Draft Remedy Selection Report

Plant Yates AP-3, A, B, B’, and R6 CCR Landfill
708 Dyer Road
Newnan, Georgia

September 30, 2024

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Certification

I, Geoffrey Gay, am a professional engineer and licensed in the State of Georgia. I hereby certify that this Draft Remedy Selection Report was prepared by, or under the direct supervision of, a Qualified Groundwater Scientist, in accordance with the Georgia Environmental Protection Division (EPD) Rules of Solid Waste Management. According to 391-3-4-.01, a Qualified Groundwater Scientist is "a professional engineer or geologist registered to practice in Georgia who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields that enable individuals to make sound professional judgments regarding groundwater monitoring, contaminant fate and transport, and corrective action." By affixing my professional seal and signature, I hereby acknowledge that this report has been prepared in conformance with the United States Environmental Protection Agency coal combustion residual rule [40 Code of Federal Regulations (CFR) 257 Subpart D] and the Georgia Environmental Protection Division Rules for Solid Waste Management 391-3-4-.10.



Geoffrey Gay, P.E. (PE 27801)
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Georgia Power

Executive Summary

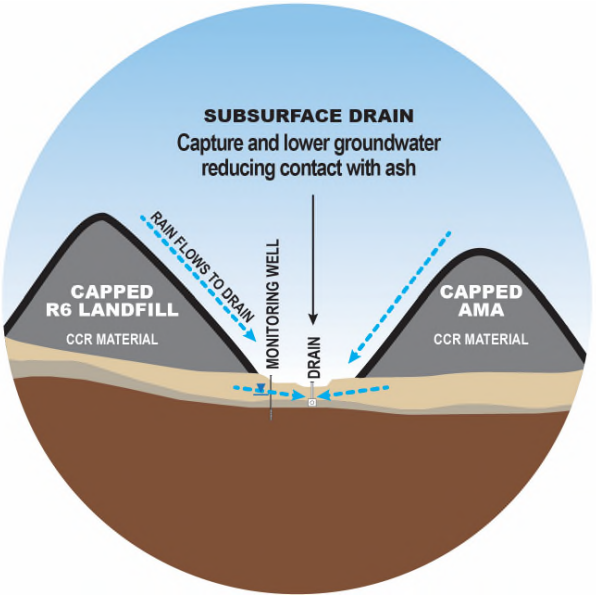


Plant Yates, located in Newnan, Georgia, originally operated seven coal-fired steam-generating units. Five of the units were retired in 2015 and two units were converted from coal to natural gas. Coal combustion residuals (CCR), commonly referred to as “coal ash”, a non-hazardous material generated from burning coal to generate electricity, were stored at the site in ash ponds AP-3, A, B, and B’ (AMA) and the R6 Landfill. Ash ponds were designed, installed, and operated to function as a treatment system for power plant wastewaters, and they have effectively served in this capacity for decades in compliance with the National Pollutant Discharge Elimination System (“NPDES”) permits under which they were regulated. Georgia Power has undertaken actions to close the AMA and R6 Landfill in accordance with federal and state regulations. Ash pond consolidation and closure activities began in 2014 and concluded in early 2023. As part of a comprehensive approach to managing CCR, Georgia Power completed a detailed evaluation of corrective measures to remove cobalt, lithium, and selenium in groundwater above the Groundwater Protection Standard (GWPS) at the AMA and R6 CCR Landfill at Plant Yates.

Closure of the CCR Units

Source control by closure of the CCR unit provides considerable benefits to groundwater and is an important step in managing impacts to groundwater. Source control benefits are being achieved at Plant Yates through several steps in accordance with the performance standards applicable to CCR unit closures:

- **CCR consolidation:** AP-A and AP-B are being closed by removal with consolidation of CCR from those impoundments to the AMA.
- **Capping:** The AMA and R6 Landfills are being closed in place by capping with final cover systems.
- **Subsurface Drain:** The subsurface drain engineering measure and associated risers and pumps are designed to lower and sustain a lowered groundwater elevation relative to the elevation of the CCR closed in place.



Groundwater Monitoring and Assessment

Georgia Power has performed CCR groundwater monitoring at AMA and R6 since 2016. Over the period of Georgia Power’s monitoring, concentrations of selenium were identified above GWPS in two downgradient wells. Extended groundwater monitoring indicates selenium above the GWPS is limited in extent (delineated) and confined to two wells well within the plant’s property boundary.

Executive Summary

Risk Evaluation for Human Health and Environment



Georgia Power completed a risk evaluation on selenium in groundwater at the site. As documented in the Risk Evaluation Report, the selenium in groundwater at the site is not expected to pose a risk to human health or the environment.

Proposed Corrective Action for Groundwater: Monitored Natural Attenuation



Georgia Power submitted an assessment of corrective measures (ACM) report for AMA and R6 Landfill in June 2019. Georgia Power has worked with GA EPD to adhere to regulations and select a comprehensive and technically sound approach for implementing corrective measures to address cobalt, lithium, and selenium in groundwater. In light of the expected source control benefits, as a polishing step for cobalt, lithium, and selenium in groundwater, Monitored Natural Attenuation (MNA) was selected as the proposed remedy using the criteria described in the CCR Rule, 40 Code of Federal Regulations (CFR) Parts 257.97. MNA is the proposed remedy based on the site-specific demonstration following the EPA 2015 guidance of natural attenuation mechanisms, capacity, stability, and favorable protectiveness, effectiveness, and ease of implementation. The source control provided by the closure and MNA actions are anticipated to decrease selenium concentrations to less than the GWPS at the waste boundary within 10 years. Cobalt and lithium concentrations are stable but are anticipated to decrease via natural attenuation mechanisms as upgradient water continues to transport downgradient.

Adaptive Site Management



The remedy performance will be monitored, evaluated, and, if needed, the remedy will be adjusted or augmented to meet remedial objectives.

Long-term Groundwater Monitoring



Georgia Power will continue to perform groundwater monitoring and reporting at the AMA and R6 landfills for at least 30-years after the units are closed.

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Acronyms and Abbreviations

ACC	Atlantic Coast Consulting
ACM	assessment of corrective measures
AMA	Ash Management Area
AP	Ash Pond
AP-3	Ash Pond 3
AP-A	Ash Pond A
AP-B	Ash Pond B
AP-B'	Ash Pond B'
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
CCR	coal combustion residuals
CFR	Code of Federal Regulations
CSM	conceptual site model
GA EPD	Georgia Environmental Protection Division
Georgia Power	Georgia Power Company
GWPS	Groundwater Protection Standards
ISI	In-Situ Injections
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MNA	Monitored Natural Attenuation
redox	oxidation-reduction
SSL	statistically significant level
USEPA	United States Environmental Protection Agency
ZVI	zero-valent iron

1 Introduction

On behalf of Georgia Power Company (Georgia Power), Arcadis U.S., Inc. (Arcadis) prepared this Draft Remedy Selection Report for Plant Yates Ash Ponds (AP) AP-3, A, B, and B' and R6 CCR Landfill (the site). As documented here, Georgia Power has completed a detailed evaluation of corrective measures to address cobalt, lithium, and selenium in groundwater at statistically significant levels (SSLs) above the Groundwater Protection Standard (GWPS). The evaluation was completed in accordance with the United States Environmental Protection Agency's (USEPA's) Coal Combustion Residuals (CCR) Rule, 40 Code of Federal Regulations (CFR) Part 257 effective October 19, 2015 (CCR Rule) including subsequent revisions, and Georgia Environmental Protection Division's (GA EPD's) Rule for Solid Waste Management Rule 391-3-4-.10 for CCR.

This Draft Remedy Selection Report includes an overview of ongoing geologic and hydrogeologic investigations to refine the conceptual site model (CSM), identifies Appendix IV constituents detected in groundwater at SSLs above the GWPS, discusses the nature and extent of these inorganic constituents in groundwater, evaluates potential corrective measures to address SSLs in groundwater, and presents monitored natural attenuation (MNA) as the proposed groundwater remedy for preliminary review by GA EPD. At GA EPD's request, a public meeting will be held after the agency's preliminary review of this Draft Report to discuss the assessment of corrective measures and proposed remedy, after which a remedy will be selected, and the Remedy Selection Report will be submitted to GA EPD. Once a remedy is selected and implemented, the remediation will be monitored routinely and subject to potential modification based on adaptive management strategies, as appropriate.

2 Background

2.1 Remedy Selection Process

The remedy selection process involves assessment of potentially applicable groundwater remediation approaches. To date, this process has occurred as reported in previous submittals including the Assessment of Corrective Measures Report – Plant Yates Ash Ponds 3, A, B, and B' (Atlantic Coast Consulting [ACC] 2019a) and Semiannual Remedy Selection and Design Progress Reports (ACC 2019b, ACC 2020a, Arcadis 2020, Arcadis 2021a, Arcadis 2021b, Arcadis 2022a, and Arcadis 2022b).

The remedy selected for the unit must meet the following required criteria:

§257.97 Selection of Remedy [Required Criteria]

(b) Remedies must:

(1) Be protective of human health and the environment;

(2) Attain the groundwater protection standard as specified pursuant to §257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;

(5) Comply with standards for management of wastes as specified in §257.98(d).

Technologies that meet the required criteria are then evaluated using the following comparative criteria:

§257.97 Selection of remedy [Comparative Criteria]

(c) In selecting a remedy that meets the standards of paragraph (b) of this section, the owner or operator of the CCR unit shall consider the following evaluation factors:

(1) The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on consideration of the following:

(i) magnitude of reduction of existing risks;

(ii) magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;

(iii) the type and degree of long-term management required, including monitoring, operation, and maintenance;

(iv) short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant;

(v) time until full protection is achieved;

(vi) potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;

(vii) long-term reliability of the engineering and institutional controls; and

(viii) potential need for replacement of the remedy.

(2) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:

(i) the extent to which containment practices will reduce further releases; and

(ii) the extent to which treatment technologies may be used.

(3) The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors:

(i) degree of difficulty associated with constructing the technology;

(ii) expected operational reliability of the technologies;

(iii) need to coordinate with and obtain necessary approvals and permits from other agencies;

(iv) availability of necessary equipment and specialists; and

(v) available capacity and location of needed treatment, storage, and disposal services.

(4) The degree to which community concerns are addressed by a potential remedy(s).

Using the above criteria, this document evaluates the potential remedies identified in the Assessment of Corrective Measures (ACM) and subsequent updates to identify an appropriate groundwater remedy for the unit. Selection of an appropriate groundwater remedy is significantly influenced by CCR constituent chemistry and characteristics of Appendix IV parameters, which are inorganic trace elements – metals and metalloids that have attenuation and remediation characteristics markedly different than organic constituents. Common chemical mechanisms of attenuation for CCR constituents include adsorption to, or coprecipitation with, oxides and hydrous oxides (oxyhydroxides) of iron and manganese; coprecipitation with, and adsorption to, iron sulfides such as pyrite (FeS2); and precipitation as carbonates, sulfides, sulfates, and/or phosphates (USEPA 2007; Electric Power Research Institute 2018). The attenuation capacity can be evaluated through site-specific field and laboratory testing and geochemical modeling. Processes such as precipitation/co-precipitation and adsorption and other methods such as groundwater extraction and treatment and engineered plant uptake (phytoremediation) are also evaluated for the remediation and adaptive management of Appendix IV constituents. The selected remedy will meet the criteria of §257.97(b) and the effectiveness of criteria specified in §257.97(c).

An evaluation of the degree to which community concerns are addressed by a potential remedy is not included in this Draft Groundwater Remedy Selection Report. A discussion of this criterion will be substantially informed by a forthcoming public meeting following GA EPD preliminary review and comment on this Draft Groundwater Remedy Selection Report. Following the public meeting, the Groundwater Remedy Selection Report will be prepared for submission to GA EPD and will include a discussion of the "degree to which community concerns are addressed by a potential remedy."

2.2 Unit Location and Description

Plant Yates is located at 708 Dyer Road on the east bank of the Chattahoochee River in Coweta County, Georgia, near the Coweta and Carroll County line, approximately 8 miles northwest of the city of Newnan and 13 miles southeast of the city of Carrollton. A general site layout is shown on Figure 1. Plant Yates was built after World War II and originally had seven coal-fired steam-generating units (Units 1 through 7). Units 1 through 5 were retired in 2015 following approval by the Georgia Public Service Commission through the company's 2013 Integrated Resource Plan. The two largest units (Units 6 and 7) were converted from coal to natural gas and remain in service. Plant Yates consists of multiple CCR units that are in the process of being closed in accordance with federal and state regulations. Cobalt, lithium, and selenium SSLs at the waste boundary for the CCR units AP-3, A, B, and B', and the R6 CCR Landfill are the subject of this Draft Groundwater Remedy Selection Report.

2.3 Unit Closure

CCR placement in AP-3, AP-A, AP-B, and AP-B' ceased in 2014 after Plant Yates ceased burning coal at the site. Closure activities in accordance with 40 CFR 257.100 were initiated on December 7, 2015 (AP-A) and April 20, 2018 (AP-B, AP-B', and AP-3). AP-A and AP-B are being closed by removal with consolidation of CCR from those impoundments to AP-B' and AP-3, which make up the footprint of the Ash Management Area (AMA). A final cover system is being placed over the consolidated AMA footprint.

AP-A and AP-B closure construction activities were approved by GA EPD and consisted of removal of all CCR and an additional 6 inches (minimum) of over-excavation and placement in the AMA.

CCR consolidated within the AMA waste footprint is moisture conditioned, spread, and compacted prior to capping with the final cover system. The final cover system will be graded to prevent erosion, provide adequate levels of slope stability, and promote positive drainage for surface water runoff. The cover system consists of a prepared subgrade overlain with a 50 mil geomembrane and ClosureTurf® engineered synthetic turf. The final cover system will eliminate infiltration to the maximum extent feasible.

CCR placement in the R6 CCR Landfill ceased in October 2015. The R6 CCR Landfill was closed in place and has been covered in accordance with the closure plan. The final cover consists of a minimum of an 18-inch infiltration barrier layer of clayey soil placed and compacted in accordance with the design specifications and a minimum of a 6-inch surface layer of topsoil capable of supporting vegetation growth. The final cover system was graded to prevent erosion and promote drainage.

In addition, Georgia Power is implementing an engineering measure to supplement the closure design. The engineering measure selected for Plant Yates is a subsurface drain system that will serve as a hydraulic conveyance with active pumping. The subsurface drain engineering measure and associated risers and pumps are designed to lower and sustain a lowered groundwater elevation relative to the elevation of the CCR closed in place (Deason et al. 2021). The effect of the decrease in the groundwater elevation translates into a reduction in the volume of CCR present below the potentiometric surface as compared to pre-closure conditions (TRC 2020), as well as the capture and removal of groundwater that has been in contact with CCR.

Closure by removal areas, AMA, R6 CCR Landfill, and the subsurface drain are depicted on Figure 2.

Following closure completion, a minimum post-closure care period of thirty (30) years will apply. Post-closure care is detailed in the Permit Application, Part A, Section 8. Georgia Power will retain ownership of the Site following closure.

2.4 Groundwater Monitoring

The current groundwater monitoring network for the CCR unit includes the background/upgradient and downgradient monitoring wells, as summarized in Table 1 and shown on Figure 3.

CCR groundwater monitoring-related activities have been performed at the site since 2016. Table 2 summarizes the current and potential future Appendix IV SSL parameter and well pairs that are the subject of this report:

Table 2. Appendix IV SSL Summary

Appendix IV Parameter[1]	Monitoring Well ID
Cobalt	YAMW-3
Lithium	YGWC-42, YAMW-3*
Selenium	YGWC-38, PZ-37, YAMW-5*

Notes:
*Lithium at YAMW-3 and selenium at YAMW-5 are not currently SSLs; however, it is anticipated that they will become SSLs during future semiannual monitoring periods.

Monitoring wells YGWC-33S, YGWC-38, and YGWC-41 exhibited SSLs in the past that are no longer present at the site.

YGWC-41: Concentrations of selenium have decreased to less than the GWPS and the statistical analysis no longer indicates an SSL.

YGWC-33S: Concentrations of beryllium and cobalt were above the GWPS before it was abandoned in June 2020 because it was within the waste boundary. Upon further statistical evaluation using pooled upgradient well data from across Yates rather than only the wells immediately upgradient of AMA-R6, cobalt was not found to exhibit an SSL. Monitoring wells YGWC-36A, YAMW-1 and PZ-35 installed at the waste boundary downgradient of YGWC-33S are below the GWPS beryllium and cobalt.

YGWC-38: Concentrations of beryllium have decreased to less than the GWPS and statistical analysis no longer indicates an SSL.

Additional details regarding the statistical analyses are provided in the annual and semiannual *Groundwater and Corrective Action Monitoring Reports* submitted to GA EPD and posted on Georgia Power's website. It is anticipated that lithium at YAMW-3 and selenium at YAMW-5 will become SSLs during future semiannual monitoring periods. For this reason, lithium at YAMW-3 and selenium at YAMW-5 has been considered in this evaluation and any selected remedy will also address GWPS exceedances at these locations. Lithium at YAMW-3 and selenium at YAMW-5 will be incorporated into the Final Remedy Selection Report, if appropriate.

[1] An SSL-related constituent is determined by comparing the confidence intervals developed to either the constituent's maximum contaminant level (MCL), if available; the calculated background interwell prediction limit; or for cobalt, molybdenum, lithium, and lead, the promulgated concentrations at 40 CFR §257.95(h)(2).

3 Groundwater Conceptual Site Model

A CSM is a dynamic tool that contextualizes available geological, hydrogeological, and geochemical information at a site to convey how groundwater and constituents (Appendix III and IV parameters) travel in a geologic setting. A CSM is not static and may evolve as data are collected and more is known about the setting. A CSM was developed for the site. As data were gathered during the ACM process, the CSM was refined and used to pre-screen remedial technologies, retaining technologies that were suitable for consideration in remedial alternatives for groundwater or adaptive management based on site-specific conditions.

Plant Yates is located in the Inner Piedmont Physiographic Province of western Georgia, southeast of the Brevard Zone, a regional fault zone that separates the Piedmont from the Blue Ridge. Rock units at Plant Yates are primarily interlayered gneiss and schists. The rocks in the area have been subjected to extensive metamorphism, deformation, and igneous intrusions. Extensive fracture sets are present in the underlying bedrock (Golder 2017).

Geologic cross-sections are presented on Figures 4 through 6. A soil layer, approximately 1 foot to 10 feet thick, of sand and silt with trace organic material overlies a thick layer of saprolite. The saprolite, which extends to typical depths of 20 to 40 feet below ground surface, was formed in place by the physical and chemical weathering of the underlying metamorphic rocks. The saprolite typically consists of clay- and silt-rich soils that grade to sandier soils with depth. A zone of variable thickness (approximately 5 to 20 feet) of transitionally weathered rock typically exists between the saprolite and competent bedrock. The lithology of the transition zone is highly variable and ranges from medium to coarse unconsolidated material to highly fractured and weathered rock fragments. Localized alluvial soils consisting of generally coarser material (silty sand, clayey silt, and silty clay with well-rounded gravel and cobbles) that have been observed in saprolite may be related to historical river channel migration.

Bedrock types present at the site include granitic and migmatitic gneiss, biotite gneiss, and amphibolite, all of which have highly variable mineralogy and texture. Detailed geologic mapping of the site indicates folding and faulting both north and south of the Chattahoochee River. The fault is truncated northwest and southwest of the site by an unnamed, strike-slip fault, referred to as the Yates Fault (Golder 2017). Foliation is dominantly north-south trending and moderately dipping to the southeast. Fracture sets have also been mapped paralleling the foliation orientation. Additional fracture sets have been observed trending northwest/northeast and dipping steeply to the southeast and southwest. The development of the observed faults, foliation orientation, and lithologic variations in the bedrock are interpreted to have created an upright, slightly overturned, west-verging antiformal structure that is present in the central portion of the site (see excerpted map Golder 2017 provided in Appendix A).

Borehole geophysics conducted at the site indicate strike and dip angles of the fractures oriented toward the southeast with an average ranging from 120 (in BH-52) to 146 (in BH-54D) degrees, with an average dip angle of the fractures of approximately 25 (in BH-52) to 33 (in BH-54D) degrees, as reported in Appendix A of the 2021 Annual Groundwater Monitoring and Corrective Action Report (Arcadis 2022a). Fracture data from adjacent boreholes located within the AMA-R6 CCR Landfill area indicate the potential for interconnectivity of various fracture zones across the site. Additionally, fracture orientations encountered in the borehole are similar in orientation to mapped foliation orientations (Golder 2017). Borehole geophysics conducted in BH-52 near PZ-37 in 2021 determined a similar fault orientation and dip angle (toward the southeast and dipping approximately 25 degrees) and further suggest the potential for interconnectivity of structural features beneath and adjacent to the R6 CCR Landfill (Arcadis 2022a).

Groundwater is typically encountered above the saprolite/weathered rock interface. Groundwater flow in the saprolite zone is through interconnected pores and relict textures and fractures. As the rock becomes increasingly competent with depth, groundwater flow occurs mainly through joints and fractures (i.e., secondary porosity). Recharge to the water-bearing zones in fractured bedrock takes place by seepage through the overlying saprolite or by direct entrance through openings in outcrops and varies with topography. The water table occurs in the saprolite and in the transitionally weathered zone, at least several feet above the top of rock.

Figure 7 presents a groundwater elevation map. Groundwater flow direction in the upper aquifer is controlled by topography, drainage features, and human-made surface impoundments (ACC 2020b). The general site-wide groundwater flow direction is from the east to west with localized flow direction controlled by surface water bodies. Groundwater flow beneath the AP-3, A, B, B' and the R6 CCR Landfill in the uppermost aquifer is from three directions: south to north, southeast to northwest, and east to west, as shown on Figure 7. These three flow directions are controlled somewhat by the former surface water drainage swale that meandered from the southeast corner of the site, around the southeast and south corners of the AMA, and between the AMA and the R6 CCR Landfill. The groundwater level data at the site supports topography-controlled groundwater flow with a downward hydraulic gradient from the residuum material in areas of topographic highs and an upward hydraulic gradient near discharge areas.

3.1 Nature and Extent of Groundwater Above the Groundwater Protection Standard

Based on statistical analysis of Appendix IV groundwater data, the cobalt, lithium, and selenium SSLs identified in the compliance wells are horizontally and vertically delineated to levels below GWPS. Based on groundwater data collected to date, horizontal and vertical delineation of these constituents is complete. The distribution of cobalt, lithium, and selenium based on February 2024 data is presented on Figure 8. Monitoring wells with SSLs and the pertinent horizontal and vertical delineation wells are also indicated below in Table 3.

The selenium GWPS exceedances at YGWC-38 and YAMW-5 are horizontally delineated by downgradient wells YGWC-23S and YGWC-36A, PZ-35, and YAMW-1 to below the GWPS.

To delineate the vertical extent of selenium concentrations observed at PZ-37, a deep bedrock boring, BH-52, was drilled in August-September 2021. The boring was also used to characterize the structural features in the bedrock using borehole geophysical tools. The borehole was drilled to a total depth of 200 feet below ground surface (bgs). Core samples from the borehole were logged for lithologic properties. Well construction and development information are provided in Appendix C of the 2021 Annual Groundwater Monitoring and Corrective Action Report (Arcadis 2022a).

After reaching total depth, Arcadis collected borehole geophysical logs using a portable Matrix system manufactured by Mount Sopris Instrument Company in Golden, Colorado. Packer testing was conducted at specified intervals based on the results of the geophysical logging and identified fracture zones.

After the completion of geophysical logging and packer testing, two monitoring wells were installed in the BH-52 borehole (well PZ-52D and PZ-53D) to delineate the nature and extent of selenium and support the understanding of groundwater conditions in the vicinity of PZ-37, PZ-37D, YGWC-38, and YAMW-5. PZ-52D was screened from 82 to 92 feet bgs and PZ-53D was screened from 150 to 160 feet bgs. The well installation procedures and specifications are provided in Appendix C of the 2021 Annual Groundwater Monitoring and Corrective Action Report (Arcadis 2022a). Analytical laboratory results associated with PZ-52D are provided in Table 3.

Concentrations of Appendix IV constituents, including selenium, were less than the GWPS, as shown on Figure 8. PZ-52D will continue to be monitored to provide additional support for delineation of constituents and remedy selection. Since the vertical extent of selenium is delineated by well PZ-52D, the deeper well PZ-53D will be used for water level monitoring and not for routine sampling.

The cobalt and lithium SSLs at well YAMW-3 and YGWC-42, respectively, are horizontally delineated by downgradient well PZ-55 and vertically by PZ-54D to below the GWPS. To delineate the vertical extent of cobalt and lithium concentrations observed at YGWC-42 and YAMW-3, a deep bedrock boring, BH-54D, was drilled in January 2024. As with BH-52, the boring was also used to characterize the structural features in the bedrock using borehole geophysical tools. The borehole was drilled to a total depth of 200 feet bgs and core samples from the borehole were logged for lithologic properties. After the completion of geophysical logging and packer testing, two monitoring wells were installed in the BH-54D borehole at 124 to 134 feet bgs (PZ-54D) and 185 to 195 feet bgs (PZ-56D) to delineate the nature and extent of cobalt and lithium and support the understanding of groundwater conditions. Analytical laboratory results associated with the newly installed PZ-54D are provided in Table 3. Concentrations of Appendix IV constituents, including cobalt and lithium, were less than the GWPS, as shown in Table 3 and Figure 8. PZ-54D will continue to be monitored to provide additional support for delineation of constituents and remedy selection. Since the vertical extent of cobalt and lithium is delineated by well PZ-54D, the deeper well PZ-56D will be used for water level monitoring and not for routine sampling.

Table 3. Cobalt, Lithium, and Selenium Delineation Summary

Detected Constituent	GWPS (mg/L)	Monitoring Well ID	Concentration (mg/L)
Cobalt	0.035	Monitoring Wells with Concentrations Greater than GWPS	
		YAMW-3	0.051 to 0.14[1]
		Vertical Delineation Wells	
		PZ-54D	0.0033 J
		Horizontal Delineation Wells	
		PZ-55	0.0041 J
Lithium	0.040	Monitoring Wells with Concentrations Greater than GWPS	
		YAMW-3	0.047
		YGWC-42	0.049
		Vertical Delineation Wells	
		PZ-54D	0.022 J
		Horizontal Delineation Wells	
		PZ-55	0.0034 J

Detected Constituent	GWPS (mg/L)	Monitoring Well ID	Concentration (mg/L)
Selenium	0.05	Monitoring Wells with Concentrations Greater than GWPS	
		YAMW-5	0.053
		PZ-37	0.13
		Vertical Delineation Wells	
		PZ-37D	< 0.00096
		PZ-52D	0.0099
		Horizontal Delineation Wells	
		YGWC-23S	0.031
		YGWC-36A	< 0.0050 J
		YAMW-1	0.0056
		PZ-35	0.0035 J

Notes:
1. Cobalt data for YAMW-3 are from February 2024 and August 2023, respectively.

< less than reporting limit indication
mg/L = milligrams per liter
J = estimated value

4 Assessment of Correction Measures Summary

An ACM Report was completed in June 2019 (ACC 2019a) in accordance with 40 CFR §257.96 and identified the following corrective measures as potentially applicable to remediate groundwater at the site:

- Geochemical Manipulation (In-Situ Injection [ISI]);
- Hydraulic Containment (Pump and Treat);
- In-Situ Solidification/Stabilization;
- Monitored Natural Attenuation (MNA);
- Phytoremediation;
- Permeable Reactive Barriers; and
- Subsurface Vertical Barrier Walls.

Georgia Power also plans to proactively utilize adaptive site management to support the remedial strategy and address potential changes in site conditions as appropriate. Under an adaptive site management strategy, a remedial approach will be selected whereby: (1) a remedy will be installed or implemented to address current conditions; (2) the performance of the remedy will be monitored, evaluated, and reported semiannually; (3) the CSM will be updated as more data are collected; and (4) adjustments and augmentations will be made to the remedy, as warranted, to achieve site objectives.

Further evaluation and refinement of the groundwater corrective measures since completion of the ACM Report was presented in Semiannual and Annual Remedy Selection Progress Reports submitted in 2019, 2020, 2021, and 2022 (ACC 2019b, ACC 2020a, Arcadis 2020, Arcadis 2021a, Arcadis 2021b, Arcadis 2022a, and Arcadis 2022b). The corrective measures identified for the CCR unit in the ACM Report were further evaluated using the criteria outlined in 40 CFR §257.96(c) and GA EPD Rule 391-3-4.10(6)(a). The screening of the corrective measures, as presented in the Annual and Semiannual Remedy Selection and Design Progress Reports, is summarized in Table 4. Permeable reactive barriers and subsurface vertical barrier walls were screened out due to limits on implementability, performance and effectiveness in the site-specific hydrogeology. In situ stabilization/solidification is impractical to implement at the scale of the site and was also screened out.

The corrective measures that were not screened out and that were retained for further evaluation under the 40 CFR §257.97 remedy selection criteria in this document include the following:

Monitored Natural Attenuation – MNA is defined as the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site remedial approach) to achieve site-specific objectives, in this case GWPS, within a timeframe that is reasonable compared to that offered by other, more active methods (USEPA 2007). MNA is a remedial solution that takes advantage of natural attenuation processes to reduce constituent concentrations in groundwater.

Hydraulic Containment (Pump and Treat) – Hydraulic control/containment (pump and treat) uses groundwater extraction to establish a hydraulic gradient to capture and control the migration of groundwater that is impacted by a constituent of concern. The remedy combines a groundwater extraction system with a treatment system to remove target analytes from the subsurface and/or to control/prevent constituent migration.

Geochemical Manipulation (In-Situ Injections) – ISI is the application of reagents in the subsurface to influence the solubility, mobility, and/or toxicity of inorganic constituents. The injection of a chemical or organic substrate

would be intended to alter geochemical conditions to those more favorable for stabilization of the target constituent.

The two alternatives discussed in further detail below are MNA and ISI, which are retained as corrective measures for evaluation against the remedy selection criteria specified in 40 CFR §257.97(b,c). Hydraulic containment remedies (pump and treat and phytoremediation) are not advanced in the evaluation because they would provide little incremental reduction of the current extent of the constituents above GWPS outside the waste boundary beyond what the subsurface drain provides. Based on flow modeling, the drain is anticipated to capture groundwater on the west side of the landfill upgradient of the selenium, lithium, and cobalt SSLs, and additional hydraulic containment is similarly anticipated to provide little incremental value (Appendix C). However, pump and treat could be considered during adaptive management over the course of remedy implementation. Table 4 summarizes measures retained for further evaluation and adaptive management.

Alternative 1: MNA

Alternative 1 relies on natural attenuation processes to achieve the GWPS at the waste boundary. Natural attenuation processes, including adsorption and ion exchange (i.e. sorption) are sufficient to decrease concentrations of cobalt and lithium; while sorption, dilution, and dispersion are sufficient to decrease concentrations of selenium below the GWPS at the waste boundary as demonstrated in the geochemical CSM and site-specific demonstration of natural attenuation (Appendices B and F). Consistent with Environmental Protection Agency guidance for the implementation of MNA for inorganics (USEPA 2015), consideration of MNA based on these mechanisms is considered in this evaluation as a polishing step for the groundwater plume in light of unit closures and related source control benefits. The conceptual remedy design for Alternative 1 is shown on Figure 9.

Alternative 2: ISI

Alternative 2 relies on stabilizing cobalt, lithium, and/or selenium by altering geochemical conditions in groundwater using in situ injections. In situ immobilization of cobalt, lithium, and/or selenium could be achieved through the addition of various in situ reagents. For example, reagents to achieve the reduction of selenium to insoluble forms like elemental selenium or iron selenides include inorganic reagents (e.g., various forms of iron) or organic reagents (e.g., sugars, alcohols or oils) to promote chemical and/or biotic reduction and other immobilization mechanisms. For the purpose of evaluating ISI against the remedy selection criteria, a conceptual design was considered. In the conceptual design, the injections use a form of zero-valent iron (ZVI) to immobilize selenium through reduction and adsorption and to immobilize lithium and cobalt through adsorption and co-precipitation as sulfides. To evaluate this alternative, hypothetical ZVI injections are conceptualized in various transects to create in-situ reactive zones; as groundwater passes through the zone, cobalt, lithium, and/or selenium are immobilized. Each transect consists of approximately 15 to 20 injection points, spaced 10 feet apart with injection screened intervals located within saprolite and partially weathered rock units. The conceptual remedy design for Alternative 2 is shown on Figure 10.

Preliminary or conceptual remedy design drawings of the two alternatives are shown on Figures 9 and 10. Because the layouts are considered conceptual, the configuration of the implemented remedy may be adjusted during the detailed design process.

5 Corrective Measures Evaluation

The purpose of this section is to evaluate the two corrective measures alternatives under the required criteria described in 40 CFR §257.97(b) and rank them using the comparative criteria described in 40 CFR §257.97(c).

5.1 Required Criteria (§257.97(B))

As described in 40 CFR §257.97(b), for a groundwater corrective measure to be selected, it must meet the following criteria:

- *Be protective of human health and the environment;*
- *Attain the GWPS as specified pursuant to 40 CFR §257.95(h);*
- *Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to this part into the environment;*
- *Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and*
- *Comply with standards for management of wastes as specified in 40 CFR §257.98(d).*

The corrective measures alternatives are evaluated against the required criteria in the following subsections. As shown below, both alternatives evaluated meet or exceed the required criteria.

5.1.1 Protective of Human Health and the Environment (§257.97(b)(1))

CCR is classified as a non-hazardous RCRA solid waste, a determination confirmed in 40 CFR §257 Preamble part III.A. Nevertheless, Georgia Power conservatively and protectively conducted a risk evaluation. The Risk Evaluation Report (Wood 2021) was prepared for Plant Yates and was submitted in the remedy selection and design progress report dated January 2021 and has been updated in Appendix D. The evaluation is one of many lines of evidence presented herein and factored into the remedy selection process. The risk evaluation for the SSL-related constituents in groundwater at Plant Yates was conducted using methods consistent with GA EPD and USEPA guidance and included multiple conservative assumptions. A conceptual exposure model was developed, initial groundwater risk screening was conducted, and a refined risk evaluation was conducted for retained constituents of potential interest for hypothetical off-site receptors. Selenium, cobalt, and lithium were delineated to concentrations not exceeding health-protective screening criteria on site. Based on the evaluation, selenium, cobalt, and lithium observed in groundwater at the site are not expected to pose a risk to human health or the environment.

Accordingly, no further risk evaluation of groundwater or surface water is warranted in connection with the remedy selection process. Because no adverse human health or environmental risk currently exists, human health and the environment will be protected through implementation of both of the remedies being evaluated.

5.1.2 Attain the Groundwater Protection Standards (§257.97(b)(2))

Both of the proposed remedies are anticipated to attain the GWPS at the compliance boundary (waste boundary). For each of the remedies retained, attainment of the GWPS is expected based on constituent transport evaluations.

Alternative 1- MNA was evaluated for ability to reach groundwater protection standards and other criteria using USEPA issued MNA technical guidance specific to inorganic constituents (USEPA 2007) that contained four "tiers," which were later described as "phases" (USEPA 2015). Under this guidance, each successive phase of the MNA evaluation is designed to progressively consider existing and long-term attenuation characteristics of the aquifer and incrementally reduce uncertainty at each decision-making screening step. Supporting data interpretations from the Geochemical CSM (Appendix B) and the Site-specific Demonstration of Natural Attenuation (Appendix F) were used to inform the phased evaluation as follows:

Phase I: Demonstration that the groundwater plume is not expanding through Mann-Kendall analysis of historical analytical data.

Phase II: Determination that the mechanism and rate of the attenuation process are sufficient through speciation analysis, general chemical analysis, mineralogical analysis, sorption studies and Sen's slope analysis, where concentrations are declining.

Phase III: Determination that the capacity of the aquifer is sufficient to attenuate the mass of contaminant within the plume through mineralogical analysis and sorption studies and the stability of the immobilized contaminant is sufficient to resist remobilization through analysis of likely future groundwater conditions.

Phase IV: Design of a performance monitoring program based on an understanding of the mechanism of the attenuation process, and establishment of contingency remedies tailored to site-specific characteristics will be forthcoming upon approval of the Remedy Selection Report.

Alternative 2- ISI would also support the attainment of GWPS for cobalt, lithium, and selenium as demonstrated during bench-scale testing presented in Appendix B.

For selenium, the groundwater flow and constituent transport evaluations, and associated input parameters, for both of the remedies are described in detail in Appendix C and show that the GWPS can be met at the compliance boundary within 8 years from the date of this report, based on a 2022 modeling prediction of 10 years (Appendix C to the Draft Remedy Selection Report). Additional statistical trend evaluation for Alternative 1 (MNA) corroborates this timeframe estimate (Appendix E). Lithium at YGWC-42 increased in the first several years following the R6 CCR Landfill closure and then began to stabilize from mid-2021 to 2024. Cobalt concentrations at YAMW-3 are varying, but stable in the small data set developed since sampling for cobalt was initiated in 2022. The stability of cobalt and lithium are consistent with the stability requirements for selecting MNA in phase I of the MNA evaluations. Additional time will show how long stable concentrations will persist before decreasing toward the GWPS, as the benefits of closure are further realized and as the subsurface drain engineering measure is brought on-line.

5.1.3 Control the Source of Release (§257.97(b)(3))

In connection with a remedy, the source of the contamination must be controlled to reduce or eliminate, to the maximum extent feasible, further releases by identifying and locating the cause of the release. The following section describes how the source control required criteria is met in connection with each evaluated alternative.

Closure-in-place is being completed safely and in compliance with applicable federal and state regulations and is protective of public health and the environment. Closure construction is complete at the R6 Landfill and is being implemented at the AMA by consolidation and capping of CCR material. Closure of the CCR units will contribute to a reduction in concentrations of Appendix IV constituents in downgradient groundwater and overall attenuation of groundwater concentrations, as is already being demonstrated by site groundwater concentration trends (Appendix B).

In addition, Georgia Power has incorporated an engineering measure into the closure design. The engineering measure selected for Plant Yates includes a subsurface drain for the collection and conveyance of groundwater. The purpose of the subsurface drain is to collect and remove groundwater from the area, which will result in lowering the potentiometric surface. The effect of the decrease in the groundwater elevation translates into a reduction in the volume of CCR present below the potentiometric surface as compared to pre-closure conditions. In addition, the subsurface drain will remove and manage groundwater that has been in contact with CCR.

The control provided by the closure ensures that, for the purpose of remedy selection, the control requirement is met for all corrective measures being evaluated. Neither of the alternatives will interfere with the control provided by the closure in 40 CFR §257.102.

In addition, Appendix IV constituents beyond the waste boundary that are present above GWPS will be controlled by the groundwater remedy:

MNA – The natural attenuation processes that are at work in such a remedial approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of constituents in groundwater. To support MNA as a potential corrective action, data collected from soil and groundwater analyzed in laboratory studies show specific immobilization and other attenuation mechanisms such ion exchange and adsorption (i.e. sorption) for cobalt and lithium; and sorption, dilution, and dispersion for selenium will occur and are anticipated to be stable, as documented in the geochemical CSM in Appendix B and the site-specific demonstration of natural attenuation in Appendix F. These in-situ processes, applicable to inorganic constituents found in CCR, effectively attenuate the movement of inorganic CCR constituents in groundwater, thereby controlling contaminant release/movement beyond the waste boundary. Consistent with Environmental Protection Agency guidance for the implementation of MNA for inorganics (USEPA 2015), consideration of MNA based on these mechanisms is considered in this evaluation as a polishing step for the groundwater plume in light of unit closures and related source control benefits.

ISI – Cobalt and lithium can be immobilized by adsorption and precipitation. Selenium can be immobilized under different combinations of pH and oxidation-reduction (redox) conditions. ISI would create an in-situ reactive zone at two transects on the southeast side of the R6 CCR Landfill for selenium and one transect on the west side for cobalt and lithium, creating conditions for redox reactions and physical processes to take place. These processes would chemically immobilize constituents in groundwater through precipitation and/or sorption, which effectively remove the constituents from groundwater, thereby controlling contaminant release/movement beyond the waste boundary.

5.1.4 Removal of Contaminated Material from the Environment (§257.97(b)(4))

The remedial alternatives retained for further consideration would be effective at removing Appendix IV constituents from groundwater, either through processes of immobilization or chemical attenuation in groundwater, as provided below:

The remedies considered herein remove contaminated material from the environment as follows:

MNA – The natural attenuation processes that are at work in such a remedial approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. Sorption and redox reactions are the dominant mechanisms responsible for the reduction of mobility, toxicity, or bioavailability of inorganic contaminants. These processes remove contamination from the environment by reducing the presence of contaminants in groundwater.

Geochemical Approaches (In-Situ Injection) – Cobalt and lithium can be immobilized by adsorption and precipitation. Selenium can be immobilized under different combinations of pH and redox conditions. Injections would create an in-situ reactive zone in the areas where cobalt, lithium, or selenium are present above GWPS beyond the waste boundary. The injections remove contamination from the environment by reducing the presence of contaminants in groundwater through immobilization and/or precipitation.

5.1.5 Comply with Waste Management Standards (§257.97(b)(5))

In accordance with 40 CFR §257.98(d), any waste generated during the implementation of any of the remedies under consideration would be managed in a manner that complies with any applicable requirements of the Resource Conservation and Recovery Act and the Georgia Comprehensive Solid Waste Management Act.

Table 5. Summary of Required Criteria

Required Criteria	Alternative 1 - (MNA)	Alternative 2 - (ISI)
Be protective of human health and the environment	✓	✓
Attain the groundwater protection standards	✓	✓
Control the source of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of Appendix IV constituents into the environment	✓	✓
Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems	✓	✓
Management of waste to comply with all applicable RCRA requirements	✓	✓

5.2 Comparative Criteria (§257.97(C))

This section compares the alternatives using the comparative criteria listed in 40 CFR §257.97(c). Each of the comparative criteria consists of several sub-criteria listed in the CCR Rule, which are considered in this remedy selection below. The goal of this analysis is to further evaluate the alternatives that meet the required criteria to support remedy selection. Consistent with 40 CFR §257.98(b), the selected and implemented remedy will be continually evaluated and, if warranted, modified consistent with adaptive management practices.

A graphic is provided for each category of comparative criteria to visually depict the favorability of each alternative, where dark green represents that the "option's performance under this criterion is *highly favorable*," medium green represents that the "option performs *favorably* under this criterion," and light green represents that the "option performs *less favorably* under this criterion."

Color Legend:

	Option's performance under this criterion is *highly favorable*
	Option performs *favorably* under this criterion
	Option performs *less favorably* under this criterion

5.2.1 Long- and Short-Term Effectiveness and Protectiveness

This comparative criterion takes into consideration the following sub-criteria relative to the long-term and short-term effectiveness of each remedy. Long-term effectiveness and permanence mean that the remedy will protect human health and the environment after the GWPS have been met.

The short-term effectiveness means that the remedy will be protective of human health and the environment during construction and implementation of the remedy. The degree of protection and the time period to achieve GWPS are also considered.

5.2.1.1 Magnitude of reduction of existing risks

As indicated by the nature and extent evaluation, the most recent groundwater sampling results, and the Risk Evaluation Report summarized in Section 5.1.1, Appendix IV constituents in groundwater at the site are not expected to pose a risk to human health or the environment. Therefore, this criterion is considered highly favorable for both remedial alternatives. In addition, each groundwater remedy retained for this comparative analysis will be effective at reducing concentrations to levels below the GWPS, as described in Section 5.1.2 above.

5.2.1.2 Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy

Unit closure provides effective source control, as described in Section 2.3 above. As noted in the groundwater modeling report (Appendix C), each of the groundwater remedies retained for comparison will be effective at reducing the concentration of selenium in groundwater beyond the waste boundary to levels below the GWPS. The results of bench testing presented in Appendix B indicate that both MNA and ISI are capable of reducing the

concentrations of cobalt and lithium to less than GWPS. The MNA remedy has a contingency in situ technology that has been tested to ensure achievement of GWPS. Consequently, all remedies being evaluated perform similarly for purposes of this criterion and, therefore, this criterion is considered highly favorable for both remedies being evaluated.

5.2.1.3 The type and degree of long-term management required, including monitoring, operations, and maintenance

In accordance with 40 CFR §257.97(c)(1)(iii), this sub-criterion considers the long-term management of each groundwater remedy.

Both Alternative 1 - MNA and Alternative 2 - ISI will require monitoring during the period to reach GWPS and after for 3 years. The duration of groundwater remedy monitoring is anticipated to be somewhat less for Alternative 2 (see section 5.2.1.5). However, Alternative 2 may require greater activity for initial and/or on-going injections and associated maintenance of injection infrastructure for re-injection during the period to reach GWPS, and so is considered less favorable overall than Alternative 1. In addition to groundwater remedy monitoring, per CCR rule requirements, post closure care monitoring, including groundwater sampling and reporting, will continue for no less than 30 years because this is a closure in place site.

5.2.1.4 Short-term risks that might be posed to the community or the environment during implementation of such a remedy

In accordance with 40 CFR §257.97(c)(1)(iv), this sub-criterion relates to the potential for threats to human health (including without limitation worker safety and the community) and the environment associated with remedy implementation.

Community impacts include general impacts to the community, such as increased truck traffic, noise, and vehicle emissions during construction. Although Alternative 2 (ISI) will require active injection implementation beyond what is anticipated for Alternative 1 (MNA), the impact to the community will be minimal for both alternatives. For both alternatives, remedial activities will take place on Georgia Power property. Based on these considerations, both alternatives are rated highly favorable for this criterion.

5.2.1.5 Time until full protection is achieved

Receptors are already protected because Appendix IV constituents in groundwater at the site are not expected to pose a risk to human health or the environment. However, in accordance with 40 CFR §§257.98(c)(1) and (2), a remedy is considered complete when the GWPS is achieved at all points within the plume at and beyond the compliance boundary for 3 consecutive years. Remedial alternatives that require less time to meet the GWPS at the compliance boundary would be considered more favorably under this metric.

For selenium, the timeframes to achieve the GWPS at the waste boundary were evaluated using a predictive groundwater flow and transport model (Appendix C) and trend analysis (Appendix E), and all timeframes are considered reasonable. Predictions to meet GWPS at PZ-37 were used to represent the timeframe to reach GWPS at the compliance boundary. Solute transport modeling for selenium predicts GWPS are reached within approximately 8 years from the date of this report, based on a 2022 modeling prediction of 10 years (Appendix C to the Draft Remedy Selection Report), while the trend analysis indicated GWPS would be reached between within two to five years from the date of submittal of this report. Solute transport modeling indicated GWPS at PZ-

37 would be reached for Alternative 2 - ISI within approximately a year of injections. Alternative 1 - MNA is predicted to take more time to achieve the GWPS than Alternative 2 - ISI. For lithium and cobalt, the bench testing data (Appendix B) indicates rapid treatment is possible for the Alternative 2 - ISI. Lithium and cobalt concentrations at locations with SSLs are currently stable. Additional time is needed to determine how long stable concentrations will persist before decreasing toward the GWPS. This attenuation timeframe will be further enhanced as the benefits of closure are further realized and as the AMA drain is brought online. Alternative 1 - MNA for cobalt and lithium would be relatively longer than Alternative 2 - ISI for lithium and cobalt. However, the MNA remedy has a tested in situ technology incorporated as a contingency to ensure achievement of GWPS. GWPSs for lithium and cobalt with Alternative 1 MNA could be achieved with implementation of the contingency, as needed, within the 10-year timeframe, comparable to the Alternative 1 - MNA timeframe for selenium.

Based on the analysis presented in this section, Alternative 1 - MNA was rated favorable, while Alternative 2 - ISI is rated highly favorable. However, both achieve GWPS within a reasonable timeframe.

5.2.1.6 Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment

In accordance with 40 CFR §257.97(c)(1)(vi), this sub-criterion considers elements such as CCR outside of the unit boundary or the handling of impacted groundwater encountered during construction and operation of the remedy.

Alternative 1 - MNA and Alternative 2 - ISI are considered highly favorable and comparable to each other since neither approach requires management of remaining wastes and potential exposure through contact with CCR or groundwater is minimal for both alternatives.

5.2.1.7 Long-term reliability of the engineering and institutional controls

The following describes the overall long-term reliability for each of the proposed groundwater remedial alternatives for purposes of comparison. Of note, the reliability of all alternatives is bolstered by the long-term reliability of the closure method and its expected positive effect on groundwater conditions.

Alternative 1 - MNA is expected to have high long-term reliability and is considered highly favorable with respect to this criterion. Alternative 2 - ISI is only considered favorable since this remedy would also require:

1. extensive field pilot studies and bench-scale testing,
2. rely on injection systems to implement and maintain,
3. potentially be vulnerable to subsurface reliability issues such as injection point fouling,
4. uneven reagent distribution in a fractured bedrock system, and
5. could require multiple injections if the duration of reliable geochemical conditions stimulated is not adequate.

Deed restrictions to prevent exposure to impacted groundwater will be equally reliable for both alternatives.

5.2.1.8 Potential need for replacement of the remedy

Any need to replace a remedy would be based on a systematic site review during the remedy implementation process if warranted to improve remedy protectiveness, increase effectiveness, or facilitate progress toward meeting site goals. In accordance with 40 CFR §257.98(b), adaptive site management practices will be used to modify or replace the remedy if the requirements of 40 CFR §257.97(b) are not being achieved.

Alternative 1 - MNA is considered the remedy with the lowest likelihood of requiring replacement because natural processes will reduce the concentrations of Appendix IV constituents in groundwater over time and monitoring infrastructure typically does not require frequent replacement. Alternative 2 - ISI, which relies on in situ treatment to address cobalt, lithium, and selenium, is considered less favorable because the longevity of the reagent for treatment of these constituents is uncertain and re-injections could be required.

During the implementation process, all remedies will be evaluated for effectiveness and modified if remedial objectives are not being met, in accordance with adaptive site management practices and 40 CFR §257.98(b).

5.2.1.9 Long- and short-term effectiveness summary

This subsection provides a summary of the eight 40 CFR §257.97(c)(1) sub-criteria that are discussed in this section relative to long- and short-term effectiveness.

Overall, Alternative 1 - MNA is highly favorable while Alternative 2 - ISI is favorable with respect to long- and short- term effectiveness and protectiveness. Both alternatives perform highly favorably with respect to reduction of residual risks and short-term risks to the community and human and environmental receptors during remedy implementation. While Alternative 2 - ISI is projected to reach GWPS at the waste boundary more quickly than Alternative 1 - MNA, both achieve GWPS within a reasonable timeframe. Alternative 2 - ISI requires further in-field pilot testing to evaluate short and long-term effectiveness and reliability and could result in a greater degree of long-term management if re-injections are required.

Table 6. Category 1 – Long- and Short-Term Effectiveness, Protectiveness, and Certainty of Success Summary

	Alternative 1 - (MNA)	**Alternative 2 - (ISI)**
Sub-Criterion i. Magnitude of reduction of existing risks		
Sub-Criterion ii Magnitude of residual risk in terms of likelihood of further release		
Sub-criterion iii Type and degree of long-term management required		
Sub-criterion iv Short term risk to community or environment during implementation		
Sub-criterion v Time until full protection is achieved		
Sub-criterion vi Potential for exposure of humans and environmental receptors to remaining wastes		
Sub-criterion vii Long-term reliability of engineering and institutional controls		
Sub-criterion viii Potential need for replacement of the remedy		
Category 1 Summary		

Color Legend:

Option's performance under this criterion is *highly favorable*

Option performs *favorably* under this criterion

Option performs *less favorably* under this criterion

5.2.2 Source Control Effectiveness

As described in Section 5.1.3 above, the source control required criteria is satisfied in connection with both of the alternatives being evaluated. Specifically, in connection with closure, CCR material will be controlled through consolidation, where applicable, capping, and an engineering measure. The R6 CCR Landfill was closed in place and covered with an compacted clay cap in accordance with the closure plan. Within the AMA, CCR is consolidated within the AMA waste footprint, moisture conditioned, spread, and compacted prior to capping with the final cover system. The final cover system will eliminate infiltration to the maximum extent feasible through the

CCR. Finally, the engineering measure selected for Plant Yates is a subsurface drain system that will serve as a hydraulic conveyance for the collection and removal of groundwater. A Georgia-registered professional engineer certified that the closure design meets the requirements of the CCR Rule.

This comparative criterion takes into consideration the ability of the remedy to control a future release and the extensiveness of treatment technologies that will be required.

5.2.2.1 The extent to which containment practices will reduce further releases

Because the source material will be controlled following CCR unit closure, the potential for further release will be substantially reduced. Appendix IV constituents that are present in groundwater at or currently beyond the waste boundary will be controlled by the groundwater remedy. Therefore, all groundwater remedy alternatives are considered highly favorable for this sub-criterion.

Alternative 1 - MNA will further reduce and remove selenium, cobalt, and lithium from the groundwater by natural attenuation processes. Geochemical data also indicates selenium reduction may be a potential mechanism in some portions of the site (Appendix B). Alternative 1 - MNA is anticipated to reduce concentrations of selenium to the GWPS at the waste boundary and prevent further releases downgradient of the waste boundary and is highly favorable. Alternative 1- MNA will reduce cobalt and lithium to GWPS either through MNA itself or implementation of the identified contingency of ISI. Alternative 2 - ISI is also highly favorable and will also further reduce cobalt, lithium and selenium concentrations and remove those constituents from groundwater, preventing further releases downgradient of the waste boundary.

5.2.2.2 The extent to which treatment technologies may be used

This section evaluates 40 CFR §257.97(c)(2)(ii) regarding the extent to which treatment technologies may be used. Alternatives that include more limited treatment approaches may be considered less favorable. Alternatives that rely on more extensive treatment approaches may be considered more favorable.

Alternative 2 - ISI relies on in-situ treatment with active injections to reduce concentrations of cobalt, lithium, and selenium to GWPS at the waste boundary and prevent further releases downgradient of the waste boundary. Alternative 1 - MNA, relies on natural attenuation as the treatment mechanism and, while predicted to be effective at reducing cobalt, lithium, and selenium concentrations at the waste boundary, would be considered less favorable with respect to this criterion. Because Alternative 2 adds a treatment technology, it is considered more favorable than Alternative 1.

5.2.2.3 Source control effectiveness summary

This subsection provides a summary of the two 40 CFR §257.97(c)(2) sub-criteria discussed in this section relative to effectiveness. Given that source control measures will be used and are the main driver to control additional releases, overall both alternatives are highly favorable for the category of source control. Adaptive site management strategies will be implemented to achieve GWPS.

Table 7. Category 2 – Source Control Effectiveness Summary

	Alternative 1 - (MNA)	Alternative 2 - (ISI)
Sub-criterion i Extent to which containment practices will reduce further releases		
Sub-criterion ii Extent to which treatment technologies may be used		
Category 2 Summary		

Color Legend:

Option's performance under this criterion is *highly favorable*

Option performs *favorably* under this criterion

Option performs *less favorably* under this criterion

5.2.3 Ease of Implementation

This comparative criterion takes into consideration technical and logistical challenges required to implement a remedy, including practical considerations such as equipment availability and disposal facility capacity.

5.2.3.1 Degree of difficulty associated with constructing the technology

This sub-criterion considers the relative technical difficulty of implementing each of the remedies.

Implementation of a long-term monitoring program to confirm attenuation is straightforward; therefore, Alternative 1 - MNA is considered highly favorable. Alternative 2 - ISI is considered favorable; however, in-situ treatment will require additional treatability testing and field pilot studies, making it less favorable than Alternative 1.

5.2.3.2 Expected operational reliability of the technologies

This subsection compares the operational reliability of each of the proposed remedies in accordance with 40 CFR §257.97(c)(3)(ii). Typically, simple remedies that do not require the installation of significant infrastructure are generally more reliable and do not require significant operation and maintenance; more complex remedies that rely on groundwater flow or ISI or mechanical systems would be considered less favorable.

Alternative 1 - MNA and Alternative 2 - ISI are considered highly favorable with respect to operational reliability. Site-specific data and solute transport modeling for selenium indicate that MNA will be reliable with monitoring and implementation of contingencies, as needed. In-situ injections may require re-injection, but those injections would be periodic and would not require constant maintenance of operating equipment that would pose a challenge for reliability.

5.2.3.3 Need to coordinate with and obtain necessary approvals and permits from other agencies

Section 40 CFR §257.97(c)(3)(iii) requires consideration be given and compared between remedies regarding the various agencies and type of permits that would be required for implementation of the groundwater remedy. A remedial alternative that could require several permits (for example, a pump and treat system) would be considered less favorable when compared to a remedial alternative that would require fewer permits (for example, MNA).

Implementation of the MNA remedy for groundwater is straightforward; therefore, Alternative 1 - MNA is highly favorable. Alternative 2 - ISI will require additional treatability testing, permitting, and approvals for field-scale pilot testing and full-scale injection, and is considered less favorable with respect to this criterion.

5.2.3.4 Availability of necessary equipment and specialists

Generally, remedies that could be implemented by local contractors and without specialty contractors or experts may be considered more favorable. Consideration should be given to specialty contractor/consultant proximity to the CCR unit, contractor or equipment availability, and the effectiveness of the proposed remedy on similar sites.

Both Alternative 1 - MNA and Alternative 2 - ISI require specialists in geochemistry, while in-situ injections also require specialists in the design and implementation of the injections themselves. Alternative 1 - MNA does not require specialty equipment beyond typical equipment for monitoring well installation and groundwater sampling. Alternative 2 - ISI will require equipment for drilling and injection well installation or direct injections, although the qualified contractors and equipment required should not present a challenge. Implementation of both alternatives would potentially be subject to challenges experienced with the global supply chain issues in recent years, although the impact for MNA would be minimal given that the monitoring well network is already largely in place. Overall, the alternatives are both considered highly favorable with respect to this criterion.

5.2.3.5 Available capacity and location of needed treatment, storage, and disposal services

This sub-criterion (40 CFR §257.97(c)(3)(v)) considers disposal options for materials generated by the groundwater remedy and land area that are available for implementation of the remedy.

Alternative 1 - MNA is considered highly favorable since no additional treatment, storage, or disposal services are anticipated. Alternative 2 - ISI is also considered highly favorable since treatment will be in-situ and generate minimal waste.

5.2.3.6 Ease of implementation summary

This subsection provides a summary of the five 40 CFR §257.97(c)(3) sub-criteria discussed in this section relative to the ease or difficulty of implementing the remedy.

Alternative 1 - MNA is highly favorable in each sub-criterion for ease of implementation because it is a straightforward implementation without additional equipment, permits, or other difficulties. Alternative 2 - ISI is less favorable for ease of implementation because it requires additional equipment installation, pilot testing, and permitting and may introduce unforeseen difficulties with implementation.

Table 8. Category 3 – Ease of Implementation Summary

	Alternative 1 - (MNA)	**Alternative 2 - (ISI)**
Category 3 – Sub-criterion i Degree of difficulty associated with constructing the technology		
Category 3 – Sub-criterion ii Expected operational reliability of the technologies		
Category 3 – Sub-criterion iii Need to coordinate with and obtain necessary approvals and permits from other agencies		
Category 3 – Sub-criterion iv Availability of necessary equipment and specialists		
Category 3 – Sub-criterion v Available capacity and location of needed treatment, storage, and disposal services		
Category 3 Summary		

Color Legend:

Option's performance under this criterion is *highly favorable*

Option performs *favorably* under this criterion

Option performs *less favorably* under this criterion

5.2.4 Evaluation of Comparison Criteria

The various sub-criteria were evaluated, and relative comparisons were made between the remedial alternatives to determine which remedy or remedies would be expected to be the most and least favorable regarding the certainty of success. The results of this comparison are summarized in the Table below.

Table 9. Summary of Comparison Criteria

	Alternative 1 - (MNA)	Alternative 2 - (ISI)
Category 1 Long- and Short-Term Effectiveness, Protectiveness, and Certainty of Success		
Category 2 Effectiveness in controlling the source to reduce further releases		
Category 3 Ease of implementation		

Color Legend:

	Option's performance under this criterion is *highly favorable*
	Option performs *favorably* under this criterion
	Option performs *less favorably* under this criterion

Both Alternative 1 - MNA and Alternative 2 - ISI are anticipated to be effective in controlling the source to prevent further releases. Alternative 1- MNA for lithium and cobalt requires additional data collection to determine if the in situ contingency remedy will be needed. Alternative 2 - ISI requires further testing to evaluate short and long-term effectiveness and reliability, is more difficult to implement and could require re-injections. Alternative 1 - MNA is considered more favorable overall, given the favorable assessment of effectiveness and ease of implementation in comparison to the in-situ alternative.

5.3 Public Meeting and Community Engagement

As noted in Section 2.1 above, this criterion will be addressed in the Remedy Selection Report to be submitted to GA EPD after a public meeting.

6 Proposed Remedy Selection

This section provides a summary of the proposed groundwater remedy and a schedule for remedy implementation in accordance with 40 CFR §257.97(d). Georgia Power also plans to proactively utilize adaptive site management to support the remedial strategy and address potential changes in site conditions as appropriate. Under an adaptive site management strategy, a remedial approach will be selected whereby: (1) a corrective measure will be installed or implemented to address current conditions; (2) the performance of the corrective measure will be monitored, evaluated, and reported semiannually; (3) the CSM will be updated as more data are collected; and (4) adjustments and augmentations will be made to the corrective measure(s), as needed, to ensure that performance criteria and the GWPS are met.

6.1 Summary of Proposed Remedy

Based on the evaluation of corrective measures, using the required and comparative criteria presented in Section 5, Alternative 1 (MNA) is the proposed remedy for cobalt, lithium, and selenium in groundwater above the GWPS beyond the waste boundary (Figure 9). MNA is proposed based on the site-specific demonstration of natural attenuation mechanisms, capacity, stability, and favorable protectiveness, effectiveness, and ease of implementation in comparison to the in-situ alternative. The site-specific demonstration of natural attenuation is described Appendix F.

While Alternative 1 - MNA is the proposed remedy for cobalt and lithium, additional time is needed to understand how concentrations are responding to the closure of the R6 CCR Landfill and future activities. Lithium at YGWC-42 increased in the first several years following the R6 CCR Landfill closure and then began to stabilize from mid-2021 to 2024. Cobalt concentrations at YAMW-3 are varying, but stable in the small data set developed since sampling for cobalt was initiated in 2022. The stability of cobalt and lithium are consistent with the stability requirements for selecting MNA in Phase I of the MNA evaluations. Additional time will show how long stable concentrations will persist before decreasing toward the GWPS, as the benefits of closure are further realized and as the AMA drain is brought on-line. As such, it is proposed to implement Alternative 1 - MNA for cobalt and lithium for 10 semiannual sampling events (i.e. five years). If decreasing cobalt and lithium concentration trends are not identified during this timeframe, then the tested in situ option presented in Appendix B will be implemented as a contingency, consistent with phase IV of the MNA framework.

Other remedial technologies and alternatives considered, but not proposed, herein are retained as options for adaptive management and include ISI, hydraulic containment, and phytoremediation.

6.2 Schedule

In accordance with 40 CFR §257.97(d), the following factors were considered when developing the schedule:

Extent and nature of contamination: The horizontal and vertical extent of Appendix IV constituents present in groundwater are delineated. The selected remedy will address groundwater impacts and adaptive site management practices will be utilized to evaluate whether to modify the remedial approach.

Reasonable probabilities of remedial technologies in achieving compliance with the GWPS and other remedial objectives: The selected remedy is expected to achieve compliance with the GWPS within 8 years from the date of this report, based on a 2022 modeling prediction of 10 years (Appendix C to the Draft Remedy

Selection Report). As considered in Section 5 of this report, the selected remedy is expected to address Appendix IV constituents in groundwater. If adequate progress is not made toward achieving the GWPS, Georgia Power will modify the remedial approach under the adaptive site management strategy, in accordance with 40 CFR §257.98(b), including implementation of the in situ contingency for cobalt and lithium if declining concentrations are not identified before the end of the 5-year period of semi-annual sampling. Site- and remedy-specific performance metrics will be developed and documented in the Corrective Action Groundwater Monitoring Plan.

Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy: As described in Section 5.1.1 of this report, the risk evaluation for cobalt, lithium, and selenium in groundwater at Plant Yates was conducted using methods consistent with GA EPD and USEPA guidance, included multiple conservative assumptions, and concluded that groundwater conditions are not expected to pose a risk to human health or the environment. Because of the lack of risk to human health and the environment, this factor will not impact the project schedule. Additional risks that may be present during remedy implementation are considered in Section 5 of this report, as required under 40 CFR §257.97(c)(1).

Resource value of the aquifer: As summarized in Section 5.1.1 of this report and detailed in the risk evaluation, no downgradient drinking water receptors or surface water ecological receptors were identified. Given that receptors are absent downgradient from the CCR unit, an alternative drinking water supply or interim remedial measure, as outlined in 40 CFR §257.98(a)(3), is not necessary. Further, Georgia Power will retain ownership of the site, and future development for non-industrial purposes is not currently anticipated. Because no downgradient drinking water receptors or surface water ecological receptors have been identified, this factor will not impact the project schedule.

The schedule for implementing and completing the groundwater remedial activities is described below. The general approach and implementation schedule will be modified based on new groundwater quality data obtained during the remedial implementation process, following adaptive site management practices and in accordance with 40 CFR §257.98(b).

6.2.1 Planning and Design

Planning and design of Alternative 1 includes the development of the Corrective Action Groundwater Monitoring Plan to continue to evaluate the performance of the selected remedy to reach and maintain the GWPS at the waste boundary through temporal and spatial groundwater quality monitoring. In accordance with 40 CFR §257.98(a) the Corrective Action Groundwater Monitoring Plan and program will be established within 90 days of selection of the groundwater remedy.

6.2.2 Construction and Implementation

The infrastructure of the groundwater MNA remedy is largely in place with the existing monitoring network. In accordance with 40 CFR §257.98(a), the Corrective Action Groundwater Monitoring Plan and program will be established within 90 days of selection of the groundwater remedy; however, if new monitoring well locations are deemed necessary in the approval process of the monitoring plan, additional time for installation may be required.

6.2.3 Operation

It is anticipated that the selected alternative will achieve concentrations less than the GWPS at the waste boundary within 10 years of implementation. The groundwater remedy will be considered complete when

applicable regulatory requirements are satisfied. In accordance with adaptive site management practices and 40 CFR §257.98(b), the groundwater remedy will be modified if it is determined that the site goals are not being met or will not be met.

6.3 Reporting

In accordance with 40 CFR §257.105(h), Georgia Power will place the Remedy Selection Report into the site operating record. Thereafter, Georgia Power will develop a corrective action groundwater monitoring program and implement and report on the selected remedy implementation and monitoring in accordance with applicable regulatory requirements.

7 References

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Tables

Table 1
Monitoring Network Well Summary
2024 Remedy Selection Report
Plant Yates - AP-3, A, B, B' and R6 CCR Landfill

Well ID	Well Designation	Location	Northing	Easting	Ground Surface Elevation (ft)	Top of Casing Elevation (ft)	Top of Screen Elevation (ft)	Bottom of Screen Elevation (ft)	Total Well Depth (ft bTOC)	Groundwater Zone Screened	Installation Date
YGWA-4I	Detection	Upgradient	1254436.68	2075455.62	781.9	784.21	745.70	735.70	48.81	PWR/Transition Zone	5/21/2014
YGWA-5I	Detection	Upgradient	1254399.95	2076218.86	782.1	784.54	735.90	725.90	58.94	PWR/Transition Zone	5/21/2014
YGWA-5D	Detection	Upgradient	1254396.67	2076223.63	781.9	784.53	706.00	656.00	129.13	Deep Bedrock	5/21/2014
YGWA-17S	Detection	Upgradient	1257602.79	2076758.31	780.2	783.05	753.20	743.20	39.85	Saprolite	9/10/2015
YGWA-18S	Detection	Upgradient	1257116.05	2077015.25	787.6	790.57	760.90	750.90	39.97	Saprolite	9/8/2015
YGWA-18I	Detection	Upgradient	1257090.05	2077015.82	787.6	790.57	720.90	710.90	79.97	PWR/Transition Zone	9/8/2015
YGWA-20S	Detection	Upgradient	1255531.55	2077410.37	764.6	767.12	747.90	737.90	29.52	Saprolite	9/29/2015
YGWA-21I	Detection	Upgradient	1255538.27	2076768.14	780.8	783.70	714.10	704.10	79.90	PWR/Transition Zone	9/28/2015
YGWA-39	Detection	Upgradient	1255717.13	2073865.58	815.6	818.19	760.10	750.10	68.59	Upper Fractured Bedrock	7/7/2016
YGWA-40	Detection	Upgradient	1255791.95	2073431.34	813.5	815.73	778.00	768.00	48.23	Upper Fractured Bedrock	7/7/2016
YGWA-1I	Detection	Upgradient	1256876.13	2070097.91	834.3	836.60	793.30	783.30	53.60	PWR/Transition Zone	5/20/2014
YGWA-1D	Detection	Upgradient	1256867.34	2070104.61	834.9	837.25	759.20	749.20	128.85	Deep Bedrock	5/20/2014
YGWA-2I	Detection	Upgradient	1256144.08	2070790.49	864.0	866.25	812.80	802.80	63.75	PWR/Transition Zone	5/20/2014
YGWA-3I	Detection	Upgradient	1256405.20	2072024.20	794.0	796.55	747.70	737.70	59.05	PWR/Transition Zone	5/20/2014
YGWA-3D	Detection	Upgradient	1256399.94	2072026.21	794.1	796.78	712.90	702.90	134.18	Deep Bedrock	5/20/2014
YGWA-14S	Detection	Upgradient	1257828.64	2072537.24	746.8	748.76	724.10	714.10	34.96	Saprolite	5/20/2014
YGWA-30I	Detection	Upgradient	1258421.86	2071107.11	760.1	762.58	713.40	703.40	59.48	PWR/Transition Zone	9/23/2015
YGWA-47	Detection	Upgradient	1262411.84	2071818.05	755.6	758.22	709.60	699.60	59.19	Bedrock	7/11/2016
GWA-2	Detection	Upgradient	1261383.11	2073509.98	803.1	805.62	763.80	753.80	52.02	Bedrock	4/12/2007
YGWC-23S	Detection	Downgradient	1256366.93	2074734.07	762.0	764.91	733.39	723.39	38.91	Saprolite	09/21/2015
YGWC-24SB	Detection	Downgradient	1258938.45	2073965.94	761.6	764.89	713.81	703.81	57.79	Saprolite	10/13/2022
YGWC-36A	Detection	Downgradient	1258547.74	2073748.73	737.7	740.88	696.52	686.52	51.20	Saprolite	09/22/2020
YGWC-38	Detection	Downgradient	1256108.38	2074446.80	797.1	799.69	757.51	747.51	49.89	Upper Fractured Bedrock	07/23/2016
YGWC-41	Detection	Downgradient	1256510.62	2073274.41	801.1	803.92	744.28	734.28	67.12	Upper Fractured Bedrock	07/08/2016
YGWC-42	Detection	Downgradient	1256882.87	2073326.52	795.1	797.86	745.74	735.74	59.76	Upper Fractured Bedrock	07/08/2016
YGWC-43	Detection	Downgradient	1257547.41	2073199.65	742.3	744.96	673.14	663.14	78.46	Upper Fractured Bedrock	07/09/2016
YGWC-49	Detection	Downgradient	1259375.23	2074337.51	780.1	782.73	712.47	702.47	78.53	PWR/Transition Zone	07/13/2016
YGWC-50	Detection	Downgradient	1258123.39	2073321.00	726.5	729.78	698.78	688.78	39.28	Saprolite	10/14/2022
PZ-35	Assessment	Downgradient	1258593.16	2073805.60	740.9	743.81	701.99	691.99	49.21	Saprolite/PWR	07/20/2016
PZ-37D	Assessment	Downgradient	1256478.32	2074688.08	758.8	761.12	566.5	556.48	202.30	Deep Bedrock	04/16/2021
PZ-52D	Assessment	Downgradient	1256463.09	2074676.14	759.9	762.79	675.01	665.01	94.89	Deep Bedrock	09/28/2021
PZ-54D	Assessment	Downgradient	1256904.08	2073369.06	792.5	795.56	665.44	655.44	137.36	Deep Bedrock	01/22/2024
PZ-55	Assessment	Downgradient	1257131.73	2073193.74	771.3	774.02	713.58	703.58	68.02	Upper Fractured Bedrock	12/16/2023
YAMW-1	Assessment	Downgradient	1258602.12	2073814.55	740.9	743.83	680.97	670.97	72.93	Upper Fractured Bedrock	09/19/2018
YAMW-2	Assessment	Downgradient	1256780.59	2072924.89	777.9	781.04	741.42	731.42	46.78	Deep Bedrock	11/12/2019
YAMW-3	Assessment	Downgradient	1256915.25	2073345.21	793.2	796.05	711.76	701.76	91.74	Deep Bedrock	11/06/2019
YAMW-4	Assessment	Downgradient	1256532.64	2073280.71	802.6	805.59	716.05	706.05	96.85	Deep Bedrock	11/07/2019
YAMW-5	Assessment	Downgradient	1256140.21	2074486.69	785.9	788.90	705.56	695.56	90.64	Deep Bedrock	11/13/2019
PZ-04S	Piezometer	Downgradient	1254442.86	2075454.20	781.8	784.25	759.35	749.35	32.75	Saprolite	05/21/2014
PZ-05S	Piezometer	Downgradient	1254404.42	2076211.43	782.2	784.64	750.56	740.56	41.94	Saprolite	05/21/2014
PZ-06D	Piezometer	Downgradient	1260480.15	2074782.68	779.5	782.02	695.78	645.78	134.02	Deep Bedrock	05/19/2014
PZ-24IB	Piezometer	Downgradient	1258927.49	2073952.22	761.9	764.92	698.88	688.88	73.42	Transition Zone/Upper Fractured Bedrock	10/11/2022
PZ-37	Piezometer	Downgradient	1256471.14	2074699.59	758.0	760.78	718.72	708.72	49.78	Upper Fractured Bedrock	07/06/2016
PZ-48	Piezometer	Downgradient	1259868.04	2074528.00	777.2	779.83	728.77	718.77	58.73	Upper Fractured Bedrock	07/11/2016
PZ-51	Piezometer	Downgradient	1257595.80	2073182.55	741.3	744.30	714.98	704.98	36.32	Upper Fractured Bedrock	11/08/2019
PZ-53D	Piezometer	Downgradient	1256463.09	2074676.14	759.9	762.80	607.00	597.00	162.90	Deep Bedrock	09/28/2021
YGWA-6I	Piezometer	Downgradient	1260490.02	2074790.49	780.2	782.73	721.47	711.47	69.03	Upper Fractured Bedrock	05/19/2014
YGWA-6S	Piezometer	Upgradient	1260484.87	2074786.49	779.8	782.47	750.23	740.23	39.87	Saprolite	05/19/2014
PZ-56D	Piezometer	Downgradient	1256904.08	2073369.06	792.5	795.56	607.50	597.50	198.36	Deep Bedrock	1/22/2024

Notes:
Elevation is presented in U.S. Survey Feet (North American Vertical Datum of 1988).

Northing and Easting Georgia State Plane West, NAD83

Acronyms and Abbreviations:
bTOC = below top of casing

ft = feet

PWR = Partially Weathered Rock

Table 4
Remedy Evaluation Summary
Draft Remedy Selection Report
Plant Yates AP-3, A, B, B', and R6 CCR Landfill
Georgia Power Company

Corrective Measure *Retained/ Screened Out*	Geochemical Manipulation (In-Situ Injection) *Retained as an Option for Adaptive Management*	Hydraulic Containment *Retained as Option for Adaptive Management*	In-Situ Stabilization/Solidification (ISS) *Screened Out*	Monitored Natural Attenuation *Retained*	Subsurface Vertical Barrier Walls *Screened Out*	Permeable Reactive Barrier *Screened Out*	Phytoremediation *Screened Out*
Description	Injection of a chemical or organic substrate to alter geochemical conditions to those more favorable for stabilization of lithium, cobalt, and/or selenium.	Combines a groundwater extraction system with a surface treatment system to remove target analytes from the subsurface and/or to control/prevent constituent migration.	In-situ solidification is the process by which constituent mobility in a solid matrix is decreased through physical and/or chemical means. Grout or other chemical additives are mixed with aquifer materials to reduce permeability. ISS could be applied to the aquifer matrix in groundwater flow zones but is less applicable than other technologies evaluated.	A remedial solution that takes advantage of natural attenuation processes to attenuate constituents in soil and groundwater. This option can meet the GWPS given sufficient time and favorable conditions.	Used to physically control the migration of impacted groundwater flow through isolation or redirection, typically around or upgradient of a source area.	A permeable reactive barrier is a zone of reactive material that extends below the water table to intercept and treat groundwater.	Phytoremediation is the direct use of various living plants as a means of hydraulic control or containment, immobilization of constituents, and/or uptake/degradation of constituents in shallow groundwater or, if engineered, using the TreeWell® system for intermediate depth groundwater.
40 CFR 257.96(c)(1)							
Ease of Implementation	This process is not substantially limited by implementation. The hydrogeology of the site is amenable to reagent injection and distribution. Bench testing and pilot testing can be used to optimize implementation.	Relative ease in implementation compared to other technologies.	ISS technology would be difficult to impractical to implement at the scale of the AMA and R6 landfill. The implementation would also be complicated on the R6 landfill where the cap is in place.	This process is not limited by implementation. Robust performance monitoring program required.	Installing into competent bedrock may be challenging due to depth, the presence of fractures, and the groundwater flow directions at the site.	Installing into competent bedrock may be challenging due to depth and presence of fractures. Implementation is also challenging due to the groundwater flow directions at the site.	The depth of the treatment zone is limited to the depth of the root zone when relying on plants alone. When using the TreeWell® system, deeper target depths (i.e., 30 feet or more) are achievable. Site groundwater elevations are typically 10 feet to 30 feet below ground surface.
Performance	The geochemical manipulation processes identified have the potential to alter conditions and immobilize cobalt, lithium, and/or selenium rapidly, but have not been demonstrated to work in situ under site conditions. Would require ongoing monitoring to ensure that conditions remain favorable.	Hydraulic containment is an effective corrective measure for remediating dissolved constituents, provided regular maintenance is performed throughout the operational life. Not typically immediately effective for trace level metals. Rebounding can occur as water levels return to normal once the pumping system is turned off post-remediation. Generally, requires disposal of treated water and sludges.	Performance would need to be assessed through bench or pilot testing. Likely would need to be used in conjunction with an additional technology for groundwater. Technology anticipated to be less effective for groundwater than other options evaluated.	This process provides ongoing effectiveness and is well documented as an effective measure for remediating groundwater.	Performance may be limited due to site geology.	The effectiveness of this technology may be limited by underflow and reactive lifespan and is only effective for specific constituents. Marginally effective over long periods of time without replacement of PRB material.	May be directly effective by accumulation or uptake of some metals or hydraulic control; however, phytoaccumulation is directly related to the plant species. Constituents may need to be addressed by a method that does not involve direct uptake of impacted groundwater (i.e., traditional phytoremediation). An alternative method, such as a TreeWell® system, may need to be considered.

Table 4
Remedy Evaluation Summary
Draft Remedy Selection Report
Plant Yates AP-3, A, B, B', and R6 CCR Landfill
Georgia Power Company

Corrective Measure *Retained/ Screened Out*	Geochemical Manipulation (In-Situ Injection) *Retained as an Option for Adaptive Management*	Hydraulic Containment *Retained as Option for Adaptive Management*	In-Situ Stabilization/Solidification (ISS) *Screened Out*	Monitored Natural Attenuation *Retained*	Subsurface Vertical Barrier Walls *Screened Out*	Permeable Reactive Barrier *Screened Out*	Phytoremediation *Screened Out*
Potential Impacts	Low potential for impacts: health and safety concerns during injections associated with equipment, injection pressure management and reagent handling, minimal risk of cross media contamination, exposure potential limited to groundwater sampling.	Low potential for impacts: health and safety concerns during construction and O&M, injection pressure management and reagent handling, minimal risk of cross media contamination, exposure potential limited to groundwater sampling.	Low potential for impacts: No health and safety concerns during construction, minimal risk of cross media contamination, exposure potential limited to groundwater sampling.	Low potential for impacts: No health and safety concerns during construction, minimal risk of cross media contamination, exposure potential limited to groundwater sampling.	Low potential for impacts: health and safety during construction, minimal risk of cross media contamination, exposure post-construction limited to groundwater sampling.	Low potential for impacts: health and safety during construction, minimal risk of cross media contamination, exposure post-construction limited to groundwater sampling.	Low potential for impacts: health and safety during construction, minimal risk of cross media contamination, exposure post-construction limited to groundwater sampling.
Reliability	This process will likely have overall reliability in achieving GWPS goals if and when adequate volume and subsurface distribution are achieved. Ongoing monitoring is necessary to ensure that favorable conditions are maintained once achieved.	This technology provides moderate to high reliability based on extraction well up-time and maintenance for the treatment system.	Reliable immobilization over time with proper implementation.	This process will likely have overall reliability in achieving GWPS goals where impacted area remains internal to the site and is adequately monitored.	The reliability of this technology is limited at depth and may require long-term hydraulic control to manage groundwater heads.	This technology may not provide reliability in the site-specific lithology due to difficulty in interception groundwater flow though fractured bedrock.	The presence of impacted groundwater below typical root zones would need to be addressed for phytoremediation to be a reliable technology for hydraulic control. Reliable plant species for selenium uptake are established.
40 CFR 257.96(c)(2)							
Begin/Complete	Can begin immediately upon completion of pilot testing and/or bench-scale testing, which may take up to 24 months. Long-term monitoring and reporting likely required.	Time needed to model and design may take up to 24 months; variable time for construction depending on scale, generally can be accomplished in 6 months.	Time needed to model and design may take up to 24 months; variable time for construction depending on scale, generally can be accomplished relatively quickly between 6 and 12 months.	Can begin immediately. Long-term monitoring and reporting likely required.	Time needed to model and design may take up to 24 months. Variable time for construction depending on scale. Generally can be accomplished relatively quickly between 6 and 12 months, but is highlight dependent upon site conditions.	Time needed to model and design may take up to 24 months; variable time for construction depending on scale, generally can be accomplished in 6 to 12 months.	Time needed to model and design may take up to 6 months. Pilot testing may be required, which could take up to 3 years. Depending on the number of required units, the installation effort is expected to last several weeks. Full hydraulic capture/control is expected approximately 3 years after planting.
40 CFR 257.96(c)(3)							
Institutional Requirements	A new UIC permit (for in-situ injections) would be required to implement this corrective measure. No other institutional requirements are expected at this time.	Depending on the effluent management strategy, modifications to the existing NPDES permit may be required, or obtaining a new UIC permit may be needed if groundwater reinjection is chosen.	No institutional requirements are expected at this time.	No institutional requirements are expected at this time.	No institutional requirements are expected at this time.	No institutional requirements are expected at this time.	No institutional requirements are expected at this time.

Table 4
Remedy Evaluation Summary
Draft Remedy Selection Report
Plant Yates AP-3, A, B, B', and R6 CCR Landfill
Georgia Power Company

Corrective Measure *Retained/ Screened Out*	**Geochemical Manipulation (In-Situ Injection)** *Retained as an Option for Adaptive Management*	**Hydraulic Containment** *Retained as Option for Adaptive Management*	**In-Situ Stabilization/Solidification (ISS)** *Screened Out*	**Monitored Natural Attenuation** *Retained*	**Subsurface Vertical Barrier Walls** *Screened Out*	**Permeable Reactive Barrier** *Screened Out*	**Phytoremediation** *Screened Out*
Other Environmental or Public Health Requirements	None expected at this point. Based on downgradient sampling results near adjacent waterbodies, there currently appear to be no potential receptors downgradient of the units.	Based on downgradient sampling results near adjacent waterbodies, there currently are no complete receptor pathways downgradient of the units. Aboveground treatment components may need to be present for an extended period, generating residuals requiring management and disposal.	None expected at this point. Based on downgradient sampling results near adjacent waterbodies, there currently appear to be no potential receptors downgradient of the unit. Following implementation of ISS, this source control remedy is passive, does not create carbon emissions, and preserves groundwater resources.	Little to no physical disruption to remediation areas and no adverse construction-related impacts are expected on the surrounding community. Based on downgradient sampling results near adjacent waterbodies, there currently are no complete receptor pathways downgradient of the units.	Based on downgradient sampling results near adjacent waterbodies, there currently appear to be no potential receptors downgradient of the unit. Due to the potential need for groundwater extraction associated with barrier walls, aboveground treatment components may need to be present for an extended period, creating carbon emissions and generating residuals requiring management and disposal.	None expected at this point. Based on downgradient sampling results near adjacent waterbodies, there currently are no complete receptor pathways downgradient of the unit. Following installation, the remedy is passive.	None expected at this point. Based on downgradient sampling results near adjacent waterbodies, there currently are no complete receptor pathways downgradient of the units. Innovative and green technology may be positively received by various stakeholders. Following installation, the remedy is passive and does not require external energy.
Screening							
Retaining Technology for Further Evaluation?	Yes, this technology is reliable and applicable, and is retained for adaptive management should it be applicable to future conditions.	No. Hydraulic containment is not included in the alternatives because it would provide little incremental value to reduce the current extent of cobalt, lithium, and/or selenium above GWPS outside the waste boundary given the predicted gradients of the AEM drain operation (Appendix C).	No. ISS technology would be difficult to impractical to implement at the scale of the AMA and R6 landfill.	Yes	No. Site-specific hydrogeology limits implementability, performance, and effectiveness.	No. Site-specific hydrogeology limits implementability, performance, and effectiveness.	No. Hydraulic containment is not included in the alternatives because it would provide little incremental value to reduce the current extent of cobalt, lithium, and/or selenium above GWPS outside the waste boundary given the predicted gradients of the AEM drain operation (Appendix C). management should it be applicable to future conditions.

