg; Tennessee Background Inorganic Survey – 3rd Quartile (1996)] in one sample from outside of the playground area (i.e., CLX-SL-PGOUT-13) but did not exceed the ETTP Soil Background Value of 14.95 mg/kg.

- Calcium
  - Calcium is an essential nutrient. U.S. EPA RSL and ATSDR Soil Ingestion Criteria have not been established for Calcium.
  - Calcium exceeded the most conservative of the presented background concentrations [i.e., 2,400 mg/kg; ETTP Soil Background Values (2003)] in each of the samples collected from outside of the playground area (including the duplicate sample), with the exception of CLX-SL-PGOUT-14. Calcium exceeded the ETTP Soil Background Value in seven of the samples collected inside of the playground area (i.e., CLX-SL-PGIN-11, -13, -14, -15, -16, and CLX-MLCH-PGIN-11, -12).
- Chromium
  - Chromium was reported below the U.S. EPA RSL (12,000 mg/kg) in each of the 16 samples, including the duplicate.
  - Chromium was reported below the ATSDR Ingestion Criteria (78,000 mg/kg) in each of the 16 samples, including the duplicate.
  - Chromium exceeded the most conservative of the presented background concentrations [i.e., 20 mg/kg; Tennessee Background Inorganic Survey – 3rd Quartile (1996)] in soil/mulch mixture sample CLX-SL-PGIN-15. However, the chromium concentration in this sample did not exceed the ETTP Soil Background Value for chromium of 44.88 mg/kg.

- Cobalt
    - Cobalt was quantified above the U.S. EPA RSL (2.3 mg/kg) in each of the samples collected outside of the playground area, including the duplicate, and in five of the samples collected inside of the playground area (i.e., CLX-SL-PGIN-13, -14, -15, -16, and CLX-MLCH-PGIN-12).
    - Cobalt was reported below the ATSDR Ingestion Criteria (520 mg/kg) in each of the 16 samples, including the duplicate.
    - Cobalt was reported below the most conservative of the presented background concentrations [i.e., 13 mg/kg; Tennessee Background Inorganic Survey – 3rd Quartile (1996)] in each of the 16 samples.
- Copper
    - Copper was reported below the U.S. EPA RSL (310 mg/kg) in each of the 16 samples, including the duplicate.
    - Copper was reported below ATSDR Ingestion Criteria (520 mg/kg) in each of the 16 samples, including the duplicate.
    - Copper was quantified above both presented background concentrations [i.e., 22.48 mg/kg; ETTP Soil Background Values (2003) and 25 mg/kg; Tennessee Background Inorganic Survey – 3rd Quartile (1996)] in two of the samples (CLX-SL-PGIN-15 and -16) collected inside of the playground area.

3.3 POLARIZED LIGHT MICROSCOPY

Samples were submitted to RJ Lee Corporation for PLM analysis via RJ Lee SOP OPT23.02. PLM analysis was selected to assess the percent ash particles in each sample. The background soil sample from Haw Ridge Park was submitted for PLM analysis. The results are summarized below:

- Three samples collected for PLM analysis from outside the playground were reported as non-detect for ash particles, including the background sample [i.e., CLX-SL-PGOUT-14, -15 (plus duplicate), and -16]. The remaining samples were reported to have an ash content from 1 to 2% (i.e., CLX-SL-PGOUT-11, -12, and -13).
- Two samples collected for PLM analysis from inside the park were reported as non-detect for ash particles (i.e., CLX-SL-PGIN-18 and CLX-MLCH-PGIN11). The remaining samples were reported to have an ash content ranging from 1% to 9% (i.e., CLX-SL-PGIN-11, -12, -13, -14, -15, -16, -17, and CLX-MLCH-PGIN-12).

3.4 RADIOLOGICAL PARAMETERS

Samples were submitted to Pace Analytical for laboratory analysis of Radium 226 and Radium 228 via Method DOE Ga-01-R/901.1. The screening criteria obtained for Radium 226is based upon 5 pCi/g over background. As explained in the U.S. EPA Memorandum titled, "*Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites*" (February 1998), the risk of Radium 226 and Radium 228 is additive. As such, the screening criteria for Radium 226 (i.e., 5 pCi/g) is used to compare against Radium 226 and Radium 228 results and the Combined Radium background results can be considered background for the purposes of determining a site-specific Combined Radium screening level. Three (3) pCi/g was previously established as the Combined Radium background threshold value (BTV) in the vicinity of Tennessee Valley Authority's Bull Run Fossil Plant. This results in a screening level of 8 pCi/g for Combined Radium. Radium 226 and Radium 228 results were summed to generate a Combined Radium result as reported by Pace Analytical. All reported Combined Radium results were below the 8 pCi/g screening value.

FIGURES

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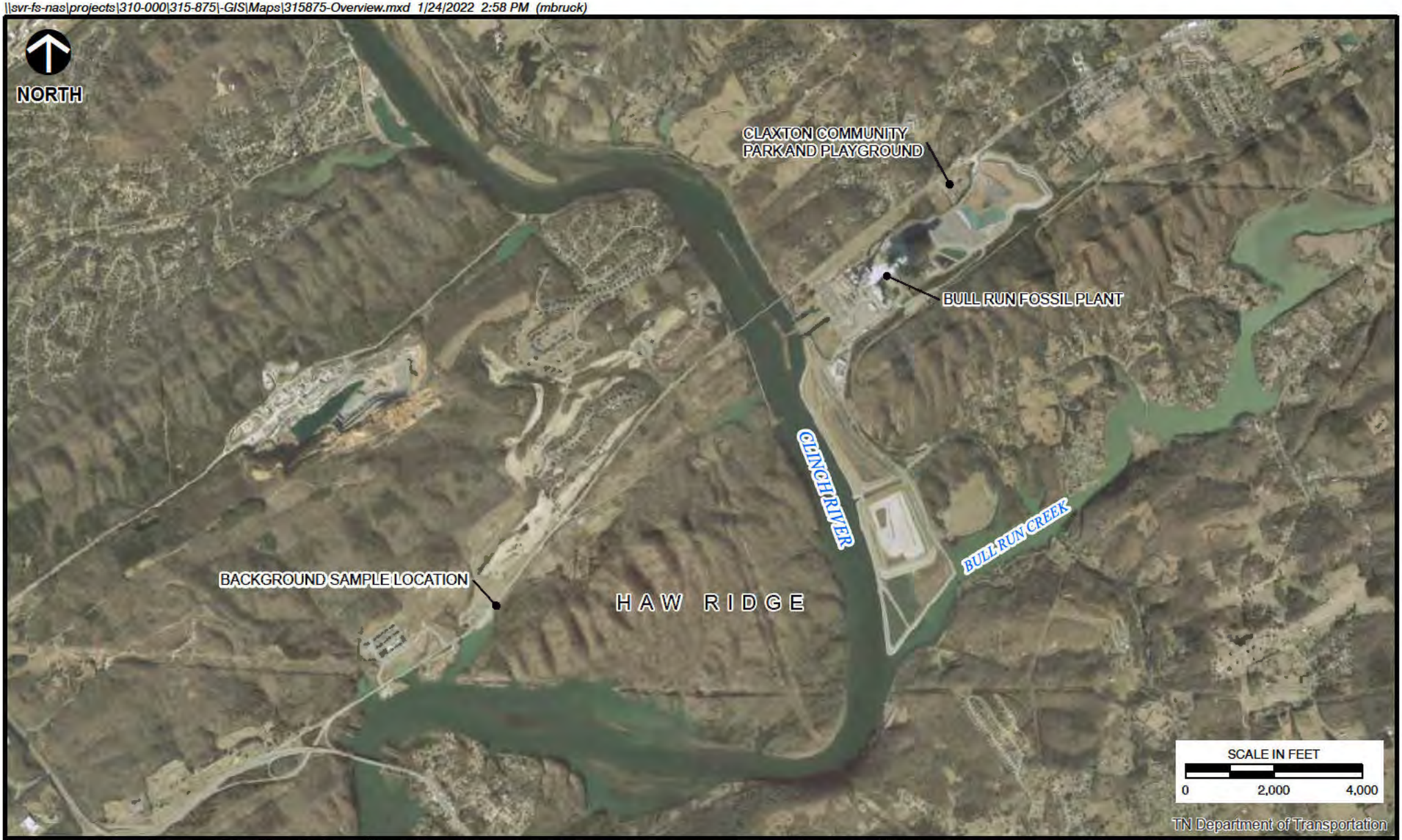

REFERENCE

SOURCE: TN DEPARTMENT OF TRANSPORTATION
MAP SERVICE:
HTTPS://TNMAP.TN.GOV/ARCGIS/SERVICES.
LAST ACCESSED: 1/25/2022

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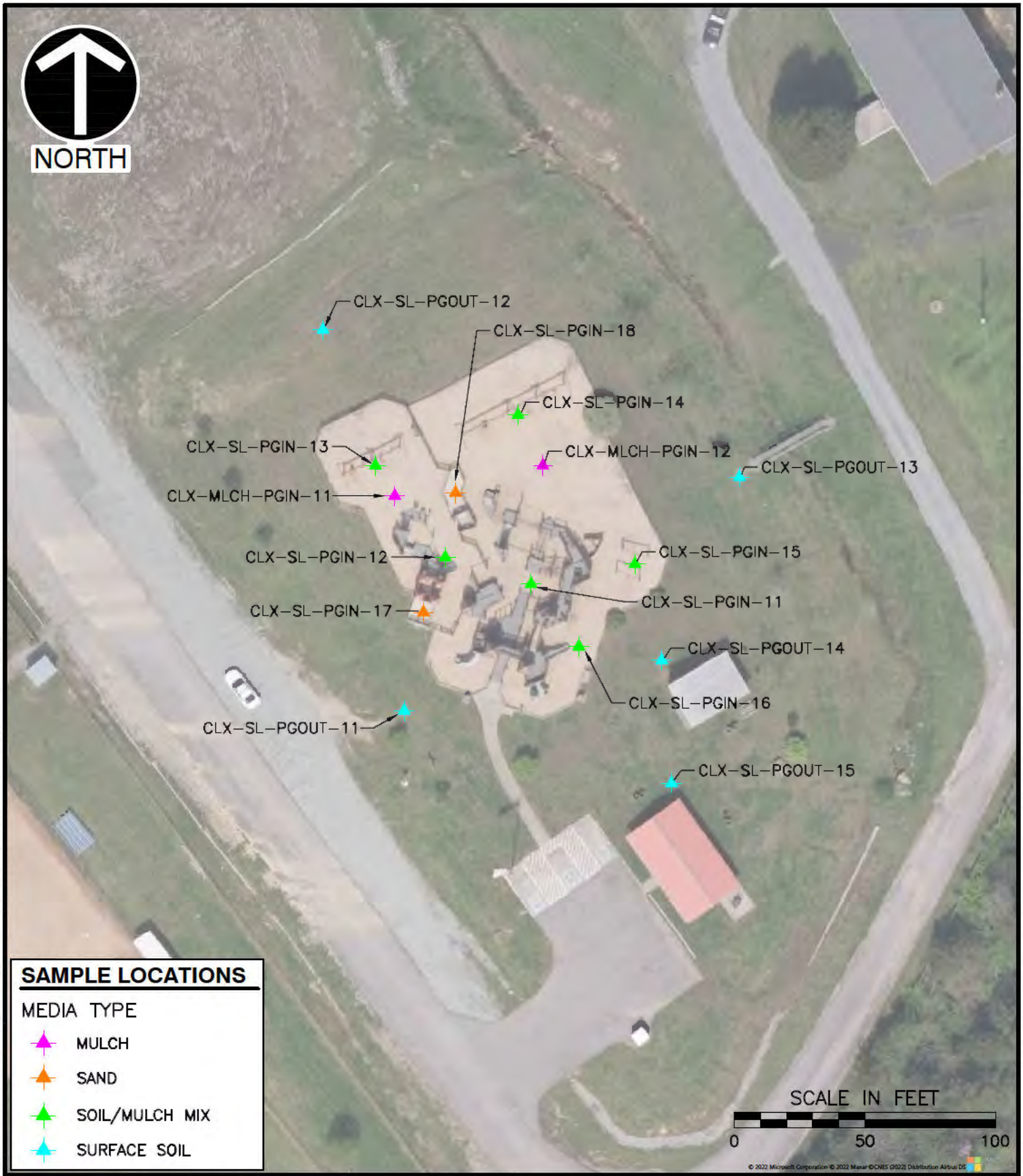
TDEC DIVISION OF REMEDIATION
CLAXTON COMM. PARK AND PLAYGROUND
FIELD SAMPLING SUMMARY REPORT

PROJECT VICINITY MAP

DRAWN BY:	KAM	CHECKED BY:	GAW	APPROVED BY:	* Hand signature on file JMB*	FIGURE NO:	1
DATE:	1/24/2022	SCALE:	1 " = 3,000 '	PROJECT NO:	315-875		



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TDEC DIVISION OF REMEDIATION
CLAXTON COMM. PARK AND PLAYGROUND
FIELD SAMPLING SUMMARY REPORT

MATERIAL SAMPLING LOCATIONS

DRAWN BY:	KAM	CHECKED BY:	GAW	APPROVED BY:	JMB*	FIGURE NO.:	
DATE:	FEBRUARY 24, 2022	DWG SCALE:	1"=50'	PROJECT NO:	315-875	*SIGNATURE ON FILE	2

TABLES

TABLE 3
CLAXTON COMMUNITY PARK AND PLAYGROUND
FIELD SAMPLING ANALYTICAL RESULTS
TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION - DIVISION OF REMEDIATION
CEC PROJECT NUMBER: 315-875

			Screening Criteria		Background Comparison Concentrations		Sample Information																	
Constituent	Analytical Method	Units	EPA RSLs for Residential Soil[1]	ATSDR Soil Ingestion Criteria[2]	Tennessee Background Inorganic Survey - 3rd Quartile (1996)[3]	ETTP Soil Background Values (2003)[4]	ID*	SL-PGOUT-11		SL-PGOUT-12		SL-PGOUT-13		SL-PGOUT-14		SL-PGOUT-15		SL- PGOUT (Duplicate)		SL-PGOUT-16		SL-PGIN-11	
							Date	12/1/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021	
							Media	Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Surface Soil		Soil/Mulch Mix	
							Time	0941		1016		1046		1118		1145		1145		1606		1224	
Inorganics/Wet Chemistry																							
Chloride	EPA300.0	mg/kg	--	--	--	--		< 25.6		< 25.2		< 25		< 25.4		< 25.4		< 25.7		NA		< 45.4	
Fluoride	EPA300.0	mg/kg	310	--	--	--		2 3	J	1 68	J	2.52		1.74	J	2.72		2.43	J	NA		< 4 54	
Sulfate	EPA300.0	mg/kg	--	--	--	--		22.1	J	< 63		< 62.5		21 9	J	27.7	J	35.4	J	NA		< 113	
pH	EPA9045D	su	--	--	--	--		7.71	T8	6 66	T8	7.48	T8	6 88	T8	6.93	T8	6.85		NA		6 31	T8
Total Solids	Method 2540G-2011	%	--	--	--	--		78		79.3		84		80.4		80.4		77.9		NA		44.1	
Metals																							
Antimony	EPA6010	mg/kg	3.1	21	6 2	1.52		< 3.84		0 26	J	0 254	J	< 3.73		< 3.73		< 3.85		NA		< 6.8	
Arsenic	EPA6010	mg/kg	0.68	16	10	14 95		5.83		8 99		11.2		5 61		4.57		4 6		NA		4 65	
Barium	EPA6010	mg/kg	1500	10000	144	124.93		102		118		70.9		90 3		115		107		NA		21.1	
Beryllium	EPA6010	mg/kg	16	100	1	2 2		0 806	J	1 01	J	0 918	J	0.711	J	0 853	J	0.803	J	NA		< 5 67	
Boron[#]	EPA6010	mg/kg	1600	10000	50	--		< 64.1		< 63		< 59.5		< 62 2		< 62.2		< 64.2		NA		< 113	
Cadmium	EPA6010	mg/kg	7.1	5 2	1	0.22U		0 212	J	0.287	J	< 1.19		0.225	J	0 253	J	0.27	J	NA		< 2 27	
Calcium**	EPA6010	mg/kg	--	--	4400	2400		31800		2500		19800		2170		3180		2760		NA		2580	
Chromium^	EPA6010	mg/kg	12000	78000	20	44 88		9.69		11.4		14.5		8.12		9.67		9.32		NA		6 08	J
Cobalt	EPA6010	mg/kg	2 3	520	13	42		10.4		10.1		10.8		7.79		9.29		9.18		NA		1 38	J
Copper	EPA6010	mg/kg	310	520	25	22.48		9.62		12.1		10.6		11		11.1		10.1		NA		13 8	
Lead	EPA6010	mg/kg	400	--	45	37 91		13.3		14		11.1		14		14.9		14.7		NA		2 98	J
Lithium	EPA6010	mg/kg	16	--	--	48 94		7.1		8 29		8.59		4 91		6.39		5.91		NA		< 3.4	
Molybdenum[#]	EPA6010	mg/kg	39	260	15	--		0.428	J	0.759	J	0 521	J	0.444	J	0.482	J	0.418	J	NA		0.239	J
Nickel	EPA6010	mg/kg	150	1000	18	26 07		11.6	O1	13.2		12		8 86		11.9		11.2		NA		1 25	J
Selenium	EPA6010	mg/kg	39	260	1 2	1.47		0.452	J	0.994	J	0.68	J	0.488	J	0 522	J	0.477	J	NA		< 5 67	
Silver	EPA6010	mg/kg	39	260	1 2	0 6U		< 0 641		< 0 63		< 0 595		< 0.622		< 0 622		< 0.642		NA		< 1.13	
Thallium	EPA6010	mg/kg	0 078	--	1 9	0.4U		0 582	J	0.509	J	0 301	J	0.202	J	0.157	J	0.108	J	NA		< 4 54	
Vanadium	EPA6010	mg/kg	39	520	31.8	65.47		12.5		16.4		17.7		10 3		12.5		12.1		NA		1 34	J
Zinc	EPA6010	mg/kg	2300	16000	94	89.7		38.1		45.6		30.2		36		45.8		41.7		NA		21 9	J
Mercury	EPA7471A	mg/kg	1.1	--	0.18	0.17		< 0.0513		0 0294	J	0.0548		0 0302	J	0.0384	J	0 0398	J	NA		< 0.0907	
Polarized Light Microscopy																							
Percentage of Coal Ash	SOP OPT.023	Area % CCP	--	--	--	--		1		2		2		ND		ND		ND		ND		1	
Radiological Parameters																							
Radium-228	DOE Ga-01-R/901.1 (21 day)	pCi/g	--	--	--	--		1.55	±0 323	1 51	±0.276	1.53	±0.374	0.958	±0.198	1.03	±0.221	1.31	±0 341	NA		0.480	±0.25
Radium-226	DOE Ga-01-R/901.1 (21 day)	pCi/g	--	--	--	--		1.61	±0 258	1 93	±0.259	1.92	±0.301	1.16	±0.166	1.27	±0.189	1.50	±0 294	NA		0.278	±0.144
Radium-226+228	Combined	pCi/g	8[5]	--	--	--		3.17	±0 582	3.44	±0.535	3.44	±0.675	2.11	±0 364	2.30	±0.41	2.81	±0 635	NA		0.757	±0 394

Notes:

1. EPA Regional Screening Levels (RSL) for Residential Soil (November 2021), TR=1E-06, THQ=0.1.
2. Suggested comparison value, as obtained from Agency for Toxic Substances and Disease Registry Comparison Value Viewer, was selected for screening purposes (version date 7/24/2019). For Antimony and Molybdenum, the Chronic RMEG Child comparison value is presented.
3. Third quartile of background concentrations collected by State of TN and/or EPA in either site inspections or expanded site inspections. These values were determined to be appropriate to evaluate whether concentrations at a site are within what is considered natural background levels by Tennessee Superfund. Source dated 5/13/1996.
4. Soil Background Supplemental Data Set for the East Tennessee Technology Park (ETTP) prepared for the U.S. Department of Energy Office of Environmental Management (September 2003).
5. Screening level obtained for Radium-226+228 is 5 pCi/g above background, averaged over the first 15 cm of soil below the surface. The assumed background threshold value (BTV) of Radium-226+228 near the Project is 3 pCi/g (i e., resulting in a screening criteria of 8 pCi/g). The BTV was calculated as part of Haley Aldrich's memorandum titled, "Risk-Based Closure Approach for Fly Ash Stilling Pond 2C, TVA Bull Run Fossil Plant (BRF)" dated August 21, 2019.

Indicates a reporting limit exceedance of the residential RSL, TR=1E-06, THQ=0.1 criterion, or ATSDR criteria.

Indicates detected concentration exceeds the residential RSL, TR=1E-06, THQ=0.1 criterion, or ATSDR criteria but is below one or both background comparison concentration.

Indicates detected concentration exceeds the residential RSL, TR=1E-06, THQ=0.1 criterion, the ATSDR criteria, and background concentrations from both background data sets.

-- Denotes that no standard is available.

mg/kg - milligrams/kilograms; su - standard units; pCi/g - picocuries/gram

CCP - Coal Combustion Products

ND - No CCP Detected

NA - Not Analyzed

*- Shorthand version of the sample D presented; actual sample IDs include prefix, "CLX-", and suffix, "-12012021".

^- Trivalent chromium screening criteria presented for the EPA RSL.

**- Calcium is an essential nutrient and toxicity based screening criteria are not available.

[#] - Presented background criteria derived from TDEC's 2001 Report titled, "Hazardous Trace Elements in Tennessee Soils and Other Regolith." Boron screening level based upon a sample collected in Anderson County, Tennessee. Molybdenum screening level based upon the concentration range in Tennessee per the U.S. Geological Survey.

Qualifier Definitions

O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

T8: Sample(s) received past/too close to holding time expiration.

U: Not-Detected at the laboratory reporting limit. Non-detects for non-radiological parameters reported with "<" signifier

J: The identification of the analyte is acceptable; the reported value is an estimate

TABLE 3
CLAXTON COMMUNITY PARK AND PLAYGROUND
FIELD SAMPLING ANALYTICAL RESULTS
TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION - DIVISION OF REMEDIATION
CEC PROJECT NUMBER: 315-875

			Screening Criteria		Background Comparison Concentrations		Sample Information																			
Constituent	Analytical Method	Units	EPA RSLs for Residential Soil[1]	ATSDR Soil Ingestion Criteria[2]	Tennessee Background Inorganic Survey - 3rd Quartile (1996)[3]	ETTP Soil Background Values (2003)[4]	ID* / Date / Media / Time	SL-PGIN-12 12/1/2021 Soil/Mulch Mix 1242		SL-PGIN-13 12/1/2021 Soil/Mulch Mix 1301		SL-PGIN-14 12/1/2021 Soil/Mulch Mix 1334		SL-PGIN-15 12/1/2021 Soil/Mulch Mix 1353		SL-PGIN-16 12/1/2021 Soil/Mulch Mix 1409		SL-PGIN-17 12/1/2021 Sand 1428		SL-PGIN-18 12/1/2021 Sand 1444		MLCH-PGIN-11 12/1/2021 Mulch 1502		MLCH-PGIN-12 12/1/2021 Mulch 1528	
Inorganics/Wet Chemistry																										
Chloride	EPA300.0	mg/kg	--	--	--	--		< 38.7		< 31 8		< 29 3		< 86.5		< 33.4		< 22 3		< 21.2		< 60.3		< 76 5	
Fluoride	EPA300.0	mg/kg	310	--	--	--		< 3.76		< 3.09		1.47	J	< 8 65		< 3 38		< 2.17		< 2.12		< 6 03		< 7.8	
Sulfate	EPA300.0	mg/kg	--	--	--	--		< 96.9		< 79 6		28 5	J	< 216		< 83 5		< 55 8		< 53.1		< 151		< 191	
pH	EPA9045D	su	--	--	--	--		6.96	T8	6.99	T8	7.3	T8	6.45	T8	6.76	T8	7 54	T8	7.06	T8	5 91	T8	6 36	T8
Total Solids	Method 2540G-2011	%	--	--	--	--		53.2		64.7		71		23.1		59 9		94.1		94.2		33.2		26 2	
Metals																										
Antimony	EPA6010	mg/kg	3.1	21	6.2	1.52		< 5.64		< 4.63		0 296	J	< 13		< 5 01		< 3.19		< 3.19		< 9 04		< 11 5	
Arsenic	EPA6010	mg/kg	0.68	16	10	14.95		7.51		28 2		35.60		23.9		19 5		8.7		5.14		1 66	J	2 05	J
Barium	EPA6010	mg/kg	1500	10000	144	124 93		13.1		34 6		62 9		60		32.1		1 88	J	1.72	J	33.1		84.7	
Beryllium	EPA6010	mg/kg	16	100	1	2.2		< 4.7		< 3.86		0.404	J	< 10.8		< 4.18		< 2 66		< 2.65		< 7 53		< 9 56	
Boron[#]	EPA6010	mg/kg	1600	10000	50	--		< 94		< 77 2		< 70.4		< 216		< 83 5		< 53.1		< 53.1		< 151		< 191	
Cadmium	EPA6010	mg/kg	7.1	5.2	1	0.22U		< 1.88		0.173	J	0.152	J	< 4 32		0.16	J	< 1 06		< 1.06		< 3 01		0.529	J
Calcium**	EPA6010	mg/kg	--	--	4400	2400		1300		3950		14000		6070		62300		< 531		< 531		3750		10200	
Chromium^	EPA6010	mg/kg	12000	78000	20	44.88		5.16	J	12.4		14 2		21.6		16 8		4 36	J	2.55	J	3 28	J	1.79	J
Cobalt	EPA6010	mg/kg	2.3	520	13	42		1.17	J	2.53		3.32		5.4		2 83		0.6	J	0.421	J	0.907	J	2.7	J
Copper	EPA6010	mg/kg	310	520	25	22.48		10.7		20.4		16.7		44.9		25 8		3 66	J	2.87	J	11.8	J	19 6	
Lead	EPA6010	mg/kg	400	--	45	37.91		2.4	J	4.41		5.35		8 02	J	5 59		1 29	J	1.35	J	3 96	J	9 83	
Lithium	EPA6010	mg/kg	16	--	--	48.94		< 2.82		1.13	J	3.35		< 6.49		2.7		0 25	J	< 1.59		< 4 52		< 5.73	
Molybdenum[#]	EPA6010	mg/kg	39	260	15	--		< 4.7		0.26	J	0 505	J	0.514	J	0.262	J	< 2 66		< 2.65		< 7 53		< 9 56	
Nickel	EPA6010	mg/kg	150	1000	18	26.07		1.01	J	1.99	J	4.18		3.43	J	2 38	J	0.854	J	0.412	J	1 66	J	2 97	J
Selenium	EPA6010	mg/kg	39	260	1.2	1.47		< 4.7		0 334	J	0 825	J	< 10.8		< 4.18		< 2 66		< 2.65		< 7 53		< 9 56	
Silver	EPA6010	mg/kg	39	260	1.2	0.6U		< 0.94		< 0.772		< 0.704		< 2.16		< 0.835		< 0.531		< 0.531		< 1 51		< 1 91	
Thallium	EPA6010	mg/kg	0 078	--	1.9	0.4U		< 3.76		< 3.09		0 211	J	< 8 65		< 3 34		< 2.13		< 2.12		< 6 03		< 7 65	
Vanadium	EPA6010	mg/kg	39	520	31 8	65.47		0 994	J	3.21	J	8.12		3.12	J	4 07	J	0.658	J	0 574	J	1.6	J	3 26	J
Zinc	EPA6010	mg/kg	2300	16000	94	89.7		13.9	J	56.1		48 2		79.2	J	49 2		3 52	J	4.53	J	26.1	J	54 6	J
Mercury	EPA7471A	mg/kg	1.1	--	0.18	0.17		< 0.0752		< 0.0618		0.0448	J	< 0.173		0 0339	J	< 0 0425		< 0.0425		< 0.121		< 0.153	
Polarized Light Microscopy																										
Percentage of Coal Ash	SOP OPT.023	Area % CCP	--	--	--	--		2		6		9		2		1		2		ND		ND		1	
Radiological Parameters																										
Radium-228	DOE Ga-01-R/901.1 (21 day)	pCi/g	--	--	--	--		1.50	±0.429	0 228	±0.179 J	2.33	±0 557	0.225	±0.496 U	0 0835	±0.405 U	0.247	±0.107	0.194	±0.103 J	0.176	±0.456 U	-0 0425	±0.453 U
Radium-226	DOE Ga-01-R/901.1 (21 day)	pCi/g	--	--	--	--		1.86	±0.339	0.0366	±0.114 U	3.65	±0.472	0.420	±0 284 J	0.530	±0 258	0.280	±0 0879	0.121	±0 0664	0.103	±0.258 U	0.212	±0.316 U
Radium-226+228	Combined	pCi/g	8[5]	--	--	--		3.36	±0.767	0 265	±0 294 U	5.97	±1.03	0.645	±0.78 U	0.613	±0.662 U	0.528	±0.195	0 315	±0.169	0.279	±0.714 U	0.212	±0.769 U

Notes:

1. EPA Regional Screening Levels (RSL) for Residential Soil (November 2021), TR=1E-06, THQ=0.1.
2. Suggested comparison value, as obtained from Agency for Toxic Substances and Disease Registry Comparison Value Viewer, was selected for screening purposes (version date 7/24/2019). For Antimony and Molybdenum, the Chronic RMEG Child comparison value is presented.
3. Third quartile of background concentrations collected by State of TN and/or EPA in either site inspections or expanded site inspections. These values were determined to be appropriate to evaluate whether concentrations at a site are within what is considered natural background levels by Tennessee Superfund. Source dated 5/13/1996.
4. Soil Background Supplemental Data Set for the East Tennessee Technology Park (ETTP) prepared for the U.S. Department of Energy Office of Environmental Management (September 2003).
5. Screening level obtained for Radium-226+228 is 5 pCi/g above background, averaged over the first 15 cm of soil below the surface. The assumed background threshold value (BTV) of Radium-226+228 near the Project is 3 pCi/g (i.e., resulting in a screening criteria of 8 pCi/g). The BTV was calculated as part of Haley Aldrich's memorandum titled, "Risk-Based Closure Approach for Fly Ash Stilling Pond 2C, TVA Bull Run Fossil Plant (BRF)" dated August 21, 2019.

Indicates a reporting limit exceedance of the residential RSL, TR=1E-06, THQ=0.1 criterion, or ATSDR criteria.

Indicates detected concentration exceeds the residential RSL, TR=1E-06, THQ=0.1 criterion, or ATSDR criteria but is below one or both background comparison concentration.

Indicates detected concentration exceeds the residential RSL, TR=1E-06, THQ=0.1 criterion, the ATSDR criteria, and background concentrations from both background data sets.

-- Denotes that no standard is available.

mg/kg - milligrams/kilograms; su - standard units; pCi/g - picocuries/gram

CCP - Coal Combustion Products

ND - No CCP Detected

NA - Not Analyzed

*- Shorthand version of the sample D presented; actual sample IDs include prefix, "CLX-", and suffix, "-12012021".

^- Trivalent chromium screening criteria presented for the EPA RSL.

**- Calcium is an essential nutrient and toxicity based screening criteria are not available.

[#] - Presented background criteria derived from TDEC's 2001 Report titled, "Hazardous Trace Elements in Tennessee Soils and Other Regolith." Boron screening level based upon a sample collected in Anderson County, Tennessee. Molybdenum screening level based upon the concentration range in Tennessee per the U.S. Geological Survey.

Qualifier Definitions

O1: The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

T8: Sample(s) received past/too close to holding time expiration.

U: Not-Detected at the laboratory reporting limit. Non-detects for non-radiological parameters reported with "<" signifier

J: The identification of the analyte is acceptable; the reported value is an estimate

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

CLAXTON COMMUNITY PARK AND PLAYGROUND – FIELD SAMPLING PHOTO LOG
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
2704 Cherokee Farm Way, Suite 101
Knoxville, Tennessee 37920
P: (865) 977-9997 F: (865) 977-9919

DATE: 12/01/2021

REPORT NO: 001

PHOTOGRAPHIC LOG:

Photo 1: Surface soil sample collection at CLX-SL-PGOUT-11, in progress (Photo Orientation: Southeast)

Photo 2: Surface soil sample (CLX-SL-PGOUT-13) location near the footbridge following the collection of each aliquot (Photo Orientation: Northeast)

CLAXTON COMMUNITY PARK AND PLAYGROUND - FIELD SAMPLING PHOTO LOG

DATE: 12/01/2021

REPORT NO: 001

Photo 3: High traffic area, beneath the swing set located within the playground area in the northwest corner, where a soil/mulch mix was observed and the geotextile fabric was compromised (CLX-SL-PGIN-13)

Photo 4: High traffic area, beneath the swing set located within the playground area in the northeast corner, where a soil/mulch mix was observed and the geotextile fabric was compromised (CLX-SL-PGIN-14)

CLAXTON COMMUNITY PARK AND PLAYGROUND - FIELD SAMPLING PHOTO LOG

Photo 4: High traffic area, beneath the monkey bars within the playground area in the southeast corner, where a soil/mulch mix was observed (CLX-SL-PGIN-15)

Photo 5: Sandbox sampling location (CLX-SL-PGIN-17)

Photo 6: Low traffic area where mulch was collected (CLX-MLCH-PGIN-12) (Photo Orientation: North)

Photo 7: Sample material processing area beneath the covered pavilion

APPENDIX B

SPLIT SAMPLING LOGS

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1224

TDEC Split Sample ID: CLX-SL-PG IN-11-120121

TVA Paired Sample ID: CLX-SL-PG IN-1-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026277° N, -84.149178° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. High traffic area in the center of the playground.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Liner was encountered at 2 aliquot locations. At one of the locations, the liner was 2" below grade, and at 3" below grade at the other.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1242

TDEC Split Sample ID: CLX-SL-PG IN-12-120121

TVA Paired Sample ID: CLX-SL-PG IN-2-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026307° N, -84.149288° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Northeast corner near swings.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1301

TDEC Split Sample ID: CLX-SL-PG IN-13-120121

TVA Paired Sample ID: CLX-SL-PG IN-3-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026405° N, -84.149376° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Northwest corner beneath swings.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Two aliquots encountered liner at 2" below grade. One aliquot was collected beneath liner fabric and included densely packed sandy material.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1334

TDEC Split Sample ID: CLX-SL-PG IN-14-120121

TVA Paired Sample ID: CLX-SL-PG IN-4-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026455° N, -84.149190° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other:

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Northeast corner beneath swings.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other:

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description:

Notes:
Three aliquots encountered bottom layer of liner at 1-2". Two aliquots were beneath liner material and included dense sand and clay.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1353

TDEC Split Sample ID: CLX-SL-PG IN-15-120121

TVA Paired Sample ID: CLX-SL-PG IN-5-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026296° N, -84.149043° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. East side beneath equipment.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1409

TDEC Split Sample ID: CLX-SL-PG IN-16-120121

TVA Paired Sample ID: CLX-SL-PG IN-6-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026210° N, -84.149117° W

Sample Matrix: ☐ Surface Soil from Grass Areas ■ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: ____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Southern end of playground beneath features including slides, metal pole, and tire swing.