Notes:
AMA = Ash Management Area
CCR = Coal Combustion Rule
CFR = Code of Federal Regulations
GWPS = Groundwater Protection Standard
MNA = monitored natural attenuation
NPDES = National Pollutant Discharge Elimination System
O&M = operation and maintenance
PRB = permeable reactive barrier
UIC = underground injection control

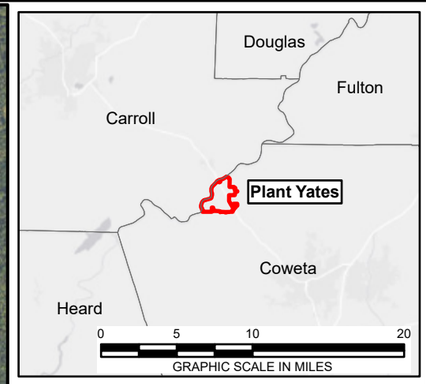
Figures

84°55'30"W 84°55'20"W 84°55'10"W 84°55'0"W 84°54'50"W 84°54'40"W 84°54'30"W 84°54'20"W 84°54'10"W 84°54'0"W 84°53'50"W 84°53'40"W 84°53'30"W 84°53'20"W 84°53'10"W 84°53'0"W 84°52'50"W 84°52'40"W 84°52'30"W

33°28'40"N
33°28'30"N
33°28'20"N
33°28'10"N
33°28'0"N
33°27'50"N
33°27'40"N
33°27'30"N
33°27'20"N
33°27'10"N
33°27'0"N
33°26'50"N
33°26'40"N

FORMER ASH POND A
ASH POND B
ASH POND B'
R6 ASH DISPOSAL AREA
ASH POND 3
ASH MANAGEMENT AREA

84°55'30"W 84°55'20"W 84°55'10"W 84°55'0"W 84°54'50"W 84°54'40"W 84°54'30"W 84°54'20"W 84°54'10"W 84°54'0"W 84°53'50"W 84°53'40"W 84°53'30"W 84°53'20"W 84°53'10"W 84°53'0"W 84°52'50"W 84°52'40"W 84°52'30"W 84°52'20"W



LEGEND

APPROXIMATE PROPERTY BOUNDARY
PERMITTED UNIT BOUNDARY

NOTE:
AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

0 650 1,300 2,600
GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

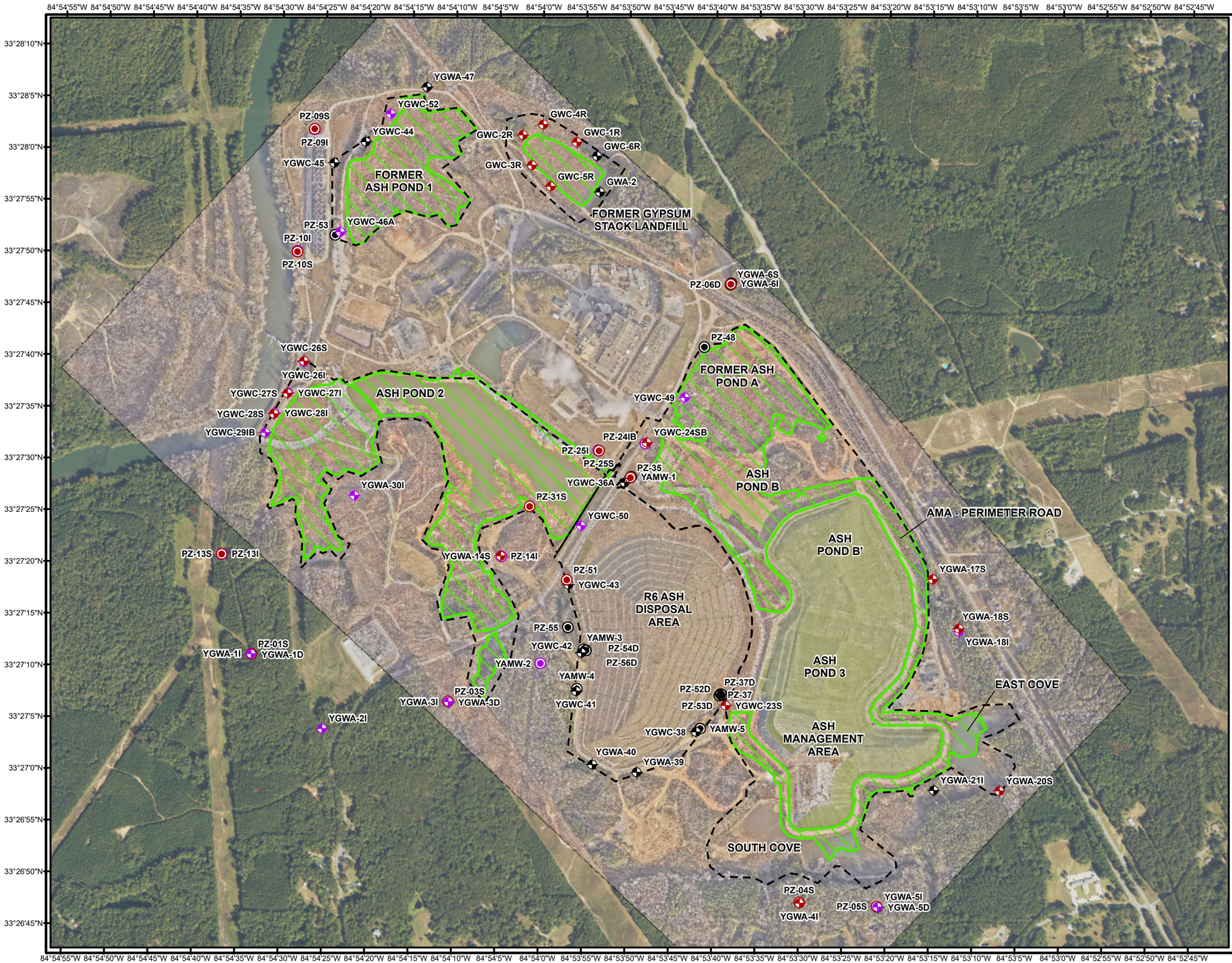
Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

SITE LOCATION MAP

ARCADIS

FIGURE
1



LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/PIEZOMETER
- TRANSITION ASSESSMENT WELL/PIEZOMETER
- BEDROCK ASSESSMENT WELL/PIEZOMETER
- PERMITTED UNIT BOUNDARY
- AREA WHERE ASH HAS BEEN CERTIFIED REMOVED AS OF 1/31/2024

NOTE:
AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

0 450 900 1,800
GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

PLANT YATES CCR REMOVAL AREAS

ARCADIS

FIGURE
2

84°54'20"W 84°54'15"W 84°54'10"W 84°54'5"W 84°54'0"W 84°53'55"W 84°53'50"W 84°53'45"W 84°53'40"W 84°53'35"W 84°53'30"W 84°53'25"W 84°53'20"W 84°53'15"W 84°53'10"W 84°53'5"W 84°53'0"W 84°52'55"W 84°52'50"W 84°52'45"W 84°52'40"W

33°27'50"N
33°27'45"N
33°27'40"N
33°27'35"N
33°27'30"N
33°27'25"N
33°27'20"N
33°27'15"N
33°27'10"N
33°27'5"N
33°27'0"N
33°26'55"N
33°26'50"N
33°26'45"N

YGWA-6S
PZ-06D
YGWA-6I
PZ-48'
YGWC-49
FORMER ASH POND A
YGWC-24SB
PZ-24IB
ASH POND 2
YAMW-1
PZ-35
YGWC-36A
ASH POND B
YGWC-50
ASH POND B'
YGWA-17S
PZ-51
YGWC-43
R6 ASH DISPOSAL AREA
PZ-55
YGWA-18S
YGWA-18I
PZ-54D
PZ-56D
YAMW-3
YGWC-42
YAMW-2
ASH POND 3
PZ-37
PZ-37D
PZ-52D
PZ-53D
YGWC-23S
YAMW-4
YGWC-41
YAMW-5
YGWC-38
ASH MANAGEMENT AREA
YGWA-40
YGWA-39
YGWA-21I
YGWA-20S
YGWA-4I
PZ-04S
PZ-05S
YGWA-5D
YGWA-5I

LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/ PIEZOMETER
- TRANSITION ASSESSMENT WELL/ PIEZOMETER
- BEDROCK ASSESSMENT WELL/ PIEZOMETER
- PERMITTED UNIT BOUNDARY

NOTE:
AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

0 350 700 1,400
GRAPHIC SCALE IN FEET

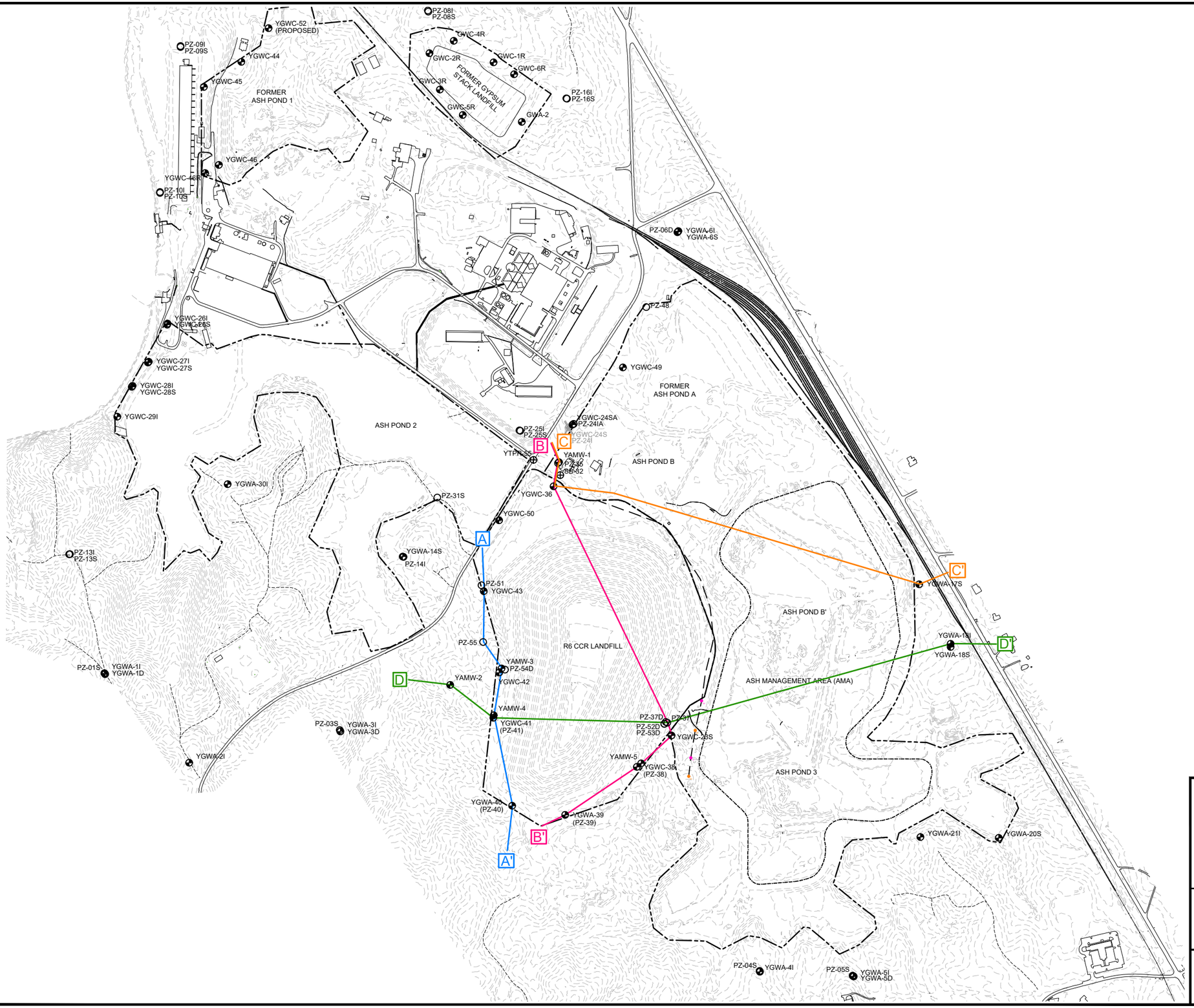
COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

WELL LOCATION MAP

ARCADIS

FIGURE
3



LEGEND:

- EXISTING GRADE
- GROUNDWATER MONITORING WELL
- PIEZOMETER
- TEST BORING
- ABANDONED WELL
- A — CROSS–SECTION
- BOUNDARY PER D&O PLAN
- EXTENT OF ASH MANAGEMENT AREA FINAL COVER
- ENGINEERING MEASURE, SUBSURFACE DRAIN

0 800’ 1,600’

GRAPHIC SCALE

Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA

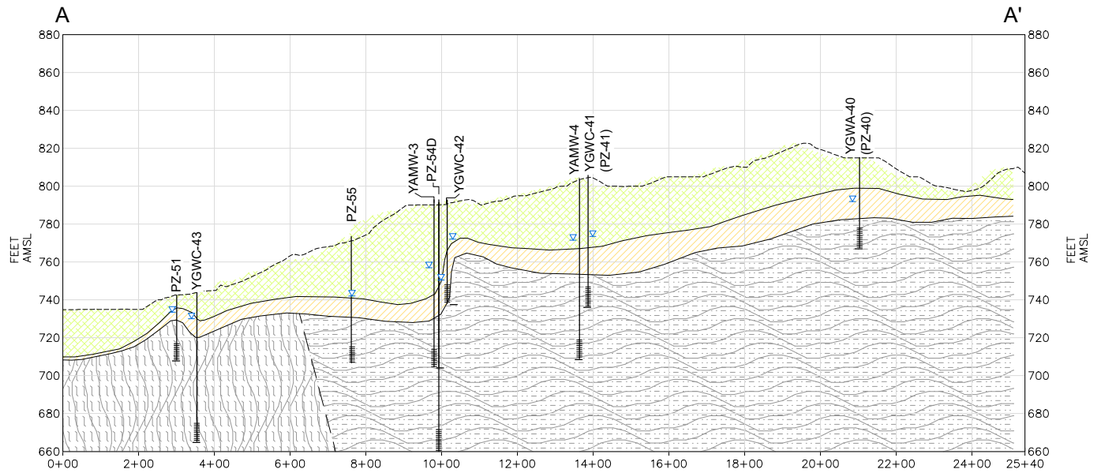
DRAFT REMEDY SELECTION REPORT

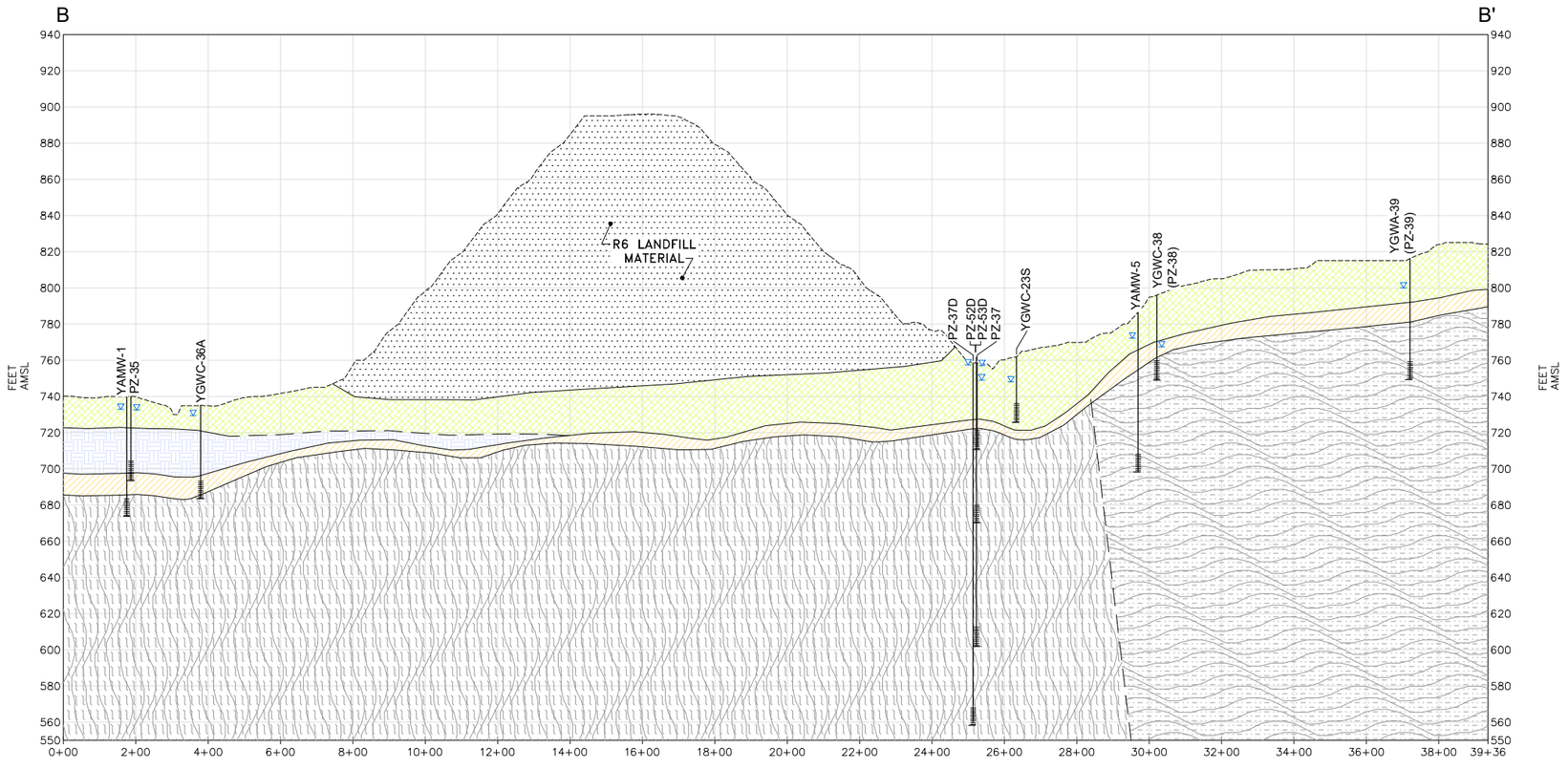
CROSS-SECTION LOCATION MAP

ARCADIS

FIGURE **4**

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PLOTTED: 7/25/2024 2:48 PM BY: SARTORI, KATHERINE





LEGEND:

WATER ELEVATION (FEBRUARY 2024)

WELL SCREEN

ESTIMATED GEOLOGIC CONTACT (DASHED WERE INFERRED)

SAPROLITE:

SILTY SAND – LIGHT BROWN TO TAN FINE–MEDIUM GRAINED SAND WITH SILT. LOOSE

CLAYEY SAND – MOTTLED TO BROWN, FINE TO MEDIUM GRAINED SAND WITH CLAY. LOOSE.

TRANSITION ZONE:

HIGHLY WEATHERED AND HIGHLY FRACTURED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. FINE TO COARSE SAND AND GRAVEL PRESENT

BEDROCK:

BEDROCK (UNDIFFERENTIATED) – UNDIFFERENTIATED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. MODERATELY TO INTENSELY FOLIATED

BIOTITE GNEISS – BIOTITE AND MUSCOVITE GNEISS. MODERATELY TO INTENSELY FOLIATED

NOTE:

1. CROSS–SECTION ELEVATIONS ARE MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL).

0 400' 800'

HORIZONTAL GRAPHIC SCALE

0 80' 160'

VERTICAL GRAPHIC SCALE

Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA

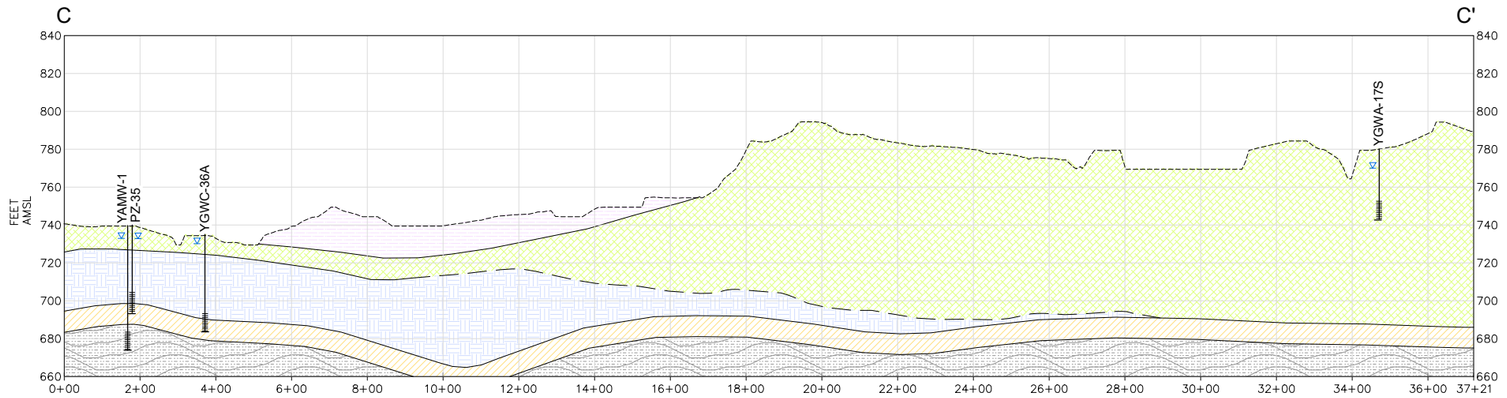
DRAFT REMEDY SELECTION REPORT

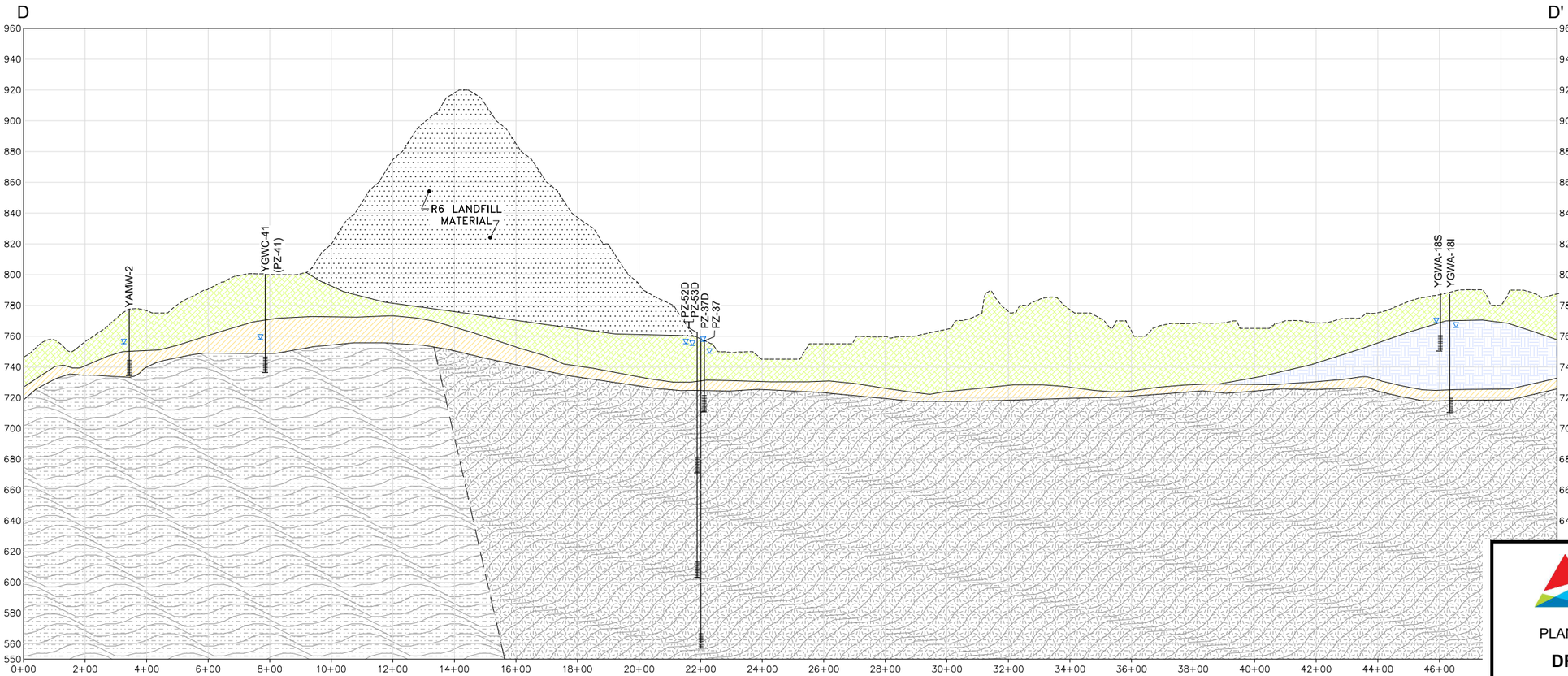
CROSS-SECTIONS A-A' AND B-B'

ARCADIS

FIGURE **5**

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PLOTSTYLETABLE: ---- PLOTTED: 9/20/2024 9:34 AM BY: SARTORI, KATHERINE





LEGEND:

- WATER ELEVATION (FEBRUARY 2024)
- WELL SCREEN
- ESTIMATED GEOLOGIC CONTACT (DASHED WERE INFERRED)

SAPROLITE:

- SANDY SILT– LIGHT BROWN TO BROWN SANDY SILT. LOW PLASTICITY
- SILTY SAND – LIGHT BROWN TO TAN FINE–MEDIUM GRAINED SAND WITH SILT. LOOSE
- CLAYEY SAND – MOTTLED TO BROWN, FINE TO MEDIUM GRAINED SAND WITH CLAY. LOOSE.

TRANSITION ZONE:

- HIGHLY WEATHERED AND HIGHLY FRACTURED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. FINE TO COARSE SAND AND GRAVEL PRESENT

BEDROCK:

- GRANITIC GNEISS –GRAY TO WHITE, BIOTITE, MUSCOVITE, QUARTZ, PLAGIOCLASE GNEISS. MODERATELY TO INTENSELY FOLIATED
- BIOTITE GNEISS – BIOTITE AND MUSCOVITE GNEISS. MODERATELY TO INTENSELY FOLIATED

NOTE:

1. CROSS–SECTION ELEVATIONS ARE MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL).

0 400' 800'
HORIZONTAL GRAPHIC SCALE

0 80' 160'
VERTICAL GRAPHIC SCALE

Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA
DRAFT REMEDY SELECTION REPORT

CROSS-SECTIONS C-C' AND D-D'

ARCADIS

FIGURE
6

C:\Users\KSARTORI\DC\ACCDocs\Arcadis ACC US\AUS-99999999-GA POWER_PLANT YATES_NEWNAN_GA\Project Files\10_WIP\10T_ARC_ENV\2024\01-DWG\DRSR_Fig 5-6_CIVIL SECTIONS.dwg LAYOUT: 6 SAVED: 9/20/2024 8:29 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---
PLOTSTYLETABLE: ---- PLOTTED: 9/20/2024 9:33 AM BY: SARTORI, KATHERINE



LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/ PIEZOMETER
- TRANSITION ASSESSMENT WELL/ PIEZOMETER
- BEDROCK ASSESSMENT WELL/ PIEZOMETER
- PERMITTED UNIT BOUNDARY
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE POTENTIOMETRIC CONTOUR (FEET) DASHED WHERE INFERRED
- **757.11** GROUNDWATER ELEVATION (FEET)

NOTES:

1. SHALLOW GROUNDWATER ELEVATIONS ARE DERIVED FROM SOIL COMPRISED OF SAPROLITE, RANGING FROM 15 - 60 FEET BELOW GROUND SURFACE.

2. BEDROCK WELLS YGWA-40, YGWA-39, YGWC-38, YGWC-41, YGWC-42 USED FOR CONTOURING. ALL OTHER BEDROCK WELLS NOT USED TO CREATE CONTOURS.

3. SAPROLITE WELL GROUNDWATER ELEVATIONS WERE USED FOR CONTOURING FOR SAPROLITE/TRANSITION ZONE/BEDROCK WELL CLUSTER LOCATIONS.

4. AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

5. ELEVATION IS PRESENTED IN U.S. SURVEY FEET (NAVD 1988).

6. GROUNDWATER ELEVATIONS COLLECTED ON FEBRUARY 19, 2024.

0 350 700 1,400

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

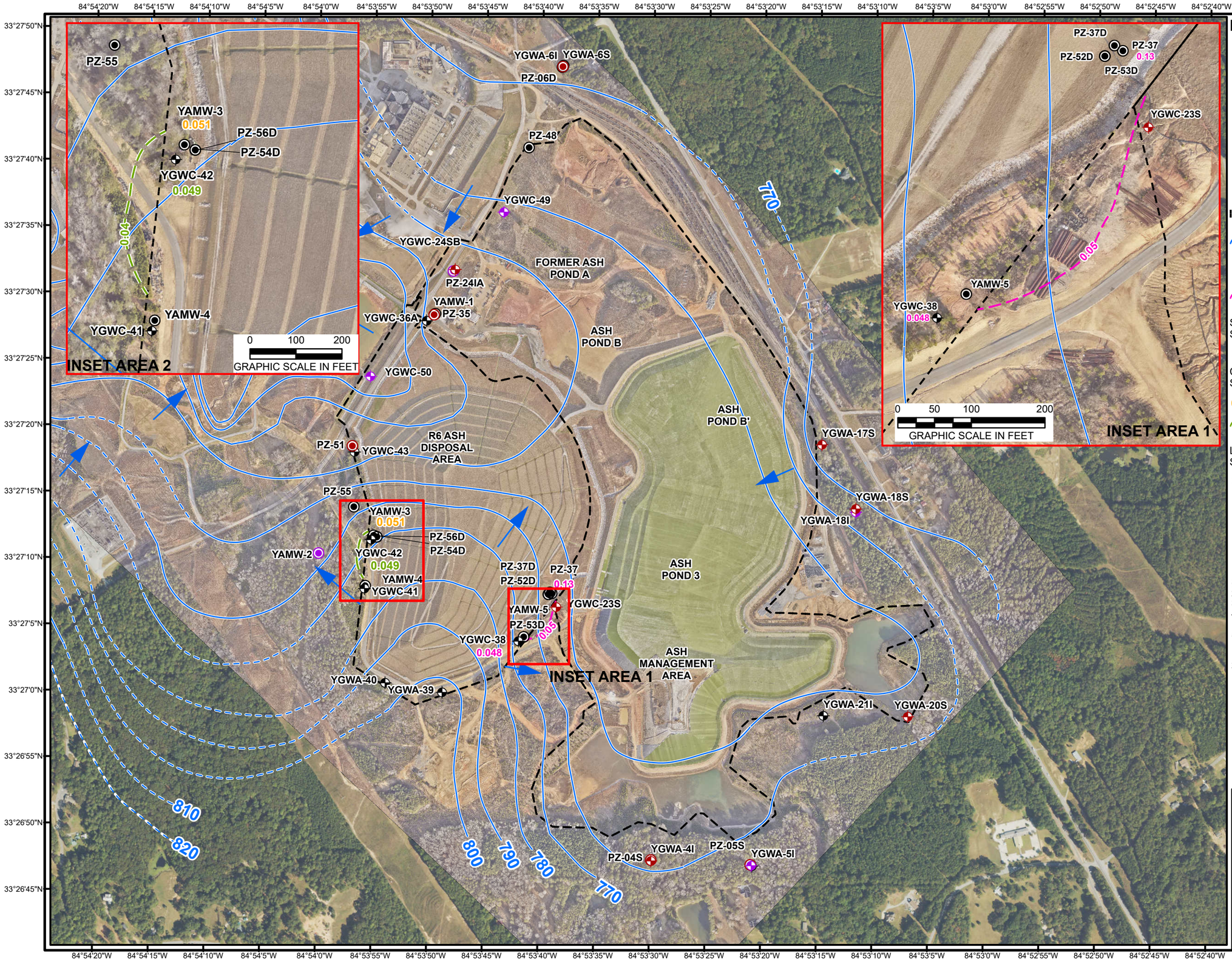
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA

DRAFT REMEDY SELECTION REPORT

GROUNDWATER ELEVATION MAP FEBRUARY 2024

ARCADIS

FIGURE **7**



LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/ PIEZOMETER
- TRANSITION ASSESSMENT WELL/ PIEZOMETER
- BEDROCK ASSESSMENT WELL/ PIEZOMETER
- PERMITTED UNIT BOUNDARY
- APPROXIMATE POTENTIOMETRIC CONTOUR (FEET) DASHED WHERE INFERRED
- GROUNDWATER FLOW DIRECTION
- SELENIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

SELENIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.050 mg/L

0.046 SELENIUM CONCENTRATION VALUES (mg/L)

COBALT GROUNDWATER PROTECTION STANDARD VALUE = 0.035 mg/L

0.011 COBALT CONCENTRATION VALUES (mg/L)

- LITHIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

LITHIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.04 mg/L

0.049 LITHIUM CONCENTRATION VALUES (mg/L)

NOTES:

1. RESULTS ARE PROVIDED IN MILLIGRAMS PER LITER (mg/L)
2. J = ESTIMATED VALUE
3. SAMPLES WERE COLLECTED FEBRUARY 20-23, 2024.
4. APPROXIMATE POTENTIOMETRIC CONTOURS DATED FEBRUARY 19, 2024.
5. AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

0 350 700 1,400

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

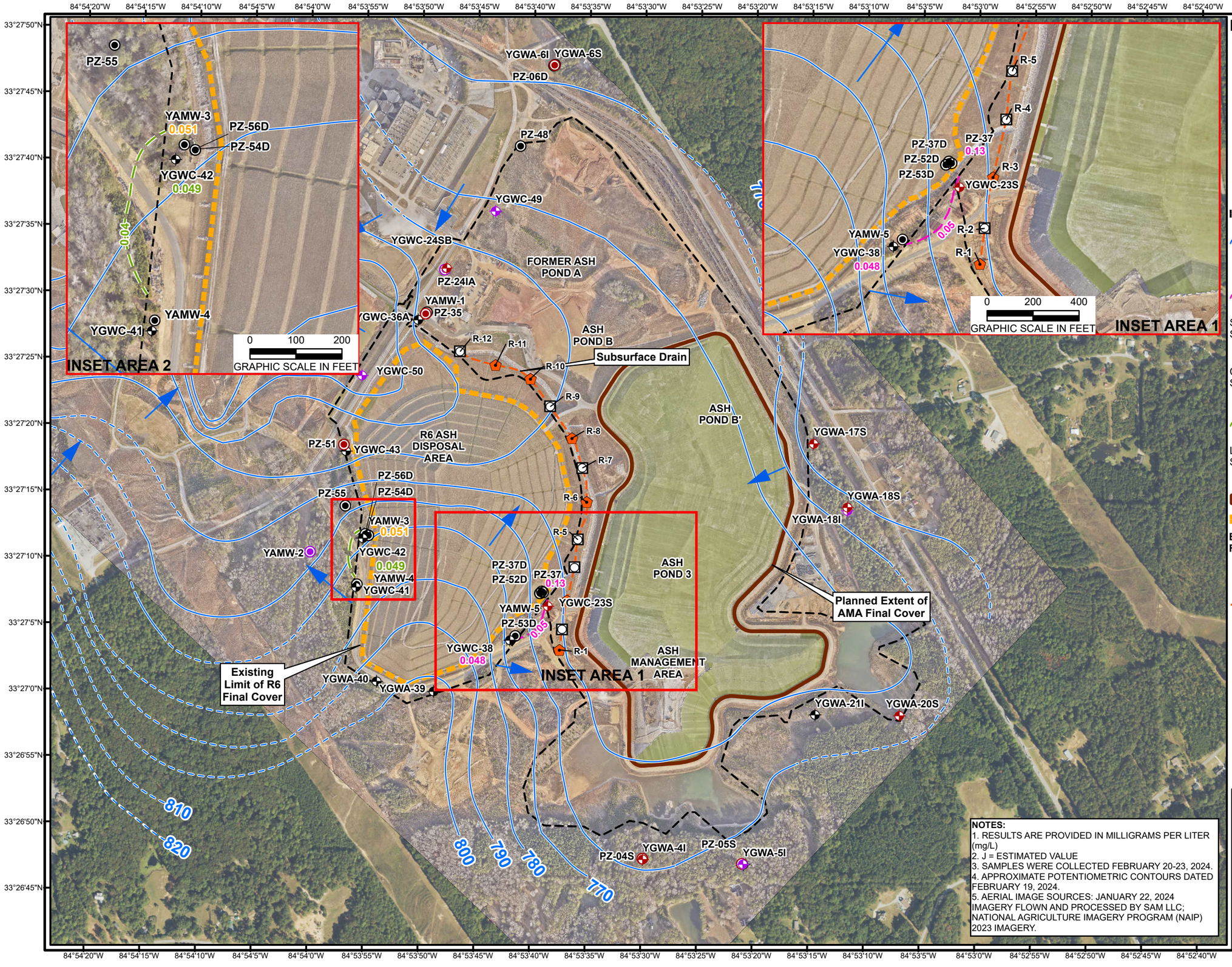
Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

SELENIUM, COBALT AND LITHIUM ISOCONCENTRATION MAP – FEBRUARY 2024

ARCADIS

FIGURE
8



LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/ PIEZOMETER
- TRANSITION ASSESSMENT WELL/ PIEZOMETER
- BEDROCK ASSESSMENT WELL/ PIEZOMETER
- PERMITTED UNIT BOUNDARY
- APPROXIMATE POTENTIOMETRIC CONTOUR (FEET) DASHED WHERE INFERRED
- GROUNDWATER FLOW DIRECTION
- SELENIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

SELENIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.050 mg/L

0.046 SELENIUM CONCENTRATION VALUES (mg/L)

COBALT GROUNDWATER PROTECTION STANDARD VALUE = 0.035 mg/L

0.011 COBALT CONCENTRATION VALUES (mg/L)

- LITHIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

LITHIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.04 mg/L

0.049 LITHIUM CONCENTRATION VALUES (mg/L)

- PLANNED EXTENT OF AMA FINAL COVER
- EXISTING LIMIT OF R6 FINAL COVER

ENGINEERING MEASURE SUBSURFACE DRAIN FEATURES

- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- ENGINEERING MEASURE, SUBSURFACE DRAIN

0 350 700 1,400
GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

NOTES:
1. RESULTS ARE PROVIDED IN MILLIGRAMS PER LITER (mg/L)
2. J = ESTIMATED VALUE
3. SAMPLES WERE COLLECTED FEBRUARY 20-23, 2024.
4. APPROXIMATE POTENTIOMETRIC CONTOURS DATED FEBRUARY 19, 2024.
5. AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

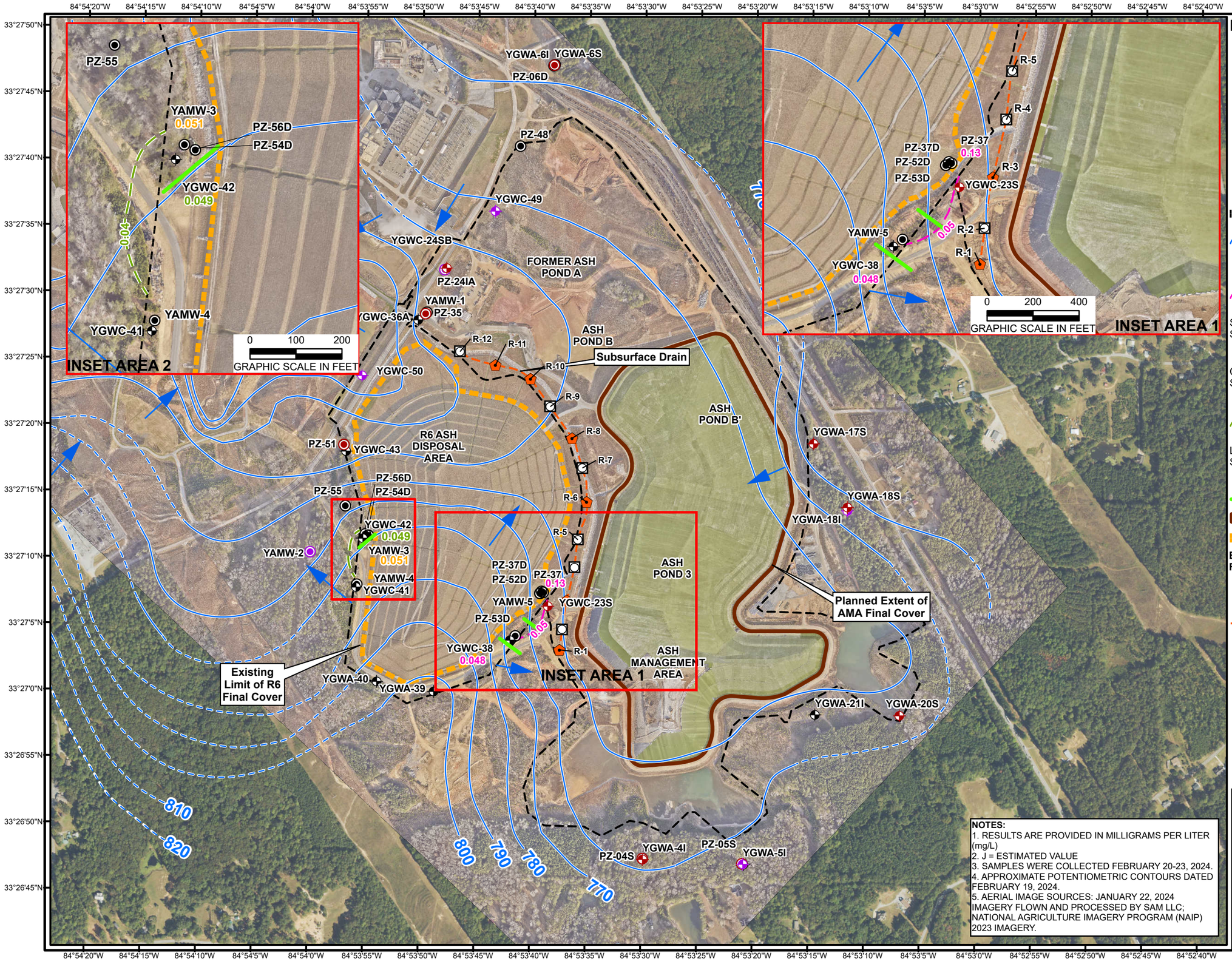
Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

REMEDIAL ALTERNATIVE 1 : MNA

ARCADIS

FIGURE
9



LEGEND

- SAPROLITE DETECTION MONITORING WELL LOCATION
- TRANSITION DETECTION MONITORING WELL LOCATION
- BEDROCK DETECTION MONITORING WELL LOCATION
- SAPROLITE ASSESSMENT WELL/ PIEZOMETER
- TRANSITION ASSESSMENT WELL/ PIEZOMETER
- BEDROCK ASSESSMENT WELL/ PIEZOMETER
- PERMITTED UNIT BOUNDARY
- APPROXIMATE POTENTIOMETRIC CONTOUR (FEET) DASHED WHERE INFERRED
- GROUNDWATER FLOW DIRECTION
- SELENIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

SELENIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.050 mg/L

0.046 SELENIUM CONCENTRATION VALUES (mg/L)

COBALT GROUNDWATER PROTECTION STANDARD VALUE = 0.035 mg/L

0.011 COBALT CONCENTRATION VALUES (mg/L)

- LITHIUM ISOCONTOUR LINE (DASHED WHERE INFERRED)

LITHIUM GROUNDWATER PROTECTION STANDARD VALUE = 0.04 mg/L

0.049 LITHIUM CONCENTRATION VALUES (mg/L)

- IN SITU TRANSECT
- PLANNED EXTENT OF AMA FINAL COVER
- EXISTING LIMIT OF R6 FINAL COVER

ENGINEERING MEASURE SUBSURFACE DRAIN FEATURES

- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- ENGINEERING MEASURE, SUBSURFACE DRAIN

0 350 700 1,400
GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

NOTES:
1. RESULTS ARE PROVIDED IN MILLIGRAMS PER LITER (mg/L)
2. J = ESTIMATED VALUE
3. SAMPLES WERE COLLECTED FEBRUARY 20-23, 2024.
4. APPROXIMATE POTENTIOMETRIC CONTOURS DATED FEBRUARY 19, 2024.
5. AERIAL IMAGE SOURCES: JANUARY 22, 2024 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2023 IMAGERY.

Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA
DRAFT REMEDY SELECTION REPORT

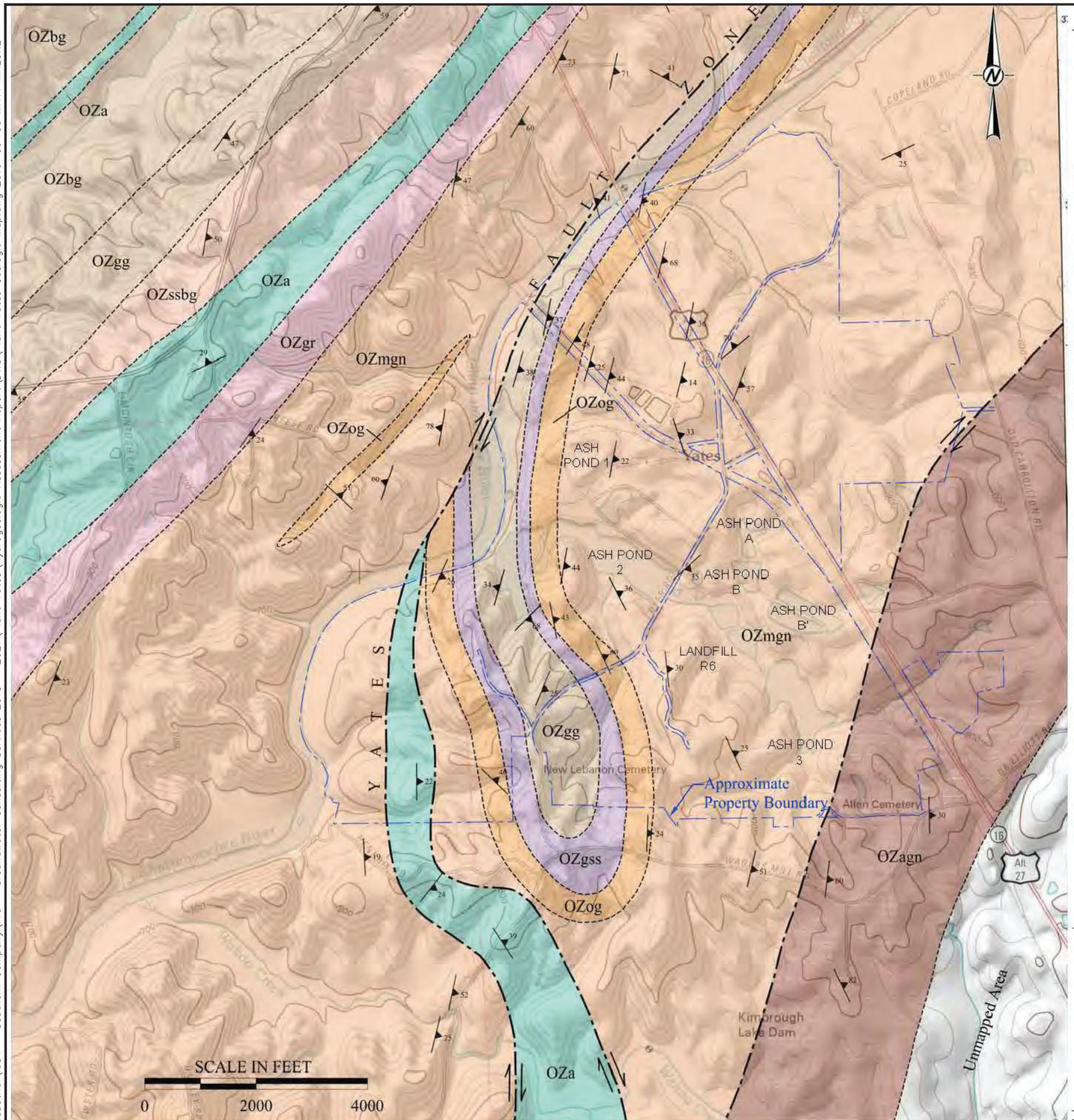
REMEDIAL ALTERNATIVE 2 : ISI

ARCADIS

FIGURE
10

Appendix A

Excerpt from Geologic Mapping and Lineament Analysis (Golder 2017)



NOTE: THIS DRAWING WAS PREPARED BY GOLDER ASSOCIATES, INC. FOR THE GEOLOGIC MAPPING AND LINEAMENT ANALYSIS GEORGIA POWER PLANT YATES, DATED OCTOBER 6, 2017. GEOLOGIC MAPPING WAS CONDUCTED BY PETROLOGIC SOLUTIONS, INC.

DESCRIPTION OF MAP UNITS

OZbg — ***Biotite Gneiss-***
garnet (small, minor)-muscovite-biotite-quartz-feldspar gneiss, fine- to medium-grained, schistose in part; interlayered with garnet (small, minor)-biotite-feldspar-quartz-muscovite schist, medium- to coarse-grained; some garnet-rich zones, all layereded with concordant and discordant pegmatite pods, lenses, and layers up to 10 feet thick; foliation wraps around pegmatite pods/lenses.

OZa — ***Amphibolite-***
amphibole/hornblende gneiss, thinly laminated, fine- to medium-grained hornblende and plagioclase; and chlorite-actinolite schist, very fine-grained; joints are close-spaced and abundant.

OZgg — ***Granitic-Gneiss-***
biotite-quartz-feldspar gneiss, very feldspathic; quartz and feldspar are medium- to coarse-grained; biotite is fine- to medium-grained. Muscovite is present where this gneiss is sheared. Shear foliation is commonly developed.

OZssbg — ***Biotite Gneiss and Sillimanite Schist-***
biotite-quartz-feldspar gneiss; interlayered with sillimanite, garnet, quartz, muscovite schist. Shear foliation is commonly developed.

OZog — ***Orange Gneiss-***
well layered, well foliated, moderately jointed, fine- to medium-grained, biotite-quartz-feldspar gneiss; this unit weathers fairly deeply relative to adjacent lithologies, forming a distinctive dark red, vermiculitic soil from weathering of biotite; the gneiss locally contains thin lenses of chlorite-actinolite schist and feldspar-hornblende gneiss/amphibolite, increasing in concentration of these ultramafic and mafic bodies to the southeast.

OZgr — ***Granite-***
generally massive, weakly foliated, poorly jointed, fine- to medium-grained, light-gray, large exfoliation boulders are common.

OZmgn — ***Migmatitic Gneiss-***
highly contorted, well layered, well foliated, poorly jointed, medium-grained muscovite-biotite-quartz-feldspar migmaticite gneiss. Granite is locally interlayered with biotite gneiss and pods/lenses of ultramafic bodies, which occur as relatively fresh, well foliated, unjointed boulders of medium- to course-grained actinolite-chlorite schist..

OZgss — ***Sillimanite Staurolite Garnet Schist-***
sillimanite-staurolite-garnet-biotite-quartz-muscovite schist, medium- to coarse-grained, sheared; staurolite and garnet are porphyroblastic, biotite and quartz content are highly variable, generally poorly weathered.

OZagn — ***Porphyroclastic Augen Gneissic-***
muscovite-biotite-quartz-feldspar gneissic granite, feldspathic; quartz and feldspar are medium- to coarse-grained; feldspar phenocrysts form porphyroclasts, biotite is fine- to medium-grained.

EXPLANATION OF MAP SYMBOLS

Lithologic unit contact- Approximate location

Fault (high angle)- Approximate location

Fault (strike/slip)- Approximate location

65 Strike and Dip of Foliation

REFERENCES

1. USGS 7.5 Minute Quadrangles, Whitesburg, 2011.
2. Property Boundary provided by Coweta County GIS Department, 2015.

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PROJECT:

PLANT YATES HYDROGEOLOGIC ASSESSMENT

708 DYER ROAD
NEWNAN, GEORGIA

REVISIONS

Drawn by: MM
Checked by: JF

PROJECT NUMBER:
I054-110
March 2020

PLANT YATES GEOLOGIC MAP

FIGURE 4

P:\Industrial\I054 - Southern Company\110 - Groundwater Consulting Services 2018 - 2021\Plant Yates\Hydrogeologic Assessment Report\DWG\Plant Yates Geologic Map.dwg 2019-09-05 MATT MALONE

Appendix B

Geochemical Conceptual Site Model

Geochemical Conceptual Site Model Report

Plant Yates – R6 CCR Landfill
Newnan, Georgia

September 30, 2024

Geochemical Conceptual Site Model

Georgia Power Company
Newnan, Georgia
Coweta County

September 30, 2024

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Attachments

Attachment 1 Analytical Laboratory Reports

Attachment 2 Memo: Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Selenium in Groundwater

Attachment 3 Memo: Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Cobalt and Lithium in Groundwater

Attachment 4 Phreeqc Input Script

Acronyms and Abbreviations

bgs	below ground surface
CCR	coal combustion residual
Eh	electron potential
EPRI	Electric Power Research Institute
Geochemical CSM Report	Geochemical Conceptual Site Model Report
GWPS	Groundwater Protection Standard
kg	kilogram
L/kg	liter per kilogram
MDL	method detection limit
mg	milligram
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
mV	millivolt
ORP	oxidation-reduction potential
PWR	partially weathered bedrock
R6 CCR Landfill	R6 Coal Combustion Residual Landfill
redox	reduction-oxidation
site	Plant Yates R6 Coal Combustion Residual Landfill, located in Newnan, Georgia
SSL	statistically significant level
TDS	total dissolved solids
USGS	U.S. Geological Survey
XRD	x-ray diffraction
ZVI	zero-valent iron

1 Introduction

This Geochemical Conceptual Site Model Report (Geochemical CSM Report) describes the current understanding of geochemical conditions and factors affecting the fate and transport of cobalt, lithium, and selenium in groundwater. The information presented in this Geochemical CSM Report is intended to support remedy selection and transport modeling at Plant Yates R6 Coal Combustion Residual Landfill (R6 CCR Landfill), located in Newnan, Georgia (site), and includes data and analysis of:

- General conditions (i.e., aquifer matrix composition, pH and redox conditions, major ion chemistry, and concentration trends)
- Fate and transport of selenium (selenium geochemistry, selenium speciation, and selenium sorption evaluation)
- Fate and transport of cobalt and lithium (cobalt and lithium geochemistry and sorption evaluation).

This Geochemical CSM Report is provided as Appendix B to the Draft Remedy Selection Report.

2 General Conditions

This section describes the general conditions, including aquifer matrix composition, pH and redox conditions, major ion chemistry, and trend analysis, at the R6 CCR Landfill.

2.1 Aquifer Matrix Composition

In 2020, aquifer matrix solids were collected from the saprolite unit and the underlying fractured gneiss bedrock to evaluate the mineralogy and phases affecting the fate and transport of selenium. Subsurface materials were collected from discrete core intervals from monitoring locations YGWC-38, YGWC-41, YGWC-24SA, YAMW-3, and YAMW-4 and submitted for mineralogy by semiquantitative x-ray diffraction (XRD) and elemental assay. Analytical laboratory reports are provided in Attachment 1. A total of 11 samples were collected from the five monitoring locations (Table 2-1) representing the following lithologies:

- *Saprolite*. YGWC-24SA (three depth intervals) and YGWC-38 (one interval)
- *Partially weathered rock*. YGWC-41 (two intervals)
- *Biotite gneiss*. YAMW-3 and YAMW-4 (one interval each), YGWC-38 (two intervals), and YGWC-41 (one interval).

The target depth intervals were selected to represent the overall depth profiles within each boring, such as unsaturated material, saturated or partially saturated material just above the screened interval, and saturated material within the screened interval.

Table 2-1 presents XRD mineralogy results, identifying the dominant mineral assemblages and chemical balance of individual constituents in the saprolite, partially weathered bedrock (PWR), and bedrock units. Specifically, this analysis was completed to identify and evaluate the mineral phases that support attenuation of dissolved inorganic constituents such as selenium, cobalt, and lithium.

The saprolite material contains mainly quartz and plagioclase feldspar minerals (albite and albite, calcian) accounting for more than 70 percent of the composition. Quartz occurs mostly in the range of 40 to 52 weight percent. Plagioclase feldspars occur in significant amounts ranging from 33 to 38 weight percent. Micas (muscovite and biotite) make up the next most dominant mineral group. Together, the mineralogical assemblage reflects a mafic (iron and magnesium-rich) nature of the underlying rocks. The plagioclase feldspar and mica minerals are important to the conceptual site model because as weathering of the saprolite progresses, the plagioclase feldspar, muscovite, and biotite (along with other silicates) weather to form clays, which are present mainly in the form of kaolinite and other minor clay minerals (Table 2-1). Additionally, biotite weathers to illite or montmorillonite, which are known to have high cation exchange capacities. The formation of secondary minerals, such as clays and aluminum and iron oxides, provides sorption capacity for constituents such as selenium, cobalt, and lithium. Certain clays derived from the mica mineral group may also contain trace amounts of lithium within the crystal structure (U.S. Geological Survey [USGS] 1982). Specific clay minerals that are known to incorporate lithium into the mineral structure as impurities include kaolinite (in particular, magnesium-rich kaolinite; USGS 1982), which is present at the site.

Similarly, the mineralogy of the PWR at YGWC-41 is dominated by quartz and plagioclase feldspar minerals, accounting for more than 85 percent of the overall composition. Of the mica minerals that make up the next largest component, muscovite and hydrated biotite are abundant in the interval from 32 to 33 feet below ground surface (bgs), and biotite and muscovite are abundant in the interval from 48 to 49 feet bgs. The abundance of biotite is consistent with the magnesium-dominant water observed at YGWC-41 and YGWC-42 (see Section 2.3, below).

Micas such as biotite, muscovite, and clinochlore are phyllosilicate minerals that contain cations such as magnesium, iron, and/or aluminum in tetrahedral and octahedral sites within their structure. Lithium is known to substitute for magnesium in the octahedral site of the clay structure due to similar ionic radii (Bradley et al. 2017) and has been shown to replace octahedral aluminum by a ratio of three lithium for one aluminum and for octahedral iron at an average replacement ratio of two lithium for one and one-half iron (Foster 1960). As such, trace quantities of lithium are widespread in mica minerals. During weathering of the primary mica minerals such as biotite, lithium can be released during transformation to the secondary mineral phase. The released lithium is highly water soluble and transported away in groundwater (USGS 1982), or may be retained via sorption on secondary weathering products (e.g., kaolinite and montmorillonite) that have permanent negative surface charges.

The distinction between gneiss and biotite gneiss on the boring logs is based on the visual observation of the abundance of biotite. However, the mineralogical data suggest that these lithologies are the same and therefore, are discussed together (Table 2-1). Quartz and plagioclase feldspar are the dominant minerals in the bedrock unit, with a substantial presence of micas (muscovite and biotite), which account for up to 12 percent of the overall composition. In the sample interval collected from the screened interval at YAMW-4, clinochlore (magnesium-bearing mineral in the chlorite group) was also present. Secondary minerals associated with the weathering of micas were not present in measurable abundance in the samples collected; however, it can be reasonably assumed that weathering products (e.g., clay minerals) occur within larger bedrock fractures.

Table 2-2 presents the elemental assay results, which were calculated from the mineral formulas and quantities identified by XRD analysis. The magnesium content was greater than that of calcium (in weight percent) in the samples collected from YGWC-41 and YAMW-3 along the western boundary of the R6 CCR Landfill and YGWC-24SA north of the R6 CCR Landfill. In contrast, the calcium content was much greater than the magnesium content in samples collected from the screened interval at YGWC-38 (59.5 to 60.5 feet bgs), located southeast of

the R6 CCR Landfill. The presence and abundance of aluminum and iron in the assay results suggest a strong potential for secondary aluminum and iron oxides and hydroxides to form during weathering processes, which are phases known to contain attenuation capacity for trace constituents (Prodromou 2016; McLaren et al. 1986). These observations are consistent with boring log descriptions, which detail reddish brown and pale yellow weathering zones within the saprolite and PWR. These descriptive terms are commonly reported when describing subsurface material containing aluminum and iron oxides.

In summary, the aquifer matrix reflects a mafic rock composition with abundant iron and aluminum, which weather to form aluminum and iron oxide phases known to contain attenuation capacity for trace constituents. In addition, clay minerals formed from the weathering of plagioclase feldspar, muscovite and biotite, and silicate minerals in the saprolite and PWR further support attenuation in the aquifer.

2.2 pH and Reduction-Oxidation Conditions

Groundwater pH and reduction-oxidation (redox) conditions affect properties of the aquifer minerals and the speciation of dissolved inorganic constituents that ultimately govern their fate and transport. Selenium is redox reactive and forms different species (selenate, selenite, elemental selenium, and selenide) as a function of redox conditions and pH. Selenium mobility and attenuation are a function of which species is present as well as other water quality and aquifer mineral properties. For instance, surface charge of mineral surfaces is affected by pH, which affects whether and how strongly the surface would interact with selenium species, such as the negatively charged selenate and selenite. In comparison, cobalt and lithium speciation is not strongly controlled by pH and is not subject to redox reactions under the range of conditions observed at the site. However, similar to selenium, pH is an important control on the surface charge of minerals, which in turn affects the affinity of the mineral surface to the positively charged cobalt ions. Lithium is known for its relative conservative behavior in groundwater; however, some lithium sorption has been documented and its affinity to mineral surfaces is somewhat influenced by the groundwater pH (Prodromou 2016).

Field parameters collected during groundwater sampling events including pH, dissolved oxygen, and oxidation-reduction potential (ORP) data are presented in Table 2-3 to provide a broad indication of redox conditions. Additional characterization of redox conditions was conducted during a supplemental sampling event in October 2019 and included evaluation of additional redox processes via measurement of nitrate, ferric and ferrous iron, manganese, and total organic carbon. Additionally, total and dissolved iron and manganese were collected at monitoring well YAMW-3 in a nonroutine sample event in July 2024. Results are presented in Table 2-3.

The dissolved oxygen concentrations, pH, and electron potential (Eh) data are shown on Figures 2-1 and 2-2, respectively. Eh data are calculated from the field ORP value and corrected for the silver-silver chloride electrode by adding 200 mV. The conditions in groundwater at the R6 CCR Landfill monitoring network wells are generally oxidizing and mildly acidic, while dissolved oxygen varies with location and time. As shown on Figure 2-2, the Eh conditions at upgradient wells YGWA-39 and YGWA-40 are similar, ranging from approximately 200 to 450 millivolts (mV). However, the pH varies in these upgradient wells; groundwater at YGWA-40 is slightly more acidic (pH 4.75 to 5.84) with greater dissolved oxygen than YGWA-39 (pH 5.3 to 7.22). Downgradient wells with a history of elevated selenium (YGWC-38, YGWC-41, and PZ-37) generally yield pH less than 5.5 and show a range of dissolved oxygen concentrations from less than 1 milligram per liter (mg/L) up to 5.72 mg/L.In comparison,most other monitoring wells on site are closer to neutral yet still mildly acidic, yielding pH values of approximately 5.5 to 7 (e.g., YGWC-42 and YAMW-4) and have similar Eh conditions, primarily between 200 and 400 mV (Figure 2-2).

While field probe data can be subject to variability, and trends should therefore not be overly interpreted, the dataset presented here provides some indications of changing redox conditions since R6 CCR Landfill closure. Dissolved oxygen and Eh trends for monitoring wells on the southeastern and western site boundaries are plotted on Figures 2-3A and 2-3B, respectively. Dissolved oxygen concentrations increased to greater than 4 mg/L at YGWC-38 and YGWC-41 since closure was complete in fourth quarter 2016, while more modest increases were observed at PZ-37 and YGWC-42. Eh trends at YGWC-38 and PZ-37 on the southeastern site boundary are generally more stable than the associated DO measurements. On the western site boundary at YGWC-42, Eh trends are generally stable, with most measurements between 200 and 400 mV, while more variable results were observed at YGWC-41. At deeper monitoring wells YAMW-3 and YAMW-4, overall increasing trends in Eh were observed, although Eh was variable in the first 4 samples at YAMW-3..

The supplemental redox data collected in October 2019 showed that conditions are not iron or sulfate reducing at upgradient well YWGA-40 and R6 CCR Landfill wells YGWC-38, YGWC-41, and YGWC-42, with nondetect to 0.35 mg/L iron (total, ferric, and ferrous), manganese less than 0.12 mg/L, nondetect sulfide, and nondetect total organic carbon. In July 2024, dissolved manganese at YAMW-3 was measured at 0.14 mg/L, similar to the total manganese concentration of 0.15 mg/L. Dissolved iron was measured at 0.043 mg/L, an order of magnitude lower than the total iron concentration of 0.23 mg/L, suggesting that most of the iron in YAMW-3 groundwater is present as oxidized, colloidal ferric iron. Figure 2-4 shows an Eh/pH diagram for iron. The plot indicates that iron oxides (e.g., goethite) are thermodynamically favored under site conditions for YWGA-40, YGWC-38, YGWC-41,YGWC-42, YAMW-3, and YAMW-4, consistent with the analytical data. Iron oxides are a potential sorbent for selenate and selenite as well as cobalt (McLaren et al. 1986) and lithium (Elbana and Osman 2023). Potential iron-reducing conditions were observed at downgradient well YGWC-43, with an elevated total iron concentration of 26 mg/L, consistent with a dissolved oxygen concentration of 0.06 mg/L in October 2019 and a slightly lower range of redox potentials as shown on Figure 2-2. However, the speciation data indicated that the majority of the iron was ferric iron (Table 2-3). The analytical data indicate that reduced ferrous iron is likely present. The Eh/pH diagram (Figure 2-4) indicates conditions where goethite would predominate, but the Eh is relatively low compared to other site data and toward the boundary of the ferrous iron stability field where there would also be ferrous iron present.

2.3 Major Ion Chemistry

In February 2024, sampling and analysis included an expanded analyte list to cover major cations, anions, and alkalinity species. The results are presented in Piper and Stiff diagrams. Figure 2-5 shows a Piper diagram with the relative composition of major ion chemistry in groundwater across the site. Figure 2-5 shows predominantly a calcium-, magnesium-, sulfate-type groundwater for most of the downgradient wells. Upgradient well YGWA-39 is magnesium and bicarbonate type, while adjacent upgradient well YGWA-40 and deep downgradient monitoring location PZ-37Dplot near the line representing 50 percent between endpoints, suggesting a mix of multiple water types, and have relatively lower total dissolved solids (TDS) than wells associated with coal combustion residual (CCR) groundwater. In comparison, most downgradient monitoring wells (e.g., YGWC-41, YGWC-42, PZ-37, YAMW-3, YAMW-4) are grouped relatively close together with predominant sulfate, calcium, and/or magnesium ~~whereas downgradient well~~ . Figures 2-6A and 2-6B show the major ion chemistry on Stiff diagrams and grouped by location in the southeast and western boundaries, respectively. The Stiff diagrams are also shown in cross-section view to illustrate the spatial distribution of general water types. Figure 2-7 is a cross-section location map and Figures 2-8 and 2-9 show the cross-sectional views. The different water types in locations where statistically significant levels (SSLs) of selenium (YGWC-38 and PZ-37) occur are very apparent by visual comparison of the Stiff diagrams compared to the SSLs of cobalt and lithium (YAMW-3 and YGWC-42). On the southeastern side of

the R6 CCR Landfill on Cross-Section A-A' (Figure 2-8), PZ-37 and YGWC-38 exhibit relatively more calcium than magnesium, identifying the water as a calcium and sulfate type (shown in pink). On the west side of the R6 CCR Landfill, the groundwater has a relatively greater proportion of magnesium compared to calcium, and is identified as a magnesium and sulfate type. This groundwater type is shown in blue for wells throughout Cross-Section A-A' (Figure 2-9), including wells YGWC-42 and YAMW-3 with lithium and cobalt exceedances, respectively, as well as at YAMW-4, which has detectable lithium less than the Groundwater Protection Standard (GWPS).Trend Analysis

Groundwater analytical data (through February 2024) are provided on time-series plots (Figures 2-10 through 2-16) and show how groundwater conditions are changing in conjunction with closure and attenuation processes (Sections 3 and 4).

On the southeast side of the R6 CCR Landfill area, overall decreasing Appendix III constituents as well as decreasing beryllium and selenium concentration trends are observed. At YGWC-38, concentrations of boron, sulfate, and TDS have been decreasing through time, with chloride concentrations and pH values remaining stable (Figure 2-10). For example, boron concentrations decreased from 22.7 mg/L in June 2018 to 3.7 mg/L in February 2024. The concentration data indicate that target Appendix III constituent concentrations that are indicators for CCR constituents in groundwater are also decreasing near YGWC-38. Beryllium concentrations have decreased from a maximum of 0.0059 mg/L in June 2018 to 0.0018 mg/L in February 2024, lower less than the GWPS of 0.004 mg/L. Selenium concentrations in YGWC-38 have also decreased from 0.265 mg/L in September 2017 to 0.048 mg/L in February 2024, which is less than the GWPS of 0.05 mg/L. At this location, cobalt concentrations have historically been less than the method detection limit (MDL) and the maximum lithium concentration was an estimated 0.0058 mg/L (April 2018; Table 2-3).

Similar decreasing trends are also noted spatially and vertically near YGWC-38. Boron concentrations continue to decrease through time at PZ-37 (Figure 2-11), while sulfate and TDS decreased from 2017 through 2020 and have been generally stable through 2024, along with chloride and pH. Selenium concentrations in PZ-37 varied between 0.168 mg/L in January 2018 and approximately 0.33 mg/L in September 2018 and 2020, before decreasing to 0.13 mg/L in February 2024. To vertically delineate selenium near PZ-37, one deep bedrock well (PZ-52D) was installed in September 2021 at a depth shallower than PZ-37D. Concentrations of selenium at PZ-52D are very low, 0.0099 mg/L in February 2024, at a depth of approximately 92 feet bgs (Table 2-3). Cobalt and lithium concentrations are low, with maximum detected concentrations estimated at 0.0162 mg/L (February 2018) and 0.033 mg/L, respectively (Table 2-3).

Below YGWC-38, data collected from YAMW-5 (Figure 2-12) show decreasing concentrations of chloride, boron, sulfate, and TDS from 2019 until 2021 before stabilizing**.** Selenium concentrations ranged from 0.048 mg/L (September 2022) to 0.061 mg/L (March 2021) between 2021 and 2024 as the concentrations stabilized. At this location, cobalt concentrations have historically been less than the MDL and the maximum lithium concentration was an estimated 0.016 mg/L (February and March 2021; Table 2-3).

On the west side of the R6 CCR Landfill, concentrations of Appendix III constituents such as boron, sulfate, and TDS have decreased following the R6 CCR Landfill closure, while a limited area of dissolved cobalt and lithium is observed at YGWC-42, YAMW-3, and YAMW-4. Specifically, boron, sulfate, and TDS concentrations have declined at YGWC-41 (Figure 2-13) relative to historical high concentrations. For example, boron decreased from a maximum of 15.2 mg/L in February 2018 to 3.5 mg/L in February 2024. Concentrations of beryllium have decreased through time from 0.0039 mg/L (February 2018) to 0.0014 mg/L (February 2024). Similarly, selenium concentrations at YGWC-41 have decreased from a maximum of 0.071 mg/L in February 2018 to 0.021 mg/L in February 2024. Selenium concentrations decreased on the west side of the R6 CCR Landfill, as noted in wells

YGWC-41 and YGWC-42, compared to YWGC-38 and PZ-37 on the east side of the unit. At YGWC-41, cobalt concentrations have historically been less than the MDL and the maximum lithium concentration was an estimated 0.0047 mg/L (April 2018; Table 2-3).

Selenium concentrations in well YGWC-42 also decreased from the maximum concentration of 0.059 mg/L (October 2017) and stabilized through time, with the most recent measurement of 0.037 mg/L in February 2024 and a historic low concentration of 0.019 mg/L measured in August 2023 (Figure 2-14). Concentrations of boron, sulfate, and TDS also decreased through time, with concentrations of chloride generally stable. Concentrations of boron decreased from 22.7 mg/L in April 2018 to 15.5 mg/L in February 2024, with a historical low concentration of 7.1 mg/L in August 2023. Concentrations of sulfate have similarly decreased from a maximum of 1,100 mg/L in October 2017 to 487 mg/L in February 2024. Lithium concentrations have generally followed an inverse relationship with Appendix III and IV constituents boron, calcium, and selenium as well as cations including calcium and magnesium. These data suggest cation exchange by elevated concentrations of dissolved calcium and magnesium from the CCR groundwater, with lithium on the aquifer matrix, introducing cationic lithium ions to the groundwater. This interpretation is consistent with the exchange affinity series, which describes the general order of affinity of dissolved ions to clay minerals and oxide surfaces in order of decreasing affinity as: cesium > potassium > sodium > lithium for monovalent ions and barium > strontium > calcium > magnesium for divalent ions (Stumm and Morgan 2013). This general affinity series, along with site data, suggest that common cations, including magnesium, calcium, potassium and sodium, can displace lithium from exchange sites. The lithium concentrations increased from a historical low concentration of 0.0208 mg/L in February 2017 to a maximum of 0.059 mg/L in March 2021. Lithium concentrations have generally been stable since September 2020. Cobalt is present only at trace (i.e., J-flagged, estimated) concentrations at this location (Table 2-3).

At co-located and deeper monitoring well, YAMW-3, boron has generally been stable with concentrations ranging from 5 to 8.6 mg/L and similarly stable pH. Appendix IV constituents cobalt and lithium concentrations have been greater than their respective GWPS of 0.035 and 0.04 mg/L, respectively (Figure 2-15). Lithium has been generally stable, with concentrations ranging from the GWPS of 0.04 mg/L (August 2023) to 0.054 mg/L during February 2022. Cobalt concentrations have varied between 0.051 mg/L (February 2024) and 0.16 mg/L (February 2021), with no apparently increasing or decreasing trend. It should also be noted that the cobalt concentrations generally have inverse relationships with Appendix III CCR constituents chloride, boron, and calcium.

Just south and cross gradient/upgradient of the co-located YGWC-42 and YAMW-3, lithium has also been consistently measured in the deeper bedrock at upgradient YAMW-4 (Figure 2-16) with concentrations generally stable, ranging from an estimated 0.018 mg/L (February 2021) to 0.036 mg/L (February 2022 and 2024) compared to the GWPS of 0.04 mg/L. Cobalt at this location has ranged from less than detection to only trace (i.e. J-flagged, estimated) concentrations (Table 2-3).In summary, groundwater monitoring data show declining trends in concentrations of CCR constituents, such as boron, sulfate, beryllium, and selenium, most likely due to closure progressing at the R6 CCR Landfill since 2016 and attenuation of constituents in groundwater. On the west side of the R6 CCR Landfill, lithium concentrations at YGWC-42 increased while CCR constituents such as boron, sulfate, TDS, and selenium decreased. The apparent inverse relationship between calcium and magnesium with lithium concentrations suggest that cation exchange of cations in CCR groundwater such as calcium and magnesium replaced lithium on aquifer solids, causing an increase in lithium concentrations in groundwater at this location. Cobalt concentrations on the west side of the R6 CCR Landfill at YAMW-3 have an inverse relationship with Appendix II CCR constituents and have fluctuated greater than the GWPS, with no apparent increasing or decreasing concentration trend.

3 Fate and Transport of Selenium

This section discusses selenium geochemistry and summarizes a bench-scale sorption study and the overall selenium CSM.

3.1 Selenium Geochemistry

Selenium is a redox reactive element found in groundwater primarily as selenite, selenate, elemental selenium, or selenide. Selenium occurs in CCR material as selenium salts, selenite, and selenate (Zachara et al. 1994). The following discussion of the factors influencing the behavior of selenium is referenced from Zachara et al. (1994). The oxidation state of selenium affects solubility and mobility. Elemental selenium and metal selenides are relatively insoluble. selenite and selenate are relatively soluble and attenuate by sorption to iron and aluminum oxides and kaolinite. Selenite sorbs more strongly than selenate. In the presence of sulfate, selenate is more mobile and less likely to attenuate due to competition for sorption. Both selenate and selenite are anions and sorb more strongly at lower pH.

3.2 Selenium Speciation

The fate and transport of selenium in groundwater depends on the species of selenium present. The Eh/pH data for the R6 CCR Landfill monitoring wells are plotted on a selenium speciation diagram using site-specific data and verified with published selenium speciation diagrams from the literature (Su et al. 2007; Figure 3-1). The Eh/pH diagram indicates that, for the oxidizing, mildly acidic groundwater at the site, a species of selenite ($HSeO_3^-$), is predicted to be dominant, except for several samples from locations such as YGWC-41 and YGCW-43, where elemental selenium is predicted to be dominant.

Groundwater collected from YGWC-38 and YGWC-41 in September 2020, and PZ-37 in April 2022 was submitted for selenium speciation analysis to Brooks Applied Laboratories, located in Bothell, Washington, to determine the species present in groundwater at the site. Selenium speciation was analyzed using inductively coupled plasma-mass spectrometry and included total dissolved selenium, selenite, selenate, and other commonly observed forms of selenium. Results from the speciation of selenium in groundwater analysis are presented in Table 3-1. The results demonstrate that selenium is present predominantly in the form of selenate, with a minor amount of selenite measured only at PZ-37. While selenate was not predicted in the typical thermodynamic model shown on Figure 3-1, the presence of selenate is consistent with the shift toward higher dissolved oxygen and ORP observed at YGWC-38 and YGWC-41 by September 2020, and PZ-37 by February 2022 (Figure 2-3) and may reflect actual conditions that are not at thermodynamic equilibrium represented by the speciation diagram. Deviations from thermodynamic equilibrium may be due to recent closure activities and are expected to trend toward equilibrium through time, with groundwater conditions favoring the attenuation of selenium species onto aluminum and iron oxides (Section 3.4).

3.3 Selenium Sorption Study

A bench-scale study was completed to evaluate the sorption of selenium in site groundwater onto site aquifer materials, as detailed below.

To assess the sorption mechanism, capacity, and stability of the aquifer matrix to attenuate dissolved selenium in groundwater, a series of bench-scale sorption tests were completed on the saprolite and bedrock solids identified in Table 3-2. The bench-scale sorption tests incorporated groundwater collected from YGWC-38, where the initial concentration of selenium was approximately 0.075 mg/L, total acidity was 22.2 mg/L, and samples representative of saprolite and gneiss bedrock. Saprolite material from above the saturated zone in YGWC-24SA was used to support the assessment of sorption capacity in unimpacted sediments. The biotite gneiss bedrock material, both fine- and coarse-grained, was generated from a core collected from YAMW-4 to represent unimpacted bedrock aquifer material. The bedrock cores were crushed into two particle size ranges using a proctor hammer and 0.375- and 0.1875-inch sieves. The coarse bedrock used in the reactors incorporated particle size ranges between 0.1875 and 0.375 inch. The fine bedrock material used was the particles passing through the 0.1875-inch sieve. The core processing and separation of coarse- and fine-grained fractions was done to enable the measurement of sorption onto reactive surfaces likely present in the fine-grained fraction, although it should be recognized there is some uncertainty in how the absolute values of sorption measured would translate to the undisturbed aquifer formation.

For each of the aquifer matrix samples evaluated (saprolite, biotite gneiss fine, and biotite gneiss coarse), several trials were run with variations in the solid to liquid ratio to measure the amount of sorption. Each reactor was run for a 72-hour period, after which a filtered sample was extracted and submitted for selenium analysis. In addition, a control reactor containing only YGWC-38 groundwater was run to verify that sorption to the reaction vessel did not occur. Throughout the 72-hour period, pH in the reactor cells varied depending on the solid-to-liquid ratio and material type. Results from each trial are presented in Table 3-2. In the saprolite unit and fine-grained bedrock, selenium sorption occurred when aquifer material (in grams) to groundwater (in milliliters [mL]) ratios ranged from 1 gram:1 mL to 3 grams:1 mL with 11 to 43 percent selenium removal in the saprolite trials and 7 to 31 percent removed in the fine-grained bedrock trials.

The test can also be used to assess the capacity of aquifer materials for sorbing selenate under oxidizing conditions and high sulfate concentrations found at YGWC-38 and YGWC-41. No measurable sorption was observed when the saprolite and fine-grained bedrock fraction was loaded with more than 0.5 milligram (mg) selenium per kilogram (kg) aquifer solids, indicating that sorption capacity was exceeded. When loaded with lower amounts of selenium, the saprolite capacity was 0.008 to 0.13 milligram per kilogram (mg/kg) and the fine-grained bedrock capacity was 0.006 to 0.009 mg/kg. It should be noted that these estimates represent the low end of the range for the site. Sorption could be higher for the following reasons:

- pH increased during the test from 6.0 to 8.2 in the trials in which sorption was observed, higher than the site at PZ-37, which yields pH less than 6.
- Concentrations of sulfate, a competing anion for sorption, were relatively high in YGWC-38 at 414 mg/L in October 2020 (when the bench-scale study samples were collected) and at 452 mg/L in the most recent sample collected in February 2022 from PZ-37. However, concentrations of sulfate have been declining at the R6 CCR Landfill monitoring wells since closure, allowing for stronger sorption of selenium with reduced competition from sulfate (Zachara et al. 1994).

3.4 Selenium Conceptual Site Model

Elevated selenium concentrations are observed along the southeastern boundary of the R6 CCR Landfill. Additional borehole drilling and sampling and analysis of the deeper bedrock aquifer (BH-52, PZ-52D) further

refined the vertical delineation of selenium impacts to shallower depths (approximately 90 feet) than previously determined by PZ-37D (approximately 200 feet).

Selenium concentrations in groundwater at the R6 CCR Landfill are limited in extent, suggesting that CCR materials placed in some cells leached selenium while others did not or leached lesser amounts. Wells that exhibited elevated selenium concentrations (YGWC-41, YGWC-38, and PZ-37) have demonstrated decreases since closure of the R6 CCR Landfill was completed in 2016. Elevated concentrations of selenium at YAMW-5 have been relatively stable and are expected to decrease following short-term perturbations in groundwater flow and geochemistry due to closure. Mechanisms accounting for the reduction in concentrations include sorption, dilution, and dispersion. Dilution and dispersion are demonstrated through the simultaneous concentration reductions in indicator constituents, such as boron and sulfate, as described in Section 2.4.

The attenuation mechanism of selenium sorption was evaluated and demonstrated through speciation analysis, general chemical analysis, mineralogical analysis, and sorption studies. The dominant species of selenium observed at YGWC-38, YGWC-41, and PZ-37 was selenate. Selenate forms outer sphere complexes with aluminum oxides and aluminosilicates, and there is evidence that selenate can form outer or inner sphere complexes on iron oxides, with inner sphere complexes forming at low pH (Peak and Sparks 2002). Under ambient groundwater conditions, the oxidized mineral phase hematite is the dominant species expected to participate in sorption reactions with selenium (Figure 2-4). Mineralogical analysis presented in Section 2.1 demonstrated the presence of aluminosilicates (i.e., kaolinite) by XRD. Iron and aluminum that may be present in aluminum and iron oxides was demonstrated with bulk analysis and is further supported by the presence of iron-stained borehole materials as reported on borehole logs. General groundwater chemistry indicates favorable pH and redox conditions for sorption, with mildly acidic site groundwater favoring sorption of both selenite and selenate onto iron oxide species (Zachara et al. 1994; Peak and Sparks 2002). The presence of elevated sulfate associated with the CCR impacted groundwater at YGWC-38, YGWC-41, and PZ-37 inhibits the sorption of selenate through competitive sorption. Accordingly, as sulfate concentrations continue to decline through time, groundwater conditions are anticipated to become more favorable for the attenuation of selenium.

The attenuation of selenium in the saprolite and fine-grained bedrock material was directly demonstrated through the bench-scale study. The amount of sorption measured during the bench-scale study was low relative to other contaminants.

The capacity of sorption as an attenuation mechanism was measured in the bench-scale study. Sorption coefficient (Kd) values of 0.12 to 0.25 liter per kilogram (L/kg) were calculated for saprolite and 0.1 to 0.16 L/kg for the fine-grained bedrock. Although the capacity was low relative to other contaminants, it was conservatively estimated under oxidizing conditions with pH above the ambient values on the east side of the R6 CCR Landfill. The amount of selenium in groundwater upgradient of the monitoring wells with elevated selenium is limited. Following closure of the R6 CCR Landfill, the infiltration of selenium to groundwater was significantly reduced. Decreasing trends indicate that the sorption measured herein, coupled with dilution and dispersion, is sufficient to attenuate selenium in groundwater and continue the declining trends at the downgradient wells in the network.

Groundwater chemistry through time is the main determinant of whether selenium immobilized onto aquifer solids by natural attenuation processes will remain stable (Su et al. 2007). Immobilization of selenium through sorption at the site is currently favored by mildly acidic groundwater conditions (generally 5 to 7) and inhibited by the presence of elevated sulfate. Sulfate is a competing anion for sorption with selenate. Through time, groundwater conditions are anticipated to remain favorable for selenium sorption, promoting stability. The decreasing sulfate concentrations observed (Section 2.4) will favor the sorption of selenate through time because the presence of

that competing anion for sorption is reduced. The pH of upgradient water at the R6 CCR Landfill is mildly acidic and will continue to favor sorption of selenate after reaching the GWPS.

An evaluation of options for amending the subsurface to further promote immobilization of selenium via in situ injections, if natural mechanisms prove insufficient, was undertaken and is presented in Attachment 2. Various forms of zero-valent iron (ZVI) were tested. ZVI can enhance selenium immobilization by providing increased sorption capacity and/or by reduction to selenite, elemental selenium, and selenide that have lower solubility and/or greater propensity for sorption. The results of the testing indicate in situ injection of ZVI would promote conditions enhancing the immobilization of selenium at the site.

4 Fate and Transport of Cobalt and Lithium

This section discusses cobalt and lithium geochemistry and summarizes a bench-scale sorption study and the overall cobalt and lithium CSM.

4.1 Cobalt Geochemistry

Cobalt is present in the aquifer system in trace amounts, primarily as a soluble divalent cation, and has relatively low redox reactivity. Cobalt is known to participate in sorption-desorption reactions with metal oxides, clay minerals, and humic and fulvic acids. More specifically, cobalt has been observed to form surface complexes with iron oxides (e.g. goethite) and the retention of cobalt on mineral surfaces has been demonstrated to increase with decreasing groundwater concentrations (Ugwu and Sherman 2017). Similarly, cobalt sorption has been demonstrated to be inhibited (i.e. cobalt is more mobile) in groundwaters with elevated ionic strengths, likely due to the associated decreased activity of the divalent cobalt ion in groundwater (McLaren et al. 1986).

4.2 Lithium Geochemistry

Lithium is present in the aquifer in trace amounts, primarily as a monovalent cation, and has relatively low redox reactivity. In general, lithium acts as a relatively conservative ion controlled by low abundance, low redox reactivity, and relatively high solubility (Electric Power Research Institute [EPRI] 2018). Cations commonly found in groundwater, such as calcium and magnesium, can displace lithium from exchange sites on aquifer solids; as such, exchange reactions tend to mobilize lithium from aquifer solids into groundwater. However, adsorption of dissolved lithium onto clays, other mineral phases such as iron, aluminum-, and manganese oxides, and carbonates can occur (Elbana and Osman 2023). Additionally, lithium can exchange to some extent for divalent calcium, magnesium, and iron, but it does not typically substitute for the chemically related and more abundant alkalis sodium and potassium due to its smaller ionic size (Vine 1975).

4.3 Cobalt and Lithium Sorption Study

To assess the sorption mechanism, capacity, and ability of the aquifer matrix to attenuate dissolved cobalt and/or lithium in site groundwater, a bench-scale sorption test was completed with aquifer solids. The bench-scale sorption test consisted of reactors with PWR solids and groundwater collected from YAMW-3, where the initial concentrations of dissolved cobalt and lithium were 0.11 and 0.039 mg/L, respectively, and pH was 5.60 at the time of groundwater sample collection, as presented in Table 4-1. The reactors examined solids (grams) to

groundwater volume (mL) ratios spanning four magnitudes (0.001:1 to 2:1) and included one duplicated trial of the 0.1 solids-to-groundwater ratio (Reactor 5 and 6). A control reactor (Reactor 1) was run containing 400 grams of solids and 200 mL deionized water to control for potential leaching of cobalt or lithium from the solids at the maximum solids to groundwater ratio tested (2:1). A second control reactor was run containing only YAMW-3 groundwater to verify that sorption to the reaction vessel did not occur (Reactor 2). Reactor descriptions and initial conditions are presented in Table 4-1.

To standardize particle-size distribution among each of the different reactors, a modified version of coning and quartering was used when filling the reactors with solids. One-liter high-density polyethylene bottles were used as the reaction vessels for the sorption tests. After solids were placed in the reactors, all seven reactors were then dosed with their corresponding volume of either deionized water or site groundwater, as presented in Table 4-1. The reactors were then sealed with electrical tape and laid on the rolling table to mix for 5 days.

After 5 days of mixing on the rolling table, all seven reactors were removed and allowed to settle for approximately 3 hours. Reactors 2, 3, 4, 5, and 6 were sampled for total and dissolved metals once the solids had settled to the bottom of the reactors. For total metals, a 60 mL syringe was used to transfer sample water from the reactor to the corresponding sample bottle containing a nitric acid preservative. For dissolved metals, the same syringe was used to collect sample water from the reactor and then filtered with a 0.45 micrometer cellulose acetate syringe filter prior to being transferred to the nitric acid preserved sample bottle. Reactors 1 and 7, containing a solids to groundwater ratio of 2:1, did not have sufficient free groundwater following the 5-day mixing period to sample for both total and dissolved metals; therefore, these reactors were only sampled for dissolved metals. Samples were sent to Pace for total metals and/or dissolved metals analyses using SW-846 Method 6020B. Adsorbed cobalt and lithium concentrations were calculated from the difference between the initial and final aqueous concentrations.

Cobalt and lithium sorption occurred for all solids to groundwater ratios tested. Up to 85 and 84 percent removal of cobalt and lithium, respectively, was measured, and the percent removal was proportional to the solids-to-groundwater ratio, indicating sorption of cobalt and lithium to the solids was the associated mechanism for mass removal from the aqueous phase.

The capacity of solids for sorbing cobalt and lithium under the conditions found at YAMW-3 was also quantified. Cobalt removal of 15 percent was observed when the solids were loaded with 16-mg cobalt per kg solids, indicating that sorption capacity was not exceeded at the greatest cobalt-to-solids mass ratio tested. Comparatively for lithium, 3 percent lithium removal was observed when the solids were loaded with 1 mg lithium per kg solids, indicating that sorption capacity was nearly exceeded at the maximum lithium-to-solids mass ratio tested.

As shown on Figure 4-1, sorbed cobalt and lithium exhibit a positive and apparently linear correlation with aqueous cobalt and lithium concentrations for both cobalt and lithium at the initial (i.e., baseline) concentrations (0.11 and 0.037 mg/L; Table 4-1) and solids-to-liquid ratios tested (0.001 to 2).

4.4 Cobalt and Lithium Geochemical Modeling

PHREEQC version 3.7.3 (Parkhurst and Appelo, 1999), an equilibrium speciation and mineral-water mass-transfer code developed by the United States Geological Survey, was used to simulate the sorption study presented in Section 4.2. As a conceptual demonstration of the hypothesized mechanisms controlling sorption, cobalt and lithium uptake were simulated using surface complexation and ion exchange mechanisms,

respectively. Simulations were conducted using the minteq.v4 thermodynamic database, modified to include the ion exchange model from the wateq4f database. The associated PHREEQC input text is provided as Attachment 4.

Surface complexation of cobalt was based on the Dzombak and Morel (1990) database for complexation of metal ions on hydrous ferric oxide (HFO, or ferrihydrite). This was done by assuming the following:

- The default Dzombak and Morel (1990) model includes two sorption sites – weak sites and strong sites – present in a 40:1 ratio (0.2 and 0.005 moles weak and strong sites per mol iron, respectively). Following preliminary calibration attempts, the strong site concentration available for sorption was adjusted upward by a factor of 10 (0.05 mol sites/mol iron) to align with laboratory observations.
- The quantity of iron was calibrated to 0.08 gram HFO per gram solids (i.e., 8% of the total mass), based on a qualitative visual fit to the empirical data collected during laboratory sorption tests (Section 4.3). Based on the quantity of total solids in each reactor (0.5, 5, 50, and 400 grams of solids, Table 4-1), the reactors were assigned iron contents of 0.08, 0.8, 8, and 64 grams of HFO per liter of water.
- In order to replicate experimental conditions from the laboratory sorption tests, the initial groundwater condition used in the simulation was assigned the chemistry of the YAMW-3 sample used during the laboratory sorption tests, which included an initial cobalt concentration of 0.11 mg/L.

The attenuation of lithium was simulated using an ion exchange model with the following assumptions and initial conditions:

- The lithium ion-exchange constant was calibrated from -0.08 to 1.0 based on a qualitative visual fit to the empirical data collected during laboratory sorption tests (Section 4.3).
- Cation exchange capacity was calibrated to 25 milliequivalents per 100 grams solids based on a qualitative visual fit to the experimental results.
- To avoid non-representative changes in pH with ion-exchange reequilibration, the ion exchange reaction for H+ was turned off.
- In order to replicate experimental conditions from the laboratory sorption tests, the initial groundwater was assigned the YAMW-3 chemistry measured during the laboratory sorption tests, with a lithium concentration of 0.039 mg/L.