Sample Observations: Sample Color: Black, Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: ____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: ____

Notes:
Liner was encountered at 2" below grade at two of the five aliquot locations. Additionally, liner was encountered at 1" below grade in two of the other aliquot locations.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: ____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: ____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: ____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1428

TDEC Split Sample ID: CLX-SL-PG IN-17-120121

TVA Paired Sample ID: CLX-SL-PG IN-7-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026249° N, -84.149317° W

Sample Matrix: ☐ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ■ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Western sandbox.

Sample Observations: Sample Color: Brownish Yellow Foreign Material Present: _____

Soil Classification: Sand Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1444

TDEC Split Sample ID: CLX-SL-PG IN-18-120121

TVA Paired Sample ID: CLX-SL-PG IN-8-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026374° N, -84.149273° W

Sample Matrix: ☐ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ■ Sand

Other:

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Eastern sandbox.

Sample Observations: Sample Color: Brownish Yellow Foreign Material Present:

Soil Classification: Sand Other:

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description:

Notes:
Liner encountered at 3" in all aliquot locations.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1502

TDEC Split Sample ID: CLX-MLCH-PG IN-11-120121

TVA Paired Sample ID: CLX-MLCH-PG IN-1-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026372° N, -84.149352° W

Sample Matrix: ☐ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ■ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Northwest corner near swings.

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Mulch

Soil Classification: N/A Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:
Liner encountered at 3" in one aliquot.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1528

TDEC Split Sample ID: CLX-MLCH-PG IN-12-120121

TVA Paired Sample ID: CLX-MLCH-PG IN-2-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026401° N, -84.149159° W

Sample Matrix: ☐ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ■ Mulch ☐ Sand

Other:

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Inside playground. Northeast corner near swings

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Mulch

Soil Classification: N/A Other:

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description:

Notes:
Liner encountered at 3" in all aliquot locations.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other:

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 0941

TDEC Split Sample ID: CLX-SL-PG OUT-11-120121

TVA Paired Sample ID: CLX-SL-PG OUT-1-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026146° N, -84.149345° W

Sample Matrix: ■ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Grass area outside of playground. West of playground near parking area.

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Organics

Soil Classification: Silty Clay Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1016

TDEC Split Sample ID: CLX-SL-PG OUT-12-120121

TVA Paired Sample ID: CLX-SL-PG OUT-2-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026548° N, -84.149440° W

Sample Matrix: ■ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Grass area outside of playground. North of playground.

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Organics

Soil Classification: Silty Clay Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1046

TDEC Split Sample ID: CLX-SL-PG OUT-13-120121

TVA Paired Sample ID: CLX-SL-PG OUT-3-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026385° N, -84.148906° W

Sample Matrix: ■ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Grass area outside of playground. East of playground near foot bridge.

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Organics

Soil Classification: Silty Clay Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:
CEC collected additional soil and re-homogenized in order to satisfy the total volume for split sampling.

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1118

TDEC Split Sample ID: CLX-SL-PG OUT-14-120121

TVA Paired Sample ID: CLX-SL-PG OUT-4-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026194° N, -84.149011° W

Sample Matrix: ■ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Grass area outside of playground. Southeast of playground near shelter .

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Organics

Soil Classification: Silty Clay Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1145

TDEC Split Sample ID: CLX-SL-PG OUT-15-120121

TVA Paired Sample ID: CLX-SL-PG OUT-5-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.026065° N, -84.149001° W

Sample Matrix: ■ Surface Soil from Grass Areas □ Playground Soil or Soil/Mulch □ Mulch □ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** □ Grab □ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Grass area outside of playground. South of playground near picnic area .

Sample Observations: Sample Color: Dark Brown Foreign Material Present: Organics

Soil Classification: Silty Clay Other: _____

Soil Sample: Moisture Content: □ Dry ■ Moist □ Wet Description: _____

Notes:
Duplicate sample collected from this location and named, "CLX-SL-PG OUT-120121"

Analyses Requested (see COC): ■ Total Metals (SW-846 6020A) ■ Mercury (SW-846 7471B)

■ Chloride, Fluoride, Sulfate (EPA 300.0) ■ pH (EPA 9045D) ■ Percent Moisture (ASTM D2974-87)

■ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): P889402 (Pace); RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx □ Hand Deliver □ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

SPLIT SAMPLING FIELD DATA SHEET

Site: Claxton Playground **Date:** 12/1/2021 **Sample Time:** 1606

TDEC Split Sample ID: CLX-SL-PG OUT-16-120121

TVA Paired Sample ID: CLX-SL-PG OUT-6-120121 **Sample Interval:** 0-3"

Split Accepted By: TVA **Split Accepted From:** Garrett Welch

Sample GPS Coordinates: 36.000772° N, -84.184459° W

Sample Matrix: ■ Surface Soil from Grass Areas ☐ Playground Soil or Soil/Mulch ☐ Mulch ☐ Sand

Other: _____

Sampling Method: 5 Point Composite of Surface Material **Sample Type:** ☐ Grab ☐ Bulk ■ Composite

Sampling Equipment Used: Stainless Steel Hand Trowel

Sample Location Description: Haw Ridge park off of green way trail.

Sample Observations: Sample Color: Light Brown Foreign Material Present: None

Soil Classification: Clay Other: _____

Soil Sample: Moisture Content: ☐ Dry ■ Moist ☐ Wet Description: _____

Notes:

Analyses Requested (see COC): ☐ Total Metals (SW-846 6020A) ☐ Mercury (SW-846 7471B)

☐ Chloride, Fluoride, Sulfate (EPA 300.0) ☐ pH (EPA 9045D) ☐ Percent Moisture (ASTM D2974-87)

☐ Radiological Parameters (EPA 901.1) ■ Percent Ash (PLM; RJ Lee SOP OPT23.02)

Chain of Custody Number(s): RJ Lee Group Provided COC (no number provided)

Shipment Via: ■ FedEx ☐ Hand Deliver ☐ Other: _____

Split Sampling Field Data Sheet Completion (Sampler Signature/Date):

Signature: _____ **Date:** 12/3/21

Split Sampling Field Data Sheet QC Review Completion (Indep. QC Reviewer Signature/Date):

Signature: _____ **Date:** 12/3/21

APPENDIX C

LABORATORY ANALYTICAL REPORTS

LEVEL III & IV DATA PROVIDED ELECTRONICALLY

ANALYTICAL REPORT

January 31, 2022

Revised Report

CEC, Inc. - Knoxville, TN

Sample Delivery Group:	L1437633
Samples Received:	12/03/2021
Project Number:	315-875
Description:	Claxton Project
Site:	CLAXTON PLAYGROUND
Report To:	Garrett Welch
	2704 Cherokee Farm Way
	Suite 101
	Knoxville, TN 37920

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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SAMPLE SUMMARY

CLX-SL-PGOUT-11-120121 L1437633-01 Solid

Collected by: GW | Collected date/time: 12/01/21 09:41 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 01:29	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 14:40	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784388	1	12/05/21 10:55	12/05/21 16:27	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:19	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19:11	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:14	JDG	Mt. Ju iet, TN

CLX-SL-PGOUT-12-120121 L1437633-02 Solid

Collected by: GW | Collected date/time: 12/01/21 10:16 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 01:45	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 15:16	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:25	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19:29	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:30	JDG	Mt. Ju iet, TN

CLX-SL-PGOUT-13-120121 L1437633-03 Solid

Collected by: GW | Collected date/time: 12/01/21 10:46 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.05	12/16/21 20 55	12/17/21 03:24	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1.01	12/23/21 10 06	12/23/21 15:35	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:31	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19:32	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:34	JDG	Mt. Ju iet, TN

CLX-SL-PGOUT-14-120121 L1437633-04 Solid

Collected by: GW | Collected date/time: 12/01/21 11:18 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.02	12/16/21 20 55	12/17/21 03:40	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 15:53	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:33	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19:36	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:37	JDG	Mt. Ju iet, TN

CLX-SL-PGOUT-15-120121 L1437633-05 Solid

Collected by: GW | Collected date/time: 12/01/21 11:45 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.02	12/16/21 20 55	12/17/21 03:57	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 16:12	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN

SAMPLE SUMMARY

CLX-SL-PGOUT-15-120121 L1437633-05 Solid

Collected by: GW | Collected date/time: 12/01/21 11:45 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:35	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19:48	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:50	JDG	Mt. Ju iet, TN

CLX-SL-PGOUT-120121 L1437633-06 Solid

Collected by: GW | Collected date/time: 12/01/21 00:00 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784088	1	12/04/21 21:26	12/04/21 21:35	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 04:13	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 16:31	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:37	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19 51	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:53	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-11-120121 L1437633-07 Solid

Collected by: GW | Collected date/time: 12/01/21 12:24 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 04:30	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 16:49	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:38	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19 55	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:57	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-12-120121 L1437633-08 Solid

Collected by: GW | Collected date/time: 12/01/21 12:42 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.03	12/16/21 20 55	12/17/21 04:46	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 17 08	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:40	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 19 58	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21 00	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-13-120121 L1437633-09 Solid

Collected by: GW | Collected date/time: 12/01/21 13:01 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.03	12/16/21 20 55	12/17/21 05:02	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/23/21 17:26	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:42	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:02	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21 03	JDG	Mt. Ju iet, TN

SAMPLE SUMMARY

CLX-SL-PGIN-14-120121 L1437633-10 Solid

Collected by	Collected date/time	Received date/time
GW	12/01/21 13:34	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1 04	12/16/21 20 55	12/17/21 05:35	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1.01	12/23/21 10 06	12/27/21 13:16	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:44	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:05	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21 07	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-15-120121 L1437633-11 Solid

Collected by	Collected date/time	Received date/time
GW	12/01/21 13:53	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 06:25	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/27/21 13 53	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784925	1	12/06/21 14:26	12/08/21 09:46	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:09	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:10	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-16-120121 L1437633-12 Solid

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:09	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784096	1	12/07/21 08:34	12/07/21 09:12	KDW	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 06:41	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1.01	12/23/21 10 06	12/27/21 14:11	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784918	1	12/06/21 14:29	12/08/21 10:51	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:13	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:13	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-17-120121 L1437633-13 Solid

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:28	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784097	1	12/06/21 15:22	12/06/21 15:28	CMK	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1.05	12/16/21 20 55	12/17/21 06:57	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1.02	12/23/21 10 06	12/27/21 14:30	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784918	1	12/06/21 14:29	12/08/21 10:53	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:16	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:17	JDG	Mt. Ju iet, TN

CLX-SL-PGIN-18-120121 L1437633-14 Solid

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:44	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784097	1	12/06/21 15:22	12/06/21 15:28	CMK	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 07:14	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/27/21 14:48	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN

SAMPLE SUMMARY

CLX-SL-PGIN-18-120121 L1437633-14 Solid

Collected by: GW | Collected date/time: 12/01/21 14:44 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1784918	1	12/06/21 14:29	12/08/21 10:55	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:20	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:20	JDG	Mt. Ju iet, TN

CLX-MLCH-PGIN-11-120121 L1437633-15 Solid

Collected by: GW | Collected date/time: 12/01/21 15:02 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784097	1	12/06/21 15:22	12/06/21 15:28	CMK	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 07:30	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1	12/23/21 10 06	12/27/21 15:44	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784918	1	12/06/21 14:29	12/08/21 10:57	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:35	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:34	JDG	Mt. Ju iet, TN

CLX-EB-120121 L1437633-16 GW

Collected by: GW | Collected date/time: 12/01/21 14:58 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300 0	WG1791457	1	12/18/21 06 54	12/18/21 06 54	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 4500H+ B-2011	WG1785298	1	12/07/21 11:43	12/07/21 11:43	SCM	Mt. Ju iet, TN
Mercury by Method 7470A	WG1785880	1	12/08/21 13:50	12/10/21 12:44	ABL	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1796573	1	01/03/22 14:42	01/05/22 19:51	JPD	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1796573	1	01/03/22 14:42	01/09/22 21:34	LD	Mt. Ju iet, TN

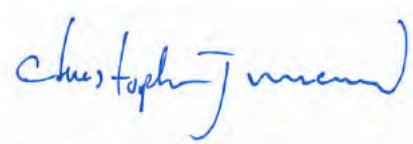
CLX-MLCH-PGIN-12-120121 L1437633-17 Solid

Collected by: GW | Collected date/time: 12/01/21 15:28 | Received date/time: 12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1784097	1	12/06/21 15:22	12/06/21 15:28	CMK	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1790139	1	12/16/21 20 55	12/17/21 07:47	LBR	Mt. Ju iet, TN
Wet Chemistry by Method 300 0	WG1793888	1.02	12/23/21 10 06	12/27/21 16:03	ELN	Mt. Ju iet, TN
Wet Chemistry by Method 9045D	WG1784409	1	12/06/21 11:00	12/06/21 12 00	PSN	Mt. Ju iet, TN
Mercury by Method 7471A	WG1784918	1	12/06/21 14:29	12/08/21 10:59	MRW	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 20:39	JDG	Mt. Ju iet, TN
Metals (ICPMS) by Method 6020	WG1787491	5	12/29/21 12:36	12/30/21 21:37	JDG	Mt. Ju iet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris McCord
Project Manager

Report Revision History

Level II Report - Version 1: 01/11/22 22:54
Level III Report - Version 2: 01/11/22 23:00

Project Narrative

1/19/22: Revised report to report to MDLs.

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	%				
Total Solids	78.0		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Chloride	U		11.8	25.6	1	12/17/2021 01:29	WG1790139
Fluoride	2.30	J	1.10	2.56	1	12/23/2021 14:40	WG1793888
Sulfate	22.1	J	16.5	64.1	1	12/17/2021 01:29	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	su				
pH	7.71	T8	1	12/05/2021 16:27	WG1784388

Sample Narrative:

L1437633-01 WG1784388: 7.71 at 19.3C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Mercury	U		0.0231	0.0513	1	12/08/2021 09:19	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Antimony	U		0.213	3.84	5	12/30/2021 19:11	WG1787491
Arsenic	5.83		0.128	1.28	5	12/30/2021 19:11	WG1787491
Barium	102		0.195	3.20	5	12/30/2021 19:11	WG1787491
Beryllium	0.806	J	0.177	3.20	5	12/30/2021 19:11	WG1787491
Boron	U		8.84	64.1	5	12/30/2021 19:11	WG1787491
Cadmium	0.212	J	0.110	1.28	5	12/30/2021 19:11	WG1787491
Calcium	31800		96.8	641	5	12/30/2021 20:14	WG1787491
Chromium	9.69		0.379	6.41	5	12/30/2021 19:11	WG1787491
Cobalt	10.4		0.0592	1.28	5	12/30/2021 19:11	WG1787491
Copper	9.62		0.169	6.41	5	12/30/2021 19:11	WG1787491
Lead	13.3		0.127	2.56	5	12/30/2021 20:14	WG1787491
Molybdenum	0.428	J	0.129	3.20	5	12/30/2021 19:11	WG1787491
Nickel	11.6	O1	0.252	3.20	5	12/30/2021 19:11	WG1787491
Selenium	0.452	J	0.231	3.20	5	12/30/2021 19:11	WG1787491
Silver	U		0.111	0.641	5	12/30/2021 19:11	WG1787491
Thallium	0.582	J	0.0833	2.56	5	12/30/2021 20:14	WG1787491
Vanadium	12.5		0.240	3.20	5	12/30/2021 19:11	WG1787491
Zinc	38.1		0.948	32.0	5	12/30/2021 19:11	WG1787491
Lithium	7.10		0.261	1.92	5	12/30/2021 19:11	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	79.3		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		11.6	25.2	1	12/17/2021 01:45	WG1790139
Fluoride	1.68	J	1.08	2.52	1	12/23/2021 15:16	WG1793888
Sulfate	U		16.3	63.0	1	12/17/2021 01:45	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.66	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-02 WG1784409: 6.66 at 20C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0294	J	0.0227	0.0504	1	12/08/2021 09:25	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	0.260	J	0.209	3.78	5	12/30/2021 19:29	WG1787491
Arsenic	8.99		0.126	1.26	5	12/30/2021 19:29	WG1787491
Barium	118		0.192	3.15	5	12/30/2021 19:29	WG1787491
Beryllium	1.01	J	0.174	3.15	5	12/30/2021 19:29	WG1787491
Boron	U		8.70	63.0	5	12/30/2021 19:29	WG1787491
Cadmium	0.287	J	0.108	1.26	5	12/30/2021 19:29	WG1787491
Calcium	2500		95.2	630	5	12/30/2021 19:29	WG1787491
Chromium	11.4		0.373	6.30	5	12/30/2021 19:29	WG1787491
Cobalt	10.1		0.0582	1.26	5	12/30/2021 19:29	WG1787491
Copper	12.1		0.166	6.30	5	12/30/2021 19:29	WG1787491
Lead	14.0		0.125	2.52	5	12/30/2021 20:30	WG1787491
Molybdenum	0.759	J	0.127	3.15	5	12/30/2021 19:29	WG1787491
Nickel	13.2		0.248	3.15	5	12/30/2021 19:29	WG1787491
Selenium	0.994	J	0.227	3.15	5	12/30/2021 19:29	WG1787491
Silver	U		0.109	0.630	5	12/30/2021 19:29	WG1787491
Thallium	0.509	J	0.0819	2.52	5	12/30/2021 20:30	WG1787491
Vanadium	16.4		0.236	3.15	5	12/30/2021 19:29	WG1787491
Zinc	45.6		0.933	31.5	5	12/30/2021 19:29	WG1787491
Lithium	8.29		0.257	1.89	5	12/30/2021 19:29	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	%				
Total Solids	84.0		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Chloride	U		11 5	25 0	1.05	12/17/2021 03:24	WG1790139
Fluoride	2.52		1.03	2.41	1.01	12/23/2021 15:35	WG1793888
Sulfate	U		16.1	62 5	1.05	12/17/2021 03:24	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	su				
pH	7.48	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:

L1437633-03 WG1784409: 7.48 at 20C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Mercury	0.0548		0.0214	0.0476	1	12/08/2021 09:31	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Antimony	0.254	J	0.198	3 57	5	12/30/2021 19:32	WG1787491
Arsenic	11 2		0.119	1.19	5	12/30/2021 19:32	WG1787491
Barium	70.9		0.181	2.98	5	12/30/2021 19:32	WG1787491
Beryl ium	0.918	J	0.164	2.98	5	12/30/2021 19:32	WG1787491
Boron	U		8.22	59 5	5	12/30/2021 19:32	WG1787491
Cadmium	U		0.102	1.19	5	12/30/2021 19:32	WG1787491
Calcium	19800		89 9	595	5	12/30/2021 19:32	WG1787491
Chromium	14.5		0.352	5.95	5	12/30/2021 19:32	WG1787491
Cobalt	10.8		0.0550	1.19	5	12/30/2021 19:32	WG1787491
Copper	10.6		0.157	5.95	5	12/30/2021 19:32	WG1787491
Lead	11.1		0.118	2.38	5	12/30/2021 20:34	WG1787491
Molybdenum	0.521	J	0.120	2.98	5	12/30/2021 19:32	WG1787491
Nickel	12.0		0.235	2.98	5	12/30/2021 19:32	WG1787491
Selenium	0.680	J	0.214	2.98	5	12/30/2021 19:32	WG1787491
Silver	U		0.103	0.595	5	12/30/2021 19:32	WG1787491
Thallium	0.301	J	0.0774	2.38	5	12/30/2021 20:34	WG1787491
Vanadium	17 7		0.223	2.98	5	12/30/2021 19:32	WG1787491
Zinc	30 2		0.881	29 8	5	12/30/2021 19:32	WG1787491
Lithium	8.59		0.243	1.79	5	12/30/2021 19:32	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.4		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		11 7	25.4	1.02	12/17/2021 03:40	WG1790139
Fluoride	1.74	J	1.07	2.49	1	12/23/2021 15:53	WG1793888
Sulfate	21.9	J	16.4	63.4	1.02	12/17/2021 03:40	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.88	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:

L1437633-04 WG1784409: 6 88 at 19.8C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0302	J	0.0224	0.0497	1	12/08/2021 09:33	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.206	3 73	5	12/30/2021 19:36	WG1787491
Arsenic	5.61		0.124	1.24	5	12/30/2021 19:36	WG1787491
Barium	90.3		0.189	3.11	5	12/30/2021 19:36	WG1787491
Beryl ium	0.711	J	0.172	3.11	5	12/30/2021 19:36	WG1787491
Boron	U		8.58	62 2	5	12/30/2021 19:36	WG1787491
Cadmium	0.225	J	0.106	1.24	5	12/30/2021 19:36	WG1787491
Calcium	2170		93.9	622	5	12/30/2021 19:36	WG1787491
Chromium	8.12		0.368	6.22	5	12/30/2021 19:36	WG1787491
Cobalt	7.79		0.0574	1.24	5	12/30/2021 19:36	WG1787491
Copper	11 0		0.164	6.22	5	12/30/2021 19:36	WG1787491
Lead	14.0		0.123	2.49	5	12/30/2021 20:37	WG1787491
Molybdenum	0.444	J	0.126	3.11	5	12/30/2021 19:36	WG1787491
Nickel	8.86		0.245	3.11	5	12/30/2021 19:36	WG1787491
Selenium	0.488	J	0.224	3.11	5	12/30/2021 19:36	WG1787491
Silver	U		0.108	0.622	5	12/30/2021 19:36	WG1787491
Thallium	0.202	J	0.0808	2.49	5	12/30/2021 20:37	WG1787491
Vanadium	10.3		0.232	3.11	5	12/30/2021 19:36	WG1787491
Zinc	36.0		0.920	31.1	5	12/30/2021 19:36	WG1787491
Lithium	4 91		0.254	1.86	5	12/30/2021 19:36	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	80.4		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		11.7	25.4	1.02	12/17/2021 03:57	WG1790139
Fluoride	2.72		1.07	2.49	1	12/23/2021 16:12	WG1793888
Sulfate	27.7	J	16.4	63.4	1.02	12/17/2021 03:57	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.93	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:
L1437633-05 WG1784409: 6.93 at 19.7C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0384	J	0.0224	0.0497	1	12/08/2021 09:35	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.206	3.73	5	12/30/2021 19:48	WG1787491
Arsenic	4.57		0.124	1.24	5	12/30/2021 19:48	WG1787491
Barium	115		0.189	3.11	5	12/30/2021 19:48	WG1787491
Beryllium	0.853	J	0.172	3.11	5	12/30/2021 19:48	WG1787491
Boron	U		8.58	62.2	5	12/30/2021 19:48	WG1787491
Cadmium	0.253	J	0.106	1.24	5	12/30/2021 19:48	WG1787491
Calcium	3180		93.9	622	5	12/30/2021 19:48	WG1787491
Chromium	9.67		0.368	6.22	5	12/30/2021 19:48	WG1787491
Cobalt	9.29		0.0575	1.24	5	12/30/2021 19:48	WG1787491
Copper	11.1		0.164	6.22	5	12/30/2021 19:48	WG1787491
Lead	14.9		0.123	2.49	5	12/30/2021 20:50	WG1787491
Molybdenum	0.482	J	0.126	3.11	5	12/30/2021 19:48	WG1787491
Nickel	11.9		0.245	3.11	5	12/30/2021 19:48	WG1787491
Selenium	0.522	J	0.224	3.11	5	12/30/2021 19:48	WG1787491
Silver	U		0.108	0.622	5	12/30/2021 19:48	WG1787491
Thallium	0.157	J	0.0808	2.49	5	12/30/2021 20:50	WG1787491
Vanadium	12.5		0.233	3.11	5	12/30/2021 19:48	WG1787491
Zinc	45.8		0.920	31.1	5	12/30/2021 19:48	WG1787491
Lithium	6.39		0.254	1.87	5	12/30/2021 19:48	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	%				
Total Solids	77.9		1	12/04/2021 21:35	WG1784088

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Chloride	U		11 8	25 7	1	12/17/2021 04:13	WG1790139
Fluoride	2.43	J	1.10	2.57	1	12/23/2021 16:31	WG1793888
Sulfate	35.4	J	16.6	64.2	1	12/17/2021 04:13	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	su				
pH	6.85	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:

L1437633-06 WG1784409: 6.85 at 19.5C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Mercury	0.0398	J	0.0231	0.0514	1	12/08/2021 09:37	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Antimony	U		0.213	3 85	5	12/30/2021 19:51	WG1787491
Arsenic	4 60		0.128	1.28	5	12/30/2021 19:51	WG1787491
Barium	107		0.195	3 21	5	12/30/2021 19:51	WG1787491
Beryl ium	0.803	J	0.177	3 21	5	12/30/2021 19:51	WG1787491
Boron	U		8.86	64.2	5	12/30/2021 19:51	WG1787491
Cadmium	0.270	J	0.110	1.28	5	12/30/2021 19:51	WG1787491
Calcium	2760		97.0	642	5	12/30/2021 19:51	WG1787491
Chromium	9.32		0.380	6.42	5	12/30/2021 19:51	WG1787491
Cobalt	9.18		0.0593	1.28	5	12/30/2021 19:51	WG1787491
Copper	10.1		0.170	6.42	5	12/30/2021 19:51	WG1787491
Lead	14.7		0.127	2.57	5	12/30/2021 20:53	WG1787491
Molybdenum	0.418	J	0.130	3 21	5	12/30/2021 19:51	WG1787491
Nickel	11 2		0.253	3 21	5	12/30/2021 19:51	WG1787491
Selenium	0.477	J	0.231	3 21	5	12/30/2021 19:51	WG1787491
Silver	U		0.111	0.642	5	12/30/2021 19:51	WG1787491
Thallium	0.108	J	0.0835	2.57	5	12/30/2021 20:53	WG1787491
Vanadium	12.1		0.240	3 21	5	12/30/2021 19:51	WG1787491
Zinc	41.7		0.950	32.1	5	12/30/2021 19:51	WG1787491
Lithium	5.91		0.262	1.93	5	12/30/2021 19:51	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	%				
Total Solids	44.1		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Chloride	U		20.9	45.4	1	12/17/2021 04:30	WG1790139
Fluoride	U		1.95	4.54	1	12/23/2021 16:49	WG1793888
Sulfate	U		29.3	113	1	12/17/2021 04:30	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	su				
pH	6.31	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-07 WG1784409: 6.31 at 19.8C

Mercury by Method 7471A

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Mercury	U		0.0408	0.0907	1	12/08/2021 09:38	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry)	Qualifier	MDL (dry)	RDL (dry)	Dilution	Analysis date / time	Batch
	mg/kg		mg/kg	mg/kg			
Antimony	U		0.377	6.80	5	12/30/2021 19:55	WG1787491
Arsenic	4.65		0.227	2.27	5	12/30/2021 19:55	WG1787491
Barium	21.1		0.345	5.67	5	12/30/2021 19:55	WG1787491
Beryllium	U		0.313	5.67	5	12/30/2021 19:55	WG1787491
Boron	U		15.7	113	5	12/30/2021 19:55	WG1787491
Cadmium	U		0.194	2.27	5	12/30/2021 19:55	WG1787491
Calcium	2580		171	1130	5	12/30/2021 19:55	WG1787491
Chromium	6.08	J	0.671	11.3	5	12/30/2021 19:55	WG1787491
Cobalt	1.38	J	0.105	2.27	5	12/30/2021 19:55	WG1787491
Copper	13.8		0.299	11.3	5	12/30/2021 19:55	WG1787491
Lead	2.98	J	0.225	4.54	5	12/30/2021 20:57	WG1787491
Molybdenum	0.239	J	0.229	5.67	5	12/30/2021 19:55	WG1787491
Nickel	1.25	J	0.447	5.67	5	12/30/2021 19:55	WG1787491
Selenium	U		0.408	5.67	5	12/30/2021 19:55	WG1787491
Silver	U		0.196	1.13	5	12/30/2021 19:55	WG1787491
Thallium	U		0.147	4.54	5	12/30/2021 20:57	WG1787491
Vanadium	1.34	J	0.424	5.67	5	12/30/2021 19:55	WG1787491
Zinc	21.9	J	1.68	56.7	5	12/30/2021 19:55	WG1787491
Lithium	U		0.463	3.40	5	12/30/2021 19:55	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	53.2		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		17.8	38.7	1.03	12/17/2021 04:46	WG1790139
Fluoride	U		1.62	3.76	1	12/23/2021 17:08	WG1793888
Sulfate	U		25.0	96.9	1.03	12/17/2021 04:46	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.96	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-08 WG1784409: 6.96 at 19.1C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0339	0.0752	1	12/08/2021 09:40	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.312	5.64	5	12/30/2021 19:58	WG1787491
Arsenic	7.51		0.188	1.88	5	12/30/2021 19:58	WG1787491
Barium	13.1		0.286	4.70	5	12/30/2021 19:58	WG1787491
Beryllium	U		0.260	4.70	5	12/30/2021 19:58	WG1787491
Boron	U		13.0	94.0	5	12/30/2021 19:58	WG1787491
Cadmium	U		0.161	1.88	5	12/30/2021 19:58	WG1787491
Calcium	1300		142	940	5	12/30/2021 19:58	WG1787491
Chromium	5.16	J	0.557	9.40	5	12/30/2021 19:58	WG1787491
Cobalt	1.17	J	0.0869	1.88	5	12/30/2021 19:58	WG1787491
Copper	10.7		0.248	9.40	5	12/30/2021 19:58	WG1787491
Lead	2.40	J	0.186	3.76	5	12/30/2021 21:00	WG1787491
Molybdenum	U		0.190	4.70	5	12/30/2021 19:58	WG1787491
Nickel	1.01	J	0.370	4.70	5	12/30/2021 19:58	WG1787491
Selenium	U		0.339	4.70	5	12/30/2021 19:58	WG1787491
Silver	U		0.163	0.940	5	12/30/2021 19:58	WG1787491
Thallium	U		0.122	3.76	5	12/30/2021 21:00	WG1787491
Vanadium	0.994	J	0.352	4.70	5	12/30/2021 19:58	WG1787491
Zinc	13.9	J	1.39	47.0	5	12/30/2021 19:58	WG1787491
Lithium	U		0.384	2.82	5	12/30/2021 19:58	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	64.7		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		14.6	31.8	1.03	12/17/2021 05:02	WG1790139
Fluoride	U		1.33	3.09	1	12/23/2021 17:26	WG1793888
Sulfate	U		20.5	79.6	1.03	12/17/2021 05:02	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.99	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-09 WG1784409: 6.99 at 19.1C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0278	0.0618	1	12/08/2021 09:42	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.256	4.63	5	12/30/2021 20:02	WG1787491
Arsenic	28.2		0.154	1.54	5	12/30/2021 20:02	WG1787491
Barium	34.6		0.235	3.86	5	12/30/2021 20:02	WG1787491
Beryllium	U		0.213	3.86	5	12/30/2021 20:02	WG1787491
Boron	U		10.7	77.2	5	12/30/2021 20:02	WG1787491
Cadmium	0.173	J	0.132	1.54	5	12/30/2021 20:02	WG1787491
Calcium	3950		117	772	5	12/30/2021 20:02	WG1787491
Chromium	12.4		0.457	7.72	5	12/30/2021 20:02	WG1787491
Cobalt	2.53		0.0714	1.54	5	12/30/2021 20:02	WG1787491
Copper	20.4		0.204	7.72	5	12/30/2021 20:02	WG1787491
Lead	4.41		0.153	3.09	5	12/30/2021 21:03	WG1787491
Molybdenum	0.260	J	0.156	3.86	5	12/30/2021 20:02	WG1787491
Nickel	1.99	J	0.304	3.86	5	12/30/2021 20:02	WG1787491
Selenium	0.334	J	0.278	3.86	5	12/30/2021 20:02	WG1787491
Silver	U		0.134	0.772	5	12/30/2021 20:02	WG1787491
Thallium	U		0.100	3.09	5	12/30/2021 21:03	WG1787491
Vanadium	3.21	J	0.289	3.86	5	12/30/2021 20:02	WG1787491
Zinc	56.1		1.14	38.6	5	12/30/2021 20:02	WG1787491
Lithium	1.13	J	0.315	2.32	5	12/30/2021 20:02	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	71.0		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		13.5	29.3	1.04	12/17/2021 05:35	WG1790139
Fluoride	1.47	J	1.22	2.84	1.01	12/27/2021 13:16	WG1793888
Sulfate	28.5	J	18.9	73.2	1.04	12/17/2021 05:35	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.30	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-10 WG1784409: 7.3 at 19.4C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0448	J	0.0254	0.0563	1	12/08/2021 09:44	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	0.296	J	0.234	4.23	5	12/30/2021 20:05	WG1787491
Arsenic	35.6		0.141	1.41	5	12/30/2021 20:05	WG1787491
Barium	62.9		0.214	3.52	5	12/30/2021 20:05	WG1787491
Beryllium	0.404	J	0.194	3.52	5	12/30/2021 20:05	WG1787491
Boron	U		9.72	70.4	5	12/30/2021 20:05	WG1787491
Cadmium	0.152	J	0.120	1.41	5	12/30/2021 20:05	WG1787491
Calcium	14000		106	704	5	12/30/2021 20:05	WG1787491
Chromium	14.2		0.417	7.04	5	12/30/2021 20:05	WG1787491
Cobalt	3.32		0.0651	1.41	5	12/30/2021 20:05	WG1787491
Copper	16.7		0.186	7.04	5	12/30/2021 20:05	WG1787491
Lead	5.35		0.139	2.82	5	12/30/2021 21:07	WG1787491
Molybdenum	0.505	J	0.142	3.52	5	12/30/2021 20:05	WG1787491
Nickel	4.18		0.277	3.52	5	12/30/2021 20:05	WG1787491
Selenium	0.825	J	0.254	3.52	5	12/30/2021 20:05	WG1787491
Silver	U		0.122	0.704	5	12/30/2021 20:05	WG1787491
Thallium	0.211	J	0.0915	2.82	5	12/30/2021 21:07	WG1787491
Vanadium	8.12		0.263	3.52	5	12/30/2021 20:05	WG1787491
Zinc	48.2		1.04	35.2	5	12/30/2021 20:05	WG1787491
Lithium	3.35		0.287	2.11	5	12/30/2021 20:05	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	23.1		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		39.8	86.5	1	12/17/2021 06:25	WG1790139
Fluoride	U		3.72	8.65	1	12/27/2021 13:53	WG1793888
Sulfate	U		55.8	216	1	12/17/2021 06:25	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.45	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-11 WG1784409: 6.45 at 18.9C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0778	0.173	1	12/08/2021 09:46	WG1784925