The qualitative calibrated results of the geochemical model simulations are presented on Figure 4-2 overlaid with the laboratory sorption study results. Overall, the surface complexation and ion exchange models for cobalt and lithium, respectively, provide reasonable simulations of the laboratory sorption study results, suggesting that these reactions are plausible sorption mechanisms for attenuation of cobalt and lithium at the site. In both cases, however, the extent of sorption was relatively high, potentially suggesting other uptake mechanisms as well. The calibrated cation exchange capacity of 25 milliequivalents per 100 grams solids (meq/100 g) is relatively high; values in this range are typically observed for pure clay minerals or clay soils (Appelo and Postma 2005; references therein), while soils without substantial clay and organic matter content are typically in the range of 5 to 22 meq/100 g (Sposito 1989; references therein). The materials tested for YAMW-3 were silty sand with some clay and gravel. In addition, the increased HFO strong-to-weak-site ratio by a factor of 10 for the surface complexation model and the relatively high calibrated HFO content of 8% of the total suggests that cobalt is likely adsorbing to a variety of other minerals in addition to ferrihydrite, such as primary minerals including micas (e.g.

biotite, muscovite, and clinochlore) and secondary minerals such as clays and aluminum oxides, which have been confirmed to be present at the site (Section 2.1).

4.5 Lithium Conceptual Site Model

SSLs were first identified for lithium at YGWC-42 in February 2024 (Arcadis 2024). Detections of lithium in groundwater at the site greater than the method reporting limit are limited to YAMW-4, YGWC-42, and YAMW-3 (Figure 8 of the Draft Remedy Selection Report), with a historical maximum concentration of 0.059 mg/L detected at YGWC-42 in February 2021. Elevated concentrations of lithium in groundwater at YAMW-4, YGWC-42, and YAMW-3 are within the magnesium- and sulfate-type water on the west side of the R6 CCR Landfill and are inversely related to CCR cations such as magnesium and calcium. These observations suggest that the occurrence of lithium is due to replacement of lithium on aquifer solids by cation exchange with calcium and magnesium from CCR impacted groundwater.

Once in groundwater, lithium tends to transport conservatively in groundwater; however, mechanisms for attenuation are present at the site via sorption capacity of aquifer solids, as demonstrated in the sorption testing described in Section 4.2. Within the Piedmont flow regime, groundwater in bedrock units ultimately flows through the PWR and then the saprolite, which likely have greater reactive surface areas compared to bedrock available for attenuation due to upward hydraulic gradients where groundwater expresses to drainages. The solids analysis presented in Section 2.1 confirms the presence of mica minerals such as muscovite, biotite, and clinochlore, which are capable of participating in cation exchange reactions and iron and aluminum oxides capable of sorbing lithium in the bedrock, PWR, and saprolite units. Given the low groundwater concentrations of lithium and limited extent of lithium in groundwater on the west side of the R6 CCR Landfill, little attenuation capacity is needed to attenuate lithium to less than the GWPS. Attenuation of lithium via sorption mechanisms is anticipated to strengthen through time as the calcium and magnesium from CCR impacted groundwater continue to decline following closure of the R6 CCR Landfill. Accordingly, lithium concentrations are anticipated to decline to less than the GWPS in the future.

4.6 Cobalt Conceptual Site Model

SSLs were identified for cobalt at YAMW-3 in February 2024 (Arcadis 2024). Elevated concentrations of cobalt in groundwater in the R6 CCR Landfill monitoring network are limited to YAMW-3 (Figure 8 of the Draft Remedy Selection Report), with a historical maximum concentration of 0.16 mg/L detected at YAMW-3 in February 2022. Elevated concentrations of cobalt in groundwater are limited to YAMW-3 within the magnesium- and sulfate-type water on the west side of the R6 CCR Landfill. The source and distribution of cobalt in groundwater appears to be distinct from impacted groundwater observed at other site monitoring wells and is limited to the immediate vicinity near YAMW-3 along the western boundary of the R6 CCR Landfill. Evidence to support this observation includes:

- During February 2024, cobalt was laterally delineated at downgradient monitoring location PZ-55 where the concentration was an estimated 0.0041 mg/L, 1 order of magnitude less than the GWPS.
- As shown on Figure 4-3, YAMW-3 appears to have a dilute CCR constituent composition that is proportionally similar to adjacent, shallow monitoring well YGWC-42 for primary CCR constituents such as sulfate, calcium, and boron. However, the proportion of cobalt to other CCR constituents such as boron, calcium, and sulfate is inconsistent, suggesting the cobalt is associated with a different CCR impacted groundwater or a non-CCR source.

Cobalt in groundwater is primarily present as the divalent cobalt cation. As with lithium, attenuation mechanisms for cobalt are present at the site based on the sorption testing summarized in Section 4.2. Within the Piedmont flow regime, groundwater in bedrock units ultimately flows through the saprolite then the PWR, which likely have greater reactive surface areas compared to bedrock available for attenuation, due to upward hydraulic gradients where groundwater expresses to drainages. The solids analysis presented in Section 2.1 confirms the presence of clay minerals such as muscovite, biotite, and clinochlore, and iron and aluminum oxides, which are capable of participating in sorption reactions (i.e., adsorption, surface complexation, and/or cation exchange) in the bedrock, PWR, and saprolite. Given the limited extent of cobalt present on the west side of the landfill, little attenuation capacity is needed to attenuate cobalt. As the groundwater system continues to equilibrate following closure of the R6 CCR Landfill, concentrations are anticipated to decline. The sorption attenuation mechanism is anticipated to be stable and potentially strengthen through time as groundwater concentrations of competing cations decline further.

Although cobalt sorbed to solids may be displaced with competing cations in solution such as calcium and magnesium, an increase in cation composition is not expected through time due to closure of the R6 CCR Landfill and flushing of clean water with low calcium and magnesium concentrations, as seen at upgradient well YGWA-40, is anticipated.

An evaluation of options for amending the subsurface to further promote immobilization of selenium via in situ injections, if natural mechanisms prove insufficient, was undertaken and is presented in Attachment 3. Various forms of ZVI were tested. ZVI can enhance cobalt and lithium immobilization by providing increased sorption capacity and/or through precipitation of sulfide phases as a result of the stimulation of sulfate reduction. The results of the testing indicate in situ injection of some forms ZVI would promote conditions enhancing the immobilization of cobalt and lithium at the site.

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Tables

Table 2-1
Mineralogy Results
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Lithology	Chemical Composition	Saprolite				Partially Weathered Rock		Biotite Gneiss				
Sample ID		YGWC-24SA	YGWC-24SA	YGWC-24SA	YGWC-38	YGWC-41	YGWC-41	YAMW-3	YAMW-4	YGWC-38	YGWC-38	YGWC-41
Interval (feet below ground surface)		40-44	47-49	52-54	26-27	32-33	48-49	83-84	88-89	39-40	59.5-60.5	59-60
Quartz	SiO_2	46.7	41.7	49.2	51.6	49.5	46.1	53.0	36.9	43.6	49.9	51.7
Albite	$NaAlSi_3O_8$	26.8	29.5	34.8	30.3	31.5	39.6	29.6	49.1	39.4	31.7	29.9
Albite, calcian	$(Na,Ca)Al(Si,Al)_3O_8$	6.40	7.00	2.40	6.30	6.90	2.50	4.90	7.10	5.30	6.30	8.70
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	11.9	11.9	7.20	5.40	6.70	4.70	7.50	1.80	6.40	6.80	5.50
Biotite	$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$	2.20	0.80	1.00	1.20	-	5.60	5.00	2.80	4.40	5.00	4.30
Hydrobiotite	$K(Mg,Fe)_6(Si,Al,Fe)_8O_{20}(OH)_4 \cdot 4H_2O$	1.10	4.70	1.70	0.90	4.00	-	-	-	-	-	-
Clinochlore	$(Fe,Mg)_5Al(Si_3Al)O_{10}(OH)_8$	1.00	1.30	1.50	1.10	1.40	1.40	-	2.40	0.90	0.30	-
Kaolinite	$Al_2Si_2O_5(OH)_4$	2.30	1.40	1.60	2.20	-	-	-	-	-	-	-
Antigorite	$Mg_3Si_2O_5(OH)_4$	1.50	1.70	0.60	1.00	-	-	-	-	-	-	-
TOTAL	----	99.9	100	100	100	100	99.9	100	100	100	100	100

Note:
1. All values are reported as weight percent.

Table 2-2
Constituent Composition – Assay Results
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Sample ID (depth interval)	Lithology	Silicon	Aluminum	Iron	Potassium	Magnesium	Calcium	Titanium	Manganese	Barium	Chromium	Hydrogen	Oxygen	Sodium
YGWC-24SA (40-44)	Saprolite	36.6	7.41	1.50	1.22	0.62	0.45	0.08	0.05	0.04	-	-	-	-
YGWC-24SA (47-49)		34.5	7.82	1.98	1.54	1.06	0.45	0.10	0.09	0.04	-	-	-	-
YGWC-24SA (52-54)		36.6	6.57	1.12	0.77	0.51	0.33	0.05	0.04	0.02	-	-	-	-
YGWC-38 (26-27)		37.8	6.33	1.06	0.64	0.43	0.34	0.05	0.02	0.02	-	-	-	-
YGWC-41 (32-33)	Partially Weathered Bedrock	36.3	6.18	1.52	0.82	0.58	0.67	0.08	0.05	0.02	-	-	-	-
YGWC-41 (48-49)		35.2	6.01	0.93	0.79	0.66	0.11	0.05	0.02	0.02	-	-	-	-
YAMW-3 (83-84)	Biotite Gneiss	36.7	5.98	0.90	0.87	0.53	0.36	0.05	0.02	-	0.02	-	-	-
YAMW-4 (88-89)		36.6	7.01	0.66	0.37	0.49	0.47	0.05	0.05	-	-	-	-	-
YGWC-38 (39-40)		37.0	6.66	0.93	0.98	0.43	0.4	0.04	0.02	0.02	-	-	-	-
YGWC-38 (59.5-60.5)		37.2	6.67	1.01	0.75	0.27	0.63	0.06	0.03	0.03	-	-	-	-
YGWC-41 (59-60)		37.1	6.55	0.93	0.65	0.63	0.34	0.06	0.02	0.02	-	-	-	-

Notes:
1. All values are as weight percent.
2. Values measured by chemical assay. Reported in weight percent.

Abbreviation:
- = not detected

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	PZ-35 8/30/2018	PZ-35 10/16/2018	PZ-35 9/26/2019	PZ-35 3/25/2020	PZ-35 9/24/2020	PZ-35 2/10/2021	PZ-35 3/4/2021	PZ-35 9/1/2021	PZ-35 2/10/2022	PZ-35 8/31/2022	PZ-35 2/9/2023
Appendix III	Boron	mg/L	**0.04**	**0.031 J**	< 0.04	**0.071 J**	**0.017 J**	NA	**0.012 J**	**0.044**	**0.054**	**0.052**	**0.076**
	Calcium	mg/L	NA	**6.5**	**4.83**	**7.9**	**3.6**	NA	**4.4**	**7.9**	**8.8**	**11.8**	**14.5**
	Chloride	mg/L	NA	**8.5**	**7.5**	**6.8**	**7.5**	NA	**6.7**	**6.3**	**5.6**	**5.5**	**5.4**
	Sulfate	mg/L	NA	**34.2**	**14.3**	NA	**7.2**	NA	**8.8**	**38.7**	**42.6**	**67.9**	**84.6**
	Total Dissolved Solids	mg/L	NA	**123**	NA	**84.0**	**100**	NA	**59.0**	**128**	**130**	**173**	**196**
Appendix IV	Cobalt	mg/L	NA	< 0.01	< 0.005	**0.0059**	< 0.00038	< 0.00038	< 0.00038	< 0.00039	<0.00039	< 0.00039 U	< 0.00039 U
	Lithium	mg/L	NA	**0.0011 J**	< 0.03	**0.011 J**	**0.0010 J**	**0.0012 J**	**0.0015 J**	**0.0019 J**	**0.0021 J**	**0.0025 J**	**0.0026 J**
	Selenium	mg/L	NA	< 0.01	< 0.0025	< 0.0013	< 0.0016	< 0.0016	< 0.0016	**0.0016 J**	**0.003 J**	**0.0033 J**	**0.0041 J**
Field	Conductivity	µS/cm	NA	NA	NA	NA	78.6	107.2	104.5	140.0	167.2	199.5	219.83
	Dissolved Oxygen	mg/L	NA	NA	NA	NA	4.8	5.21	5.57	4.14	4.02	4.21	4.5
	Iron (Ferrous)	mg/L	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	NA	NA	NA	168.5	135.37	234.5	24.94	190.1	196.49	204.5
	Eh [1]	mV	NA	NA	NA	NA	368.5	335.37	434.5	224.94	390.1	396.49	404.5
	pH	SU	NA	NA	NA	5.65	5.52	5.58	5.64	6.82	5.43	5.28	5.5
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	**13.5**	**28.5**	NA	NA	NA	NA	NA	NA	**9.3**
	Alkalinity, Bicarbonate	mg/L	NA	NA	**13.5**	**28.5**	NA	NA	NA	NA	NA	NA	**9.3**
	Alkalinity, Carbonate	mg/L	NA	NA	< 1	< 5.0	NA	NA	NA	NA	NA	NA	< 5 U
	Aluminum	mg/L	NA	NA	< 0.1	< 0.032	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	**2.57**	**4.6**	NA	NA	NA	NA	NA	NA	**8**
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	**0.0164**	**0.024 J**	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	**2.1**	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	< 0.02	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	**1.02 J**	**8.8**	NA	NA	NA	NA	NA	NA	**1.7**
	Sodium	mg/L	NA	NA	**10.7**	**13.9**	NA	NA	NA	NA	NA	NA	**15.9**
	Sulfide	mg/L	NA	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	< 1	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
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Newnan, Georgia

ANAlyte		Units	PZ-35	PZ-35	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37
			8/16/2023	2/23/2024	10/12/2017	11/21/2017	1/11/2018	2/20/2018	4/3/2018	6/29/2018	8/6/2018	9/24/2018	9/25/2020
Appendix III	Boron	mg/L	**0.13**	**0.2**	**15.4**	**17.2**	**15.8**	**19.5**	**17.5**	**20.6**	**15.9**	**16.5**	**14.1**
	Calcium	mg/L	**21.5**	**31.1**	**122**	**118**	**119**	**124**	**114**	**129**	**114**	**115**	**108**
	Chloride	mg/L	**4.9**	**4.8**	**5.4**	**6.5**	**5**	**5.2**	**4.8**	**5.7**	**4.8**	**4.9**	**4.3**
	Sulfate	mg/L	**107**	**148**	**650**	**700**	**590**	**677**	**615**	**634**	**623**	**674**	**563**
	Total Dissolved Solids	mg/L	**256**	**299**	**1060**	**1100**	**1020**	**1050**	**1080**	**979**	**1020**	**1090**	**878**
Appendix IV	Cobalt	mg/L	< 0.00039 U	< 0.00032	**0.0078 J**	**0.0097 J**	**0.0131**	**0.0162**	**0.015**	**0.013**	**0.0053 J**	**0.0071 J**	**0.0023 J**
	Lithium	mg/L	**0.0026 J**	**0.0032 J**	**0.0271 J**	**0.0255 J**	**0.0271 J**	**< 0.25**	**0.027 J**	**0.032 J**	**0.033 J**	**0.028 J**	**0.028 J**
	Selenium	mg/L	**0.0039 J**	**0.0035 J**	**0.234**	**0.225**	**0.168**	**0.315**	**0.28**	**0.26**	**0.21**	**0.33**	**0.32**
Field	Conductivity	µS/cm	246.93	386.25	1289.0	1285.4	1202.4	1220.2	1188.2	1264.7	1193.5	1209.7	1183.2
	Dissolved Oxygen	mg/L	4.11	4.07	0.25	0.29	0.14	0.37	0.22	0.31	0.22	0.42	0.3
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	294.05	216.26	9.6	15.3	-32.5	57.9	120.3	73.1	105.3	228.4	201.9
	Eh [1]	mV	494.05	416.26	209.6	215.3	167.5	257.9	320.3	273.1	305.3	428.4	401.9
	pH	SU	5.34	5.24	5.57	5.49	5.87	5.90	5.66	5.49	5.52	5.37	5.46
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	**6.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	**6.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	< 5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**16.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	**2.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	**19.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Table 2-3
Groundwater Analytical Data (2016 – 2024)
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Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37	PZ-37D	PZ-37D	PZ-37D
			2/9/2021	3/4/2021	8/25/2021	2/10/2022	9/1/2022	2/8/2023	8/17/2023	2/21/2024	5/13/2021	9/3/2021	2/11/2022
Appendix III	Boron	mg/L	NA	**12.4**	**10.3**	**9.5**	**9.9**	**8.2**	**9.5**	**7.8**	**1.3**	**1.6**	**0.44**
	Calcium	mg/L	NA	**118**	**106**	**106**	**99.9**	**95.9**	**101**	**103**	**68.3**	**64.0**	**49**
	Chloride	mg/L	NA	**3.9**	**7.0**	**4.2**	**4.2**	**3.8**	**4.1**	**4.5**	**4.0**	**7.1**	**12.5**
	Sulfate	mg/L	NA	**485**	**472**	**452**	**490**	**449**	**459**	**462**	**178**	**153**	**115**
	Total Dissolved Solids	mg/L	NA	**856**	**876**	**798**	**908**	**822**	**938**	**834**	**381**	**374**	**382**
Appendix IV	Cobalt	mg/L	**0.0023 J**	**0.0030 J**	**0.0068**	**0.0036 J**	**0.0025 J**	**0.0022 J**	**0.0027 J**	**0.0017 J**	< 0.00038	< 0.00039	<0.00039
	Lithium	mg/L	**0.024 J**	**0.028 J**	**0.023 J**	**0.017 J**	**0.016 J**	**0.013 J**	**0.016 J**	**0.015 J**	**0.011 J**	**0.013 J**	**0.0087 J**
	Selenium	mg/L	**0.28**	**0.27**	**0.2**	**0.2**	**0.17**	**0.16**	**0.15**	**0.13**	**< 0.0016**	**< 0.0014**	**<0.0014**
Field	Conductivity	µS/cm	1286.4	1436.5	1162.1	1029.3	1,023.99	953.88	956.48	1,063.73	NA	572.6	574.4
	Dissolved Oxygen	mg/L	0.88	0.73	0.77	2.86	2.7	3.31	2.17	2.44	NA	0.76	0.52
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	173.47	234.96	186.7	160.24	198.62	202.05	210.49	194.52	NA	-221.46	-259.08
	Eh [1]	mV	373.47	434.96	386.7	360.24	398.62	402.05	410.49	394.52	NA	-21.46	-59.08
	pH	SU	5.42	5.51	5.28	4.83	4.98	5.15	5.13	5.12	7.79	7.44	7.84
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	**29**	NA	NA	**13.2**	NA	**16**	NA	**112**	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	**29**	NA	NA	**13.2**	NA	**16**	NA	**112**	NA
	Alkalinity, Carbonate	mg/L	NA	NA	< 5	NA	NA	< 5 U	NA	< 5 U	NA	<5	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	**53.1**	NA	NA	50.7	NA	**56.4**	NA	**12.6**	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	**7.3**	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	**4.6**	NA	**5**	NA	**5.6**	NA
	Sodium	mg/L	NA	NA	**34.6**	NA	NA	**27.6**	NA	**28.2**	NA	**27.7**	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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ANAlyte		Units	PZ-37D	PZ-37D	PZ-37D	PZ-37D	PZ-52D	PZ-52D	PZ-52D	PZ-52D	PZ-52D	PZ-52D	PZ-54D
			9/1/2022	2/8/2023	8/16/2023	2/21/2024	11/4/2021	2/11/2022	9/1/2022	2/8/2023	8/17/2023	2/21/2024	6/12/2024
Appendix III	Boron	mg/L	**0.83**	**0.7**	**0.75**	**0.57**	**0.69**	**0.84**	**1.2**	**1.2**	**1.9**	**1.6**	**2.8**
	Calcium	mg/L	**67.9**	**55.2**	**67.5**	**65.9**	**25.6**	**27.3**	**22.8**	**22.9**	**22.1**	**24.5 M1**	**38.4**
	Chloride	mg/L	**45.6**	**33.5**	**14.8**	**18.9**	**9.5**	**6.7**	**3.7**	**2**	**1.8**	**1.6**	**2.8**
	Sulfate	mg/L	**381**	**177**	**210**	**222**	**191**	**209**	**280**	**279**	**289**	**309**	**177**
	Total Dissolved Solids	mg/L	**916**	**477**	**505**	**548**	**426**	**456**	**544**	**542**	**600**	**557**	**775**
Appendix IV	Cobalt	mg/L	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U	**0.00082 J**	**0.0011 J**	**0.0016 J**	**0.0026 J**	**0.0031 J**	**0.0029 J**	**0.0033 J**
	Lithium	mg/L	**0.0044 J**	**0.0088 J**	**0.0095 J**	**0.009 J**	**0.016 J**	**0.015**	**0.023 J**	**0.025 J**	**0.029 J**	**0.027 J**	**0.022 J**
	Selenium	mg/L	**< 0.0014 U**	**< 0.0014 U**	**< 0.0014 U**	**< 0.00096 U**	**0.0034 J**	**0.0025 J**	**0.0041 J**	**0.0057**	**0.011**	**0.0099**	**0.0056**
Field	Conductivity	µS/cm	1,550.08	753.72	766.53	1156.3	506.0	604.6	699.48	695.38	784.12	794.5	740.0
	Dissolved Oxygen	mg/L	NA	0.91	0.27	0.33	0.13	0.42	NA	0.3	0.23	0.26	4.49
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	-270.56	-223.06	-259.1	60.10	-128.94	NA	-138.61	-32.32	-47.49	139.7
	Eh [1]	mV	NA	-70.56	-23.06	-59.1	260.1	71.06	NA	61.39	167.68	152.51	339.7
	pH	SU	8.06	7.95	8.05	8.17	6.62	6.40	6.2	6.12	5.6	5.98	7.02
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	131	NA	125	NA	NA	NA	**36.2**	NA	**28.2**	NA
	Alkalinity, Bicarbonate	mg/L	NA	131	NA	125	NA	NA	NA	**36.2**	NA	**28.2**	NA
	Alkalinity, Carbonate	mg/L	NA	< 5 U	NA	< 5 U	NA	NA	NA	< 5 U	NA	< 5 U	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	10.1	NA	11.4	NA	NA	NA	**44.4**	NA	**52.2**	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	12.4	NA	7.6	NA	NA	NA	**7.8**	NA	**8.7**	NA
	Sodium	mg/L	NA	72.9	NA	87.5	NA	NA	NA	**45**	NA	**42.9**	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	PZ-55	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3	YAMW-3
			2/22/2024	1/16/2020	2/11/2020	9/3/2021	11/17/2021	12/9/2021	2/10/2022	9/1/2022	2/9/2023	8/16/2023	2/21/2024
Appendix III	Boron	mg/L	**3.5**	**6.8**	**4.5**	NA	NA	NA	**7.7**	**7.1**	**8.1**	**5**	**8.6**
	Calcium	mg/L	**22.5**	NA	NA	**42**	NA	NA	**29.4**	**34.4**	**33**	**21.4**	**39.7**
	Chloride	mg/L	**4.7**	NA	NA	NA	NA	NA	**3.2**	**10.2**	**9.6**	**2.2**	**3.5**
	Sulfate	mg/L	**139**	NA	NA	NA	NA	NA	**305**	**324**	**419**	**240**	**386**
	Total Dissolved Solids	mg/L	**297**	NA	NA	NA	NA	NA	**606**	**632**	**727**	**587**	**753**
Appendix IV	Cobalt	mg/L	**0.0041 J**	NA	NA	NA	NA	NA	**0.16**	**0.058**	**0.066**	**0.14**	**0.051**
	Lithium	mg/L	**0.0034 J**	NA	NA	NA	**0.046**	**0.043**	**0.054**	**0.041**	**0.048**	**0.04**	**0.047**
	Selenium	mg/L	**0.019**	**< 0.0013**	NA	NA	NA	NA	**<0.0014**	**< 0.0014 U**	**< 0.0014 U**	**0.0075**	**0.023**
Field	Conductivity	µS/cm	383.31	940.0	NA	1166.9	NA	NA	803.0	704.74	1,057.32	632.16	844.86
	Dissolved Oxygen	mg/L	1.39	0.25	NA	6.41	NA	NA	0.45	0.17	0.96	1.04	0.44
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	165.95	-28.9	NA	194.73	NA	NA	-239.50	-201.85	5.91	121.74	213.42
	Eh [1]	mV	365.95	171.1	NA	394.73	NA	NA	-39.5	-1.85	205.91	321.74	413.42
	pH	SU	5.69	6.67	6.62	5.74	6.01	5.92	5.93	5.93	5.89	5.92	5.65
Supplemental	Alkalinity (as CaCO3)	mg/L	**27**	NA	NA	**66.1**	NA	NA	NA	NA	**53.7**	NA	**41**
	Alkalinity, Bicarbonate	mg/L	**27**	NA	NA	**66.1**	NA	NA	NA	NA	**53.7**	NA	**41**
	Alkalinity, Carbonate	mg/L	< 5 U	NA	NA	< 5	NA	NA	NA	NA	< 5 U	NA	< 5 U
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	**21**	NA	NA	**74.1**	NA	NA	NA	NA	**59.2**	NA	**68.9**
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	**4.5**	NA	NA	**18.5**	NA	NA	NA	NA	**16.6**	NA	**12.7**
	Sodium	mg/L	**18.2**	NA	NA	**73.0**	NA	NA	NA	NA	**50**	NA	**42**
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YAMW-3	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4	YAMW-4
			7/17/2024	1/16/2020	9/23/2020	2/9/2021	3/3/2021	8/25/2021	2/10/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024
Appendix III	Boron	mg/L	NA	**1.9**	**2.5**	NA	**0.81**	**2.8**	**3**	**3.2**	**3**	**3.2**	**3.8**
	Calcium	mg/L	NA	NA	**10.5**	NA	**20.6**	**11.0**	**11.6**	**11.1 M1**	**12**	**11.9**	**14.4**
	Chloride	mg/L	NA	NA	**1.8**	NA	**22.9**	**1.5**	**1.4**	**1.4**	**1.5**	**1.4**	**1.5**
	Sulfate	mg/L	NA	NA	**152**	NA	**91.7**	**164**	**160**	**179**	**192**	**177**	**208**
	Total Dissolved Solids	mg/L	NA	NA	**329**	NA	**245**	**332**	**346**	**358**	**402**	**416**	**424**
Appendix IV	Cobalt	mg/L	NA	NA	**0.00052 J**	**0.00063 J**	**0.0010 J**	**0.00041 J**	**0.00044 J**	**0.00048 J**	0.00085 J	< 0.00039 U	< 0.00032 U
	Lithium	mg/L	NA	NA	**0.030 J**	**0.018 J**	**0.020 J**	**0.033**	**0.036**	**0.032**	**0.033**	**0.033**	**0.036**
	Selenium	mg/L	NA	**0.0018 J**	**0.016**	**< 0.0016**	**< 0.0016**	**0.019**	**0.019**	**0.023**	**0.017**	**0.019**	**0.015**
Field	Conductivity	µS/cm	900	398.0	517.2	417.3	449.1	466.1	506.6	489.19	790.33	514.29	693.18
	Dissolved Oxygen	mg/L	0.81	0.31	1.2	9.25	1.86	0.44	506.58	NA	0.63	0.81	1.11
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	119.1	4.8	-142.4	44.68	-124.66	25.04	150.81	NA	191.86	196.98	181.01
	Eh [1]	mV	319.1	204.8	57.6	244.68	75.34	225.04	350.81	NA	391.86	396.98	381.01
	pH	SU	5.77	6.47	5.89	6.89	6.81	6.79	6.10	5.87	6.19	5.94	5.99
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	**61.4**	NA	NA	**58.1**	NA	**57.9**
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	**61.4**	NA	NA	**58.1**	NA	**57.9**
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	< 5	NA	NA	< 5 U	NA	< 5 U
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	**0.043**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	**0.23**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	**36.1**	NA	NA	**39.2**	NA	**48.3**
	Manganese, Dissolved	mg/L	**0.14**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	**0.15**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**6.1**	NA	**7**
	Sodium	mg/L	NA	NA	NA	NA	NA	**24.9**	NA	NA	**25.3**	NA	**29.3**
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5	YAMW-5
			1/15/2020	2/11/2020	9/24/2020	2/9/2021	3/4/2021	8/26/2021	2/10/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024
Appendix III	Boron	mg/L	**8.7**	**7.8**	**8.7**	NA	**6.1**	**5.9**	**4.9**	**6.1**	**6.5**	**6.4**	**6.7**
	Calcium	mg/L	NA	NA	**61.3**	NA	**53.8**	**45.0**	**40.8**	**43.7**	**52.3**	**51**	**52.7**
	Chloride	mg/L	NA	NA	**3.7**	NA	**3.7**	**3.9**	**3.9**	**3.6**	**3.8**	**3.6**	**3.7**
	Sulfate	mg/L	NA	NA	**438**	NA	**340**	**338**	**276**	**354**	**368**	**343**	**369**
	Total Dissolved Solids	mg/L	NA	NA	**788**	NA	**604**	**570**	**499**	**662**	**660**	**716**	**681**
Appendix IV	Cobalt	mg/L	NA	NA	0.00077 J	< 0.00038	< 0.00038	< 0.00039	<0.00039	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U
	Lithium	mg/L	NA	NA	**0.013 J**	**0.016 J**	**0.016 J**	**0.015 J**	**0.015 J**	**0.013 J**	**0.014 J**	**0.014 J**	**0.014 J**
	Selenium	mg/L	**0.045**	NA	**0.026**	**0.060**	**0.061**	**0.055**	**0.057**	**0.048**	**0.052**	**0.054**	**0.053**
Field	Conductivity	µS/cm	1080.0	NA	947.2	0.1	833.4	792.7	708.8	NA	880.47	816.6	NA
	Dissolved Oxygen	mg/L	0.72	NA	1.8	10.52	5.65	2.02	2.21	NA	1.65	1.69	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	37	NA	219	223.76	266.64	260.96	89.09	NA	206.62	190.75	NA
	Eh [1]	mV	237	NA	419	423.76	466.64	460.96	289.09	NA	406.62	390.75	NA
	pH	SU	5.64	5.37	5.38	5.37	5.32	5.35	5.22	5.32	5.67	5.41	NA
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	**13**	NA	NA	**13.1**	NA	**14.3**
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	**13**	NA	NA	**13.1**	NA	**14.3**
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	< 5	NA	NA	< 5 U	NA	< 5 U
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**49**	NA	**50.9**
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**7.8**	NA	**7.8**
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**41.7**	NA	**41.2**
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39	YGWA-39
			10/11/2017	11/20/2017	1/11/2018	2/20/2018	4/3/2018	6/28/2018	8/7/2018	9/24/2018	3/27/2019	8/21/2019	10/8/2019
Appendix III	Boron	mg/L	**0.0135 J**	**0.0251 J**	**0.0255 J**	**< 0.04**	**0.033 J**	**0.053**	**0.024 J**	**0.028 J**	**0.017 J**	NA	NA
	Calcium	mg/L	**2.74**	**1.81**	**1.54**	**1.71**	**1.4**	**1.4**	**1.2**	**1.1**	**1.5**	NA	NA
	Chloride	mg/L	**2.4**	**1.8**	**1.6**	**2**	**3.3**	**2.1**	**1.2**	**1.3**	**1.4**	NA	NA
	Sulfate	mg/L	**20**	**24**	**23**	**20.6**	**24.5**	**22**	**20.7**	**21.2**	**17.7**	NA	NA
	Total Dissolved Solids	mg/L	**68**	**139**	**153**	**87**	**85**	**88**	**89**	**82**	**75**	NA	NA
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA	**0.00034 J**	NA
	Lithium	mg/L	**0.0018 J**	**0.0018 J**	**0.0019 J**	**< 0.05 o**	**0.0022 J**	**0.0026 J**	**0.0024 J**	**0.0022 J**	NA	**0.0035 J**	NA
	Selenium	mg/L	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**0.0015 J**	NA	**< 0.01**	NA
Field	Conductivity	µS/cm	107.9	96.2	97.8	87.7	89.9	79.1	73.4	80.4	80.9	105.1	NA
	Dissolved Oxygen	mg/L	0.2	2.69	3.93	0.98	4.7	4.22	3.94	3.93	2.17	0.16	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	184.4	74.9	-1.4	94.5	107.7	163.9	127.8	105.1	110.8	70.9	NA
	Eh [1]	mV	384.4	274.9	198.6	294.5	307.7	363.9	327.8	305.1	310.8	270.9	NA
	pH	SU	6.40	6.33	6.29	7.22	6.87	6.18	6.08	5.81	5.84	5.96	NA
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWA-39 10/9/2019	YGWA-39 2/12/2020	YGWA-39 3/25/2020	YGWA-39 9/24/2020	YGWA-39 2/10/2021	YGWA-39 3/4/2021	YGWA-39 8/26/2021	YGWA-39 2/8/2022	YGWA-39 8/31/2022	YGWA-39 2/7/2023	YGWA-39 8/15/2023
Appendix III	Boron	mg/L	**0.017 J**	NA	**0.043 J**	**0.037 J**	NA	**0.033 J**	**0.095**	**0.13**	**0.14**	**0.13**	**0.15 J**
	Calcium	mg/L	**2.4**	NA	**2.7**	**3.7**	NA	**8.2**	**14.1**	**15.2**	**16.3**	**16.1**	**17.2**
	Chloride	mg/L	**2.1**	NA	**1.9**	**2.7**	NA	**4.9**	**7.2**	**7.4**	**6.7**	**5.6**	**4.5**
	Sulfate	mg/L	**15**	NA	NA	**11.7**	NA	**12.0**	**19.2**	**14.6**	**10.9**	**9.7**	**7.6**
	Total Dissolved Solids	mg/L	**119**	NA	**158**	**170**	NA	**168**	**249**	**248**	**242**	**224**	**225**
Appendix IV	Cobalt	mg/L	< 0.005	**0.00034 J**	**0.00034 J**	**0.00053 J**	**0.00098 J**	**0.00071 J**	**0.0011 J**		**0.00085 J**	**0.00066 J**	0.00072 J
	Lithium	mg/L	**0.0036 J**	**0.0041 J**	**0.0049 J**	**0.0054 J**	**0.0071 J**	**0.0084 J**	**0.0082 J**		**0.0065 J**	**0.0065 J**	**0.0064 J,D3**
	Selenium	mg/L	**< 0.01**	**< 0.0013**	**< 0.0013**	**< 0.0016**	**< 0.0016**	**< 0.0016**	**< 0.0014**	**< 0.0014**	**< 0.0014 U**	**< 0.0014 U**	**< 0.0014 U**
Field	Conductivity	µS/cm	109.4	NA	NA	NA	267.9	260.6	318.3	0.4	364.75	358.41	421.12
	Dissolved Oxygen	mg/L	0.1	NA	NA	NA	0.13	1.05	0.16	0.19	NA	0.19	0.11
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	56	NA	NA	NA	92.12	92.55	29.15	92	NA	82.59	87.17
	Eh [1]	mV	256	NA	NA	NA	292.12	292.55	229.15	292	NA	282.59	287.17
	pH	SU	5.81	5.97	5.78	5.70	5.80	5.54	6.91	5.78	5.3	5.78	5.78
Supplemental	Alkalinity (as CaCO3)	mg/L	**35**	NA	NA	NA	NA	NA	NA	NA	NA	**177**	NA
	Alkalinity, Bicarbonate	mg/L	**35**	NA	NA	NA	NA	NA	NA	NA	NA	**177**	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 5 U	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	**1.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	**1.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	**1.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	**3**	NA	NA	NA	NA	NA	**19.1**	NA	NA	**21.7**	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	**0.22**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	**0.013 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	**6.60**	NA	NA	**6.6**	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	**29.6**	NA	NA	**28.1**	NA
	Sulfide	mg/L	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	**4.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWA-39	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40	YGWA-40
			2/20/2024	10/12/2017	11/20/2017	1/10/2018	2/19/2018	4/3/2018	6/28/2018	8/7/2018	9/24/2018	3/26/2019	8/21/2019
Appendix III	Boron	mg/L	**0.12**	**0.0401**	**0.156**	**0.15**	**0.146**	**0.12**	**0.16**	**0.12**	**0.099**	**0.096**	NA
	Calcium	mg/L	**16.9**	**2.9**	**10.4**	**10.2**	**< 25**	**6.3**	**6.7**	**6.3**	**5.7**	**5.6**	NA
	Chloride	mg/L	**4.6**	**3.8**	**4.4**	**4.6**	**4.6**	**5.9**	**5**	**4.3**	**4.9**	**4.4**	NA
	Sulfate	mg/L	**8.6**	**17**	**71**	**66**	**57.2**	**49.4**	**43.8**	**40.5**	**39.7**	**34.3**	NA
	Total Dissolved Solids	mg/L	**233**	**74**	**179**	**140**	**119**	**106**	**112**	**103**	**107**	**90**	NA
Appendix IV	Cobalt	mg/L	0.00073 J	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA	< 0.005
	Lithium	mg/L	**0.0059 J**	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	NA	< 0.03
	Selenium	mg/L	**< 0.00096 U**	< 0.01	**0.0042 J**	**0.0043 J**	< 0.01	< 0.01	**0.0032 J**	**0.0031 J**	**0.0026 J**	NA	**0.0024 J**
Field	Conductivity	µS/cm	372.43	73.0	195.6	202.5	168.7	149.5	143.6	126.1	131.1	117.5	107.3
	Dissolved Oxygen	mg/L	0.09	3.85	5.77	5.85	5.55	5.31	5.6	5.23	5.64	5.21	5.14
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	54.05	17.2	146.9	108.3	135.7	130	78.1	168.2	145.8	187	102
	Eh [1]	mV	254.05	217.2	346.9	308.3	335.7	330	278.1	368.2	345.8	387	302
	pH	SU	5.97	5.43	5.10	4.97	5.60	5.84	5.24	5.18	5.14	5.30	5.26
Supplemental	Alkalinity (as CaCO3)	mg/L	**183**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	**183**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	< 5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	**21.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	**5.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	**25.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWA-40 10/8/2019	YGWA-40 10/9/2019	YGWA-40 2/12/2020	YGWA-40 3/24/2020	YGWA-40 9/24/2020	YGWA-40 2/10/2021	YGWA-40 3/4/2021	YGWA-40 9/3/2021	YGWA-40 2/8/2022	YGWA-40 8/31/2022	YGWA-40 2/8/2023
Appendix III	Boron	mg/L	NA	**0.079**	NA	**0.088 J**	**0.087 J**	NA	**0.078**	**0.077**	**0.074**	**0.062**	**0.057**
	Calcium	mg/L	NA	**5.2**	NA	**4.8**	**4.4**	NA	**4.6**	**5.6**	**6.0**	**6.2**	**5.9**
	Chloride	mg/L	NA	**5.1**	NA	**4.7**	**5.0**	NA	**4.9**	**5.5**	**6.2**	**6.3**	**6.9**
	Sulfate	mg/L	NA	**27.6**	NA	NA	**22.9**	NA	**21.5**	**21.3**	**17.9**	**17.9**	**17.5**
	Total Dissolved Solids	mg/L	NA	**98**	NA	**84.0**	**77.0**	NA	**57.0**	**88.0**	**93**	**92**	**115**
Appendix IV	Cobalt	mg/L	NA	< 0.005	< 0.00030	< 0.00030	< 0.00038	< 0.00038	< 0.00038	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00039 U
	Lithium	mg/L	NA	< 0.03	< 0.00078	< 0.00078	< 0.00081	< 0.00081	< 0.00081	< 0.00073	**0.00076 J**	< 0.00073 U	**0.00074 J**
	Selenium	mg/L	NA	**0.0026 J**	**0.0020 J**	**0.0020 J**	**0.0016 J**	< 0.0016	< 0.0016	< 0.0014	**0.0014 J**	< 0.0014 U	< 0.0014 U
Field	Conductivity	µS/cm	NA	110.6	NA	NA	NA	119.9	148.1	111.5	0.1	NA	115.91
	Dissolved Oxygen	mg/L	NA	5.61	NA	NA	NA	6.14	3.89	0.68	0.53	NA	0.11
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	79.6	NA	NA	NA	121.99	226.63	229.69	211.7	NA	196.44
	Eh [1]	mV	NA	279.6	NA	NA	NA	321.99	426.63	429.69	411.7	NA	396.44
	pH	SU	NA	5.22	5.30	5.29	5.43	5.16	5.24	5.01	5.26	4.53	5.71
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	**9.5**	NA	NA	NA	NA	NA	**13.8**	NA	NA	**27.6**
	Alkalinity, Bicarbonate	mg/L	NA	**9.5**	NA	NA	NA	NA	NA	**13.8**	NA	NA	**27.6**
	Alkalinity, Carbonate	mg/L	NA	< 1	NA	NA	NA	NA	NA	< 5	NA	NA	< 5 U
	Aluminum	mg/L	NA	< 0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**2.9**	NA	NA	NA	NA	NA	**3.1**	NA	NA	**3.4**
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	< 0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	**0.026 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	< 0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	**2.0**	NA	NA	NA	NA	NA	NA	NA	NA	**2.2**
	Sodium	mg/L	NA	**7.9**	NA	NA	NA	NA	NA	**9.1**	NA	NA	**10.1**
	Sulfide	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	< 1	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWA-40	YGWA-40	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S	YGWC-23S
			8/15/2023	2/20/2024	6/7/2016	7/28/2016	9/20/2016	11/8/2016	1/16/2017	3/9/2017	5/2/2017	7/10/2017	10/11/2017
Appendix III	Boron	mg/L	**0.052 J,D3**	**0.056**	**0.99**	**1.09**	**1.35**	**1.5**	**1.67**	**1.44**	**1.2**	**1.12**	**1.09**
	Calcium	mg/L	**5.3**	**5.6**	**9.6**	**7.87**	**9.28**	**8.6**	**8.85**	**8.4**	**12.9**	**8.09**	**6.36**
	Chloride	mg/L	**5.6**	**5.7**	**2.9**	**3.5**	**2.4**	**2.8**	**1.8**	**1.7**	**1.8**	**1.9**	**2.4**
	Sulfate	mg/L	**16.4**	**17.2**	**56**	**57**	**68**	**79**	**72**	**69**	**60**	**57**	**52**
	Total Dissolved Solids	mg/L	**83**	**109**	**130**	**119**	**132**	**146**	**194**	**288**	**221**	**123**	**100**
Appendix IV	Cobalt	mg/L	< 0.00039 U	< 0.00032 U	< 0.0025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA
	Lithium	mg/L	< 0.0036 U,D3	< 0.0016 U	< 0.005	**0.0019 J**	**0.0021 J**	**0.0024 J**	**0.0022 J**	**0.0025 J**	**0.0019 J**	**0.0018 J**	NA
	Selenium	mg/L	< 0.0014 U	< 0.00096 U	**0.037**	**0.0385**	**0.0464**	**0.0521**	**0.0469**	**0.0437**	**0.0395**	**0.0386**	NA
Field	Conductivity	µS/cm	125.51	109.19	184.0	200.1	199.7	219.2	208.6	208.7	179.4	160.5	NA
	Dissolved Oxygen	mg/L	0.08	0.07	5.87	6.17	6.84	7.02	7.52	7.91	8.15	7.65	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	199.02	178.49	122.1	55.8	68.32	113.3	124.8	132.9	180.9	63.9	NA
	Eh [1]	mV	399.02	378.49	322.1	255.8	268.32	313.3	324.8	332.9	380.9	263.9	NA
	pH	SU	5	5.32	5.57	5.60	5.53	5.53	5.59	5.56	5.61	5.68	5.46
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	**24.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	**24.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	< 5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**3.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	**2**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	**10.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-23S 3/30/2018	YGWC-23S 6/12/2018	YGWC-23S 9/27/2018	YGWC-23S 3/6/2019	YGWC-23S 4/4/2019	YGWC-23S 9/27/2019	YGWC-23S 10/10/2019	YGWC-23S 2/17/2020	YGWC-23S 3/26/2020	YGWC-23S 9/24/2020	YGWC-23S 2/9/2021
Appendix III	Boron	mg/L	NA	**0.9**	**0.71**	NA	**0.6**	**0.58**	NA	NA	**0.94**	**1.1**	NA
	Calcium	mg/L	NA	**4.7**	**4.1**	NA	**3.7**	**3.7**	**9.5**	NA	**5.6**	**7.9**	NA
	Chloride	mg/L	NA	**1.8**	**2**	NA	**1.7**	**1.7**	**2**	NA	**1.6**	**2.0**	NA
	Sulfate	mg/L	NA	**41.4**	**39.6**	NA	**27.9**	**30.3**	**29.5**	NA	NA	**52.5**	NA
	Total Dissolved Solids	mg/L	NA	**115**	**105**	NA	**85**	**96**	NA	NA	**110**	**129**	NA
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	NA	< 0.00030	< 0.00030	< 0.00038	< 0.00038
	Lithium	mg/L	**0.0039 J**	**0.0017 J**	**0.0017 J**	**0.0025 J**	**0.0018 J**	**0.0017 J**	NA	**0.0021 J**	**0.0021 J**	**0.0035 J**	**0.0026 J**
	Selenium	mg/L	**0.028**	**0.026**	**0.023**	**0.019**	**0.017**	**0.018**	NA	**0.020**	**0.024**	**0.031**	**0.032**
Field	Conductivity	µS/cm	142.1	NA	NA	74.6	87.9	100.9	NA	NA	NA	NA	205.7
	Dissolved Oxygen	mg/L	8.43	NA	NA	8.68	8.23	8.6	NA	NA	NA	NA	8.22
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	91.8	NA	NA	122.4	146.9	105.5	NA	NA	NA	NA	90.41
	Eh [1]	mV	291.8	NA	NA	322.4	346.9	305.5	NA	NA	NA	NA	290.41
	pH	SU	5.73	5.63	5.47	5.84	5.64	5.77	NA	5.84	5.69	5.51	5.73
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	**7**	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	**7**	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	< 1	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	**0.078 J**	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	**0.080**	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	**3.1**	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	< 0.04	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	**0.081**	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	< 0.02	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	**0.72**	NA	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	**7**	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	< 1	NA	NA	NA	NA

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Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-23S 3/4/2021	YGWC-23S 8/25/2021	YGWC-23S 2/10/2022	YGWC-23S 9/1/2022	YGWC-23S 2/8/2023	YGWC-23S 8/16/2023	YGWC-23S 2/21/2024	YGWC-24S 6/8/2016	YGWC-24S 8/1/2016	YGWC-24S 9/20/2016	YGWC-24S 11/8/2016
Appendix III	Boron	mg/L	**1.2**	**1.3**	**1.5**	**1.5**	**1.6**	**1.2**	**1.3**	< 0.05	< 0.1	< 0.1	< 0.04
	Calcium	mg/L	**10.2**	**10.6**	**11.8**	**11.2**	**10.9**	**11.2**	**11.1**	**1.9**	**1.83**	**1.78**	**1.77**
	Chloride	mg/L	**1.8**	**2.5**	**1.9**	**2**	**2**	**2.7**	**2.4**	**5.9**	**5.3**	**5.5**	**6.4**
	Sulfate	mg/L	**61.7**	**68.0**	**78.7**	**79**	**78 M1**	**69.3**	**81**	< 1	**1.1**	**0.38 J**	**0.39 J**
	Total Dissolved Solids	mg/L	**96.0**	**141**	**180**	**191**	**158**	**170**	**192**	**66**	**56**	**53**	**58**
Appendix IV	Cobalt	mg/L	< 0.00038	< 0.00039	<0.00039	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U	< 0.0025	< 0.01	< 0.01	< 0.01
	Lithium	mg/L	**0.0026 J**	**0.0026 J**	**0.0029 J**	**0.0025 J**	**0.0028 J**	**0.0024 J**	**0.0024 J**	< 0.005	< 0.05	< 0.05	< 0.05
	Selenium	mg/L	**0.037**	**0.032**	**0.039**	**0.036**	**0.035**	**0.03**	**0.031**	< 0.0013	< 0.01	< 0.01	< 0.01
Field	Conductivity	µS/cm	193.2	218.2	228.0	240.43	219.84	221.95	217.61	61.9	66.3	65.6	65.9
	Dissolved Oxygen	mg/L	8.07	6.64	6.62	NA	7.73	6.98	7.5	6.57	5.65	6.19	5.44
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	180.67	217.2	211.4	NA	152.61	187.73	208.84	139.8	82.6	57.14	111.5
	Eh [1]	mV	380.67	417.2	411.4	NA	352.61	387.73	408.84	339.8	282.6	257.14	311.5
	pH	SU	5.47	5.46	5.51	5.27	5.33	5.36	5.43	5.65	5.47	5.61	5.55
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	**13.9**	NA	NA	**10**	NA	**10.7**	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	**13.9**	NA	NA	**10**	NA	**10.7**	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	< 5	NA	NA	< 5 U	NA	< 5 U	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**9.0**	NA	NA	**8.9**	NA	**9.5**	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	**1.10**	NA	NA	**1.1**	NA	**1.2**	NA	NA	NA	NA
	Sodium	mg/L	NA	**13.5**	NA	NA	**14.6**	NA	**16.7**	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-24S 1/17/2017	YGWC-24S 3/8/2017	YGWC-24S 5/2/2017	YGWC-24S 7/7/2017	YGWC-24S 10/5/2017	YGWC-24S 3/30/2018	YGWC-24S 6/12/2018	YGWC-24S 9/26/2018	YGWC-24S 3/5/2019	YGWC-24S 4/4/2019	YGWC-24S 4/9/2019
Appendix III	Boron	mg/L	< 0.04	< 0.04	**0.0099 J**	**0.0076 J**	< 0.04	NA	**0.018 J**	**0.0055 J**	NA	**< 0.04**	NA
	Calcium	mg/L	**1.7**	**1.77**	**1.57**	**1.8**	**1.7**	NA	**1.8**	**1.7**	NA	**1.9**	NA
	Chloride	mg/L	**5.5**	**5.4**	**5.7**	**5.7**	**6**	NA	**6.2**	**6.9**	NA	**5.9**	NA
	Sulfate	mg/L	< 1	**0.29 J**	**0.29 J**	**0.37 J**	< 1	NA	**0.35 J**	**0.28 J**	NA	**0.29 J**	NA
	Total Dissolved Solids	mg/L	**56**	**192**	**113**	**46**	**48**	NA	**79**	**59**	NA	**63**	NA
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA
	Lithium	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	NA	< 0.05	< 0.05	< 0.05	**< 0.05**	**< 0.05**	NA
	Selenium	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	NA	< 0.01	< 0.01	< 0.01	**< 0.01**	**< 0.01**	NA
Field	Conductivity	µS/cm	66.2	66.6	67.2	67.7	NA	67.7	NA	NA	66.4	65.4	NA
	Dissolved Oxygen	mg/L	5.79	5.86	6.01	6.33	NA	6.39	NA	NA	6.15	6.37	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	110	135.3	86.3	121.1	NA	127.5	NA	NA	116.6	192.6	NA
	Eh [1]	mV	310	335.3	286.3	321.1	NA	327.5	NA	NA	316.6	392.6	NA
	pH	SU	5.53	5.62	5.46	5.81	5.45	5.64	5.64	5.61	5.72	5.66	NA
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-24S	YGWC-24S	YGWC-24S	YGWC-24S	YGWC-24SA	YGWC-24SA	YGWC-24SA	YGWC-24SA	YGWC-24SA	YGWC-36	YGWC-36
			9/26/2019	10/10/2019	2/13/2020	3/26/2020	9/23/2020	2/9/2021	3/3/2021	9/1/2021	2/10/2022	9/2/2016	9/22/2016
Appendix III	Boron	mg/L	**0.0068 J**	NA	NA	**0.033 J**	< 0.0052	NA	< 0.0052	< 0.0086	<0.0086	**0.133**	NA
	Calcium	mg/L	**1.7**	**1.7**	NA	**1.7**	**2.4**	NA	**2.4**	**2.3**	**2.2**	**11.2**	NA
	Chloride	mg/L	**6.5**	**6.8**	NA	**5.4**	**9.3**	NA	**8.6**	**8.9**	**8.7**	**6.3**	NA
	Sulfate	mg/L	**0.23 J**	**0.21 J**	NA	NA	< 0.50	NA	< 0.50	< 0.50	<0.50	**72**	NA
	Total Dissolved Solids	mg/L	**81**	NA	NA	**67.0**	**87**	NA	**70.0**	**96.0**	**78**	**243**	NA
Appendix IV	Cobalt	mg/L	< 0.005	NA	< 0.00030	< 0.00030	< 0.00038	< 0.00038	< 0.00038	< 0.00039	<0.00039	0.0006 J	NA
	Lithium	mg/L	**< 0.03**	NA	< 0.00078	< 0.00078	< 0.00081	< 0.00081	< 0.00081	< 0.00073	<0.00073	0.0029 J	NA
	Selenium	mg/L	**< 0.01**	NA	< 0.0013	< 0.0013	< 0.0016	< 0.0016	< 0.0016	< 0.0014	<0.0014	0.0012 J	NA
Field	Conductivity	µS/cm	60.1	NA	NA	NA	NA	105.8	77.1	74.9	74.8	255.3	NA
	Dissolved Oxygen	mg/L	6.13	NA	NA	NA	NA	8.12	6.59	6.34	6.73	1.98	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	142.7	NA	NA	NA	NA	205.13	258.58	169.69	234.14	51.5	NA
	Eh [1]	mV	342.7	NA	NA	NA	NA	405.13	458.58	369.69	434.14	251.5	NA
	pH	SU	5.52	NA	5.69	5.51	5.64	5.69	5.70	5.22	4.66	5.84	NA
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	**13**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	**13**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	< 1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	< 0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**1.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	< 0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	**1.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	< 0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	**0.61**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	**7.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	< 0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	< 1	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-36 9/29/2016	YGWC-36 10/6/2016	YGWC-36 11/14/2016	YGWC-36 2/28/2017	YGWC-36 5/9/2017	YGWC-36 7/13/2017	YGWC-36 9/22/2017	YGWC-36 9/29/2017	YGWC-36 10/6/2017	YGWC-36 10/11/2017	YGWC-36 3/30/2018
Appendix III	Boron	mg/L	NA	NA	**0.287**	**0.215**	**0.233**	**0.262**	**0.238**	**0.235**	**0.256**	**0.245**	NA
	Calcium	mg/L	NA	NA	**7.79**	**8.37**	**13.9**	**16.6**	**18.4**	**16.1**	**16.6**	**18.1**	NA
	Chloride	mg/L	NA	NA	**6.7**	**5.4**	**5.7**	**5.4**	**6.9**	**5.5**	**5.5**	**6.4**	NA
	Sulfate	mg/L	NA	NA	**110**	**110**	**130**	**140**	**160**	**160**	**160**	**150**	NA
	Total Dissolved Solids	mg/L	NA	NA	**272**	**306**	**303**	**282**	**309**	**273**	**287**	**264**	NA
Appendix IV	Cobalt	mg/L	NA	NA	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA	< 0.01
	Lithium	mg/L	NA	NA	**0.0044 J**	**0.0038 J**	**0.0057 J**	**0.007 J**	**0.0067 J**	**0.0064 J**	**0.0065 J**	NA	**0.0061 J**
	Selenium	mg/L	NA	NA	**< 0.05**	**0.0017 J**	**0.0018 J**	**0.0031 J**	**0.0024 J**	**0.002 J**	**< 0.01**	NA	**< 0.01**
Field	Conductivity	µS/cm	NA	NA	439.0	NA	NA	NA	NA	NA	NA	NA	412.3
	Dissolved Oxygen	mg/L	NA	NA	0.24	NA	NA	NA	NA	NA	NA	NA	0.87
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	NA	60.9	NA	NA	NA	NA	NA	NA	NA	139.5
	Eh [1]	mV	NA	NA	260.9	NA	NA	NA	NA	NA	NA	NA	339.5
	pH	SU	NA	NA	6.28	5.99	6.30	5.57	5.50	5.58	5.51	5.47	5.51
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-36	YGWC-36	YGWC-36	YGWC-36	YGWC-36	YGWC-36	YGWC-36	YGWC-36	YGWC-36A	YGWC-36A	YGWC-36A
			6/13/2018	9/26/2018	3/6/2019	4/4/2019	9/26/2019	10/10/2019	2/14/2020	3/25/2020	10/7/2020	2/10/2021	3/4/2021
Appendix III	Boron	mg/L	**0.25**	**0.24**	NA	**0.22**	**0.13**	NA	NA	**0.11**	**0.018 J**	NA	**0.0088 J**
	Calcium	mg/L	**18.7 J**	**19.8 J**	NA	**16.9 J**	**11.7**	**12.2**	NA	**10.6**	**9.9**	NA	**5.6**
	Chloride	mg/L	**5.6**	**6**	NA	**5.4**	**7.1**	NA	NA	**6.6**	**8.7**	NA	**6.6**
	Sulfate	mg/L	**144**	**160**	NA	**119**	**84.8**	NA	NA	NA	**18.2**	NA	**6.3**
	Total Dissolved Solids	mg/L	**292**	**277**	NA	**240**	**198**	NA	NA	**164**	**137**	NA	**69.0**
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.00048 J	NA	0.00041 J	0.00038 J	0.00086 J	0.00038 J	< 0.00038
	Lithium	mg/L	**0.0065 J**	**0.0063 J**	**0.0057 J**	**0.0058 J**	**0.0041 J**	NA	**0.0024 J**	**0.0032 J**	**0.0014 J**	**0.0011 J**	< 0.00081
	Selenium	mg/L	**0.0024 J**	**0.0037 J**	**0.0033 J**	**0.0029 J**	**0.0019 J**	NA	**0.0020 J**	**0.0024 J**	**< 0.0016**	< 0.0016	< 0.0016
Field	Conductivity	µS/cm	NA	NA	355.6	354.5	255.6	NA	NA	NA	NA	112.8	105.3
	Dissolved Oxygen	mg/L	NA	NA	1.94	1.47	0.78	NA	NA	NA	NA	8.5	4.43
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	0 (NA)	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	NA	125.3	164.3	138.3	NA	NA	NA	NA	121.6	217.8
	Eh [1]	mV	NA	NA	325.3	364.3	338.3	NA	NA	NA	NA	321.6	417.8
	pH	SU	5.50	5.53	5.21	5.74	5.51	NA	5.71	5.49	5.86	6.31	5.73
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	**12**	NA	**10.9**	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	**12**	NA	**10.9**	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	< 1	NA	< 5.0	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	< 0.1	NA	< 0.032	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	**0.028 J**	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	**7.4**	NA	**6.1**	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	**0.062**	NA	**0.036 J**	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	**1.6**	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	< 0.02	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	**1.9**	NA	**1.9**	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	**18.2**	NA	**18**	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	< 1	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-36A	YGWC-36A	YGWC-36A	YGWC-36A	YGWC-36A	YGWC-36A	YGWC-38	YGWC-38	YGWC-38	YGWC-38	YGWC-38
			9/3/2021	2/11/2022	9/1/2022	2/9/2023	8/16/2023	2/23/2024	10/12/2017	11/20/2017	1/12/2018	2/20/2018	4/3/2018
Appendix III	Boron	mg/L	**0.012 J**	**0.019 J**	**0.067**	**0.028 J**	**0.058**	**0.11**	**19.3**	**21.8**	**18.7**	**18.6**	**20.9**
	Calcium	mg/L	**4.1**	**4.6**	**6.3**	**9.2**	**20**	**33.6**	**190**	**184**	**178**	**184**	**174**
	Chloride	mg/L	**7.0**	**6.6**	**6.2**	**5.9**	**4.9**	**4.8**	**6**	**6.9**	**6.6**	**6.2**	**6.9**
	Sulfate	mg/L	**13.8**	**16.4**	**28.2**	**50.8**	**93.9**	**156**	**940**	**980**	**880**	**905**	**872**
	Total Dissolved Solids	mg/L	**89.0**	**81**	**108**	**116**	**234**	**308**	**1360**	**1390**	**1400**	**1300**	**1390**
Appendix IV	Cobalt	mg/L	< 0.00039	<0.00039	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Lithium	mg/L	**0.00086 J**	**0.00093 J**	**0.00089 J**	**0.001 J**	**0.0014 J**	**0.0017 J**	**0.0095 J**	**0.0083 J**	**0.0089 J**	**0.0082 J**	**0.0097 J**
	Selenium	mg/L	< 0.0014	<0.0014	< 0.0014 U	**0.0027 J**	**0.0032 J**	**0.005 J**	**0.265**	**0.246**	**0.249**	**0.253**	**0.23**
Field	Conductivity	µS/cm	96.0	101.4	112.18	139.25	0.06	423.7	1606.9	1581.7	1648.0	1512.2	1574.4
	Dissolved Oxygen	mg/L	4.52	4.29	4.04	3.98	8.42	3.47	0.36	2.76	0.44	1.58	0.88
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	107.99	183.42	250.32	219.63	227.13	195.9	172.8	181.3	107.5	85.2	161.5
	Eh [1]	mV	307.99	383.42	450.32	419.63	427.13	395.9	372.8	381.3	307.5	285.2	361.5
	pH	SU	5.06	5.58	5.18	5.67	5.36	5.20	4.85	4.87	4.78	5.10	4.76
Supplemental	Alkalinity (as CaCO3)	mg/L	**10.9**	NA	NA	**10.6**	NA	**6.8**	NA	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	**10.9**	NA	NA	**10.6**	NA	**6.8**	NA	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	< 5	NA	NA	< 5 U	NA	< 5 U	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	**1.6**	NA	NA	**4**	NA	**15.1**	NA	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA		NA		NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA		NA		NA	NA	NA	NA	NA
	Potassium	mg/L	**0.79**	NA	NA	**1.1**	NA	**2.3**	NA	NA	NA	NA	NA
	Sodium	mg/L	11.2	NA	NA	**14.7**	NA	**28.3**	NA	NA	NA	NA	NA
	Sulfide	mg/L	**NA**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-38 6/28/2018	YGWC-38 8/7/2018	YGWC-38 9/24/2018	YGWC-38 3/27/2019	YGWC-38 8/22/2019	YGWC-38 10/8/2019	YGWC-38 10/9/2019	YGWC-38 2/14/2020	YGWC-38 3/25/2020	YGWC-38 9/25/2020	YGWC-38 2/9/2021
Appendix III	Boron	mg/L	**22.7**	**19.1**	**18.4**	**16.7**	NA	NA	**13.5**	NA	**9.3**	**8.0**	NA
	Calcium	mg/L	**190**	**176**	**172**	**155**	NA	NA	**147**	NA	**124**	**93.7**	NA
	Chloride	mg/L	**6.4**	**5.5**	**5.9**	**6.2**	NA	NA	**4.8**	NA	**4.0**	**4.0**	NA
	Sulfate	mg/L	**869**	**879**	**872**	**851**	NA	NA	**692**	NA	NA	**414**	NA
	Total Dissolved Solids	mg/L	**1310**	**1340**	**1400**	**1190**	NA	NA	**1100**	NA	**883**	**664**	NA
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	NA	< 0.005	NA	< 0.005	< 0.00030	< 0.00030	< 0.00038	< 0.00038
	Lithium	mg/L	**0.0093 J**	**0.0092 J**	**0.0083 J**	NA	**0.0082 J**	NA	**0.0081 J**	**0.0076 J**	**0.0081 J**	**0.0069 J**	**0.0067 J**
	Selenium	mg/L	**0.23**	**0.2**	**0.2**	NA	**0.14**	NA	**0.12**	**0.11**	**0.099**	**0.076**	**0.073**
Field	Conductivity	µS/cm	1548.1	1401.2	1517.2	1394.5	1300.7	NA	1260.4	NA	NA	NA	920.9
	Dissolved Oxygen	mg/L	0.54	0.44	0.85	1.47	1.76	NA	2.09	NA	NA	NA	4.23
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	99.2	209.9	184.6	162.4	118.4	NA	101.8	NA	NA	NA	144.02
	Eh [1]	mV	299.2	409.9	384.6	362.4	318.4	NA	301.8	NA	NA	NA	344.02
	pH	SU	4.75	4.72	4.67	4.79	4.81	NA	4.80	4.84	4.89	4.90	5.04
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	**8.5**	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	**8.5**	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	< 20	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	0.068 J	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	**73.2**	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	**0.11**	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	1.0	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	< 0.02	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	**6.1**	NA	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	**24.3**	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	< 1	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-38	YGWC-38	YGWC-38	YGWC-38	YGWC-38	YGWC-38	YGWC-38	YGWC-41	YGWC-41	YGWC-41	YGWC-41
			3/4/2021	8/26/2021	2/10/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024	10/12/2017	11/21/2017	1/11/2018	2/19/2018
Appendix III	Boron	mg/L	**6.4**	**6.1**	**5.41**	**4.8**	**4.1**	**3.7**	**3.7**	**12**	**12.1**	**12.8**	**15.2**
	Calcium	mg/L	**87.0**	**73.6**	**68.9**	**59.4**	**55.3**	**50.9**	**49.7**	**44.5**	**44.4**	**43.9**	**45.3**
	Chloride	mg/L	**3.9**	**4.1**	**4**	**4.2**	**3.9**	**3.7**	**3.7**	**3.1**	**4.2**	**3.8**	**3.5**
	Sulfate	mg/L	**356**	**328**	**290**	**282**	**251**	**227**	**210**	**400**	**430**	**390**	**414**
	Total Dissolved Solids	mg/L	**600**	**562**	**541**	**499**	**579**	**460**	**403**	**636**	**706**	**701**	**630**
Appendix IV	Cobalt	mg/L	< 0.00038	< 0.00039	<0.00039	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U	0.0011 J	0.0003 J	0.0003 J	< 0.01
	Lithium	mg/L	**0.0067 J**	**0.0070 J**	**0.0068 J**	**0.006 J**	**0.0058 J**	**0.0058 J**	**0.0058 J**	**0.004 J**	**0.0043 J**	**0.0044 J**	**< 0.05**
	Selenium	mg/L	**0.076**	**0.06**	**0.064**	**0.055**	**0.056**	**0.053**	**0.048**	**0.0191**	**0.0687**	**0.069**	**0.071**
Field	Conductivity	µS/cm	914.3	769.0	689.5	NA	640.29	560.63	542.99	845.7	858.7	896.9	804.6
	Dissolved Oxygen	mg/L	3.96	3.83	3.53	NA	3.69	3.22	3.73	0.19	1.1	1.2	1.17
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	233.18	267.7	169.91	NA	197.16	215.05	194.99	49	105.8	73.7	130.9
	Eh [1]	mV	433.18	467.7	369.91	NA	397.16	415.05	394.99	249	305.8	273.7	330.9
	pH	SU	5.01	4.54	4.85	4.91	5.16	4.83	5.03	4.94	4.69	4.73	4.96
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	**8.2**	NA	**8.6**	NA	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	**8.2**	NA	**8.6**	NA	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	< 5 U	NA	< 5 U	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	**36.8**	NA	NA	**27.5**	NA	**25.5**	NA	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	**3.8**	NA	**3.9**	NA	NA	NA	NA
	Sodium	mg/L	NA	**20.8**	NA	NA	**18.1**	NA	**19.1**	NA	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-41 4/3/2018	YGWC-41 6/27/2018	YGWC-41 8/7/2018	YGWC-41 9/24/2018	YGWC-41 3/28/2019	YGWC-41 8/22/2019	YGWC-41 10/8/2019	YGWC-41 10/9/2019	YGWC-41 2/14/2020	YGWC-41 3/25/2020	YGWC-41 9/25/2020
Appendix III	Boron	mg/L	**14.5**	**14.1**	**11.9**	**12.2**	**7.1**	NA	NA	**8.6**	NA	**7.9**	**6.0**
	Calcium	mg/L	**42.7**	**42.2**	**40.7**	**38.5**	**26**	NA	NA	**30.9**	NA	**29.6**	**20.5**
	Chloride	mg/L	**4.4**	**3.6**	**3.3**	**3.3**	**3.2**	NA	NA	**3.3**	NA	**2.7**	**3.0**
	Sulfate	mg/L	**406**	**357**	**346**	**358**	**258**	NA	NA	**256**	NA	NA	**175**
	Total Dissolved Solids	mg/L	**660**	**575**	**574**	**588**	**372**	NA	NA	**440**	NA	**428**	**307**
Appendix IV	Cobalt	mg/L	< 0.01	0.00069 J	< 0.01	< 0.01	NA	< 0.005	NA	< 0.005	< 0.00030	< 0.00030	< 0.00038
	Lithium	mg/L	**0.0047 J**	**0.0042 J**	**0.0038 J**	**0.0037 J**	NA	**0.0035 J**	NA	**0.0032 J**	**0.0029 J**	**0.0029 J**	**0.0025 J**
	Selenium	mg/L	**0.067**	**0.066**	**0.061**	**0.061**	NA	**0.058**	NA	**0.052**	**0.059**	**0.057**	**0.046**
Field	Conductivity	µS/cm	840.8	763.4	671.4	700.1	574.2	578.6	NA	578.4	NA	NA	NA
	Dissolved Oxygen	mg/L	3.79	1.53	1.84	1.93	2.71	2.56	NA	4.94	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	156.5	64.7	176.7	746.6	202.4	110.7	NA	92.7	NA	NA	NA
	Eh [1]	mV	356.5	264.7	376.7	946.6	402.4	310.7	NA	292.7	NA	NA	NA
	pH	SU	5.31	4.78	4.77	4.78	5.00	4.89	NA	4.86	4.84	4.87	4.95
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	**4.5**	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	**4.5**	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	**0.048 J**	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	**0.3**	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	**36.4**	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	**0.073**	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	**0.50**	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.02	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	**3.5**	NA	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	**20.5**	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	< 1	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-41	YGWC-41	YGWC-41	YGWC-41	YGWC-41	YGWC-41	YGWC-41	YGWC-41	YGWC-42	YGWC-42	YGWC-42
			2/10/2021	3/4/2021	8/26/2021	2/8/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024	8/30/2016	11/16/2016	2/27/2017
Appendix III	Boron	mg/L	NA	**4.0**	**3.3**	**4.0**	**3.6**	**3.3**	**3.1**	**3.5**	**24.7**	**16.4**	**17.9**
	Calcium	mg/L	NA	**16.4**	**12.8**	**15.0**	**12.9**	**14.4**	**13.5**	**14.4**	**133**	**125**	**139**
	Chloride	mg/L	NA	**3.4**	**3.6**	**3.5**	**3.8**	**4**	**3.7**	**3.9**	**4.4**	**4.7**	**4.7**
	Sulfate	mg/L	NA	**117**	**117**	**109**	**117**	**119**	**104**	**109**	**980**	**940**	**940**
	Total Dissolved Solids	mg/L	NA	**224**	**225**	**226**	**205**	**257**	**266**	**224**	**1650**	**1420**	**1640**
Appendix IV	Cobalt	mg/L	< 0.00038	< 0.00038	< 0.00039	< 0.00039	< 0.00039 U	< 0.00039 U	< 0.00039 U	< 0.00032 U	**0.0025 J**	**0.002 J**	**0.0021 J**
	Lithium	mg/L	**0.0021 J**	**0.0021 J**	**0.0021 J**	**0.0023 J**	**0.0019 J**	**0.0021 J**	**0.0026 J**	**0.0021 J**	**0.0257 J**	**0.0221 J**	**0.0208 J**
	Selenium	mg/L	**0.033**	**0.037**	**0.027**	**0.031**	**0.027**	**0.027**	**0.023**	**0.021**	**0.0711**	**0.0313**	**0.0316**
Field	Conductivity	µS/cm	345.0	336.6	267.3	0.3	298.14	280.67	280.67	416.29	NA	1673.6	1694.1
	Dissolved Oxygen	mg/L	5.72	4.53	4.06	5.48	NA	4.76	4.76	3.97	NA	0.33	0.49
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	125.48	237.7	40.79	270.9	NA	289.35	204.98	210.56	NA	-13.8	59.3
	Eh [1]	mV	325.48	437.7	240.79	470.9	NA	489.35	404.98	410.56	NA	186.2	259.3
	pH	SU	5.25	4.68	6.77	5.07	4.43	5.01	5.01	4.84	5.64	6.21	6.09
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	< 5	NA	NA	< 5 U	NA	**6.6**	NA	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	< 5	NA	NA	< 5 U	NA	**6.6**	NA	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	< 5	NA	NA	< 5 U	NA	< 5 U	NA	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	**16.5**	NA	NA	**17.4**	NA	**17.7**	NA	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	**2.3**	NA	**2.5**	NA	NA	NA
	Sodium	mg/L	NA	NA	**13.5**	NA	NA	**14.3**	NA	**15**	NA	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-42 5/10/2017	YGWC-42 7/11/2017	YGWC-42 10/12/2017	YGWC-42 4/4/2018	YGWC-42 9/20/2018	YGWC-42 3/27/2019	YGWC-42 8/22/2019	YGWC-42 10/8/2019	YGWC-42 10/9/2019	YGWC-42 2/14/2020	YGWC-42 3/25/2020
Appendix III	Boron	mg/L	**20.4**	**25.2**	**20**	**22.7**	**20.3**	**20.3**	NA	NA	**16.6**	NA	**15.5**
	Calcium	mg/L	**130**	**172**	**144**	**137**	**108**	**109**	NA	NA	**103**	NA	**107**
	Chloride	mg/L	**4.4**	**4.7**	**4.3**	**3.7**	**3.8**	**3.9**	NA	NA	**4.3**	NA	**3.2**
	Sulfate	mg/L	**1200**	**1300**	**1100**	**1020**	**810**	**831**	NA	NA	**732**	NA	NA
	Total Dissolved Solids	mg/L	**1630**	**1800**	**1600**	**1520**	**1240**	**1100**	NA	NA	**1170**	NA	**1200**
Appendix IV	Cobalt	mg/L	**0.0021 J**	**0.0014 J**	**0.0017 J**	< 0.01	**0.003 J**	NA	0.0019 J	NA	0.0019 J	0.0019 J	0.0018 J
	Lithium	mg/L	**0.0316 J**	**0.0281 J**	**0.0331 J**	**0.037 J**	**0.049 J**	NA	**0.047**	NA	**0.037**	**0.038**	**0.045**
	Selenium	mg/L	**0.053**	**0.0697**	**0.0594**	**0.055**	**0.041**	NA	**0.047**	NA	**0.042**	**0.040**	**0.046**
Field	Conductivity	µS/cm	1632.5	1858.7	1798.2	1725.4	1386.0	1360.6	1289.9	NA	1293.2	NA	NA
	Dissolved Oxygen	mg/L	0.49	0.6	0.64	0.69	0.56	0.7	0.86	NA	1.44	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	57	43	118.9	112.33	83.9	121.1	114.2	NA	113.9	NA	NA
	Eh [1]	mV	257	243	318.9	312.33	283.9	321.1	314.2	NA	313.9	NA	NA
	pH	SU	5.79	5.45	5.48	5.93	5.63	5.57	5.61	NA	5.50	5.80	5.53
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**36**	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**36**	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 20	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.047 J**	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.35**	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.35**	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**110**	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.12**	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.32**	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.02	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**11.7**	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**28.8**	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 1	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-42	YGWC-43	YGWC-43
			9/24/2020	2/10/2021	3/4/2021	8/25/2021	2/10/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024	8/31/2016	11/16/2016
Appendix III	Boron	mg/L	**15.2**	NA	**14.8**	**13.5**	**14.4**	**13.4**	**14.5**	**7.1**	**15.5**	**0.169**	**0.406**
	Calcium	mg/L	**84.3**	NA	**90.7**	**79.9**	**74.4**	**68.5**	**74.6**	**69.2**	**73.5**	**3.4**	**3.79**
	Chloride	mg/L	**3.3**	NA	**2.7**	**3.4**	**3.3**	**3.3**	**3.4**	**2.8**	**3.3**	**1.5**	**1.7**
	Sulfate	mg/L	**579**	NA	**537**	**500**	**485**	**502**	**494**	**451**	**487**	**34**	**240**
	Total Dissolved Solids	mg/L	**1060**	NA	**501**	**886**	**882**	**934**	**853**	**904**	**881**	**80**	**112**
Appendix IV	Cobalt	mg/L	0.0017 J	0.0019 J	0.0018 J	0.0014 J	0.0017 J	0.0015 J	0.0018 J	0.0014 J	0.0023 J	< 0.01	< 0.01
	Lithium	mg/L	**0.050**	**0.058**	**0.059**	**0.053**	**0.052**	**0.054**	**0.046**	**0.054**	**0.049**	**0.006 J**	**0.0095 J**
	Selenium	mg/L	**0.046**	**0.043**	**0.048**	**0.043**	**0.044**	**0.035**	**0.041**	**0.019**	**0.037**	**< 0.01**	**< 0.01**
Field	Conductivity	µS/cm	NA	1333.1	1651.6	1120.9	1069.0	865.31	1,005.33	1,012.69	1,345.34	NA	270.2
	Dissolved Oxygen	mg/L	NA	5.11	1.88	1.33	1.78	NA	1.2	0.31	1.09	NA	0.12
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	157.84	227.39	28.2	188.9	NA	258.34	9.69	146.38	NA	-76.6
	Eh [1]	mV	NA	357.84	427.39	228.2	388.9	NA	458.34	209.69	346.38	NA	123.4
	pH	SU	5.55	5.55	5.59	6.73	5.57	5.49	5.48	5.53	5.61	7.27	6.79
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	**38.5**	NA	NA	**34.3**	NA	**36.3**	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	**38.5**	NA	NA	**34.3**	NA	**36.3**	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	< 5	NA	NA	< 5 U	NA	< 5 U	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	**11.5**	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	**80.9**	NA	NA	**77.7**	NA	**79.5**	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	**10.9**	NA	**12**	NA	NA
	Sodium	mg/L	NA	NA	NA	**36.4**	NA	NA	**32.9**	NA	**38**	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-43 2/24/2017	YGWC-43 5/10/2017	YGWC-43 7/11/2017	YGWC-43 10/12/2017	YGWC-43 4/4/2018	YGWC-43 9/20/2018	YGWC-43 3/28/2019	YGWC-43 8/21/2019	YGWC-43 10/9/2019	YGWC-43 2/17/2020	YGWC-43 3/25/2020
Appendix III	Boron	mg/L	**0.725**	**0.955**	**0.994**	**1.15**	**1.2**	**2.1**	**1.8**	NA	**2.7**	NA	**2.4**
	Calcium	mg/L	**6.42**	**7.9**	**6.71**	**7.05**	**8.6**	**15.9 J**	**8.9**	NA	**21.9**	NA	**12.1**
	Chloride	mg/L	**1.5**	**1.2**	**1.5**	**1.6**	**1.8**	**1.9**	**1.8**	NA	**2.4**	NA	**1.8**
	Sulfate	mg/L	**89**	**100**	**110**	**120**	**160**	**247**	**181**	NA	**279**	NA	NA
	Total Dissolved Solids	mg/L	**147**	**203**	**238**	**287**	**292**	**434**	**323**	NA	**501**	NA	**352**
Appendix IV	Cobalt	mg/L	< 0.01	< 0.01	< 0.01	0.0006 J	< 0.01	0.0034 J	NA	0.0026 J	0.0023 J	0.00088 J	0.0016 J
	Lithium	mg/L	**0.0104 J**	**0.0123 J**	**0.0131 J**	**0.013 J**	**0.016 J**	**0.019 J**	NA	**0.015 J**	**0.018 J**	**0.015 J**	**0.016 J**
	Selenium	mg/L	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	**< 0.01**	NA	**< 0.01**	**< 0.01**	**< 0.0013**	**< 0.0013**
Field	Conductivity	µS/cm	320.5	329.7	337.2	373.9	425.6	535.6	467.9	446.6	596.2	NA	NA
	Dissolved Oxygen	mg/L	0.13	0.12	0.12	0.08	0.09	0.1	0.06	0.08	0.06	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	-25.4	-13.8	-71.5	41.7	77.1	-1	71.8	36	44.9	NA	NA
	Eh [1]	mV	174.6	186.2	128.5	241.7	277.1	199	271.8	236	244.9	NA	NA
	pH	SU	6.39	6.50	6.32	5.97	6.41	5.69	5.96	5.84	5.78	5.93	5.79
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**42**	NA	NA
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**42**	NA	NA
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 20	NA	NA
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.1	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**26**	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**26**	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**3**	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**43**	NA	NA
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**0.011 J**	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.02	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**8.1**	NA	NA
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	**20.7**	NA	NA
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.2	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 1	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfil
Newnan, Georgia

ANAlyte		Units	YGWC-43	YGWC-43	YGWC-43	YGWC-43	YGWC-43	YGWC-43	YGWC-43	YGWC-43	YGWC-43
			9/25/2020	2/9/2021	3/4/2021	9/27/2021	2/8/2022	9/1/2022	2/8/2023	8/16/2023	2/22/2024
Appendix III	Boron	mg/L	**3.9**	NA	**3.6**	**0.64**	**2.3**	**2.6**	**2.5**	**2.8**	**2.3**
	Calcium	mg/L	**19.8**	NA	**32.2**	**4.1**	**9.9**	**10.7**	**11**	**10.7**	**10.5**
	Chloride	mg/L	**2.3**	NA	**2.1**	**1.1**	**2.1**	**2.1**	**2.4**	**2.3**	**2.3**
	Sulfate	mg/L	**281**	NA	**328**	**56.5**	**133**	**169**	**164**	**151 M1**	**147**
	Total Dissolved Solids	mg/L	**494**	NA	**592**	**158**	**294**	**366**	**333**	**356**	**313**
Appendix IV	Cobalt	mg/L	0.0018 J	0.0017 J	0.0015 J	<0.00039	0.00045 J	0.0005 J	0.00049 J	0.00046 J	0.00038 J
	Lithium	mg/L	**0.018 J**	**0.024 J**	**0.025 J**	**0.0092 J**	**0.016 J**	**0.014 J**	**0.015 J**	**0.015 J**	**0.015 J**
	Selenium	mg/L	**< 0.0016**	**< 0.0016**	**< 0.0016**	**<0.0014**	**<0.0014**	**< 0.0014 U**	**< 0.0014 U**	**< 0.0014 U**	**< 0.00096 U**
Field	Conductivity	µS/cm	NA	809.5	615.7	169.0	383.9	390.83	652.65	430.31	403.42
	Dissolved Oxygen	mg/L	NA	5.57	8.69	0.25	0.13	NA	0.18	0.13	0.14
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Oxidation Reduction Potentia	mV	NA	43.08	-19.08	-13	-99.81	NA	4.66	-67.63	70.91
	Eh [1]	mV	NA	243.08	180.92	187	100.19	NA	204.66	132.37	270.91
	pH	SU	5.75	5.82	5.88	6.08	5.82	5.62	5.4	5.58	5.81
Supplemental	Alkalinity (as CaCO3)	mg/L	NA	NA	NA	NA	NA	NA	**33.9**	NA	**35.5**
	Alkalinity, Bicarbonate	mg/L	NA	NA	NA	NA	NA	NA	**33.9**	NA	**35.5**
	Alkalinity, Carbonate	mg/L	NA	NA	NA	NA	NA	NA	< 5 U	NA	< 5 U
	Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferric)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron (Ferrous)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Magnesium	mg/L	NA	NA	NA	NA	NA	NA	**25.8**	NA	**25.8**
	Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nitrate-N	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ortho-Phosphate (As P)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	mg/L	NA	NA	NA	NA	NA	NA	**6.5**	NA	**6.7**
	Sodium	mg/L	NA	NA	NA	NA	NA	NA	**18.3**	NA	**19.1**
	Sulfide	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes are provided on last page.

Table 2-3
Groundwater Analytical Data (2016 – 2024)
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Notes:
[1] Eh is calculated from the field ORP value and corrected for the silver-silver chloride electrode (Ag/AgCl) by adding 200 mV.

1. Detections are in **bold.**

Acronyms and Abbreviations:
< = the analyte was not detected above the laboratory method detection limit
µS/cm = microSiemen per centimeter
$CaCO_3$ = calcium carbonate
Eh = electron potential
mg/L = milligram per liter
mV = millivolt
NA = not analyzed
ND = the analyte was not detected above the laboratory method detection limit.
S.U. = standard unit

Qualifiers:
J = The substance was detected at such low levels that the precision of the laboratory instrument could not produce a reliable value. Therefore, the value displayed (value J) is qualified by the laboratory as an estimated value.
U = Indicates the analyte was analyzed for, but not detected.

Table 3-1
Selenium Speciation Results
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Sample ID	Sample Date	MeSe(IV)	Se	Se(IV)	Se(VI)	SeCN	SeMet	$SeSO_3$
YGWC-38	9/25/2020	<0.350 U	85.9	<0.350 U	82.10	<0.250 U	<0.350 U	<0.300 U
YGWC-41	9/25/2020	<0.350 U	50.7	<0.350 U	49.3	<0.250 U	<0.350 U	<0.300 U

Notes:
1. All results are dissolved fraction.
2. All results are in microgram per liter.

Acronyms and Abbreviations:
< = the analyte was not detected above the laboratory method detection limit (MDL)
Me Se (IV) = methylseleninic acid
Se = selenium
Se(IV) = selenite
Se(VI) = selenate
SeCN = selenocyanate
SeMet = selenomethionine
$SeSO_3$ = selenium sulfite

Qualifier:
U = Result is less than or equal to the method detection limit MDL

Table 3-2
Selenium Sorption Study Details and Results
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Initial Conditions						Results			
Lithology	Mass Solids (grams)	Volume Groundwater (mL)	pH	Selenium Concentration Control (ppb)	Mass Selenium Added per Mass Aquifer Solids (µg/kg)	Selenium Concentration Aqueous (ppb)	Percent Removed	Sorption Coefficient (Kd) (L/kg)	Mass Selenium Adsorbed per Mass Aquifer Material (µg/kg)
Saprolite	0.24	259	5.9	0.075	81	0.075	0	N/A	N/A
	5.0	395	4.5	0.075	5.9	0.082	0	N/A	N/A
	50	370	6.3	0.075	0.56	0.082	0	N/A	N/A
	250	260	6.4	0.075	0.08	0.067	11	0.12	0.008
	350	175	NM	0.075	0.04	0.050	33	0.22	0.013
	300	100	NM	0.075	0.03	0.043	43	0.25	0.011
Biotite-Gneiss (Fine -Grained)	2.4	250	6.0	0.075	7.9	0.071	Nominal	N/A	N/A
	50	370	6.3	0.075	0.6	0.078	0	N/A	N/A
	200	290	7.6	0.075	0.11	0.070	7	0.1	0.007
	500	120	8.2	0.075	0.02	0.052	31	0.11	0.006
	800	350	NM	0.075	0.03	0.055	27	0.16	0.009
Biotite-Gneiss (Coarse -Grained)	2.4	250	5.9	0.075	N/A	0.076	0	N/A	N/A
	50	370	5.4	0.075	N/A	0.081	0	N/A	N/A
	200	290	7.1	0.075	N/A	0.079	0	N/A	N/A
	500	120	8.4	0.075	N/A	0.076	0	N/A	N/A
	800	350	7.5	0.075	N/A	0.073	0	N/A	N/A

Acronyms and Abbreviations:
µg/kg = microgram per kilogram
L/kg = liter per kilogram
mL = milliliter
N/A = not applicable
NM = not measured
ppb = part per billion

Table 4-1
Cobalt and Lithium Sorption Study Details and Results
Geochemical Conceptual Site Model Report
Plant Yates AP3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Reactor ID	Reactor Description	Test Setup				Lithium					Cobalt				
		Mass Solids (grams)	Volume Groundwater (mL)	Solid to Groundwater Ratio (g/mL)	pH[1]	Lithium, Dissolved Concentration Control (mg/L)	Mass Lithium Added per Mass Aquifer Solids (mg/kg)	Lithium Concentration Aqueous (mg/L)	Percent Removed	Mass Lithium Adsorbed per Mass Aquifer Material (mg/kg)	Cobalt, Dissolved Concentration Control (mg/L)	Mass Cobalt Added per Mass Aquifer Solids (mg/kg)	Cobalt Concentration Aqueous (mg/L)	Percent Removed	Mass Cobalt Adsorbed per Mass Aquifer Material (mg/kg)
Reactor 1: DIW + 400 grams	Control – Reactor contains deionized water and PWR solids to control for potential contribution of COI from solids.	400	200	2	5.60	< 0.0016	N/A	< 0.0016	N/A	N/A	< 0.00032	N/A	< 0.00032	N/A	N/A
Reactor 2: GW Only	Control – Reactor contains YAMW-3 groundwater only to control for potential sorption to the reactor and/or potential precipitation of solids from solution in the absence of solids.	0.0	500	0	5.60	0.039	N/A	0.039	0	N/A	0.11	N/A	0.110	0	N/A
Reactor 3: GW + 0.5 gram	Reactor contains YAMW-3 groundwater and 0.5 gram of solids and 500 mL of YAMW-3 groundwater.	0.5	500	0.001	5.60	0.039	40	0.038	3	1	0.11	110.0	0.094	15	20
Reactor 4: GW + 5 gram	Reactor contains YAMW-3 groundwater and 5 grams of solids and 500 mL of YAMW-3 groundwater.	5.0	500	0.01	5.60	0.039	4	0.034	13	0.5	0.11	11.0	0.049	55	6
Reactor 5: GW + 50 grams	Reactor contains YAMW-3 groundwater and 50 grams of solids and 500 mL of YAMW-3 groundwater.	50	500	0.1	5.60	0.039	0.4	0.0087J	78	0.4	0.11	1.1	0.024	78	0.9
Reactor 6: GW + 50 grams	Duplicate of Reactor 5. Reactor contains YAMW-3 groundwater and 50 grams of solids and 500 mL of YAMW-3 groundwater.	50	500	0.1	5.60	0.039	0.4	0.009J	77	0.4	0.11	1.1	0.028	75	0.8
Reactor 7: GW + 400 grams	Reactor contains YAMW-3 groundwater and 400 grams of solids and 200 mL of YAMW-3 groundwater.	400	200	2	5.60	0.039	0.02	0.0061J	84	0.02	0.11	0.055	0.017	85	0.05

Table 4-1
Cobalt and Lithium Sorption Study Details and Results
Geochemical Conceptual Site Model Report
Plant Yates AP-3, A, B, and B', and R6 CCR Landfill
Newnan, Georgia

Notes:

[1]pH was measured with an Aqua Troll 600 during the low-flow groundwater sampling event on October 31, 2023 prior to sample collection and shipment to the Arcadis Treatability Laboratory.