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.718	13.0	5	12/30/2021 20:09	WG1787491
Arsenic	23.9		0.432	4.32	5	12/30/2021 20:09	WG1787491
Barium	60.0		0.657	10.8	5	12/30/2021 20:09	WG1787491
Beryllium	U		0.597	10.8	5	12/30/2021 20:09	WG1787491
Boron	U		29.8	216	5	12/30/2021 20:09	WG1787491
Cadmium	U		0.370	4.32	5	12/30/2021 20:09	WG1787491
Calcium	6070		326	2160	5	12/30/2021 20:09	WG1787491
Chromium	21.6		1.28	21.6	5	12/30/2021 20:09	WG1787491
Cobalt	5.40		0.200	4.32	5	12/30/2021 20:09	WG1787491
Copper	44.9		0.571	21.6	5	12/30/2021 20:09	WG1787491
Lead	8.02	J	0.428	8.65	5	12/30/2021 21:10	WG1787491
Molybdenum	0.514	J	0.437	10.8	5	12/30/2021 20:09	WG1787491
Nickel	3.43	J	0.852	10.8	5	12/30/2021 20:09	WG1787491
Selenium	U		0.778	10.8	5	12/30/2021 20:09	WG1787491
Silver	U		0.374	2.16	5	12/30/2021 20:09	WG1787491
Thallium	U		0.281	8.65	5	12/30/2021 21:10	WG1787491
Vanadium	3.12	J	0.808	10.8	5	12/30/2021 20:09	WG1787491
Zinc	79.2	J	3.20	108	5	12/30/2021 20:09	WG1787491
Lithium	U		0.882	6.49	5	12/30/2021 20:09	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	59 9		1	12/07/2021 09:12	WG1784096

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		15.4	33.4	1	12/17/2021 06:41	WG1790139
Fluoride	U		1.45	3 38	1.01	12/27/2021 14:11	WG1793888
Sulfate	U		21.6	83.5	1	12/17/2021 06:41	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.76	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:

L1437633-12 WG1784409: 6.76 at 18.6C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0339	J	0.0301	0.0668	1	12/08/2021 10 51	WG1784918

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.277	5.01	5	12/30/2021 20:13	WG1787491
Arsenic	19.5		0.167	1.67	5	12/30/2021 20:13	WG1787491
Barium	32.1		0.254	4.18	5	12/30/2021 20:13	WG1787491
Beryl ium	U		0.231	4.18	5	12/30/2021 20:13	WG1787491
Boron	U		11 5	83.5	5	12/30/2021 20:13	WG1787491
Cadmium	0.160	J	0.143	1.67	5	12/30/2021 20:13	WG1787491
Calcium	62300		126	835	5	12/30/2021 20:13	WG1787491
Chromium	16.8		0.495	8.35	5	12/30/2021 20:13	WG1787491
Cobalt	2.83		0.0772	1.67	5	12/30/2021 20:13	WG1787491
Copper	25 8		0.221	8.35	5	12/30/2021 20:13	WG1787491
Lead	5.59		0.165	3 34	5	12/30/2021 21:13	WG1787491
Molybdenum	0.262	J	0.169	4.18	5	12/30/2021 20:13	WG1787491
Nickel	2.38	J	0.329	4.18	5	12/30/2021 20:13	WG1787491
Selenium	U		0.301	4.18	5	12/30/2021 20:13	WG1787491
Silver	U		0.145	0.835	5	12/30/2021 20:13	WG1787491
Thallium	U		0.109	3 34	5	12/30/2021 21:13	WG1787491
Vanadium	4 07	J	0.312	4.18	5	12/30/2021 20:13	WG1787491
Zinc	49.2		1.24	41.8	5	12/30/2021 20:13	WG1787491
Lithium	2.70		0.341	2.51	5	12/30/2021 20:13	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.1		1	12/06/2021 15:28	WG1784097

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		10.3	22.3	1.05	12/17/2021 06:57	WG1790139
Fluoride	U		0.932	2.17	1.02	12/27/2021 14:30	WG1793888
Sulfate	U		14.4	55.8	1.05	12/17/2021 06:57	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.54	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-13 WG1784409: 7.54 at 18.7C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0191	0.0425	1	12/08/2021 10:53	WG1784918

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.176	3.19	5	12/30/2021 20:16	WG1787491
Arsenic	8.70		0.106	1.06	5	12/30/2021 20:16	WG1787491
Barium	1.88	J	0.162	2.66	5	12/30/2021 20:16	WG1787491
Beryllium	U		0.147	2.66	5	12/30/2021 20:16	WG1787491
Boron	U		7.33	53.1	5	12/30/2021 20:16	WG1787491
Cadmium	U		0.0909	1.06	5	12/30/2021 20:16	WG1787491
Calcium	U		80.3	531	5	12/30/2021 20:16	WG1787491
Chromium	4.36	J	0.315	5.31	5	12/30/2021 20:16	WG1787491
Cobalt	0.600	J	0.0491	1.06	5	12/30/2021 20:16	WG1787491
Copper	3.66	J	0.140	5.31	5	12/30/2021 20:16	WG1787491
Lead	1.29	J	0.105	2.13	5	12/30/2021 21:17	WG1787491
Molybdenum	U		0.107	2.66	5	12/30/2021 20:16	WG1787491
Nickel	0.854	J	0.209	2.66	5	12/30/2021 20:16	WG1787491
Selenium	U		0.191	2.66	5	12/30/2021 20:16	WG1787491
Silver	U		0.0919	0.531	5	12/30/2021 20:16	WG1787491
Thallium	U		0.0691	2.13	5	12/30/2021 21:17	WG1787491
Vanadium	0.658	J	0.199	2.66	5	12/30/2021 20:16	WG1787491
Zinc	3.52	J	0.787	26.6	5	12/30/2021 20:16	WG1787491
Lithium	0.250	J	0.217	1.59	5	12/30/2021 20:16	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	94.2		1	12/06/2021 15:28	WG1784097

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		9.77	21.2	1	12/17/2021 07:14	WG1790139
Fluoride	U		0.913	2.12	1	12/27/2021 14:48	WG1793888
Sulfate	U		13.7	53.1	1	12/17/2021 07:14	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.06	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:

L1437633-14 WG1784409: 7.06 at 18.6C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0191	0.0425	1	12/08/2021 10 55	WG1784918

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.176	3.19	5	12/30/2021 20:20	WG1787491
Arsenic	5.14		0.106	1.06	5	12/30/2021 20:20	WG1787491
Barium	1.72	J	0.161	2.65	5	12/30/2021 20:20	WG1787491
Beryl ium	U		0.147	2.65	5	12/30/2021 20:20	WG1787491
Boron	U		7.33	53.1	5	12/30/2021 20:20	WG1787491
Cadmium	U		0.0908	1.06	5	12/30/2021 20:20	WG1787491
Calcium	U		80.2	531	5	12/30/2021 20:20	WG1787491
Chromium	2.55	J	0.314	5.31	5	12/30/2021 20:20	WG1787491
Cobalt	0.421	J	0.0491	1.06	5	12/30/2021 20:20	WG1787491
Copper	2.87	J	0.140	5.31	5	12/30/2021 20:20	WG1787491
Lead	1.35	J	0.105	2.12	5	12/30/2021 21:20	WG1787491
Molybdenum	U		0.107	2.65	5	12/30/2021 20:20	WG1787491
Nickel	0.412	J	0.209	2.65	5	12/30/2021 20:20	WG1787491
Selenium	U		0.191	2.65	5	12/30/2021 20:20	WG1787491
Silver	U		0.0919	0.531	5	12/30/2021 20:20	WG1787491
Thallium	U		0.0690	2.12	5	12/30/2021 21:20	WG1787491
Vanadium	0.574	J	0.199	2.65	5	12/30/2021 20:20	WG1787491
Zinc	4 53	J	0.786	26 5	5	12/30/2021 20:20	WG1787491
Lithium	U		0.217	1.59	5	12/30/2021 20:20	WG1787491

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	33.2		1	12/06/2021 15:28	WG1784097

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		27.7	60.3	1	12/17/2021 07:30	WG1790139
Fluoride	U		2.59	6.03	1	12/27/2021 15:44	WG1793888
Sulfate	U		38.9	151	1	12/17/2021 07:30	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	5.91	T8	1	12/06/2021 12 00	WG1784409

Sample Narrative:
L1437633-15 WG1784409: 5.91 at 19.3C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0542	0.121	1	12/08/2021 10 57	WG1784918

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.500	9.04	5	12/30/2021 20:35	WG1787491
Arsenic	1.66	J	0.301	3 01	5	12/30/2021 20:35	WG1787491
Barium	33.1		0.458	7.53	5	12/30/2021 20:35	WG1787491
Beryl ium	U		0.416	7.53	5	12/30/2021 20:35	WG1787491
Boron	U		20.8	151	5	12/30/2021 20:35	WG1787491
Cadmium	U		0.258	3 01	5	12/30/2021 20:35	WG1787491
Calcium	3750		228	1510	5	12/30/2021 20:35	WG1787491
Chromium	3 28	J	0.892	15.1	5	12/30/2021 20:35	WG1787491
Cobalt	0.907	J	0.139	3 01	5	12/30/2021 20:35	WG1787491
Copper	11 8	J	0.398	15.1	5	12/30/2021 20:35	WG1787491
Lead	3 96	J	0.298	6.03	5	12/30/2021 21:34	WG1787491
Molybdenum	U		0.304	7.53	5	12/30/2021 20:35	WG1787491
Nickel	1.66	J	0.594	7.53	5	12/30/2021 20:35	WG1787491
Selenium	U		0.542	7.53	5	12/30/2021 20:35	WG1787491
Silver	U		0.261	1.51	5	12/30/2021 20:35	WG1787491
Thallium	U		0.196	6.03	5	12/30/2021 21:34	WG1787491
Vanadium	1.60	J	0.564	7.53	5	12/30/2021 20:35	WG1787491
Zinc	26.1	J	2.23	75.3	5	12/30/2021 20:35	WG1787491
Lithium	U		0.615	4 52	5	12/30/2021 20:35	WG1787491

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	U		0.379	1.00	1	12/18/2021 06:54	WG1791457
Fluoride	U		0.0640	0.150	1	12/18/2021 06:54	WG1791457
Sulfate	U		0.594	5.00	1	12/18/2021 06:54	WG1791457

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	7.53	T8	1	12/07/2021 11:43	WG1785298

Sample Narrative:
L1437633-16 WG1785298: 7.53 @ 16.49C

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	12/10/2021 12:44	WG1785880

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony	U		0.00103	0.00400	1	01/05/2022 19:51	WG1796573
Arsenic	U		0.000180	0.00200	1	01/05/2022 19:51	WG1796573
Barium	0.000719	J	0.000381	0.00200	1	01/05/2022 19:51	WG1796573
Beryllium	U		0.000190	0.00200	1	01/05/2022 19:51	WG1796573
Boron	0.0141	J	0.00963	0.0300	1	01/09/2022 21:34	WG1796573
Cadmium	U		0.000150	0.00100	1	01/05/2022 19:51	WG1796573
Calcium	U		0.0936	1.00	1	01/05/2022 19:51	WG1796573
Chromium	0.00286		0.00124	0.00200	1	01/05/2022 19:51	WG1796573
Copper	U		0.00151	0.00500	1	01/05/2022 19:51	WG1796573
Cobalt	U		0.0000596	0.00200	1	01/05/2022 19:51	WG1796573
Lead	U		0.000849	0.00200	1	01/05/2022 19:51	WG1796573
Molybdenum	U		0.000348	0.00500	1	01/05/2022 19:51	WG1796573
Nickel	U		0.000816	0.00200	1	01/05/2022 19:51	WG1796573
Selenium	U		0.000300	0.00200	1	01/05/2022 19:51	WG1796573
Silver	U		0.0000700	0.00200	1	01/05/2022 19:51	WG1796573
Thallium	U		0.000121	0.00200	1	01/05/2022 19:51	WG1796573
Vanadium	U		0.000664	0.00500	1	01/05/2022 19:51	WG1796573
Zinc	U		0.00302	0.0250	1	01/05/2022 19:51	WG1796573
Lithium	0.00155	J	0.000695	0.00200	1	01/05/2022 19:51	WG1796573

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	26.2		1	12/06/2021 15:28	WG1784097

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	U		35.2	76.5	1	12/17/2021 07:47	WG1790139
Fluoride	U		3.35	7.80	1.02	12/27/2021 16:03	WG1793888
Sulfate	U		49.3	191	1	12/17/2021 07:47	WG1790139

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.36	T8	1	12/06/2021 12:00	WG1784409

Sample Narrative:

L1437633-17 WG1784409: 6.36 at 18.6C

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.0688	0.153	1	12/08/2021 10:59	WG1784918

Metals (ICPMS) by Method 6020

Analyte	Result (dry) mg/kg	Qualifier	MDL (dry) mg/kg	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Antimony	U		0.635	11.5	5	12/30/2021 20:39	WG1787491
Arsenic	2.05	J	0.382	3.82	5	12/30/2021 20:39	WG1787491
Barium	84.7		0.581	9.56	5	12/30/2021 20:39	WG1787491
Beryllium	U		0.528	9.56	5	12/30/2021 20:39	WG1787491
Boron	U		26.4	191	5	12/30/2021 20:39	WG1787491
Cadmium	0.529	J	0.327	3.82	5	12/30/2021 20:39	WG1787491
Calcium	10200		289	1910	5	12/30/2021 20:39	WG1787491
Chromium	1.79	J	1.13	19.1	5	12/30/2021 20:39	WG1787491
Cobalt	2.70	J	0.177	3.82	5	12/30/2021 20:39	WG1787491
Copper	19.6		0.505	19.1	5	12/30/2021 20:39	WG1787491
Lead	9.83		0.378	7.65	5	12/30/2021 21:37	WG1787491
Molybdenum	U		0.386	9.56	5	12/30/2021 20:39	WG1787491
Nickel	2.97	J	0.753	9.56	5	12/30/2021 20:39	WG1787491
Selenium	U		0.688	9.56	5	12/30/2021 20:39	WG1787491
Silver	U		0.331	1.91	5	12/30/2021 20:39	WG1787491
Thallium	U		0.249	7.65	5	12/30/2021 21:37	WG1787491
Vanadium	3.26	J	0.715	9.56	5	12/30/2021 20:39	WG1787491
Zinc	54.6	J	2.83	95.6	5	12/30/2021 20:39	WG1787491
Lithium	U		0.780	5.73	5	12/30/2021 20:39	WG1787491

Method Blank (MB)

(MB) R3737697-1 12/04/21 21:35

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1437633-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-03 12/04/21 21:35 • (DUP) R3737697-3 12/04/21 21:35

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	84.0	86.3	1	2.78		10

Laboratory Control Sample (LCS)

(LCS) R3737697-2 12/04/21 21:35

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3738235-1 12/07/21 09:12

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00200			

L1437622-21 Original Sample (OS) • Duplicate (DUP)

(OS) L1437622-21 12/07/21 09:12 • (DUP) R3738235-3 12/07/21 09:12

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	77.6	78.0	1	0.504		10

Laboratory Control Sample (LCS)

(LCS) R3738235-2 12/07/21 09:12

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	99.9	85.0-115	

Method Blank (MB)

(MB) R3737757-1 12/06/21 15:28

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1437637-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1437637-02 12/06/21 15:28 • (DUP) R3737757-3 12/06/21 15:28

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	78.8	79.8	1	1.32		10

Laboratory Control Sample (LCS)

(LCS) R3737757-2 12/06/21 15:28

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85 0-115	

Method Blank (MB)

(MB) R3743303-7 12/16/21 23:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		9.20	20.0
Sulfate	U		12.9	50.0

L1437633-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-02 12/17/21 01:45 • (DUP) R3743303-3 12/17/21 02:02

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	U	U	1.01	0.000		20
Sulfate	U	U	1.01	0.000		20

L1437633-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-09 12/17/21 05:02 • (DUP) R3743303-6 12/17/21 05:19

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	U	U	1	0.000		20
Sulfate	U	U	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3743303-2 12/17/21 00:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	200	194	97.2	90.0-110	
Sulfate	200	187	93.6	90.0-110	

L1437633-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-02 12/17/21 01:45 • (MS) R3743303-4 12/17/21 02:18 • (MSD) R3743303-5 12/17/21 03:08

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	630	U	542	589	85 9	93.5	1	80.0-120			8.47	20
Sulfate	630	U	541	588	85 8	93.3	1	80.0-120			8.35	20

Method Blank (MB)

(MB) R3744398-1 12/23/21 11:58

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Fluoride	U		0.860	2.00

L1437633-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-01 12/23/21 14:40 • (DUP) R3744398-3 12/23/21 14:58

Analyte	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Fluoride	2.30	2.31	1.01	0.271	J	20

L1437633-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-10 12/27/21 13:16 • (DUP) R3744398-7 12/27/21 13:34

Analyte	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Fluoride	1.47	1.45	1.01	0.981	J	20

Laboratory Control Sample (LCS)

(LCS) R3744398-2 12/23/21 12:15

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Fluoride	20.0	18.4	92.1	90.0-110	

L1437633-14 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-14 12/27/21 14:48 • (MS) R3744398-8 12/27/21 15:07 • (MSD) R3744398-9 12/27/21 15:26

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Fluoride	53.1	U	50.2	51.8	94.5	97.5	1	80.0-120			3.17	20

Method Blank (MB)

(MB) R3742690-1 12/17/21 23:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.379	1.00
Fluoride	U		0.0640	0.150
Sulfate	U		0.594	5.00

L1434473-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1434473-02 12/18/21 01:35 • (DUP) R3742690-3 12/18/21 01:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	6.97	5.31	10	0.000		20
Fluoride	0.733	U	10	0.000		20
Sulfate	496	497	10	0.0985		20

L1437333-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1437333-01 12/19/21 07:26 • (DUP) R3742690-8 12/19/21 07:39

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	5.67	5.63	1	0.674		20
Fluoride	0.537	0.540	1	0.595		20
Sulfate	8.29	8.23	1	0.752		20

Laboratory Control Sample (LCS)

(LCS) R3742690-2 12/17/21 23:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	40.0	99.9	90.0-110	
Fluoride	8.00	8.12	101	90.0-110	
Sulfate	40.0	39.8	99.5	90.0-110	

L1437273-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437273-02 12/18/21 02:26 • (MS) R3742690-4 12/18/21 02:39 • (MSD) R3742690-5 12/18/21 02:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	5.00	0.708	5.36	5.45	93.1	94.9	1	80.0-120			1.64	20
Sulfate	50.0	9.47	61.6	62.9	104	107	1	80.0-120			2.21	20

L1437333-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1437333-01 12/19/21 07:26 • (MS) R3742690-9 12/19/21 07:51

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	5.67	59.1	107	1	80.0-120	
Fluoride	5.00	0.537	5.90	107	1	80.0-120	
Sulfate	50.0	8.29	61.7	107	1	80.0-120	

L1437336-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1437336-02 12/07/21 11:06 • (DUP) R3737940-2 12/07/21 11:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.30	7.51	1	2.84	J3	1

Sample Narrative:
OS: 7.30 @ 15.12C
DUP: 7.51 @ 15.50C

L1437663-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1437663-04 12/07/21 12:05 • (DUP) R3737940-3 12/07/21 12:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.42	9.44	1	0.212		1

Sample Narrative:
OS: 9.42 @ 16 83C
DUP: 9.44 @ 16.95C

Laboratory Control Sample (LCS)

(LCS) R3737940-1 12/07/21 10:25

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.94	99.4	99 0-101	

Sample Narrative:
LCS: 9.94 @ 16.69C

L1436820-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1436820-02 12/05/21 16:27 • (DUP) R3737190-2 12/05/21 16:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.77	7.78	1	0.129		1

Sample Narrative:
OS: 7.77 at 19.8C
DUP: 7.78 at 19.3C

L1436820-16 Original Sample (OS) • Duplicate (DUP)

(OS) L1436820-16 12/05/21 16:27 • (DUP) R3737190-3 12/05/21 16:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	9.24	9.25	1	0.108		1

Sample Narrative:
OS: 9.24 at 18.6C
DUP: 9 25 at 19.9C

Laboratory Control Sample (LCS)

(LCS) R3737190-1 12/05/21 16:27

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.99	99 9	99 0-101	

Sample Narrative:
LCS: 9.99 at 18.5C

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

L1437633-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-05 12/06/21 12:00 • (DUP) R3737392-2 12/06/21 12:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.93	6.94	1	0.144		1

Sample Narrative:
OS: 6.93 at 19.7C
DUP: 6.94 at 19.4C

L1437633-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1437633-11 12/06/21 12:00 • (DUP) R3737392-3 12/06/21 12:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	6.45	6.50	1	0.772		1

Sample Narrative:
OS: 6.45 at 18.9C
DUP: 6.5 at 18.8C

Laboratory Control Sample (LCS)

(LCS) R3737392-1 12/06/21 12:00

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.99	99.9	99.0-101	

Sample Narrative:
LCS: 9.99 at 19.2C

Method Blank (MB)

(MB) R3739179-1 12/09/21 15:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3739179-2 12/09/21 15:18

Analyte	Spike Amount mg/l	LCS Resu t mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00285	95 0	80.0-120	

L1437469-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437469-01 12/09/21 15:20 • (MS) R3739179-3 12/09/21 15:22 • (MSD) R3739179-4 12/09/21 15:24

Analyte	Spike Amount mg/l	Original Resu t mg/l	MS Resu t mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qua ifier	RPD %	RPD Limits %
Mercury	0.00300	U	0.00267	0.00280	89 0	93.2	1	75.0-125			4 65	20

Method Blank (MB)

(MB) R3738368-1 12/08/21 10:10

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3738368-2 12/08/21 10:12

	Spike Amount	LCS Resu t	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Mercury	0.500	0.517	103	80.0-120	

L1437640-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437640-03 12/08/21 10:18 • (MS) R3738368-3 12/08/21 10:20 • (MSD) R3738368-4 12/08/21 10:21

	Spike Amount (dry)	Original Resu t (dry)	MS Resu t (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qua ifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.590	0.0396	0.611	0.634	96 9	101	1	75.0-125			3 81	20

Method Blank (MB)

(MB) R3738333-1 12/08/21 09:15

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Mercury	U		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3738333-2 12/08/21 09:17

Analyte	Spike Amount	LCS Resu t	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Mercury	0.500	0.525	105	80.0-120	

L1437633-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-01 12/08/21 09:19 • (MS) R3738333-3 12/08/21 09:21 • (MSD) R3738333-4 12/08/21 09:23

Analyte	Spike Amount (dry)	Original Resu t (dry)	MS Resu t (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qua ifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.641	U	0.711	0.720	111	112	1	75.0-125			1.29	20

Method Blank (MB)

(MB) R3746552-1 12/30/21 19:04

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Antimony	U		0.166	3 00
Arsenic	U		0.100	1.00
Barium	U		0.152	2.50
Beryl ium	U		0.138	2.50
Boron	U		6.90	50.0
Cadmium	U		0.0855	1.00
Calcium	U		75.5	500
Chromium	U		0.297	5.00
Cobalt	U		0.0463	1.00
Copper	U		0.133	5.00
Molybdenum	U		0.101	2.50
Nickel	U		0.197	2.50
Selenium	U		0.180	2.50
Silver	U		0.0865	0.500
Vanadium	U		0.187	2.50
Zinc	U		0.740	25 0
Lithium	U		0.205	1.50

Method Blank (MB)

(MB) R3746554-1 12/30/21 20:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Lead	U		0.0990	2.00
Thallium	U		0.0650	2.00

Laboratory Control Sample (LCS)

(LCS) R3746552-2 12/30/21 19:07

Analyte	Spike Amount mg/kg	LCS Resu t mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	100	105	105	80.0-120	
Arsenic	100	91.7	91.7	80.0-120	
Barium	100	97.0	97.0	80.0-120	
Beryl ium	100	94.5	94.5	80.0-120	
Boron	100	95 2	95 2	80.0-120	
Cadmium	100	103	103	80.0-120	
Calcium	1000	973	97.3	80.0-120	
Chromium	100	95 2	95 2	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3746552-2 12/30/21 19:07

Analyte	Spike Amount mg/kg	LCS Resu t mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cobalt	100	99 2	99 2	80.0-120	
Copper	100	93.9	93.9	80.0-120	
Molybdenum	100	102	102	80.0-120	
Nickel	100	98 2	98 2	80.0-120	
Selenium	100	99 0	99 0	80.0-120	
Silver	20.0	20.3	101	80.0-120	
Vanadium	100	94.4	94.4	80.0-120	
Zinc	100	96 6	96 6	80.0-120	
Lithium	100	98.4	98.4	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3746554-2 12/30/21 20:10

Analyte	Spike Amount mg/kg	LCS Resu t mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Lead	100	87.4	87.4	80.0-120	
Thallium	100	91.5	91.5	80.0-120	

L1437633-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-01 12/30/21 19:11 • (MS) R3746552-5 12/30/21 19:22 • (MSD) R3746552-6 12/30/21 19:25

Analyte	Spike Amount (dry) mg/kg	Original Resu t (dry) mg/kg	MS Resu t (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qua ifier	RPD %	RPD Limits %
Antimony	128	U	101	110	78.6	85 8	5	75.0-125			8.86	20
Arsenic	128	5.83	115	127	85 0	94.2	5	75.0-125			9.84	20
Barium	128	102	248	228	114	98.4	5	75.0-125			8.19	20
Beryl ium	128	0.806	117	122	90.8	94.6	5	75.0-125			4.11	20
Boron	128	U	116	122	90.2	95 3	5	75.0-125			5.49	20
Cadmium	128	0.212	126	135	98 2	105	5	75.0-125			6.88	20
Calcium	1280	33600	12200	49300	0.000	1230	5	75.0-125	V	J3 V	121	20
Chromium	128	9.69	126	140	90.6	102	5	75.0-125			10.7	20
Cobalt	128	10.4	130	139	93.0	100	5	75.0-125			6.84	20
Copper	128	9.62	128	129	92 0	93.0	5	75.0-125			0.951	20
Molybdenum	128	0.428	118	129	91.9	101	5	75.0-125			8.98	20
Nickel	128	11 6	133	141	94.6	101	5	75.0-125			5.72	20
Selenium	128	0.452	111	131	86 2	102	5	75.0-125			17 0	20
Silver	25 6	U	25 0	26 9	97.4	105	5	75.0-125			7.65	20
Vanadium	128	12.5	128	141	90.2	100	5	75.0-125			9.36	20

L1437633-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-01 12/30/21 19:11 • (MS) R3746552-5 12/30/21 19:22 • (MSD) R3746552-6 12/30/21 19:25

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Zinc	128	38.1	161	170	95.6	103	5	75.0-125			5.92	20
Lithium	128	7.10	128	135	94.7	99.5	5	75.0-125			4.71	20

L1437633-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437633-01 12/30/21 20:14 • (MS) R3746554-4 12/30/21 20:24 • (MSD) R3746554-5 12/30/21 20:27

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	128	13.3	130	137	91.5	96.8	5	75.0-125			5.09	20
Thallium	128	0.582	117	125	90.5	97.5	5	75.0-125			7.40	20

Method Blank (MB)

(MB) R3747815-1 01/05/22 17:16

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.00103	0.00400
Arsenic	U		0.000180	0.00200
Barium	U		0.000381	0.00200
Beryl ium	U		0.000190	0.00200
Cadmium	U		0.000150	0.00100
Calcium	U		0.0936	1.00
Chromium	U		0.00124	0.00200
Copper	U		0.00151	0.00500
Cobalt	U		0.0000596	0.00200
Lead	U		0.000849	0.00200
Molybdenum	U		0.000348	0.00500
Nickel	U		0.000816	0.00200
Selenium	0.000386	J	0.000300	0.00200
Silver	U		0.0000700	0.00200
Thallium	U		0.000121	0.00200
Vanadium	U		0.000664	0.00500
Zinc	U		0.00302	0.0250
Lithium	U		0.000695	0.00200

Method Blank (MB)

(MB) R3748288-1 01/09/22 21:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.00963	0.0300

Laboratory Control Sample (LCS)

(LCS) R3747815-2 01/05/22 17:19

Analyte	Spike Amount mg/l	LCS Resu t mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	0.0500	0.0585	117	80.0-120	
Arsenic	0.0500	0.0468	93.7	80.0-120	
Barium	0.0500	0.0469	93.8	80.0-120	
Beryl ium	0.0500	0.0478	95 7	80.0-120	
Cadmium	0.0500	0.0488	97.6	80.0-120	
Calcium	5.00	4 92	98.4	80.0-120	
Chromium	0.0500	0.0495	99 0	80.0-120	
Copper	0.0500	0.0469	93.9	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3747815-2 01/05/22 17:19

Analyte	Spike Amount mg/l	LCS Resu t mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cobalt	0.0500	0.0488	97.6	80.0-120	
Lead	0.0500	0.0486	97.2	80.0-120	
Molybdenum	0.0500	0.0480	96.1	80.0-120	
Nickel	0.0500	0.0488	97.6	80.0-120	
Selenium	0.0500	0.0531	106	80.0-120	
Silver	0.0500	0.0482	96.4	80.0-120	
Thallium	0.0500	0.0459	91.8	80.0-120	
Vanadium	0.0500	0.0478	95 7	80.0-120	
Zinc	0.500	0.464	92 8	80.0-120	
Lithium	0.0500	0.0459	91.7	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3748288-2 01/09/22 21:17

Analyte	Spike Amount mg/l	LCS Resu t mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Boron	0.500	0.432	86.4	80.0-120	

L1437900-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437900-10 01/05/22 17:23 • (MS) R3747815-4 01/05/22 17:29 • (MSD) R3747815-5 01/05/22 17:33

Analyte	Spike Amount mg/l	Original Resu t mg/l	MS Resu t mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qua ifier	RPD %	RPD Limits %
Antimony	0.0500	U	0.0613	0.0597	123	119	1	75.0-125			2.64	20
Arsenic	0.0500	0.000505	0.0490	0.0493	96 9	97.6	1	75.0-125			0.701	20
Barium	0.0500	0.0261	0.0744	0.0757	96 7	99 2	1	75.0-125			1.65	20
Beryl ium	0.0500	U	0.0475	0.0478	94.9	95 6	1	75.0-125			0.722	20
Cadmium	0.0500	0.000162	0.0491	0.0503	98 0	100	1	75.0-125			2.31	20
Calcium	5.00	174	184	182	199	160	1	75.0-125	V	V	1.06	20
Chromium	0.0500	U	0.0502	0.0496	100	99 2	1	75.0-125			1.29	20
Copper	0.0500	0.00297	0.0482	0.0504	90.5	94.9	1	75.0-125			4.46	20
Cobalt	0.0500	0.00304	0.0514	0.0518	96 7	97.5	1	75.0-125			0.818	20
Lead	0.0500	0.00126	0.0488	0.0487	95 0	94.8	1	75.0-125			0.240	20
Molybdenum	0.0500	U	0.0506	0.0505	101	101	1	75.0-125			0.305	20
Nickel	0.0500	0.00471	0.0537	0.0548	98.1	100	1	75.0-125			2.01	20
Selenium	0.0500	U	0.0498	0.0502	99 5	100	1	75.0-125			0.870	20
Silver	0.0500	0.000137	0.0487	0.0483	97.2	96 3	1	75.0-125			0.973	20
Thallium	0.0500	0.000250	0.0469	0.0469	93.4	93.3	1	75.0-125			0.128	20
Vanadium	0.0500	0.00117	0.0495	0.0512	96 7	100	1	75.0-125			3 34	20

L1437900-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437900-10 01/05/22 17:23 • (MS) R3747815-4 01/05/22 17:29 • (MSD) R3747815-5 01/05/22 17:33

Analyte	Spike Amount mg/l	Original Resu t mg/l	MS Resu t mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qua ifier	RPD %	RPD Limits %
Zinc	0.500	0.00452	0.462	0.471	91.5	93.4	1	75.0-125			1.99	20
Lithium	0.0500		0.105	0.105	89 6	89.1	1	75.0-125			0.214	20

L1437900-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437900-10 01/09/22 21:21 • (MS) R3748288-4 01/09/22 21:27 • (MSD) R3748288-5 01/09/22 21:31

Analyte	Spike Amount mg/l	Original Resu t mg/l	MS Resu t mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qua ifier	RPD %	RPD Limits %
Boron	0.500	0.256	0.715	0.742	91.9	97.3	1	75.0-125			3 68	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Perm t Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Resu ts relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
MDL (dry)	Method Detection Limit.
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have mu tiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest lim t of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a qual ty control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qual fier is provided w thin the Glossary and Definitions page and potentially a discussion of possible implications of the Qual fier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable resu t returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the resu ts column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qual fiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were in tially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The ident fication of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
CEC, Inc. - Knoxville, TN

2704 Cherokee Farm Way
Suite 101
Knoxville. TN 37920

Billing Information:
Attn: Accounts Payable
333 Baldwin Rd.
Pittsburgh, PA 15205

Pres Chk

Report to: Garrett Welch

Email To: gwelch@cecinc.com;kmcnally@cecinc.com;mbr

Project Description: Claxton Project

City/State Collected: Claxton, TN

Please Circle: PT MT CT ET

Phone: 865-977-9997

Client Project # 315-875

Lab Project # CECKTN-CLAXTON

Collected by (print): G.Welch

Site/Facility ID # Claxton Playground

P.O. #

Collected by (signature):

Quote #

Rush? (Lab MUST be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: Standard Turn

Immediately Packed on Ice N ___ Y X

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	RA-226-903.0 1L-HDPE-Add HNO3	RA-226/228COMB 16ozHDPE-NoPres	RA-228 1L-HDPE-Add HNO3	Total Metals 250mlHDPE-HNO3	Total Metals,WetChem 8ozClr-NoPres	WetChem 125mlHDPE-NoPres	Remarks	Sample # (lab only)
CLX-SL-PG OUT-11-120121	Comp	SCM	0-3"	12/1/21	0941	2		X			X			01
CLX-SL-PG OUT-12-120121	Comp	SCM	0-3"	12/1/21	1016	2		X			X			02
CLX-SL-PG OUT-13-120121	Comp	SCM	0-3"	12/1/21	1046	2		X			X			03
CLX-SL-PG OUT-14-120121	Comp	SCM	0-3"	12/1/21	1118	2		X			X			04
CLX-SL-PG OUT-15-120121	Comp	SCM	0-3"	12/1/21	1145	2		X			X			05
CLX-SL-PG OUT-120121	Comp	SCM	0-3"	12/1/21		2		X			X			06
CLX-SL-PG IN-11-120121	Comp	SCM	0-3"	12/1/21	1224	2		X			X			07
CLX-SL-PG IN-12-120121	Comp	SCM	0-3"	12/1/21	1242	2		X			X			08
CLX-SL-PG IN-13-120121	Comp	SCM	0-3"	12/1/21	1301	2		X			X			09
CLX-SL-PG IN-14-120121	Comp	SCM	0-3"	12/1/21	1334	2		X			X			10

12/4/21

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Total Metals = M6020CCR+Ag,Cu,Ni,V,Zn Mercury
WetChem = CHLORIDE-300,FLUORIDE-300,pH,SULFATE-300
Percent Moisture ASTM D2974-87