1. Samples were transported to the laboratory and analyzed under atmospheric conditions.

Acronyms and Abbreviations:

< = not detected at or above the value shown, which is the adjusted reporting limit

COI = constituent of interest

DIW = dionized water

g/mL = gram per milliliter

GW = groundwater

mg/L = milligram per liter

mg/kg = milligram per kilogram

mL = milliliter

N/A = not applicable

PWR = partially weathered rock

Table 4.2
Cobalt and Lithium Sorption Study Details and Results
2024 Draft Geochemical Conceptual Site Model Report
Plant Yates; Ash Ponds 3, A, B, and B'; and R6 CRR Landfill

Sample Identification		Reactor 1		Reactor 2		Reactor 3		Reactor 4		Reactor 5		Reactor 6		Reactor 7	
Description		Control: DIW + 400g Solids		Control: GW only		GW + 0.5g Solids		GW + 5g Solids		GW + 50g Solids		GW + 50g Solids		GW + 400g Solids	
Method/Analyte	Result Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals USEPA 6020B - Total															
Antimony	mg/L	--	NP	<0.00054	ND	<0.00054	ND	<0.00054	ND	<0.00054	ND	<0.00054	ND	--	NP
Arsenic	mg/L	--	NP	0.0027	J B	0.003	J B	0.0031	J B	0.003	J B	0.003	J B	--	NP
Barium	mg/L	--	NP	0.03		0.041		0.063		0.076		0.078		--	NP
Beryllium	mg/L	--	NP	0.00015	J	0.00015	J	0.00018	J	0.00034	J	0.00037	J	--	NP
Cadmium	mg/L	--	NP	0.00026	J	0.00024	J	0.00019	J	0.00013	J	0.00015	J	--	NP
Chromium	mg/L	--	NP	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	--	NP
Cobalt	mg/L	--	NP	0.11		0.1		0.052		0.025		0.028		--	NP
Lead	mg/L	--	NP	<0.00016	ND	<0.00016	ND	0.00037	J	0.00029	J	0.00023	J	--	NP
Lithium	mg/L	--	NP	0.04		0.038		0.034		0.0091	J	0.0096	J	--	NP
Molybdenum	mg/L	--	NP	0.0044	J	0.0044	J	0.0048	J	0.0011	J	0.00079	J	--	NP
Selenium	mg/L	--	NP	0.0083		0.0089		0.0093		0.008		0.0074		--	NP
Thallium	mg/L	--	NP	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	--	NP
Metals USEPA 6020B - Dissolved															
Antimony	mg/L	0.0013	J	0.0008	J	0.00071	J	0.00061	J	0.00066	J	0.00084	J	0.00073	J
Arsenic	mg/L	0.0012	J B	0.0029	J B	0.0036	J B	0.0033	J B	0.0028	J B	0.0029	J B	0.0028	J B
Barium	mg/L	0.029		0.029		0.038		0.053		0.067		0.071		0.074	
Beryllium	mg/L	0.00054		0.00016	J	<0.000094	ND	<0.000094	ND	0.00025	J	0.00031	J	0.002	
Cadmium	mg/L	<0.00010	ND	0.00025	J	0.00023	J	0.00016	J	0.00013	J	0.00013	J	0.00015	J
Chromium	mg/L	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND
Cobalt	mg/L	0.0019	J	0.11		0.094		0.049		0.024		0.028		0.017	
Iron	mg/L		NP	<0.0075	ND	0.01	J	0.014	J	0.011	J	0.0076	J		NP
Lead	mg/L	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	0.00036	J
Lithium	mg/L	0.0016	J	0.039		0.038		0.034		0.0087	J	0.009	J	0.0061	J
Manganese	mg/L	<0.00062	ND	0.51		0.48		0.59		1.2		1.2			NP
Molybdenum	mg/L		NP	0.0044	J	0.0041	J	0.0045	J	0.001	J	0.00068	J	<0.00062	ND
Selenium	mg/L	0.0022	J	0.0086		0.0088		0.0073		0.0074		0.0075		0.0086	
Thallium	mg/L	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND

Table 4.2
Bench-Scale Sorption Study All Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Acronyms and Abbreviations:

GWPS = groundwater protection standards

mg/L = milligram per liter

ND = Not detected at or above adjusted reporting limit

Q = Data Qualifier

USEPA = United States Environmental Protection Agency

Data Qualifiers:

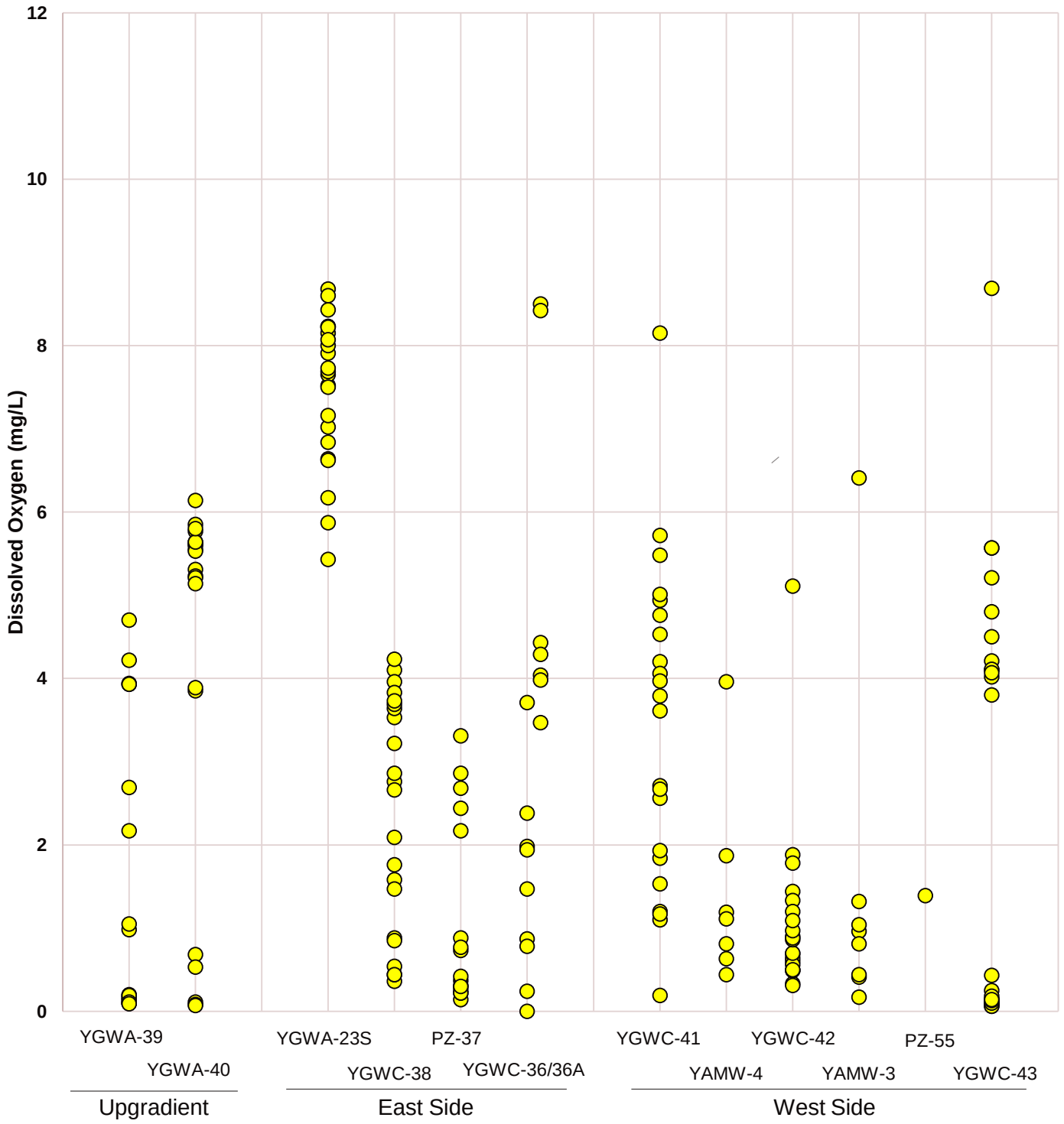
B = Analyte was detected in the associated method blank.

J = Estimated concentration.

NP = Not Performed

ND = Not Detected

Figures



Notes:
1. Data shown are from 2016 through 2024

mg/L = milligram per liter
= sample result

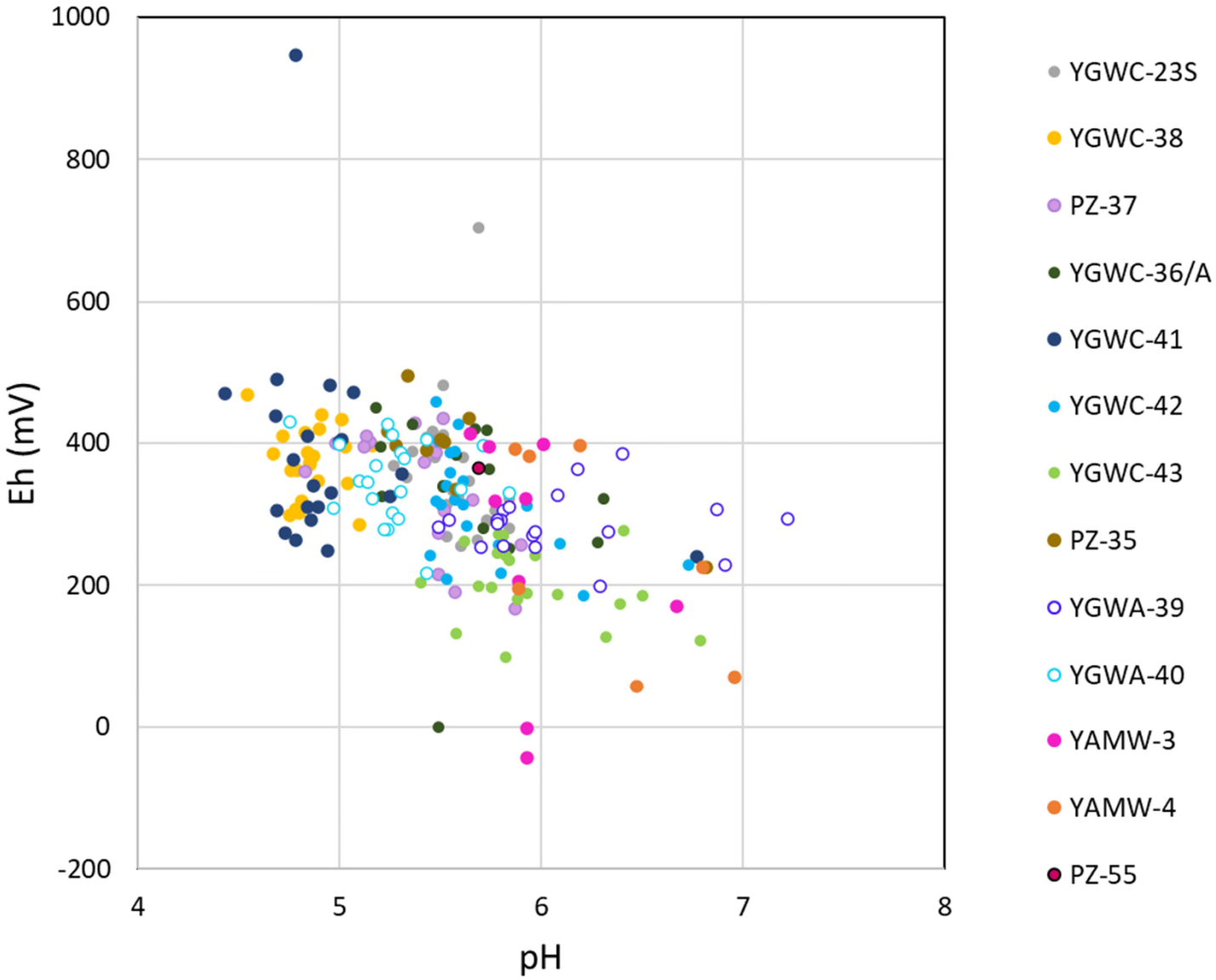
Georgia Power
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

DISSOLVED OXYGEN
CONCENTRATION SUMMARY

ARCADIS

FIGURE
2-1

June 6, 2024, 10:56:52 AM



Notes:
1. Data shown are from 2016 through 2024
2. Upgradient wells are shown as open symbols

Eh = electron potential
mV = millivolt

Georgia Power

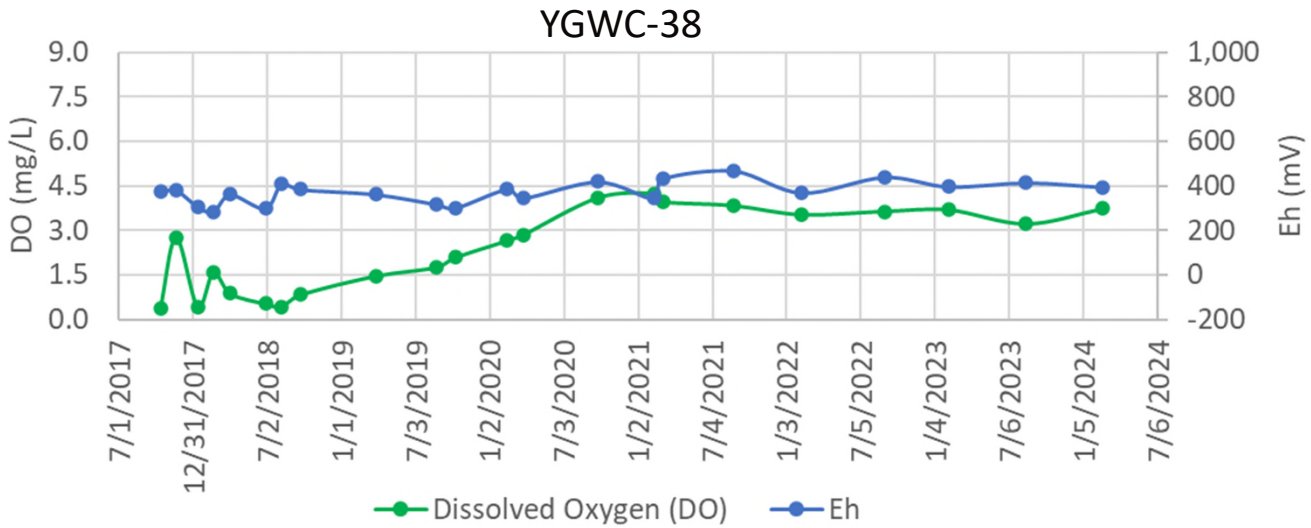
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

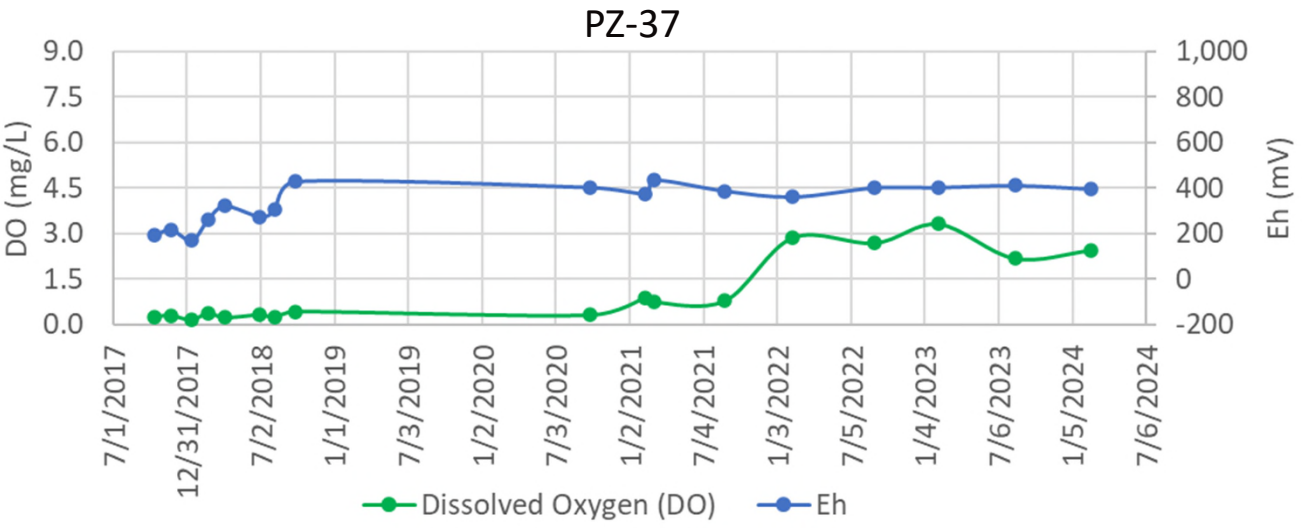
EH PH DATA SUMMARY

ARCADIS

FIGURE
2-2

June 5, 2024; 11:54:38 AM





Notes:
1. R6 CCR Landfill closure complete in 2016.

DO = dissolved oxygen
Eh = electron potential
mV = millivolt
mg/L = milligram per liter

Georgia Power

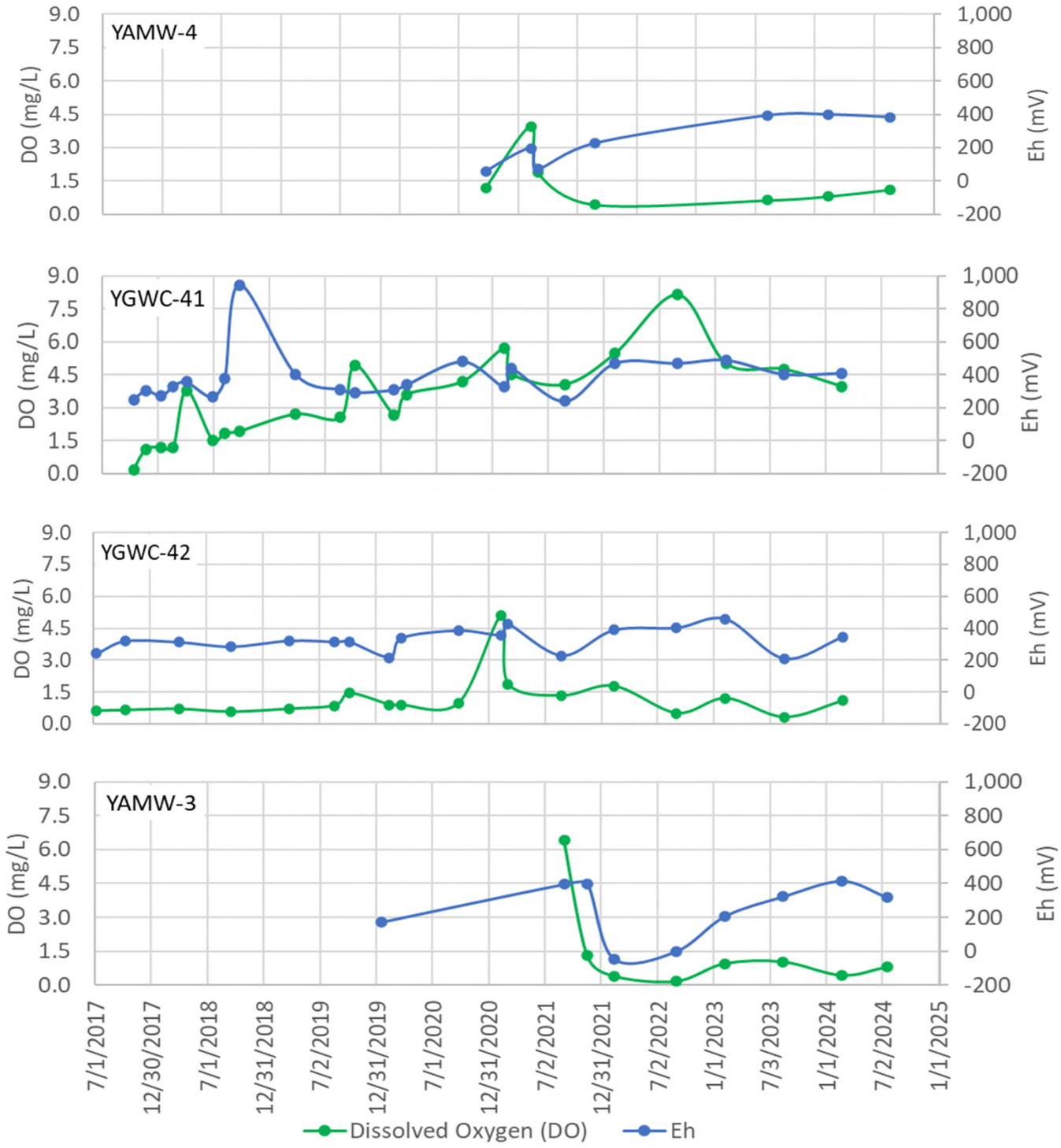
PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

DISSOLVED OXYGEN CONCENTRATION AND EH TRENDS – SOUTHEASTERN BOUNDARY

ARCADIS

FIGURE
2-3A

June 5, 2024; 12:17:42 PM



Notes:
1. R6 CCR Landfill closure complete in 2016.

DO = dissolved oxygen
Eh = electron potential
mV = millivolt
mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

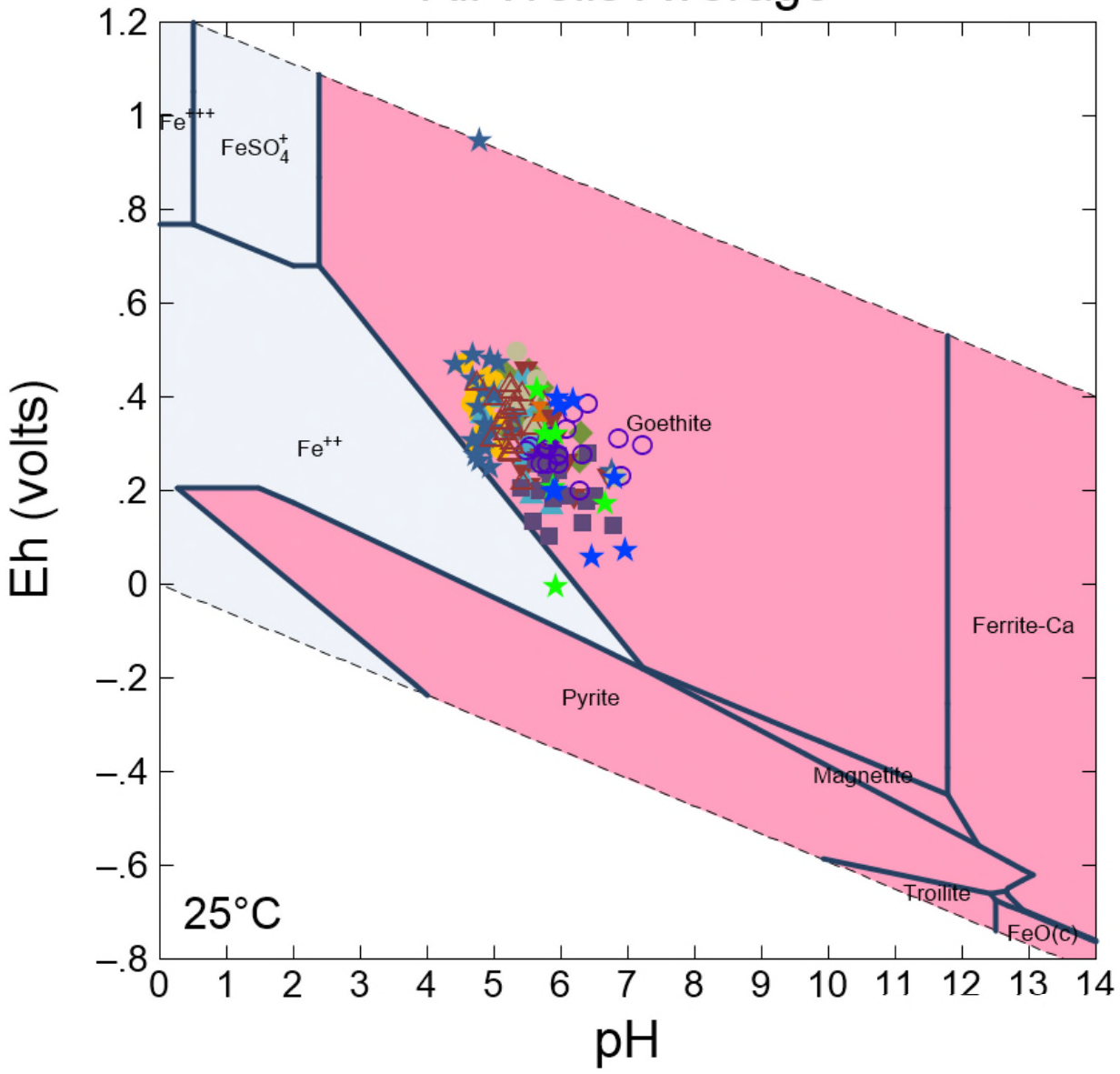
DISSOLVED OXYGEN CONCENTRATION AND EH TRENDS – WESTERN BOUNDARY

ARCADIS

FIGURE
2-3B

June 5, 2024; 12:17:42 PM

All Wells Average



Legend

- YGWC-23S
- YGWC-36/A
- YGWC-42
- YGWC-38
- PZ-37
- YGWC-41
- YGWC-43
- PZ-35
- YGWA-39
- YGWA-40
- YAMW-3
- YAMW-4
- PZ-55

Notes:

1. This Eh-pH diagram was produced with Geochemist's Workbench. The LLNL thermodynamic database, "thermos.tdat", the program's default database, was used
2. The basis species in the LLNL thermodynamic database for ferrous iron was used to construct the Eh-pH diagram. Representative value of all wells shown on this figure (7.2e-6 mol/L) was used. Units needed to create the Eh-pH diagram is activity. It is assumed that concentrations in mol/L is roughly equivalent to activity because the ionic strength of groundwater is very low.
3. Major complexing ions (redox sensitive species Ca^{2+}, Cl^{-}, HCO_3^{-}, K^{+}, Mg^{2+}, Na^{+}, SO_4^{2-}) were speciated by reaction with species on both the x and y axes.
4. Formation of hematite and FeSe2 were suppressed because they are not representative of site conditions.
5. Mineral fields (e.g., Geothite) are shaded in pink. Aqueous species are shaded in blue.

°C = degree Celsius
Eh = electron potential
mol/L = mole per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

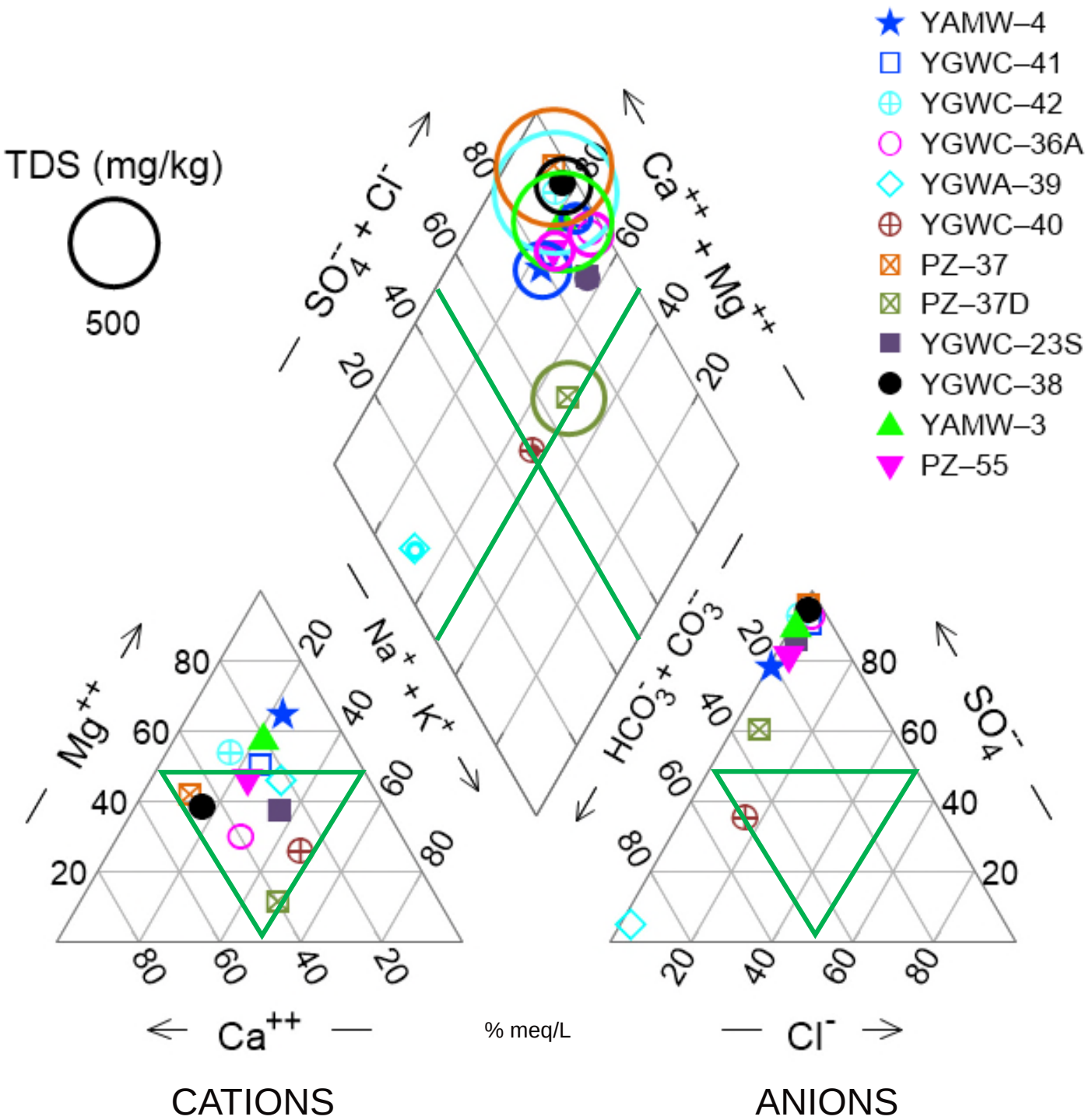
IRON SPECIATION DIAGRAM

ARCADIS

FIGURE
2-4

Geochemical Conceptual Site Model Plant Yates – AP-3, A, B, B' and R6 CCR Landfill

Piper Diagram



Notes:
% meq/L = percent milliequivalent per liter
Na + K = sodium + potassium
Ca = calcium
Mg = magnesium
Cl = chloride
$HCO_3 + CO_3$ = bicarbonate + carbonate
SO_4 = sulfate
TDS = total dissolved solids
= line representing 50 percent between endpoints

Georgia Power

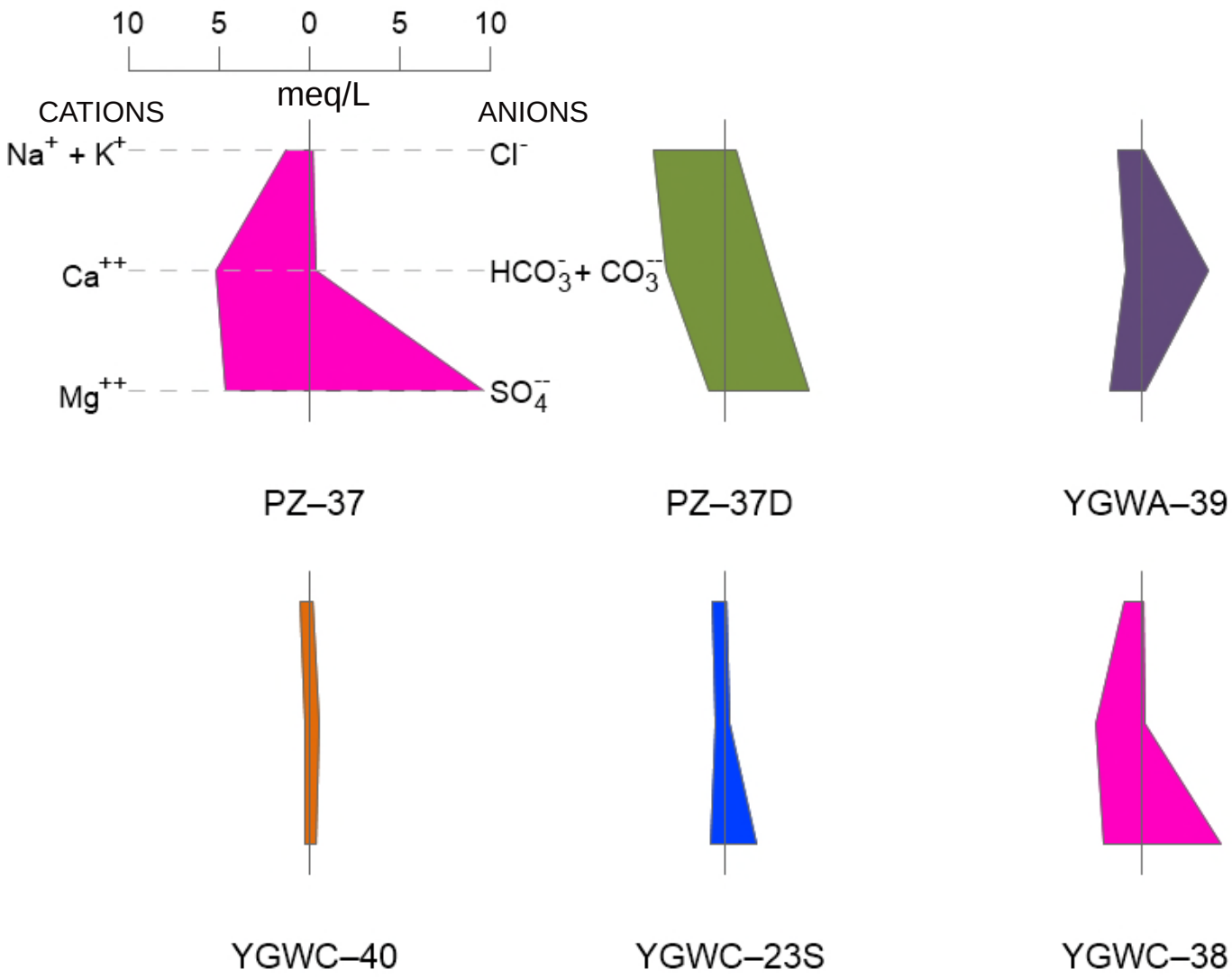
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

PIPER DIAGRAM

ARCADIS

FIGURE
2-5

Geochemical Conceptual Site Model Plant Yates – AP-3, A, B, B' and R6 CCR Landfill



Notes:

1. Units are in milliequivalent per liter (meq/L)

Na + K = sodium + potassium
Ca = calcium
Mg = magnesium
Cl = chloride
HCO_3 + CO_3 = bicarbonate + carbonate
SO_4 = sulfate

Stiff diagram color indicates the hydrochemical-water type:
- Blue = magnesium-sulfate type
- Green = sodium-sulfate type
- Orange = sodium-bicarbonate type
- Pink = calcium-sulfate type
- Purple = magnesium-bicarbonate type

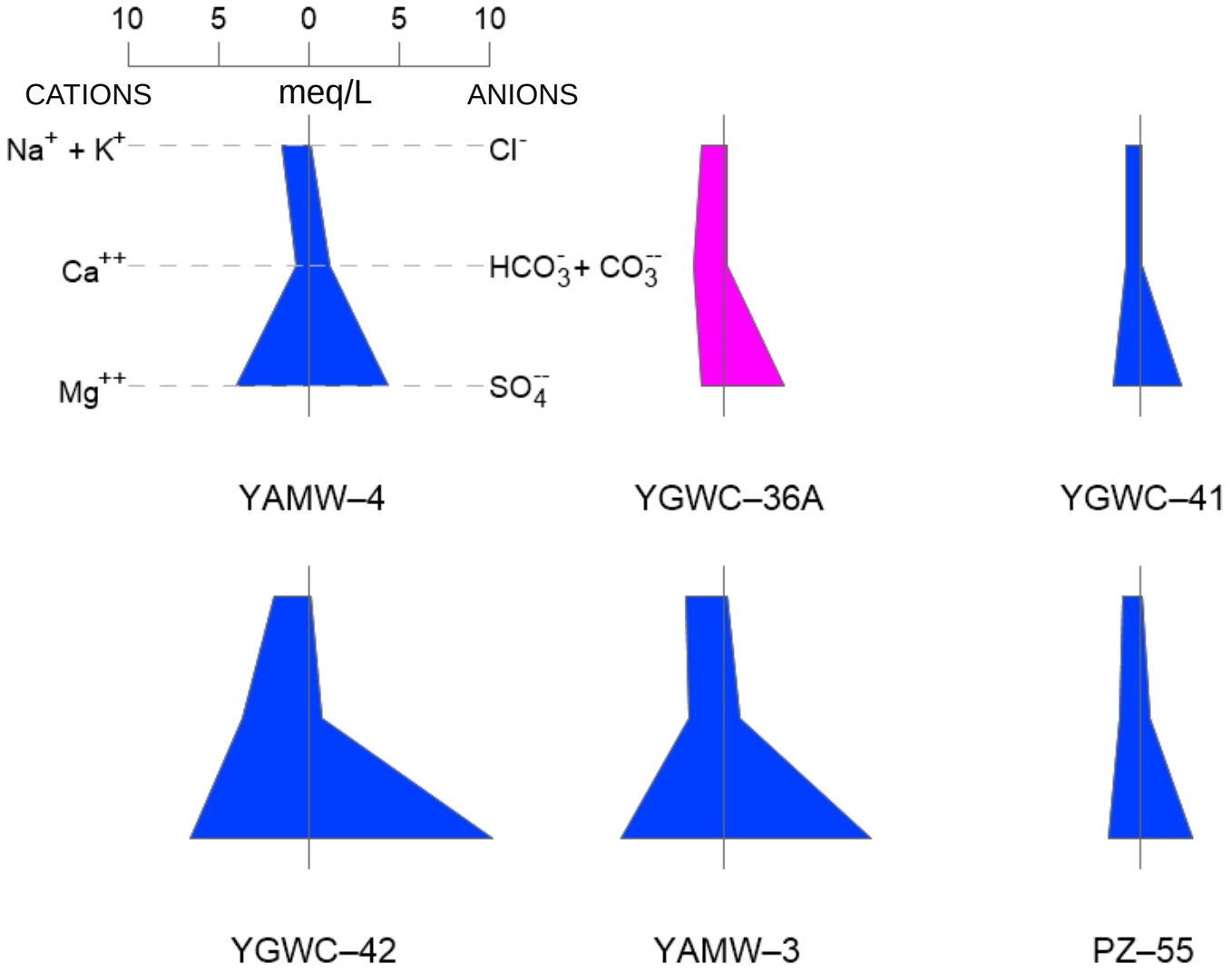
Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

STIFF DIAGRAMS – SOUTHEASTERN BOUNDARY

ARCADIS

FIGURE
2-6A



Notes:
1. Units are in milliequivalent per liter (meq/L)
Na + K = sodium + potassium
Ca = calcium
Mg = magnesium
Cl = chloride
HCO_3 + CO_3 = bicarbonate + carbonate
SO4 = sulfate

Stiff diagram color indicates the hydrochemical-water type:
Blue = magnesium-sulfate type
Pink = calcium-sulfate type

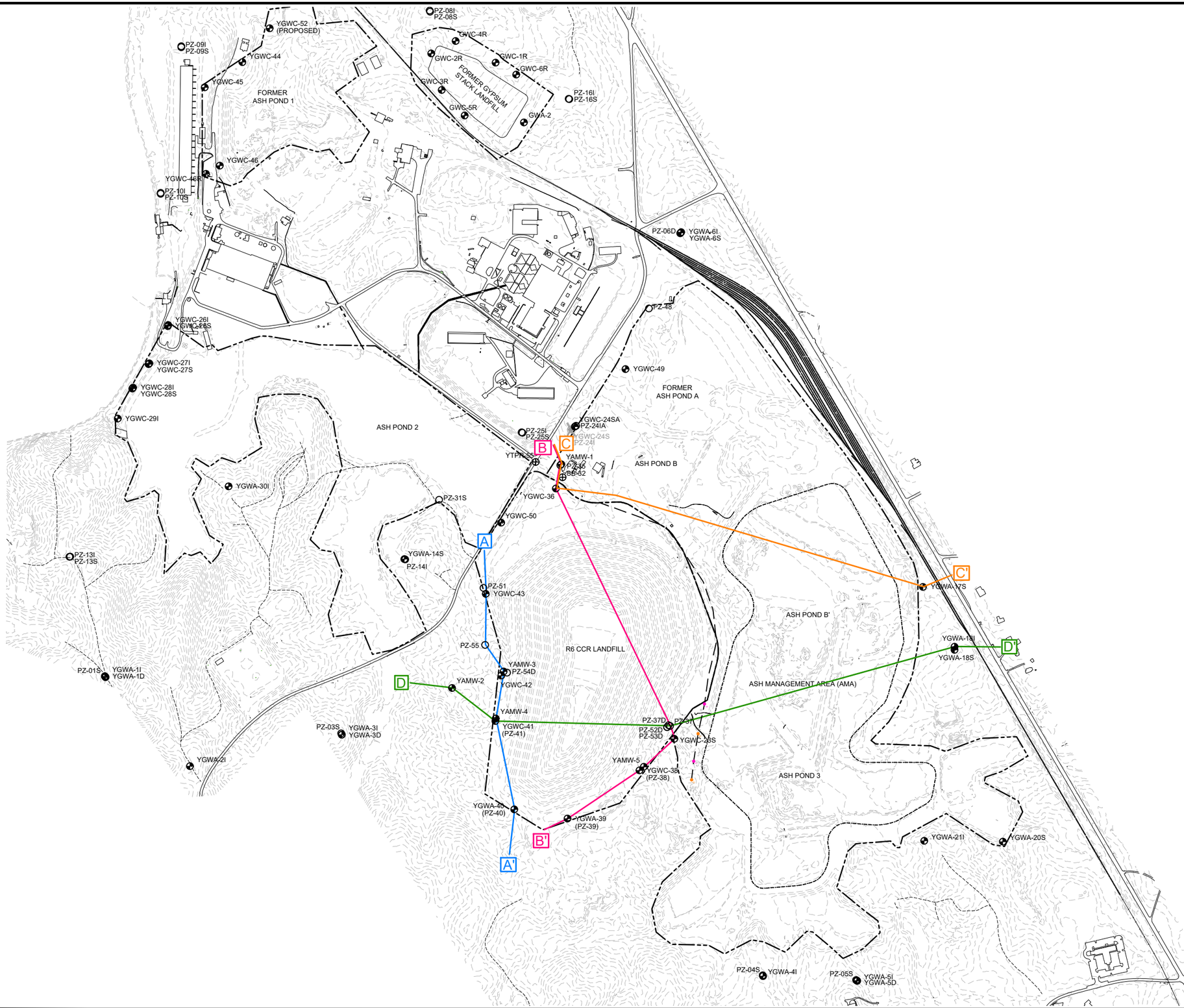
Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

STIFF DIAGRAMS – WESTERN BOUNDARY

ARCADIS

FIGURE
2-6B



LEGEND:

- EXISTING GRADE
- GROUNDWATER MONITORING WELL
- PIEZOMETER
- TEST BORING
- ABANDONED WELL
- A — CROSS–SECTION
- BOUNDARY PER D&O PLAN
- EXTENT OF ASH MANAGEMENT AREA FINAL COVER
- ENGINEERING MEASURE, SUBSURFACE DRAIN

0 800' 1,600'

GRAPHIC SCALE

Georgia Power

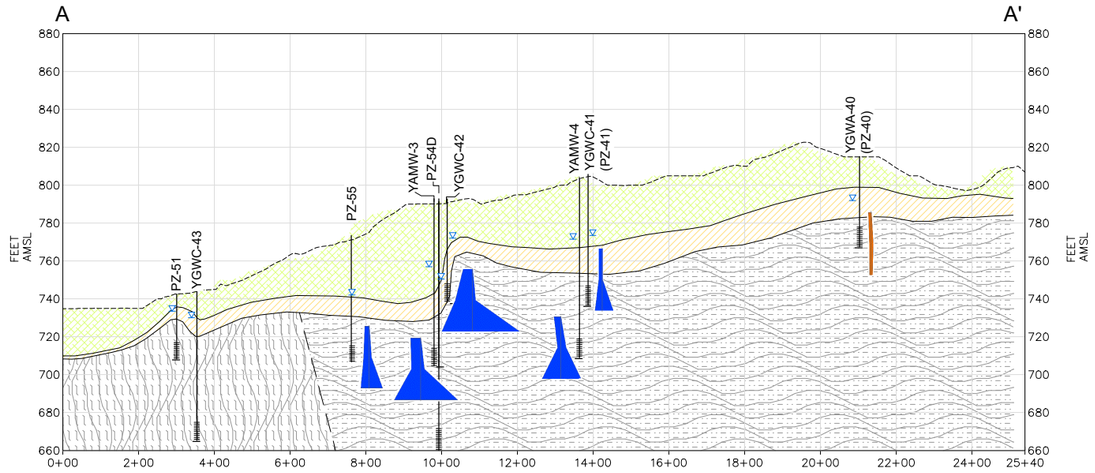
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA

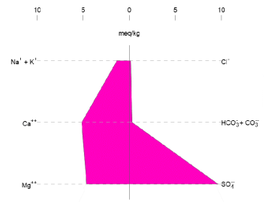
GEOCHEMICAL CONCEPTUAL SITE MODEL

CROSS-SECTION LOCATION MAP

ARCADIS

FIGURE
2-7





LEGEND:

WATER ELEVATION (FEBRUARY 2024)

WELL SCREEN

STIFF AXIS AND LABELS

Ca	=	CALCIUM
Mg	=	MAGNESIUM
Na+K	=	SODIUM–POTASSIUM ALLOY
HC03 + CO3	=	TOTAL ALKALINITY
SO4	=	SULFATE
Cl	=	CHLORIDE
MEQ/KG	=	MILLIEQUIVALENTS PER KILOGRAM

MAGNESIUM–SULFATE

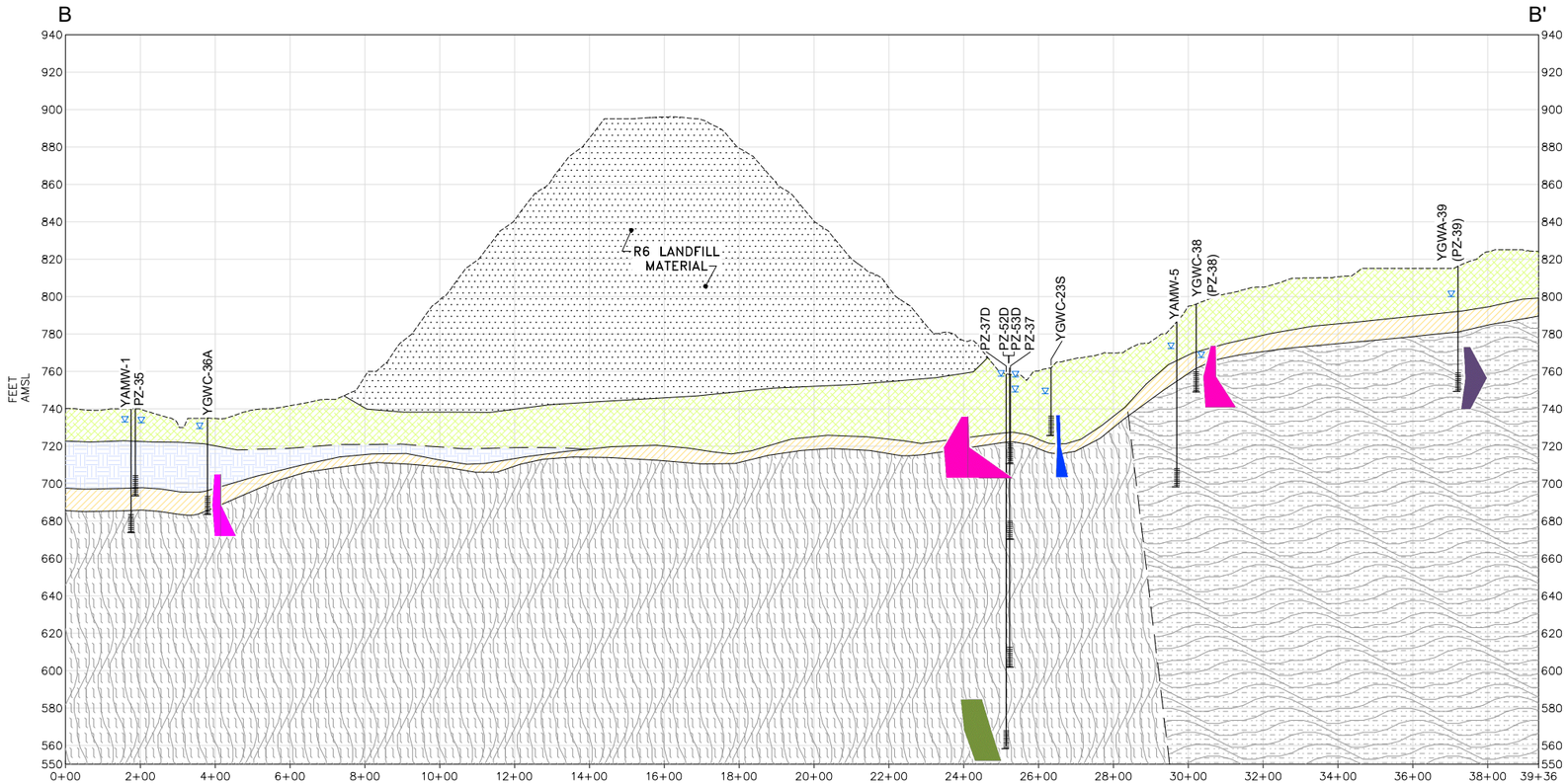
SODIUM–BICARBONATE

SODIUM–SULFATE

CALCIUM–SULFATE

MAGNESIUM–BICARBONATE

ESTIMATED GEOLOGIC CONTACT (DASHED WERE INFERRED)



SAPROLITE:

SILTY SAND – LIGHT BROWN TO TAN FINE–MEDIUM GRAINED SAND WITH SILT. LOOSE

CLAYEY SAND – MOTTLED TO BROWN, FINE TO MEDIUM GRAINED SAND WITH CLAY. LOOSE.

TRANSITION ZONE:

HIGHLY WEATHERED AND HIGHLY FRACTURED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. FINE TO COARSE SAND AND GRAVEL PRESENT

BEDROCK:

BEDROCK (UNDIFFERENTIATED) – UNDIFFERENTIATED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. MODERATELY TO INTENSELY FOLIATED

BIOTITE GNEISS – BIOTITE AND MUSCOVITE GNEISS. MODERATELY TO INTENSELY FOLIATED

NOTE:

1. CROSS–SECTION ELEVATIONS ARE MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL)

0 400' 800'

HORIZONTAL GRAPHIC SCALE

0 80' 160'

VERTICAL GRAPHIC SCALE

Georgia Power

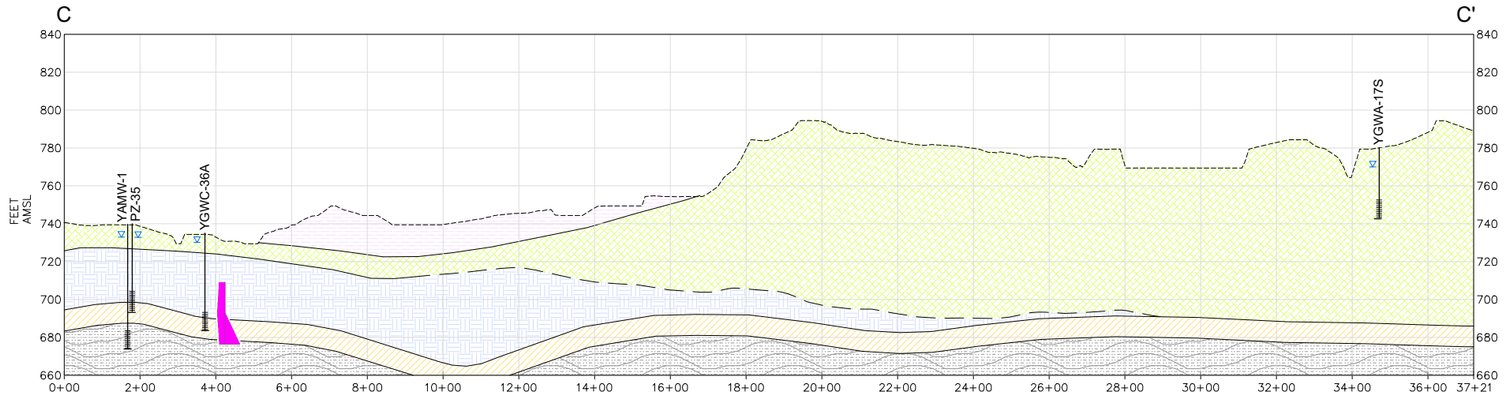
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA

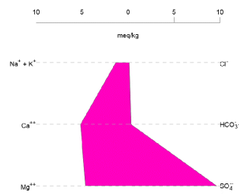
GEOCHEMICAL CONCEPTUAL SITE MODEL

CROSS-SECTIONS A-A' AND B-B' WITH STIFF DIAGRAMS

ARCADIS

FIGURE
2-8





LEGEND:

WATER ELEVATION (FEBRUARY 2024)

WELL SCREEN

STIFF AXIS AND LABELS

Ca	=	CALCIUM
Mg	=	MAGNESIUM
Na+K	=	SODIUM–POTASSIUM ALLOY
HC03 + CO3	=	TOTAL ALKALINITY
SO4	=	SULFATE
Cl	=	CHLORIDE
MEQ/KG	=	MILLIEQUIVALENTS PER KILOGRAM

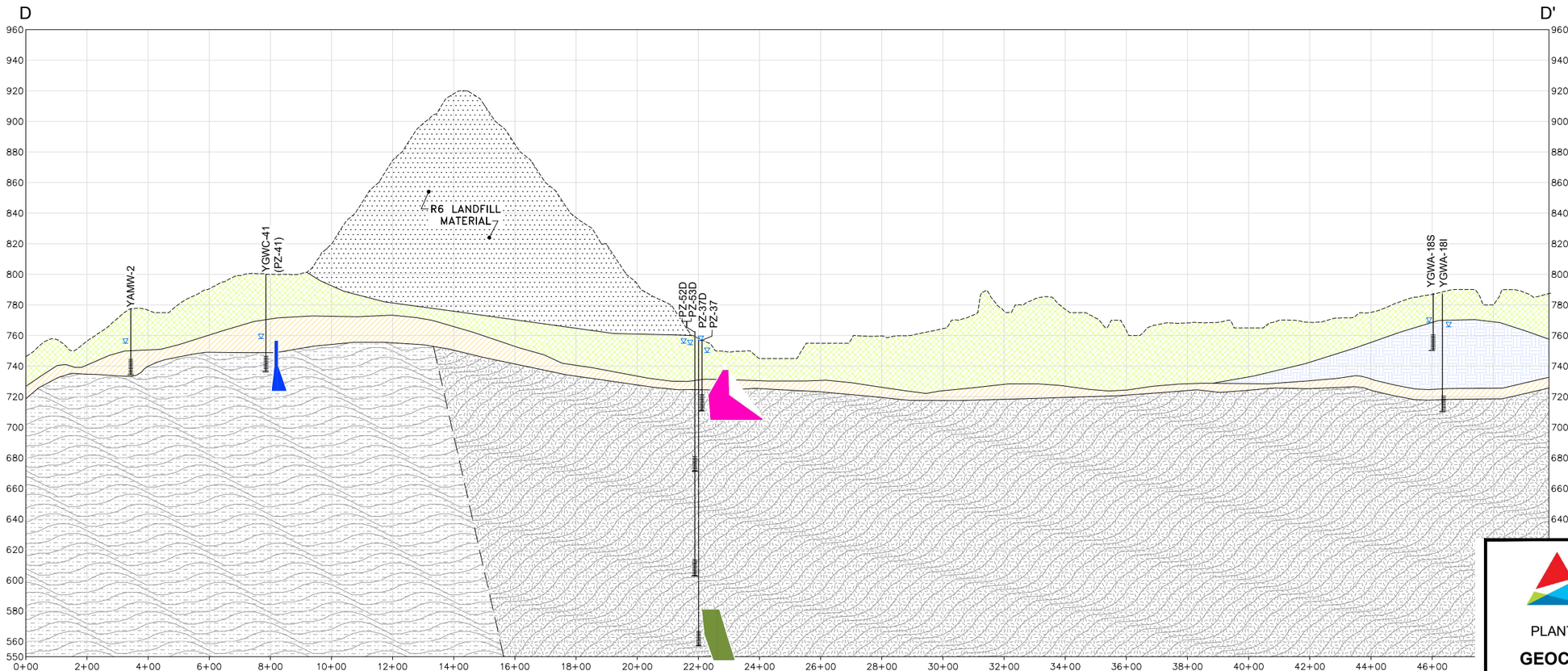
MAGNESIUM–SULFATE

SODIUM–BICARBONATE

SODIUM–SULFATE

CALCIUM–SULFATE

ESTIMATED GEOLOGIC CONTACT (DASHED WERE INFERRED)



SAPROLITE:

SANDY SILT– LIGHT BROWN TO BROWN SANDY SILT. LOW PLASTICITY

SILTY SAND – LIGHT BROWN TO TAN FINE–MEDIUM GRAINED SAND WITH SILT. LOOSE

CLAYEY SAND – MOTTLED TO BROWN, FINE TO MEDIUM GRAINED SAND WITH CLAY. LOOSE.

TRANSITION ZONE:

HIGHLY WEATHERED AND HIGHLY FRACTURED BIOTITE GNEISS, GRANITIC GNEISS, AND MICA SCHIST. FINE TO COARSE SAND AND GRAVEL PRESENT

BEDROCK:

GRANITIC GNEISS –GRAY TO WHITE, BIOTITE, MUSCOVITE, QUARTZ, PLAGIOCLASE GNEISS. MODERATELY TO INTENSELY FOLIATED

BIOTITE GNEISS – BIOTITE AND MUSCOVITE GNEISS. MODERATELY TO INTENSELY FOLIATED

NOTE:

1. CROSS–SECTION ELEVATIONS ARE MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL).

0 400' 800'

HORIZONTAL GRAPHIC SCALE

0 80' 160'

VERTICAL GRAPHIC SCALE

Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GEORGIA

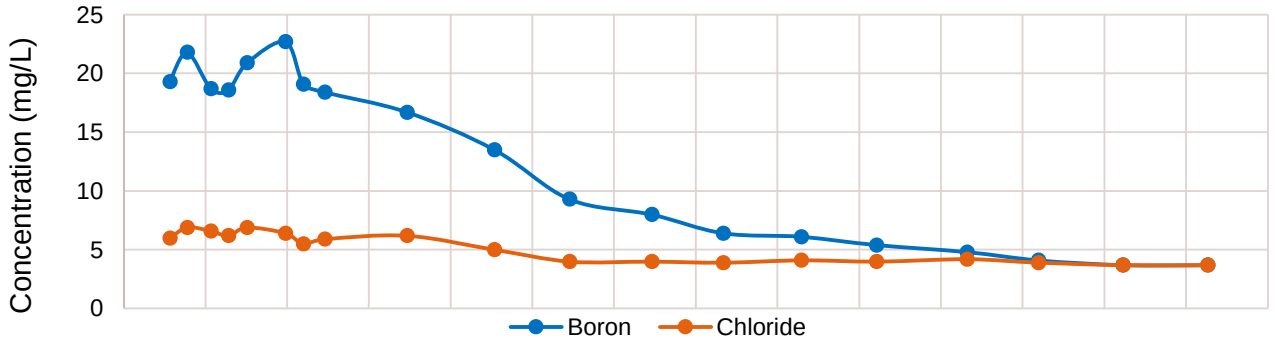
GEOCHEMICAL CONCEPTUAL SITE MODEL

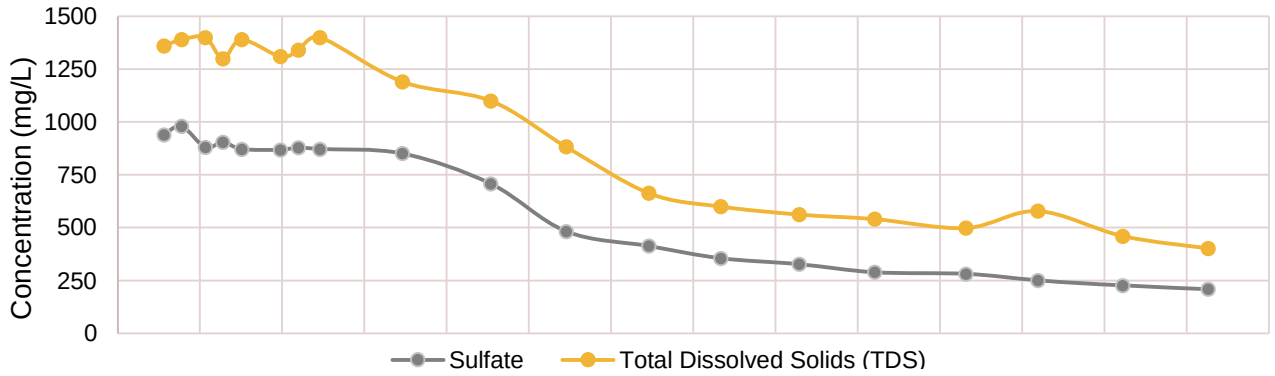
CROSS-SECTIONS C-C' AND D-D' WITH STIFF DIAGRAMS

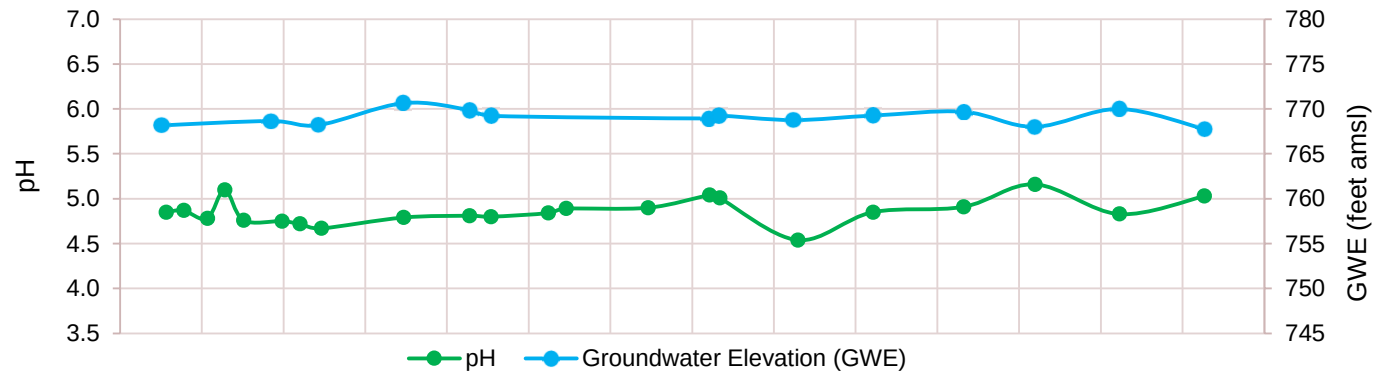
ARCADIS

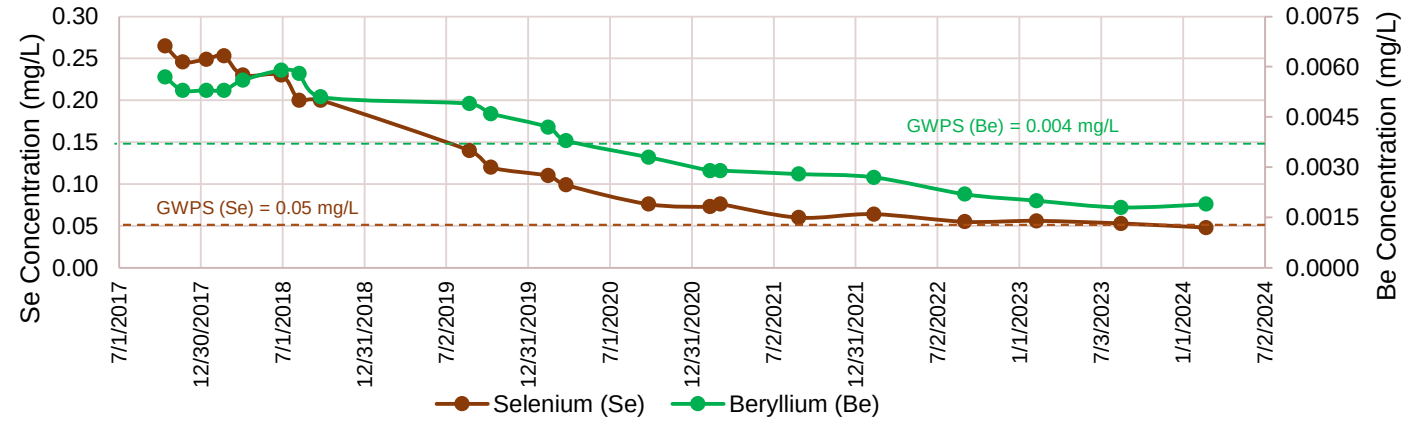
FIGURE
2-9

YGWC-38









Notes:
1. R6 CCR Landfill closure complete in 2016.

amsl = above mean sea level
GWPS = Groundwater Protection Standard
mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

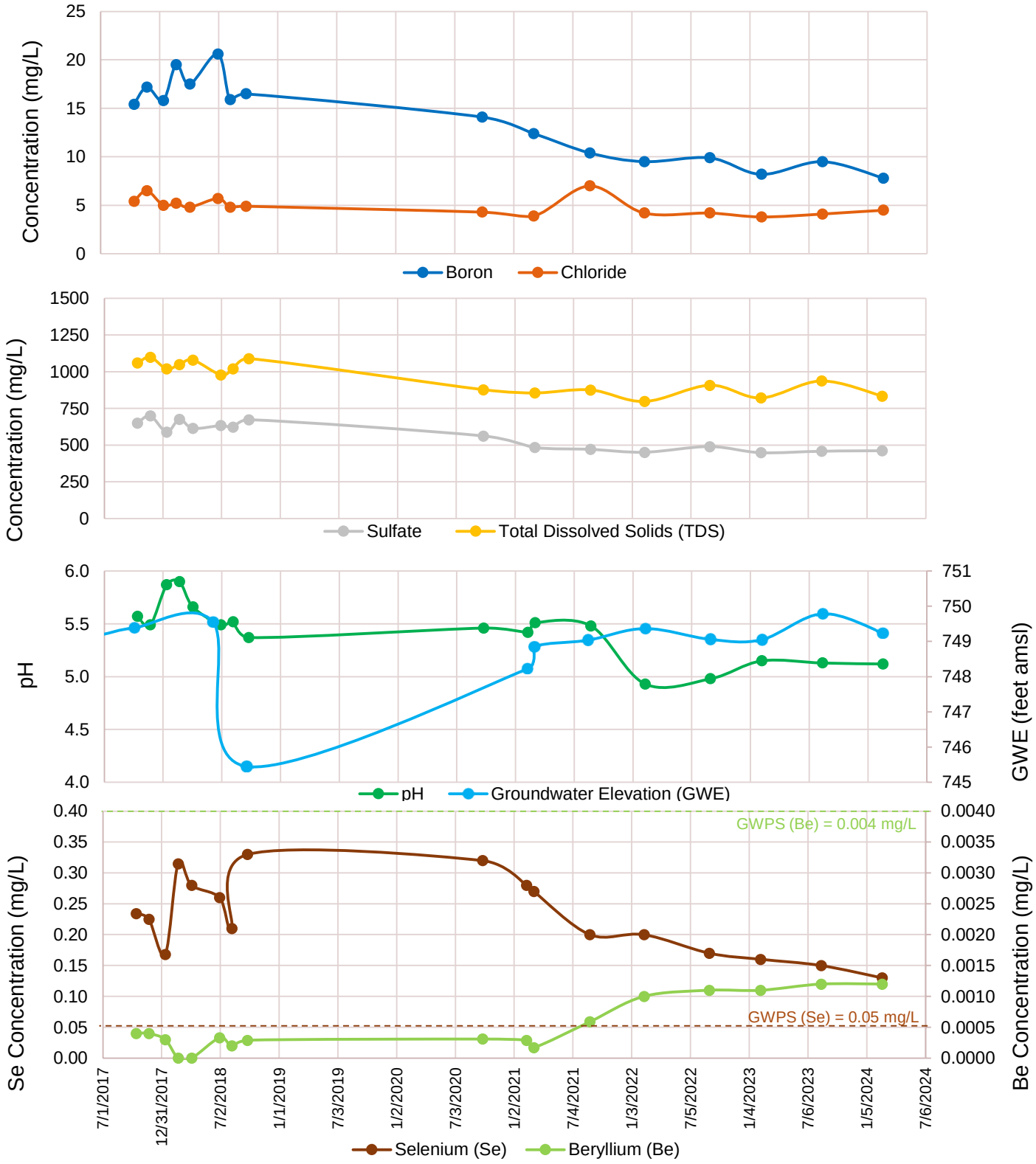
YGWC-38 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-10

June 5, 2024; 01:13:16 PM

PZ-37



Notes:
1. R6 CCR Landfill closure complete in 2016.

amsl = above mean sea level
GWPS = Groundwater Protection Standard
mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

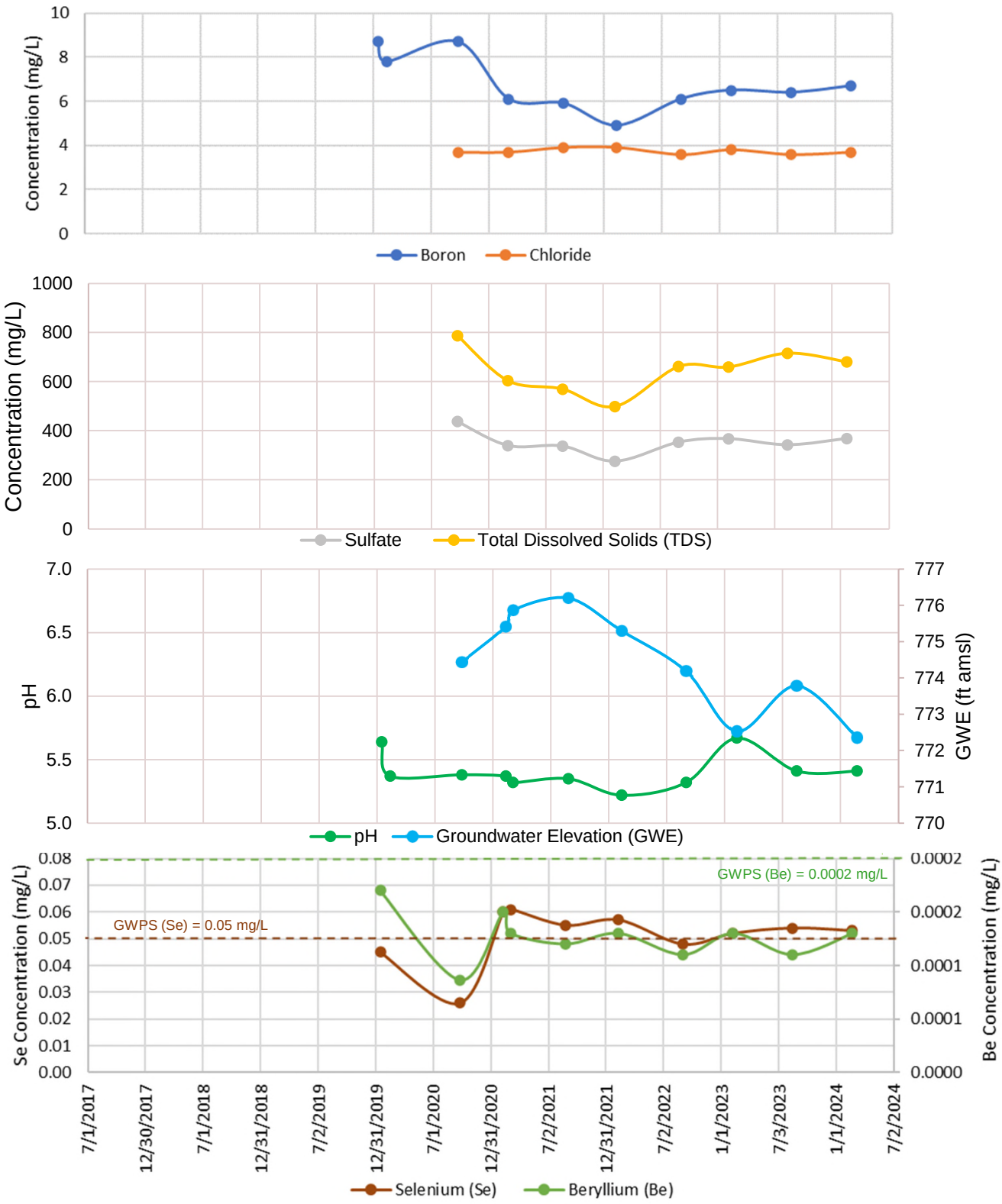
PZ-37 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-11

June 5, 2024; 01:47:19 PM

YAMW-5



Notes:
1. R6 CCR Landfill closure complete in 2016.

amsl = above mean sea level
GWPS = Groundwater Protection Standard
mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

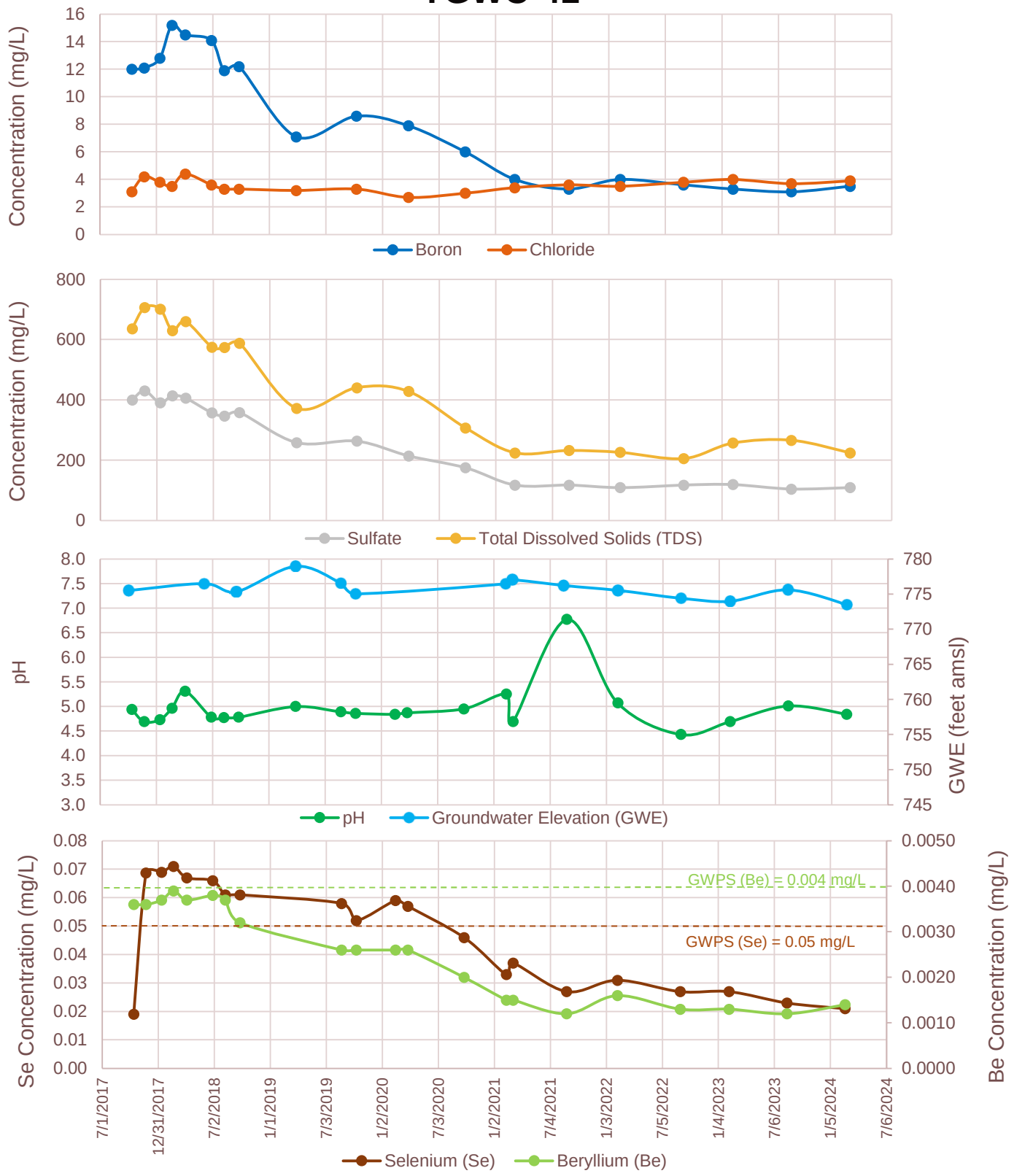
YAMW-5 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-12

June 5, 2024; 01:47:19 PM

YGWC-41



Notes:
1. R6 CCR Landfill closure complete in 2016.

amsl = above mean sea level
GWPS = Groundwater Protection Standard
mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

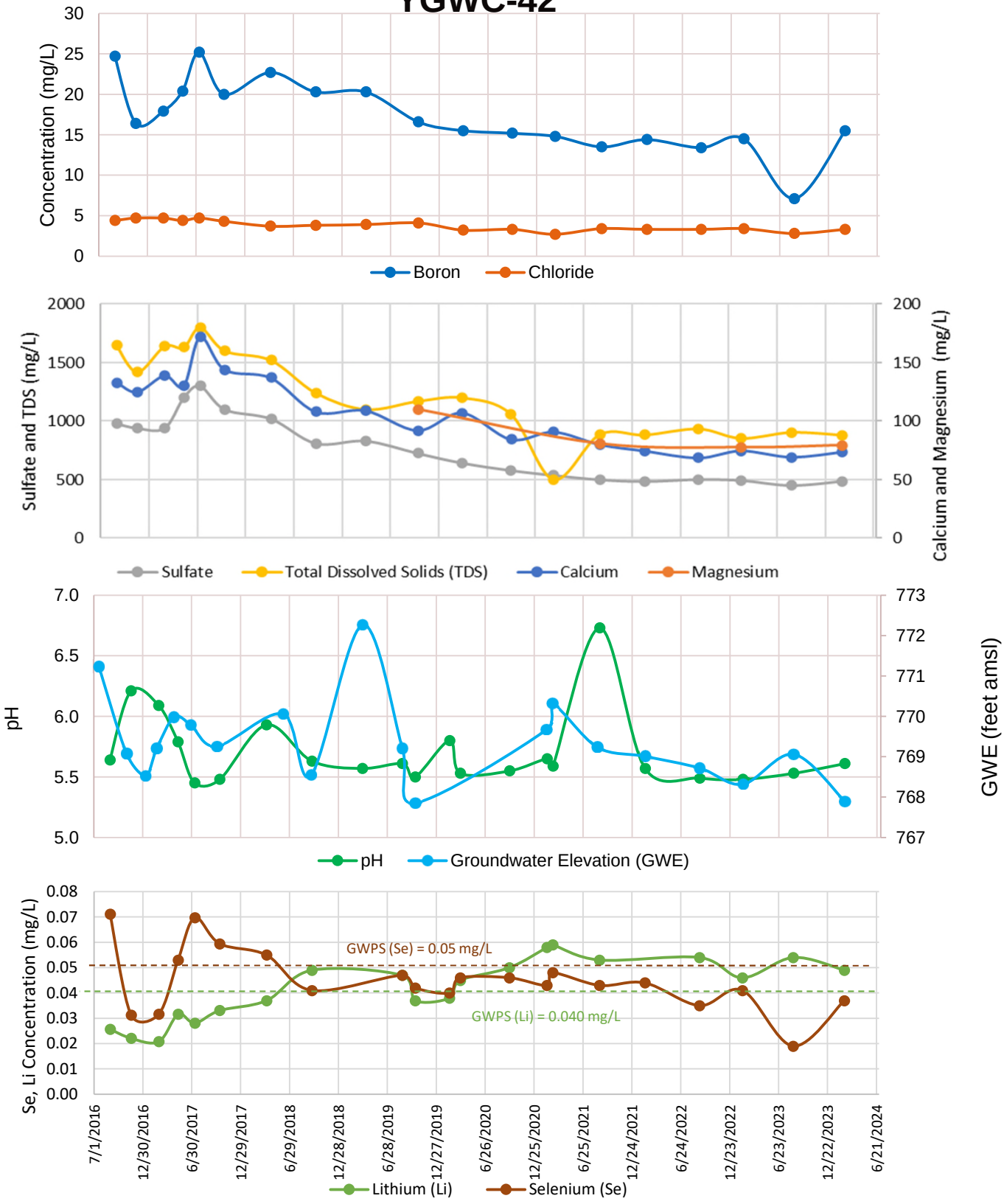
YGWC-41 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-13

June 5, 2024; 03:02:56 PM

YGWC-42



Notes:
1. R6 CCR Landfill closure complete in 2016.

mg/L = milligram per liter
amsl = above mean sea level
GWPS = Groundwater Protection Standard

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PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

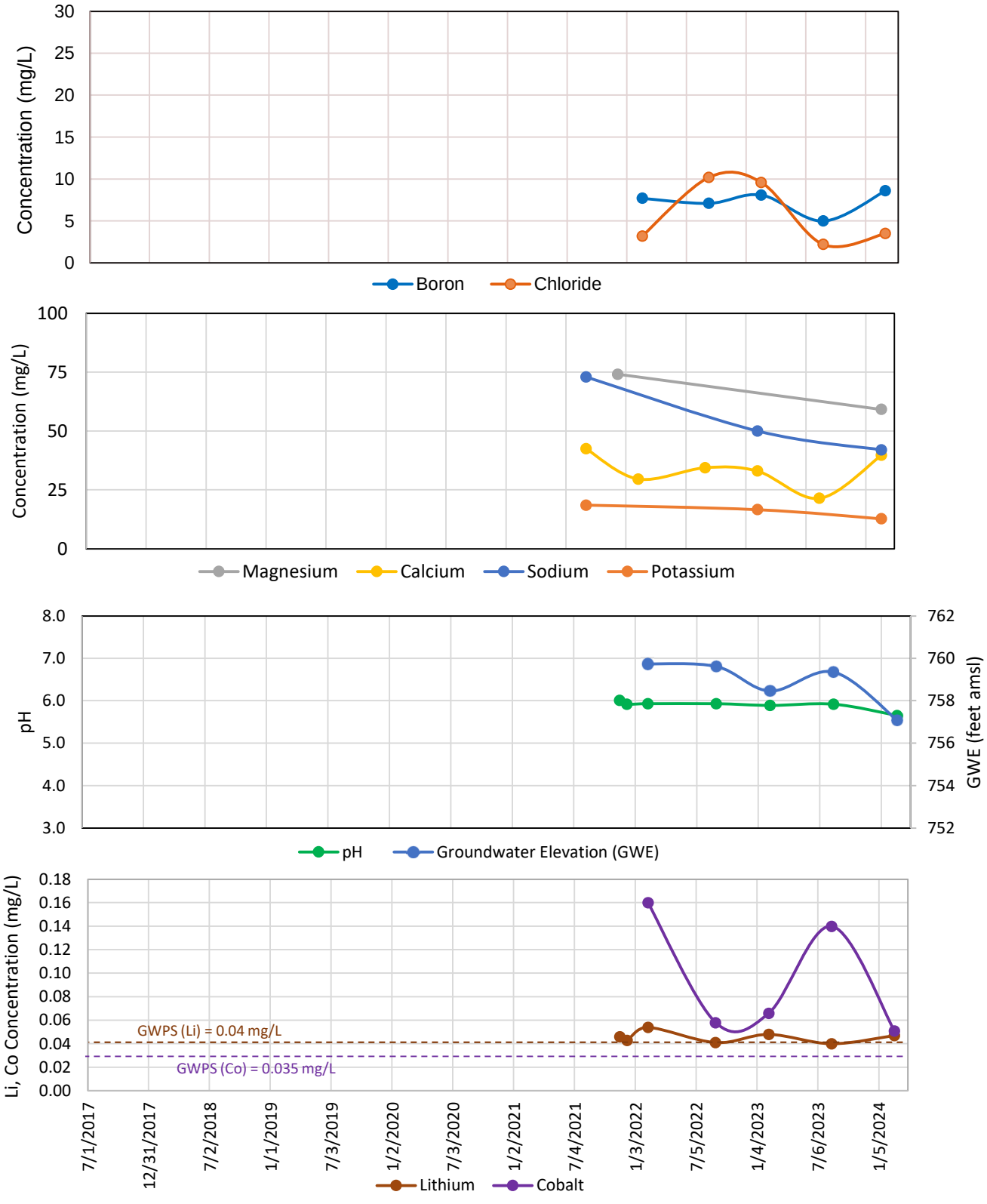
YGWC-42 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-14

June 5, 2024; 03:22:18 PM

YAMW-3



Notes:
1. R6 CCR Landfill closure complete in 2016.

amsl = above mean sea level
GWE = groundwater elevation
GWPS = Groundwater Protection Standard
mg/L = milligram per liter

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PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

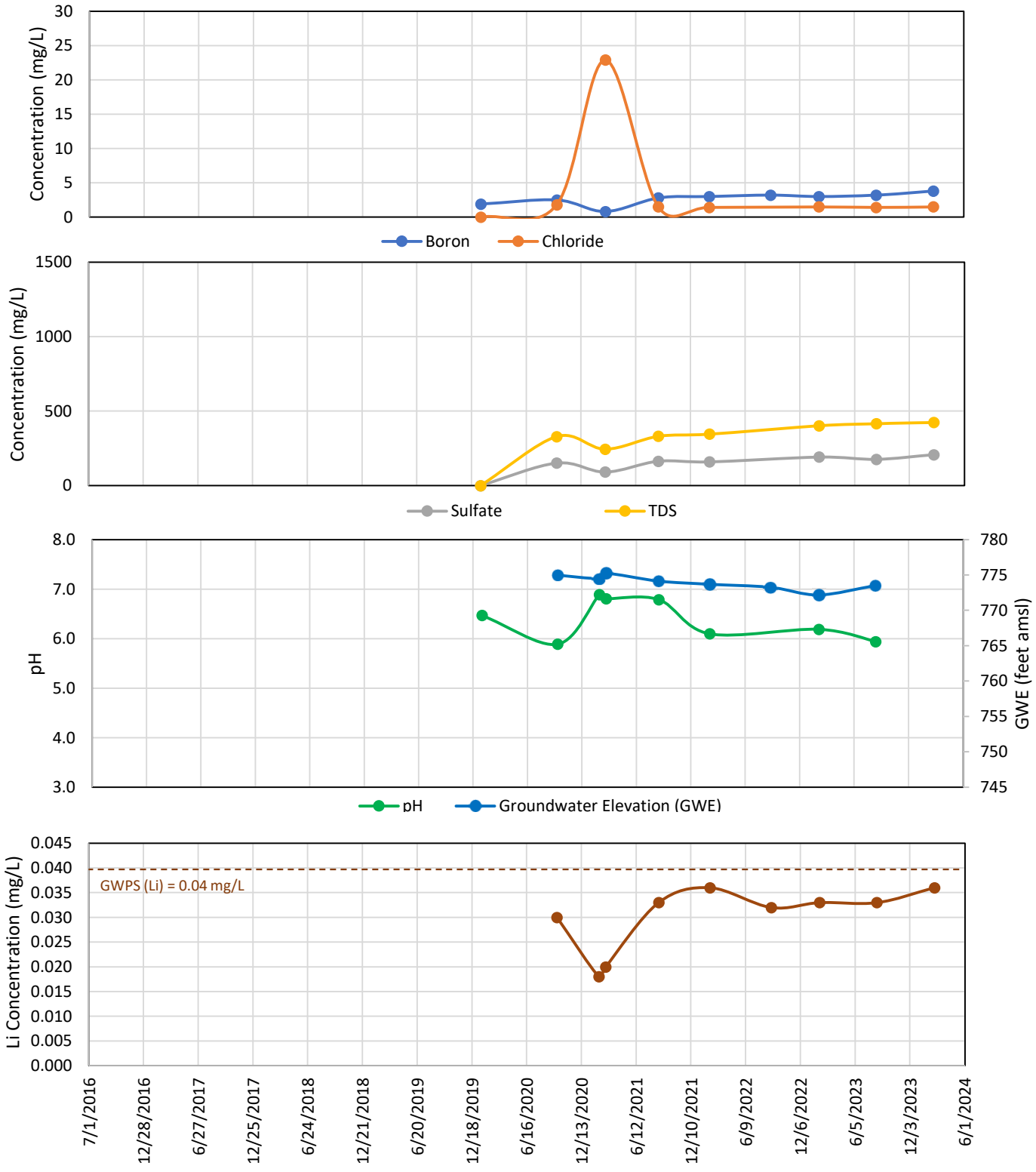
YAMW-3 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-15

June 5, 2024; 03:22:18 PM

YAMW-4



Notes:
1. R6 CCR Landfill closure complete in 2016.

mg/L = milligram per liter
amsl = above mean sea level
GWPS = Groundwater Protection Standard

Georgia Power

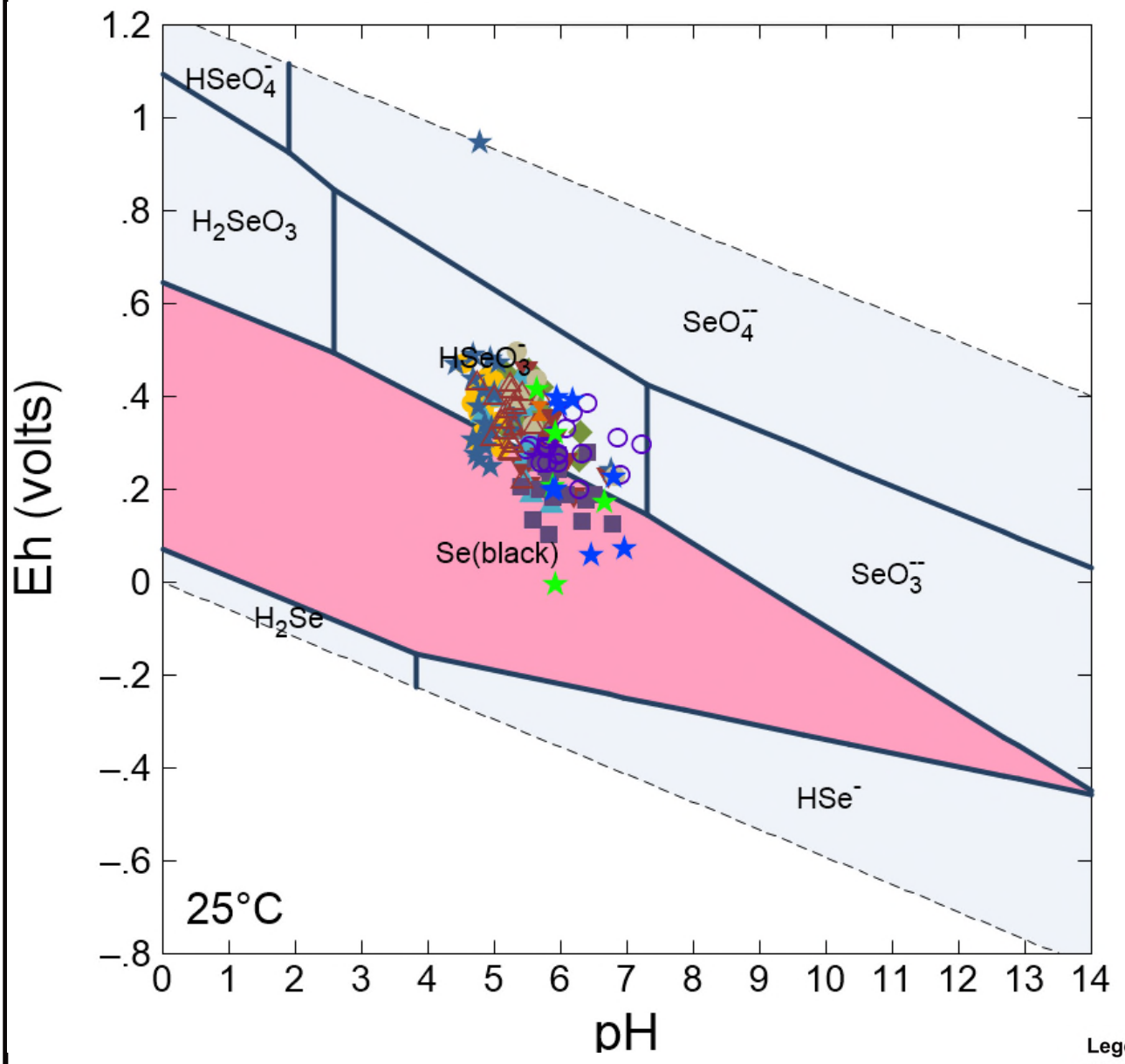
PLANT YATES AP-3, A, B, B' AND R6 LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

YAMW-4 CONCENTRATION TRENDS

ARCADIS

FIGURE
2-16

June 5, 2024; 03:22:18 PM



Legend

- YGWC-23S
- YGWC-36/A
- YGWC-42
- YGWC-38
- PZ-37
- YGWC-41
- YGWC-43
- PZ-35
- YGWA-39
- YGWA-40
- YAMW-3
- YAMW-4
- PZ-55

Notes:

1. This Eh-pH diagram was produced with Geochemist's Workbench. The LLNL thermodynamic database, "thermos.tdat", the program's default database, was used
2. The basis species in the LLNL thermodynamic database for selenium (SeO_3^{2-}) was used to construct the Eh-pH diagram. Representative value of all wells shown on this figure (5.2e-7 mol/L) was used. Units needed to create Eh-pH diagram is activity. It is assumed that concentrations in mol/L is roughly equivalent to activity since ionic strength of groundwater is very low.
3. Major complexing ions (redox sensitive species Ca^{2+}, Cl^-, HCO_3^-, K^+, Mg^{2+}, Na^+, SO_4^{2-}) were speciated by reaction with species on both the x and y axes.
4. Elemental selenium (Se) is shaded in pink. Aqueous species are shaded in blue.
5. Eh-pH diagram produced for selenium at 25 °C

°C = degree Celsius
mol/L = mole per liter

Georgia Power

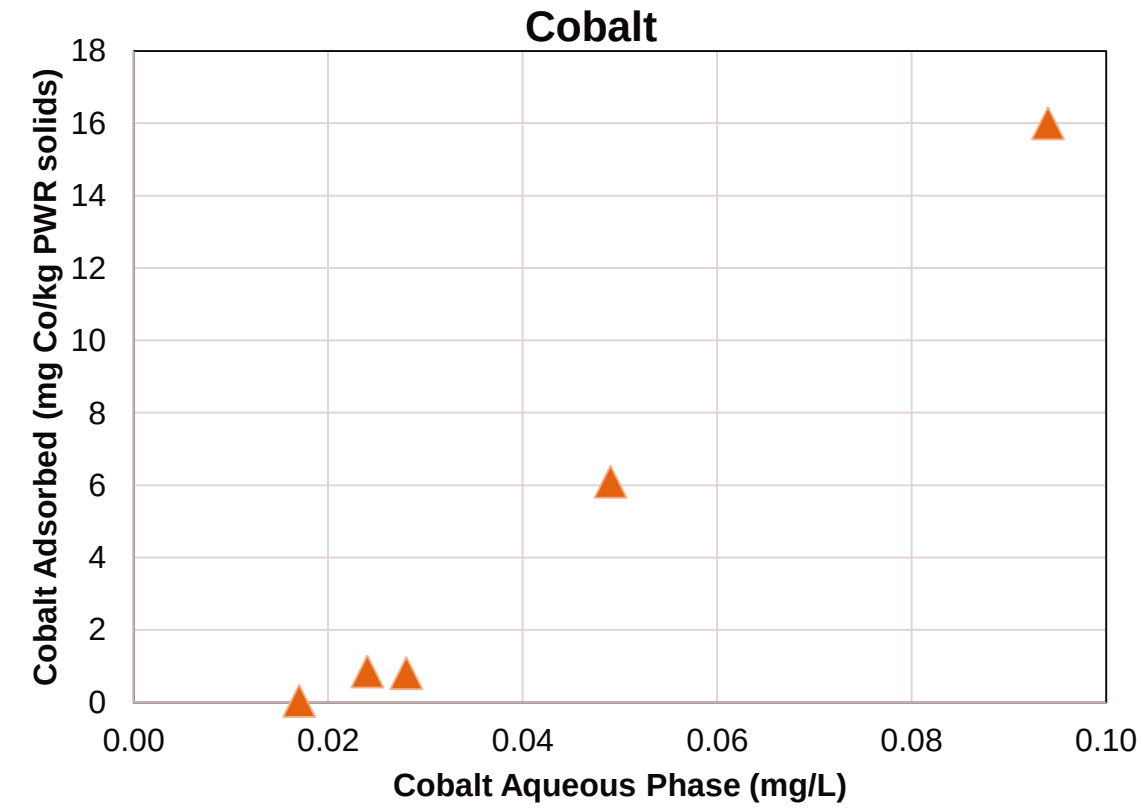
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

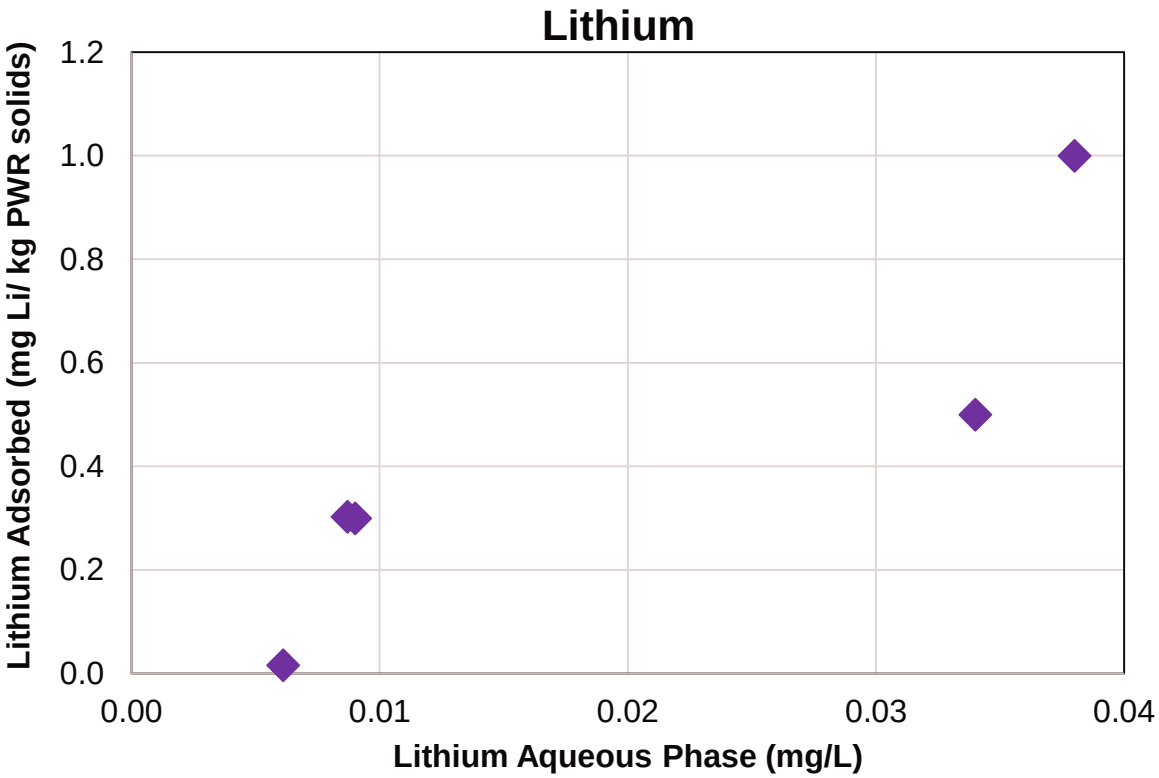
SELENIUM SPECIATION DIAGRAM

ARCADIS

FIGURE
3-1

Geochemical Conceptual Site Model Plant Yates – AP-3, A, B, B' and R6 CCR Landfill





Notes:
Co = cobalt
GWPS = Groundwater Protection Standard
kg – kilograms
Li = lithium
mg = milligram
mg/kg = milligram
mg/L = milligram per liter
PWR = partially weathered rock

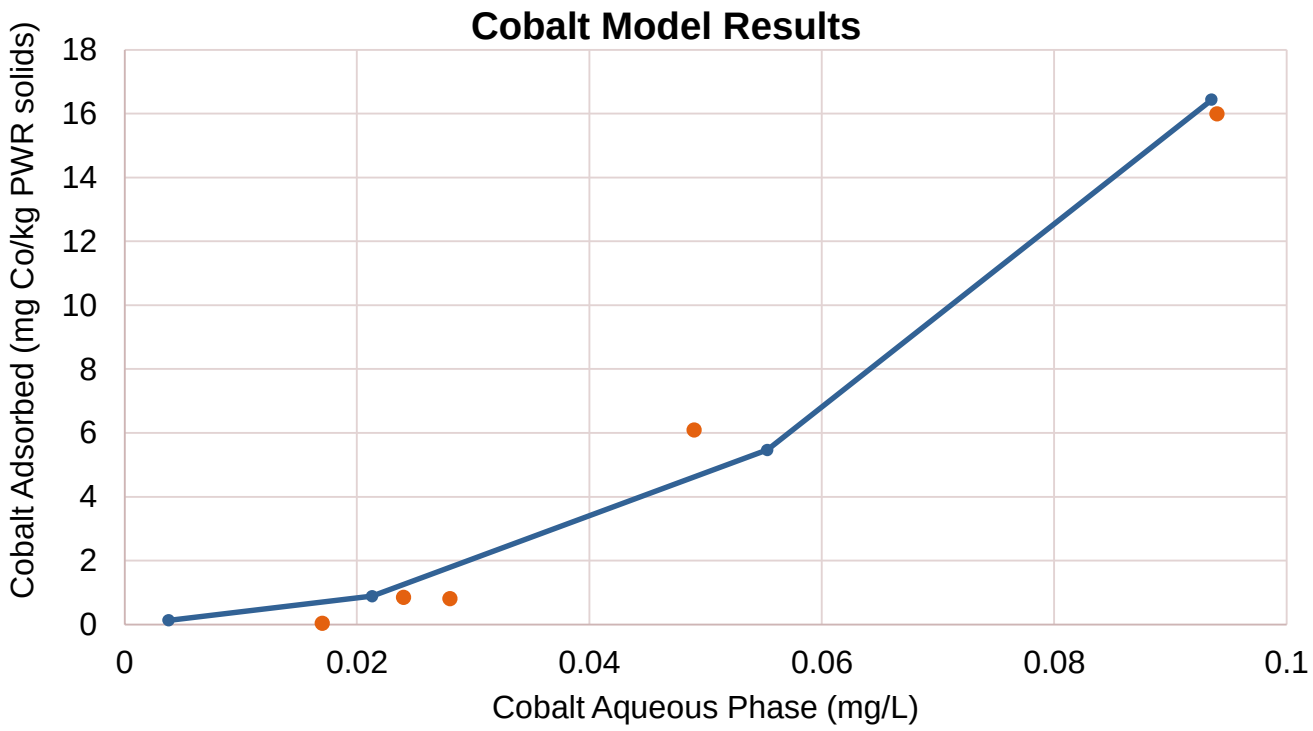
GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA

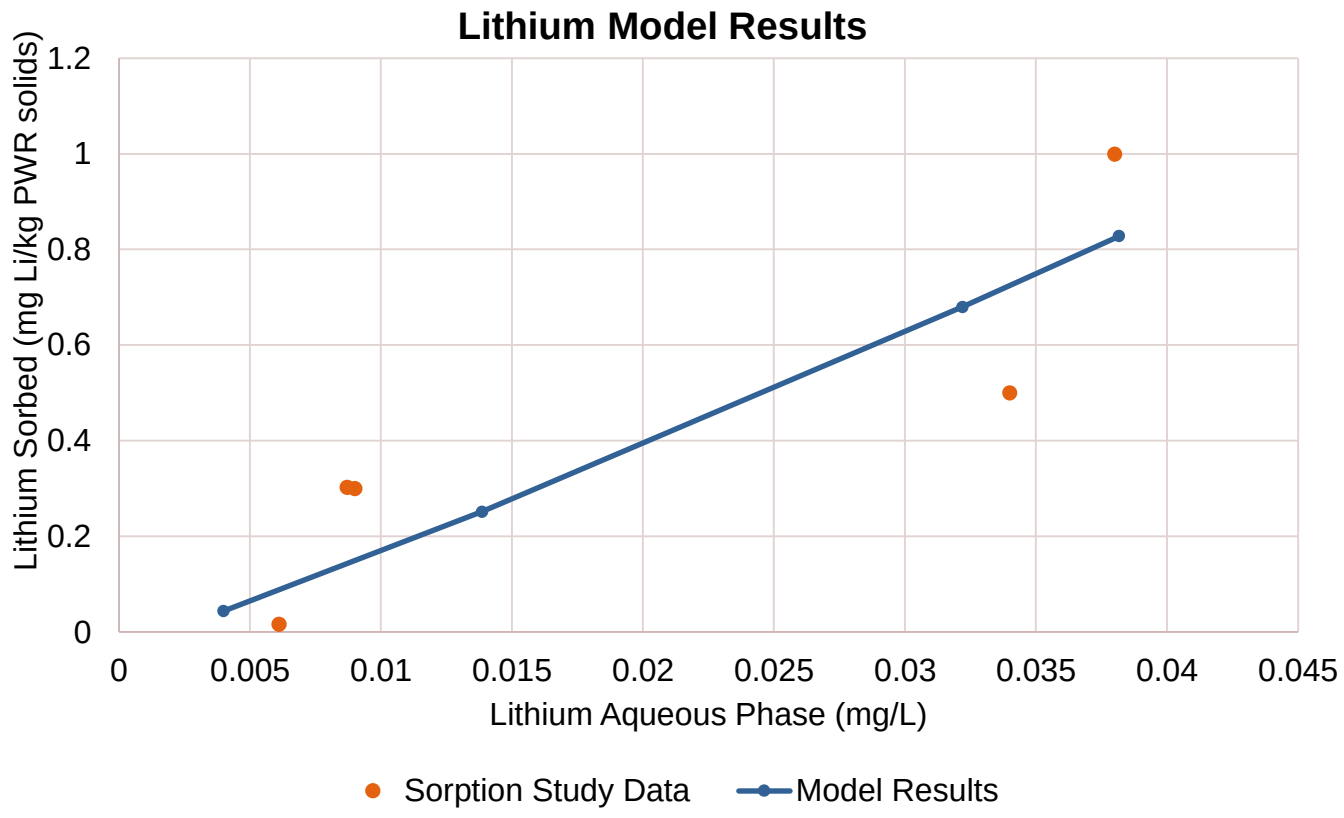
COBALT AND LITHIUM SORPTION TEST RESULTS

ARCADIS

FIGURE
4-1

Bench-Scale Investigation and Analysis Results Plant Yates – AP-3, A, B, B' and R6 CCR Landfill





Notes:
Co = cobalt
GWPS = Groundwater Protection Standard
kg – kilograms
Li = lithium
mg = milligram
mg/kg = milligram
mg/L = milligram per liter
PWR = partially weathered rock

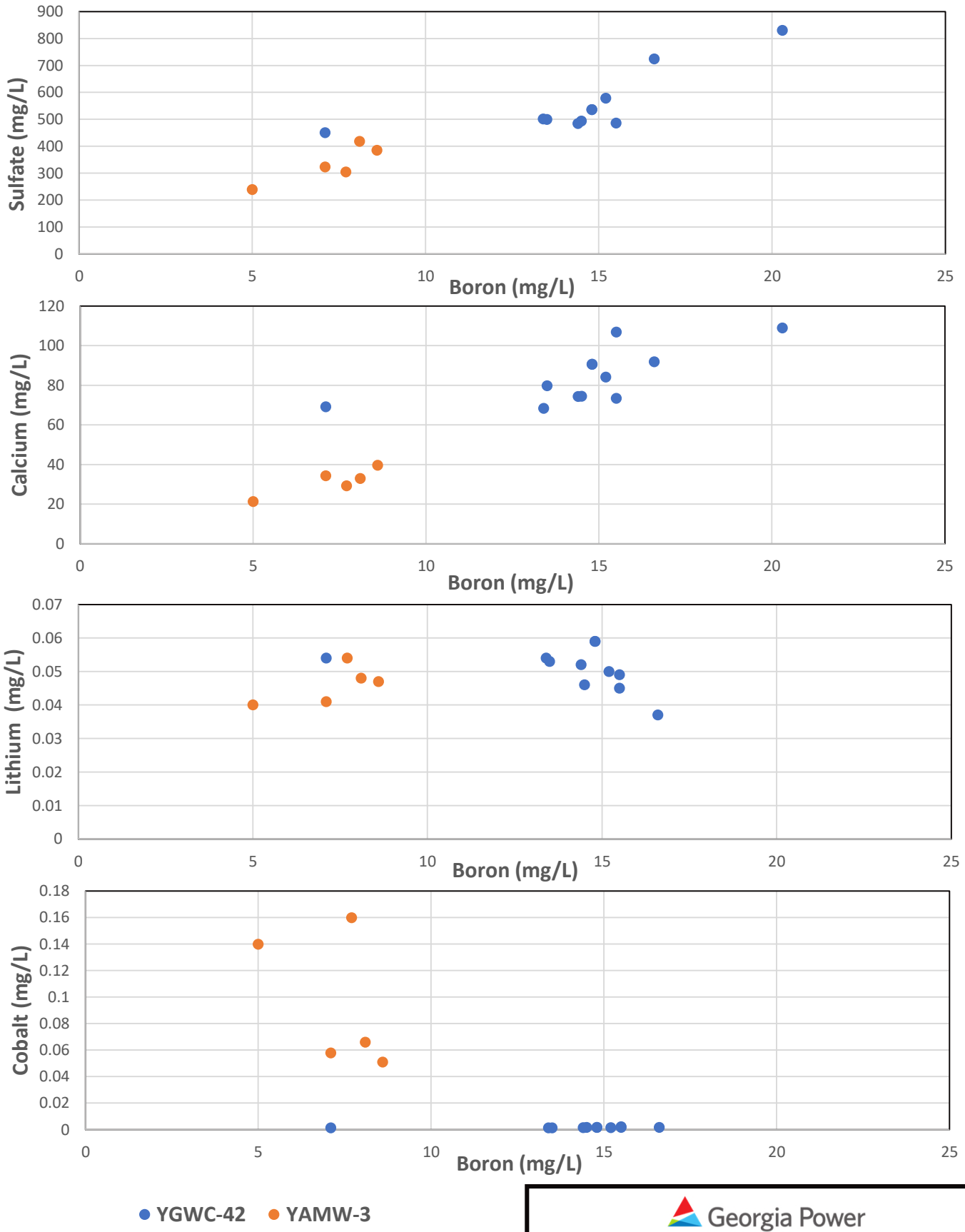
GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA

COBALT AND LITHIUM MODELING RESULTS

ARCADIS

FIGURE
4-2

Bench-Scale Investigation and Analysis Results Plant Yates – AP-3, A, B, B' and R6 CCR Landfill



Notes:
1. Data posted are through February 2024.

mg/L = milligram per liter

Georgia Power

PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA
GEOCHEMICAL CONCEPTUAL SITE MODEL REPORT

YGWC-42 AND YAMW-3 CONSTITUENT CORRELATIONS

ARCADIS

FIGURE
4-3

Geochemical Conceptual Site Model Plant Yates – AP-3, A, B, B' and R6 CCR Landfill

Attachment 1

Analytical Laboratory Reports

Semi-Quantitative X-Ray Diffraction

Report Prepared for:	*Arcadis US Inc*
Project Number/ LIMS No.	*18122-01/MI4505-OCT20*
Sample Receipt:	*October 14, 2020*
Sample Analysis:	*October 15, 2020*
Reporting Date:	*November 12, 2020*

Instrument:	BRUKER AXS D8 Advance Diffractometer
Test Conditions:	Co radiation, 35 kV, 40 mA Regular Scanning: Step: 0.02°, Step time:0.2s, 2θ range: 3-70°
Interpretations :	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva software.
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

1) Method Summary
2) Summary of Mineral Asemblages
3) Semi-Quantitative XRD Results
4) Chemical Balance(s)
5) XRD Pattern(s)

Kim Gibbs, H.B.Sc., P.Geo.
Senior Mineralogist

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

ACCREDITATION: SGS Minerals Services Lakefield is accredited to the requirements of ISO/IEC 17025 for specific tests as listed on our scope of accreditation, including geochemical, mineralogical and trade mineral tests. To view a list of the accredited methods, please visit the following website and search SGS Canada - Minerals Services - Lakefield: http://palcan.scc.ca/SpecsSearch/GLSearchForm.do.

Method Summary

The Semi-Quantitative Mineral Identification by XRD (ME-LR-MIN-MET-MN-D03) method used by SGS Minerals Services is accredited to the requirements of ISO/IEC 17025.

Mineral Identification and Interpretation:

Mineral identification and interpretation involve matching the diffraction pattern of a test sample material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) and released on software as a database of Powder Diffraction Files (PDF).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds. Mineral proportions are based on relative peak heights and may be strongly influenced by crystallinity, structural group or preferred orientations. Interpretations and relative proportions should be accompanied by supporting petrographic and geochemical data (Whole Rock Analysis, Inductively Coupled Plasma - Optical Emission Spectroscopy, etc.).

Semi-Quantitative Analysis:

The Semi-Quantitative analysis (RIR method) is performed based on each mineral's relative peak heights and of their respective I/Icor values, which are available from the PDF database. Mineral abundances for the bulk sample (in weight %) are generated by Bruker-EVA Software. These data are reconciled with a bulk chemistry (e.g. whole rock analysis including SiO_2, Al_2O_3, Na_2O, K_2O, CaO, MgO, Fe_2O_3, Cr_2O_3, MnO, TiO_2, P_2O_5, V_2O_5 or other chemical data). A chemical balance table shows the difference between the assay results and elemental concentrations determined by XRD.

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

Semi-Quantitative X-ray Diffraction Results

Mineral	YGWC-24SA (10-44) (wt %)	YGWC-24SA (47-49) (wt %)	YGWC-24SA (52-54) (wt %)	YAMW-3 (83-84) (wt %)	YAMW-4 (88-89) (wt %)	YGWC-38 (26-27) (wt %)	YGWC-38 (39-40) (wt %)	YGWC-38 (59.5-60.5) (wt %)	YGWC-41 (32-33) (wt %)	YGWC-41 (48-49) (wt %)	YGWC-41 (59-60) (wt %)
Quartz	46.7	41.7	49.2	53.0	36.9	51.6	43.6	49.9	49.5	46.1	51.7
Albite	26.8	29.5	34.8	29.6	49.1	30.3	39.4	31.7	31.5	39.6	29.9
Albite, calcian	6.4	7.0	2.4	4.9	7.1	6.3	5.3	6.3	6.9	2.5	8.7
Muscovite	11.9	11.9	7.2	7.5	1.8	5.4	6.4	6.8	6.7	4.7	5.5
Biotite	2.2	0.8	1.0	5.0	2.8	1.2	4.4	5.0	-	5.6	4.3
Hydrobiotite	1.1	4.7	1.7	-	-	0.9	-	-	4.0	-	-
Clinochlore	1.0	1.3	1.5	-	2.4	1.1	0.9	0.3	1.4	1.4	-
Kaolinite	2.3	1.4	1.6	-	-	2.2	-	-	-	-	-
Antigorite	1.5	1.7	0.6	-	-	1.0	-	-	-	-	-
TOTAL	100	100	100	100	100	100	100	100	100	100	100

Mineral	Composition
Quartz	SiO_2
Albite	$NaAlSi_3O_8$
Albite, calcian	$(Na,Ca)Al(Si,Al)_3O_8$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Biotite	$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$
Hydrobiotite	$K(Mg,Fe)_6(Si,Al,Fe)_8O_{20}(OH)_4 \cdot 4H_2O$
Clinochlore	$(Fe,Mg)_5Al(Si_3Al)O_{10}(OH)_8$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Antigorite	$Mg_3Si_2O_5(OH)_4$

Chemical Balance

YGWC-24SA (10-44)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	36.6	35.4	1.25	Both
Aluminum	7.41	7.63	-0.22	Both
Iron	1.50	1.09	0.41	Both
Potassium	1.22	1.18	0.04	Both
Magnesium	0.62	0.67	-0.05	Both
Calcium	0.45	0.48	-0.03	Both
Titanium	0.08	-	0.08	XRF
Manganese	0.05	-	0.05	XRF
Barium	0.04	-	0.04	XRF
Hydrogen	-	0.16	-0.16	SQD
Oxygen	-	50.7	-50.7	SQD
Sodium	-	2.75	-2.75	SQD

YGWC-24SA (47-49)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	34.5	33.9	0.65	Both
Aluminum	7.82	8.09	-0.27	Both
Iron	1.98	1.90	0.08	Both
Potassium	1.54	1.21	0.33	Both
Magnesium	1.06	0.91	0.15	Both
Calcium	0.45	0.52	-0.07	Both
Titanium	0.10	-	0.10	XRF
Manganese	0.09	-	0.09	XRF
Barium	0.04	-	0.04	XRF
Hydrogen	-	0.18	-0.18	SQD
Oxygen	-	50.3	50.3	SQD
Sodium	-	3.01	3.01	SQD

1. Values measured by chemical assay. Reported in weight percent.

2. Values calculated based on mineral/compound formulas and quantites identified by semi-quantitative XRD.

Chemical Balance

YGWC-24SA (52-54)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	36.6	37.0	-0.41	Both
Aluminum	6.57	6.41	0.16	Both
Iron	1.12	1.03	0.09	Both
Potassium	0.77	0.73	0.04	Both
Magnesium	0.51	0.44	0.07	Both
Calcium	0.33	0.18	0.15	Both
Titanium	0.05	-	0.05	XRF
Manganese	0.04	-	0.04	XRF
Barium	0.02	-	0.02	XRF
Hydrogen	-	0.11	-0.11	SQD
Oxygen	-	50.9	50.9	SQD
Sodium	-	3.23	3.23	SQD

YAMW-3 (83-84)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	36.7	37.6	-0.85	Both
Aluminum	5.98	6.08	-0.10	Both
Iron	0.90	0.93	-0.03	Both
Potassium	0.87	1.03	-0.16	Both
Magnesium	0.53	0.39	0.14	Both
Calcium	0.36	0.37	-0.01	Both
Titanium	0.05	-	0.05	XRF
Manganese	0.02	-	0.02	XRF
Chromium	0.02	-	0.02	XRF
Hydrogen	-	0.06	-0.06	SQD
Oxygen	-	50.7	50.7	SQD
Sodium	-	2.88	2.88	SQD

1. Values measured by chemical assay. Reported in weight percent.

2. Values calculated based on mineral/compound formulas and quantites identified by semi-quantitative XRD.

Chemical Balance

YAMW-4 (88-89)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	36.6	35.2	1.40	Both
Aluminum	7.01	7.76	-0.75	Both
Iron	0.66	1.09	-0.43	Both
Magnesium	0.49	0.33	0.16	Both
Calcium	0.47	0.53	-0.06	Both
Potassium	0.37	0.37	0.00	Both
Titanium	0.05	-	0.05	XRF
Manganese	0.05	-	0.05	XRF
Hydrogen	-	0.05	-0.05	SQD
Oxygen	-	50.1	-50.1	SQD
Sodium	-	4.62	-4.62	SQD

YGWC-38 (26-27)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	37.8	37.1	0.69	Both
Aluminum	6.33	6.47	-0.14	Both
Iron	1.06	0.62	0.44	Both
Potassium	0.64	0.57	0.07	Both
Magnesium	0.43	0.61	-0.18	Both
Calcium	0.34	0.47	-0.13	Both
Titanium	0.05	-	0.05	XRF
Barium	0.02	-	0.02	XRF
Manganese	0.02	-	0.02	XRF
Hydrogen	-	0.11	-0.11	SQD
Oxygen	-	51.1	51.1	SQD
Sodium	-	2.98	2.98	SQD

1. Values measured by chemical assay. Reported in weight percent.

2. Values calculated based on mineral/compound formulas and quantites identified by semi-quantitative XRD.

Chemical Balance

YGWC-38 (39-40)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	37.0	36.1	0.86	Both
Aluminum	6.66	7.00	-0.34	Both
Potassium	0.98	0.88	0.11	Both
Iron	0.93	1.08	-0.15	Both
Magnesium	0.43	0.41	0.02	Both
Calcium	0.41	0.40	0.01	Both
Titanium	0.04	-	0.04	XRF
Barium	0.02	-	0.02	XRF
Manganese	0.02	-	0.02	XRF
Hydrogen	-	0.06	-0.06	SQD
Oxygen	-	50.3	50.3	SQD
Sodium	-	3.75	3.75	SQD

YGWC-38 (59.5-60.5)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	37.2	36.9	0.34	Both
Aluminum	6.67	6.53	0.14	Both
Iron	1.01	1.24	-0.23	Both
Potassium	0.75	0.96	-0.21	Both
Calcium	0.63	0.47	0.16	Both
Magnesium	0.27	0.29	-0.02	Both
Titanium	0.06	-	0.06	XRF
Manganese	0.03	-	0.03	XRF
Barium	0.03	-	0.03	XRF
Hydrogen	-	0.06	-0.06	SQD
Oxygen	-	50.5	50.5	SQD
Sodium	-	3.12	3.12	SQD

1. Values measured by chemical assay. Reported in weight percent.

2. Values calculated based on mineral/compound formulas and quantites identified by semi-quantitative XRD.

Chemical Balance

YGWC-41 (32-33)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	36.3	36.6	-0.32	Both
Aluminum	6.18	6.37	-0.19	Both
Iron	1.52	1.30	0.22	Both
Potassium	0.82	0.70	0.13	Both
Calcium	0.67	0.51	0.16	Both
Magnesium	0.58	0.58	0.00	Both
Titanium	0.08	-	0.08	XRF
Manganese	0.05	-	0.05	XRF
Barium	0.02	-	0.02	XRF
Hydrogen	-	0.10	-0.10	SQD
Oxygen	-	50.7	50.7	SQD
Sodium	-	3.13	3.13	SQD

YGWC-41 (48-49)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	35.2	36.8	-1.63	Both
Aluminum	6.01	6.23	-0.22	Both
Iron	0.93	1.29	-0.36	Both
Potassium	0.79	0.86	-0.07	Both
Magnesium	0.66	0.55	0.11	Both
Calcium	0.11	0.19	-0.08	Both
Titanium	0.05	-	0.05	XRF
Barium	0.02	-	0.02	XRF
Manganese	0.02	-	0.02	XRF
Hydrogen	-	0.07	-0.07	SQD
Oxygen	-	50.4	50.4	SQD
Sodium	-	3.63	3.63	SQD

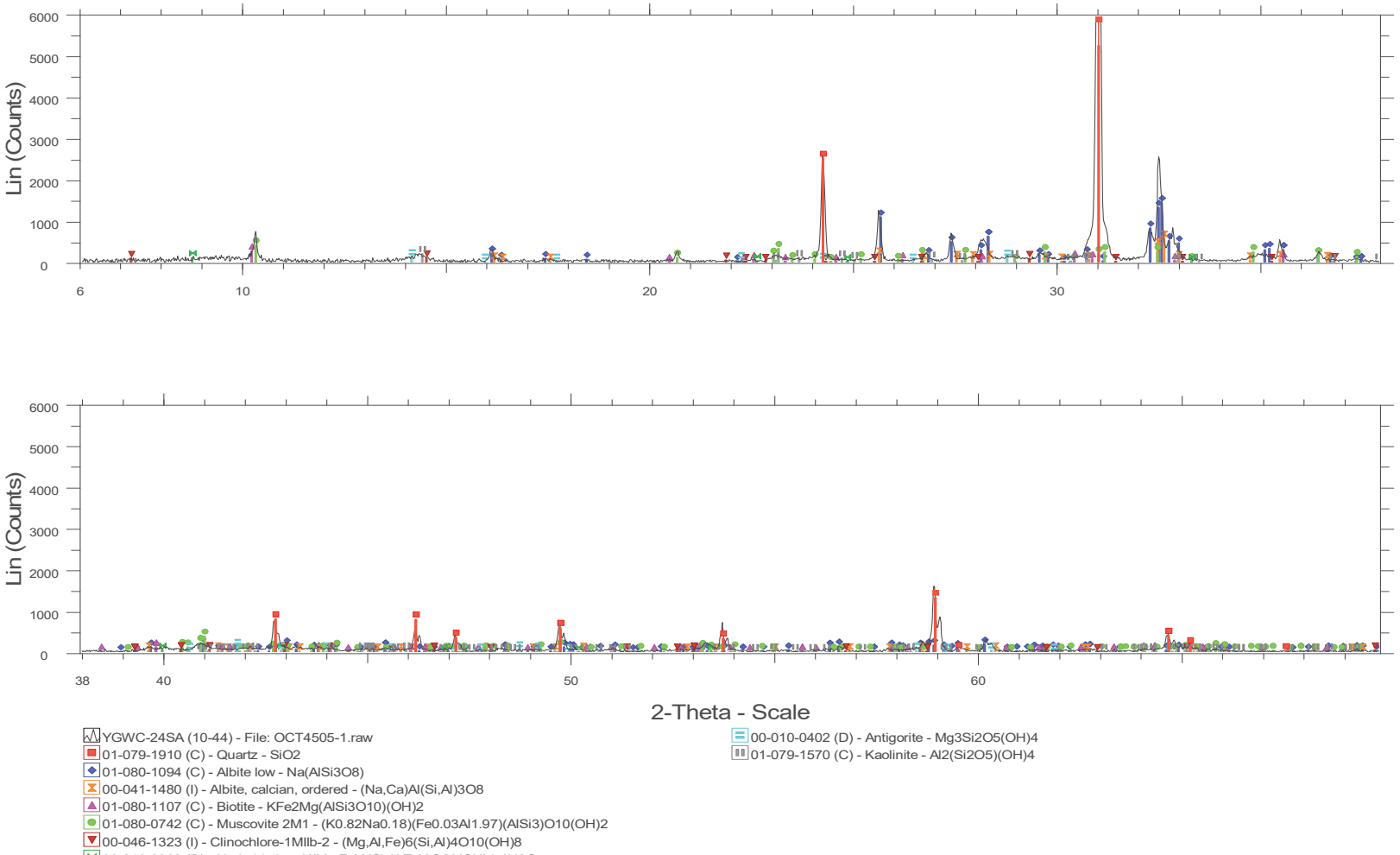
YGWC-41 (59-60)

Name	Assay[1]	SQD[2]	Delta	Status
Silicon	37.1	37.0	0.07	Both
Aluminum	6.55	6.60	-0.05	Both
Iron	0.93	1.01	-0.08	Both
Potassium	0.65	0.79	-0.14	Both
Calcium	0.63	0.65	-0.02	Both
Magnesium	0.34	0.22	0.13	Both
Titanium	0.06	-	0.06	XRF
Barium	0.02	-	0.02	XRF
Manganese	0.02	-	0.02	XRF
Hydrogen	-	0.05	-0.05	SQD
Oxygen	-	50.6	50.6	SQD
Sodium	-	3.05	3.05	SQD

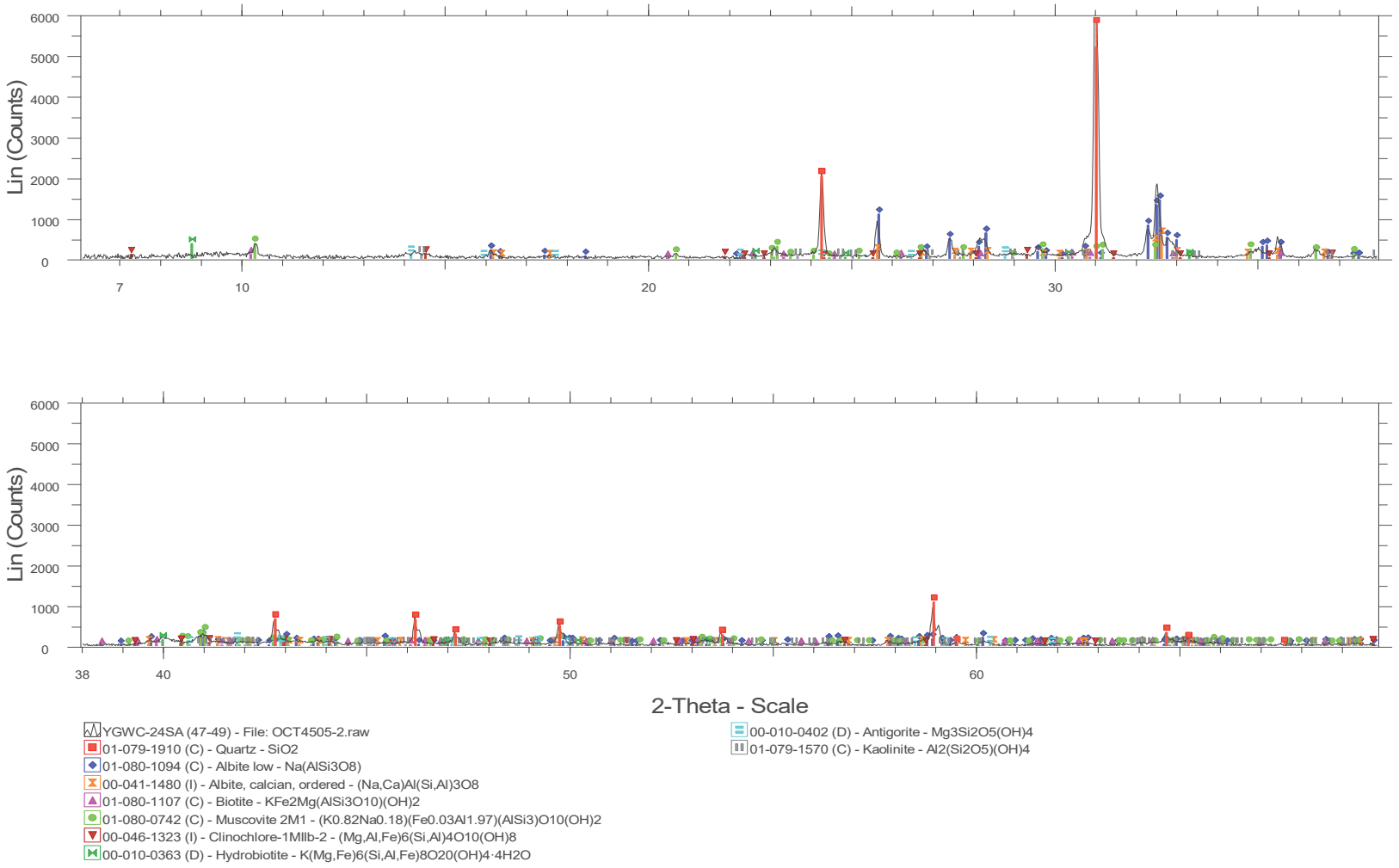
1. Values measured by chemical assay. Reported in weight percent.

2. Values calculated based on mineral/compound formulas and quantites identified by semi-quantitative XRD.

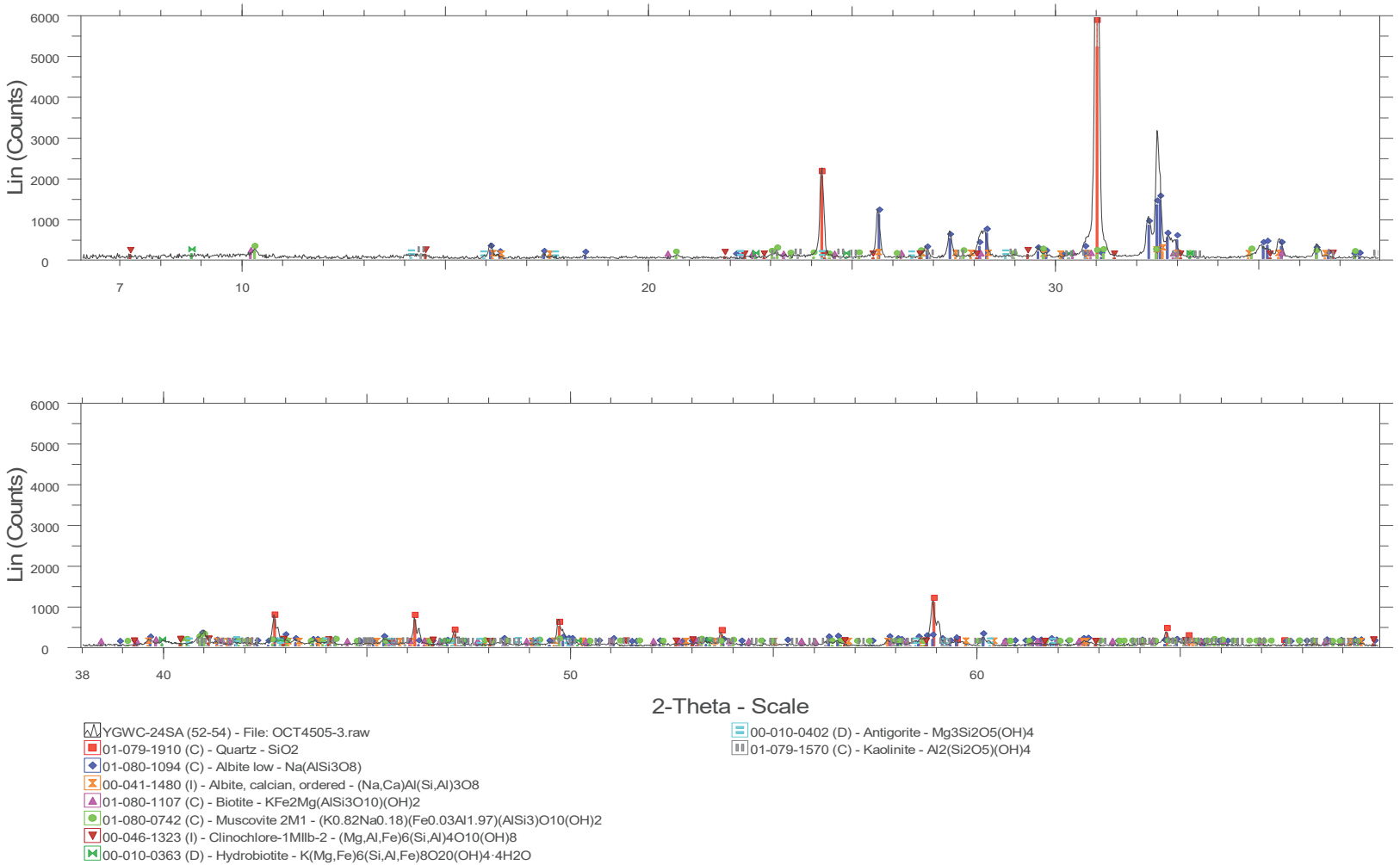
YGWC-24SA (10-44)



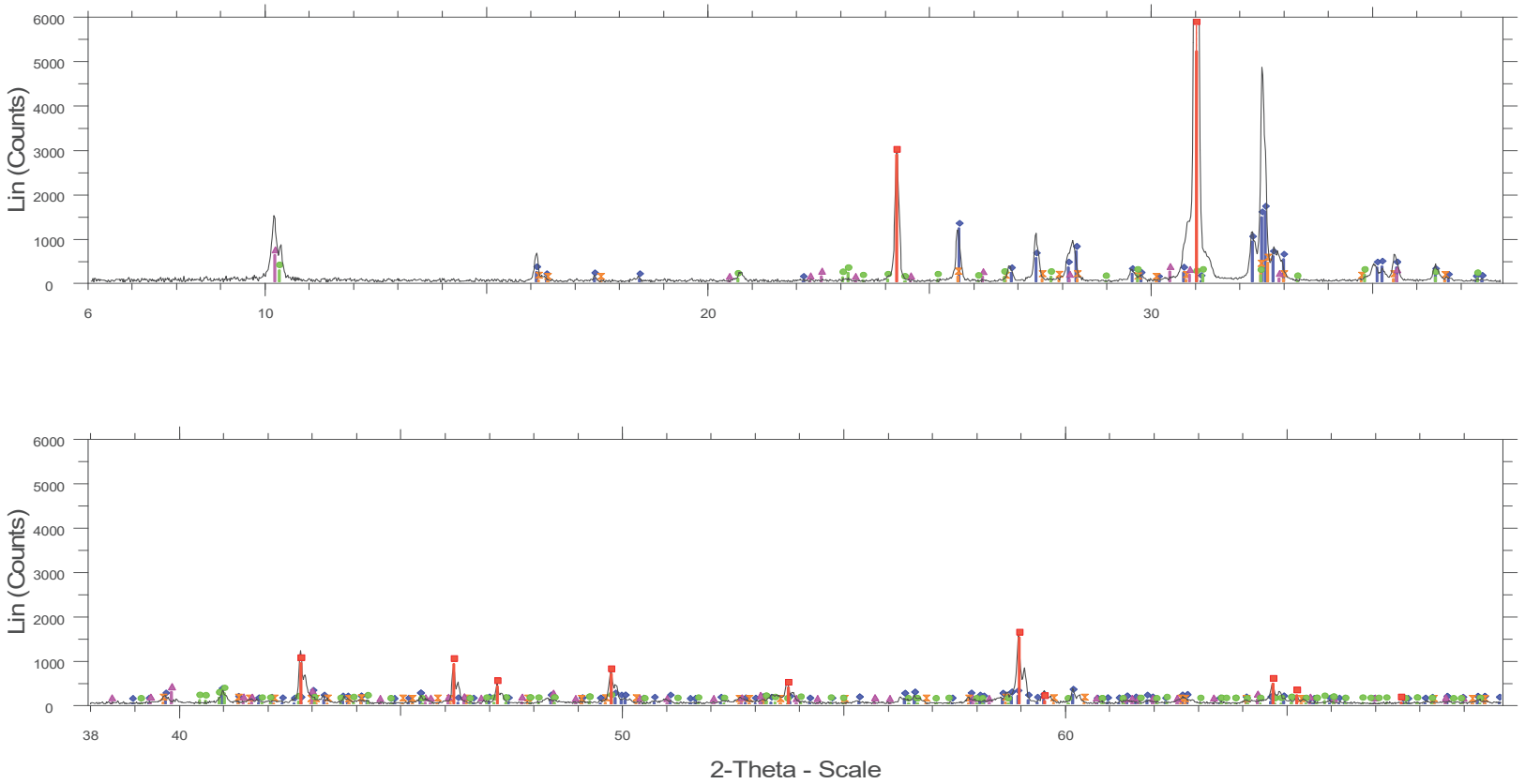
YGWC-24SA (47-49)



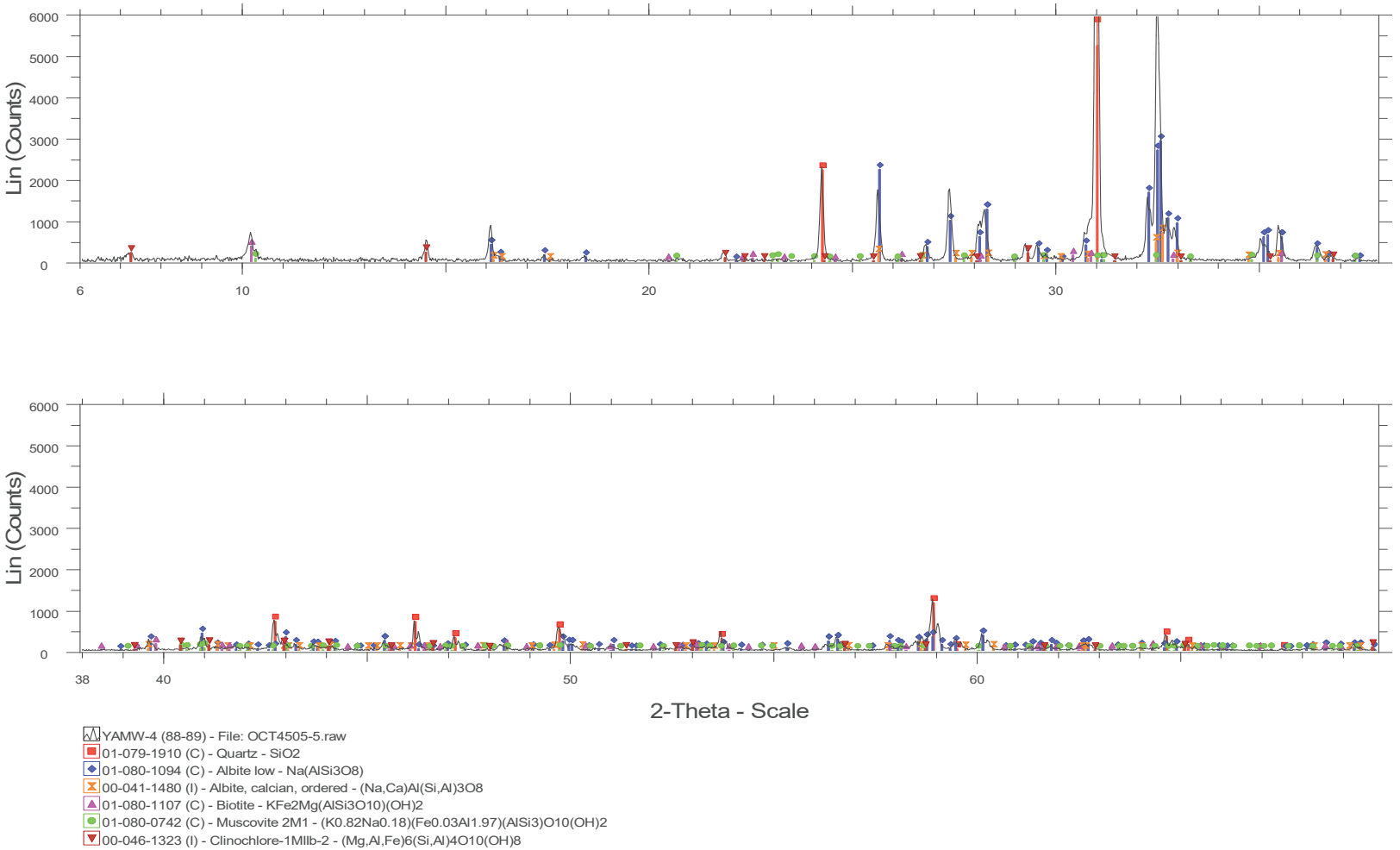
YGWC-24SA (52-54)



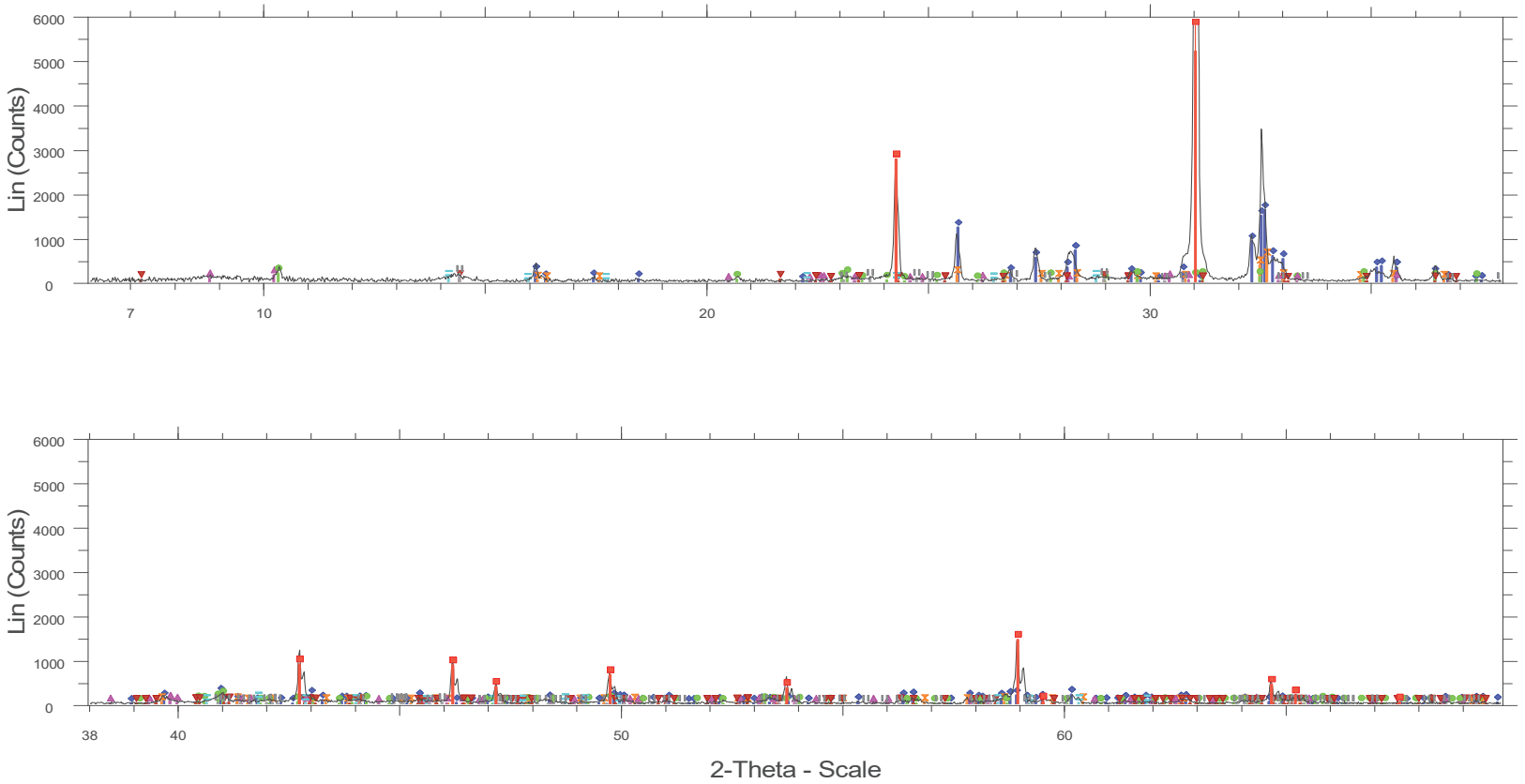
YAMW-3 (83-84)


Lin (Counts)
6000
5000
4000
3000
2000
1000
0
6
10
20
30
38
40
50
60
2-Theta - Scale
YAMW-3 (83-84) - File: OCT4505-4.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-041-1480 (I) - Albite, calcian, ordered - (Na,Ca)Al(Si,Al)3O8
01-080-1107 (C) - Biotite - K(Fe,Mg)3(AlSi3O10)(OH)2
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2

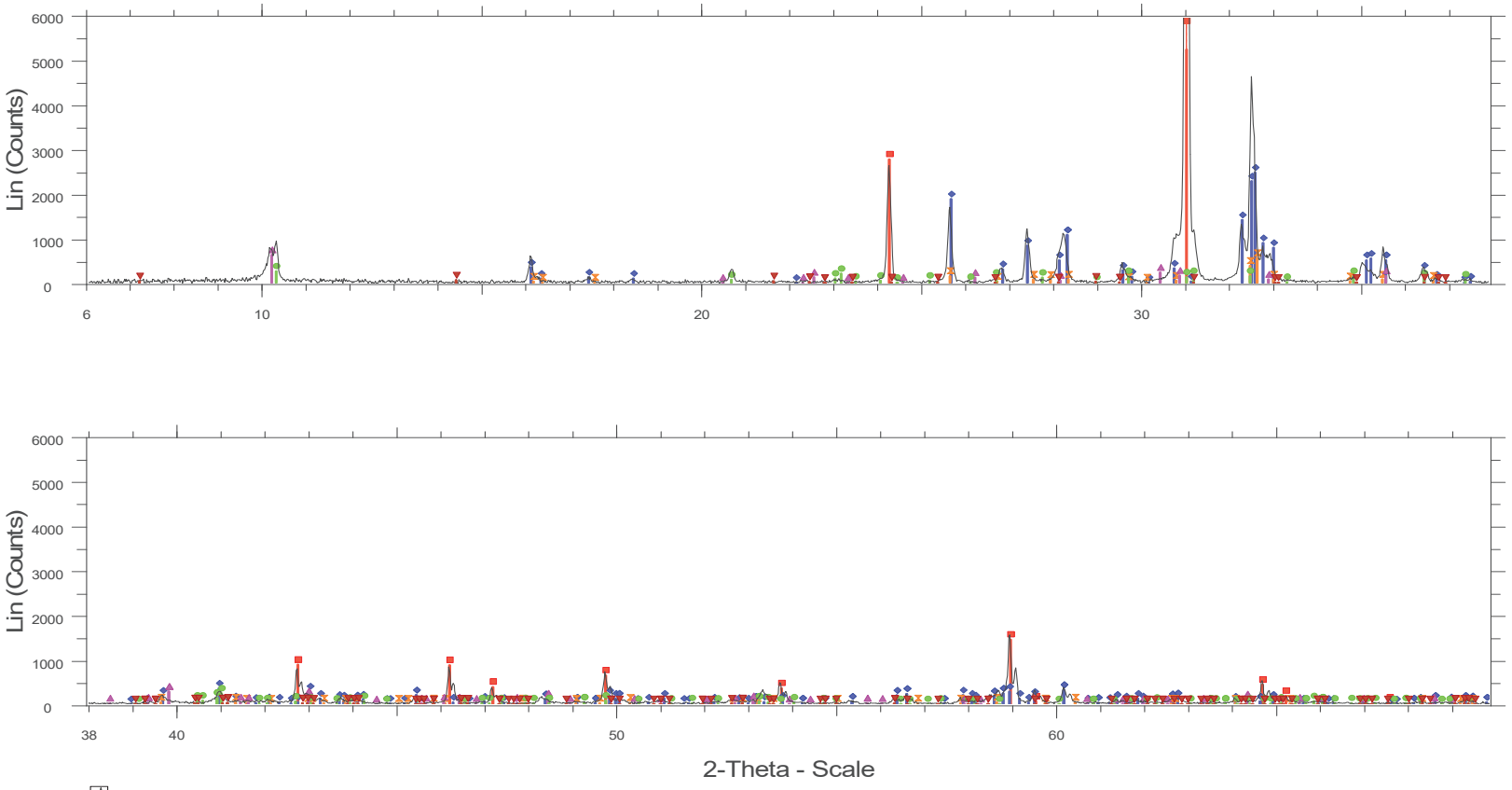
YAMW-4 (88-89)


Lin (Counts)
6000
5000
4000
3000
2000
1000
0
6
10
20
30
38
40
50
60
2-Theta - Scale
YAMW-4 (88-89) - File: OCT4505-5.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-041-1480 (I) - Albite, calcian, ordered - (Na,Ca)Al(Si,Al)3O8
01-080-1107 (C) - Biotite - KFe2Mg(AlSi3O10)(OH)2
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2
00-046-1323 (I) - Clinochlore-1MIIb-2 - (Mg,Al,Fe)6(Si,Al)4O10(OH)8

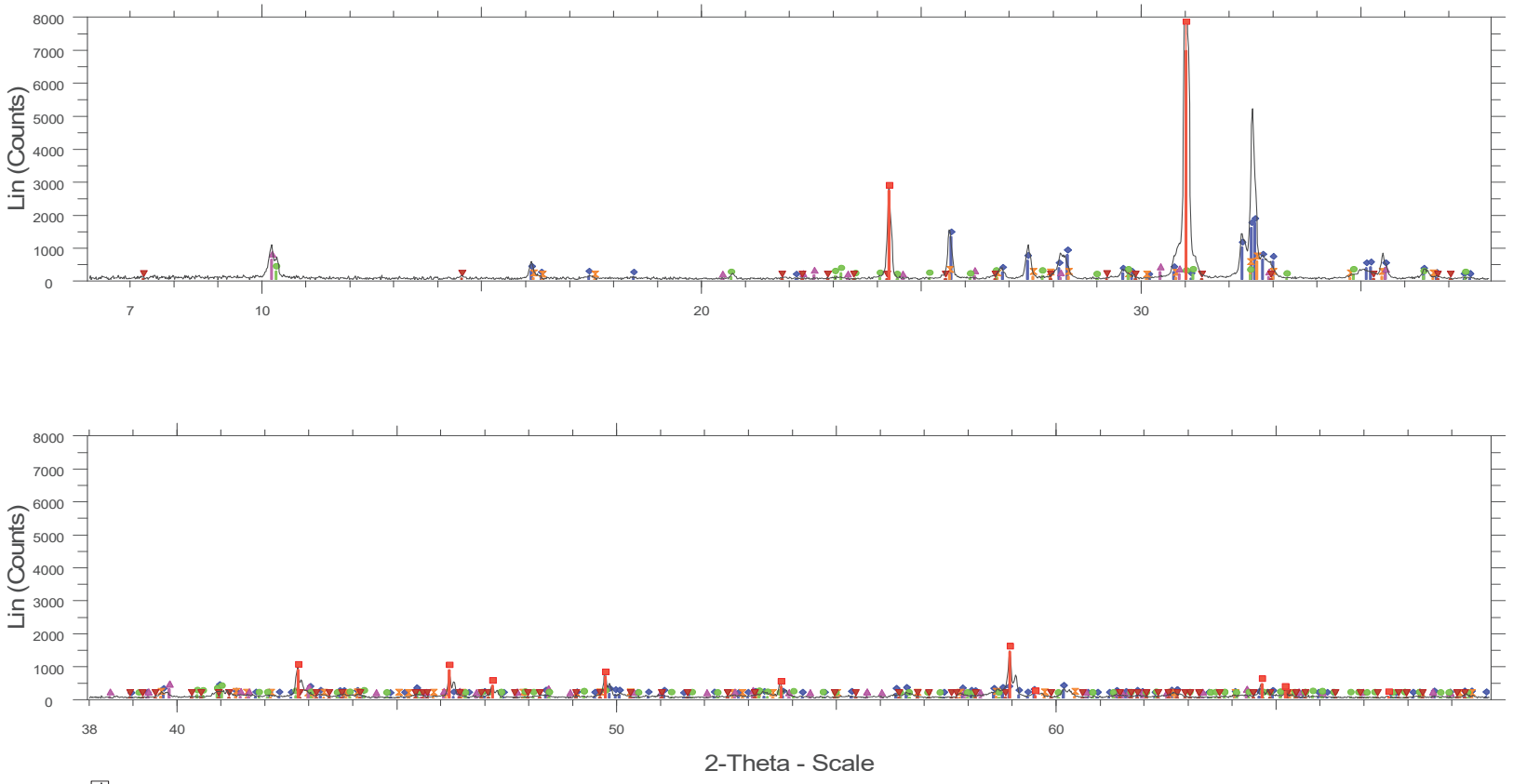
YGWC-38 (26-27)


Lin (Counts)
6000
5000
4000
3000
2000
1000
0
7
10
20
30
38
40
50
60
2-Theta - Scale
YGWC-38 (26-27) - File: OCT4505-6.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-041-1480 (I) - Albite, calcian, ordered - (Na,Ca)Al(Si,Al)3O8
01-080-1107 (C) - Biotite - KFe2Mg(AlSi3O10)(OH)2
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2
01-082-0038 (C) - Clinochlore IIb-4 (Cr-, Mg-rich) - (Mg0.99Al0.01)5(Al0.67Fe0.33)(Si3.02Al0.98)O1
00-010-0363 (D) - Hydrobiotite - K(Mg,Fe)6(Si,Al,Fe)8O20(OH)4·4H2O
00-010-0402 (D) - Antigorite - Mg3Si2O5(OH)4
01-079-1570 (C) - Kaolinite - Al2(Si2O5)(OH)4

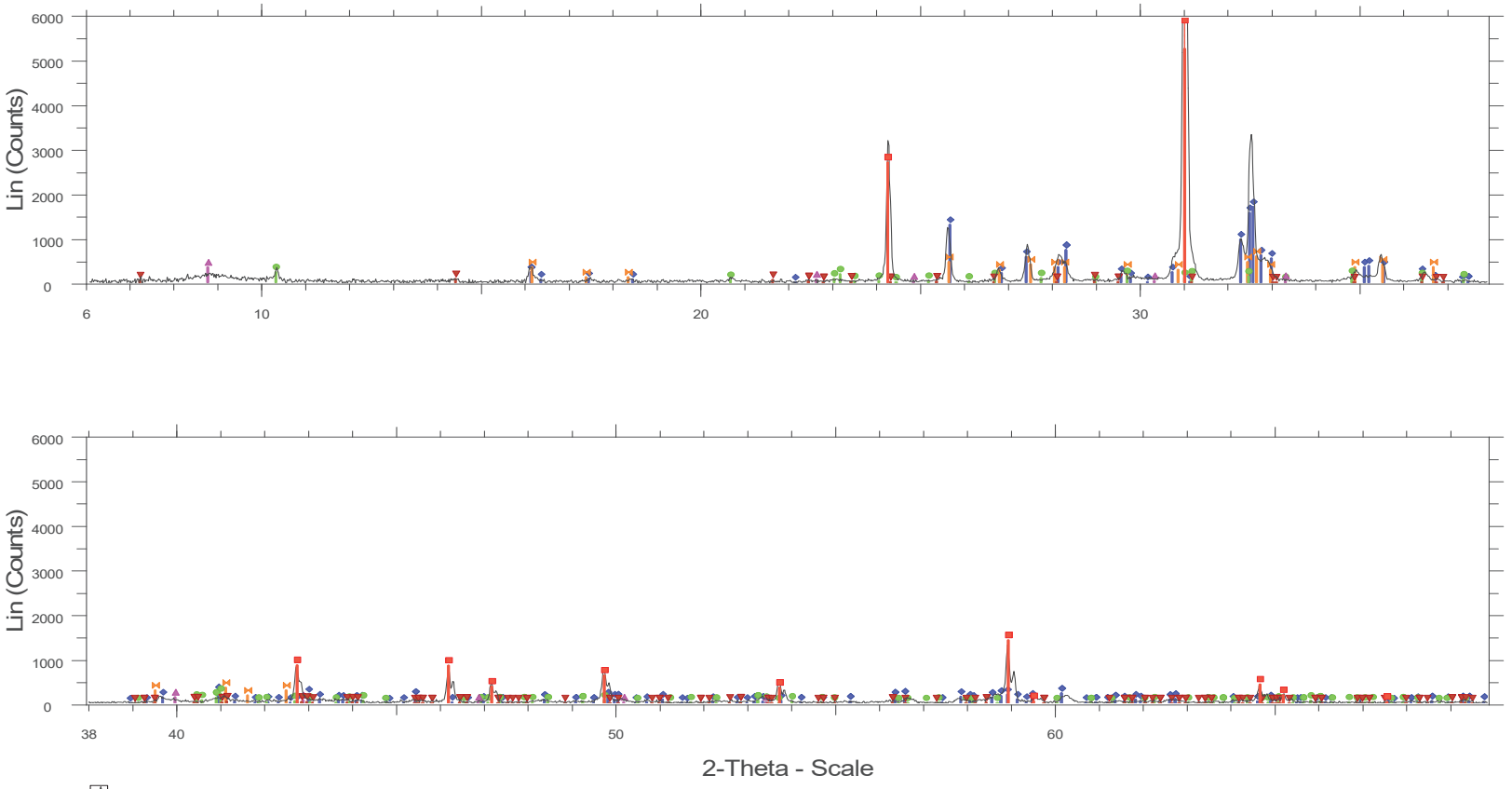
YGWC-38 (39-40)


Lin (Counts)
6000
5000
4000
3000
2000
1000
0
6
10
20
30
Lin (Counts)
6000
5000
4000
3000
2000
1000
0
38
40
50
60
2-Theta - Scale
YGWC-38 (39-40) - File: OCT4505-7.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-041-1480 (I) - Albite, calcian, ordered - (Na,Ca)Al(Si,Al)3O8
01-080-1107 (C) - Biotite - KFe2Mg(AlSi3O10)(OH)2
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2
01-082-0038 (C) - Clinochlore IIb-4 (Cr-, Mg-rich) - (Mg0.99Al0.01)5(Al0.67Fe0.33)(Si3.02Al0.98)O10(OH)8

YGWC-38 (59.5-60.5)

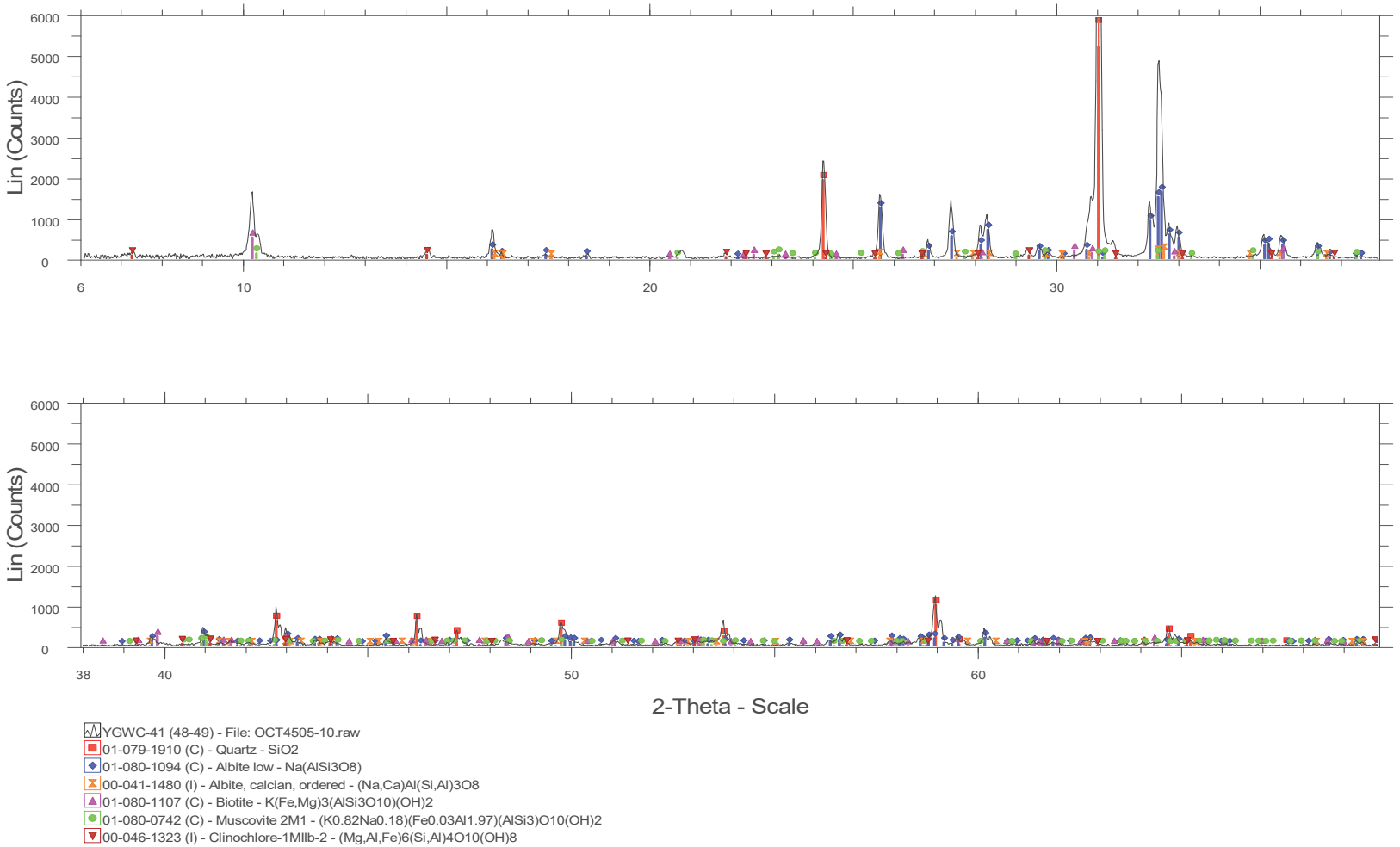


YGWC-41 (32-33)

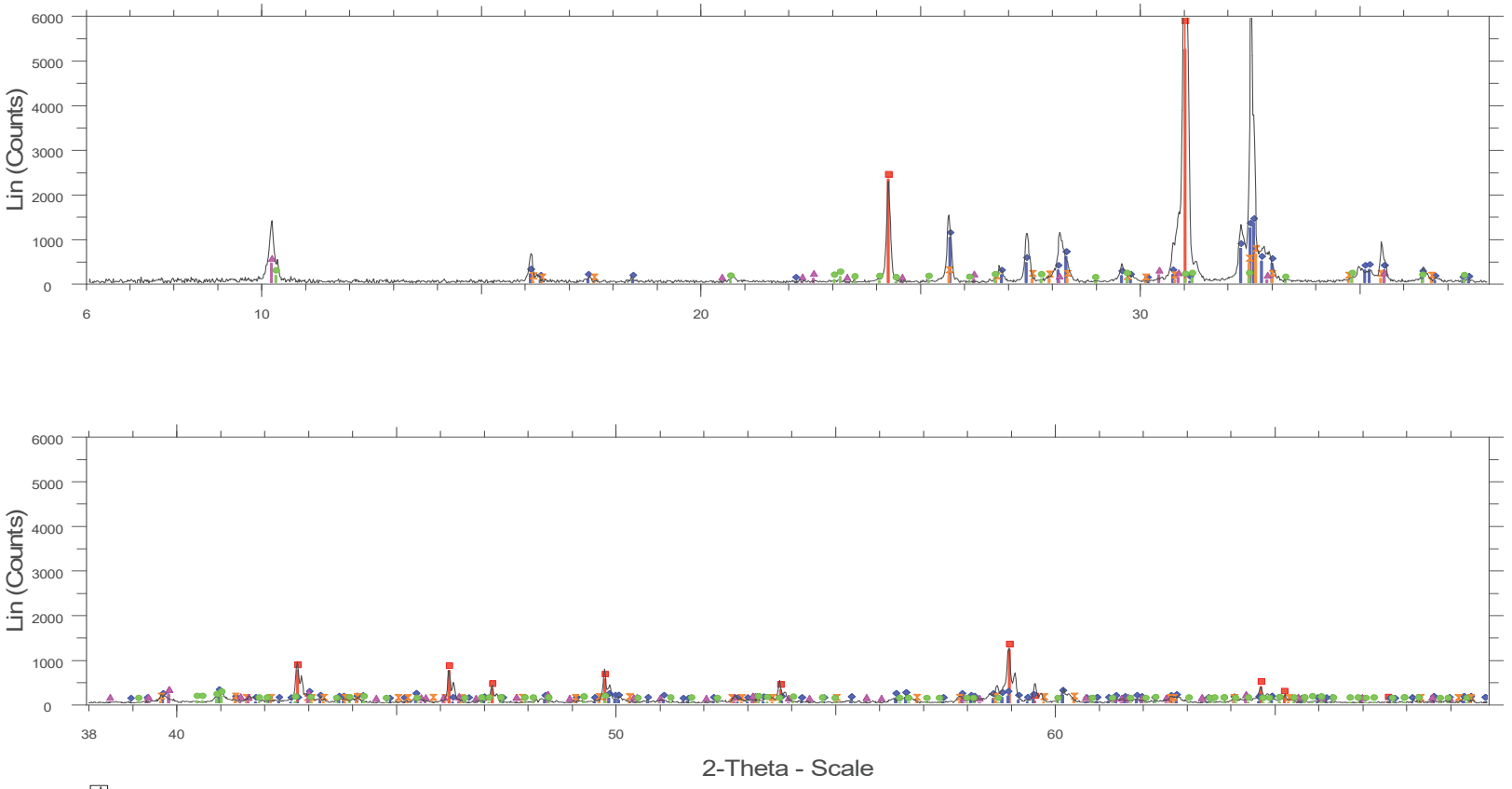

Lin (Counts)
6000
5000
4000
3000
2000
1000
0
6
10
20
30
38
40
50
60
2-Theta - Scale
YGWC-41 (32-33) - File: OCT4505-9.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-009-0457 (D) - Albite, calcian, ordered - (Na,Ca)(Si,Al)4O8
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2
00-010-0363 (D) - Hydrobiotite - K(Mg,Fe)6(Si,Al,Fe)8O20(OH)4·4H2O
01-082-0038 (C) - Clinochlore IIb-4 (Cr-, Mg-rich) - (Mg0.99Al0.01)5(Al0.67Fe0.33)(Si3.02Al0.98)O10(OH)8

Arcadis US Inc
18122-01/MI4505-OCT20
12-Nov-20

YGWC-41 (48-49)



YGWC-41 (59-60)


Lin (Counts)
6000
5000
4000
3000
2000
1000
0
6
10
20
30
38
40
50
60
2-Theta - Scale
YGWC-41 (59-60) - File: OCT4505-11.raw
01-079-1910 (C) - Quartz - SiO2
01-080-1094 (C) - Albite low - Na(AlSi3O8)
00-041-1480 (I) - Albite, calcian, ordered - (Na,Ca)Al(Si,Al)3O8
01-080-1107 (C) - Biotite - KFe2Mg(AlSi3O10)(OH)2
01-080-0742 (C) - Muscovite 2M1 - (K0.82Na0.18)(Fe0.03Al1.97)(AlSi3)O10(OH)2

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Internal Dept 14
Attn : Huyun Zhou

05-November-2020

Date Rec. : 16 October 2020
LR Report : **CA02424-OCT20**
Project : CA20I-00000-110-18122-01
Client Ref : MI4505-OCT20

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Ag g/t	Al g/t	As g/t	Ba g/t	Be g/t	Bi g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t
1: YGWC-24SA (10-44)	< 200	74100	< 200	402	< 0.8	< 8	4540	< 40	< 8	65
2: YGWC-24SA (47-49)	< 200	78200	< 200	413	< 0.8	< 8	4530	< 40	< 8	60
3: YGWC-24SA (52-54)	< 200	65700	< 200	248	< 0.8	< 8	3290	< 40	< 8	56
4: YAMW-3 (83-84)	< 200	59800	< 200	135	< 0.8	< 8	3630	< 40	< 8	157
5: YAMW-4 (88-89)	< 200	70100	< 200	90	< 0.8	< 8	4650	< 40	< 8	106
6: YGWC-38 (26-27)	< 200	63300	< 200	221	< 0.8	< 8	3440	< 40	< 8	133
7: YGWC-38 (39-40)	< 200	66600	< 200	229	< 0.8	< 8	4140	< 40	< 8	124

Sample ID	Cu g/t	Fe g/t	K g/t	Li g/t	Mg g/t	Mn g/t	Mo g/t	Ni g/t	Pb g/t	Sb g/t
1: YGWC-24SA (10-44)	< 60	15000	12200	< 100	6210	494	< 10	< 40	< 10	< 10
2: YGWC-24SA (47-49)	< 60	19800	15400	< 100	10600	865	< 10	< 40	< 10	< 10
3: YGWC-24SA (52-54)	< 60	11200	7680	< 100	5090	366	< 10	< 40	< 10	< 10
4: YAMW-3 (83-84)	< 60	9020	8740	< 100	5320	196	< 10	< 40	< 10	< 10
5: YAMW-4 (88-89)	< 60	6630	3690	< 100	4850	520	< 10	< 40	< 10	< 10
6: YGWC-38 (26-27)	< 60	10600	6390	< 100	4280	168	< 10	< 40	< 10	< 10
7: YGWC-38 (39-40)	< 60	9260	9800	< 100	4320	201	< 10	< 40	< 10	< 10

Sample ID	Se g/t	Si g/t	Sn g/t	Sr g/t	Ti g/t	Tl g/t	U g/t	V g/t	Y g/t	Zn g/t
1: YGWC-24SA (10-44)	< 200	366000	< 30	44	789	< 5	3.1	< 80	29	53
2: YGWC-24SA (47-49)	< 200	345000	< 30	46	1020	< 5	3.5	< 80	36	52
3: YGWC-24SA (52-54)	< 200	366000	< 30	54	500	< 5	2.7	< 80	38	< 50
4: YAMW-3 (83-84)	< 200	367000	< 30	47	494	< 5	2.0	< 80	29	< 50
5: YAMW-4 (88-89)	< 200	366000	< 30	63	537	< 5	2.9	< 80	40	< 50
6: YGWC-38 (26-27)	< 200	378000	< 30	41	537	< 5	2.8	< 80	57	< 50
7: YGWC-38 (39-40)	< 200	370000	< 30	60	391	< 5	3.0	< 80	46	< 50

OnLine LIMS

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0002311464

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA02424-OCT20**

Sample ID	Ag g/t	Al g/t	As g/t	Ba g/t	Be g/t	Bi g/t	Ca g/t	Cd g/t	Co g/t	Cr g/t
8: YGWC-38 (59.5-60.5)	< 200	66700	< 200	294	< 0.8	< 8	6300	< 40	< 8	121
9: YGWC-41 (32-33)	< 200	61800	< 200	234	< 0.8	< 8	6700	< 40	< 8	87
10: YGWC-41 (48-49)	< 200	60100	< 200	156	< 0.8	< 8	1110	< 40	< 8	143
11: YGWC-41 (59-60)	< 200	65500	< 200	240	< 0.8	< 8	6330	< 40	< 8	99

Sample ID	Cu g/t	Fe g/t	K g/t	Li g/t	Mg g/t	Mn g/t	Mo g/t	Ni g/t	Pb g/t	Sb g/t
8: YGWC-38 (59.5-60.5)	< 60	10100	7500	< 100	2660	342	< 10	< 40	< 10	< 10
9: YGWC-41 (32-33)	< 60	15200	8240	< 100	5820	491	< 10	< 40	< 10	< 10
10: YGWC-41 (48-49)	< 60	9250	7870	< 100	6600	192	< 10	< 40	< 10	< 10
11: YGWC-41 (59-60)	< 60	9260	6540	< 100	3400	193	< 10	< 40	< 10	< 10

Sample ID	Se g/t	Si g/t	Sn g/t	Sr g/t	Ti g/t	Tl g/t	U g/t	V g/t	Y g/t	Zn g/t
8: YGWC-38 (59.5-60.5)	< 200	372000	< 30	81	553	< 5	4.0	< 80	66	< 50
9: YGWC-41 (32-33)	< 200	363000	< 30	69	789	< 5	2.5	< 80	22	< 50
10: YGWC-41 (48-49)	< 200	352000	< 30	27	489	< 5	3.3	< 80	38	< 50
11: YGWC-41 (59-60)	< 200	371000	< 30	86	582	< 5	2.6	< 80	36	< 50

Control Quality Analysis
Not suitable for commercial exchange

Sarah Thyret-Arbour
Technologist, Mineral Services, Analytical

OnLine LIMS

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SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Internal Dept 14
Attn : Huyun Zhou

05-November-2020

Date Rec. : 16 October 2020
LR Report : **CA02425-OCT20**
Project : CA20I-00000-110-18122-01
Client Ref : MI4505-OCT20

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	LOI %
1: YGWC-24SA (10-44)	3.21
2: YGWC-24SA (47-49)	4.17
3: YGWC-24SA (52-54)	4.44
4: YAMW-3 (83-84)	0.90
5: YAMW-4 (88-89)	1.02
6: YGWC-38 (26-27)	2.55
7: YGWC-38 (39-40)	0.84
8: YGWC-38 (59.5-60.5)	0.78
9: YGWC-41 (32-33)	1.84
10: YGWC-41 (48-49)	0.93
11: YGWC-41 (59-60)	0.62

Control Quality Analysis
Not suitable for commercial exchange

Sarah Thyret-Arbour
Technologist, Mineral Services, Analytical

OnLine LIMS

0002311468

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BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

October 20, 2020

Arcadis – Raleigh
ATTN: Jennifer Beck
5420 Wade Park Blvd #350
Raleigh, NC 27607
jennifer.beck@arcadis.com

RE: Project ARC-RA2001 Client Project: #3006037.00001

Dear Jennifer Beck,

On September 26, 2020, Brooks Applied Labs (BAL) received two (2) water samples at a temperature of 1.5°C. The samples were logged-in for the analyses of Selenium Speciation analyses, including selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], selenomethionine [*SeMet*], methylseleninic acid [*MeSe(IV)*], selenosulfate [*SeSO3*]. Both samples were analyzed for dissolved Selenium (Se) per our phone conversation on September 29, 20020. All samples were received and stored according to BAL SOPs and EPA methodology.

Samples were field filtered.

Se Speciation Analysis by IC-ICP-CRC-MS

Each aqueous fraction submitted for Se speciation analysis was analyzed using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species were chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

The Se speciation results were *not* method blank corrected as described in the calculations section of the relevant BAL SOP and were evaluated using reporting limits adjusted to account for sample aliquot size. The method detection limits (MDLs) for Se(IV), Se(VI), and SeCN were generated via MDL studies. The calibration does not contain MeSe(IV), SeMet, or SeSO3 due to impurities in these standards which would bias the results for other Se species. The MDL value for Se(IV) was used as the MDL for MeSe(IV) and SeMet since Se(IV) is the nearest eluting Se species included in the calibration. The MDL value for Se(VI) was used as the MDL for SeSO3 since Se(VI) is the nearest eluting Se species included in the calibration. Please refer to the *Sample Results* page for sample-specific MDLs, method reporting limits (MRLs), and other details.

In instances where either the native sample concentration and/or the corresponding matrix duplicate (DUP) were reported as less than or equal to the MDL, and were reported as non-detectable (**ND**), the relative percent difference (RPD) between the two values was not calculated (**N/C**).

Trace Metals Quantitation by ICP-QQQ-MS

Prior to analysis all sample fractions were preserved to 1% HNO3 (v/v) and digested in a closed vessel via modified EPA Method 1638 with nitric and hydrochloric acids. Trace metals quantitation was performed using inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS determinative method uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the Interference Reduction Technology section on our website, brooksapplied.com.

In instances where the native sample result and/or the associated duplicate (DUP) result were below the MDL the RPD was not calculated (**N/C**).

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample, the recoveries are not considered valid indicators of data quality. However, these results are reported as a demonstration of precision. When the spiking levels were ≤ 25% of the native sample concentrations, the recoveries were not reported **(NR)**. No sample results were qualified on the basis of the MS or MSD recoveries

All results were *not* method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size.