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
	12/2/21	1030			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 36	If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/3/21 Time: 0900	Hold: / Condition: NCF / OK

Chain of Custody Page 1 of 2

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SDG # L1437633

Table A127

Acctnum: CECKTN

Template: T200058

Prelogin: P889402

PM: 526 - Chris McCord

PB: BF 11/24/21

Shipped Via: FedEX Ground

Company Name/Address:
CEC, Inc. - Knoxville, TN

2704 Cherokee Farm Way
Suite 101
Knoxville. TN 37920

Billing Information:
Attn: Accounts Payable
333 Baldwin Rd.
Pittsburgh, PA 15205

Pres Chk

Report to: Garrett Welch

Email To: gwelch@cecinc.com;kmcnally@cecinc.com;mbr

Project Description: Claxton Project

City/State Collected: Claxton, TN

Please Circle: PT MT CT ET

Phone: 865-977-9997

Client Project # 315-875

Lab Project # CECKTN-CLAXTON

Collected by (print): G Welch

Site/Facility ID # Claxton Playground

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: Standard Turn

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	RA-226-903.0 1L-HDPE-Add HNO3	RA-226/228COMB 16ozHDPE-NoPres	RA-228 1L-HDPE-Add HNO3	Total Metals 250mlHDPE-HNO3	Total Metals,WetChem 8ozClr-NoPres	WetChem 125mlHDPE-NoPres	Remarks	Sample # (lab only)
CLX-SL-PGIN-15-120121	comp	SCM	0-3"	12/1/21	1353	2		X			X			11
CLX-SL-PGIN-16-120121	comp	SCM	0-3"	12/1/21	1409	2		X			X			12
CLX-SL-PGIN-17-120121	comp	SCM	0-3"	12/1/21	1428	2		X			X			13
CLX-SL-PGIN-18-120121	comp	SCM	0-3"	12/1/21	1444	2		X			X			14
CLX-MLCH-PGIN-11-120121	comp	SCM	0-3"	12/1/21	1502	2		X			X			15
CLX-GB-120121	comp	GW		12/1/21	1458	4	X		X	X		X		16
CLX-MLCH-PGIN-12-120121	comp	~~GW~~ SCM	0-3"	12/1/21	1528	2	X	X	X	X	X	X		17
		~~GW~~				4	X		X	X		X		
		~~GW~~				4	X		X	X		X		
		~~GW~~				4	X		X	X		X		

12/1/21

Chain of Custody Page 2 of 2

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SDG # L1437633

Table #

Acctnum: CECKTN

Template: T200058

Prelogin: P889402

PM: 526 - Chris McCord

PB: DF 11/24/21

Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Total Metals = M6020CCR+Ag,Cu,Ni,V,Zn Mercury
WetChem = CHLORIDE-300,FLUORIDE-300,pH,SULFATE-300
Percent Moisture ASTM D2974-87

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR	If preservation required by Login: Date/Time
	12/2/21	1030			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 36	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/3/21 Time: 0900	Hold: / Condition: NCF / OK

Tracking Numbers	Temperature
5318 9962 0502	1.3±0=1.3 KHAB
5318 9962 0535	.4±0=.4 KHAB

ANALYTICAL REPORT

January 03, 2022

CEC, Inc. - Knoxville, TN

Sample Delivery Group:	L1437647
Samples Received:	12/03/2021
Project Number:	315-875
Description:	Claxton Project
Site:	CLAXTON PLAYGROUND
Report To:	Garrett Welch
	2704 Cherokee Farm Way
	Suite 101
	Knoxville, TN 37920

Entire Report Reviewed By:

Jason Romer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

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SAMPLE SUMMARY

CLX-SL-PGOUT-11-120121 L1437647-01 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 09:41	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:22	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:22	JMR	Mt. Ju iet, TN

CLX-SL-PGOUT-12-120121 L1437647-02 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 10:16	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:24	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:24	JMR	Mt. Ju iet, TN

CLX-SL-PGOUT-13-120121 L1437647-03 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 10:46	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:25	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:25	JMR	Mt. Ju iet, TN

CLX-SL-PGOUT-14-120121 L1437647-04 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 11:10	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:25	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:25	JMR	Mt. Ju iet, TN

CLX-SL-PGOUT-15-120121 L1437647-05 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 11:45	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 11:31	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 11:31	JMR	Mt. Ju iet, TN

CLX-SL-PGOUT-120121 L1437647-06 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 00:00	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 12:41	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 12:41	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-11-120121 L1437647-07 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 12:24	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 00:09	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 00:09	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-12-120121 L1437647-08 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 12:42	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 00:09	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 00:09	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-13-120121 L1437647-09 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 13:01	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:40	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:40	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-14-120121 L1437647-10 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 13:34	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:41	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:41	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-15-120121 L1437647-11 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 13:53	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 11:42	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 11:42	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-16-120121 L1437647-12 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:09	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 11:43	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 11:43	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-17-120121 L1437647-13 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:28	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 10:28	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 10:28	JMR	Mt. Ju iet, TN

CLX-SL-PGIN-18-120121 L1437647-14 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:44	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 11:35	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 11:35	JMR	Mt. Ju iet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SAMPLE SUMMARY

CLX-MLCH-PGIN-11-120121 L1437647-15 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 15:02	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 12:46	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 12:46	JMR	Mt. Ju iet, TN

CLX-EB-120121 L1437647-16 Non-Potable Water

Collected by	Collected date/time	Received date/time
GW	12/01/21 14:58	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method 903.0/9315	WG1785252	1	12/08/21 15:22	12/17/21 01:22	SNR	Mt. Ju iet, TN
Radiochemistry by Method 904/9320	WG1785074	1	12/07/21 12:30	12/10/21 14:25	JMR	Mt. Ju iet, TN
Radiochemistry by Method Calculation	WG1785252	1	12/08/21 15:22	12/17/21 01:22	SNR	Mt. Ju iet, TN

CLX-MLCH-PGIN-12-120121 L1437647-17 Solids and Chemical Materials

Collected by	Collected date/time	Received date/time
GW	12/01/21 15:28	12/03/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method Calculation	WG1784827	1	12/07/21 10:16	12/28/21 12:46	JMR	Mt. Ju iet, TN
Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)	WG1790658	1	12/07/21 10:16	12/28/21 12:46	JMR	Mt. Ju iet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jason Romer
Project Manager

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	3.17		0.582	0.716	12/28/2021 10:22	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.55		0.323	0.457	12/28/2021 10:22	WG1790658
Bismuth-214 (Ra-226)	1.61		0.258	0.259	12/28/2021 10:22	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	3.44		0.535	0.51	12/28/2021 10:24	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.51		0.276	0.327	12/28/2021 10:24	WG1790658
Bismuth-214 (Ra-226)	1.93		0.259	0.183	12/28/2021 10:24	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	3.44		0.675	0.855	12/28/2021 10:25	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.53		0.374	0.59	12/28/2021 10:25	WG1790658
Bismuth-214 (Ra-226)	1.92		0.301	0.265	12/28/2021 10:25	WG1790658

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	2.11		0.364	0.472	12/28/2021 10:25	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.958		0.198	0.313	12/28/2021 10:25	WG1790658
Bismuth-214 (Ra-226)	1.16		0.166	0.159	12/28/2021 10:25	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	2.30		0.410	0.479	12/28/2021 11:31	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.03		0.221	0.318	12/28/2021 11:31	WG1790658
Bismuth-214 (Ra-226)	1.27		0.189	0.161	12/28/2021 11:31	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	2.81		0.635	0.773	12/28/2021 12:41	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.31		0.341	0.485	12/28/2021 12:41	WG1790658
Bismuth-214 (Ra-226)	1.50		0.294	0.288	12/28/2021 12:41	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.757		0.394	0.713	12/28/2021 00:09	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.480		0.250	0.465	12/28/2021 00:09	WG1790658
Bismuth-214 (Ra-226)	0.278		0.144	0.248	12/28/2021 00:09	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	3.36		0.767	0.938	12/28/2021 00:09	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	1.50		0.429	0.603	12/28/2021 00:09	WG1790658
Bismuth-214 (Ra-226)	1.86		0.339	0.335	12/28/2021 00:09	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.265	U	0.294	0.613	12/28/2021 10:40	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.228	J	0.179	0.372	12/28/2021 10:40	WG1790658
Bismuth-214 (Ra-226)	0.0366	U	0.114	0.241	12/28/2021 10:40	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	5.97		1.03	1.2	12/28/2021 10:41	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	2.33		0.557	0.844	12/28/2021 10:41	WG1790658
Bismuth-214 (Ra-226)	3.65		0.472	0.355	12/28/2021 10:41	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.645	U	0.780	1.62	12/28/2021 11:42	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.225	U	0.496	1.14	12/28/2021 11:42	WG1790658
Bismuth-214 (Ra-226)	0.420	J	0.284	0.482	12/28/2021 11:42	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.613	U	0.662	1.32	12/28/2021 11:43	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.0835	U	0.405	0.922	12/28/2021 11:43	WG1790658
Bismuth-214 (Ra-226)	0.530		0.258	0.395	12/28/2021 11:43	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.528		0.195	0.307	12/28/2021 10:28	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/- pCi/g	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.247		0.107	0.194	12/28/2021 10:28	WG1790658
Bismuth-214 (Ra-226)	0.280		0.0879	0.113	12/28/2021 10:28	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.315		0.169	0.303	12/28/2021 11:35	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.194	J	0.103	0.199	12/28/2021 11:35	WG1790658
Bismuth-214 (Ra-226)	0.121		0.0664	0.104	12/28/2021 11:35	WG1790658

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.279	U	0.714	1.86	12/28/2021 12:46	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	0.176	U	0.456	1.32	12/28/2021 12:46	WG1790658
Bismuth-214 (Ra-226)	0.103	U	0.258	0.538	12/28/2021 12:46	WG1790658

Radiochemistry by Method 903.0/9315

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Radium-226	-0.0250	U	0.0489	0.158	12/17/2021 01:22	WG1785252
(T) Barium	*107*			*30.0-143*	*12/17/2021 01:22*	WG1785252

Radiochemistry by Method 904/9320

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
RADIUM-228	0.289	J	0.326	0.615	12/10/2021 14:25	WG1785074
(T) Barium	*96.7*			*62.0-143*	*12/10/2021 14:25*	WG1785074
(T) Yttrium	*103*			*79.0-136*	*12/10/2021 14:25*	WG1785074

Radiochemistry by Method Calculation

Analyte	Result pCi/l	Qualifier	Uncertainty +/-	MDA pCi/l	Analysis Date date / time	Batch
Combined Radium	0.289	U	0.375	0.773	12/17/2021 01:22	WG1785252

Radiochemistry by Method Calculation

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Combined Radium	0.212	U	0.769	1.86	12/28/2021 12:46	WG1784827

Radiochemistry by Method DOE Ga-01-R/901.1 (21 day)

Analyte	Result pCi/g	Qualifier	Uncertainty +/-	MDA pCi/g	Analysis Date date / time	Batch
Actinium-228 (Ra-228)	-0.0425	U	0.453	1.22	12/28/2021 12:46	WG1790658
Bismuth-214 (Ra-226)	0.212	U	0.316	0.642	12/28/2021 12:46	WG1790658

Method Blank (MB)

(MB) R3744897-1 12/16/21 22:21

Analyte	MB Result pCi/l	MB Qualifier	MB Uncertainty +/- pCi/l	MB MDA pCi/l
Radium-226	-0.0272	U	0.0533	0.160
(T) Barium	*91.4*		*91.4*	

L1437647-16 Original Sample (OS) • Duplicate (DUP)

(OS) L1437647-16 12/17/21 01:22 • (DUP) R3744897-5 12/16/21 23:21

Analyte	Original Result pCi/l	Original Uncertainty +/-	Original MDA pCi/l	DUP Result pCi/l	DUP Uncertainty +/-	DUP MDA pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	-0.0250	0.0489	0.158	-0.0288	0.126	0.158	1	0.000	0.0283	U	20	3
(T) Barium	*107*			*86.3*	*86.3*							

Laboratory Control Sample (LCS)

(LCS) R3744897-2 12/16/21 22:21

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.01	4.72	94.2	80.0-120	
(T) Barium			*91.3*		

L1437027-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1437027-03 12/17/21 00:21 • (MS) R3744897-3 12/16/21 22:21 • (MSD) R3744897-4 12/16/21 22:21

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	10.0	0.700	10.7	9.39	100	86.9	1	75.0-125			13.3		20
(T) Barium		*102*			*90.6*	*90.4*							

QUALITY CONTROL SUMMARY

L1437647-16

Method Blank (MB)

(MB) R3740030-1 12/10/21 14:25

Analyte	MB Result pCi/l	MB Qualifier	MB Uncertainty +/- pCi/l	MB MDA pCi/l
Radium-228	0.524		0.229	0.423
(T) Barium	*109*		*109*	
(T) Yttrium	*92.2*		*92.2*	

L1438155-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1438155-01 12/10/21 14:25 • (DUP) R3740030-5 12/10/21 14:25

Analyte	Original Result pCi/l	Original Uncertainty +/-	Original MDA pCi/l	DUP Result pCi/l	DUP Uncertainty +/-	DUP MDA pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-228	0.172	0.303	0.548	-0.905	0.498	0.548	1	200	1.85	U	20	3
(T) Barium	*89.1*			*105*	*105*							
(T) Yttrium	*99.3*			*97.6*	*97.6*							

Laboratory Control Sample (LCS)

(LCS) R3740030-2 12/10/21 14:25

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-228	5.00	5.41	108	80.0-120	
(T) Barium			*112*		
(T) Yttrium			*99.1*		

L1438157-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1438157-02 12/10/21 14:25 • (MS) R3740030-3 12/10/21 14:25 • (MSD) R3740030-4 12/10/21 14:25

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-228	10.0	2.16	12.3	13.3	102	111	1	70.0-130			7.50		20
(T) Barium		*113*			*112*	*109*							
(T) Yttrium		*94.0*			*99.8*	*94.2*							

Method Blank (MB)

(MB) R3745932-2 12/28/21 11:34

Analyte	MB Result pCi/g	MB Qualifier	MB Uncertainty +/- pCi/g	MB MDA pCi/g
Actinium-228 (Ra-228)	0.0352	U	0.153	0.406
Americium-241	0.357	U	0.611	1.02
Bismuth-214 (Ra-226)	0.102	J	0.104	0.186
Cesium-137	-0.0467	U	0.0563	0.135
Cobalt-60	-0.0137	U	0.0414	0.203

L1437647-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1437647-01 12/28/21 10:22 • (DUP) R3745932-3 12/28/21 11:34

Analyte	Original Result pCi/g	Original Uncertainty +/-	Original MDA pCi/g	DUP Result pCi/g	DUP Uncertainty +/-	DUP MDA pCi/g	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Actinium-228 (Ra-228)	1.55	0.323	0.457	1.07	0.180	0.457	1	36.6	1.30		20	3
Americium-241	0.696	0.425	0.75	-0.284	0.425	0.75	1	200	2.19	U	20	3
Bismuth-214 (Ra-226)	1.61	0.258	0.259	0.964	0.151	0.259	1	50.4	2.17		20	3
Cesium-137	0.184	0.0380	0.0724	-0.000385	0.0380	0.0724	1	200	1.92	U	20	3
Cobalt-60	0.177	0.0235	0.0635	-0.00532	0.0235	0.0635	1	200	2.66	U	20	3

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3745932-1 12/28/21 11:30 • (LCSD) R3745932-4 12/28/21 13:51

Analyte	Spike Amount pCi/g	LCS Result pCi/g	LCSD Result pCi/g	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Americium-241	160	158	153	98 3	95 6	60.0-140			2.77	20
Cesium-137	235	236	247	100	105	80.0-120			4 52	20
Cobalt-60	292	279	286	95 5	97.8	80.0-120			2.30	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Perm t Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Resu ts relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in mon toring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have mu tiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest lim t of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a qual ty control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qual fier is provided w thin the Glossary and Definitions page and potentially a discussion of possible implications of the Qual fier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable resu t returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the resu ts column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qual fiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were in tially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The ident fication of the analyte is acceptable; the reported value is an estimate.
U	Below Detectable Limits: Indicates that the analyte was not detected.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
CEC, Inc. - Knoxville, TN

2704 Cherokee Farm Way
Suite 101
Knoxville. TN 37920

Billing Information:
Attn: Accounts Payable
333 Baldwin Rd.
Pittsburgh, PA 15205

Pres Chk

Report to: Garrett Welch

Email To: gwelch@cecinc.com;kmcnally@cecinc.com;mbr

Project Description: Claxton Project

City/State Collected: Claxton, TN

Please Circle: PT MT CT ET

Phone: 865-977-9997

Client Project # 315-875

Lab Project # CECKTN-CLAXTON

Collected by (print): G.Welch

Site/Facility ID # claxton Playground

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard Turn

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	RA-226-903.0 1L-HDPE-Add HNO3	RA-226/228COMB 16ozHDPE-NoPres	RA-228 1L-HDPE-Add HNO3	Total Metals 250mlHDPE-HNO3	Total Metals,WetChem 8ozClr-NoPres	WetChem 125mlHDPE-NoPres	Remarks	Sample # (lab only)
CLX-SL-PG OUT-11-120121	Comp	SCM	0-3"	12/1/21	0941	2		X			X			01
CLX-SL-PG OUT-12-120121	Comp	SCM	0-3"	12/1/21	1016	2		X			X			02
CLX-SL-PG OUT-13-120121	Comp	SCM	0-3"	12/1/21	1046	2		X			X			03
CLX-SL-PG OUT-14-120121	Comp	SCM	0-3"	12/1/21	1118	2		X			X			04
CLX-SL-PG OUT-15-120121	Comp	SCM	0-3"	12/1/21	1145	2		X			X			05
CLX-SL-PG OUT-120121	Comp	SCM	0-3"	12/1/21		2		X			X			06
CLX-SL-PG IN-11-120121	Comp	SCM	0-3"	12/1/21	1224	2		X			X			07
CLX-SL-PG IN-12-120121	Comp	SCM	0-3"	12/1/21	1242	2		X			X			08
CLX-SL-PG IN-13-120121	Comp	SCM	0-3"	12/1/21	1301	2		X			X			09
CLX-SL-PG IN-14-120121	Comp	SCM	0-3"	12/1/21	1334	2		X			X			10