All data was reported without further qualification, and all other associated quality control sample results met acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Amy Goodall
Project Manager
Brooks Applied Labs
amy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
YGWC-38	2039070-01	Water	QC Sample	09/25/2020	09/26/2020
YGWC-41	2039070-02	Water	Sample	09/25/2020	09/26/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
MeSe(IV)	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183
Se	Water	EPA 1638 Mod	10/12/2020	10/14/2020	B202717	2001231
Se(IV)	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183
Se(VI)	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183
SeCN	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183
SeMet	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183
SeSO3	Water	SOP BAL-4200	09/29/2020	09/30/2020	B202612	2001183

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
YGWC-38										
2039070-01	MeSe(IV)	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-01	Se	Water	D	85.9		0.018	0.057	µg/L	B202717	2001231
2039070-01	Se(IV)	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-01	Se(VI)	Water	D	82.1		0.300	1.25	µg/L	B202612	2001183
2039070-01	SeCN	Water	D	≤ 0.250	U	0.250	1.25	µg/L	B202612	2001183
2039070-01	SeMet	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-01	SeSO3	Water	D	≤ 0.300	U	0.300	1.25	µg/L	B202612	2001183
YGWC-41										
2039070-02	MeSe(IV)	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-02	Se	Water	D	50.7		0.018	0.057	µg/L	B202717	2001231
2039070-02	Se(IV)	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-02	Se(VI)	Water	D	49.3		0.300	1.25	µg/L	B202612	2001183
2039070-02	SeCN	Water	D	≤ 0.250	U	0.250	1.25	µg/L	B202612	2001183
2039070-02	SeMet	Water	D	≤ 0.350	U	0.350	1.25	µg/L	B202612	2001183
2039070-02	SeSO3	Water	D	≤ 0.300	U	0.300	1.25	µg/L	B202612	2001183

Accuracy & Precision Summary

Batch: B202612
Lab Matrix: Water
Method: SOP BAL-4200

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202612-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	4.780	µg/L	94% 75-125	
	Se(IV)		5.000	5.097	µg/L	102% 75-125	
	Se(VI)		5.000	5.024	µg/L	100% 75-125	
	SeCN		5.015	4.984	µg/L	99% 75-125	
	SeMet		4.932	4.863	µg/L	99% 75-125	
B202612-DUP2	**Duplicate, (2039070-01)**						
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se(IV)	ND		ND	µg/L		N/C 25
	Se(VI)	82.12		81.15	µg/L		1% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
B202612-MS2	**Matrix Spike, (2039070-01)**						
	Se(IV)	ND	245.0	256.0	µg/L	104% 75-125	
	Se(VI)	82.12	255.0	344.8	µg/L	103% 75-125	
	SeCN	ND	245.2	250.1	µg/L	102% 75-125	
	SeMet	ND	49.42	43.25	µg/L	88% 75-125	
B202612-MSD2	**Matrix Spike Duplicate, (2039070-01)**						
	Se(IV)	ND	245.0	257.3	µg/L	105% 75-125	0.5% 25
	Se(VI)	82.12	255.0	344.4	µg/L	103% 75-125	0.1% 25
	SeCN	ND	245.2	248.1	µg/L	101% 75-125	0.8% 25
	SeMet	ND	49.42	42.64	µg/L	86% 75-125	1% 25

Accuracy & Precision Summary

Batch: B202717
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202717-BS1	**Blank Spike, (2042013)**						
	Se		20.00	20.66	µg/L	103% 75-125	
B202717-BS2	**Blank Spike, (2042013)**						
	Se		20.00	20.85	µg/L	104% 75-125	
B202717-BS3	**Blank Spike, (2042013)**						
	Se		20.00	21.00	µg/L	105% 75-125	
B202717-DUP4	**Duplicate, (2039070-01)**						
	Se	85.87		86.49	µg/L		0.7% 20
B202717-MS4	**Matrix Spike, (2039070-01)**						
	Se	85.87	10.20	96.60	µg/L	NR 75-125	
B202717-MSD4	**Matrix Spike Duplicate, (2039070-01)**						
	Se	85.87	10.20	94.98	µg/L	NR 75-125	N/C 20

Method Blanks & Reporting Limits

Batch: B202612
Matrix: Water
Method: SOP BAL-4200
Analyte: MeSe(IV)

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025
MDL: 0.007
MRL: 0.025

Analyte: Se(IV)

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025
MDL: 0.007
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025
MDL: 0.006
MRL: 0.025

Method Blanks & Reporting Limits

Analyte: SeCN

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.005
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.007
MRL: 0.025

Analyte: SeSO3

Sample	Result	Units
B202612-BLK1	0.00	µg/L
B202612-BLK2	0.00	µg/L
B202612-BLK3	0.00	µg/L
B202612-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.006
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B202717
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B202717-BLK1	0.009	µg/L
B202717-BLK2	0.006	µg/L
B202717-BLK3	0.005	µg/L
B202717-BLK4	0.005	µg/L

Average: 0.006
Limit: 0.056

MDL: 0.018
MRL: 0.056

Project ID: ARC-RA2001
PM: Amy Goodall

Client PM: Jennifer Beck
Client Project: #3006037.00001

Sample Containers

Lab ID: 2039070-01
Sample: YGWC-38
Report Matrix: Water
Sample Type: QC Sample
Collected: 09/25/2020
Received: 09/26/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	10 mL	na	none	na	na	Cooler 1 - 2039070
B	XTRA_VOL	250 mL	na	none	na	na	Cooler 1 - 2039070
C	Cent Tube 50mL	50 mL	na	0.2% HNO3 (BAL)	202437	2	Cooler 1 - 2039070

Lab ID: 2039070-02
Sample: YGWC-41
Report Matrix: Water
Sample Type: Sample
Collected: 09/25/2020
Received: 09/26/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	10 mL	na	none	na	na	Cooler 1 - 2039070
B	XTRA_VOL	250 mL	na	none	na	na	Cooler 1 - 2039070
C	Cent Tube 50mL	50 mL	na	0.2% HNO3 (BAL)	2024037	2	Cooler 1 - 2039070

Shipping Containers

Cooler 1 - 2039070

Received: September 26, 2020 9:15
Tracking No: 3972 1768 2270 via FedEx
Coolant Type: Ice
Temperature: 1.5 °C

Description: Cooler 1
Damaged in transit? No
Returned to client? No
Comments: IR 21

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes

Pace Analytical www.pacelabs.com BROOKS LAB

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A
Required Client Information:
Company: Georgia Power
Address: 1070 Bridge Mill Ave
Canton, GA 30114
Email:
Phone: (770)384-6526 Fax:
Requested Due Date:

Section B
Required Project Information:
Report To: Becky Steever
Copy To:
Purchase Order #:
Project Name: ~~Yates R6~~ CCR MW
Project #:

Section C
Invoice Information:
Attention:
Company Name:
Address:
Pace Quote:
Pace Project Manager: ~~kevin.herring@pacelabs.com~~
Pace Profile #: ~~10040~~

Regulatory Agency:
State / Location: GA

SAMPLE ID
One Character per box.
(A-Z, 0-9 / , -)
Sample Ids must be unique

MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)
13	~~PZ-37~~	WT																		
14	YGWC-38			9/25	0940				1	X								X	X	
15	YGWC-41			9/25	1335				1	X									1	
16																			1	
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				

Analyses Test: ~~TDS~~ Chloride, App III & IV Metals, App IV GW Hg, RAD 9315/9320, Se Speciation

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Se (IV), Se (VI), SeCN unknown 250 mL plastic	Arcadis	9/25/20	1600		9/26/20	9:15	

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Michael Guy
SIGNATURE of SAMPLER:
DATE Signed: 9/25/20

SAMPLE CONDITIONS: TEMP in C; Received on Ice (Y/N); Custody Sealed Cooler (Y/N); Samples Intact (Y/N)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

May 10, 2022

Pace Analytical Services - Huntersville
ATTN: Nicole D'Oleo
9800 Kincey Ave., Suite 100
Huntersville, NC, 28078
nicole.d'oleo@pacelabs.com

RE: Project PAC-HN2006 Client Project: 92597863

Dear Nicole D'Oleo,

Brooks Applied Labs (BAL) received one (1) water sample on April 30, 2022. The shipping container's temperature was within our recommended range at 5.4°C. The samples were logged-in for the analyses of Selenium Speciation (Se (IV), Se (VI), SeCN, MeSe(IV), SeMet, $SeSO_3$, DMSeO, and unknown Se species) according to the chain-of-custody (COC) form. All samples were received and stored according to BAL SOPs and EPA methodology.

Sample *PZ-37* (2204372-01) was field filtered.

Selenium Speciation Quantitation by IC-ICP-CRC-MS
The selenium speciation analysis was performed by ion chromatography coupled to an inductively coupled plasma collision reaction cell mass spectrometer (IC-ICP-CRC-MS). Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45-µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

The "Unk Sp Count" is the number of unknown species for a sample in the chromatogram.

In instances where the native sample result and/or the associated duplicate (DUP) result were below the MDL the RPD was not calculated (**N/C**).

The results were not method blank corrected as described in the calculations section of the relevant BAL SOP(s) and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

Aside from concentration qualifiers, all data was reported without qualification and all associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page in your report. This report should be used in its entirety for interpretation of results.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Amy Goodall
Project Manager
Brooks Applied Labs
amy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

18804 North Creek Parkway, Suite 100, Bothell, WA 98011 · P(206) 632-6206 · F(206) 632-6017 · info@brooksapplied.com · www.brooksapplied.com

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

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Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)
EPA 1631E Mod BAL-3100	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic (ISO Only)
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4101	Food by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)
SM2340B	Non-Potable Waters	Hardness
SM 2540G BAL-0501	Solids/Chemicals & Biological	% Dry Weight

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Sample Information

Sample	Alias	Lab ID	Report Matrix	Type	Sampled	Received
PZ-37	92597863005	2204372-01	Water	Sample	04/07/2022	04/30/2022

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
MeSe(IV)	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
Se(IV)	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
Se(VI)	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
SeCN	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
SeMet	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
SeSO3	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
Unk Se Sp	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506
Unk Sp Count	Water	SOP BAL-4201	05/04/2022	05/04/2022	B220962	S220506

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
PZ-37, 92597863005										
2204372-01	DMSeO	Water	D	≤ 2.00	U	2.00	5.00	µg/L	B220962	S220506
2204372-01	MeSe(IV)	Water	D	≤ 2.00	U	2.00	5.00	µg/L	B220962	S220506
2204372-01	Se(IV)	Water	D	4.79	J	2.00	15.0	µg/L	B220962	S220506
2204372-01	Se(VI)	Water	D	188		2.00	11.0	µg/L	B220962	S220506
2204372-01	SeCN	Water	D	≤ 2.00	U	2.00	10.0	µg/L	B220962	S220506
2204372-01	SeMet	Water	D	≤ 2.00	U	2.00	5.00	µg/L	B220962	S220506
2204372-01	SeSO3	Water	D	≤ 2.00	U	2.00	11.0	µg/L	B220962	S220506
2204372-01	Unk Se Sp	Water	D	≤ 2.00	U	2.00	15.0	µg/L	B220962	S220506
2204372-01	Unk Sp Count	Water	D	0	U			count	B220962	S220506

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Accuracy & Precision Summary

Batch: B220962
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B220962-BS1	**Blank Spike, (2124033)**						
	MeSe(IV)		5.095	5.286	µg/L	104% 75-125	
	Se(IV)		5.000	5.003	µg/L	100% 75-125	
	Se(VI)		5.000	4.938	µg/L	99% 75-125	
	SeCN		5.015	4.872	µg/L	97% 75-125	
	SeMet		4.932	4.792	µg/L	97% 75-125	
B220962-DUP2	**Duplicate, (2205017-04)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se(IV)	67.37		66.35	µg/L		2% 25
	Se(VI)	ND		ND	µg/L		N/C 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
	Unk Sp Count	0		0	count		200
B220962-MS2	**Matrix Spike, (2205017-04)**						
	Se(IV)	67.37	49.00	112.9	µg/L	93% 75-125	
	Se(VI)	ND	51.00	47.64	µg/L	93% 75-125	
	SeCN	ND	19.62	16.91	µg/L	86% 75-125	
	SeMet	ND	19.77	17.35	µg/L	88% 75-125	
B220962-MSD2	**Matrix Spike Duplicate, (2205017-04)**						
	Se(IV)	67.37	49.00	112.4	µg/L	92% 75-125	0.5% 25
	Se(VI)	ND	51.00	46.73	µg/L	92% 75-125	2% 25
	SeCN	ND	19.62	17.21	µg/L	88% 75-125	2% 25
	SeMet	ND	19.77	16.85	µg/L	85% 75-125	3% 25

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Method Blanks & Reporting Limits

Batch: B220962
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se(IV)

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015
MDL: 0.002
MRL: 0.015

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Method Blanks & Reporting Limits

Analyte: Se(VI)

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: SeSO3

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

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Method Blanks & Reporting Limits

Analyte: Unk Se Sp

Sample	Result	Units
B220962-BLK1	0.00	µg/L
B220962-BLK2	0.00	µg/L
B220962-BLK3	0.00	µg/L
B220962-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Analyte: Unk Sp Count

Sample	Result	Units
B220962-BLK1	0	count
B220962-BLK2	0	count
B220962-BLK3	0	count
B220962-BLK4	0	count

MRL:

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Sample Containers

Lab ID: 2204372-01
Sample: PZ-37

Report Matrix: Water
Sample Type: Sample + Sum

Collected: 04/07/2022
Received: 04/30/2022

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL	15 mL	NA	NONE	NA	NA	Cooler - 2204372
B	XTRA_VOL	60 mL	NA	NONE	NA	NA	Cooler - 2204372

Shipping Containers

Cooler - 2204372

Received: April 30, 2022 8:56
Tracking No: 5041 9000 2698 via FedEx
Coolant Type: Ice
Temperature: 5.4 °C

Description: Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#: 33

Custody seals present? No
Custody seals intact? No
COC present? Yes

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Chain of Custody

PASI Charlotte Laboratory

Workorder: 92597863 Workorder Name: YATES AEM

Pace Analytical®
www.pacelabs.com

Results Requested By: 4/21/2022

Report / Invoice To

Nicole D'Oleo
Pace Analytical Charlotte
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
Phone (704)875-9092
Email: nicole.d'oleo@pacelabs.com

State of Sample Origin: GA

Subcontract To

P.O. NGD92597863

Brooks Applied Labs
18804 North Creek Parkway
Suite 100
Bothell, WA 98011

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Unpreserved	Se Speciation	Requested Analysis	LAB USE ONLY
1	PZ-37	4/7/2022 12:00	92597863005	Water	1	X	DMSeO, MeSe(IV), Se(IV), Se(VI), SeCN, SeMet, SeSO3, Unknown Se Species, Unknown Species Count	
2								
3								
4								
5								

Transfers	Released By	Date/Time	Received By	Date/Time
1	[signature]	4/29/22 [illegible]	FedEx	
2			[signature]	4/30/22, 8:56
3				

Cooler Temperature on Receipt °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

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July 31, 2024

Trey Singleton
Southern Company
241 Ralp McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: Yates
Pace Project No.: 92742596

Dear Trey Singleton:

Enclosed are the analytical results for sample(s) received by the laboratory on July 17, 2024. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
704-977-0968
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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CERTIFICATIONS

Project: Yates
Pace Project No.: 92742596

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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SAMPLE SUMMARY

Project: Yates
Pace Project No.: 92742596

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92742596001	**YAT-YAMW-3**	Water	07/17/24 11:15	07/17/24 14:20

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SAMPLE ANALYTE COUNT

Project: Yates
Pace Project No.: 92742596

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92742596001	**YAT-YAMW-3**	EPA 6020B	CW1	2
		EPA 6020B	CW1	2

PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: Yates
Pace Project No.: 92742596

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92742596001	**YAT-YAMW-3**					
EPA 6020B	Iron	0.23	mg/L	0.040	07/24/24 18:08	
EPA 6020B	Manganese	0.15	mg/L	0.010	07/24/24 18:08	
EPA 6020B	Iron, Dissolved	0.043	mg/L	0.040	07/26/24 19:40	
EPA 6020B	Manganese, Dissolved	0.14	mg/L	0.010	07/26/24 19:40	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Yates
Pace Project No.: 92742596

Sample: YAT-YAMW-3 **Lab ID: 92742596001** Collected: 07/17/24 11:15 Received: 07/17/24 14:20 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Iron	**0.23**	mg/L	0.040	0.0075	1	07/24/24 11:55	07/24/24 18:08	7439-89-6	
Manganese	**0.15**	mg/L	0.010	0.00098	1	07/24/24 11:55	07/24/24 18:08	7439-96-5	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**0.043**	mg/L	0.040	0.0075	1	07/25/24 13:39	07/26/24 19:40	7439-89-6	
Manganese, Dissolved	**0.14**	mg/L	0.010	0.00098	1	07/25/24 13:39	07/26/24 19:40	7439-96-5	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Yates
Pace Project No.: 92742596

QC Batch: 870608
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92742596001

METHOD BLANK: 4486340 Matrix: Water
Associated Lab Samples: 92742596001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron	mg/L	ND	0.040	0.0075	07/24/24 17:09	
Manganese	mg/L	ND	0.010	0.00098	07/24/24 17:09	

LABORATORY CONTROL SAMPLE: 4486341

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron	mg/L	1	1.1	112	80-120	
Manganese	mg/L	0.1	0.11	114	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4486342 4486343

Parameter	Units	92742570001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	mg/L	38.0J ug/L	1	1	1.1	1.1	105	105	75-125	0	20	
Manganese	mg/L	113 ug/L	0.1	0.1	0.22	0.22	103	111	75-125	4	20	

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QUALITY CONTROL DATA

Project: Yates
Pace Project No.: 92742596

QC Batch: 871015
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92742596001

METHOD BLANK: 4488446 Matrix: Water
Associated Lab Samples: 92742596001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.040	0.0075	07/26/24 19:32	
Manganese, Dissolved	mg/L	ND	0.010	0.00098	07/26/24 19:32	

LABORATORY CONTROL SAMPLE: 4488447

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	1	1.0	102	80-120	
Manganese, Dissolved	mg/L	0.1	0.10	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4488448 4488449

Parameter	Units	92743496001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	3190 ug/L	1	1	4.2	4.1	99	95	75-125	1	20	
Manganese, Dissolved	mg/L	1380 ug/L	0.1	0.1	1.5	1.5	161	80	75-125	5	20	M1

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QUALIFIERS

Project: Yates
Pace Project No.: 92742596

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Yates
Pace Project No.: 92742596

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92742596001	**YAT-YAMW-3**	EPA 3005A	870608	EPA 6020B	870732
92742596001	**YAT-YAMW-3**	EPA 3005A	871015	EPA 6020B	871122

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DC#_Title: ENV-FRM-HUN1-0083 v05_Sample Condition Upon Receipt

Effective Date: 05/24/2024

Laboratory receiving samples:
Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

WO# : 92742596

92742596

Client Name: GA Power **Project #:**

Courier: ☐ Commercial ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Pace ☐ Other:____

Custody Seal Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☐ No ☑ N/A **Date/Initials Person Examining Contents:** JG 7/17/24

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Thermometer: ☑ IR Gun ID: 214 **Type of Ice:** ☑ Wet ☐ Blue ☐ None

Cooler Temp: 5.6 **Correction Factor:** Add/Subtract (°C) 0.0

Cooler Temp Corrected (°C): 5.6

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☐ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No
Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☑ Yes	☐ No	☐ N/A	8.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: WG	☑ Yes	☐ No	☐ N/A	9.
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY **Field Data Required?** ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ **Date:** _____

Project Manager SRF Review: _____ **Date:** _____

Pace ANALYTICAL SERVICES

DC#_Title: ENV-FRM-HUN1-0083 v05_Sample Condition Upon Receipt

Effective Date: 05/24/2024

WO#: 92742596

PM: BV **Due Date: 08/01/24**

CLIENT: 92-GP-Yates

*Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg
**Bottom half of box is to list number of bottles
***Check all unpreserved Nitrates for chlorine

Project #

Laboratory Receiving Location: Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☐ Kernersville ☐

Client_____ Profile/EZ (Circle one)_____ Notes_____

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)		BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)	1B3F	BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
CC																														
1							1																			1				
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

Pace® Location Requested (City/State):
Pace Analytical Charlotte
9800 Kincey Ave. Suite 100, Huntersville, NC 28078

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR Code for instructions

Company Name:	Southern Company	Contact/Report To:	Trey Singelton
Street Address:	241 Ralph McGill Blvd, Atlanta, GA 30308	Phone #:	205-346-3317
		E-Mail:	rosingle@southernco.com
		Cc E-Mail:	Arcadis contacts
Customer Project #:	Task No. YAT-CCR-OTH-20240716	Invoice To:	
Project Name:	Georgia Power Yates	Invoice E-Mail:	
Site Collection Info/Facility ID (as applicable): YAT AP-3, A, B/B', RG		Purchase Order # (if applicable):	GPC82474-0002
		Quote #:	
Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [X] ET		County / State origin of sample(s):	Georgia

Data Deliverables:
[X] Level II [ ] Level III [ ] Level IV
[X] EQUIS
[ ] Other_____

Regulatory Programs (DW, RCRA, etc.) as applicable:

Rush (Pre-approval required):
[ ] 2 Day [ ] 3 day [ ] 5 day [ ] Other_____
Date Results Requested:

DW PWSID # or WW Permit # as applicable:

Field Filtered (if applicable): [X] Yes [ ] No
Analysis:

Specify Container Size **: 3
Identify Container Preservative Type***: 2
Analysis Requested

** Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) Other

*** Preservative Types: (1) None, (2) HNO3, (3) H2SO4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) NaHSO4, (8) Na2 Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Proj. Mgr: Bonnie Vang
Acct Num / Client ID:
Table #:
Lab:
Profile / Template: 16551
Prelog / Bottle Ord. ID:

Preservation n on-conformance identified for sample.

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Waste Water (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Other (OT), Surface Water (SW), Sediment (SED), Sludge (SL), Caulk

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res. Cl2	Number & Type of Containers Plastic	Number & Type of Containers Glass	Iron, Manganese (6020)	Sample Comment
YAT-YAMW-3	WG	G	7/17/24	1115	--	--		1		X	See Remarks Dissolved Iron
YAT-YAMW-3	WG	G	7/17/24	1115	--	--		1		X	Total
					--	--					
					--	--					
					--	--					

Customer Remarks / Special Conditions / Possible Hazards:
Dissolved analyses were field filtered

Collected By:
Printed Name (Arcadis): Jessica Ward
Signature (Arcadis):

Additional Instructions from Pace*:

# Coolers	Thermometer ID:	Correction Factor (°C):	Cool. Temp. (°C)	Corrected Temp. (°C)

Relinquished by/Company: (Signature)	Date/Time: 7/17/24 1735	Received by/Company: (Signature) ARCADIS	Date/Time: 7/17/24 1735	Tracking Number:
Relinquished by/Company: (Signature)	Date/Time: 7/17/24 1420	Received by/Company: (Signature) Pace	Date/Time: 7/17/24 1420	Delivered by: [ ] In-Person [ ] Courier [ ] FedEx [ ] UPS [ ] Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Page: of

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/

Attachment 2

Memo: Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Selenium in Groundwater

Attachment 2

Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Selenium in Groundwater

This memo provides the results of bench-scale testing of in situ technologies for the Georgia Power Plant Yates ash ponds (AP) AP-3, A, B, B' and the R6 CCR Landfill (the Site) in Newnan, Georgia. Selenium concentrations are currently at statistically significant levels (SSLs) with exceedances of the groundwater protection standard (GWPS) along the southeast boundary of the R6 CCR Landfill. Monitored Natural Attenuation (MNA) is the proposed remedy for selenium in groundwater at the Site (Arcadis 2022[1]), supported by the phased MNA evaluation framework from the United States Environmental Protection Agency (USEPA 2007, 2015[2]). The Draft Remedy Selection Report Appendix F – Site Specific Demonstration of Natural Attenuation summarizes the site-specific, phased evaluation (Arcadis 2022[1]). The fourth phase of the framework is to design a performance monitoring program and identify an alternative remedy, or contingency. In a letter dated February 14, 2023, the Georgia Environmental Protection Division requested that bench testing be performed to support the contingency remedy component of EPA's phased MNA approach. In situ treatment is being proposed as the contingency measure under this framework based on bench-scale testing and analysis provided below. If approved, the in situ remedy will be incorporated into the Corrective Action Monitoring Plan that will outline the adaptive site management framework at the Site.

Geochemical Site Conceptual Model and Treatability Approach

As described in the Draft Remedy Selection Report Appendix E, selenium in groundwater at the Site is present as selenate, a relatively soluble oxyanion that can sorb to aquifer minerals. Decreasing selenium trends indicate that sorption, coupled with dilution and dispersion, is sufficient to attenuate selenium in groundwater and continue the declining trends at the downgradient wells in the network. While not currently necessary, additional selenate can be removed from groundwater via in situ mechanisms such as increasing sorption capacity or through reduction to selenite, elemental selenium, and selenide that have lower solubility and/or greater propensity for sorption. To investigate the feasibility for in situ treatment at the Site, bench-scale testing was completed at the Arcadis Treatability Laboratory in Durham, North Carolina during May and June 2023. This memo summarizes the bench-scale studies to evaluate in situ treatment with Zero Valent Iron (ZVI), including agglomeration testing and in situ selenium removal effectiveness testing, using various ZVI formulations.

ZVI Agglomeration Testing

One key to successful in situ remediation is achieving distribution of the reagent in the subsurface, which is more challenging for solid phase reagents than soluble reagents. For ZVI, injectability and distribution considerations include particle size and tendency for the ZVI to agglomerate in solution, making it larger and more difficult to inject particles. For this bench testing, a commercial product from Höganas Environment Solutions, LLC (Höganas), CleanER-5, was selected because of its reported reactive surface area properties and small particle size of approximately 5 micrometers (μm). Dispersants can be added to ZVI to suspend the ZVI and prevent agglomeration. Cascade Environmental Services has recently started working with Höganas and created a formulation of the CleanER-5 product with glycerol as a dispersant, called CleanER iZVI. As an alternative to the

[1] Arcadis. 2022. Draft Remedy Selection Report, Plant Yates AP-3, A, B, B', and R6 CCR Landfill, Newnan, Georgia. August 31.
[2] USEPA. 2007. Monitored Natural Attenuation of Inorganic Contaminants in Groundwater. Volume 1. Technical Basis for Assessment. EPA/600/R-07/139. Cincinnati, Ohio. October.
USEPA. 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Directive 9283.1-36. August.

glycerol formulation, another potential dispersant that may be effective for keeping ZVI suspended while minimizing byproducts is guar, which was tested and compared to ZVI.

The agglomeration and settling of CleanER-5, CleanER iZVI, and CleanER-5 with guar were compared to each other to determine whether any particular formulation agglomerated less and settled more slowly, indicating potentially better injection performance. Doses of ZVI and dispersant, listed in **Table 1**, were mixed with 0.5 liter of water and placed in an Imhoff cone to observe settling.

Agglomeration was not observed in any of the trials. Settling across the trials was comparable, with visual observation of settling within 1 hour—except for the 5 gram per liter (g/L) dose of guar (i.e., 0.5% guar formulation), which did not settle in an hour. The results of this test indicate that the reagents have comparable injectability, although there may be differences in practice that were not observed in this bench scale test. All three formulations were carried forward to the selenium removal effectiveness testing.

In Situ Selenium Removal Effectiveness Testing

Partially Weathered Rock and Groundwater Collection

To represent site conditions, site sediment and groundwater were used in the bench testing from the locations shown on **Figure 1**. Arcadis collected a groundwater sample from PZ-37, sample ID Composite-1-0, to support the treatability study using the standard methods of sample collection employed during the semi-annual sampling and analysis field events. Special handling procedures to preserve redox conditions were not needed, because the groundwater at PZ-37 was aerobic in recent samples from February 2023. 2.5-gallons of groundwater were collected on March 30, 2023 and shipped to the Arcadis Treatability Laboratory. The groundwater was received on April 3, 2023 and stored at 4 degrees Celsius or colder.

Partially weathered rock (PWR) sediments from PZ-37D were obtained from the core archive at the Logan Martin storage facility. The samples were received by the Arcadis Treatability Laboratory on April 18, 2023. Following receipt and inventory, the PWR samples were stored at room temperature.

A baseline composite groundwater sample was taken from the 2.5-gallon volume of collected groundwater and shipped to Pace Analytical Services located in Peachtree Corners, Georgia (Pace) for total and dissolved metals analysis by SW-846 6020B and sulfate analysis by USEPA Method 300.0. The dissolved metals samples were filtered in the laboratory with a 0.45-micron polyethersulfone (PES) syringe filter. These samples were used to evaluate whether the groundwater sample was representative and consistent with existing groundwater monitoring data. Analytical data for the groundwater are provided in **Table 2**. Selenium was detected at a concentration of 0.16 milligram per liter (mg/L), which is consistent with the concentration of 0.16 mg/L collected during routine sampling in February 2023 at PZ-37.

Additionally, the dissolved oxygen and the oxidation-reduction potential (ORP) of the composite groundwater sample were measured at the Arcadis Treatability Laboratory. Water quality parameters for the groundwater are provided in **Table 2** along with the water quality parameters measured during the in-situ injection batch tests. Results indicated aerobic groundwater conditions with dissolved oxygen at 7.25 mg/L and ORP of 228 millivolts (mV), which are consistent with February 2023 aerobic conditions (3.3 mg/L dissolved oxygen and ORP of 202 mV).

Bench-Scale Test Procedures

Batch trials with PWR from the site, groundwater, ZVI, and dispersants were tested according to the experimental matrix presented in **Table 3**. The ferrous iron reagent was included in addition to the ZVI reagents as a soluble option that would be easier to inject and distribute and could potentially reduce selenate to the less soluble forms. The batch trials consisted of control trials (one without ZVI but with PWR material, and one with ZVI but without PWR material). Two trials were designed to test the sensitivity of selenium reduction as a result of varying the dose of the ZVI administered. The dose for the ZVI was set in the gram per liter range based on what is commonly used for injection. Two trials were designed to test for the dissolution of other metals or metalloid byproducts with the addition of glycerol or guar dispersants where reagent doses were scaled to provide g/L levels of iron.

To prepare the trials, the PWR materials were mechanically crushed using a proctor hammer, sieved between 3/8-inch and No. 4 (3/16-inch) sieves, and homogenized in preparation for the batch tests to allow for distribution into experimental bottles in even amounts. These manipulations are not expected to have altered the nature of the material, given that the PWR is highly weathered rock, but could potentially provide higher surface area for a worst-case evaluation of potential byproduct formation. Duplicate reactors for each experimental condition were prepared by mixing the groundwater, reagents, and amendments in 1-liter polypropylene beakers. To fully mix the trial with guar, mixing with a high velocity immersion blender for five minutes was needed, and this procedure was then applied to all of the trials for consistency. Additionally, the reactors with a guar amendment were allowed to hydrate for 30 minutes and then mixed for an additional five minutes. The mixtures were then transferred to 500-mL high-density polyethylene centrifuge tubes with the appropriate dosage of PWR. Duplicate reactors were used for sampling at Days 2 and 14. After the reactors were created, they were set on a rolling table to continually mix for the duration of the experimental trial.
The reactors were sampled on Days 2 and 14, and the samples were shipped to Pace for total and dissolved metals analysis by SW-846 6020B and sulfate analysis by USEPA Method 300.0, as summarized in **Table 3**. The dissolved metals samples were filtered in the laboratory with a 0.45-micron PES syringe filter apart from the trial with guar amendments. Due to the increased viscosity of the guar-amended reactors, the dissolved metals samples for these reactors were filtered using a vacuum filtration device attached to a Stericup® Quick Release-HV Sterile Vacuum Filtration system with a 0.45-micron polyvinylidene fluoride (PVDF) membrane.

Results

As presented in **Table 4** and **Figure 2**, selenium concentrations were successfully reduced to below the GWPS of 0.05 mg/L by Day 14 for all amendments. The reduction of selenium in the trials containing high-dose ZVI with and without glycerol occurred rapidly; full treatment to less than the detection limit of 0.005 mg/L was observed in the Day 2 sample tests for those amendments. The trial containing high-dose ZVI and guar showed no treatment of selenium on Day 2, followed by complete treatment of selenium by Day 14. This is likely due to the guar shielding the ZVI from reacting with dissolved selenate ions until it was broken down by microbes.

No Appendix IV constituents were detected at levels greater than the respective GWPS in the 14-day experimental trials containing ZVI. ZVI trials with glycerol and guar yielded antimony exceedances of the 0.006 mg/L GWPS (0.0084 mg/L and 0.0091 mg/L, respectively) in Day 2 samples; however, concentrations returned to levels equal to or less than baseline concentrations and less than the GWPS by Day 14.

Dissolved manganese increased relative to baseline in all trials, including the controls. Manganese concentrations of 0.43 mg/L and 0.66 mg/L were measured in the control containing PWR only without reagents, indicating that disturbance of the PWR materials and setup of the trials released manganese. Dissolved manganese was detected at a concentration of 24.1 mg/L in the Day 2 sample of the control with ZVI alone, indicating some manganese was associated with the reagent. Experimental trials containing ZVI and site soils exhibited manganese concentrations ranging from 6.3 mg/L in the high-dose ZVI trial without addendums to 26.7 mg/L in the high-dose ZVI with glycerol (see **Table 4** and **Figure 3**) in the Day 2 samples. However, manganese concentrations decreased in the ZVI with site soil trials by Day 14 in all cases, ranging from 0.037 to 7.7 mg/L, indicating re-incorporation of manganese into the solid phase over time. Day 14 concentrations of manganese were lowest in the high dose of the ZVI without dispersant, indicating that it might be the best formulation for achieving selenium removal and managing manganese. Manganese associated with ZVI injections would also be expected to readily attenuate with distance downgradient of the injections.

As shown in **Table 5**, the addition of ZVI stimulated a shift to more reducing conditions compared to baseline groundwater, with ORP values in the ZVI trials ranging from -209.5 to -137.2 mV on Day 14 in comparison to an ORP of 228.0 mV in baseline samples.

Summary

The results of the bench-scale studies for in-situ reagents demonstrated successful treatment of selenium concentrations to below GWPS under site-comparable conditions for trials containing ZVI and ZVI in the presence of glycerol and guar. Trials containing high-dose ZVI (8 grams per liter, 1 percent weight by weight) were the most successful in reducing selenium concentrations, with selenium concentrations decreasing to below detection in both the Day 2 and Day 14 samples. Trials containing low-dose ZVI and high-dose ZVI with guar as a dispersant had selenium concentrations similar to baseline in the Day 2 sample but subsequently decreased to below detection in the Day 14 sample. These results support the retention of in situ ZVI injections as a potential alternative remedy for selenium in groundwater at the Site.

Enclosures:

Tables

1 – Experimental Design and Analyses Summary Agglomeration Test
2 – Bench-Scale Tests Baseline Groundwater Results
3 – Experimental Design and Analyses Summary In Situ Reagent Selenium Removal Effectiveness Bench Scale Tests
4 – In Situ Selenium Removal Effectiveness Test Analytical Results
5 – In Situ Selenium Removal Effectiveness Test Water Quality Parameter Results

Figures

1 – Bench-Scale Partially Weathered Rock and Groundwater Collection Locations
2 – In Situ Reagent Bench-Scale Results for Selenium
3 – In Situ Reagent Bench-Scale Results for Potential Byproducts

Attachment

1 – Laboratory Analytical Results

Tables

Table 1
Experimental Design and Analyses Summary Agglomeration Test
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Condition	Test Description	Reagent Dose (grams)	Mixing Water (liters)	Soil (grams)	Dispersant (grams)	Dispersant % (wt/wt)
CleanER-5	Control	5	0.5	0	0	0
0.005% guar + CleanER-5	Guar is a common dispersant which is kept on hand during drilling activities and added to the mixture if sedimentation is starting to occur. These three conditions provide bounding concentrations of guar to inform dosing in the field.	5	0.5	0	0.025	0.005
0.05% guar + CleanER-5		5	0.5	0	0.25	0.05
0.5% guar + CleanER-5		5	0.5	0	2.5	0.5
CleanER-iZVI	CleanER-5 suspended in a glycerol and water mixture. Commercially available through Cascade Environmental Services. Used as a positive baseline for injectability.	121	0.5	0	0	1.3

Note:

1. 4 grams iron, 8 grams glycerol

% dispersant (i.e. guar) is calculated as weight (in grams) of guar per weight of the solution.

wt = weight

Table 2
Bench-Scale Tests Baseline Groundwater Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Analyte	Sample ID:	COMPOSITE-1-0
	Description:	Baseline Groundwater
	Sample Date:	5/10/2023
	Units	Result
Total Metals (USEPA 6020B)		
Antimony	mg/L	< 0.003
Arsenic	mg/L	< 0.005
Barium	mg/L	0.022
Beryllium	mg/L	0.0012
Cadmium	mg/L	0.00086
Chromium	mg/L	< 0.005
Cobalt	mg/L	0.00078 J
Lead	mg/L	< 0.001
Lithium	mg/L	0.012 J
Molybdenum	mg/L	< 0.01
Selenium	mg/L	0.16
Thallium	mg/L	< 0.001
Dissolved Metals (USEPA 6020B)		
Antimony	mg/L	< 0.003
Arsenic	mg/L	< 0.005
Barium	mg/L	0.021
Beryllium	mg/L	0.0011
Cadmium	mg/L	0.00088
Chromium	mg/L	< 0.005
Cobalt	mg/L	0.00074 J
Iron	mg/L	< 0.04
Lead	mg/L	< 0.001
Lithium	mg/L	0.013 J
Manganese	mg/L	0.096
Molybdenum	mg/L	< 0.01
Selenium	mg/L	0.15
Thallium	µg/L	< 0.001
Other Parameters		
Sulfate	mg/L	432
pH	--	5.07
Dissolved Oxygen	mg/L	7.25
Oxidation Reduction Potential	mV	228.0

Acronyms and Abbreviations:

< - Not detected at or above adjusted reporting limit

mg/L = milligrams per liter

mV = millivolts

USEPA = United States Environmental Protection Agency

Data Qualifier:

J - Estimated concentration.

Table 3
Experimental Design and Analyses Summary In Situ Reagents Bench-Scale Tests
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Condition	Test Description	Sample ID	Reagent Dose (grams)	Groundwater (liters)	Soil (grams)	Additional Dispersant (grams)	Dispersant % (wt/wt)	Timescale (days)	Analyses Completed
Control - No Iron Reagant	Control-1	Control-1-2	0	0.4	79.9	0	0	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Control-1-14			80.1			14	
Control - No Soil with High-dose CleanER-5 ZVI without dispersant	Control-2	Control-2	4.000	0.4	0	0	0	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Control-2			0			14	
High-dose CleanER-5 ZVI without dispersant	Batch-1	Batch-1-2	4.001	0.4	80.1	0	0	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Batch-1-14			80			14	
Low-dose CleanER-5 ZVI without dispersant	Batch-2	Batch-2-2	2.000	0.4	79.9	0	0	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Batch-2-14			80			14	
CleanER iZVI	Batch-3	Batch-3-2	10.0	0.4	80	0	1.3	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Batch-3-14			79.9			14	
CleanER-5 ZVI with 0.2% guar	Batch-4	Batch-4-2	4.000	0.4	80.1	0.802	0.2	2	T&D Metals (Appendix IV, Fe, Mn), Sulfate, Dissolved Oxygen, Oxidation-Reduction Potential
		Batch-4-14			79.9			14	

Notes:

Appendix IV constituents include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium and thallium. Mercury and radium were not evaluated.

% dispersant (i.e. guar) is calculated as weight (in grams) of guar per weight of the solution.

Fe = iron

Mn = manganese

wt = weight

T&D = total and dissolved

Table 4
In Situ Selenium Removal Effectiveness Test Analytical Results
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Description			Day 0		Day 2											
			Baseline Water		Control - PWR, No Reagant		Control - No PWR, High-Dose ZVI		High-Dose ZVI		Low-Dose ZVI		ZVI with glycerol		ZVI with guar	
Analyte	Result Units	GWPS (mg/L)*	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals USEPA 6020B - Total																
Antimony	mg/L	0.006	0.003	ND	0.0023	J	0.003	ND	0.003	ND	0.003	ND	0.0043		0.00086	J
Arsenic	mg/L	0.010	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Barium	mg/L	2.00	0.022		0.065		0.012		0.03		0.034		0.037		0.044	
Beryllium	mg/L	0.004	0.0012		0.00033	J	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.00012	J
Cadmium	mg/L	0.005	0.00086		0.00079		0.0005	ND	0.0005	ND	0.00032	J	0.0005	ND	0.00054	
Chromium	mg/L	0.100	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.0015	J
Cobalt	mg/L	0.035	0.00078	J	0.0067		0.002	J	0.005	ND	0.01		0.005	ND	0.0086	
Lead	mg/L	0.015	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Lithium	mg/L	0.040	0.012	J	0.0014	J	0.012	J	0.013	J	0.015	J	0.012	J	0.013	J
Molybdenum	mg/L	0.100	0.01	ND	0.016	J	0.01	ND	0.01	ND	0.01	ND	0.0015	J	0.01	ND
Selenium	mg/L	0.050	0.16		0.15		0.084		0.005	ND	0.15		0.0016	J	0.16	
Thallium	mg/L	0.002	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Metals USEPA 6020B - Dissolved																
Antimony	mg/L	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0084		0.0091	J B
Arsenic	mg/L	0.010	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND B
Barium	mg/L	2.00	0.021		0.062		0.012		0.03		0.035		0.028		0.036	B
Beryllium	mg/L	0.004	0.0011		0.00072	J	0.0005	ND	0.0005	ND	0.00014	J	0.000076	J	0.000058	J B
Cadmium	mg/L	0.005	0.00088		0.0008		0.0005	ND	0.0005	ND	0.00024	J	0.0005	ND	0.00044	J B
Chromium	mg/L	0.100	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND B
Cobalt	mg/L	0.035	0.00074	J	0.0069		0.002	J	0.005	ND	0.0096		0.005	ND	0.008	B
Iron	mg/L	0.30	0.04	ND	0.093		8.9		2.3		9.3		18.4		8.4	B
Lead	mg/L	0.015	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND B
Lithium	mg/L	0.040	0.013	J	0.017	J	0.013	J	0.014	J	0.015	J	0.012	J	0.012	J B
Manganese	mg/L	0.05	0.096		0.43		24.1		6.3		11.9		26.7		20.7	B
Molybdenum	mg/L	0.100	0.01	ND	0.0012	J	0.01	ND	0.01	ND	0.01	ND	0.0016	J	0.01	ND B
Selenium	mg/L	0.050	0.15		0.15		0.069		0.005	ND	0.15		0.005	ND	0.14	B
Thallium	mg/L	0.002	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND B
USEPA 300.0 Rev 2.1 1993																
Sulfate	mg/L	250	432		440		485		487		478		526		48.7	

See notes on last page.

Table 4
In Situ Selenium Removal Effectiveness Test Analytical Results
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

		Description	Day 14											
			Control - PWR, No Reagant		Control - No PWR, High-Dose ZVI		High-Dose ZVI		Low-Dose ZVI		ZVI with glycerol		ZVI with guar	
Analyte	Result Units	GWPS (mg/L)*	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals USEPA 6020B - Total														
Antimony	mg/L	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0068		0.003	ND
Arsenic	mg/L	0.010	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Barium	mg/L	2.00	0.039		0.031		0.029		0.02		0.02		0.04	
Beryllium	mg/L	0.004	0.00016	J	0.0005	ND	0.00013	J	0.00013	J	0.00012	J	0.0005	ND
Cadmium	mg/L	0.005	0.00065		0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chromium	mg/L	0.100	0.005	ND	0.005	ND	0.0012	J	0.0023	J	0.005	ND	0.005	ND
Cobalt	mg/L	0.035	0.015		0.005	ND	0.00098	J	0.005	ND	0.005	ND	0.005	ND
Lead	mg/L	0.015	0.001	ND	0.001	ND	0.0002	J	0.00039	J	0.001	ND	0.001	ND
Lithium	mg/L	0.040	0.019	J	0.015	J	0.0072	J	0.011	J	0.0087	J	0.014	J
Molybdenum	mg/L	0.100	0.0021	J	0.01	ND	0.01	ND	0.01	ND	0.0011	J	0.01	ND
Selenium	mg/L	0.050	0.14		0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Thallium	mg/L	0.002	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Metals USEPA 6020B - Dissolved														
Antimony	mg/L	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.0022	J	0.003	ND B
Arsenic	mg/L	0.010	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND B
Barium	mg/L	2.00	0.08		0.03		0.024		0.021		0.02		0.04	B
Beryllium	mg/L	0.004	0.00031	J	0.000099	J	0.0005	ND	0.000059	J	0.0005	ND	0.0005	ND B
Cadmium	mg/L	0.005	0.00065		0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND B
Chromium	mg/L	0.100	0.0053		0.005	ND	0.005	ND	0.005	ND	0.0013	J	0.005	ND B
Cobalt	mg/L	0.035	0.017		0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND B
Iron	mg/L	0.30	4.9	A	21.9	A	0.82	A	5.6	A	5.7	A	7.9	M1 A B
Lead	mg/L	0.015	0.0011		0.001	ND	0.00012	J	0.001	ND	0.001	ND	0.001	ND B
Lithium	mg/L	0.040	0.022	J	0.014	J	0.0064	J	0.011	J	0.0076	J	0.014	J B
Manganese	mg/L	0.05	0.66	A	2	A	0.037	J A	0.32	A	0.93	A	7.7	M1 A B
Molybdenum	mg/L	0.100	0.0031	J	0.01	ND	0.01	ND	0.01	ND	0.0011	J	0.01	ND B
Selenium	mg/L	0.050	0.15		0.005	ND	0.005	ND	0.005	ND	0.0084		0.005	ND B
Thallium	mg/L	0.002	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND B
USEPA 300.0 Rev 2.1 1993														
Sulfate	mg/L	250	461		476		292		423		363		506	

See notes on last page.

Table 4
In Situ Injection Treatability Study Analytical Results
Plant Yates R6 CCR Landfill
Newnan, Georgia

Notes:

*Secondary Maximum Contaminant Limits were used for iron, manganese, and sulfate.

Acronyms and Abbreviations:

GWPS = groundwater protection standards

mg/L = milligram per liter

ND = Not detected at or above adjusted reporting limit

Q = Data Qualifier

USEPA = United States Environmental Protection Agency

Data Qualifier:

A = Run by USEPA Method 6010D to meet reporting limit standards.

B = Field filtered through 0.45 micron Stericup rather than 0.45 micron polyethersulfone (PES) filter.

D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = Estimated concentration.

M1 = Matrix spike recovery exceeded quality control limits. Batch accepted based on laboratory control sample recovery.

Table 5
In Situ Selenium Removal Effectiveness Test Water Quality Parameter Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Condition	Test Description	Sample ID	Elapsed Time (days)	Dissolved Oxygen (milligrams per liter)	Oxidation Reduction Potential (millivolts)
Baseline Composite	Composite-1	Composite-1-0	0	7.25	228.0
Control - No Iron Reagant	Control-1	Control-1-2	2	8.16	184.2
		Control-1-14	14	6.60	127.7
Control - No Soil with High-dose CleanER-5 ZVI without dispersant	Control-2	Control-2	2	4.56	70.6
		Control-2	14	3.24	-60.2
High-dose CleanER-5 ZVI without dispersant	Batch-1	Batch-1-2	2	3.95	-169.0
		Batch-1-14	14	2.41	-209.5
Low-dose CleanER-5 ZVI without dispersant	Batch-2	Batch-2-2	2	5.59	-4.1
		Batch-2-14	14	2.10	-178.0
ZVI with glycerol	Batch-3	Batch-3-2	2	2.30	-270.2
		Batch-3-14	14	2.21	-184.5
ZVI with guar	Batch-4	Batch-4-2	2	6.59	23.7
		Batch-4-14	14	1.67	-137.2

Figures

84°54'35"W 84°54'30"W 84°54'25"W 84°54'20"W 84°54'15"W 84°54'10"W 84°54'5"W 84°54'0"W 84°53'55"W 84°53'50"W 84°53'45"W 84°53'40"W 84°53'35"W 84°53'30"W 84°53'25"W 84°53'20"W 84°53'15"W 84°53'10"W 84°53'5"W 84°53'0"W 84°52'55"W 84°52'50"W 84°52'45"W 84°52'40"W 84°52'35"W 84°52'30"W 84°52'25"W

33°27'45"N
33°27'40"N
33°27'35"N
33°27'30"N
33°27'25"N
33°27'20"N
33°27'15"N
33°27'10"N
33°27'5"N
33°27'0"N
33°26'55"N
33°26'50"N
33°26'45"N

N

ASH POND 2

FORMER ASH POND A

ASH POND B

ASH POND B'

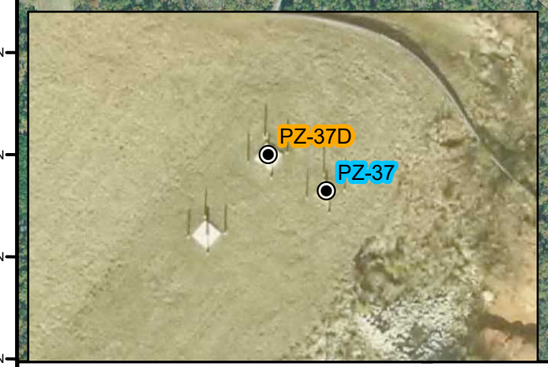
R6 ASH DISPOSAL AREA

ASH POND 3

ASH MANAGEMENT AREA

PZ-37D

PZ-37



LEGEND

- PERMITTED UNIT BOUNDARY
- BEDROCK ASSESSMENT WELL/PIEZOMETER
- PZ-37 GROUNDWATER TREATABILITY STUDY COLLECTION LOCATION
- PZ-37D PARTIALLY WEATHERED BEDROCK TREATABILITY STUDY COLLECTION LOCATION

0 30 60
INSET MAIN GRAPHIC SCALE IN FEET

0 750 1,500
MAIN MAIN GRAPHIC SCALE IN FEET

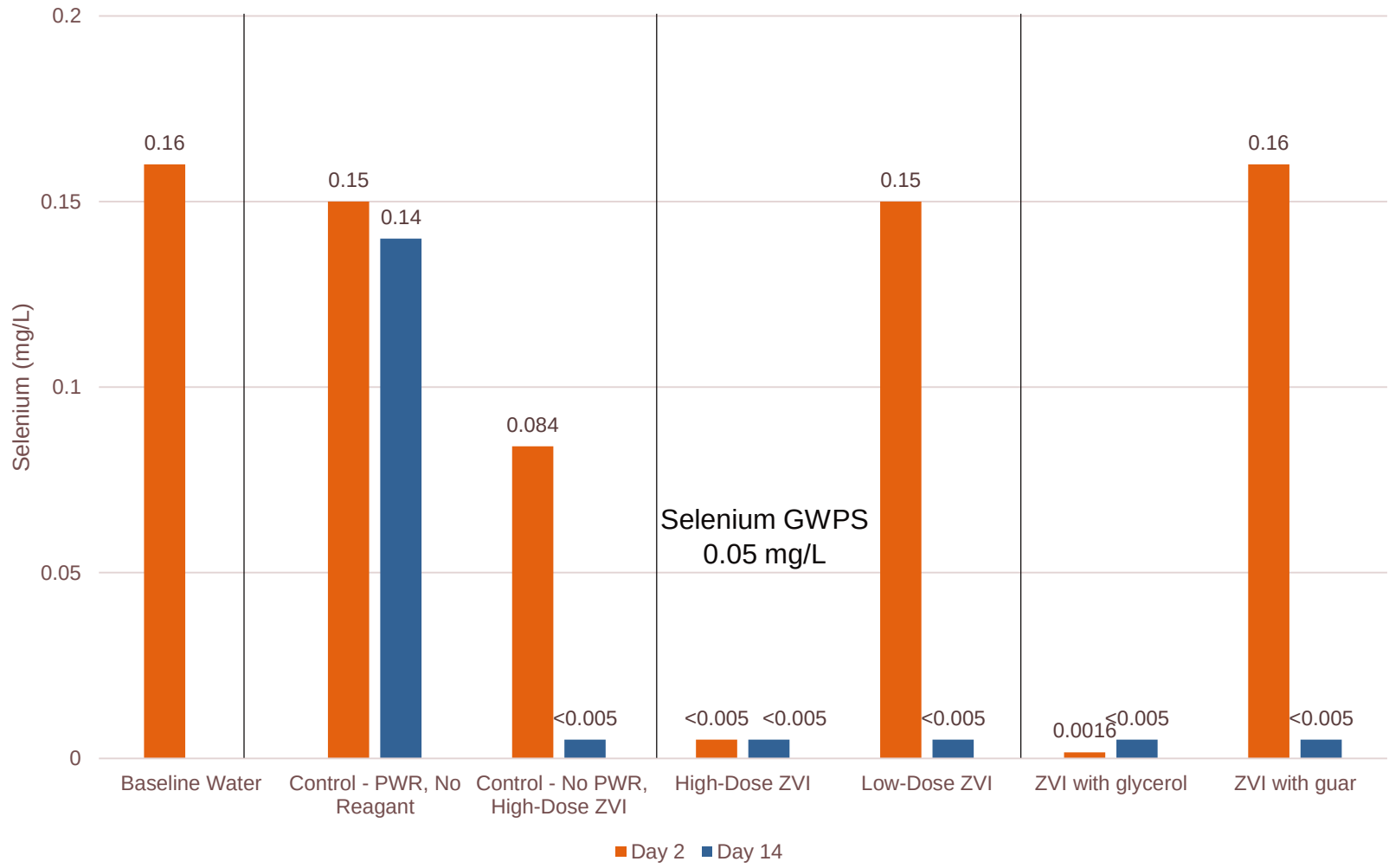
Georgia Power

PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA

BENCH-SCALE PARTIALLY WEATHERED ROCK AND GROUNDWATER COLLECTION LOCATIONS

ARCADIS

FIGURE
1



Notes:
GWPS –Protection Standard
mg/L – milligrams per liter
PWR – Partially Weathered Rock
ZVI – Zero Valent Iron
< - Result was not detected, method detection limit shown
J – Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

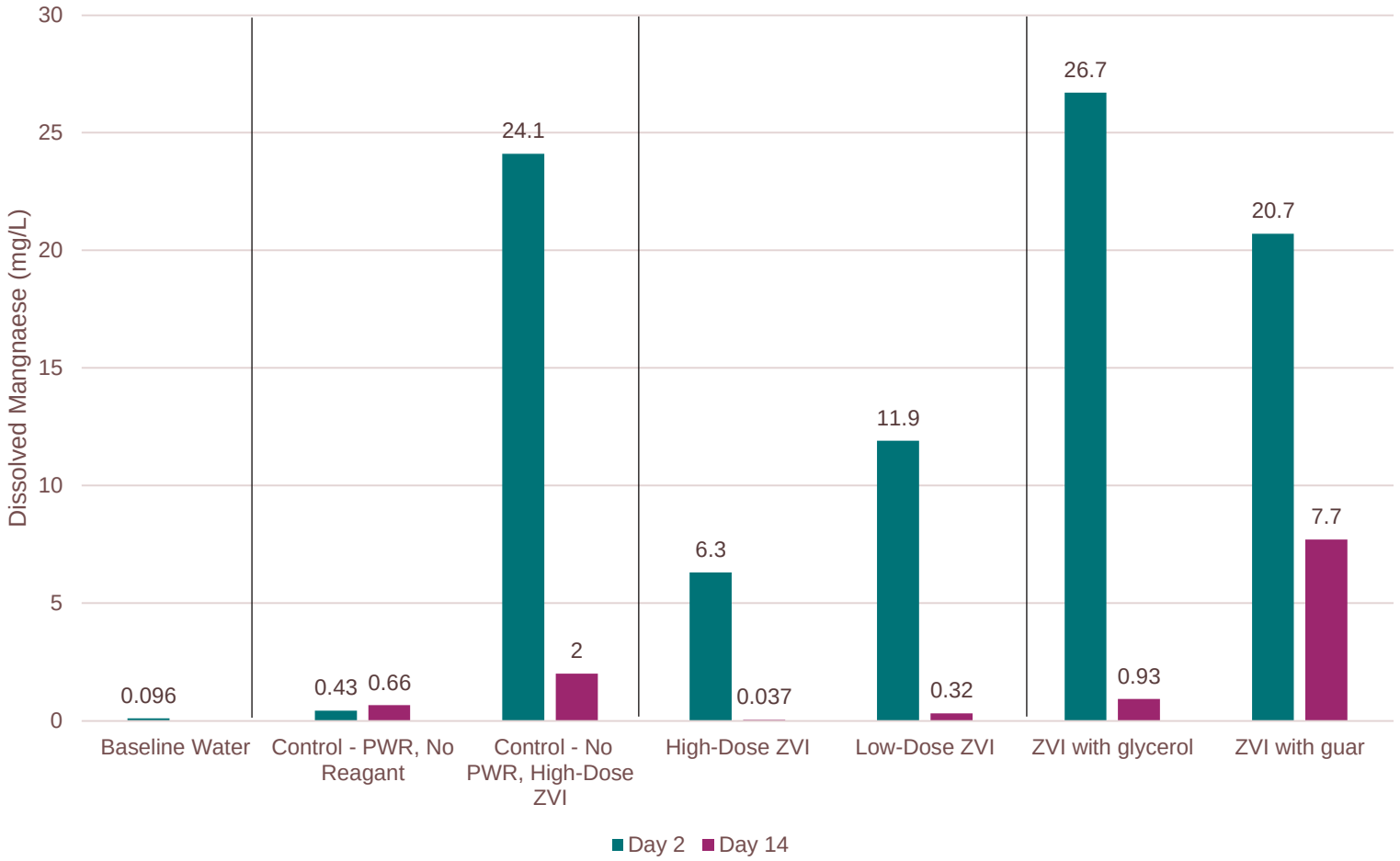
GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL, NEWNAN, GEORGIA

IN SITU REAGENTS BENCH-SCALE RESULTS FOR SELENIUM

ARCADIS

FIGURE 2

Bench-Scale Investigation and Analysis Results Plant Yates – AP-3, A, B, B' and R6 CCR Landfill



Notes:
GWPS –Protection Standard
mg/L – milligram per liter
PWR – Partially Weathered Rock
ZVI – Zero Valent Iron
< - Result was not detected, method detection limit shown
J – Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL, NEWNAN, GEORGIA

IN SITU REAGENT BENCH-SCALE RESULTS FOR POTENTIAL BYPRODUCTS

ARCADIS

FIGURE 3

Bench-Scale Investigation and Analysis Results Plant Yates – AP-3, A, B, B' and R6 CCR Landfill

Attachment

Lab Reports

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

May 23, 2023

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on May 12, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Asheville
- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
(704)875-9092
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Pace Analytical Services Asheville
2225 Riverside Drive, Asheville, NC 28804
Florida/NELAP Certification #: E87648
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Laboratory ID: 99030
South Carolina Certification #: 99030001
Virginia/VELAP Certification #: 460222

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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SAMPLE SUMMARY

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92667288001	**COMPOSITE-1-0**	Water	05/10/23 00:00	05/12/23 00:00
92667288002	**CONTROL-1-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288003	**CONTROL-2-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288004	**BATCH-1-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288005	**BATCH-2-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288006	**BATCH-3-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288007	**BATCH-4-2**	Water	05/12/23 00:00	05/12/23 00:00
92667288008	**BATCH-5-2**	Water	05/12/23 00:00	05/12/23 00:00

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SAMPLE ANALYTE COUNT

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92667288001	**COMPOSITE-1-0**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288002	**CONTROL-1-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288003	**CONTROL-2-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288004	**BATCH-1-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288005	**BATCH-2-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288006	**BATCH-3-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288007	**BATCH-4-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1
92667288008	**BATCH-5-2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
		EPA 300.0 Rev 2.1 1993	CDC	1

PASI-A = Pace Analytical Services - Asheville
PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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Huntersville, NC 28078
(704)875-9092

SUMMARY OF DETECTION

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92667288001	**COMPOSITE-1-0**					
EPA 6020B	Barium	0.022	mg/L	0.0050	05/16/23 22:26	
EPA 6020B	Beryllium	0.0012	mg/L	0.00050	05/17/23 13:08	
EPA 6020B	Cadmium	0.00086	mg/L	0.00050	05/16/23 22:26	
EPA 6020B	Cobalt	0.00078J	mg/L	0.0050	05/16/23 22:26	
EPA 6020B	Lithium	0.012J	mg/L	0.030	05/16/23 22:26	
EPA 6020B	Selenium	0.16	mg/L	0.0050	05/16/23 22:26	
EPA 6020B	Barium, Dissolved	0.021	mg/L	0.0050	05/16/23 20:45	
EPA 6020B	Beryllium, Dissolved	0.0011	mg/L	0.00050	05/17/23 15:19	
EPA 6020B	Cadmium, Dissolved	0.00088	mg/L	0.00050	05/16/23 20:45	
EPA 6020B	Cobalt, Dissolved	0.00074J	mg/L	0.0050	05/16/23 20:45	
EPA 6020B	Lithium, Dissolved	0.013J	mg/L	0.030	05/16/23 20:45	
EPA 6020B	Manganese, Dissolved	0.096	mg/L	0.010	05/16/23 20:45	
EPA 6020B	Selenium, Dissolved	0.15	mg/L	0.0050	05/16/23 20:45	
EPA 300.0 Rev 2.1 1993	Sulfate	432	mg/L	9.0	05/17/23 02:00	
92667288002	**CONTROL-1-2**					
EPA 6020B	Antimony	0.0023J	mg/L	0.0030	05/16/23 22:50	
EPA 6020B	Barium	0.065	mg/L	0.0050	05/16/23 22:50	
EPA 6020B	Beryllium	0.00033J	mg/L	0.00050	05/17/23 13:26	
EPA 6020B	Cadmium	0.00079	mg/L	0.00050	05/16/23 22:50	
EPA 6020B	Cobalt	0.0067	mg/L	0.0050	05/16/23 22:50	
EPA 6020B	Lithium	0.016J	mg/L	0.030	05/16/23 22:50	
EPA 6020B	Molybdenum	0.0014J	mg/L	0.010	05/16/23 22:50	
EPA 6020B	Selenium	0.15	mg/L	0.0050	05/16/23 22:50	
EPA 6020B	Barium, Dissolved	0.062	mg/L	0.0050	05/16/23 20:51	
EPA 6020B	Beryllium, Dissolved	0.00027J	mg/L	0.00050	05/17/23 15:25	
EPA 6020B	Cadmium, Dissolved	0.00080	mg/L	0.00050	05/16/23 20:51	
EPA 6020B	Cobalt, Dissolved	0.0069	mg/L	0.0050	05/16/23 20:51	
EPA 6020B	Iron, Dissolved	0.093	mg/L	0.040	05/16/23 20:51	
EPA 6020B	Lithium, Dissolved	0.017J	mg/L	0.030	05/16/23 20:51	
EPA 6020B	Manganese, Dissolved	0.43	mg/L	0.010	05/16/23 20:51	
EPA 6020B	Molybdenum, Dissolved	0.0012J	mg/L	0.010	05/16/23 20:51	
EPA 6020B	Selenium, Dissolved	0.15	mg/L	0.0050	05/16/23 20:51	
EPA 300.0 Rev 2.1 1993	Sulfate	440	mg/L	10.0	05/17/23 02:16	
92667288003	**CONTROL-2-2**					
EPA 6020B	Barium	0.012	mg/L	0.0050	05/16/23 22:56	
EPA 6020B	Cobalt	0.0020J	mg/L	0.0050	05/16/23 22:56	
EPA 6020B	Lithium	0.012J	mg/L	0.030	05/16/23 22:56	
EPA 6020B	Selenium	0.084	mg/L	0.0050	05/16/23 22:56	
EPA 6020B	Barium, Dissolved	0.012	mg/L	0.0050	05/16/23 21:09	
EPA 6020B	Cobalt, Dissolved	0.0020J	mg/L	0.0050	05/16/23 21:09	
EPA 6020B	Iron, Dissolved	8.9	mg/L	0.040	05/16/23 21:09	
EPA 6020B	Lithium, Dissolved	0.013J	mg/L	0.030	05/16/23 21:09	
EPA 6020B	Manganese, Dissolved	24.1	mg/L	0.50	05/17/23 15:37	
EPA 6020B	Selenium, Dissolved	0.089	mg/L	0.0050	05/16/23 21:09	
EPA 300.0 Rev 2.1 1993	Sulfate	485	mg/L	11.0	05/17/23 02:32	

REPORT OF LABORATORY ANALYSIS

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Huntersville, NC 28078
(704)875-9092

SUMMARY OF DETECTION

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92667288004	**BATCH-1-2**					
EPA 6020B	Barium	0.030	mg/L	0.0050	05/16/23 23:02	
EPA 6020B	Lithium	0.013J	mg/L	0.030	05/16/23 23:02	
EPA 6020B	Barium, Dissolved	0.030	mg/L	0.0050	05/16/23 21:14	
EPA 6020B	Iron, Dissolved	2.3	mg/L	0.040	05/16/23 21:14	
EPA 6020B	Lithium, Dissolved	0.014J	mg/L	0.030	05/16/23 21:14	
EPA 6020B	Manganese, Dissolved	6.3	mg/L	0.10	05/17/23 15:48	
EPA 300.0 Rev 2.1 1993	Sulfate	487	mg/L	11.0	05/17/23 04:11	
92667288005	**BATCH-2-2**					
EPA 6020B	Barium	0.034	mg/L	0.0050	05/16/23 23:20	
EPA 6020B	Cadmium	0.00032J	mg/L	0.00050	05/16/23 23:20	
EPA 6020B	Cobalt	0.010	mg/L	0.0050	05/16/23 23:20	
EPA 6020B	Lithium	0.015J	mg/L	0.030	05/16/23 23:20	
EPA 6020B	Selenium	0.15	mg/L	0.0050	05/16/23 23:20	
EPA 6020B	Barium, Dissolved	0.035	mg/L	0.0050	05/16/23 21:20	
EPA 6020B	Beryllium, Dissolved	0.00014J	mg/L	0.00050	05/17/23 15:54	
EPA 6020B	Cadmium, Dissolved	0.00024J	mg/L	0.00050	05/16/23 21:20	
EPA 6020B	Cobalt, Dissolved	0.0096	mg/L	0.0050	05/16/23 21:20	
EPA 6020B	Iron, Dissolved	9.3	mg/L	0.040	05/16/23 21:20	
EPA 6020B	Lithium, Dissolved	0.015J	mg/L	0.030	05/16/23 21:20	
EPA 6020B	Manganese, Dissolved	11.9	mg/L	0.50	05/17/23 16:00	
EPA 6020B	Selenium, Dissolved	0.15	mg/L	0.0050	05/16/23 21:20	
EPA 300.0 Rev 2.1 1993	Sulfate	478	mg/L	10.0	05/17/23 04:27	
92667288006	**BATCH-3-2**					
EPA 6020B	Antimony	0.0043	mg/L	0.0030	05/16/23 23:26	
EPA 6020B	Barium	0.027	mg/L	0.0050	05/16/23 23:26	
EPA 6020B	Lithium	0.012J	mg/L	0.030	05/16/23 23:26	
EPA 6020B	Molybdenum	0.0015J	mg/L	0.010	05/16/23 23:26	
EPA 6020B	Selenium	0.0016J	mg/L	0.0050	05/16/23 23:26	
EPA 6020B	Antimony, Dissolved	0.0084	mg/L	0.0030	05/16/23 21:26	
EPA 6020B	Barium, Dissolved	0.028	mg/L	0.0050	05/16/23 21:26	
EPA 6020B	Beryllium, Dissolved	0.000067J	mg/L	0.00050	05/17/23 16:18	
EPA 6020B	Iron, Dissolved	18.4	mg/L	2.0	05/17/23 16:24	
EPA 6020B	Lithium, Dissolved	0.012J	mg/L	0.030	05/16/23 21:26	
EPA 6020B	Manganese, Dissolved	26.7	mg/L	0.50	05/17/23 16:24	
EPA 6020B	Molybdenum, Dissolved	0.0016J	mg/L	0.010	05/16/23 21:26	
EPA 300.0 Rev 2.1 1993	Sulfate	526	mg/L	12.0	05/17/23 04:43	
92667288007	**BATCH-4-2**					
EPA 6020B	Antimony	0.00086J	mg/L	0.0030	05/16/23 23:32	
EPA 6020B	Barium	0.044	mg/L	0.0050	05/16/23 23:32	
EPA 6020B	Beryllium	0.00012J	mg/L	0.00050	05/16/23 23:32	
EPA 6020B	Cadmium	0.00054	mg/L	0.00050	05/16/23 23:32	
EPA 6020B	Chromium	0.0015J	mg/L	0.0050	05/16/23 23:32	
EPA 6020B	Cobalt	0.0086	mg/L	0.0050	05/16/23 23:32	
EPA 6020B	Lithium	0.013J	mg/L	0.030	05/16/23 23:32	
EPA 6020B	Selenium	0.16	mg/L	0.0050	05/16/23 23:32	
EPA 6020B	Antimony, Dissolved	0.00091J	mg/L	0.0030	05/16/23 21:32	

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SUMMARY OF DETECTION

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92667288007	**BATCH-4-2**					
EPA 6020B	Barium, Dissolved	0.036	mg/L	0.0050	05/16/23 21:32	
EPA 6020B	Beryllium, Dissolved	0.000058J	mg/L	0.00050	05/17/23 16:30	
EPA 6020B	Cadmium, Dissolved	0.00044J	mg/L	0.00050	05/16/23 21:32	
EPA 6020B	Cobalt, Dissolved	0.0080	mg/L	0.0050	05/16/23 21:32	
EPA 6020B	Iron, Dissolved	8.4	mg/L	0.040	05/16/23 21:32	
EPA 6020B	Lithium, Dissolved	0.012J	mg/L	0.030	05/16/23 21:32	
EPA 6020B	Manganese, Dissolved	20.7	mg/L	0.50	05/17/23 16:36	
EPA 6020B	Selenium, Dissolved	0.14	mg/L	0.0050	05/16/23 21:32	
EPA 300.0 Rev 2.1 1993	Sulfate	48.7	mg/L	1.0	05/16/23 21:09	
92667288008	**BATCH-5-2**					
EPA 6020B	Barium	0.085	mg/L	0.025	05/16/23 23:38	
EPA 6020B	Beryllium	0.0018J	mg/L	0.0025	05/17/23 14:57	D3
EPA 6020B	Cadmium	0.0018J	mg/L	0.0025	05/16/23 23:38	
EPA 6020B	Chromium	0.017J	mg/L	0.025	05/16/23 23:38	
EPA 6020B	Cobalt	0.049	mg/L	0.025	05/16/23 23:38	
EPA 6020B	Lithium	0.024J	mg/L	0.15	05/16/23 23:38	
EPA 6020B	Selenium	0.16	mg/L	0.025	05/16/23 23:38	
EPA 6020B	Barium, Dissolved	0.080	mg/L	0.025	05/16/23 21:38	
EPA 6020B	Beryllium, Dissolved	0.0020J	mg/L	0.0025	05/17/23 16:42	D3
EPA 6020B	Cadmium, Dissolved	0.0018J	mg/L	0.0025	05/16/23 21:38	D3
EPA 6020B	Chromium, Dissolved	0.013J	mg/L	0.025	05/16/23 21:38	D3
EPA 6020B	Cobalt, Dissolved	0.048	mg/L	0.025	05/16/23 21:38	
EPA 6020B	Iron, Dissolved	3370	mg/L	20.0	05/17/23 16:54	
EPA 6020B	Lithium, Dissolved	0.024J	mg/L	0.15	05/16/23 21:38	D3
EPA 6020B	Manganese, Dissolved	15.3	mg/L	0.50	05/17/23 16:48	
EPA 6020B	Selenium, Dissolved	0.15	mg/L	0.025	05/16/23 21:38	
EPA 300.0 Rev 2.1 1993	Sulfate	7090	mg/L	100	05/17/23 04:58	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: COMPOSITE-1-0 **Lab ID: 92667288001** Collected: 05/10/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 22:26	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 22:26	7440-38-2	
Barium	**0.022**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 22:26	7440-39-3	
Beryllium	**0.0012**	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/17/23 13:08	7440-41-7	
Cadmium	**0.00086**	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 22:26	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 22:26	7440-47-3	
Cobalt	**0.00078J**	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 22:26	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 22:26	7439-92-1	
Lithium	**0.012J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 22:26	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 22:26	7439-98-7	
Selenium	**0.16**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 22:26	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 22:26	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 20:45	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 20:45	7440-38-2	
Barium, Dissolved	**0.021**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 20:45	7440-39-3	
Beryllium, Dissolved	**0.0011**	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 15:19	7440-41-7	
Cadmium, Dissolved	**0.00088**	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 20:45	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 20:45	7440-47-3	
Cobalt, Dissolved	**0.00074J**	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 20:45	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 20:45	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 20:45	7439-92-1	
Lithium, Dissolved	**0.013J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 20:45	7439-93-2	
Manganese, Dissolved	**0.096**	mg/L	0.010	0.0011	1	05/15/23 09:41	05/16/23 20:45	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 20:45	7439-98-7	
Selenium, Dissolved	**0.15**	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 20:45	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 20:45	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**432**	mg/L	9.0	4.5	9		05/17/23 02:00	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: CONTROL-1-2 **Lab ID: 92667288002** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0023J**	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 22:50	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 22:50	7440-38-2	
Barium	**0.065**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 22:50	7440-39-3	
Beryllium	**0.00033J**	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/17/23 13:26	7440-41-7	
Cadmium	**0.00079**	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 22:50	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 22:50	7440-47-3	
Cobalt	**0.0067**	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 22:50	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 22:50	7439-92-1	
Lithium	**0.016J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 22:50	7439-93-2	
Molybdenum	**0.0014J**	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 22:50	7439-98-7	
Selenium	**0.15**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 22:50	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 22:50	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 20:51	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 20:51	7440-38-2	
Barium, Dissolved	**0.062**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 20:51	7440-39-3	
Beryllium, Dissolved	**0.00027J**	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 15:25	7440-41-7	
Cadmium, Dissolved	**0.00080**	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 20:51	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 20:51	7440-47-3	
Cobalt, Dissolved	**0.0069**	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 20:51	7440-48-4	
Iron, Dissolved	**0.093**	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 20:51	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 20:51	7439-92-1	
Lithium, Dissolved	**0.017J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 20:51	7439-93-2	
Manganese, Dissolved	**0.43**	mg/L	0.010	0.0011	1	05/15/23 09:41	05/16/23 20:51	7439-96-5	
Molybdenum, Dissolved	**0.0012J**	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 20:51	7439-98-7	
Selenium, Dissolved	**0.15**	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 20:51	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 20:51	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**440**	mg/L	10.0	5.0	10		05/17/23 02:16	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: CONTROL-2-2 **Lab ID: 92667288003** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 22:56	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 22:56	7440-38-2	
Barium	**0.012**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 22:56	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/17/23 13:32	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 22:56	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 22:56	7440-47-3	
Cobalt	**0.0020J**	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 22:56	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 22:56	7439-92-1	
Lithium	**0.012J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 22:56	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 22:56	7439-98-7	
Selenium	**0.084**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 22:56	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 22:56	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 21:09	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 21:09	7440-38-2	
Barium, Dissolved	**0.012**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 21:09	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 15:31	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 21:09	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 21:09	7440-47-3	
Cobalt, Dissolved	**0.0020J**	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 21:09	7440-48-4	
Iron, Dissolved	**8.9**	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 21:09	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 21:09	7439-92-1	
Lithium, Dissolved	**0.013J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 21:09	7439-93-2	
Manganese, Dissolved	**24.1**	mg/L	0.50	0.057	50	05/15/23 09:41	05/17/23 15:37	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 21:09	7439-98-7	
Selenium, Dissolved	**0.089**	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 21:09	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 21:09	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**485**	mg/L	11.0	5.5	11		05/17/23 02:32	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: BATCH-1-2 **Lab ID: 92667288004** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 23:02	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 23:02	7440-38-2	
Barium	**0.030**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 23:02	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/17/23 13:43	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 23:02	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 23:02	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 23:02	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 23:02	7439-92-1	
Lithium	**0.013J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 23:02	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 23:02	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 23:02	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 23:02	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 21:14	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 21:14	7440-38-2	
Barium, Dissolved	**0.030**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 21:14	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 15:43	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 21:14	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 21:14	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 21:14	7440-48-4	
Iron, Dissolved	**2.3**	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 21:14	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 21:14	7439-92-1	
Lithium, Dissolved	**0.014J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 21:14	7439-93-2	
Manganese, Dissolved	**6.3**	mg/L	0.10	0.011	10	05/15/23 09:41	05/17/23 15:48	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 21:14	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 21:14	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 21:14	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**487**	mg/L	11.0	5.5	11		05/17/23 04:11	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: BATCH-2-2 **Lab ID: 92667288005** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 23:20	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 23:20	7440-38-2	
Barium	**0.034**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 23:20	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/16/23 23:20	7440-41-7	
Cadmium	**0.00032J**	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 23:20	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 23:20	7440-47-3	
Cobalt	**0.010**	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 23:20	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 23:20	7439-92-1	
Lithium	**0.015J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 23:20	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 23:20	7439-98-7	
Selenium	**0.15**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 23:20	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 23:20	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 21:20	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 21:20	7440-38-2	
Barium, Dissolved	**0.035**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 21:20	7440-39-3	
Beryllium, Dissolved	**0.00014J**	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 15:54	7440-41-7	
Cadmium, Dissolved	**0.00024J**	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 21:20	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 21:20	7440-47-3	
Cobalt, Dissolved	**0.0096**	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 21:20	7440-48-4	
Iron, Dissolved	**9.3**	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 21:20	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 21:20	7439-92-1	
Lithium, Dissolved	**0.015J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 21:20	7439-93-2	
Manganese, Dissolved	**11.9**	mg/L	0.50	0.057	50	05/15/23 09:41	05/17/23 16:00	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 21:20	7439-98-7	
Selenium, Dissolved	**0.15**	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 21:20	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 21:20	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**478**	mg/L	10.0	5.0	10		05/17/23 04:27	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: BATCH-3-2 **Lab ID: 92667288006** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0043**	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 23:26	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 23:26	7440-38-2	
Barium	**0.027**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 23:26	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/16/23 23:26	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 23:26	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 23:26	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 23:26	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 23:26	7439-92-1	
Lithium	**0.012J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 23:26	7439-93-2	
Molybdenum	**0.0015J**	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 23:26	7439-98-7	
Selenium	**0.0016J**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 23:26	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 23:26	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0084**	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 21:26	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 21:26	7440-38-2	
Barium, Dissolved	**0.028**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 21:26	7440-39-3	
Beryllium, Dissolved	**0.000067J**	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 16:18	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 21:26	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 21:26	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 21:26	7440-48-4	
Iron, Dissolved	**18.4**	mg/L	2.0	1.5	50	05/15/23 09:41	05/17/23 16:24	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 21:26	7439-92-1	
Lithium, Dissolved	**0.012J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 21:26	7439-93-2	
Manganese, Dissolved	**26.7**	mg/L	0.50	0.057	50	05/15/23 09:41	05/17/23 16:24	7439-96-5	
Molybdenum, Dissolved	**0.0016J**	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 21:26	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 21:26	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 21:26	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**526**	mg/L	12.0	6.0	12		05/17/23 04:43	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: BATCH-4-2 **Lab ID: 92667288007** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.00086J**	mg/L	0.0030	0.00078	1	05/16/23 10:20	05/16/23 23:32	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0022	1	05/16/23 10:20	05/16/23 23:32	7440-38-2	
Barium	**0.044**	mg/L	0.0050	0.00067	1	05/16/23 10:20	05/16/23 23:32	7440-39-3	
Beryllium	**0.00012J**	mg/L	0.00050	0.000054	1	05/16/23 10:20	05/16/23 23:32	7440-41-7	
Cadmium	**0.00054**	mg/L	0.00050	0.00011	1	05/16/23 10:20	05/16/23 23:32	7440-43-9	
Chromium	**0.0015J**	mg/L	0.0050	0.0011	1	05/16/23 10:20	05/16/23 23:32	7440-47-3	
Cobalt	**0.0086**	mg/L	0.0050	0.00039	1	05/16/23 10:20	05/16/23 23:32	7440-48-4	
Lead	ND	mg/L	0.0010	0.00089	1	05/16/23 10:20	05/16/23 23:32	7439-92-1	
Lithium	**0.013J**	mg/L	0.030	0.00073	1	05/16/23 10:20	05/16/23 23:32	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/16/23 10:20	05/16/23 23:32	7439-98-7	
Selenium	**0.16**	mg/L	0.0050	0.0014	1	05/16/23 10:20	05/16/23 23:32	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/16/23 10:20	05/16/23 23:32	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00091J**	mg/L	0.0030	0.00078	1	05/15/23 09:41	05/16/23 21:32	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0022	1	05/15/23 09:41	05/16/23 21:32	7440-38-2	
Barium, Dissolved	**0.036**	mg/L	0.0050	0.00067	1	05/15/23 09:41	05/16/23 21:32	7440-39-3	
Beryllium, Dissolved	**0.000058J**	mg/L	0.00050	0.000054	1	05/15/23 09:41	05/17/23 16:30	7440-41-7	
Cadmium, Dissolved	**0.00044J**	mg/L	0.00050	0.00011	1	05/15/23 09:41	05/16/23 21:32	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/15/23 09:41	05/16/23 21:32	7440-47-3	
Cobalt, Dissolved	**0.0080**	mg/L	0.0050	0.00039	1	05/15/23 09:41	05/16/23 21:32	7440-48-4	
Iron, Dissolved	**8.4**	mg/L	0.040	0.030	1	05/15/23 09:41	05/16/23 21:32	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00089	1	05/15/23 09:41	05/16/23 21:32	7439-92-1	
Lithium, Dissolved	**0.012J**	mg/L	0.030	0.00073	1	05/15/23 09:41	05/16/23 21:32	7439-93-2	
Manganese, Dissolved	**20.7**	mg/L	0.50	0.057	50	05/15/23 09:41	05/17/23 16:36	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/15/23 09:41	05/16/23 21:32	7439-98-7	
Selenium, Dissolved	**0.14**	mg/L	0.0050	0.0014	1	05/15/23 09:41	05/16/23 21:32	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/15/23 09:41	05/16/23 21:32	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**48.7**	mg/L	1.0	0.50	1		05/16/23 21:09	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Sample: BATCH-5-2 **Lab ID: 92667288008** Collected: 05/12/23 00:00 Received: 05/12/23 00:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.015	0.0039	5	05/16/23 10:20	05/16/23 23:38	7440-36-0	
Arsenic	ND	mg/L	0.025	0.011	5	05/16/23 10:20	05/16/23 23:38	7440-38-2	
Barium	**0.085**	mg/L	0.025	0.0034	5	05/16/23 10:20	05/16/23 23:38	7440-39-3	
Beryllium	**0.0018J**	mg/L	0.0025	0.00027	5	05/16/23 10:20	05/17/23 14:57	7440-41-7	D3
Cadmium	**0.0018J**	mg/L	0.0025	0.00057	5	05/16/23 10:20	05/16/23 23:38	7440-43-9	
Chromium	**0.017J**	mg/L	0.025	0.0055	5	05/16/23 10:20	05/16/23 23:38	7440-47-3	
Cobalt	**0.049**	mg/L	0.025	0.0020	5	05/16/23 10:20	05/16/23 23:38	7440-48-4	
Lead	ND	mg/L	0.0050	0.0044	5	05/16/23 10:20	05/16/23 23:38	7439-92-1	
Lithium	**0.024J**	mg/L	0.15	0.0036	5	05/16/23 10:20	05/16/23 23:38	7439-93-2	
Molybdenum	ND	mg/L	0.050	0.0037	5	05/16/23 10:20	05/16/23 23:38	7439-98-7	
Selenium	**0.16**	mg/L	0.025	0.0068	5	05/16/23 10:20	05/16/23 23:38	7782-49-2	
Thallium	ND	mg/L	0.0050	0.00090	5	05/16/23 10:20	05/16/23 23:38	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.015	0.0039	5	05/15/23 09:41	05/16/23 21:38	7440-36-0	D3
Arsenic, Dissolved	ND	mg/L	0.025	0.011	5	05/15/23 09:41	05/16/23 21:38	7440-38-2	D3
Barium, Dissolved	**0.080**	mg/L	0.025	0.0034	5	05/15/23 09:41	05/16/23 21:38	7440-39-3	
Beryllium, Dissolved	**0.0020J**	mg/L	0.0025	0.00027	5	05/15/23 09:41	05/17/23 16:42	7440-41-7	D3
Cadmium, Dissolved	**0.0018J**	mg/L	0.0025	0.00057	5	05/15/23 09:41	05/16/23 21:38	7440-43-9	D3
Chromium, Dissolved	**0.013J**	mg/L	0.025	0.0055	5	05/15/23 09:41	05/16/23 21:38	7440-47-3	D3
Cobalt, Dissolved	**0.048**	mg/L	0.025	0.0020	5	05/15/23 09:41	05/16/23 21:38	7440-48-4	
Iron, Dissolved	**3370**	mg/L	20.0	14.8	500	05/15/23 09:41	05/17/23 16:54	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0050	0.0044	5	05/15/23 09:41	05/16/23 21:38	7439-92-1	D3
Lithium, Dissolved	**0.024J**	mg/L	0.15	0.0036	5	05/15/23 09:41	05/16/23 21:38	7439-93-2	D3
Manganese, Dissolved	**15.3**	mg/L	0.50	0.057	50	05/15/23 09:41	05/17/23 16:48	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.050	0.0037	5	05/15/23 09:41	05/16/23 21:38	7439-98-7	D3
Selenium, Dissolved	**0.15**	mg/L	0.025	0.0068	5	05/15/23 09:41	05/16/23 21:38	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0050	0.00090	5	05/15/23 09:41	05/16/23 21:38	7440-28-0	D3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**7090**	mg/L	100	50.0	100		05/17/23 04:58	14808-79-8	

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

QC Batch: 774676
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

METHOD BLANK: 4020137 Matrix: Water
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0030	0.00078	05/16/23 22:08	
Arsenic	mg/L	ND	0.0050	0.0022	05/16/23 22:08	
Barium	mg/L	ND	0.0050	0.00067	05/16/23 22:08	
Beryllium	mg/L	ND	0.00050	0.000054	05/17/23 12:56	
Cadmium	mg/L	ND	0.00050	0.00011	05/16/23 22:08	
Chromium	mg/L	ND	0.0050	0.0011	05/16/23 22:08	
Cobalt	mg/L	ND	0.0050	0.00039	05/16/23 22:08	
Lead	mg/L	ND	0.0010	0.00089	05/16/23 22:08	
Lithium	mg/L	ND	0.030	0.00073	05/16/23 22:08	
Molybdenum	mg/L	ND	0.010	0.00074	05/16/23 22:08	
Selenium	mg/L	ND	0.0050	0.0014	05/16/23 22:08	
Thallium	mg/L	ND	0.0010	0.00018	05/16/23 22:08	

LABORATORY CONTROL SAMPLE: 4020138

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.12	119	80-120	
Arsenic	mg/L	0.1	0.10	103	80-120	
Barium	mg/L	0.1	0.10	103	80-120	
Beryllium	mg/L	0.1	0.11	107	80-120	
Cadmium	mg/L	0.1	0.11	106	80-120	
Chromium	mg/L	0.1	0.10	105	80-120	
Cobalt	mg/L	0.1	0.11	106	80-120	
Lead	mg/L	0.1	0.11	106	80-120	
Lithium	mg/L	0.1	0.096	96	80-120	
Molybdenum	mg/L	0.1	0.11	110	80-120	
Selenium	mg/L	0.1	0.11	105	80-120	
Thallium	mg/L	0.1	0.10	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4020139 4020140

Parameter	Units	92667288001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	ND	0.1	0.1	0.12	0.12	117	120	75-125	2	20	
Arsenic	mg/L	ND	0.1	0.1	0.10	0.10	102	104	75-125	2	20	
Barium	mg/L	0.021	0.1	0.1	0.12	0.12	95	99	75-125	3	20	

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QUALITY CONTROL DATA

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4020139 4020140

Parameter	Units	92667288001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Beryllium	mg/L	0.0011	0.1	0.1	0.097	0.098	96	97	75-125	1	20	
Cadmium	mg/L	0.00088	0.1	0.1	0.10	0.11	102	104	75-125	2	20	
Chromium	mg/L	ND	0.1	0.1	0.10	0.10	102	102	75-125	0	20	
Cobalt	mg/L	0.00074J	0.1	0.1	0.10	0.10	102	103	75-125	1	20	
Lead	mg/L	ND	0.1	0.1	0.096	0.098	96	98	75-125	2	20	
Lithium	mg/L	0.013J	0.1	0.1	0.10	0.10	89	89	75-125	0	20	
Molybdenum	mg/L	ND	0.1	0.1	0.11	0.11	107	109	75-125	2	20	
Selenium	mg/L	0.15	0.1	0.1	0.25	0.26	98	103	75-125	2	20	
Thallium	mg/L	ND	0.1	0.1	0.095	0.099	95	99	75-125	3	20	

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QUALITY CONTROL DATA

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

QC Batch: 774443
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

METHOD BLANK: 4019010 Matrix: Water
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.00078	05/16/23 19:57	
Arsenic, Dissolved	mg/L	ND	0.0050	0.0022	05/16/23 19:57	
Barium, Dissolved	mg/L	ND	0.0050	0.00067	05/16/23 19:57	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000054	05/17/23 15:07	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00011	05/16/23 19:57	
Chromium, Dissolved	mg/L	ND	0.0050	0.0011	05/16/23 19:57	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00039	05/16/23 19:57	
Iron, Dissolved	mg/L	ND	0.040	0.030	05/16/23 19:57	
Lead, Dissolved	mg/L	ND	0.0010	0.00089	05/16/23 19:57	
Lithium, Dissolved	mg/L	ND	0.030	0.00073	05/16/23 19:57	
Manganese, Dissolved	mg/L	ND	0.010	0.0011	05/16/23 19:57	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00074	05/16/23 19:57	
Selenium, Dissolved	mg/L	ND	0.0050	0.0014	05/16/23 19:57	
Thallium, Dissolved	mg/L	ND	0.0010	0.00018	05/16/23 19:57	

LABORATORY CONTROL SAMPLE: 4019011

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.12	119	80-120	
Arsenic, Dissolved	mg/L	0.1	0.10	105	80-120	
Barium, Dissolved	mg/L	0.1	0.10	100	80-120	
Beryllium, Dissolved	mg/L	0.1	0.099	99	80-120	
Cadmium, Dissolved	mg/L	0.1	0.11	106	80-120	
Chromium, Dissolved	mg/L	0.1	0.10	104	80-120	
Cobalt, Dissolved	mg/L	0.1	0.10	104	80-120	
Iron, Dissolved	mg/L	1	1.0	104	80-120	
Lead, Dissolved	mg/L	0.1	0.10	104	80-120	
Lithium, Dissolved	mg/L	0.1	0.095	95	80-120	
Manganese, Dissolved	mg/L	0.1	0.11	105	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.11	107	80-120	
Selenium, Dissolved	mg/L	0.1	0.10	105	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	102	80-120	

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QUALITY CONTROL DATA

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4019012 4019013

Parameter	Units	92666818001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony, Dissolved	mg/L	ND	0.1	0.1	0.12	0.12	115	119	75-125	3	20	
Arsenic, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	101	102	75-125	1	20	
Barium, Dissolved	mg/L	17.3 ug/L	0.1	0.1	0.12	0.12	98	102	75-125	4	20	
Beryllium, Dissolved	mg/L	ND	0.1	0.1	0.091	0.093	91	93	75-125	2	20	
Cadmium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	103	107	75-125	4	20	
Chromium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	101	104	75-125	3	20	
Cobalt, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	102	105	75-125	3	20	
Iron, Dissolved	mg/L	166 ug/L	1	1	1.2	1.2	104	104	75-125	0	20	
Lead, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	102	103	75-125	2	20	
Lithium, Dissolved	mg/L	ND	0.1	0.1	0.093	0.096	93	96	75-125	3	20	
Manganese, Dissolved	mg/L	52.1 ug/L	0.1	0.1	0.15	0.16	102	105	75-125	2	20	
Molybdenum, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	104	108	75-125	4	20	
Selenium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	101	106	75-125	4	20	
Thallium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	101	102	75-125	1	20	

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QUALITY CONTROL DATA

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

QC Batch: 774650 Analysis Method: EPA 300.0 Rev 2.1 1993
QC Batch Method: EPA 300.0 Rev 2.1 1993 Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Asheville
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

METHOD BLANK: 4020028 Matrix: Water
Associated Lab Samples: 92667288001, 92667288002, 92667288003, 92667288004, 92667288005, 92667288006, 92667288007, 92667288008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	0.50	05/16/23 12:54	

LABORATORY CONTROL SAMPLE: 4020029

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	50	46.3	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4020030 4020031

Parameter	Units	92667312001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	12.0	50	50	60.9	61.7	98	100	90-110	1	10	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4020032 4020033

Parameter	Units	92667288003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	485	50	50	541	537	110	103	90-110	1	10	

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QUALIFIERS

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: GPC Yates-30143623 Task 13B
Pace Project No.: 92667288

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92667288001	**COMPOSITE-1-0**	EPA 3005A	774676	EPA 6020B	774850
92667288002	**CONTROL-1-2**	EPA 3005A	774676	EPA 6020B	774850
92667288003	**CONTROL-2-2**	EPA 3005A	774676	EPA 6020B	774850
92667288004	**BATCH-1-2**	EPA 3005A	774676	EPA 6020B	774850
92667288005	**BATCH-2-2**	EPA 3005A	774676	EPA 6020B	774850
92667288006	**BATCH-3-2**	EPA 3005A	774676	EPA 6020B	774850
92667288007	**BATCH-4-2**	EPA 3005A	774676	EPA 6020B	774850
92667288008	**BATCH-5-2**	EPA 3005A	774676	EPA 6020B	774850
92667288001	**COMPOSITE-1-0**	EPA 3005A	774443	EPA 6020B	774526
92667288002	**CONTROL-1-2**	EPA 3005A	774443	EPA 6020B	774526
92667288003	**CONTROL-2-2**	EPA 3005A	774443	EPA 6020B	774526
92667288004	**BATCH-1-2**	EPA 3005A	774443	EPA 6020B	774526
92667288005	**BATCH-2-2**	EPA 3005A	774443	EPA 6020B	774526
92667288006	**BATCH-3-2**	EPA 3005A	774443	EPA 6020B	774526
92667288007	**BATCH-4-2**	EPA 3005A	774443	EPA 6020B	774526
92667288008	**BATCH-5-2**	EPA 3005A	774443	EPA 6020B	774526
92667288001	**COMPOSITE-1-0**	EPA 300.0 Rev 2.1 1993	774650		
92667288002	**CONTROL-1-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288003	**CONTROL-2-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288004	**BATCH-1-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288005	**BATCH-2-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288006	**BATCH-3-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288007	**BATCH-4-2**	EPA 300.0 Rev 2.1 1993	774650		
92667288008	**BATCH-5-2**	EPA 300.0 Rev 2.1 1993	774650		

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ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

[redacted]

Page 1 of 1

PROJECT NUMBER	PROJECT NAME		SDG NUMBER	LAB PROFILE
30143623 Task 13B	GPC Yates			16561-10
SEND RESULTS TO: Geoffrey Gay	**EMAIL ADDRESS:** geoffrey.gay@arcadis.com	**TELEPHONE:** 404-402-2983		
SAMPLERS: David Rosen				

SAMPLE ID	DATE	TIME	MATRIX	COMPOSITE / GRAB	QUANTITY	REQUESTED ANALYSES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
COMPOSITE-1-0	5/10/23	1530	GW	G	3	1	1	1													
CONTROL-1-2	5/12/23	1505	GW	G	3	1	1	1													
CONTROL-2-2	5/12/23	1545	GW	G	3	1	1	1													
BATCH-1-2	5/12/23	1520	GW	G	3	1	1	1													
BATCH-2-2	5/12/23	1535	GW	G	3	1	1	1													
BATCH-3-2	5/12/23	1600	GW	G	3	1	1	1													
BATCH-4-2	5/12/23	1615	GW	G	3	1	1	1													
BATCH-5-2	5/12/23	1645	GW	G	3	1	1	1													

	Requested Analyses	Container	Pres.
1	Total Metals 6020	250mL HDPE	HNO3
2	Dissolved Metals 6020	250mL HDPE	HNO3
3	Sulfate	250mL HDPE	None
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Special Instructions/Comments:
FEDEX OVERNIGHT for SATURDAY DELIVERY

☐ **Special QA/QC Instructions**
Total metals for Appendix IV. Dissolved metals for Appendix IV, iron, and manganese.

Laboratory Information and Receipt

Lab Name: Pace Norcross
Lab Project Manager: Bonnie Vang
Shipping Tracking #
Specify Turnaround Requirements: Standard

☐ Cooler packed with ice
☐ Cooler custody seal intact

Sample Receipt:
Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
David Rosen/ANA	5/12/23	1730	FedEx		
Relinquished by:	DATE	TIME	Received by:	DATE	TIME
			[illegible]	05/13/23	1004

WO# : 92667288

92667288

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-HUN1-0083 v02_Sample Condition Upon Receipt
	Effective Date: 11/14/2022

Laboratory receiving samples:

Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

Client Name: GPC Yates

Project #: WO#: 92667288
PM: BV Due Date: 05/23/23
CLIENT: 92-GP-Yates

Courier: ☐ Commercial ☑ Fed Ex ☐ Pace ☐ UPS ☐ USPS ☐ Other:____ ☐ Client

Custody Seal Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No

Date/Initials Person Examining Contents: 05/13/23 ST

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Thermometer: ☑ IR Gun ID: 214

Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp: 6.8 **Correction Factor:** Add/Subtract (°C) +0.1

Cooler Temp Corrected (°C): 6.9

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☐ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☐ Yes	☑ No	☐ N/A	8.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: GW	☑ Yes	☐ No	☐ N/A	9.
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

Field Data Required? ☐ Yes ☐ No

772133851624

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ **Date:** _____

Project Manager SRF Review: _____ **Date:** _____

*Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

**Bottom half of box is to list number of bottles

***Check all unpreserved Nitrates for chlorine

Project # WO#: 92667288

PM: BV Due Date: 05/23/23

CLIENT: 92-GP-Yates

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1		1				2 1																							
2		1				2 1																							
3		1				2 1																							
4		1				2 1																							
5		1				2 1																							
6		1				2 1																							
7		1				2 1																							
8		1				2 1																							
9																													
10																													
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

June 13, 2023

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: GPC Yates
Pace Project No.: 92669361

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on May 25, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Asheville
- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
(704)875-9092
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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CERTIFICATIONS

Project: GPC Yates
Pace Project No.: 92669361

Pace Analytical Services Asheville
2225 Riverside Drive, Asheville, NC 28804
Florida/NELAP Certification #: E87648
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Laboratory ID: 99030
South Carolina Certification #: 99030001
Virginia/VELAP Certification #: 460222

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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SAMPLE SUMMARY

Project: GPC Yates
Pace Project No.: 92669361

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92669361001	**CONTROL-1-14**	Water	05/24/23 15:30	05/25/23 09:42
92669361002	**CONTROL-2-14**	Water	05/24/23 16:05	05/25/23 09:42
92669361003	**BATCH-1-14**	Water	05/24/23 15:45	05/25/23 09:42
92669361004	**BATCH-2-14**	Water	05/24/23 15:25	05/25/23 09:42
92669361005	**BATCH-3-14**	Water	05/24/23 15:15	05/25/23 09:42
92669361006	**BATCH-4-14**	Water	05/24/23 16:00	05/25/23 09:42
92669361007	**BATCH-5-14**	Water	05/24/23 15:05	05/25/23 09:42

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SAMPLE ANALYTE COUNT

Project: GPC Yates
Pace Project No.: 92669361

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92669361001	**CONTROL-1-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361002	**CONTROL-2-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361003	**BATCH-1-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361004	**BATCH-2-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361005	**BATCH-3-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361006	**BATCH-4-14**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1
92669361007	**BATCH-5-14**	EPA 6010D	DRB, MS	2
		EPA 6020B	CW1	12
		EPA 6020B	CW1	12
		EPA 300.0 Rev 2.1 1993	CDC	1

PASI-A = Pace Analytical Services - Asheville
PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: GPC Yates
Pace Project No.: 92669361

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92669361001	**CONTROL-1-14**					
EPA 6010D	Iron, Dissolved	4.9	mg/L	0.040	05/30/23 19:27	
EPA 6010D	Manganese, Dissolved	0.66	mg/L	0.040	05/30/23 19:27	
EPA 6020B	Barium	0.039	mg/L	0.0050	05/30/23 18:29	
EPA 6020B	Beryllium	0.00016J	mg/L	0.00050	06/02/23 18:45	
EPA 6020B	Cadmium	0.00065	mg/L	0.00050	06/02/23 18:45	
EPA 6020B	Cobalt	0.015	mg/L	0.0050	06/02/23 18:45	
EPA 6020B	Lithium	0.019J	mg/L	0.030	06/02/23 18:45	
EPA 6020B	Molybdenum	0.0021J	mg/L	0.010	05/30/23 18:29	
EPA 6020B	Selenium	0.14	mg/L	0.0050	06/02/23 18:45	
EPA 6020B	Barium, Dissolved	0.080	mg/L	0.0050	06/07/23 18:10	
EPA 6020B	Beryllium, Dissolved	0.00031J	mg/L	0.00050	06/09/23 17:54	
EPA 6020B	Cadmium, Dissolved	0.00065	mg/L	0.00050	06/07/23 18:10	
EPA 6020B	Chromium, Dissolved	0.0053	mg/L	0.0050	06/07/23 18:10	
EPA 6020B	Cobalt, Dissolved	0.017	mg/L	0.0050	06/07/23 18:10	
EPA 6020B	Lead, Dissolved	0.0011	mg/L	0.0010	06/07/23 18:10	
EPA 6020B	Lithium, Dissolved	0.022J	mg/L	0.030	06/09/23 17:54	
EPA 6020B	Molybdenum, Dissolved	0.0031J	mg/L	0.010	06/07/23 18:10	
EPA 6020B	Selenium, Dissolved	0.15	mg/L	0.0050	06/07/23 18:10	
EPA 300.0 Rev 2.1 1993	Sulfate	461	mg/L	10.0	05/26/23 21:34	
92669361002	**CONTROL-2-14**					
EPA 6010D	Iron, Dissolved	21.9	mg/L	0.040	05/30/23 19:31	
EPA 6010D	Manganese, Dissolved	2.0	mg/L	0.040	05/30/23 19:31	
EPA 6020B	Barium	0.031	mg/L	0.0050	05/30/23 18:35	
EPA 6020B	Lithium	0.015J	mg/L	0.030	06/02/23 19:03	
EPA 6020B	Barium, Dissolved	0.030	mg/L	0.0050	06/07/23 18:14	
EPA 6020B	Beryllium, Dissolved	0.000099J	mg/L	0.00050	06/07/23 18:14	
EPA 6020B	Lithium, Dissolved	0.014J	mg/L	0.030	06/07/23 18:14	
EPA 300.0 Rev 2.1 1993	Sulfate	476	mg/L	10.0	05/26/23 21:52	
92669361003	**BATCH-1-14**					
EPA 6010D	Iron, Dissolved	0.82	mg/L	0.040	05/30/23 19:36	
EPA 6010D	Manganese, Dissolved	0.037J	mg/L	0.040	05/30/23 19:36	
EPA 6020B	Barium	0.029	mg/L	0.0050	05/30/23 18:41	
EPA 6020B	Beryllium	0.00013J	mg/L	0.00050	06/02/23 19:09	
EPA 6020B	Chromium	0.0012J	mg/L	0.0050	05/30/23 18:41	
EPA 6020B	Cobalt	0.00098J	mg/L	0.0050	05/30/23 18:41	
EPA 6020B	Lead	0.00020J	mg/L	0.0010	05/30/23 18:41	
EPA 6020B	Lithium	0.0072J	mg/L	0.030	06/02/23 19:09	
EPA 6020B	Barium, Dissolved	0.024	mg/L	0.0050	06/07/23 18:18	
EPA 6020B	Lead, Dissolved	0.00012J	mg/L	0.0010	06/07/23 18:18	
EPA 6020B	Lithium, Dissolved	0.0064J	mg/L	0.030	06/07/23 18:18	
EPA 300.0 Rev 2.1 1993	Sulfate	292	mg/L	6.0	05/26/23 22:10	
92669361004	**BATCH-2-14**					
EPA 6010D	Iron, Dissolved	5.6	mg/L	0.040	05/30/23 19:41	
EPA 6010D	Manganese, Dissolved	0.32	mg/L	0.040	05/30/23 19:41	
EPA 6020B	Barium	0.020	mg/L	0.0050	05/30/23 18:47	
EPA 6020B	Beryllium	0.00013J	mg/L	0.00050	06/02/23 19:15	

REPORT OF LABORATORY ANALYSIS

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SUMMARY OF DETECTION

Project: GPC Yates
Pace Project No.: 92669361

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92669361004	**BATCH-2-14**					
EPA 6020B	Chromium	0.0023J	mg/L	0.0050	05/30/23 18:47	
EPA 6020B	Lead	0.00039J	mg/L	0.0010	05/30/23 18:47	
EPA 6020B	Lithium	0.011J	mg/L	0.030	06/02/23 19:15	
EPA 6020B	Barium, Dissolved	0.021	mg/L	0.0050	06/07/23 18:21	
EPA 6020B	Beryllium, Dissolved	0.000059J	mg/L	0.00050	06/07/23 18:21	
EPA 6020B	Lithium, Dissolved	0.011J	mg/L	0.030	06/07/23 18:21	
EPA 300.0 Rev 2.1 1993	Sulfate	423	mg/L	9.0	05/26/23 22:28	
92669361005	**BATCH-3-14**					
EPA 6010D	Iron, Dissolved	5.7	mg/L	0.040	05/30/23 19:46	
EPA 6010D	Manganese, Dissolved	0.93	mg/L	0.040	05/30/23 19:46	
EPA 6020B	Antimony	0.0068	mg/L	0.0030	06/02/23 19:21	
EPA 6020B	Barium	0.020	mg/L	0.0050	06/02/23 19:21	
EPA 6020B	Beryllium	0.00012J	mg/L	0.00050	06/02/23 19:21	
EPA 6020B	Lithium	0.0087J	mg/L	0.030	06/02/23 19:21	
EPA 6020B	Molybdenum	0.0011J	mg/L	0.010	06/02/23 19:21	
EPA 6020B	Antimony, Dissolved	0.0022J	mg/L	0.0030	06/07/23 18:25	
EPA 6020B	Barium, Dissolved	0.020	mg/L	0.0050	06/07/23 18:25	
EPA 6020B	Chromium, Dissolved	0.0013J	mg/L	0.0050	06/07/23 18:25	
EPA 6020B	Lithium, Dissolved	0.0076J	mg/L	0.030	06/09/23 18:00	
EPA 6020B	Molybdenum, Dissolved	0.0011J	mg/L	0.010	06/07/23 18:25	
EPA 6020B	Selenium, Dissolved	0.0084	mg/L	0.0050	06/07/23 18:25	
EPA 300.0 Rev 2.1 1993	Sulfate	363	mg/L	8.0	05/26/23 22:47	
92669361006	**BATCH-4-14**					
EPA 6010D	Iron, Dissolved	7.9	mg/L	0.040	05/30/23 20:00	M1
EPA 6010D	Manganese, Dissolved	7.7	mg/L	0.040	05/30/23 20:00	M1
EPA 6020B	Barium	0.040	mg/L	0.0050	05/30/23 19:11	
EPA 6020B	Lithium	0.014J	mg/L	0.030	06/02/23 19:27	
EPA 6020B	Barium, Dissolved	0.040	mg/L	0.0050	06/07/23 18:29	
EPA 6020B	Lithium, Dissolved	0.014J	mg/L	0.030	06/07/23 18:29	
EPA 300.0 Rev 2.1 1993	Sulfate	506	mg/L	10.0	05/26/23 23:42	
92669361007	**BATCH-5-14**					
EPA 6010D	Iron, Dissolved	3070	mg/L	1.0	05/31/23 19:07	
EPA 6010D	Manganese, Dissolved	12.0	mg/L	0.040	05/30/23 20:20	
EPA 6020B	Barium	0.046	mg/L	0.0050	05/30/23 19:17	
EPA 6020B	Beryllium	0.0033J	mg/L	0.0050	06/02/23 19:33	D3
EPA 6020B	Cadmium	0.0016	mg/L	0.00050	05/30/23 19:17	
EPA 6020B	Chromium	0.030	mg/L	0.0050	05/30/23 19:17	
EPA 6020B	Cobalt	0.049	mg/L	0.0050	05/30/23 19:17	
EPA 6020B	Lead	0.011	mg/L	0.0010	05/30/23 19:17	
EPA 6020B	Lithium	0.048J	mg/L	0.30	06/02/23 19:33	D3
EPA 6020B	Selenium	0.18	mg/L	0.0050	05/30/23 19:17	
EPA 6020B	Thallium	0.00054J	mg/L	0.0010	05/30/23 19:17	
EPA 6020B	Barium, Dissolved	0.066	mg/L	0.0050	06/07/23 18:33	
EPA 6020B	Beryllium, Dissolved	0.0023J	mg/L	0.0050	06/07/23 18:40	D3
EPA 6020B	Cadmium, Dissolved	0.0013	mg/L	0.00050	06/07/23 18:33	
EPA 6020B	Chromium, Dissolved	0.033	mg/L	0.0050	06/07/23 18:33	

REPORT OF LABORATORY ANALYSIS

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SUMMARY OF DETECTION

Project: GPC Yates
Pace Project No.: 92669361

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92669361007	**BATCH-5-14**					
EPA 6020B	Cobalt, Dissolved	0.039	mg/L	0.0050	06/07/23 18:33	
EPA 6020B	Lead, Dissolved	0.0091	mg/L	0.0010	06/07/23 18:33	
EPA 6020B	Lithium, Dissolved	0.039J	mg/L	0.30	06/07/23 18:40	D3
EPA 6020B	Selenium, Dissolved	0.14	mg/L	0.025	06/07/23 18:36	
EPA 6020B	Thallium, Dissolved	0.00042J	mg/L	0.0010	06/07/23 18:33	
EPA 300.0 Rev 2.1 1993	Sulfate	6080	mg/L	100	05/26/23 20:21	

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: CONTROL-1-14 **Lab ID: 92669361001** Collected: 05/24/23 15:30 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**4.9**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 19:27	7439-89-6	
Manganese, Dissolved	**0.66**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 19:27	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 18:29	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	06/02/23 18:45	7440-38-2	
Barium	**0.039**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 18:29	7440-39-3	
Beryllium	**0.00016J**	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 18:45	7440-41-7	
Cadmium	**0.00065**	mg/L	0.00050	0.00011	1	05/26/23 10:28	06/02/23 18:45	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/26/23 10:28	06/02/23 18:45	7440-47-3	
Cobalt	**0.015**	mg/L	0.0050	0.00039	1	05/26/23 10:28	06/02/23 18:45	7440-48-4	
Lead	ND	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 18:29	7439-92-1	
Lithium	**0.019J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 18:45	7439-93-2	
Molybdenum	**0.0021J**	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 18:29	7439-98-7	
Selenium	**0.14**	mg/L	0.0050	0.0014	1	05/26/23 10:28	06/02/23 18:45	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 18:29	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:10	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:10	7440-38-2	
Barium, Dissolved	**0.080**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:10	7440-39-3	
Beryllium, Dissolved	**0.00031J**	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/09/23 17:54	7440-41-7	
Cadmium, Dissolved	**0.00065**	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:10	7440-43-9	
Chromium, Dissolved	**0.0053**	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:10	7440-47-3	
Cobalt, Dissolved	**0.017**	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:10	7440-48-4	
Lead, Dissolved	**0.0011**	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:10	7439-92-1	
Lithium, Dissolved	**0.022J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/09/23 17:54	7439-93-2	
Molybdenum, Dissolved	**0.0031J**	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:10	7439-98-7	
Selenium, Dissolved	**0.15**	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:10	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:10	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**461**	mg/L	10.0	5.0	10		05/26/23 21:34	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: CONTROL-2-14 **Lab ID: 92669361002** Collected: 05/24/23 16:05 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**21.9**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 19:31	7439-89-6	
Manganese, Dissolved	**2.0**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 19:31	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 18:35	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	05/30/23 18:35	7440-38-2	
Barium	**0.031**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 18:35	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 19:03	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/26/23 10:28	05/30/23 18:35	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/26/23 10:28	05/30/23 18:35	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/26/23 10:28	05/30/23 18:35	7440-48-4	
Lead	ND	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 18:35	7439-92-1	
Lithium	**0.015J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 19:03	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 18:35	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/26/23 10:28	05/30/23 18:35	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 18:35	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:14	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:14	7440-38-2	
Barium, Dissolved	**0.030**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:14	7440-39-3	
Beryllium, Dissolved	**0.000099J**	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/07/23 18:14	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:14	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:14	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:14	7440-48-4	
Lead, Dissolved	ND	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:14	7439-92-1	
Lithium, Dissolved	**0.014J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/07/23 18:14	7439-93-2	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:14	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:14	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:14	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**476**	mg/L	10.0	5.0	10		05/26/23 21:52	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: BATCH-1-14 **Lab ID: 92669361003** Collected: 05/24/23 15:45 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**0.82**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 19:36	7439-89-6	
Manganese, Dissolved	**0.037J**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 19:36	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 18:41	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	06/02/23 19:09	7440-38-2	
Barium	**0.029**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 18:41	7440-39-3	
Beryllium	**0.00013J**	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 19:09	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/26/23 10:28	05/30/23 18:41	7440-43-9	
Chromium	**0.0012J**	mg/L	0.0050	0.0011	1	05/26/23 10:28	05/30/23 18:41	7440-47-3	
Cobalt	**0.00098J**	mg/L	0.0050	0.00039	1	05/26/23 10:28	05/30/23 18:41	7440-48-4	
Lead	**0.00020J**	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 18:41	7439-92-1	
Lithium	**0.0072J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 19:09	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 18:41	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/26/23 10:28	06/02/23 19:09	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 18:41	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:18	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:18	7440-38-2	
Barium, Dissolved	**0.024**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:18	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/07/23 18:18	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:18	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:18	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:18	7440-48-4	
Lead, Dissolved	**0.00012J**	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:18	7439-92-1	
Lithium, Dissolved	**0.0064J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/07/23 18:18	7439-93-2	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:18	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:18	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:18	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**292**	mg/L	6.0	3.0	6		05/26/23 22:10	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: BATCH-2-14 **Lab ID: 92669361004** Collected: 05/24/23 15:25 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**5.6**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 19:41	7439-89-6	
Manganese, Dissolved	**0.32**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 19:41	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 18:47	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	05/30/23 18:47	7440-38-2	
Barium	**0.020**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 18:47	7440-39-3	
Beryllium	**0.00013J**	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 19:15	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/26/23 10:28	05/30/23 18:47	7440-43-9	
Chromium	**0.0023J**	mg/L	0.0050	0.0011	1	05/26/23 10:28	05/30/23 18:47	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/26/23 10:28	05/30/23 18:47	7440-48-4	
Lead	**0.00039J**	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 18:47	7439-92-1	
Lithium	**0.011J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 19:15	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 18:47	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/26/23 10:28	05/30/23 18:47	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 18:47	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:21	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:21	7440-38-2	
Barium, Dissolved	**0.021**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:21	7440-39-3	
Beryllium, Dissolved	**0.000059J**	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/07/23 18:21	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:21	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:21	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:21	7440-48-4	
Lead, Dissolved	ND	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:21	7439-92-1	
Lithium, Dissolved	**0.011J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/07/23 18:21	7439-93-2	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:21	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:21	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:21	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**423**	mg/L	9.0	4.5	9		05/26/23 22:28	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: BATCH-3-14 **Lab ID: 92669361005** Collected: 05/24/23 15:15 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**5.7**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 19:46	7439-89-6	
Manganese, Dissolved	**0.93**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 19:46	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0068**	mg/L	0.0030	0.0012	1	05/26/23 10:28	06/02/23 19:21	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	06/02/23 19:21	7440-38-2	
Barium	**0.020**	mg/L	0.0050	0.00067	1	05/26/23 10:28	06/02/23 19:21	7440-39-3	
Beryllium	**0.00012J**	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 19:21	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/26/23 10:28	06/02/23 19:21	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/26/23 10:28	06/02/23 19:21	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/26/23 10:28	06/02/23 19:21	7440-48-4	
Lead	ND	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 18:53	7439-92-1	
Lithium	**0.0087J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 19:21	7439-93-2	
Molybdenum	**0.0011J**	mg/L	0.010	0.00074	1	05/26/23 10:28	06/02/23 19:21	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/26/23 10:28	06/02/23 19:21	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 18:53	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0022J**	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:25	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:25	7440-38-2	
Barium, Dissolved	**0.020**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:25	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/09/23 18:00	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:25	7440-43-9	
Chromium, Dissolved	**0.0013J**	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:25	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:25	7440-48-4	
Lead, Dissolved	ND	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:25	7439-92-1	
Lithium, Dissolved	**0.0076J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/09/23 18:00	7439-93-2	
Molybdenum, Dissolved	**0.0011J**	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:25	7439-98-7	
Selenium, Dissolved	**0.0084**	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:25	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:25	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**363**	mg/L	8.0	4.0	8		05/26/23 22:47	14808-79-8	

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: BATCH-4-14 **Lab ID: 92669361006** Collected: 05/24/23 16:00 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**7.9**	mg/L	0.040	0.025	1	05/27/23 15:28	05/30/23 20:00	7439-89-6	M1
Manganese, Dissolved	**7.7**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 20:00	7439-96-5	M1
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 19:11	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	05/30/23 19:11	7440-38-2	
Barium	**0.040**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 19:11	7440-39-3	
Beryllium	ND	mg/L	0.00050	0.000054	1	05/26/23 10:28	06/02/23 19:27	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00011	1	05/26/23 10:28	05/30/23 19:11	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0011	1	05/26/23 10:28	05/30/23 19:11	7440-47-3	
Cobalt	ND	mg/L	0.0050	0.00039	1	05/26/23 10:28	05/30/23 19:11	7440-48-4	
Lead	ND	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 19:11	7439-92-1	
Lithium	**0.014J**	mg/L	0.030	0.00073	1	05/26/23 10:28	06/02/23 19:27	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 19:11	7439-98-7	
Selenium	ND	mg/L	0.0050	0.0014	1	05/26/23 10:28	05/30/23 19:11	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 19:11	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:29	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.0037	1	05/27/23 10:56	06/07/23 18:29	7440-38-2	
Barium, Dissolved	**0.040**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:29	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000054	1	05/27/23 10:56	06/07/23 18:29	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:29	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:29	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:29	7440-48-4	
Lead, Dissolved	ND	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:29	7439-92-1	
Lithium, Dissolved	**0.014J**	mg/L	0.030	0.00073	1	05/27/23 10:56	06/07/23 18:29	7439-93-2	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:29	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.0014	1	05/27/23 10:56	06/07/23 18:29	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:29	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**506**	mg/L	10.0	5.0	10		05/26/23 23:42	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: GPC Yates
Pace Project No.: 92669361

Sample: BATCH-5-14 **Lab ID: 92669361007** Collected: 05/24/23 15:05 Received: 05/25/23 09:42 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**3070**	mg/L	1.0	0.63	25	05/27/23 15:28	05/31/23 19:07	7439-89-6	
Manganese, Dissolved	**12.0**	mg/L	0.040	0.0043	1	05/27/23 15:28	05/30/23 20:20	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.0012	1	05/26/23 10:28	05/30/23 19:17	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.0037	1	05/26/23 10:28	05/30/23 19:17	7440-38-2	
Barium	**0.046**	mg/L	0.0050	0.00067	1	05/26/23 10:28	05/30/23 19:17	7440-39-3	
Beryllium	**0.0033J**	mg/L	0.0050	0.00054	10	05/26/23 10:28	06/02/23 19:33	7440-41-7	D3
Cadmium	**0.0016**	mg/L	0.00050	0.00011	1	05/26/23 10:28	05/30/23 19:17	7440-43-9	
Chromium	**0.030**	mg/L	0.0050	0.0011	1	05/26/23 10:28	05/30/23 19:17	7440-47-3	
Cobalt	**0.049**	mg/L	0.0050	0.00039	1	05/26/23 10:28	05/30/23 19:17	7440-48-4	
Lead	**0.011**	mg/L	0.0010	0.00012	1	05/26/23 10:28	05/30/23 19:17	7439-92-1	
Lithium	**0.048J**	mg/L	0.30	0.0073	10	05/26/23 10:28	06/02/23 19:33	7439-93-2	D3
Molybdenum	ND	mg/L	0.010	0.00074	1	05/26/23 10:28	05/30/23 19:17	7439-98-7	
Selenium	**0.18**	mg/L	0.0050	0.0014	1	05/26/23 10:28	05/30/23 19:17	7782-49-2	
Thallium	**0.00054J**	mg/L	0.0010	0.00018	1	05/26/23 10:28	05/30/23 19:17	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.0012	1	05/27/23 10:56	06/07/23 18:33	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.025	0.018	5	05/27/23 10:56	06/07/23 18:36	7440-38-2	D3
Barium, Dissolved	**0.066**	mg/L	0.0050	0.00067	1	05/27/23 10:56	06/07/23 18:33	7440-39-3	
Beryllium, Dissolved	**0.0023J**	mg/L	0.0050	0.00054	10	05/27/23 10:56	06/07/23 18:40	7440-41-7	D3
Cadmium, Dissolved	**0.0013**	mg/L	0.00050	0.00011	1	05/27/23 10:56	06/07/23 18:33	7440-43-9	
Chromium, Dissolved	**0.033**	mg/L	0.0050	0.0011	1	05/27/23 10:56	06/07/23 18:33	7440-47-3	
Cobalt, Dissolved	**0.039**	mg/L	0.0050	0.00039	1	05/27/23 10:56	06/07/23 18:33	7440-48-4	
Lead, Dissolved	**0.0091**	mg/L	0.0010	0.00012	1	05/27/23 10:56	06/07/23 18:33	7439-92-1	
Lithium, Dissolved	**0.039J**	mg/L	0.30	0.0073	10	05/27/23 10:56	06/07/23 18:40	7439-93-2	D3
Molybdenum, Dissolved	ND	mg/L	0.010	0.00074	1	05/27/23 10:56	06/07/23 18:33	7439-98-7	
Selenium, Dissolved	**0.14**	mg/L	0.025	0.0068	5	05/27/23 10:56	06/07/23 18:36	7782-49-2	
Thallium, Dissolved	**0.00042J**	mg/L	0.0010	0.00018	1	05/27/23 10:56	06/07/23 18:33	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**6080**	mg/L	100	50.0	100		05/26/23 20:21	14808-79-8	

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

QC Batch: 777332 | Analysis Method: EPA 6010D
QC Batch Method: EPA 3010A | Analysis Description: 6010 MET Filtered Diss.
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

METHOD BLANK: 4032743 Matrix: Water
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.040	0.025	05/30/23 19:17	
Manganese, Dissolved	mg/L	ND	0.040	0.0043	05/30/23 19:17	

LABORATORY CONTROL SAMPLE: 4032744

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	1	0.98	98	80-120	
Manganese, Dissolved	mg/L	1	0.96	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4032856 4032857

Parameter	Units	92669361006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	7.9	1	1	9.4	9.4	158	158	75-125	0	20	M1
Manganese, Dissolved	mg/L	7.7	1	1	9.2	9.3	152	157	75-125	1	20	M1

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

QC Batch: 777126
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

METHOD BLANK: 4031716 Matrix: Water
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0030	0.0012	05/30/23 16:48	
Arsenic	mg/L	ND	0.0050	0.0037	05/30/23 16:48	
Barium	mg/L	ND	0.0050	0.00067	05/30/23 16:48	
Beryllium	mg/L	ND	0.00050	0.000054	05/30/23 16:48	
Cadmium	mg/L	ND	0.00050	0.00011	05/30/23 16:48	
Chromium	mg/L	ND	0.0050	0.0011	05/30/23 16:48	
Cobalt	mg/L	ND	0.0050	0.00039	05/30/23 16:48	
Lead	mg/L	ND	0.0010	0.00012	05/30/23 16:48	
Lithium	mg/L	ND	0.030	0.00073	05/30/23 16:48	
Molybdenum	mg/L	ND	0.010	0.00074	05/30/23 16:48	
Selenium	mg/L	ND	0.0050	0.0014	05/30/23 16:48	
Thallium	mg/L	ND	0.0010	0.00018	05/30/23 16:48	

LABORATORY CONTROL SAMPLE: 4031717

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.11	108	80-120	
Arsenic	mg/L	0.1	0.098	98	80-120	
Barium	mg/L	0.1	0.098	98	80-120	
Beryllium	mg/L	0.1	0.10	102	80-120	
Cadmium	mg/L	0.1	0.10	100	80-120	
Chromium	mg/L	0.1	0.10	101	80-120	
Cobalt	mg/L	0.1	0.10	101	80-120	
Lead	mg/L	0.1	0.10	100	80-120	
Lithium	mg/L	0.1	0.10	104	80-120	
Molybdenum	mg/L	0.1	0.10	102	80-120	
Selenium	mg/L	0.1	0.097	97	80-120	
Thallium	mg/L	0.1	0.099	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4031718 4031719

Parameter	Units	92669218001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	3.1 ug/L	0.1	0.1	0.11	0.11	106	105	75-125	1	20	
Arsenic	mg/L	8.6 ug/L	0.1	0.1	0.11	0.10	99	97	75-125	2	20	
Barium	mg/L	120 ug/L	0.1	0.1	0.27	0.26	91	86	75-125	2	20	
Beryllium	mg/L	ND	0.1	0.1	0.098	0.094	98	94	75-125	4	20	

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4031718 4031719

Parameter	Units	92669218001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	mg/L	ND	0.1	0.1	0.098	0.097	98	97	75-125	1	20	
Chromium	mg/L	ND	0.1	0.1	0.10	0.10	99	98	75-125	1	20	
Cobalt	mg/L	ND	0.1	0.1	0.099	0.097	98	96	75-125	2	20	
Lead	mg/L	ND	0.1	0.1	0.096	0.095	95	94	75-125	1	20	
Lithium	mg/L	40.3 ug/L	0.1	0.1	0.14	0.13	102	94	75-125	6	20	
Molybdenum	mg/L	ND	0.1	0.1	0.11	0.11	103	103	75-125	0	20	
Selenium	mg/L	ND	0.1	0.1	0.10	0.097	99	96	75-125	3	20	
Thallium	mg/L	ND	0.1	0.1	0.095	0.092	94	92	75-125	3	20	

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

QC Batch: 777336
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

METHOD BLANK: 4032759 Matrix: Water
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.0012	06/07/23 17:22	
Arsenic, Dissolved	mg/L	ND	0.0050	0.0037	06/07/23 17:22	
Barium, Dissolved	mg/L	ND	0.0050	0.00067	06/07/23 17:22	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000054	06/07/23 17:22	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00011	06/07/23 17:22	
Chromium, Dissolved	mg/L	ND	0.0050	0.0011	06/07/23 17:22	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00039	06/07/23 17:22	
Lead, Dissolved	mg/L	ND	0.0010	0.00012	06/07/23 17:22	
Lithium, Dissolved	mg/L	ND	0.030	0.00073	06/07/23 17:22	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00074	06/07/23 17:22	
Selenium, Dissolved	mg/L	ND	0.0050	0.0014	06/07/23 17:22	
Thallium, Dissolved	mg/L	ND	0.0010	0.00018	06/07/23 17:22	

LABORATORY CONTROL SAMPLE: 4032760

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.10	103	80-120	
Arsenic, Dissolved	mg/L	0.1	0.099	99	80-120	
Barium, Dissolved	mg/L	0.1	0.096	96	80-120	
Beryllium, Dissolved	mg/L	0.1	0.11	107	80-120	
Cadmium, Dissolved	mg/L	0.1	0.10	101	80-120	
Chromium, Dissolved	mg/L	0.1	0.10	103	80-120	
Cobalt, Dissolved	mg/L	0.1	0.10	104	80-120	
Lead, Dissolved	mg/L	0.1	0.10	103	80-120	
Lithium, Dissolved	mg/L	0.1	0.11	109	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.10	105	80-120	
Selenium, Dissolved	mg/L	0.1	0.095	95	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4032761 4032762

Parameter	Units	92669521001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony, Dissolved	mg/L	ND	0.1	0.1	0.10	0.11	104	105	75-125	1	20	
Arsenic, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	99	100	75-125	2	20	
Barium, Dissolved	mg/L	0.053	0.1	0.1	0.16	0.17	110	113	75-125	2	20	
Beryllium, Dissolved	mg/L	ND	0.1	0.1	0.064	0.063	64	63	75-125	1	20	M1

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4032761 4032762

Parameter	Units	92669521001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	101	100	75-125	1	20	
Chromium, Dissolved	mg/L	ND	0.1	0.1	0.11	0.11	102	104	75-125	2	20	
Cobalt, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	103	105	75-125	1	20	
Lead, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	101	102	75-125	1	20	
Lithium, Dissolved	mg/L	ND	0.1	0.1	0.065	0.066	65	65	75-125	1	20	M1
Molybdenum, Dissolved	mg/L	ND	0.1	0.1	0.11	0.11	108	110	75-125	2	20	
Selenium, Dissolved	mg/L	ND	0.1	0.1	0.092	0.094	92	94	75-125	3	20	
Thallium, Dissolved	mg/L	ND	0.1	0.1	0.10	0.10	101	101	75-125	0	20	

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QUALITY CONTROL DATA

Project: GPC Yates
Pace Project No.: 92669361

QC Batch: 777251 | Analysis Method: EPA 300.0 Rev 2.1 1993
QC Batch Method: EPA 300.0 Rev 2.1 1993 | Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Asheville
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

METHOD BLANK: 4032393 Matrix: Water
Associated Lab Samples: 92669361001, 92669361002, 92669361003, 92669361004, 92669361005, 92669361006, 92669361007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	0.50	05/26/23 16:19	

LABORATORY CONTROL SAMPLE: 4032394

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	50	51.8	104	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4032395 4032396

Parameter	Units	92669073001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	9.6	50	50	59.8	63.6	101	108	90-110	6	10	

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QUALIFIERS

Project: GPC Yates
Pace Project No.: 92669361

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

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TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: GPC Yates
Pace Project No.: 92669361

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92669361001	**CONTROL-1-14**	EPA 3010A	777332	EPA 6010D	777368
92669361002	**CONTROL-2-14**	EPA 3010A	777332	EPA 6010D	777368
92669361003	**BATCH-1-14**	EPA 3010A	777332	EPA 6010D	777368
92669361004	**BATCH-2-14**	EPA 3010A	777332	EPA 6010D	777368
92669361005	**BATCH-3-14**	EPA 3010A	777332	EPA 6010D	777368
92669361006	**BATCH-4-14**	EPA 3010A	777332	EPA 6010D	777368
92669361007	**BATCH-5-14**	EPA 3010A	777332	EPA 6010D	777368
92669361001	**CONTROL-1-14**	EPA 3005A	777126	EPA 6020B	777258
92669361002	**CONTROL-2-14**	EPA 3005A	777126	EPA 6020B	777258
92669361003	**BATCH-1-14**	EPA 3005A	777126	EPA 6020B	777258
92669361004	**BATCH-2-14**	EPA 3005A	777126	EPA 6020B	777258
92669361005	**BATCH-3-14**	EPA 3005A	777126	EPA 6020B	777258
92669361006	**BATCH-4-14**	EPA 3005A	777126	EPA 6020B	777258
92669361007	**BATCH-5-14**	EPA 3005A	777126	EPA 6020B	777258
92669361001	**CONTROL-1-14**	EPA 3005A	777336	EPA 6020B	777371
92669361002	**CONTROL-2-14**	EPA 3005A	777336	EPA 6020B	777371
92669361003	**BATCH-1-14**	EPA 3005A	777336	EPA 6020B	777371
92669361004	**BATCH-2-14**	EPA 3005A	777336	EPA 6020B	777371
92669361005	**BATCH-3-14**	EPA 3005A	777336	EPA 6020B	777371
92669361006	**BATCH-4-14**	EPA 3005A	777336	EPA 6020B	777371
92669361007	**BATCH-5-14**	EPA 3005A	777336	EPA 6020B	777371
92669361001	**CONTROL-1-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361002	**CONTROL-2-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361003	**BATCH-1-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361004	**BATCH-2-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361005	**BATCH-3-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361006	**BATCH-4-14**	EPA 300.0 Rev 2.1 1993	777251		
92669361007	**BATCH-5-14**	EPA 300.0 Rev 2.1 1993	777251		

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ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Lab Work Order #

Page 1 of 1

PROJECT NUMBER	PROJECT NAME			SDG NUMBER	LAB PROFILE
30143623 Task 13B	GPC Yates				16561-10
SEND RESULTS TO: Geoffrey Gay	**EMAIL ADDRESS:** geoffrey.gay@arcadis.com		**TELEPHONE:** 404-402-2983		
SAMPLERS: David Rosen			REQUESTED ANALYSES		

SAMPLE ID	DATE	TIME	MATRIX	COMPOSITE / GRAB	QUANTITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
	5/24/23																				
CONTROL-1-14	~~5/12/23~~	1530	GW	G	3	1	1	1													
CONTROL-2-14	~~5/12/23~~	1605	GW	G	3	1	1	1													
BATCH-1-14	~~5/12/23~~	1545	GW	G	3	1	1	1													
BATCH-2-14	~~5/12/23~~	1505	GW	G	3	1	1	1													
BATCH-3-14	~~5/12/23~~	1515	GW	G	3	1	1	1													
BATCH-4-14	~~5/12/23~~	1600	GW	G	3	1	1	1													
BATCH-5-14	~~5/12/23~~	1505	GW	G	3	1	1	1													

	Requested Analyses	Container	Pres.
1	Total Metals 6020	250mL HDPE	HNO3
2	Dissolved Metals 6020	250mL HDPE	HNO3
3	Sulfate	250mL HDPE	None
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

Special Instructions/Comments:

FEDEX OVERNIGHT

☐ **Special QA/QC Instructions**

Total metals for Appendix IV excluding radium and mercury. Dissolved metals for Appendix IV, iron, and manganese.

Laboratory Information and Receipt

Lab Name: Pace Norcross

Lab Project Manager: Bonnie Vang

Shipping Tracking # 772237476007

Specify Turnaround Requirements: Standard

☐ Cooler packed with ice

☐ Cooler custody seal intact

Sample Receipt:

Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
DAVID ROSEN ANA	5/24/23	1620		5/25	0942
Relinquished by:	DATE	TIME	Received by:	DATE	TIME

WO# : 92669361

92669361

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-HUN1-0083 v02_Sample Condition Upon Receipt
	Effective Date: 11/14/2022

oratory receiving samples:

sheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑

Sample Condition Upon Receipt

Client Name: AMCADIS | GAPower

Project #:

WO#: 92669361

PM: BV Due Date: 06/09/23

CLIENT: 92-GP-Yates

ourier: ☐ Commercial ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ Other:

ustody Seal Present? ☑ Yes ☐ No Seals Intact? ☑ Yes ☐ No

Date/Initials Person Examining Contents: 5-25-23 AG

acking Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☑ No ☐ N/A

hermometer: ☑ IR Gun ID: 083

Type of Ice: ☑ Wet ☐ Blue ☐ None

ooler Temp: 9.2 Correction Factor: Add/Subtract (°C) +0.3

ooler Temp Corrected (°C): 9.5

Temp should be above freezing to 6°C

☐ Samples out of temp criteria. Samples on ice, cooling process has begun

SDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☐ Yes	☑ No	☐ N/A	8.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	9.
-Includes Date/Time/ID/Analysis Matrix: GW				
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

OMMENTS/SAMPLE DISCREPANCY

Field Data Required? ☐ Yes ☐ No

772237476009

Lot ID of split containers:

IENT NOTIFICATION/RESOLUTION

Person contacted: Date/Time:

Project Manager SCURF Review: **Date:**

Project Manager SRF Review: **Date:**

Pace ANALYTICAL SERVICES

DC#_Title: ENV-FRM-HUN1-0083 v02_Sample Condition Upon Receipt

Effective Date: 11/14/2022

Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

***Bottom half of box is to list number of bottles**

****Check all unpreserved Nitrates for chlorine**

Project # **WO#: 92669361**

PM: BV **Due Date: 06/09/23**

CLIENT: 92-GP-Yates

	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
		1				2																						
		1				2																						
		1				2																						
		1				2																						
		1				2																						
		1				2																						
		1				2																						
10																												
11																												
12																												

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

Attachment 3

Memo: Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Cobalt and Lithium in Groundwater

Attachment 3

Bench-Scale Testing of In Situ Technologies as Contingency Corrective Action for Cobalt and Lithium in Groundwater

This memo provides the results of bench-scale testing of in situ technologies for the Georgia Power Plant Yates ash ponds (AP) AP-3, A, B, B' and the R6 CCR Landfill (the Site) in Newnan, Georgia. Cobalt and lithium concentrations are currently at statistically significant levels (SSLs) with exceedances of the groundwater protection standard (GWPS) along the western boundary of the R6 CCR Landfill. Monitored Natural Attenuation (MNA) is the proposed remedy for cobalt and lithium in groundwater at the Site, supported by the phased MNA evaluation framework from the United States Environmental Protection Agency (USEPA 2007, 2015[1]). The Draft Remedy Selection Report Appendix F – Site Specific Demonstration of Natural Attenuation summarizes the site-specific, phased evaluation. The fourth phase of the framework is to design a performance monitoring program and identify an alternative remedy, or contingency. In situ treatment is being proposed as the contingency measure under this framework based on bench-scale testing and analysis provided below. If approved, the in situ remedy will be incorporated into the Corrective Action Monitoring Plan that will outline the adaptive site management framework at the Site.

Geochemical Site Conceptual Model and Treatability Approach

As described in the Draft Remedy Selection Report Appendix B, cobalt and lithium in groundwater at the Site are present as divalent and monovalent cations, respectively, are soluble, and have relatively low redox reactivities. Natural attenuation mechanisms such as cation exchange and adsorption are present at the site and capable of removing cobalt and lithium ions from groundwater. Additional cobalt and lithium can be removed from groundwater via in situ mechanisms such as enhanced sorption and precipitation as sulfides. To investigate the feasibility of in situ treatment at the Site, bench-scale testing was completed at the Arcadis Treatability Laboratory in Durham, North Carolina during January and February 2024. This memo summarizes the bench-scale studies to evaluate in situ treatment with various forms of Zero Valent Iron (ZVI).

Cobalt and Lithium Removal Effectiveness Testing Methods

Partially Weathered Rock and Groundwater Collection

To represent site conditions, site sediment and groundwater were used in the bench testing from the location shown on **Figure 1**. Arcadis collected a groundwater sample from YAMW-3, sample ID Composite-1, to support the treatability study using the standard methods of sample collection employed during the semi-annual sampling

[1] USEPA. 2007. Monitored Natural Attenuation of Inorganic Contaminants in Groundwater. Volume 1. Technical Basis for Assessment. EPA/600/R-07/139. Cincinnati, Ohio. October.

USEPA. 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Directive 9283.1-36. August.

and analysis field events. Special handling procedures to preserve redox conditions were not needed, because the groundwater at YAMW-3 contained oxygen and had elevated redox potential in recent samples from February and August 2023. 14 liters (L) of groundwater were collected on October 31, 2023 and shipped to the Arcadis Treatability Laboratory. The groundwater was received on November 3, 2023 and stored at 4 degrees Celsius or colder.

Partially weathered rock (PWR) sediments (PWR solids, herein) from 16 to 19 feet below ground surface (ft bgs) and 26 to 29 ft bgs intervals at YAMW-3 were obtained from the core archive at the Logan Martin storage facility. The lithology from both intervals consists primarily of silty sand with minor clay and gravel components. The samples were received by the Arcadis Treatability Laboratory in April 2023. Following receipt and inventory, the PWR solids from both intervals were homogenized and stored at room temperature.

On November 7, 2023, a baseline composite groundwater sample was taken from the 14-liter volume of collected groundwater and shipped to Pace Analytical Services located in Peachtree Corners, Georgia (Pace) for total and dissolved metals analysis by SW-846 6020B and sulfate analysis by USEPA Method 300.0. Laboratory analytical reports are provided in Attachment 1 of Appendix B of the Draft Remedy Selection Report. The dissolved metals samples were filtered in the laboratory with a 0.45-micron polyethersulfone (PES) syringe filter. These samples were used to evaluate whether the groundwater sample was representative and consistent with existing groundwater monitoring data. Analytical data for the groundwater are provided in **Table 1**. Dissolved cobalt and lithium were detected at concentrations of 0.11 milligram per liter (mg/L) and 0.039 mg/L, respectively, which are consistent with the concentrations of 0.14 mg/L and 0.04 mg/L collected during routine sampling in August 2023 at YAMW-3.

Bench-Scale Reagent Effectiveness for In-Situ Treatment

Batch trials with PWR from the Site, groundwater, and commercially available ZVI were tested according to the experimental matrix presented in **Table 2.** Reagents were selected based on their potential removal mechanisms for cobalt and/or lithium and properties that would allow for possible injection and distribution in the subsurface.

Two different ZVI reagents provided by Höganas /Cascade were evaluated: a common ZVI reagent (CleanER-5) and ZVI suspended in a dispersant, glycerol (CleanER iZVI). The dose for ZVI was set in the gram-per-liter (g/L) range based on what is commonly used for injections.

The batch trials included two control trails: Control 1, which only contained site groundwater without solids and controlled for potential cobalt and lithium losses to the reactor; and Control 2, which contained site groundwater with solids, controlling for potential cobalt and lithium losses to, or contributions from, the solids.

To prepare the batch reactors, 40 g of sieved and homogenized solids were weighed out into 250 milliliter (mL) centrifuge tubes, except for Reactor 1 (i.e. Control 1), which only contained site groundwater. Each of the twenty reactors were then given 0.2 L of homogenized groundwater. ZVI reactors were then dosed with the appropriate type and amount of reagent, as summarized **Table 2**. Duplicate reactors were made for each trial: the first reactor of each pair, designated with an “A” at the end of the sample ID (e.g. Reactor 1A) to be sampled on Day 2 and the second to be sampled on Day 14, designated with a “B” at the end of the sample ID (e.g. Reactor 1B). After the reactors were created, they were shaken, allowed to settle, and then measured for pH and oxidation-reduction potential (ORP). The reactors were then set in a holding rack for the duration of the experiment and inverted and shaken once a day to ensure sufficient mixing of components. On Days 2 and 14, additional pH and ORP measurements were collected, and samples were then collected and shipped to Pace for total and dissolved

metals analysis by SW-846 6020B, as summarized in **Table 2**. The dissolved metals samples were filtered in the laboratory with a 0.45-micron PES syringe filter.

Results

Bench-Scale Reagent Effectiveness for In-Situ Treatment Results

As shown on **Table 3** and **Figure 2**, dissolved cobalt and lithium concentrations in groundwater were preserved well from the time of groundwater sample collection (Baseline Groundwater) throughout the experiment (Control 1). Cobalt and lithium concentrations decreased significantly compared to baseline (0.11 mg/L and 0.039 mg/L, respectively) in the presence of solids without reagents, as seen in Control 2; however, both constituent concentrations remained elevated enough to continue with the testing program.

Dissolved cobalt concentrations decreased in trials containing CleanER-iZVI compared to Control 2, in which dissolved cobalt concentrations were measured at 0.036 mg/L and 0.027 mg/L in the Day 2 and Day 14 samples, respectively. Cobalt-concentrations declines occurred relatively rapidly, decreasing to 0.0023 mg/L in the Day 2 sample with CleanER-iZVI. Dissolved cobalt concentrations remained at similar concentrations to Day 2 in samples collected during Day 14.

Similarly, by Day 2, dissolved lithium concentrations successfully decreased to 0.011 mg/L in trials containing CleanER iZVI, compared to Control 2 (0.024 mg/L). By Day 14, lithium concentrations declined further to below the 0.0016-mg/L MDL.

No Appendix IV constituents were detected at levels greater than the respective GWPS in the 14-day experimental trials. Dissolved manganese increased relative to baseline in all trials, including Control 2 (**Figure 3**). Dissolved manganese concentrations of 1.3 mg/L and 1.5 mg/L on Day 2 and Day 14, respectively, were measured in the control containing only solids without reagents (i.e. Control 2), indicating that disturbance of the solids and setup of the trials released manganese. Dissolved manganese was detected at concentrations of 6.6 mg/L and 6.1 mg/L in the Day 2 samples for trials containing both ZVI reagents, indicating some manganese was associated with the reagents. Manganese associated with ZVI injections would also be expected to attenuate with distance downgradient of injections.

As shown in **Table 4**, the addition of iZVI stimulated a shift to more reducing conditions compared to baseline groundwater, with ORP values in the iZVI trials ranging from -551 mV to -420 mV, in comparison to an ORP of 288 mV to 326 mV in Control 1 (i.e. Reactor 1B, site groundwater without solids) on Day 2 and Day 14, respectively. Additionally, pH in all reactors containing reagents was similar to Control 2 and varied from 5.53 to 6.71, except for the trials containing iZVI, in which a maximum pH of 7.67 was measured.

Summary

The results of the bench-scale studies for in-situ reagents demonstrated successful treatment of cobalt and lithium to concentrations to below GWPS under site-comparable conditions for trials containing iZVI. These results support the retention of iZVI for further consideration for in-situ treatment, as a potential remedy for cobalt and lithium in groundwater at the Site.

Attachment 3

Bench-Scale Testing of In Situ Technologies as a Contingency Corrective Action for Selenium in Groundwater

Enclosures:

Tables

1 – Bench-Scale Tests Baseline Groundwater Results

2– Experimental Design and Analyses Summary Reagent Effectiveness Bench Scale Tests

3 – In Situ Cobalt and Lithium Removal Effectiveness Test Analytical Results

4– In Situ Cobalt and Lithium Removal Effectiveness Test Water Quality Parameter Results

Figures

1 – Partially Weathered Rock and Groundwater Collection Locations for Bench-Scale Tests

2 – In Situ Reagent Bench-Scale Results for Cobalt and Lithium

3 – In Situ Reagent Bench-Scale Results for Potential Byproducts

Attachment

Laboratory Analytical Reports

References

Arcadis. 2022. Plant Yates, Ash Ponds 3, A, B, and B'/ R6 CCR Landfill – Groundwater Remedy Selection Report. August.

Arcadis. 2023. Plant Yates, Ash Ponds 3, A, B, and B'/ R6 CCR Landfill – Bench-Scale Investigation and Analysis Scope of Work. June.

Arcadis. 2024. Plant Yates, Ash Ponds 3, A, B, and B'/ R6 CCR Landfill - 2023 Annual Groundwater Monitoring and Corrective Action Report. Prepared for Georgia Environmental Protection Division. January.

EPRI. 2021. Corrective Action Technology Profile. Permeable Reactive Zones for Groundwater Remediation at Coal Combustion Product Landfills and Impoundments. 3002021966. October.

Tables

Table 1
Bench-Scale Tests Baseline Groundwater Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Analyte	Sample ID:	COMPOSITE-1	
	Description:	Baseline Groundwater	
	Sample Date[1]:	11/7/2023	
	Units		
Total Metals (USEPA 6020B)		**Result**	**Qualifier**
Antimony	mg/L	<0.00054	ND
Arsenic	mg/L	<0.00084	ND
Barium	mg/L	0.029	--
Beryllium	mg/L	<0.00047	ND D3
Cadmium	mg/L	0.00032	J
Chromium	mg/L	<0.0019	ND
Cobalt	mg/L	0.11	--
Lead	mg/L	<0.00016	ND
Lithium	mg/L	0.037	J D3
Molybdenum	mg/L	0.0052	J
Selenium	mg/L	0.011	--
Thallium	mg/L	<0.00038	ND
Dissolved Metals (USEPA 6020B)			
Antimony	mg/L	<0.00054	ND
Arsenic	mg/L	<0.00084	ND
Barium	mg/L	0.031	--
Beryllium	mg/L	0.00035	J
Cadmium	mg/L	0.00033	J
Chromium	mg/L	<0.0019	ND
Cobalt	mg/L	0.11	--
Lead	mg/L	<0.00016	ND
Lithium	mg/L	0.039	--
Molybdenum	mg/L	0.0039	J
Selenium	mg/L	0.0087	--
Dissolved Metals by EPA 6010D			
Iron	mg/L	0.62	--
Manganese	mg/L	0.48	--
Sulfate By EPA 300.0 Rev 2.1 1993			
Sulfate	mg/L	353.00	--
Field Parameters[2]			
pH	--	5.60	--
Dissolved Oxygen	mg/L	0.89	--
Oxidation Reduction Potential	mV	159.86	--

Table 1
Bench-Scale Tests Baseline Groundwater Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Acronyms and Abbreviations:

< - Not detected at or above adjusted reporting limit

mg/L = milligrams per liter

mV = millivolts

USEPA = United States Environmental Protection Agency

Data Qualifiers:

B - Analyte was detected in the associated method blank.

D3 - Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference

J - Estimated value

ND - Not Detected

Note:

[1]Sample date represents the date the groundwater was homogenized and sampled at the Arcadis Treatability Laboratory and then shipped to Pace Analytical Services located in Peachtree Corners, Georgia.

[2]Field parameters were measured with an Aqua Troll 600 during the low-flow sampling event on October 31, 2023 prior to sample collection and shipment to the Arcadis Treability Laboratory.

Table 2
Experimental Design and Analyses Summary for Reagent Effectiveness Bench Scale Tests
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Condition	Test Description	Sample ID	Reagent Dose (grams)	Groundwater (liters)	Soil (grams)	Timescale (days)	Analyses Completed
Control - Site Groundwater without solids, no reagents	Control, GW 48-hr	Reactor 1A	0.000	0.200	0	2	T&D Metals (Appendix IV, Fe, Mn), Dissolved Oxygen, Oxidation-Reduction Potential, pH
	Control, GW 2-wk	Reactor 1B				14	
Control - Site Groundwater with solids, no reagents	Control, GW + Solids 48-hr	Reactor 2A	0.000	0.200	40	2	T&D Metals (Appendix IV, Fe, Mn), Dissolved Oxygen, Oxidation-Reduction Potential, pH
	Control, GW +Solids 2-wk	Reactor 2B				14	
CleanER iZVI*	CleanER iZVI 48-hr	Reactor 7A	2.500	0.200	40	2	T&D Metals (Appendix IV, Fe, Mn), Dissolved Oxygen, Oxidation-Reduction Potential, pH
	CleanER iZVI 2-wk	Reactor 7B				14	
CleanER-5	CleanER-5 48-hr	Reactor 8A	1.000	0.200	40	2	T&D Metals (Appendix IV, Fe, Mn), Dissolved Oxygen, Oxidation-Reduction Potential, pH
	CleanER-5 2-wk	Reactor 8B				14	

*Suspended in solution: Mass reflects required amount to reach desired ZVI addition
**As decahydrate: Mass reflects required amount to reach desired Sodium Carbonate addition

Notes:

Appendix IV constituents include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium and thallium. Mercury and radium were not evaluated.

Fe = iron

GW = groundwater

ID = identity

Mn = manganese

wk = week

wt = weight

T&D = total and dissolved

ZVI = zero valent iron

Table 3
In Situ Cobalt amd Lithium Removal Effectiveness Test Analytical Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Sample Identification			Reactor 1A		Reactor 1B		Reactor 2A		Reactor 2B		Reactor 7A		Reactor 7B		Reactor 8A		Reactor 8B	
Description			Control 1, Groundwater				Control 2, Groundwater + PWR Solids				CleanER iZVI				CleanER-5			
Sample Collection Day			Day 2		Day 14		Day 2		Day 14		Day 2		Day 14		Day 2		Day 14	
Method/Analyte	Result Units	GWPS (mg/L)*	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals USEPA 6020B - Total																		
Antimony	mg/L	0.006	<0.00054	ND	<0.00054	ND	<0.00054	ND	<0.00054	ND	<0.00054	ND	<0.00054	ND	0.0014	J B	0.0013	J
Arsenic	mg/L	0.010	<0.00084	ND	0.0018	J	<0.00084	ND	0.0021	J	<0.00084	ND	<0.00084	ND	<0.00084	ND	<0.00084	ND
Barium	mg/L	2.00	0.031		0.031		0.1		0.089		0.065		0.041		0.089		0.092	
Beryllium	mg/L	0.004	0.00019	J	0.00012	J	0.00069		0.001		0.00035	J	0.00029	J	0.00014	J	0.0011	
Cadmium	mg/L	0.005	0.00028	J	0.00024	J	0.00015	J	0.00018	J	<0.00010	ND	<0.00010	ND	<0.0019	ND	0.00019	J
Chromium	mg/L	0.100	<0.0019	ND	<0.0019	ND	0.0021	J	0.0025	J	0.003	J	0.0031	J	0.035		0.0029	J
Cobalt	mg/L	0.035	0.1		0.1		0.033		0.027		0.0042	J	0.0021	J	0.00037	J	0.04	
Lead	mg/L	0.015	<0.00016	ND	<0.00016	ND	0.00071	J	0.00044	J	0.00091	J	0.00078	J	<0.00016	ND	0.00063	J
Lithium	mg/L	0.040	0.037		0.037		0.021	J	0.0098	J	0.011	J	0.0032	J	0.018	J	0.01	J
Molybdenum	mg/L	0.100	0.0041	J	0.0044	J	0.0011	J	<0.00062	ND	0.0011	J	0.002	J	<0.00062	ND	<0.00062	ND
Selenium	mg/L	0.050	0.0089		0.0089		0.0082		0.008		<0.00096	ND	<0.00096	ND	0.0076		0.007	
Thallium	mg/L	0.002	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND	<0.00038	ND
Metals USEPA 6020B - Dissolved																		
Antimony	mg/L	0.006	0.0011	J	0.0013	J	0.00095	J	0.0014	J	0.0014	J	0.0012	J	0.0026	J	0.0023	J
Arsenic	mg/L	0.010	0.0024	J	0.0011	J	0.0035	J	0.0013	J	<0.00084	ND	<0.00084	ND	0.0021	J	<0.00084	ND
Barium	mg/L	2.00	0.032		0.031		0.087		0.079		0.037		0.02		0.092		0.077	
Beryllium	mg/L	0.004	0.00021	J	0.00012	J	0.00057		0.00083		<0.000094	ND	<0.000094	ND	0.00044	J	0.00098	
Cadmium	mg/L	0.005	0.00029	J	0.00024	J	0.00012	J	0.00015	J	<0.00010	ND	<0.00010	ND	0.00012	J	0.00022	J
Chromium	mg/L	0.100	<0.0019	ND	0.0035	J	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND	<0.0019	ND
Cobalt	mg/L	0.035	0.12		0.11		0.036		0.027		0.0023	J	0.00064	J	0.042		0.041	
Iron	mg/L	0.30	<0.0075	ND	0.021	J	0.011	J	<0.0075	ND	2.9		3.5		<0.0075	ND	0.016	J
Lead	mg/L	0.015	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND	<0.00016	ND
Lithium	mg/L	0.040	0.044		0.039		0.024	J	0.0088	J	0.011	J	0.0016	ND	0.023	J	0.0089	J
Manganese	mg/L	0.05	0.52		0.51		1.3		1.5		6.6		3.4		6.1		5.8	

Table 3
In Situ Cobalt amd Lithium Removal Effectiveness Test Analytical Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

Notes:

*Secondary Maximum Contaminant Limits were used for iron, manganese, and sulfate.

Acronyms and Abbreviations:

GWPS = groundwater protection standards

mg/L = milligram per liter

PWR = partially weathered rock

Q = Data Qualifier

USEPA = United States Environmental Protection Agency

Data Qualifiers:

A = run by USEPA Method 6010D to meet reporting limit standards.

B = analyte was detected in the associated method blank.

D3 = sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

J = estimated concentration.

M1 = matrix spike recovery exceeded quality control limits. Batch accepted based on laboratory control sample recovery.

NP = Not performed

ND = not detected at or above adjusted reporting limit

Table 4
In Situ Cobalt and Lithium Removal Effectiveness Test Water Quality Parameter Results
Georgia Power Company
Plant Yates AP-3, A, B, B' and R6 CCR Landfill
Newnan, Georgia

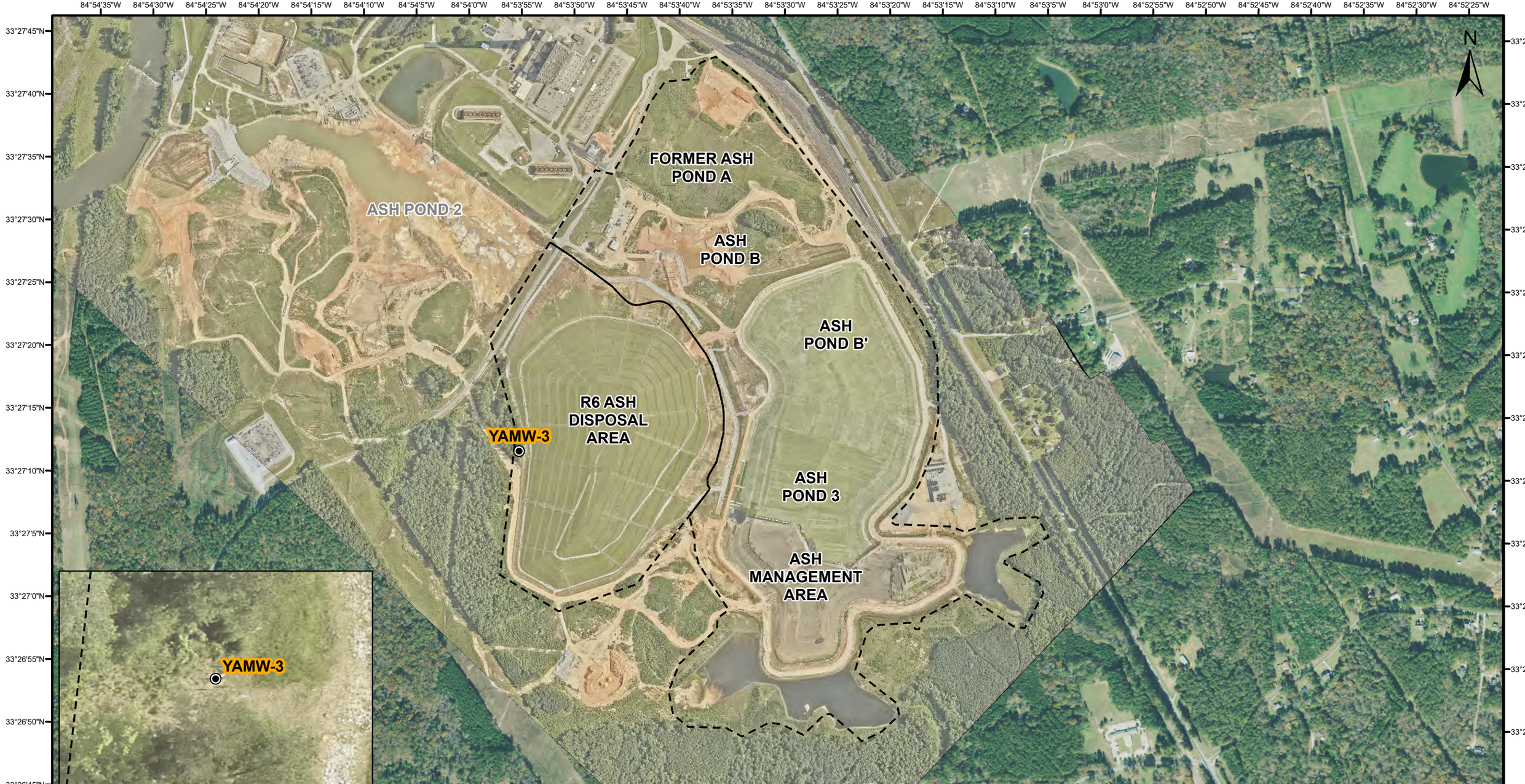
Description	Sample Identification	pH			Oxidation Reduction Potential			Dissolved Oxygen[2]
	Units:	--			millivolts			milligrams per liter
	Measurement Time[1]:	Day 0	Day 2	Day 14	Day 0	Day 2	Day 14	Day 0
Control 1, Groundwater	Reactor 1A	6.32	6.89	--	326	290	--	8.81
	Reactor 1B	6.47	6.80	7.14	336	288	326	9.29
Control 2, Groundwater + PWR Solids	Reactor 2A	6.53	6.03	--	338	223	--	9.25
	Reactor 2B	6.35	5.93	5.5	337	220	343	9.48
CleanER iZVI	Reactor 7A	6.99	7.05	--	-480	-523	--	0.27
	Reactor 7B	7.16	7.06	7.67	-480	-551	-420	0.66
CleanER-5	Reactor 8A	6.71	6.08	--	226	208	--	9.87
	Reactor 8B	6.67	5.76	5.53	257	253	170	9.56

Notes:

[1] Day 0 measurements were taken immediately after reactor construction at the start of the experiment.

[2] Dissolved oxygen was only measured on Day 0 due to subsequent instrument malfunction.

Figures



LEGEND

- PERMITTED UNIT BOUNDARY
- BEDROCK ASSESSMENT WELL/PIEZOMETER
- YAMW-3 GROUNDWATER AND PARTIALLY WEATHERED ROCK TREATABILITY STUDY COLLECTION LOCATION

0 30 60
INSET MAIN GRAPHIC SCALE IN FEET

0 750 1,500
MAIN MAIN GRAPHIC SCALE IN FEET

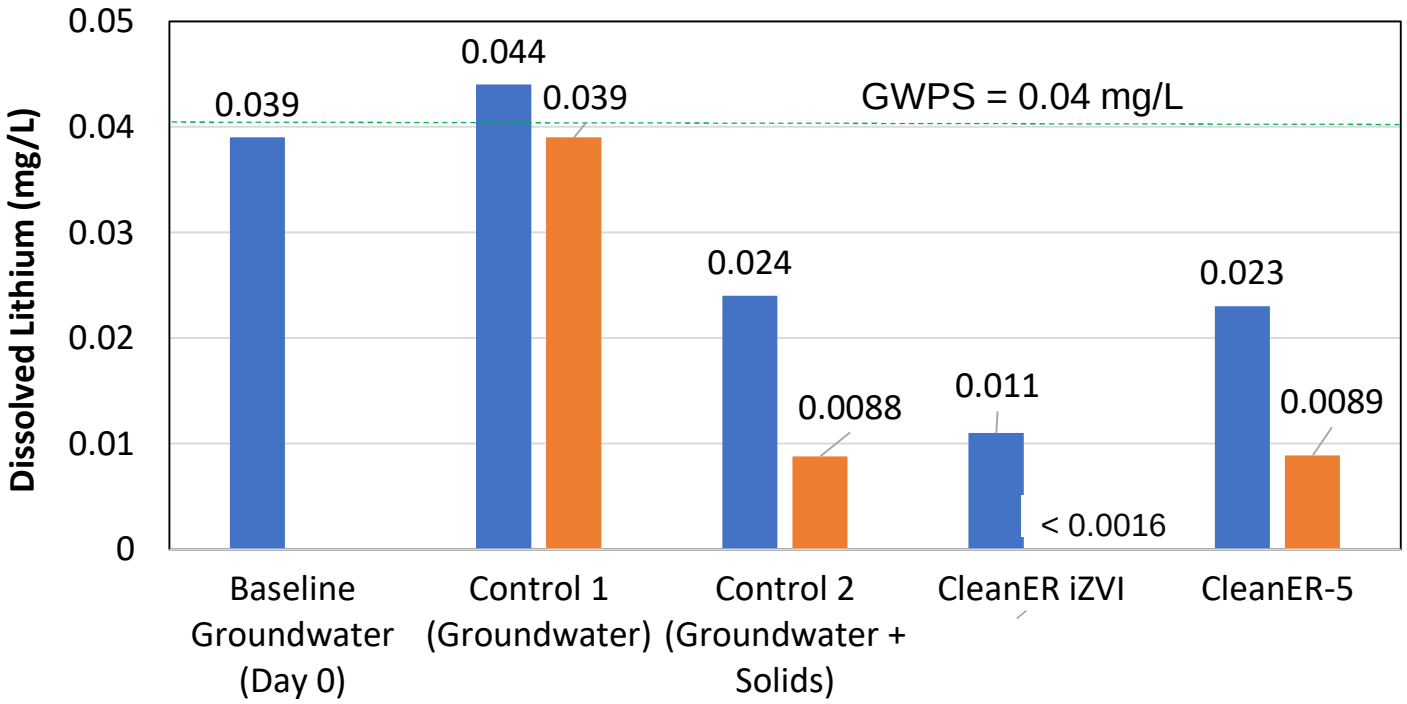
Georgia Power

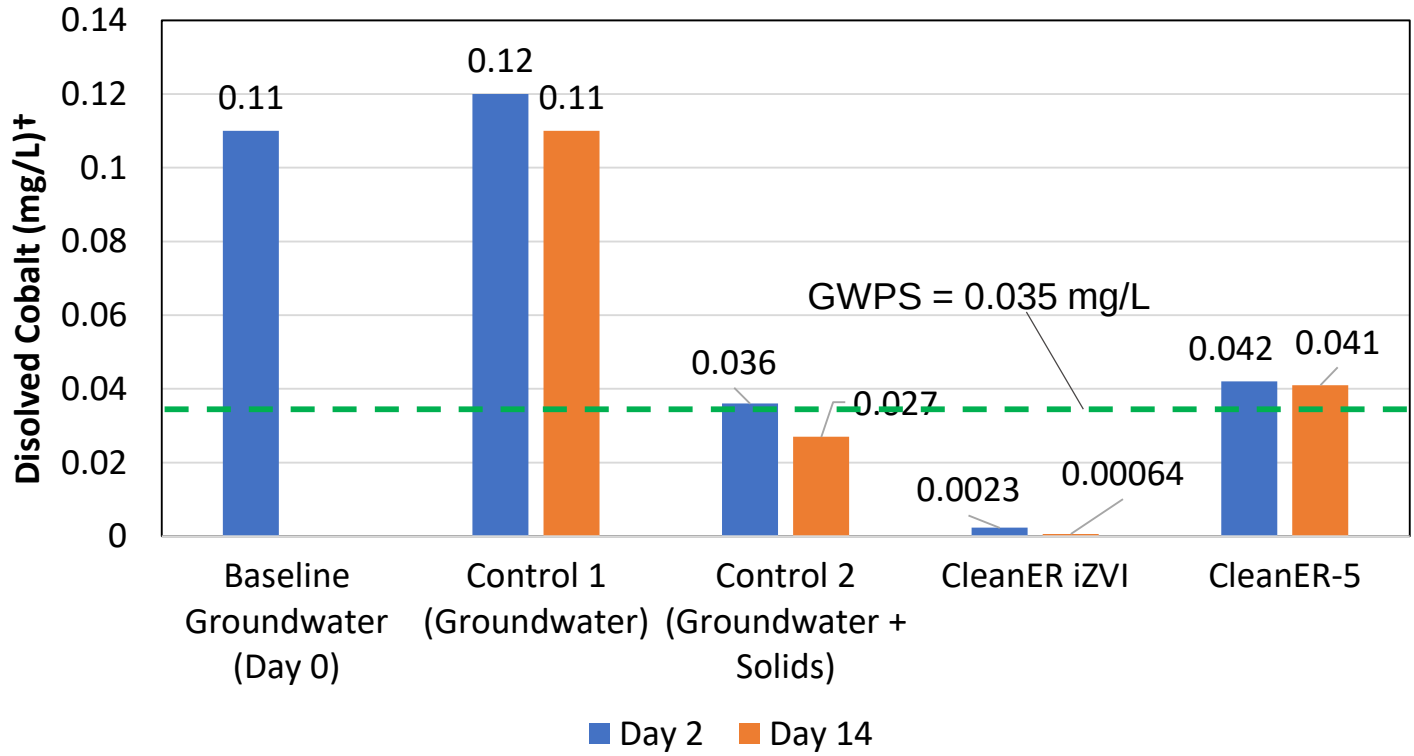
PLANT YATES AP-3, A, B, B', AND R6 CCR LANDFILL
NEWNAN, GA

PARTIALLY WEATHERED ROCK AND GROUNDWATER COLLECTION LOCATION FOR BENCH-SCALE TESTS

ARCADIS

FIGURE
1





Notes:
GWPS – Groundwater Protection Standard
mg/L – milligrams per liter
ZVI – Zero Valent Iron CleanER-5
< - Result was not detected, method detection limit shown
† - Background concentration is higher than the federally promulgated value (0.006 mg/L for Cobalt). Therefore, background is the GWPS.

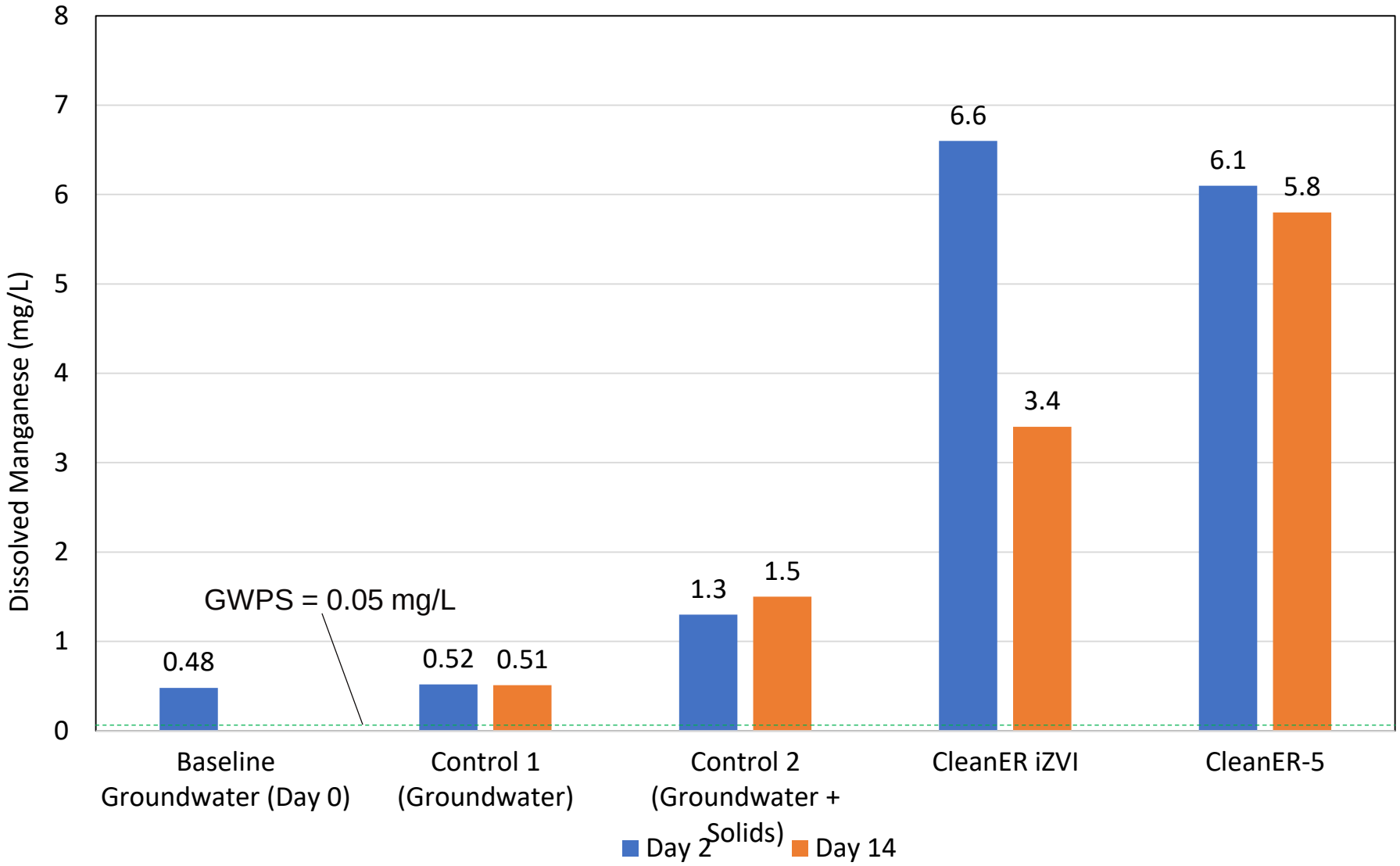
GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL
NEWNAN, GEORGIA

IN SITU REAGENT BENCH-SCALE RESULTS FOR COBALT AND LITHIUM

ARCADIS

FIGURE
2

Bench-Scale Investigation and Analysis Results Plant Yates – AP-3, A, B, B' and R6 CCR Landfill



Notes:
GWPS – Groundwater Protection Standard
mg/L – milligrams per liter
ZVI – Zero Valent Iron CleanER-5

GEORGIA POWER
PLANT YATES AP-3, A, B, B' AND R6 CCR LANDFILL, NEWNAN, GEORGIA

IN SITU REAGENTS BENCH-SCALE RESULTS FOR MANGANESE

ARCADIS

FIGURE
3

ATTACHMENT

Laboratory Analytical Reports

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

November 28, 2023

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on November 08, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Asheville
- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
704-977-0968
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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Huntersville, NC 28078
(704)875-9092

CERTIFICATIONS

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Pace Analytical Services Asheville
2225 Riverside Drive, Asheville, NC 28804
Florida/NELAP Certification #: E87648
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Laboratory ID: 99030
South Carolina Certification #: 99030001
Virginia/VELAP Certification #: 460222

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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Huntersville, NC 28078
(704)875-9092

SAMPLE SUMMARY

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92697623001	**Composite-1**	Water	11/07/23 09:30	11/08/23 11:30

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
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(704)875-9092

SAMPLE ANALYTE COUNT

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92697623001	**Composite-1**	EPA 6010D	DRB	2
		EPA 6020B	CW1	12
		EPA 6020B	MT1	12
		EPA 300.0 Rev 2.1 1993	CDC	1

PASI-A = Pace Analytical Services - Asheville
PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92697623001	**Composite-1**					
EPA 6010D	Iron, Dissolved	0.62	mg/L	0.040	11/20/23 19:32	
EPA 6010D	Manganese, Dissolved	0.48	mg/L	0.040	11/20/23 19:32	
EPA 6020B	Barium	0.029	mg/L	0.0050	11/21/23 13:23	
EPA 6020B	Cadmium	0.00032J	mg/L	0.00050	11/21/23 13:23	
EPA 6020B	Cobalt	0.11	mg/L	0.0050	11/21/23 13:23	
EPA 6020B	Lithium	0.037J	mg/L	0.15	11/27/23 12:36	D3
EPA 6020B	Molybdenum	0.0052J	mg/L	0.010	11/21/23 13:23	
EPA 6020B	Selenium	0.011	mg/L	0.0050	11/21/23 13:23	
EPA 6020B	Barium, Dissolved	0.031	mg/L	0.0050	11/20/23 21:13	
EPA 6020B	Beryllium, Dissolved	0.00035J	mg/L	0.00050	11/20/23 21:13	
EPA 6020B	Cadmium, Dissolved	0.00033J	mg/L	0.00050	11/20/23 21:13	
EPA 6020B	Cobalt, Dissolved	0.11	mg/L	0.0050	11/20/23 21:13	
EPA 6020B	Lithium, Dissolved	0.039	mg/L	0.030	11/20/23 21:13	
EPA 6020B	Molybdenum, Dissolved	0.0039J	mg/L	0.010	11/20/23 21:13	
EPA 6020B	Selenium, Dissolved	0.0087	mg/L	0.0050	11/20/23 21:13	
EPA 300.0 Rev 2.1 1993	Sulfate	353	mg/L	7.0	11/14/23 08:44	

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Huntersville, NC 28078
(704)875-9092

ANALYTICAL RESULTS

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Sample: Composite-1 **Lab ID: 92697623001** Collected: 11/07/23 09:30 Received: 11/08/23 11:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010D Preparation Method: EPA 3010A Pace Analytical Services - Peachtree Corners, GA								
Iron, Dissolved	**0.62**	mg/L	0.040	0.025	1	11/17/23 14:18	11/20/23 19:32	7439-89-6	
Manganese, Dissolved	**0.48**	mg/L	0.040	0.011	1	11/17/23 14:18	11/20/23 19:32	7439-96-5	
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	11/17/23 12:30	11/21/23 13:23	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	11/17/23 12:30	11/22/23 15:21	7440-38-2	
Barium	**0.029**	mg/L	0.0050	0.00047	1	11/17/23 12:30	11/21/23 13:23	7440-39-3	
Beryllium	ND	mg/L	0.0025	0.00047	5	11/17/23 12:30	11/27/23 12:36	7440-41-7	D3
Cadmium	**0.00032J**	mg/L	0.00050	0.00010	1	11/17/23 12:30	11/21/23 13:23	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	11/17/23 12:30	11/21/23 13:23	7440-47-3	
Cobalt	**0.11**	mg/L	0.0050	0.00032	1	11/17/23 12:30	11/21/23 13:23	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	11/17/23 12:30	11/21/23 13:23	7439-92-1	
Lithium	**0.037J**	mg/L	0.15	0.0078	5	11/17/23 12:30	11/27/23 12:36	7439-93-2	D3
Molybdenum	**0.0052J**	mg/L	0.010	0.00062	1	11/17/23 12:30	11/21/23 13:23	7439-98-7	
Selenium	**0.011**	mg/L	0.0050	0.00096	1	11/17/23 12:30	11/21/23 13:23	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	11/17/23 12:30	11/21/23 13:23	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	ND	mg/L	0.0030	0.00054	1	11/17/23 14:09	11/20/23 21:13	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.00084	1	11/17/23 14:09	11/20/23 21:13	7440-38-2	
Barium, Dissolved	**0.031**	mg/L	0.0050	0.00047	1	11/17/23 14:09	11/20/23 21:13	7440-39-3	
Beryllium, Dissolved	**0.00035J**	mg/L	0.00050	0.000094	1	11/17/23 14:09	11/20/23 21:13	7440-41-7	
Cadmium, Dissolved	**0.00033J**	mg/L	0.00050	0.00010	1	11/17/23 14:09	11/20/23 21:13	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	11/17/23 14:09	11/20/23 21:13	7440-47-3	
Cobalt, Dissolved	**0.11**	mg/L	0.0050	0.00032	1	11/17/23 14:09	11/20/23 21:13	7440-48-4	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	11/17/23 14:09	11/20/23 21:13	7439-92-1	
Lithium, Dissolved	**0.039**	mg/L	0.030	0.0016	1	11/17/23 14:09	11/20/23 21:13	7439-93-2	
Molybdenum, Dissolved	**0.0039J**	mg/L	0.010	0.00062	1	11/17/23 14:09	11/20/23 21:13	7439-98-7	
Selenium, Dissolved	**0.0087**	mg/L	0.0050	0.00096	1	11/17/23 14:09	11/20/23 21:13	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	11/17/23 14:09	11/20/23 21:13	7440-28-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0 Rev 2.1 1993 Pace Analytical Services - Asheville								
Sulfate	**353**	mg/L	7.0	3.5	7		11/14/23 08:44	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

QC Batch: 814154
QC Batch Method: EPA 3010A
Analysis Method: EPA 6010D
Analysis Description: 6010 MET Filtered Diss.
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92697623001

METHOD BLANK: 4215040 Matrix: Water
Associated Lab Samples: 92697623001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.040	0.025	11/20/23 19:23	
Manganese, Dissolved	mg/L	ND	0.040	0.011	11/20/23 19:23	

LABORATORY CONTROL SAMPLE: 4215041

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	1	1.0	104	80-120	
Manganese, Dissolved	mg/L	1	1.0	101	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

QC Batch: 814093
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92697623001

METHOD BLANK: 4214778 Matrix: Water
Associated Lab Samples: 92697623001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0030	0.00054	11/21/23 13:15	
Arsenic	mg/L	ND	0.0050	0.00084	11/22/23 15:17	
Barium	mg/L	ND	0.0050	0.00047	11/21/23 13:15	
Beryllium	mg/L	ND	0.00050	0.000094	11/21/23 13:15	
Cadmium	mg/L	ND	0.00050	0.00010	11/21/23 13:15	
Chromium	mg/L	ND	0.0050	0.0019	11/21/23 13:15	
Cobalt	mg/L	ND	0.0050	0.00032	11/21/23 13:15	
Lead	mg/L	ND	0.0010	0.00016	11/21/23 13:15	
Lithium	mg/L	ND	0.030	0.0016	11/21/23 13:15	
Molybdenum	mg/L	ND	0.010	0.00062	11/21/23 13:15	
Selenium	mg/L	ND	0.0050	0.00096	11/21/23 13:15	
Thallium	mg/L	ND	0.0010	0.00038	11/21/23 13:15	

LABORATORY CONTROL SAMPLE: 4214779

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.10	101	80-120	
Arsenic	mg/L	0.1	0.10	100	80-120	
Barium	mg/L	0.1	0.10	102	80-120	
Beryllium	mg/L	0.1	0.10	104	80-120	
Cadmium	mg/L	0.1	0.10	101	80-120	
Chromium	mg/L	0.1	0.10	105	80-120	
Cobalt	mg/L	0.1	0.10	104	80-120	
Lead	mg/L	0.1	0.10	101	80-120	
Lithium	mg/L	0.1	0.11	107	80-120	
Molybdenum	mg/L	0.1	0.11	107	80-120	
Selenium	mg/L	0.1	0.10	103	80-120	
Thallium	mg/L	0.1	0.10	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4214780 4214781

Parameter	Units	92697629002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	ND	0.1	0.1	0.10	0.099	102	99	75-125	3	20	
Arsenic	mg/L	0.24	0.1	0.1	0.36	0.35	117	113	75-125	1	20	
Barium	mg/L	0.052	0.1	0.1	0.16	0.16	111	105	75-125	3	20	
Beryllium	mg/L	ND	0.1	0.1	0.092	0.090	92	90	75-125	2	20	

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Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4214780 4214781

Parameter	Units	92697629002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	mg/L	ND	0.1	0.1	0.10	0.099	102	99	75-125	4	20	
Chromium	mg/L	ND	0.1	0.1	0.10	0.096	99	96	75-125	4	20	
Cobalt	mg/L	0.029	0.1	0.1	0.13	0.12	100	95	75-125	4	20	
Lead	mg/L	ND	0.1	0.1	0.095	0.091	94	91	75-125	4	20	
Lithium	mg/L	0.022J	0.1	0.1	0.12	0.12	96	95	75-125	1	20	
Molybdenum	mg/L	0.028	0.1	0.1	0.13	0.13	102	101	75-125	1	20	
Selenium	mg/L	ND	0.1	0.1	0.10	0.10	104	101	75-125	2	20	
Thallium	mg/L	ND	0.1	0.1	0.097	0.096	97	96	75-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Huntersville, NC 28078
(704)875-9092

QUALITY CONTROL DATA

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

QC Batch: 814149
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA

Associated Lab Samples: 92697623001

METHOD BLANK: 4215024 Matrix: Water
Associated Lab Samples: 92697623001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.00054	11/20/23 21:05	
Arsenic, Dissolved	mg/L	ND	0.0050	0.00084	11/20/23 21:05	
Barium, Dissolved	mg/L	ND	0.0050	0.00047	11/20/23 21:05	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000094	11/20/23 21:05	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00010	11/20/23 21:05	
Chromium, Dissolved	mg/L	ND	0.0050	0.0019	11/20/23 21:05	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00032	11/20/23 21:05	
Lead, Dissolved	mg/L	ND	0.0010	0.00016	11/20/23 21:05	
Lithium, Dissolved	mg/L	ND	0.030	0.0016	11/20/23 21:05	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00062	11/20/23 21:05	
Selenium, Dissolved	mg/L	ND	0.0050	0.00096	11/20/23 21:05	
Thallium, Dissolved	mg/L	ND	0.0010	0.00038	11/20/23 21:05	

LABORATORY CONTROL SAMPLE: 4215025

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.10	104	80-120	
Arsenic, Dissolved	mg/L	0.1	0.097	97	80-120	
Barium, Dissolved	mg/L	0.1	0.10	103	80-120	
Beryllium, Dissolved	mg/L	0.1	0.099	99	80-120	
Cadmium, Dissolved	mg/L	0.1	0.10	103	80-120	
Chromium, Dissolved	mg/L	0.1	0.097	97	80-120	
Cobalt, Dissolved	mg/L	0.1	0.096	96	80-120	
Lead, Dissolved	mg/L	0.1	0.10	100	80-120	
Lithium, Dissolved	mg/L	0.1	0.10	103	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.096	96	80-120	
Selenium, Dissolved	mg/L	0.1	0.10	100	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	102	80-120	

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QUALITY CONTROL DATA

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

QC Batch: 812941
QC Batch Method: EPA 300.0 Rev 2.1 1993
Analysis Method: EPA 300.0 Rev 2.1 1993
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Asheville
Associated Lab Samples: 92697623001

METHOD BLANK: 4209281 Matrix: Water
Associated Lab Samples: 92697623001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	0.50	11/13/23 23:18	

LABORATORY CONTROL SAMPLE: 4209282

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	50	51.3	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4209283 4209284

Parameter	Units	92698094008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	ND	50	50	54.2	54.7	108	109	90-110	1	10	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4209407 4209408

Parameter	Units	92697629002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	273	50	50	323	324	99	101	90-110	0	10	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: GPC Yates Lithium/Cobalt Treat
Pace Project No.: 92697623

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92697623001	**Composite-1**	EPA 3010A	814154	EPA 6010D	814405
92697623001	**Composite-1**	EPA 3005A	814093	EPA 6020B	814408
92697623001	**Composite-1**	EPA 3005A	814149	EPA 6020B	814406
92697623001	**Composite-1**	EPA 300.0 Rev 2.1 1993	812941		

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Laboratory receiving samples:

Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

Client Name: GPC Yates Lithium/Icebelt

Project #:

WO# : 92697623

92697623

Courier: ☐ Commercial ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ Other:

Custody Seal Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☑ No

Date/Initials Person Examining Contents: 11-8-23 JCC

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other

Thermometer: ☑ IR Gun ID: 230

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Type of Ice: ☐ Wet ☐ Blue ☐ None

Cooler Temp: 11.0 Correction Factor: Add/Subtract (°C) 0.0

Temp should be above freezing to 6°C

☐ Samples out of temp criteria. Samples on ice, cooling process has begun

Cooler Temp Corrected (°C): 11.0

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☑ Yes	☐ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered? 11-8-23 JCC	☑ Yes	☐ No	☑ N/A	8.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: WT	☑ Yes	☐ No	☐ N/A	9.
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

TRK 7740 1966 7430

Field Data Required? ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: Date/Time:

Project Manager SCURF Review: Date:

Project Manager SRF Review: Date:

Qualtrax ID: 69614

*Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

**Bottom half of box is to list number of bottles

***Check all unpreserved Nitrates for chlorine

Project # **WO#: 92697623**

PM: BV Due Date: 11/22/23

CLIENT: 92-GP-Yates

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG8U-40 mL Amber Unpreserved vials (N/A)
1	1					2																							
2																													
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Lab Work Order #

Page 1 of 1

PROJECT NUMBER	PROJECT NAME	SDG NUMBER	LAB PROFILE
0182242 Task 9A	GPC Yates Lithium/Cobalt Treatability Study		16561-10
END RESULTS TO: Geoffrey Gay	EMAIL ADDRESS: geoffrey.gay@arcadis.com	TELEPHONE: 404-402-2983	
AMPLERS: David Rosen, Jessica Ware			

SAMPLE ID	DATE	TIME	MATRIX	COMPOSITE / GRAB	QUANTITY	REQUESTED ANALYSES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
OMPOSITE-1	11/7/23	0930	GW	C	3	1	1	1													

	Requested Analyses	Container	Pres.
1	Total Metals 6020	250mL HDPE	HNO3
2	Dissolved Metals 6020	250mL HDPE	HNO3
3	Sulfate	250mL HDPE	None
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Special Instructions/Comments:

FEDEX OVERNIGHT

Dissolved metals was field filtered with 0.45µm PES membrane.