12/1/21

Chain of Custody Page 1 of 2

Pace Analytical®

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Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1458647

Table A127

Acctnum: CECKTN

Template: T200058

Prelogin: P889402

PM: 526 - Chris McCord

PB: BF 11/24/21

Shipped Via: FedEx Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Total Metals = M6020CCR+Ag,Cu,Ni,V,Zn Mercury
WetChem = CHLORIDE-300,FLUORIDE-300,pH,SULFATE-300
Percent Moisture ASTM D2974-87 All cont LS004pm

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	12/2/21	1030			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 36	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/3/21 Time: 0900	Hold: / Condition: NCF / OK

Company Name/Address:
CEC, Inc. - Knoxville, TN

2704 Cherokee Farm Way
Suite 101
Knoxville. TN 37920

Billing Information:
Attn: Accounts Payable
333 Baldwin Rd.
Pittsburgh, PA 15205

Pres Chk

Report to: Garrett Welch

Email To: gwelch@cecinc.com;kmcnally@cecinc.com;mbr

Project Description: Claxton Project

City/State Collected: Claxton, TN

Please Circle: PT MT CT ET

Phone: 865-977-9997

Client Project # 315-875

Lab Project # CECKTN-CLAXTON

Collected by (print): G Welch

Site/Facility ID # Claxton Playground

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: Standard Turn

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	RA-226-903.0 1L-HDPE-Add HNO3	RA-226/228COMB 16ozHDPE-NoPres	RA-228 1L-HDPE-Add HNO3	Total Metals 250mlHDPE-HNO3	Total Metals,WetChem 8ozClr-NoPres	WetChem 125mlHDPE-NoPres	Remarks	Sample # (lab only)
CLX-SL-PGIN-15-120121	comp	SCM	0-3"	12/1/21	1353	2		X			X			11
CLX-SL-PGIN-16-120121	comp	SCM	0-3"	12/1/21	1409	2		X			X			12
CLX-SL-PGIN-17-120121	comp	SCM	0-3"	12/1/21	1428	2		X			X			13
CLX-SL-PGIN-18-120121	comp	SCM	0-3"	12/1/21	1444	2		X			X			14
CLX-MLCH-PGIN-11-120121	comp	SCM	0-3"	12/1/21	1502	2		X			X			15
CLX-EB-120121	comp	GW		12/1/21	1458	4	X		X	X		X		16
CLX-MLCH-PGIN-12-120121	comp	~~GW~~ SCM	0-3"	12/1/21	1520	~~4~~ 2	X	X	X	X	X	X		17
		~~GW~~				~~4~~	X		X	X		X		
		~~GW~~				~~4~~	X		X	X		X		
		~~GW~~				~~4~~	X		X	X		X		

12/1/21

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Total Metals = M6020CCR+Ag,Cu,Ni,V,Zn Mercury
WetChem = CHLORIDE-300,FLUORIDE-300,pH,SULFATE-300
Percent Moisture ASTM D2974-87

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ~~__~~ Y __N
COC Signed/Accurate: X Y __N
Bottles arrive intact: X Y __N
Correct bottles used: __Y __N
Sufficient volume sent: X Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: X Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	12/2/21	1030			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 36	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/3/21 Time: 0900	Hold: Condition: NCF / OK

Chain of Custody Page 2 of 2

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SDG # L1437647

Table #

Acctnum: CECKTN
Template: T200058
Prelogin: P889402
PM: 526 - Chris McCord
PB: BF 11/24/21

Shipped Via: FedEX Ground

Tracking Numbers	Temperature
5318 9962 0502	1.3±0=1.3 KHA3
5318 9962 0535	.4±0=.4 KHA3

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

December 10, 2021

Garrett Welch
Civil & Environmental Consultants, Inc.
2704 Cherokee Farm Way
Suite 101
Knoxville, TN 37920

RE: Civil & Environmental Consultants Project
RJ Lee Group Project Number AOH1064381-0

Dear Mr. Welch,

The RJ Lee Group, Inc. Monroeville laboratory received 17 samples on December 3, 2021. The samples were logged into RJ Lee Group project number AOH1064381-0 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with all custody seals in place and intact. Attached in Appendix A is the signed sample receipt confirmation form, COC, and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Elizabeth A. Fischer

Elizabeth A. Fischer
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: AOH1064381-0

Project Name/Case #: null

Received From:	Relinquished To:
Garrett Welch Project Manager Civil & Environmental Consultants, Inc. 2704 Cherokee Farm Way Suite 101 Knoxville, TN 37920 United States Email: gwelch@cecinc.com Main: 865-977-9997 Mobile: 865-440-1655	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10553506	CLX-SL-PGOUT-11-120121	12/03/2021 9:47 AM EST
10553507	CLX-SL-PGOUT-12-120121	12/03/2021 9:47 AM EST
10553508	CLX-SL-PGOUT-13-120121	12/03/2021 9:47 AM EST
10553509	CLX-SL-PGOUT-14-120121	12/03/2021 9:47 AM EST
10553510	CLX-SL-PGOUT-15-120121	12/03/2021 9:47 AM EST
10553511	CLX-SL-PGOUT-120121	12/03/2021 9:47 AM EST
10553512	CLX-SL-PGIN-11-120121	12/03/2021 9:47 AM EST
10553513	CLX-SL-PGIN-12-120121	12/03/2021 9:47 AM EST
10553514	CLX-SL-PGIN-13-120121	12/03/2021 9:47 AM EST
10553515	CLX-SL-PGIN-14-120121	12/03/2021 9:47 AM EST
10553516	CLX-SL-PGIN-15-120121	12/03/2021 9:47 AM EST
10553517	CLX-SL-PGIN-16-120121	12/03/2021 9:47 AM EST
10553518	CLX-SL-PGIN-17-120121	12/03/2021 9:47 AM EST
10553519	CLX-SL-PGIN-18-120121	12/03/2021 9:47 AM EST
10553520	CLX-MLCH-PGIN-11-120121	12/03/2021 9:47 AM EST
10553521	CLX-MLCH-PGIN-12-120121	12/03/2021 9:47 AM EST
10553522	CLX-SL-PGOUT-16-120121	12/03/2021 9:47 AM EST
10553523	QC_CLX-SL-PGIN-13-120121	12/03/2021 9:47 AM EST

	Received From: Garrett Welch	*Method of Shipment: Federal Express*	
	Company: Civil & Environmental Consultants, Inc.		**Date:** 12/03/2021
	Received By: Monica Carse	*Package Condition Upon Receipt: Sealed*	
	Company: RJ Lee Group, Inc.		**Date:** 12/03/2021

	Relinquished	*Method of Shipment:*	
	Company:		**Date:**
	Received By:	*Package Condition Upon Receipt:*	
	Company:		**Date:**

	Relinquished	*Method of Shipment:*	
	Company:		**Date:**
	Received By:	*Package Condition Upon Receipt:*	
	Company:		**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	Civil & Environmental Consultants	**Date Received:**	12/3/2021	**Log in Date:**	12/3/2021
Time Received:	9:47 AM	**By:**	Monica Carse	**COC#:**	
Project:	AOH1064381-0	**# Coolers Received**	1	**Means of Shipment:**	FedEX
Air Bill:	2869 4829 9387				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	N/A		
Were all samples intact?	✓		
Were all samples accurately labeled?	✓		
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?	✓		
Were there any discrepancies among samples and COC?		✓	
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

N/A

Analyst Signature: M. Carse 12-03-21

Manager Signature: [signature] 12/06/21

Request for Environmental and IH Laboratory Analytical Services

AOH1064381-D

ATTENTION TO:			Purchase Order No.:		Client Job No.:
Lab Use Only	Project No.:	Client No:	Date Results Needed	STD TURN	Rush Charges Authorized ? (check one) Yes / No
	Date Logged In:	Logged In By:			
Report Results To	Name: Garrett Welch		Drinking Water Sample Only	Sample Purpose: Information ☐ Regulatory ☐ Accreditation (please list below):	
	Company: CEC			System ID #:	
	Address: 2704 Cherokee Farm Way			DOH Source #:	
	City, State, Zip: Knoxville, TN 37920			Multiple Sources #s:	
	Phone: 865-977-9917	Fax:		Sample Purpose: A ☐ B ☐ Other ☐	
	Email Results To: gwelch@cecinc.com		Chemistry Analysis Key	Preservation: Unpres, 4°C, HNO3, Other; H_2SO_4, HCl, NaOH, Na_2SO_3	Matrix: WW=Wastewater, GW=Groundwater, S=Soil/Sludge, E=Extract; SW=Surface Water, DW=Drinking Water, O=Oil, K=Other	Container: P=Plastic, G=Glass, W=Wipe, A=Air (filter or tube)
Invoice To	Name: SAME AS ABOVE	If a hard copy of invoice is needed, check here ☐				
	Company:	Email:				
	Address:					
	City, State, Zip:					
	Phone:	Fax:				
Special Instructions						

Client Sample ID	Sample Description	Sample Date	Sample Time Start	Sample Time Stop	Volume Area / Air Volume	Sample Location (Please specify if NY state)	Analysis Requested: RJ LEE SOP OPTION 2 PLM	Pres. Upon Receipt (Y/N)	Preservation	Matrix	Container Type	pH	No. Containers
CLX-SL-PGOUT-11-120121	Soil	12/1/21		0941		TN	X						
CLX-SL-PGOUT-12-120121	Soil	12/1/21		1016		TN	X						
CLX-SL-PGOUT-13-120121	Soil	12/1/21		1046		TN	X						
CLX-SL-PGOUT-14-120121	Soil	12/1/21		1118		TN	X						
CLX-SL-PGOUT-15-120121	Soil	12/1/21		1145		TN	X						
CLX-SL-PGOUT-120121 11-120121	Soil	12/1/21				TN	X						
CLX-SL-PGIN-120121 GAW	Soil	12/1/21		1224		TN	X						
CLX-SL-PGIN-12-120121	Soil	12/1/21		1242		TN	X						
CLX-SL-PGIN-13-120121	Soil	12/1/21		1301		TN	X						
CLX-SL-PGIN-14-120121	Soil	12/1/21		1334		TN	X						
CLX-SL-PGIN-15-120121	Soil	12/1/21		1353		TN	X						

Chain of Custody	Relinquished By (Signature):	Date: 12/2/21	Time: 1030	Received By (Signature): M. Carrier	Date: 12-03-21 Time: 09:47
	Relinquished By (Print Name): Garrett Welch	Relinquished To:		Received By (Print Name): M. Marsic	Relinquished To:
	Company Name: CEC	Method of Shipment: FedEx		Company Name: RJ Lee Group	Method of Shipment:
Chain of Custody	Relinquished By (Signature):	Date:	Time:	Received By (Signature):	Date: Time:
	Relinquished By (Print Name):	Relinquished To:		Received By (Print Name):	Relinquished To:
	Company Name:	Method of Shipment:		Company Name:	Method of Shipment:

Pennsylvania - HQ
350 Hochberg Road
Monroeville, PA 15146

724.325.1776 Phone
724.733.1799 Fax

Washington
Columbia Basin Analytical Laboratories
2710 North 20th Avenue
Pasco, WA 99301

509.545.4989 Phone
509.544.6010 Fax

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

AC#1064381-0

ATTENTION TO:

Did you complete a Submit a Sample Form Online? Yes ☐ No ☐

Lab Use Only	Project No.:	Client No.:	Purchase Order Number:	Client Job Number:	
	Date Logged In:	Logged In By:			

Report Results To	Name: Garrett Welch		Invoice To	Name: SAME as "Report results TO"	Email:
	Company: CEC			Company:	Fax:
	Address: 2714 Cherokee Farm Way			Address:	
	City, State, Zip: Knoxville TN 37920			City, State, Zip:	
	Phone: 865-977-9997	Fax:		Phone:	
	Email results to: gwelch@cecinc.com		Date Results Needed	Standard TA assumed if left blank; please do not use vague terms like ASAP	Rush Charges Authorized? (circle one) Yes / No
	If a hard copy of invoice is needed, check here ☐				

Quality System Requirements (If applicable)	Accreditations required to be followed: yes / no	Analysis Requested		Special Instructions or Comments
	Circle which ones to follow: ISO (Please specify): cGMP: Other (Please specify):	PLM RJ LEE SOP OPT 23.02		

Client Sample ID	Sample Description	Sample Location (Please specify if NY state)	Sample Date & Time		
CLX-SL-PGIN-16-120121	Soil	TN	12/1/21 1409	X	
CLX-SL-PGIN-17-120121	Soil	TN	12/1/21 1428	X	
CLX-SL-PGIN-18-120121	Soil	TN	12/1/21 1444	X	
CLX-MLCH-PGIN-11-120121	Mulch	TN	12/1/21 1522	X	
CLX-MLCH-PGIN-12-120121	mulch	TN	12/1/21 1528	X	
CLX-SL-~~PGIN~~ PG OUT -16-120121	Soil	TN	12/1/21 1606	X	

Chain of Custody	Relinquished By (Signature): GWL	Date: 12/2/21	Time: 1036	Chain of Custody	Received By (Signature): TM Parker	Date: 12-03-21	Time: 07:47
	Relinquished By (Print Name): Garrett Welch	Relinquished To:			Received By (Print Name): M. Parker	Relinquished To:	
	Company Name: CEC	Method of Shipment: FedEx			Company Name: RJ Lee Group	Method of Shipment:	
Chain of Custody	Relinquished By (Signature):	Date:	Time:	Chain of Custody	Received By (Signature):	Date:	Time:
	Relinquished By (Print Name):	Relinquished To:			Received By (Print Name):	Relinquished To:	
	Company Name:	Method of Shipment:			Company Name:	Method of Shipment:	

Pennsylvania - HQ
950 Hochberg Road
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RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Appendix B

Mineral Identification Report

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Garrett Welch
Civil & Environmental Consultants, Inc.
2704 Cherokee Farm Way
Suite 101
Knoxville, TN 37920 United States
Email: gwelch@cecinc.com
Main: 865-977-9997

Report Date: 12/10/2021
Sample Received Date: 12/03/2021
RJLG Project: AOH1064381-0
Customer COC:
Purchase Order:
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
CLX-MLCH-PGIN-11-120121	10553520	12/09/2021	12/01/2021	ND	Carbonate Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment
CLX-MLCH-PGIN-12-120121	10553521	12/09/2021	12/01/2021	1%	Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment
CLX-SL-PGIN-11-120121	10553512	12/09/2021	12/01/2021	1%	Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment
CLX-SL-PGIN-12-120121	10553513	12/09/2021	12/01/2021	2%	Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
CLX-SL-PGIN-13-120121	10553514	12/09/2021	12/01/2021	6%	Carbonate Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment
CLX-SL-PGIN-14-120121	10553515	12/09/2021	12/01/2021	9%	Carbonate Misc. Silicates Opaques Organic Particulate Quartz	Brown Sediment
CLX-SL-PGIN-15-120121	10553516	12/09/2021	12/01/2021	2%	Misc. Silicates Opaques Organic Particulate Quartz	Dark Brown Sediment
CLX-SL-PGIN-16-120121	10553517	12/09/2021	12/01/2021	1%	Carbonate Misc. Silicates Opaques Organic Particulate Quartz	Dark Brown Sediment
CLX-SL-PGIN-17-120121	10553518	12/09/2021	12/01/2021	2%	Carbonate Misc. Silicates Opaques Quartz	Pale Yellow Sediment
CLX-SL-PGIN-18-120121	10553519	12/09/2021	12/01/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Pale Yellow Sediment
CLX-SL-PGOUT-11-120121	10553506	12/09/2021	12/01/2021	1%	Carbonate Clay Diatoms Misc. Silicates Opaques Quartz	Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
CLX-SL-PGOUT-12-120121	10553507	12/09/2021	12/01/2021	2%	Clay Diatoms Mica Misc. Silicates Opaques Quartz	Brown Sediment
CLX-SL-PGOUT-120121	10553511	12/09/2021	12/01/2021	ND	Clay Misc. Silicates Opaques Quartz	Light Brown Sediment
CLX-SL-PGOUT-13-120121	10553508	12/09/2021	12/01/2021	2%	Clay Feldspar Mica Misc. Silicates Opaques Quartz	Yellowish Brown Sediment
CLX-SL-PGOUT-14-120121	10553509	12/09/2021	12/01/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Brown Sediment
CLX-SL-PGOUT-15-120121	10553510	12/09/2021	12/01/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Brown Sediment
CLX-SL-PGOUT-16-120121	10553522	12/09/2021	12/01/2021	ND	Clay Misc. Silicates Opaques Quartz	Light Brown Sediment
QC_CLX-SL-PGIN-13-120121	10553523	12/10/2021	12/01/2021	2%	NA	Brown Sediment

Disclaimer Notes

* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Coal Combustion Products (CCP) are defined as fly ash, bottom ash, and slag.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
CCP – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% CCP observed, none counted.
ND – No CCP detected.