☐ **Special QA/QC Instructions**

Total metals for Appendix IV. Dissolved metals for Appendix IV, iron, and manganese.

(SEE LIST IN BONNIE'S EMAIL)

Laboratory Information and Receipt

Lab Name: Pace Norcross

Lab Project Manager: Bonnie Vang

Shipping Tracking #

Specify Turnaround Requirements: Standard

☐ Cooler packed with ice

☐ Cooler custody seal intact

Sample Receipt:

Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
DAVID ROSEN/ANA	11/7/23	11:30	JCL	11-8-23	0955
Relinquished by:	DATE	TIME	Received by:	DATE	TIME

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

February 23, 2024

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on February 06, 2024. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
704-977-0968
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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CERTIFICATIONS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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SAMPLE SUMMARY

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92711945001	**Reactor 1A: Control, GW (48hr)**	Water	02/01/24 14:05	02/06/24 16:14
92711945002	**Reactor 2A: Control, GW+Solids**	Water	02/01/24 14:15	02/06/24 16:14
92711945003	**Reactor 3A: Unmodified Regenes**	Water	02/01/24 14:30	02/06/24 16:14
92711945004	**Reactor 4A: Modified Regenesis**	Water	02/01/24 14:35	02/06/24 16:14
92711945005	**Reactor 5A: Unmodified Aqua Ae**	Water	02/01/24 14:45	02/06/24 16:14
92711945006	**Reactor 6A: Modified Aqua Aero**	Water	02/01/24 15:05	02/06/24 16:14
92711945007	**Reactor 7A: CleanER iZVI (48hr**	Water	02/01/24 15:15	02/06/24 16:14
92711945008	**Reactor 8A: CleanER-5 (48hr)**	Water	02/01/24 15:20	02/06/24 16:14
92711945009	**Reactor 9A: Sodium Carbonate 2**	Water	02/01/24 15:30	02/06/24 16:14
92711945010	**Reactor 10A: Sodium Carbonate**	Water	02/01/24 15:35	02/06/24 16:14

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SAMPLE ANALYTE COUNT

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92711945001	**Reactor 1A: Control, GW (48hr)**	EPA 6020B	CW1	12
		EPA 6020B	MT1	14
92711945002	**Reactor 2A: Control, GW+Solids**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945003	**Reactor 3A: Unmodified Regenes**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945004	**Reactor 4A: Modified Regenesis**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945005	**Reactor 5A: Unmodified Aqua Ae**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945006	**Reactor 6A: Modified Aqua Aero**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945007	**Reactor 7A: CleanER iZVI (48hr**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945008	**Reactor 8A: CleanER-5 (48hr)**	EPA 6020B	CW1	12
		EPA 6020B	CW1, MT1	14
92711945009	**Reactor 9A: Sodium Carbonate 2**	EPA 6020B	CW1	12
		EPA 6020B	MT1	14
92711945010	**Reactor 10A: Sodium Carbonate**	EPA 6020B	CW1	12
		EPA 6020B	MT1	14

PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92711945001	**Reactor 1A: Control, GW (48hr)**					
EPA 6020B	Barium	0.031	mg/L	0.0050	02/09/24 17:11	
EPA 6020B	Beryllium	0.00019J	mg/L	0.00050	02/09/24 17:11	
EPA 6020B	Cadmium	0.00028J	mg/L	0.00050	02/09/24 17:11	
EPA 6020B	Cobalt	0.10	mg/L	0.0050	02/09/24 17:11	
EPA 6020B	Lithium	0.037	mg/L	0.030	02/09/24 17:11	
EPA 6020B	Molybdenum	0.0041J	mg/L	0.010	02/09/24 17:11	
EPA 6020B	Selenium	0.0089	mg/L	0.0050	02/09/24 17:11	
EPA 6020B	Antimony, Dissolved	0.0011J	mg/L	0.0030	02/15/24 13:55	
EPA 6020B	Arsenic, Dissolved	0.0024J	mg/L	0.0050	02/15/24 13:55	
EPA 6020B	Barium, Dissolved	0.032	mg/L	0.0050	02/15/24 13:55	
EPA 6020B	Beryllium, Dissolved	0.00021J	mg/L	0.00050	02/15/24 13:55	
EPA 6020B	Cadmium, Dissolved	0.00029J	mg/L	0.00050	02/15/24 13:55	
EPA 6020B	Cobalt, Dissolved	0.12	mg/L	0.0050	02/15/24 13:55	
EPA 6020B	Lithium, Dissolved	0.044	mg/L	0.030	02/15/24 13:55	
EPA 6020B	Manganese, Dissolved	0.52	mg/L	0.010	02/15/24 13:55	
EPA 6020B	Molybdenum, Dissolved	0.0044J	mg/L	0.010	02/15/24 13:55	
EPA 6020B	Selenium, Dissolved	0.0085	mg/L	0.0050	02/15/24 13:55	
92711945002	**Reactor 2A: Control, GW+Solids**					
EPA 6020B	Barium	0.10	mg/L	0.0050	02/09/24 17:15	
EPA 6020B	Beryllium	0.00069	mg/L	0.00050	02/09/24 17:15	
EPA 6020B	Cadmium	0.00015J	mg/L	0.00050	02/09/24 17:15	
EPA 6020B	Chromium	0.0021J	mg/L	0.0050	02/09/24 17:15	
EPA 6020B	Cobalt	0.033	mg/L	0.0050	02/09/24 17:15	
EPA 6020B	Lead	0.00071J	mg/L	0.0010	02/09/24 17:15	
EPA 6020B	Lithium	0.021J	mg/L	0.030	02/09/24 17:15	
EPA 6020B	Molybdenum	0.0011J	mg/L	0.010	02/09/24 17:15	
EPA 6020B	Selenium	0.0082	mg/L	0.0050	02/09/24 17:15	
EPA 6020B	Antimony, Dissolved	0.00095J	mg/L	0.0030	02/15/24 14:00	
EPA 6020B	Arsenic, Dissolved	0.0035J	mg/L	0.0050	02/15/24 14:00	
EPA 6020B	Barium, Dissolved	0.087	mg/L	0.0050	02/15/24 14:00	
EPA 6020B	Beryllium, Dissolved	0.00057	mg/L	0.00050	02/15/24 14:00	
EPA 6020B	Cadmium, Dissolved	0.00012J	mg/L	0.00050	02/15/24 14:00	
EPA 6020B	Cobalt, Dissolved	0.036	mg/L	0.0050	02/15/24 14:00	
EPA 6020B	Iron, Dissolved	0.011J	mg/L	0.040	02/15/24 14:00	
EPA 6020B	Lithium, Dissolved	0.024J	mg/L	0.030	02/15/24 14:00	
EPA 6020B	Manganese, Dissolved	1.3	mg/L	0.10	02/21/24 13:18	
EPA 6020B	Molybdenum, Dissolved	0.0010J	mg/L	0.010	02/15/24 14:00	
EPA 6020B	Selenium, Dissolved	0.0073	mg/L	0.0050	02/15/24 14:00	
92711945003	**Reactor 3A: Unmodified Regenes**					
EPA 6020B	Barium	0.13	mg/L	0.0050	02/09/24 17:19	
EPA 6020B	Beryllium	0.00073	mg/L	0.00050	02/09/24 17:19	
EPA 6020B	Cadmium	0.00012J	mg/L	0.00050	02/09/24 17:19	
EPA 6020B	Chromium	0.0043J	mg/L	0.0050	02/09/24 17:19	
EPA 6020B	Cobalt	0.029	mg/L	0.0050	02/09/24 17:19	
EPA 6020B	Lead	0.0014	mg/L	0.0010	02/09/24 17:19	

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92711945003	**Reactor 3A: Unmodified Regenes**					
EPA 6020B	Lithium	0.021J	mg/L	0.030	02/09/24 17:19	
EPA 6020B	Molybdenum	0.0015J	mg/L	0.010	02/09/24 17:19	
EPA 6020B	Selenium	0.0078	mg/L	0.0050	02/09/24 17:19	
EPA 6020B	Antimony, Dissolved	0.0014J	mg/L	0.0030	02/15/24 14:06	
EPA 6020B	Arsenic, Dissolved	0.0043J	mg/L	0.0050	02/15/24 14:06	
EPA 6020B	Barium, Dissolved	0.093	mg/L	0.0050	02/15/24 14:06	
EPA 6020B	Beryllium, Dissolved	0.00027J	mg/L	0.00050	02/15/24 14:06	
EPA 6020B	Cobalt, Dissolved	0.033	mg/L	0.0050	02/15/24 14:06	
EPA 6020B	Iron, Dissolved	0.012J	mg/L	0.040	02/15/24 14:06	
EPA 6020B	Lithium, Dissolved	0.023J	mg/L	0.030	02/15/24 14:06	
EPA 6020B	Manganese, Dissolved	1.3	mg/L	0.10	02/21/24 13:22	
EPA 6020B	Molybdenum, Dissolved	0.00098J	mg/L	0.010	02/15/24 14:06	
EPA 6020B	Selenium, Dissolved	0.0071	mg/L	0.0050	02/15/24 14:06	
92711945004	**Reactor 4A: Modified Regenesis**					
EPA 6020B	Barium	0.090	mg/L	0.0050	02/09/24 17:23	
EPA 6020B	Beryllium	0.00038J	mg/L	0.00050	02/09/24 17:23	
EPA 6020B	Cobalt	0.028	mg/L	0.0050	02/09/24 17:23	
EPA 6020B	Lead	0.00044J	mg/L	0.0010	02/09/24 17:23	
EPA 6020B	Lithium	0.020J	mg/L	0.030	02/09/24 17:23	
EPA 6020B	Molybdenum	0.0015J	mg/L	0.010	02/09/24 17:23	
EPA 6020B	Selenium	0.0081	mg/L	0.0050	02/09/24 17:23	
EPA 6020B	Antimony, Dissolved	0.0013J	mg/L	0.0030	02/15/24 14:10	
EPA 6020B	Arsenic, Dissolved	0.0043J	mg/L	0.0050	02/15/24 14:10	
EPA 6020B	Barium, Dissolved	0.080	mg/L	0.0050	02/15/24 14:10	
EPA 6020B	Beryllium, Dissolved	0.00030J	mg/L	0.00050	02/15/24 14:10	
EPA 6020B	Cadmium, Dissolved	0.00010J	mg/L	0.00050	02/15/24 14:10	
EPA 6020B	Cobalt, Dissolved	0.032	mg/L	0.0050	02/15/24 14:10	
EPA 6020B	Iron, Dissolved	0.012J	mg/L	0.040	02/15/24 14:10	
EPA 6020B	Lithium, Dissolved	0.024J	mg/L	0.030	02/15/24 14:10	
EPA 6020B	Manganese, Dissolved	1.2	mg/L	0.10	02/21/24 13:25	
EPA 6020B	Molybdenum, Dissolved	0.0014J	mg/L	0.010	02/15/24 14:10	
EPA 6020B	Selenium, Dissolved	0.0069	mg/L	0.0050	02/15/24 14:10	
92711945005	**Reactor 5A: Unmodified Aqua Ae**					
EPA 6020B	Barium	0.096	mg/L	0.0050	02/09/24 17:42	
EPA 6020B	Beryllium	0.00046J	mg/L	0.00050	02/09/24 17:42	
EPA 6020B	Cadmium	0.00011J	mg/L	0.00050	02/09/24 17:42	
EPA 6020B	Cobalt	0.029	mg/L	0.0050	02/09/24 17:42	
EPA 6020B	Lead	0.00052J	mg/L	0.0010	02/09/24 17:42	
EPA 6020B	Lithium	0.020J	mg/L	0.030	02/09/24 17:42	
EPA 6020B	Molybdenum	0.0014J	mg/L	0.010	02/09/24 17:42	
EPA 6020B	Selenium	0.0075	mg/L	0.0050	02/09/24 17:42	
EPA 6020B	Antimony, Dissolved	0.0012J	mg/L	0.0030	02/15/24 14:14	
EPA 6020B	Arsenic, Dissolved	0.0044J	mg/L	0.0050	02/15/24 14:14	
EPA 6020B	Barium, Dissolved	0.082	mg/L	0.0050	02/15/24 14:14	
EPA 6020B	Beryllium, Dissolved	0.00035J	mg/L	0.00050	02/15/24 14:14	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92711945005	**Reactor 5A: Unmodified Aqua Ae**					
EPA 6020B	Cadmium, Dissolved	0.00011J	mg/L	0.00050	02/15/24 14:14	
EPA 6020B	Cobalt, Dissolved	0.032	mg/L	0.0050	02/15/24 14:14	
EPA 6020B	Iron, Dissolved	0.0082J	mg/L	0.040	02/15/24 14:14	
EPA 6020B	Lithium, Dissolved	0.024J	mg/L	0.030	02/15/24 14:14	
EPA 6020B	Manganese, Dissolved	1.2	mg/L	0.10	02/21/24 13:29	
EPA 6020B	Molybdenum, Dissolved	0.0012J	mg/L	0.010	02/15/24 14:14	
EPA 6020B	Selenium, Dissolved	0.0067	mg/L	0.0050	02/15/24 14:14	
92711945006	**Reactor 6A: Modified Aqua Aero**					
EPA 6020B	Barium	0.082	mg/L	0.0050	02/09/24 17:46	
EPA 6020B	Beryllium	0.00034J	mg/L	0.00050	02/09/24 17:46	
EPA 6020B	Cadmium	0.00014J	mg/L	0.00050	02/09/24 17:46	
EPA 6020B	Cobalt	0.025	mg/L	0.0050	02/09/24 17:46	
EPA 6020B	Lead	0.00028J	mg/L	0.0010	02/09/24 17:46	
EPA 6020B	Lithium	0.019J	mg/L	0.030	02/09/24 17:46	
EPA 6020B	Molybdenum	0.0014J	mg/L	0.010	02/09/24 17:46	
EPA 6020B	Selenium	0.0077	mg/L	0.0050	02/09/24 17:46	
EPA 6020B	Antimony, Dissolved	0.0012J	mg/L	0.0030	02/15/24 14:18	
EPA 6020B	Arsenic, Dissolved	0.0042J	mg/L	0.0050	02/15/24 14:18	
EPA 6020B	Barium, Dissolved	0.077	mg/L	0.0050	02/15/24 14:18	
EPA 6020B	Beryllium, Dissolved	0.00031J	mg/L	0.00050	02/15/24 14:18	
EPA 6020B	Cadmium, Dissolved	0.00011J	mg/L	0.00050	02/15/24 14:18	
EPA 6020B	Cobalt, Dissolved	0.030	mg/L	0.0050	02/15/24 14:18	
EPA 6020B	Lithium, Dissolved	0.023J	mg/L	0.030	02/15/24 14:18	
EPA 6020B	Manganese, Dissolved	1.2	mg/L	0.10	02/21/24 13:33	
EPA 6020B	Molybdenum, Dissolved	0.0014J	mg/L	0.010	02/15/24 14:18	
EPA 6020B	Selenium, Dissolved	0.0068	mg/L	0.0050	02/15/24 14:18	
92711945007	**Reactor 7A: CleanER iZVI (48hr**					
EPA 6020B	Barium	0.065	mg/L	0.0050	02/09/24 17:50	
EPA 6020B	Beryllium	0.00035J	mg/L	0.00050	02/09/24 17:50	
EPA 6020B	Chromium	0.0030J	mg/L	0.0050	02/09/24 17:50	
EPA 6020B	Cobalt	0.0042J	mg/L	0.0050	02/09/24 17:50	
EPA 6020B	Lead	0.00091J	mg/L	0.0010	02/09/24 17:50	
EPA 6020B	Lithium	0.011J	mg/L	0.030	02/09/24 17:50	
EPA 6020B	Molybdenum	0.0011J	mg/L	0.010	02/09/24 17:50	
EPA 6020B	Antimony, Dissolved	0.0014J	mg/L	0.0030	02/15/24 14:22	
EPA 6020B	Barium, Dissolved	0.037	mg/L	0.0050	02/15/24 14:22	
EPA 6020B	Cobalt, Dissolved	0.0023J	mg/L	0.0050	02/15/24 14:22	
EPA 6020B	Iron, Dissolved	2.9	mg/L	0.040	02/15/24 14:22	
EPA 6020B	Lithium, Dissolved	0.011J	mg/L	0.030	02/15/24 14:22	
EPA 6020B	Manganese, Dissolved	6.6	mg/L	0.10	02/21/24 13:36	
EPA 6020B	Molybdenum, Dissolved	0.00075J	mg/L	0.010	02/15/24 14:22	
92711945008	**Reactor 8A: CleanER-5 (48hr)**					
EPA 6020B	Antimony	0.0014J	mg/L	0.0030	02/09/24 17:54	B
EPA 6020B	Barium	0.089	mg/L	0.0050	02/09/24 17:54	
EPA 6020B	Beryllium	0.00037J	mg/L	0.00050	02/09/24 17:54	
EPA 6020B	Cadmium	0.00014J	mg/L	0.00050	02/09/24 17:54	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92711945008	**Reactor 8A: CleanER-5 (48hr)**					
EPA 6020B	Cobalt	0.035	mg/L	0.0050	02/09/24 17:54	
EPA 6020B	Lithium	0.018J	mg/L	0.030	02/09/24 17:54	
EPA 6020B	Selenium	0.0076	mg/L	0.0050	02/09/24 17:54	
EPA 6020B	Antimony, Dissolved	0.0026J	mg/L	0.0030	02/15/24 14:27	
EPA 6020B	Arsenic, Dissolved	0.0021J	mg/L	0.0050	02/15/24 14:27	
EPA 6020B	Barium, Dissolved	0.092	mg/L	0.0050	02/15/24 14:27	
EPA 6020B	Beryllium, Dissolved	0.00044J	mg/L	0.00050	02/15/24 14:27	
EPA 6020B	Cadmium, Dissolved	0.00012J	mg/L	0.00050	02/15/24 14:27	
EPA 6020B	Cobalt, Dissolved	0.042	mg/L	0.0050	02/15/24 14:27	
EPA 6020B	Lithium, Dissolved	0.023J	mg/L	0.030	02/15/24 14:27	
EPA 6020B	Manganese, Dissolved	6.1	mg/L	0.10	02/21/24 13:40	
EPA 6020B	Selenium, Dissolved	0.0067	mg/L	0.0050	02/15/24 14:27	
92711945009	**Reactor 9A: Sodium Carbonate 2**					
EPA 6020B	Antimony	0.00070J	mg/L	0.0030	02/09/24 17:58	B
EPA 6020B	Barium	0.071	mg/L	0.0050	02/09/24 17:58	
EPA 6020B	Beryllium	0.00046J	mg/L	0.00050	02/09/24 17:58	
EPA 6020B	Chromium	0.0037J	mg/L	0.0050	02/09/24 17:58	
EPA 6020B	Cobalt	0.0021J	mg/L	0.0050	02/09/24 17:58	
EPA 6020B	Lead	0.0012	mg/L	0.0010	02/09/24 17:58	
EPA 6020B	Lithium	0.0069J	mg/L	0.030	02/09/24 17:58	
EPA 6020B	Molybdenum	0.015	mg/L	0.010	02/09/24 17:58	
EPA 6020B	Selenium	0.0094	mg/L	0.0050	02/09/24 17:58	
EPA 6020B	Antimony, Dissolved	0.0020J	mg/L	0.0030	02/15/24 15:09	
EPA 6020B	Arsenic, Dissolved	0.0048J	mg/L	0.0050	02/15/24 15:09	
EPA 6020B	Barium, Dissolved	0.027	mg/L	0.0050	02/15/24 15:09	
EPA 6020B	Iron, Dissolved	0.024J	mg/L	0.040	02/15/24 15:09	
EPA 6020B	Lithium, Dissolved	0.0032J	mg/L	0.030	02/15/24 15:09	
EPA 6020B	Manganese, Dissolved	0.0016J	mg/L	0.010	02/15/24 15:09	
EPA 6020B	Molybdenum, Dissolved	0.015	mg/L	0.010	02/15/24 15:09	
EPA 6020B	Selenium, Dissolved	0.0093	mg/L	0.0050	02/15/24 15:09	
92711945010	**Reactor 10A: Sodium Carbonate**					
EPA 6020B	Barium	0.085	mg/L	0.0050	02/09/24 18:02	
EPA 6020B	Beryllium	0.00040J	mg/L	0.00050	02/09/24 18:02	
EPA 6020B	Chromium	0.0036J	mg/L	0.0050	02/09/24 18:02	
EPA 6020B	Cobalt	0.0021J	mg/L	0.0050	02/09/24 18:02	
EPA 6020B	Lead	0.0011	mg/L	0.0010	02/09/24 18:02	
EPA 6020B	Lithium	0.0066J	mg/L	0.030	02/09/24 18:02	
EPA 6020B	Molybdenum	0.016	mg/L	0.010	02/09/24 18:02	
EPA 6020B	Selenium	0.0098	mg/L	0.0050	02/09/24 18:02	
EPA 6020B	Antimony, Dissolved	0.0019J	mg/L	0.0030	02/15/24 15:13	
EPA 6020B	Arsenic, Dissolved	0.0052	mg/L	0.0050	02/15/24 15:13	
EPA 6020B	Barium, Dissolved	0.049	mg/L	0.0050	02/15/24 15:13	
EPA 6020B	Iron, Dissolved	0.017J	mg/L	0.040	02/15/24 15:13	
EPA 6020B	Lithium, Dissolved	0.0037J	mg/L	0.030	02/15/24 15:13	
EPA 6020B	Manganese, Dissolved	0.0016J	mg/L	0.010	02/15/24 15:13	
EPA 6020B	Molybdenum, Dissolved	0.017	mg/L	0.010	02/15/24 15:13	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92711945010	**Reactor 10A: Sodium Carbonate**					
EPA 6020B	Selenium, Dissolved	0.010	mg/L	0.0050	02/15/24 15:13	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 1A: Control, GW (48hr) **Lab ID: 92711945001** Collected: 02/01/24 14:05 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:11	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:11	7440-38-2	
Barium	**0.031**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:11	7440-39-3	
Beryllium	**0.00019J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:11	7440-41-7	
Cadmium	**0.00028J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:11	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:11	7440-47-3	
Cobalt	**0.10**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:11	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:11	7439-92-1	
Lithium	**0.037**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:11	7439-93-2	
Molybdenum	**0.0041J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:11	7439-98-7	
Selenium	**0.0089**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:11	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:11	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0011J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 13:55	7440-36-0	
Arsenic, Dissolved	**0.0024J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 13:55	7440-38-2	
Barium, Dissolved	**0.032**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 13:55	7440-39-3	
Beryllium, Dissolved	**0.00021J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 13:55	7440-41-7	
Cadmium, Dissolved	**0.00029J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 13:55	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 13:55	7440-47-3	
Cobalt, Dissolved	**0.12**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 13:55	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 13:55	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 13:55	7439-92-1	
Lithium, Dissolved	**0.044**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 13:55	7439-93-2	
Manganese, Dissolved	**0.52**	mg/L	0.010	0.00098	1	02/08/24 17:26	02/15/24 13:55	7439-96-5	
Molybdenum, Dissolved	**0.0044J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 13:55	7439-98-7	
Selenium, Dissolved	**0.0085**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 13:55	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 13:55	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 2A: Control, GW+Solids **Lab ID: 92711945002** Collected: 02/01/24 14:15 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:15	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:15	7440-38-2	
Barium	**0.10**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:15	7440-39-3	
Beryllium	**0.00069**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:15	7440-41-7	
Cadmium	**0.00015J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:15	7440-43-9	
Chromium	**0.0021J**	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:15	7440-47-3	
Cobalt	**0.033**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:15	7440-48-4	
Lead	**0.00071J**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:15	7439-92-1	
Lithium	**0.021J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:15	7439-93-2	
Molybdenum	**0.0011J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:15	7439-98-7	
Selenium	**0.0082**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:15	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:15	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00095J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:00	7440-36-0	
Arsenic, Dissolved	**0.0035J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:00	7440-38-2	
Barium, Dissolved	**0.087**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:00	7440-39-3	
Beryllium, Dissolved	**0.00057**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:00	7440-41-7	
Cadmium, Dissolved	**0.00012J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:00	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:00	7440-47-3	
Cobalt, Dissolved	**0.036**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:00	7440-48-4	
Iron, Dissolved	**0.011J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:00	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:00	7439-92-1	
Lithium, Dissolved	**0.024J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:00	7439-93-2	
Manganese, Dissolved	**1.3**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:18	7439-96-5	
Molybdenum, Dissolved	**0.0010J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:00	7439-98-7	
Selenium, Dissolved	**0.0073**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:00	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:00	7440-28-0	

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(704)875-9092

ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 3A: Unmodified Regenes **Lab ID: 92711945003** Collected: 02/01/24 14:30 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:19	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:19	7440-38-2	
Barium	**0.13**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:19	7440-39-3	
Beryllium	**0.00073**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:19	7440-41-7	
Cadmium	**0.00012J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:19	7440-43-9	
Chromium	**0.0043J**	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:19	7440-47-3	
Cobalt	**0.029**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:19	7440-48-4	
Lead	**0.0014**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:19	7439-92-1	
Lithium	**0.021J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:19	7439-93-2	
Molybdenum	**0.0015J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:19	7439-98-7	
Selenium	**0.0078**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:19	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:19	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0014J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:06	7440-36-0	
Arsenic, Dissolved	**0.0043J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:06	7440-38-2	
Barium, Dissolved	**0.093**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:06	7440-39-3	
Beryllium, Dissolved	**0.00027J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:06	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:06	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:06	7440-47-3	
Cobalt, Dissolved	**0.033**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:06	7440-48-4	
Iron, Dissolved	**0.012J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:06	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:06	7439-92-1	
Lithium, Dissolved	**0.023J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:06	7439-93-2	
Manganese, Dissolved	**1.3**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:22	7439-96-5	
Molybdenum, Dissolved	**0.00098J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:06	7439-98-7	
Selenium, Dissolved	**0.0071**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:06	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:06	7440-28-0	

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(704)875-9092

ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 4A: Modified Regenesis **Lab ID: 92711945004** Collected: 02/01/24 14:35 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:23	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:23	7440-38-2	
Barium	**0.090**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:23	7440-39-3	
Beryllium	**0.00038J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:23	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:23	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:23	7440-47-3	
Cobalt	**0.028**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:23	7440-48-4	
Lead	**0.00044J**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:23	7439-92-1	
Lithium	**0.020J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:23	7439-93-2	
Molybdenum	**0.0015J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:23	7439-98-7	
Selenium	**0.0081**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:23	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:23	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0013J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:10	7440-36-0	
Arsenic, Dissolved	**0.0043J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:10	7440-38-2	
Barium, Dissolved	**0.080**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:10	7440-39-3	
Beryllium, Dissolved	**0.00030J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:10	7440-41-7	
Cadmium, Dissolved	**0.00010J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:10	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:10	7440-47-3	
Cobalt, Dissolved	**0.032**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:10	7440-48-4	
Iron, Dissolved	**0.012J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:10	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:10	7439-92-1	
Lithium, Dissolved	**0.024J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:10	7439-93-2	
Manganese, Dissolved	**1.2**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:25	7439-96-5	
Molybdenum, Dissolved	**0.0014J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:10	7439-98-7	
Selenium, Dissolved	**0.0069**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:10	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:10	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 5A: Unmodified Aqua Ae **Lab ID: 92711945005** Collected: 02/01/24 14:45 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:42	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:42	7440-38-2	
Barium	**0.096**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:42	7440-39-3	
Beryllium	**0.00046J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:42	7440-41-7	
Cadmium	**0.00011J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:42	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:42	7440-47-3	
Cobalt	**0.029**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:42	7440-48-4	
Lead	**0.00052J**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:42	7439-92-1	
Lithium	**0.020J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:42	7439-93-2	
Molybdenum	**0.0014J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:42	7439-98-7	
Selenium	**0.0075**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:42	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:42	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0012J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:14	7440-36-0	
Arsenic, Dissolved	**0.0044J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:14	7440-38-2	
Barium, Dissolved	**0.082**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:14	7440-39-3	
Beryllium, Dissolved	**0.00035J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:14	7440-41-7	
Cadmium, Dissolved	**0.00011J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:14	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:14	7440-47-3	
Cobalt, Dissolved	**0.032**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:14	7440-48-4	
Iron, Dissolved	**0.0082J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:14	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:14	7439-92-1	
Lithium, Dissolved	**0.024J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:14	7439-93-2	
Manganese, Dissolved	**1.2**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:29	7439-96-5	
Molybdenum, Dissolved	**0.0012J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:14	7439-98-7	
Selenium, Dissolved	**0.0067**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:14	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:14	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 6A: Modified Aqua Aero **Lab ID: 92711945006** Collected: 02/01/24 15:05 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:46	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:46	7440-38-2	
Barium	**0.082**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:46	7440-39-3	
Beryllium	**0.00034J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:46	7440-41-7	
Cadmium	**0.00014J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:46	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:46	7440-47-3	
Cobalt	**0.025**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:46	7440-48-4	
Lead	**0.00028J**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:46	7439-92-1	
Lithium	**0.019J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:46	7439-93-2	
Molybdenum	**0.0014J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:46	7439-98-7	
Selenium	**0.0077**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:46	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:46	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0012J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:18	7440-36-0	
Arsenic, Dissolved	**0.0042J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:18	7440-38-2	
Barium, Dissolved	**0.077**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:18	7440-39-3	
Beryllium, Dissolved	**0.00031J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:18	7440-41-7	
Cadmium, Dissolved	**0.00011J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:18	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:18	7440-47-3	
Cobalt, Dissolved	**0.030**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:18	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:18	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:18	7439-92-1	
Lithium, Dissolved	**0.023J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:18	7439-93-2	
Manganese, Dissolved	**1.2**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:33	7439-96-5	
Molybdenum, Dissolved	**0.0014J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:18	7439-98-7	
Selenium, Dissolved	**0.0068**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:18	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:18	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 7A: CleanER iZVI (48hr **Lab ID: 92711945007** Collected: 02/01/24 15:15 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:50	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:50	7440-38-2	
Barium	**0.065**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:50	7440-39-3	
Beryllium	**0.00035J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:50	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:50	7440-43-9	
Chromium	**0.0030J**	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:50	7440-47-3	
Cobalt	**0.0042J**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:50	7440-48-4	
Lead	**0.00091J**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:50	7439-92-1	
Lithium	**0.011J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:50	7439-93-2	
Molybdenum	**0.0011J**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:50	7439-98-7	
Selenium	ND	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:50	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:50	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0014J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:22	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:22	7440-38-2	
Barium, Dissolved	**0.037**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:22	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:22	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:22	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:22	7440-47-3	
Cobalt, Dissolved	**0.0023J**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:22	7440-48-4	
Iron, Dissolved	**2.9**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:22	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:22	7439-92-1	
Lithium, Dissolved	**0.011J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:22	7439-93-2	
Manganese, Dissolved	**6.6**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:36	7439-96-5	
Molybdenum, Dissolved	**0.00075J**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:22	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:22	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:22	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 8A: CleanER-5 (48hr) **Lab ID: 92711945008** Collected: 02/01/24 15:20 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0014J**	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:54	7440-36-0	B
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:54	7440-38-2	
Barium	**0.089**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:54	7440-39-3	
Beryllium	**0.00037J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:54	7440-41-7	
Cadmium	**0.00014J**	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:54	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:54	7440-47-3	
Cobalt	**0.035**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:54	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:54	7439-92-1	
Lithium	**0.018J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:54	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:54	7439-98-7	
Selenium	**0.0076**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:54	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:54	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0026J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 14:27	7440-36-0	
Arsenic, Dissolved	**0.0021J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 14:27	7440-38-2	
Barium, Dissolved	**0.092**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 14:27	7440-39-3	
Beryllium, Dissolved	**0.00044J**	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 14:27	7440-41-7	
Cadmium, Dissolved	**0.00012J**	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 14:27	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 14:27	7440-47-3	
Cobalt, Dissolved	**0.042**	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 14:27	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 14:27	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 14:27	7439-92-1	
Lithium, Dissolved	**0.023J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 14:27	7439-93-2	
Manganese, Dissolved	**6.1**	mg/L	0.10	0.0098	10	02/08/24 17:26	02/21/24 13:40	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 14:27	7439-98-7	
Selenium, Dissolved	**0.0067**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 14:27	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 14:27	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 9A: Sodium Carbonate 2 **Lab ID: 92711945009** Collected: 02/01/24 15:30 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.00070J**	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 17:58	7440-36-0	B
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 17:58	7440-38-2	
Barium	**0.071**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 17:58	7440-39-3	
Beryllium	**0.00046J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 17:58	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 17:58	7440-43-9	
Chromium	**0.0037J**	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 17:58	7440-47-3	
Cobalt	**0.0021J**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 17:58	7440-48-4	
Lead	**0.0012**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 17:58	7439-92-1	
Lithium	**0.0069J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 17:58	7439-93-2	
Molybdenum	**0.015**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 17:58	7439-98-7	
Selenium	**0.0094**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 17:58	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 17:58	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0020J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 15:09	7440-36-0	
Arsenic, Dissolved	**0.0048J**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 15:09	7440-38-2	
Barium, Dissolved	**0.027**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 15:09	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 15:09	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 15:09	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 15:09	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 15:09	7440-48-4	
Iron, Dissolved	**0.024J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 15:09	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 15:09	7439-92-1	
Lithium, Dissolved	**0.0032J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 15:09	7439-93-2	
Manganese, Dissolved	**0.0016J**	mg/L	0.010	0.00098	1	02/08/24 17:26	02/15/24 15:09	7439-96-5	
Molybdenum, Dissolved	**0.015**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 15:09	7439-98-7	
Selenium, Dissolved	**0.0093**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 15:09	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 15:09	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Sample: Reactor 10A: Sodium Carbonate **Lab ID: 92711945010** Collected: 02/01/24 15:35 Received: 02/06/24 16:14 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/08/24 10:00	02/09/24 18:02	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/08/24 10:00	02/09/24 18:02	7440-38-2	
Barium	**0.085**	mg/L	0.0050	0.00047	1	02/08/24 10:00	02/09/24 18:02	7440-39-3	
Beryllium	**0.00040J**	mg/L	0.00050	0.000094	1	02/08/24 10:00	02/09/24 18:02	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/08/24 10:00	02/09/24 18:02	7440-43-9	
Chromium	**0.0036J**	mg/L	0.0050	0.0019	1	02/08/24 10:00	02/09/24 18:02	7440-47-3	
Cobalt	**0.0021J**	mg/L	0.0050	0.00032	1	02/08/24 10:00	02/09/24 18:02	7440-48-4	
Lead	**0.0011**	mg/L	0.0010	0.00016	1	02/08/24 10:00	02/09/24 18:02	7439-92-1	
Lithium	**0.0066J**	mg/L	0.030	0.0016	1	02/08/24 10:00	02/09/24 18:02	7439-93-2	
Molybdenum	**0.016**	mg/L	0.010	0.00062	1	02/08/24 10:00	02/09/24 18:02	7439-98-7	
Selenium	**0.0098**	mg/L	0.0050	0.00096	1	02/08/24 10:00	02/09/24 18:02	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/08/24 10:00	02/09/24 18:02	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0019J**	mg/L	0.0030	0.00054	1	02/08/24 17:26	02/15/24 15:13	7440-36-0	
Arsenic, Dissolved	**0.0052**	mg/L	0.0050	0.00084	1	02/08/24 17:26	02/15/24 15:13	7440-38-2	
Barium, Dissolved	**0.049**	mg/L	0.0050	0.00047	1	02/08/24 17:26	02/15/24 15:13	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/08/24 17:26	02/15/24 15:13	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/08/24 17:26	02/15/24 15:13	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/08/24 17:26	02/15/24 15:13	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00032	1	02/08/24 17:26	02/15/24 15:13	7440-48-4	
Iron, Dissolved	**0.017J**	mg/L	0.040	0.0075	1	02/08/24 17:26	02/15/24 15:13	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/08/24 17:26	02/15/24 15:13	7439-92-1	
Lithium, Dissolved	**0.0037J**	mg/L	0.030	0.0016	1	02/08/24 17:26	02/15/24 15:13	7439-93-2	
Manganese, Dissolved	**0.0016J**	mg/L	0.010	0.00098	1	02/08/24 17:26	02/15/24 15:13	7439-96-5	
Molybdenum, Dissolved	**0.017**	mg/L	0.010	0.00062	1	02/08/24 17:26	02/15/24 15:13	7439-98-7	
Selenium, Dissolved	**0.010**	mg/L	0.0050	0.00096	1	02/08/24 17:26	02/15/24 15:13	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/08/24 17:26	02/15/24 15:13	7440-28-0	

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

QC Batch: 830824
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92711945001, 92711945002, 92711945003, 92711945004, 92711945005, 92711945006, 92711945007, 92711945008, 92711945009, 92711945010

METHOD BLANK: 4294183 Matrix: Water
Associated Lab Samples: 92711945001, 92711945002, 92711945003, 92711945004, 92711945005, 92711945006, 92711945007, 92711945008, 92711945009, 92711945010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	0.00084J	0.0030	0.00054	02/09/24 15:54	
Arsenic	mg/L	ND	0.0050	0.00084	02/09/24 15:54	
Barium	mg/L	ND	0.0050	0.00047	02/09/24 15:54	
Beryllium	mg/L	ND	0.00050	0.000094	02/09/24 15:54	
Cadmium	mg/L	ND	0.00050	0.00010	02/09/24 15:54	
Chromium	mg/L	ND	0.0050	0.0019	02/09/24 15:54	
Cobalt	mg/L	ND	0.0050	0.00032	02/09/24 15:54	
Lead	mg/L	ND	0.0010	0.00016	02/09/24 15:54	
Lithium	mg/L	ND	0.030	0.0016	02/09/24 15:54	
Molybdenum	mg/L	ND	0.010	0.00062	02/09/24 15:54	
Selenium	mg/L	ND	0.0050	0.00096	02/09/24 15:54	
Thallium	mg/L	ND	0.0010	0.00038	02/09/24 15:54	

LABORATORY CONTROL SAMPLE: 4294184

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.11	106	80-120	
Arsenic	mg/L	0.1	0.10	103	80-120	
Barium	mg/L	0.1	0.10	104	80-120	
Beryllium	mg/L	0.1	0.10	102	80-120	
Cadmium	mg/L	0.1	0.10	100	80-120	
Chromium	mg/L	0.1	0.10	100	80-120	
Cobalt	mg/L	0.1	0.099	99	80-120	
Lead	mg/L	0.1	0.10	100	80-120	
Lithium	mg/L	0.1	0.10	102	80-120	
Molybdenum	mg/L	0.1	0.10	102	80-120	
Selenium	mg/L	0.1	0.11	106	80-120	
Thallium	mg/L	0.1	0.10	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4294185 4294186

Parameter	Units	92711015025 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	ND	0.1	0.1	0.10	0.10	102	104	75-125	2	20	
Arsenic	mg/L	ND	0.1	0.1	0.11	0.11	108	107	75-125	0	20	
Barium	mg/L	0.027	0.1	0.1	0.13	0.13	105	106	75-125	1	20	

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4294185 4294186

Parameter	Units	92711015025 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Beryllium	mg/L	ND	0.1	0.1	0.093	0.093	93	93	75-125	0	20	
Cadmium	mg/L	ND	0.1	0.1	0.10	0.10	100	101	75-125	1	20	
Chromium	mg/L	ND	0.1	0.1	0.094	0.095	94	95	75-125	0	20	
Cobalt	mg/L	0.0030J	0.1	0.1	0.099	0.099	96	96	75-125	0	20	
Lead	mg/L	ND	0.1	0.1	0.094	0.093	94	93	75-125	1	20	
Lithium	mg/L	ND	0.1	0.1	0.094	0.094	94	94	75-125	0	20	
Molybdenum	mg/L	0.0040J	0.1	0.1	0.10	0.10	100	101	75-125	1	20	
Selenium	mg/L	ND	0.1	0.1	0.11	0.11	109	106	75-125	2	20	
Thallium	mg/L	ND	0.1	0.1	0.099	0.099	99	99	75-125	0	20	

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

QC Batch: 831139
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92711945001, 92711945002, 92711945003, 92711945004, 92711945005, 92711945006, 92711945007, 92711945008, 92711945009, 92711945010

METHOD BLANK: 4295682 Matrix: Water
Associated Lab Samples: 92711945001, 92711945002, 92711945003, 92711945004, 92711945005, 92711945006, 92711945007, 92711945008, 92711945009, 92711945010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.00054	02/15/24 13:47	
Arsenic, Dissolved	mg/L	ND	0.0050	0.00084	02/15/24 13:47	
Barium, Dissolved	mg/L	ND	0.0050	0.00047	02/15/24 13:47	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000094	02/15/24 13:47	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00010	02/15/24 13:47	
Chromium, Dissolved	mg/L	ND	0.0050	0.0019	02/15/24 13:47	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00032	02/15/24 13:47	
Lead, Dissolved	mg/L	ND	0.0010	0.00016	02/15/24 13:47	
Lithium, Dissolved	mg/L	ND	0.030	0.0016	02/15/24 13:47	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00062	02/15/24 13:47	
Selenium, Dissolved	mg/L	ND	0.0050	0.00096	02/15/24 13:47	
Thallium, Dissolved	mg/L	ND	0.0010	0.00038	02/15/24 13:47	

LABORATORY CONTROL SAMPLE: 4295683

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.11	106	80-120	
Arsenic, Dissolved	mg/L	0.1	0.10	102	80-120	
Barium, Dissolved	mg/L	0.1	0.11	106	80-120	
Beryllium, Dissolved	mg/L	0.1	0.099	99	80-120	
Cadmium, Dissolved	mg/L	0.1	0.10	105	80-120	
Chromium, Dissolved	mg/L	0.1	0.098	98	80-120	
Cobalt, Dissolved	mg/L	0.1	0.098	98	80-120	
Lead, Dissolved	mg/L	0.1	0.10	100	80-120	
Lithium, Dissolved	mg/L	0.1	0.11	106	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.10	101	80-120	
Selenium, Dissolved	mg/L	0.1	0.10	104	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	104	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

QUALIFIERS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Georgia Power Yates Cobalt
Pace Project No.: 92711945

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92711945001	**Reactor 1A: Control, GW (48hr)**	EPA 3005A	830824	EPA 6020B	831080
92711945002	**Reactor 2A: Control, GW+Solids**	EPA 3005A	830824	EPA 6020B	831080
92711945003	**Reactor 3A: Unmodified Regenes**	EPA 3005A	830824	EPA 6020B	831080
92711945004	**Reactor 4A: Modified Regenesis**	EPA 3005A	830824	EPA 6020B	831080
92711945005	**Reactor 5A: Unmodified Aqua Ae**	EPA 3005A	830824	EPA 6020B	831080
92711945006	**Reactor 6A: Modified Aqua Aero**	EPA 3005A	830824	EPA 6020B	831080
92711945007	**Reactor 7A: CleanER iZVI (48hr**	EPA 3005A	830824	EPA 6020B	831080
92711945008	**Reactor 8A: CleanER-5 (48hr)**	EPA 3005A	830824	EPA 6020B	831080
92711945009	**Reactor 9A: Sodium Carbonate 2**	EPA 3005A	830824	EPA 6020B	831080
92711945010	**Reactor 10A: Sodium Carbonate**	EPA 3005A	830824	EPA 6020B	831080
92711945001	**Reactor 1A: Control, GW (48hr)**	EPA 3005A	831139	EPA 6020B	831196
92711945002	**Reactor 2A: Control, GW+Solids**	EPA 3005A	831139	EPA 6020B	831196
92711945003	**Reactor 3A: Unmodified Regenes**	EPA 3005A	831139	EPA 6020B	831196
92711945004	**Reactor 4A: Modified Regenesis**	EPA 3005A	831139	EPA 6020B	831196
92711945005	**Reactor 5A: Unmodified Aqua Ae**	EPA 3005A	831139	EPA 6020B	831196
92711945006	**Reactor 6A: Modified Aqua Aero**	EPA 3005A	831139	EPA 6020B	831196
92711945007	**Reactor 7A: CleanER iZVI (48hr**	EPA 3005A	831139	EPA 6020B	831196
92711945008	**Reactor 8A: CleanER-5 (48hr)**	EPA 3005A	831139	EPA 6020B	831196
92711945009	**Reactor 9A: Sodium Carbonate 2**	EPA 3005A	831139	EPA 6020B	831196
92711945010	**Reactor 10A: Sodium Carbonate**	EPA 3005A	831139	EPA 6020B	831196

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Pace ANALYTICAL SERVICES

DC#_Title: ENV-FRM-HUN1-0083 v03_Sample Condition Upon Receipt

Effective Date: 11/29/2023

Laboratory receiving samples:

Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

Client Name: Duke Power (Catawba)

Project #:

WO# : 92711945

92711945

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other:____

Custody Seal Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No ☐ N/A

Date/Initials Person Examining Contents: 7/16/24 SC

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Thermometer: ☑ IR Gun ID: 730

Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp: 1.4 **Correction Factor:** Add/Subtract (°C) 0.1

Temp should be above freezing to 6°C

☐ Samples out of temp criteria. Samples on ice, cooling process has begun

Cooler Temp Corrected (°C): 1.5

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☐ Yes	☐ No	☑ N/A	8.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	9.
-Includes Date/Time/ID/Analysis Matrix: W				
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

TRIP # 7750 7803 9976

Field Data Required? ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ **Date:** _____

Project Manager SRF Review: _____ **Date:** _____

***Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.**

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

****Bottom half of box is to list number of bottles**

*****Check all unpreserved Nitrates for chlorine**

Project # **WO#: 92711945**

PM: BV Due Date: 02/21/24

CLIENT: 92-GP-Yates

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass Jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1						1																							
2						1																							
3						1																							
4						1																							
5						1																							
6						1																							
7						1																							
8						1																							
9						1																							
10						1																							
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

LAB REFERENCE NUMBER:

Page _1_ of _1_

PROJECT NUMBER	PROJECT NAME	SAMPLE ORIGIN
30143622 Task 13B	Georgia Power Yates Cobalt	Yates, GA
SEND RESULTS TO: David Liles	EMAIL ADDRESS:david.liles@arcadis.com	TELEPHONE: 9193285574
SAMPLERS: Tessa Davis		

SAMPLE ID	DATE	TIME	MATRIX	COMPOSITE / GRAB	QUANTITY	REQUESTED ANALYSES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
Reator 1A: Control, GW (48hr)	2/1/24	14:05	GW	C	2	X	X														001
Reactor 2A: Control, GW + Solids (48hr)	2/1/24	14:15	GW	C	2	X	X														002
Reactor 3A: Unmodified Regenesis/Coconut (48hr)	2/1/24	14:30	GW	C	2	X	X														003
Reactor 4A: Modified Regenesis/Coconut (48hr)	2/1/24	14:35	GW	C	2	X	X														004
Reactor 5A: Unmodified Aqua Aerobics/Bitumen (48hr)	2/1/24	14:45	GW	C	2	X	X														005
Reactor 6A: Modified Aqua Aerobics/Bitumen (48hr)	2/1/24	15:05	GW	C	2	X	X														006
Reactor 7A: CleanER iZVI (48hr)	2/1/24	15:15	GW	C	2	X	X														007
Reactor 8A: CleanER-5 (48hr)	2/1/24	15:20	GW	C	2	X	X														008
Reactor 9A: Sodium Carbonate 2 g/L (48hr)	2/1/24	15:30	GW	C	2	X	X														009
Reactor 10A: Sodium Carbonate 5 g/L (48hr)	2/1/24	15:35	GW	C	2	X	X														010

	Requested Analyses	Container	Pres.
1	Total Metals 6020: see "Special Instructions"	250mL HDPE	HNO3
2	Dissolved Metals 6020: see "Special Instructions"	250mL HDPE	HNO3
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Special Instructions/Comments:

Please analyze for the following metals:
Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lead, Lithium, Molybdenum, Selenium, Thallium.
For dissolved metals, please also test for Iron and Manganese

☐ Special QA/QC Instructions

☐ USDA Regulated

☐ Packed with Ice

Laboratory Information and Receipt

Lab Name: Pace Labs Peachtree

Lab Project Manager: Bonnie Vang

Shipping Tracking #: 775078039976

Specify Turnaround Requirements: Standard

☐ Custody seal intact

☐ Samples Intact

Sample Receipt:

Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
Jessa Davis	02/01/24	17:00		2/6/24	0914
Relinquished by:	DATE	TIME	Received by:	DATE	TIME

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

February 26, 2024

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on February 14, 2024. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
704-977-0968
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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CERTIFICATIONS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

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SAMPLE SUMMARY

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92713388001	**Reactor 1B: Control, GW (2wk)**	Water	02/13/24 14:25	02/14/24 09:50
92713388002	**Reactor 2B: Control, GW+Solids**	Water	02/13/24 14:35	02/14/24 09:50
92713388003	**Reactor 3B: Unmodified Regenes**	Water	02/13/24 14:45	02/14/24 09:50
92713388004	**Reactor 4B: Modified Regenesis**	Water	02/13/24 14:50	02/14/24 09:50
92713388005	**Reactor 5B: Unmodified Aqua Ae**	Water	02/13/24 14:55	02/14/24 09:50
92713388006	**Reactor 6B: Modified Aqua Aero**	Water	02/13/24 15:10	02/14/24 09:50
92713388007	**Reactor 7B: CleanER iZVI (2wk)**	Water	02/13/24 15:15	02/14/24 09:50
92713388008	**Reactor 8B: CleanER-5 (2wk)**	Water	02/13/24 15:20	02/14/24 09:50
92713388009	**Reactor 9B: Sodium Carbonate 2**	Water	02/13/24 15:25	02/14/24 09:50
92713388010	**Reactor 10B: Sodium Carbonate**	Water	02/13/24 15:30	02/14/24 09:50

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SAMPLE ANALYTE COUNT

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92713388001	**Reactor 1B: Control, GW (2wk)**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388002	**Reactor 2B: Control, GW+Solids**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388003	**Reactor 3B: Unmodified Regenes**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388004	**Reactor 4B: Modified Regenesis**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388005	**Reactor 5B: Unmodified Aqua Ae**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388006	**Reactor 6B: Modified Aqua Aero**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388007	**Reactor 7B: CleanER iZVI (2wk)**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388008	**Reactor 8B: CleanER-5 (2wk)**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388009	**Reactor 9B: Sodium Carbonate 2**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92713388010	**Reactor 10B: Sodium Carbonate**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14

PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92713388001	**Reactor 1B: Control, GW (2wk)**					
EPA 6020B	Arsenic	0.0018J	mg/L	0.0050	02/20/24 17:52	
EPA 6020B	Barium	0.031	mg/L	0.0050	02/20/24 17:52	
EPA 6020B	Beryllium	0.00012J	mg/L	0.00050	02/20/24 17:52	
EPA 6020B	Cadmium	0.00024J	mg/L	0.00050	02/20/24 17:52	
EPA 6020B	Cobalt	0.10	mg/L	0.0050	02/20/24 17:52	
EPA 6020B	Lithium	0.037	mg/L	0.030	02/20/24 17:52	
EPA 6020B	Molybdenum	0.0044J	mg/L	0.010	02/20/24 17:52	
EPA 6020B	Selenium	0.0089	mg/L	0.0050	02/20/24 17:52	
EPA 6020B	Antimony, Dissolved	0.0013J	mg/L	0.0030	02/20/24 15:58	
EPA 6020B	Arsenic, Dissolved	0.0011J	mg/L	0.0050	02/20/24 15:58	
EPA 6020B	Barium, Dissolved	0.031	mg/L	0.0050	02/20/24 15:58	
EPA 6020B	Beryllium, Dissolved	0.00012J	mg/L	0.00050	02/20/24 15:58	
EPA 6020B	Cadmium, Dissolved	0.00024J	mg/L	0.00050	02/20/24 15:58	
EPA 6020B	Chromium, Dissolved	0.0035J	mg/L	0.0050	02/20/24 15:58	
EPA 6020B	Cobalt, Dissolved	0.11	mg/L	0.0050	02/20/24 15:58	
EPA 6020B	Iron, Dissolved	0.021J	mg/L	0.040	02/20/24 15:58	
EPA 6020B	Lithium, Dissolved	0.039	mg/L	0.030	02/20/24 15:58	
EPA 6020B	Manganese, Dissolved	0.51	mg/L	0.010	02/20/24 15:58	
EPA 6020B	Molybdenum, Dissolved	0.0044J	mg/L	0.010	02/20/24 15:58	
EPA 6020B	Selenium, Dissolved	0.0088	mg/L	0.0050	02/20/24 15:58	
92713388002	**Reactor 2B: Control, GW+Solids**					
EPA 6020B	Arsenic	0.0021J	mg/L	0.0050	02/20/24 17:56	
EPA 6020B	Barium	0.089	mg/L	0.0050	02/20/24 17:56	
EPA 6020B	Beryllium	0.0010	mg/L	0.00050	02/20/24 17:56	
EPA 6020B	Cadmium	0.00018J	mg/L	0.00050	02/20/24 17:56	
EPA 6020B	Chromium	0.0025J	mg/L	0.0050	02/20/24 17:56	
EPA 6020B	Cobalt	0.027	mg/L	0.0050	02/20/24 17:56	
EPA 6020B	Lead	0.00044J	mg/L	0.0010	02/20/24 17:56	
EPA 6020B	Lithium	0.0098J	mg/L	0.030	02/20/24 17:56	
EPA 6020B	Selenium	0.0080	mg/L	0.0050	02/20/24 17:56	
EPA 6020B	Antimony, Dissolved	0.0014J	mg/L	0.0030	02/20/24 16:02	
EPA 6020B	Arsenic, Dissolved	0.0013J	mg/L	0.0050	02/20/24 16:02	
EPA 6020B	Barium, Dissolved	0.079	mg/L	0.0050	02/20/24 16:02	
EPA 6020B	Beryllium, Dissolved	0.00083	mg/L	0.00050	02/20/24 16:02	
EPA 6020B	Cadmium, Dissolved	0.00015J	mg/L	0.00050	02/20/24 16:02	
EPA 6020B	Cobalt, Dissolved	0.027	mg/L	0.0050	02/20/24 16:02	
EPA 6020B	Lithium, Dissolved	0.0088J	mg/L	0.030	02/20/24 16:02	
EPA 6020B	Manganese, Dissolved	1.5	mg/L	0.10	02/23/24 19:29	
EPA 6020B	Selenium, Dissolved	0.0071	mg/L	0.0050	02/20/24 16:02	
92713388003	**Reactor 3B: Unmodified Regenes**					
EPA 6020B	Arsenic	0.0019J	mg/L	0.0050	02/20/24 18:00	
EPA 6020B	Barium	0.084	mg/L	0.0050	02/20/24 18:00	
EPA 6020B	Beryllium	0.00047J	mg/L	0.00050	02/20/24 18:00	
EPA 6020B	Cadmium	0.00013J	mg/L	0.00050	02/20/24 18:00	
EPA 6020B	Chromium	0.0022J	mg/L	0.0050	02/20/24 18:00	

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9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92713388003	**Reactor 3B: Unmodified Regenes**					
EPA 6020B	Cobalt	0.023	mg/L	0.0050	02/20/24 18:00	
EPA 6020B	Lead	0.00051J	mg/L	0.0010	02/20/24 18:00	
EPA 6020B	Lithium	0.0081J	mg/L	0.030	02/20/24 18:00	
EPA 6020B	Molybdenum	0.00062J	mg/L	0.010	02/20/24 18:00	
EPA 6020B	Selenium	0.0076	mg/L	0.0050	02/20/24 18:00	
EPA 6020B	Antimony, Dissolved	0.00090J	mg/L	0.0030	02/20/24 16:06	
EPA 6020B	Arsenic, Dissolved	0.0014J	mg/L	0.0050	02/20/24 16:06	
EPA 6020B	Barium, Dissolved	0.073	mg/L	0.0050	02/20/24 16:06	
EPA 6020B	Beryllium, Dissolved	0.00033J	mg/L	0.00050	02/20/24 16:06	
EPA 6020B	Cadmium, Dissolved	0.00012J	mg/L	0.00050	02/20/24 16:06	
EPA 6020B	Cobalt, Dissolved	0.022	mg/L	0.0050	02/20/24 16:06	
EPA 6020B	Iron, Dissolved	0.012J	mg/L	0.040	02/20/24 16:06	
EPA 6020B	Lithium, Dissolved	0.0072J	mg/L	0.030	02/20/24 16:06	
EPA 6020B	Manganese, Dissolved	1.6	mg/L	0.10	02/23/24 19:32	
EPA 6020B	Selenium, Dissolved	0.0075	mg/L	0.0050	02/20/24 16:06	
92713388004	**Reactor 4B: Modified Regenesis**					
EPA 6020B	Arsenic	0.0018J	mg/L	0.0050	02/20/24 18:04	
EPA 6020B	Barium	0.086	mg/L	0.0050	02/20/24 18:04	
EPA 6020B	Beryllium	0.00066	mg/L	0.00050	02/20/24 18:04	
EPA 6020B	Cadmium	0.00013J	mg/L	0.00050	02/20/24 18:04	
EPA 6020B	Chromium	0.0026J	mg/L	0.0050	02/20/24 18:04	
EPA 6020B	Cobalt	0.028	mg/L	0.0050	02/20/24 18:04	
EPA 6020B	Lead	0.00061J	mg/L	0.0010	02/20/24 18:04	
EPA 6020B	Lithium	0.010J	mg/L	0.030	02/20/24 18:04	
EPA 6020B	Selenium	0.0073	mg/L	0.0050	02/20/24 18:04	
EPA 6020B	Antimony, Dissolved	0.0011J	mg/L	0.0030	02/20/24 16:10	
EPA 6020B	Arsenic, Dissolved	0.0011J	mg/L	0.0050	02/20/24 16:10	
EPA 6020B	Barium, Dissolved	0.071	mg/L	0.0050	02/20/24 16:10	
EPA 6020B	Beryllium, Dissolved	0.00046J	mg/L	0.00050	02/20/24 16:10	
EPA 6020B	Cadmium, Dissolved	0.00010J	mg/L	0.00050	02/20/24 16:10	
EPA 6020B	Cobalt, Dissolved	0.028	mg/L	0.0050	02/20/24 16:10	
EPA 6020B	Lithium, Dissolved	0.0091J	mg/L	0.030	02/20/24 16:10	
EPA 6020B	Manganese, Dissolved	1.7	mg/L	0.10	02/23/24 19:36	
EPA 6020B	Selenium, Dissolved	0.0068	mg/L	0.0050	02/20/24 16:10	
92713388005	**Reactor 5B: Unmodified Aqua Ae**					
EPA 6020B	Arsenic	0.0019J	mg/L	0.0050	02/20/24 18:08	
EPA 6020B	Barium	0.084	mg/L	0.0050	02/20/24 18:08	
EPA 6020B	Beryllium	0.00049J	mg/L	0.00050	02/20/24 18:08	
EPA 6020B	Cadmium	0.00012J	mg/L	0.00050	02/20/24 18:08	
EPA 6020B	Chromium	0.0024J	mg/L	0.0050	02/20/24 18:08	
EPA 6020B	Cobalt	0.023	mg/L	0.0050	02/20/24 18:08	
EPA 6020B	Lead	0.00047J	mg/L	0.0010	02/20/24 18:08	
EPA 6020B	Lithium	0.0090J	mg/L	0.030	02/20/24 18:08	
EPA 6020B	Molybdenum	0.00065J	mg/L	0.010	02/20/24 18:08	
EPA 6020B	Selenium	0.0069	mg/L	0.0050	02/20/24 18:08	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92713388005	**Reactor 5B: Unmodified Aqua Ae**					
EPA 6020B	Antimony, Dissolved	0.00096J	mg/L	0.0030	02/20/24 16:14	
EPA 6020B	Arsenic, Dissolved	0.00098J	mg/L	0.0050	02/20/24 16:14	
EPA 6020B	Barium, Dissolved	0.067	mg/L	0.0050	02/20/24 16:14	
EPA 6020B	Beryllium, Dissolved	0.00034J	mg/L	0.00050	02/20/24 16:14	
EPA 6020B	Cadmium, Dissolved	0.00013J	mg/L	0.00050	02/20/24 16:14	
EPA 6020B	Cobalt, Dissolved	0.022	mg/L	0.0050	02/20/24 16:14	
EPA 6020B	Lithium, Dissolved	0.0076J	mg/L	0.030	02/20/24 16:14	
EPA 6020B	Manganese, Dissolved	1.6	mg/L	0.10	02/23/24 19:40	
EPA 6020B	Selenium, Dissolved	0.0064	mg/L	0.0050	02/20/24 16:14	
92713388006	**Reactor 6B: Modified Aqua Aero**					
EPA 6020B	Arsenic	0.0018J	mg/L	0.0050	02/20/24 18:13	
EPA 6020B	Barium	0.084	mg/L	0.0050	02/20/24 18:13	
EPA 6020B	Beryllium	0.00066	mg/L	0.00050	02/20/24 18:13	
EPA 6020B	Cadmium	0.00012J	mg/L	0.00050	02/20/24 18:13	
EPA 6020B	Chromium	0.0019J	mg/L	0.0050	02/20/24 18:13	
EPA 6020B	Cobalt	0.029	mg/L	0.0050	02/20/24 18:13	
EPA 6020B	Lead	0.00046J	mg/L	0.0010	02/20/24 18:13	
EPA 6020B	Lithium	0.010J	mg/L	0.030	02/20/24 18:13	
EPA 6020B	Selenium	0.0075	mg/L	0.0050	02/20/24 18:13	
EPA 6020B	Antimony, Dissolved	0.0011J	mg/L	0.0030	02/20/24 16:19	
EPA 6020B	Arsenic, Dissolved	0.0014J	mg/L	0.0050	02/20/24 16:19	
EPA 6020B	Barium, Dissolved	0.073	mg/L	0.0050	02/20/24 16:19	
EPA 6020B	Beryllium, Dissolved	0.00054	mg/L	0.00050	02/20/24 16:19	
EPA 6020B	Cadmium, Dissolved	0.00018J	mg/L	0.00050	02/20/24 16:19	
EPA 6020B	Cobalt, Dissolved	0.029	mg/L	0.0050	02/20/24 16:19	
EPA 6020B	Iron, Dissolved	0.0095J	mg/L	0.040	02/20/24 16:19	
EPA 6020B	Lithium, Dissolved	0.0095J	mg/L	0.030	02/20/24 16:19	
EPA 6020B	Manganese, Dissolved	1.7	mg/L	0.10	02/23/24 19:44	
EPA 6020B	Selenium, Dissolved	0.0071	mg/L	0.0050	02/20/24 16:19	
92713388007	**Reactor 7B: CleanER iZVI (2wk)**					
EPA 6020B	Barium	0.041	mg/L	0.0050	02/20/24 18:17	
EPA 6020B	Beryllium	0.00029J	mg/L	0.00050	02/20/24 18:17	
EPA 6020B	Chromium	0.0031J	mg/L	0.0050	02/20/24 18:17	
EPA 6020B	Cobalt	0.0021J	mg/L	0.0050	02/20/24 18:17	
EPA 6020B	Lead	0.00078J	mg/L	0.0010	02/20/24 18:17	
EPA 6020B	Lithium	0.0032J	mg/L	0.030	02/20/24 18:17	
EPA 6020B	Molybdenum	0.0020J	mg/L	0.010	02/20/24 18:17	
EPA 6020B	Antimony, Dissolved	0.0012J	mg/L	0.0030	02/20/24 16:23	
EPA 6020B	Barium, Dissolved	0.020	mg/L	0.0050	02/20/24 16:23	
EPA 6020B	Cobalt, Dissolved	0.00064J	mg/L	0.0050	02/20/24 16:23	
EPA 6020B	Iron, Dissolved	3.5	mg/L	0.040	02/20/24 16:23	
EPA 6020B	Manganese, Dissolved	3.4	mg/L	0.10	02/23/24 19:47	
EPA 6020B	Molybdenum, Dissolved	0.0015J	mg/L	0.010	02/20/24 16:23	
92713388008	**Reactor 8B: CleanER-5 (2wk)**					
EPA 6020B	Antimony	0.0013J	mg/L	0.0030	02/20/24 18:21	
EPA 6020B	Barium	0.092	mg/L	0.0050	02/20/24 18:21	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92713388008	**Reactor 8B: CleanER-5 (2wk)**					
EPA 6020B	Beryllium	0.0011	mg/L	0.00050	02/20/24 18:21	
EPA 6020B	Cadmium	0.00019J	mg/L	0.00050	02/20/24 18:21	
EPA 6020B	Chromium	0.0029J	mg/L	0.0050	02/20/24 18:21	
EPA 6020B	Cobalt	0.040	mg/L	0.0050	02/20/24 18:21	
EPA 6020B	Lead	0.00063J	mg/L	0.0010	02/20/24 18:21	
EPA 6020B	Lithium	0.010J	mg/L	0.030	02/20/24 18:21	
EPA 6020B	Selenium	0.0070	mg/L	0.0050	02/20/24 18:21	
EPA 6020B	Antimony, Dissolved	0.0023J	mg/L	0.0030	02/20/24 16:27	
EPA 6020B	Barium, Dissolved	0.077	mg/L	0.0050	02/20/24 16:27	
EPA 6020B	Beryllium, Dissolved	0.00098	mg/L	0.00050	02/20/24 16:27	
EPA 6020B	Cadmium, Dissolved	0.00022J	mg/L	0.00050	02/20/24 16:27	
EPA 6020B	Cobalt, Dissolved	0.041	mg/L	0.0050	02/20/24 16:27	
EPA 6020B	Iron, Dissolved	0.016J	mg/L	0.040	02/20/24 16:27	
EPA 6020B	Lithium, Dissolved	0.0089J	mg/L	0.030	02/20/24 16:27	
EPA 6020B	Manganese, Dissolved	5.8	mg/L	0.10	02/23/24 19:51	
EPA 6020B	Selenium, Dissolved	0.0063	mg/L	0.0050	02/20/24 16:27	
92713388009	**Reactor 9B: Sodium Carbonate 2**					
EPA 6020B	Arsenic	0.0014J	mg/L	0.0050	02/20/24 18:33	
EPA 6020B	Barium	0.093	mg/L	0.0050	02/20/24 18:33	
EPA 6020B	Beryllium	0.00082	mg/L	0.00050	02/20/24 18:33	
EPA 6020B	Chromium	0.0071	mg/L	0.0050	02/20/24 18:33	
EPA 6020B	Cobalt	0.0035J	mg/L	0.0050	02/20/24 18:33	
EPA 6020B	Lead	0.0021	mg/L	0.0010	02/20/24 18:33	
EPA 6020B	Lithium	0.0084J	mg/L	0.030	02/20/24 18:33	
EPA 6020B	Molybdenum	0.020	mg/L	0.010	02/20/24 18:33	
EPA 6020B	Selenium	0.0092	mg/L	0.0050	02/20/24 18:33	
EPA 6020B	Antimony, Dissolved	0.0025J	mg/L	0.0030	02/20/24 16:49	
EPA 6020B	Arsenic, Dissolved	0.0022J	mg/L	0.0050	02/20/24 16:49	
EPA 6020B	Barium, Dissolved	0.022	mg/L	0.0050	02/20/24 16:49	
EPA 6020B	Iron, Dissolved	0.044	mg/L	0.040	02/20/24 16:49	
EPA 6020B	Manganese, Dissolved	0.0019J	mg/L	0.010	02/20/24 16:49	
EPA 6020B	Molybdenum, Dissolved	0.019	mg/L	0.010	02/20/24 16:49	
EPA 6020B	Selenium, Dissolved	0.0095	mg/L	0.0050	02/20/24 16:49	
92713388010	**Reactor 10B: Sodium Carbonate**					
EPA 6020B	Arsenic	0.0021J	mg/L	0.0050	02/20/24 18:37	
EPA 6020B	Barium	0.11	mg/L	0.0050	02/20/24 18:37	
EPA 6020B	Beryllium	0.00070	mg/L	0.00050	02/20/24 18:37	
EPA 6020B	Chromium	0.0070	mg/L	0.0050	02/20/24 18:37	
EPA 6020B	Cobalt	0.0039J	mg/L	0.0050	02/20/24 18:37	
EPA 6020B	Lead	0.0021	mg/L	0.0010	02/20/24 18:37	
EPA 6020B	Lithium	0.0088J	mg/L	0.030	02/20/24 18:37	
EPA 6020B	Molybdenum	0.022	mg/L	0.010	02/20/24 18:37	
EPA 6020B	Selenium	0.011	mg/L	0.0050	02/20/24 18:37	
EPA 6020B	Antimony, Dissolved	0.0020J	mg/L	0.0030	02/20/24 16:53	
EPA 6020B	Arsenic, Dissolved	0.0032J	mg/L	0.0050	02/20/24 16:53	
EPA 6020B	Barium, Dissolved	0.036	mg/L	0.0050	02/20/24 16:53	

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92713388010	**Reactor 10B: Sodium Carbonate**					
EPA 6020B	Chromium, Dissolved	0.016	mg/L	0.0050	02/20/24 16:53	
EPA 6020B	Cobalt, Dissolved	0.00043J	mg/L	0.0050	02/20/24 16:53	
EPA 6020B	Iron, Dissolved	0.12	mg/L	0.040	02/20/24 16:53	
EPA 6020B	Manganese, Dissolved	0.0027J	mg/L	0.010	02/20/24 16:53	
EPA 6020B	Molybdenum, Dissolved	0.021	mg/L	0.010	02/20/24 16:53	
EPA 6020B	Selenium, Dissolved	0.010	mg/L	0.0050	02/20/24 16:53	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 1B: Control, GW (2wk) **Lab ID: 92713388001** Collected: 02/13/24 14:25 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 17:52	7440-36-0	
Arsenic	**0.0018J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 17:52	7440-38-2	
Barium	**0.031**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 17:52	7440-39-3	
Beryllium	**0.00012J**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 17:52	7440-41-7	
Cadmium	**0.00024J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 17:52	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 17:52	7440-47-3	
Cobalt	**0.10**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 17:52	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 17:52	7439-92-1	
Lithium	**0.037**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 17:52	7439-93-2	
Molybdenum	**0.0044J**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 17:52	7439-98-7	
Selenium	**0.0089**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 17:52	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 17:52	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0013J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 15:58	7440-36-0	
Arsenic, Dissolved	**0.0011J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 15:58	7440-38-2	
Barium, Dissolved	**0.031**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 15:58	7440-39-3	
Beryllium, Dissolved	**0.00012J**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 15:58	7440-41-7	
Cadmium, Dissolved	**0.00024J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 15:58	7440-43-9	
Chromium, Dissolved	**0.0035J**	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 15:58	7440-47-3	
Cobalt, Dissolved	**0.11**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 15:58	7440-48-4	
Iron, Dissolved	**0.021J**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 15:58	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 15:58	7439-92-1	
Lithium, Dissolved	**0.039**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 15:58	7439-93-2	
Manganese, Dissolved	**0.51**	mg/L	0.010	0.00098	1	02/15/24 12:45	02/20/24 15:58	7439-96-5	
Molybdenum, Dissolved	**0.0044J**	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 15:58	7439-98-7	
Selenium, Dissolved	**0.0088**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 15:58	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 15:58	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 2B: Control, GW+Solids **Lab ID: 92713388002** Collected: 02/13/24 14:35 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 17:56	7440-36-0	
Arsenic	**0.0021J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 17:56	7440-38-2	
Barium	**0.089**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 17:56	7440-39-3	
Beryllium	**0.0010**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 17:56	7440-41-7	
Cadmium	**0.00018J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 17:56	7440-43-9	
Chromium	**0.0025J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 17:56	7440-47-3	
Cobalt	**0.027**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 17:56	7440-48-4	
Lead	**0.00044J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 17:56	7439-92-1	
Lithium	**0.0098J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 17:56	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 17:56	7439-98-7	
Selenium	**0.0080**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 17:56	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 17:56	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0014J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:02	7440-36-0	
Arsenic, Dissolved	**0.0013J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:02	7440-38-2	
Barium, Dissolved	**0.079**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:02	7440-39-3	
Beryllium, Dissolved	**0.00083**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:02	7440-41-7	
Cadmium, Dissolved	**0.00015J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:02	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:02	7440-47-3	
Cobalt, Dissolved	**0.027**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:02	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:02	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:02	7439-92-1	
Lithium, Dissolved	**0.0088J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:02	7439-93-2	
Manganese, Dissolved	**1.5**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:29	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:02	7439-98-7	
Selenium, Dissolved	**0.0071**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:02	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:02	7440-28-0	

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(704)875-9092

ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 3B: Unmodified Regenes **Lab ID: 92713388003** Collected: 02/13/24 14:45 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:00	7440-36-0	
Arsenic	**0.0019J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:00	7440-38-2	
Barium	**0.084**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:00	7440-39-3	
Beryllium	**0.00047J**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:00	7440-41-7	
Cadmium	**0.00013J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:00	7440-43-9	
Chromium	**0.0022J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:00	7440-47-3	
Cobalt	**0.023**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:00	7440-48-4	
Lead	**0.00051J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:00	7439-92-1	
Lithium	**0.0081J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:00	7439-93-2	
Molybdenum	**0.00062J**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:00	7439-98-7	
Selenium	**0.0076**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:00	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:00	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00090J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:06	7440-36-0	
Arsenic, Dissolved	**0.0014J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:06	7440-38-2	
Barium, Dissolved	**0.073**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:06	7440-39-3	
Beryllium, Dissolved	**0.00033J**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:06	7440-41-7	
Cadmium, Dissolved	**0.00012J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:06	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:06	7440-47-3	
Cobalt, Dissolved	**0.022**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:06	7440-48-4	
Iron, Dissolved	**0.012J**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:06	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:06	7439-92-1	
Lithium, Dissolved	**0.0072J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:06	7439-93-2	
Manganese, Dissolved	**1.6**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:32	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:06	7439-98-7	
Selenium, Dissolved	**0.0075**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:06	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:06	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 4B: Modified Regenesis **Lab ID: 92713388004** Collected: 02/13/24 14:50 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:04	7440-36-0	
Arsenic	**0.0018J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:04	7440-38-2	
Barium	**0.086**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:04	7440-39-3	
Beryllium	**0.00066**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:04	7440-41-7	
Cadmium	**0.00013J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:04	7440-43-9	
Chromium	**0.0026J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:04	7440-47-3	
Cobalt	**0.028**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:04	7440-48-4	
Lead	**0.00061J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:04	7439-92-1	
Lithium	**0.010J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:04	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:04	7439-98-7	
Selenium	**0.0073**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:04	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:04	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0011J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:10	7440-36-0	
Arsenic, Dissolved	**0.0011J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:10	7440-38-2	
Barium, Dissolved	**0.071**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:10	7440-39-3	
Beryllium, Dissolved	**0.00046J**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:10	7440-41-7	
Cadmium, Dissolved	**0.00010J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:10	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:10	7440-47-3	
Cobalt, Dissolved	**0.028**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:10	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:10	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:10	7439-92-1	
Lithium, Dissolved	**0.0091J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:10	7439-93-2	
Manganese, Dissolved	**1.7**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:36	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:10	7439-98-7	
Selenium, Dissolved	**0.0068**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:10	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:10	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 5B: Unmodified Aqua Ae **Lab ID: 92713388005** Collected: 02/13/24 14:55 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:08	7440-36-0	
Arsenic	**0.0019J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:08	7440-38-2	
Barium	**0.084**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:08	7440-39-3	
Beryllium	**0.00049J**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:08	7440-41-7	
Cadmium	**0.00012J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:08	7440-43-9	
Chromium	**0.0024J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:08	7440-47-3	
Cobalt	**0.023**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:08	7440-48-4	
Lead	**0.00047J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:08	7439-92-1	
Lithium	**0.0090J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:08	7439-93-2	
Molybdenum	**0.00065J**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:08	7439-98-7	
Selenium	**0.0069**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:08	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:08	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00096J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:14	7440-36-0	
Arsenic, Dissolved	**0.00098J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:14	7440-38-2	
Barium, Dissolved	**0.067**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:14	7440-39-3	
Beryllium, Dissolved	**0.00034J**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:14	7440-41-7	
Cadmium, Dissolved	**0.00013J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:14	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:14	7440-47-3	
Cobalt, Dissolved	**0.022**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:14	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:14	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:14	7439-92-1	
Lithium, Dissolved	**0.0076J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:14	7439-93-2	
Manganese, Dissolved	**1.6**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:40	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:14	7439-98-7	
Selenium, Dissolved	**0.0064**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:14	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:14	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 6B: Modified Aqua Aero **Lab ID: 92713388006** Collected: 02/13/24 15:10 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:13	7440-36-0	
Arsenic	**0.0018J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:13	7440-38-2	
Barium	**0.084**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:13	7440-39-3	
Beryllium	**0.00066**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:13	7440-41-7	
Cadmium	**0.00012J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:13	7440-43-9	
Chromium	**0.0019J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:13	7440-47-3	
Cobalt	**0.029**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:13	7440-48-4	
Lead	**0.00046J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:13	7439-92-1	
Lithium	**0.010J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:13	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:13	7439-98-7	
Selenium	**0.0075**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:13	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:13	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0011J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:19	7440-36-0	
Arsenic, Dissolved	**0.0014J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:19	7440-38-2	
Barium, Dissolved	**0.073**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:19	7440-39-3	
Beryllium, Dissolved	**0.00054**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:19	7440-41-7	
Cadmium, Dissolved	**0.00018J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:19	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:19	7440-47-3	
Cobalt, Dissolved	**0.029**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:19	7440-48-4	
Iron, Dissolved	**0.0095J**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:19	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:19	7439-92-1	
Lithium, Dissolved	**0.0095J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:19	7439-93-2	
Manganese, Dissolved	**1.7**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:44	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:19	7439-98-7	
Selenium, Dissolved	**0.0071**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:19	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:19	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 7B: CleanER iZVI (2wk) **Lab ID: 92713388007** Collected: 02/13/24 15:15 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:17	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:17	7440-38-2	
Barium	**0.041**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:17	7440-39-3	
Beryllium	**0.00029J**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:17	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:17	7440-43-9	
Chromium	**0.0031J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:17	7440-47-3	
Cobalt	**0.0021J**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:17	7440-48-4	
Lead	**0.00078J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:17	7439-92-1	
Lithium	**0.0032J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:17	7439-93-2	
Molybdenum	**0.0020J**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:17	7439-98-7	
Selenium	ND	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:17	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:17	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0012J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:23	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:23	7440-38-2	
Barium, Dissolved	**0.020**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:23	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:23	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:23	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:23	7440-47-3	
Cobalt, Dissolved	**0.00064J**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:23	7440-48-4	
Iron, Dissolved	**3.5**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:23	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:23	7439-92-1	
Lithium, Dissolved	ND	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:23	7439-93-2	
Manganese, Dissolved	**3.4**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:47	7439-96-5	
Molybdenum, Dissolved	**0.0015J**	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:23	7439-98-7	
Selenium, Dissolved	ND	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:23	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:23	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 8B: CleanER-5 (2wk) **Lab ID: 92713388008** Collected: 02/13/24 15:20 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0013J**	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:21	7440-36-0	
Arsenic	ND	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:21	7440-38-2	
Barium	**0.092**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:21	7440-39-3	
Beryllium	**0.0011**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:21	7440-41-7	
Cadmium	**0.00019J**	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:21	7440-43-9	
Chromium	**0.0029J**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:21	7440-47-3	
Cobalt	**0.040**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:21	7440-48-4	
Lead	**0.00063J**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:21	7439-92-1	
Lithium	**0.010J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:21	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:21	7439-98-7	
Selenium	**0.0070**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:21	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:21	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0023J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:27	7440-36-0	
Arsenic, Dissolved	ND	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:27	7440-38-2	
Barium, Dissolved	**0.077**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:27	7440-39-3	
Beryllium, Dissolved	**0.00098**	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:27	7440-41-7	
Cadmium, Dissolved	**0.00022J**	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:27	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:27	7440-47-3	
Cobalt, Dissolved	**0.041**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:27	7440-48-4	
Iron, Dissolved	**0.016J**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:27	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:27	7439-92-1	
Lithium, Dissolved	**0.0089J**	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:27	7439-93-2	
Manganese, Dissolved	**5.8**	mg/L	0.10	0.0098	10	02/15/24 12:45	02/23/24 19:51	7439-96-5	
Molybdenum, Dissolved	ND	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:27	7439-98-7	
Selenium, Dissolved	**0.0063**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:27	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:27	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 9B: Sodium Carbonate 2 **Lab ID: 92713388009** Collected: 02/13/24 15:25 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:33	7440-36-0	
Arsenic	**0.0014J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:33	7440-38-2	
Barium	**0.093**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:33	7440-39-3	
Beryllium	**0.00082**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:33	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:33	7440-43-9	
Chromium	**0.0071**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:33	7440-47-3	
Cobalt	**0.0035J**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:33	7440-48-4	
Lead	**0.0021**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:33	7439-92-1	
Lithium	**0.0084J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:33	7439-93-2	
Molybdenum	**0.020**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:33	7439-98-7	
Selenium	**0.0092**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:33	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:33	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0025J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:49	7440-36-0	
Arsenic, Dissolved	**0.0022J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:49	7440-38-2	
Barium, Dissolved	**0.022**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:49	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:49	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:49	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:49	7440-47-3	
Cobalt, Dissolved	ND	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:49	7440-48-4	
Iron, Dissolved	**0.044**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:49	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:49	7439-92-1	
Lithium, Dissolved	ND	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:49	7439-93-2	
Manganese, Dissolved	**0.0019J**	mg/L	0.010	0.00098	1	02/15/24 12:45	02/20/24 16:49	7439-96-5	
Molybdenum, Dissolved	**0.019**	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:49	7439-98-7	
Selenium, Dissolved	**0.0095**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:49	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:49	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Sample: Reactor 10B: Sodium Carbonate **Lab ID: 92713388010** Collected: 02/13/24 15:30 Received: 02/14/24 09:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	02/15/24 14:46	02/20/24 18:37	7440-36-0	
Arsenic	**0.0021J**	mg/L	0.0050	0.00084	1	02/15/24 14:46	02/20/24 18:37	7440-38-2	
Barium	**0.11**	mg/L	0.0050	0.00047	1	02/15/24 14:46	02/20/24 18:37	7440-39-3	
Beryllium	**0.00070**	mg/L	0.00050	0.000094	1	02/15/24 14:46	02/20/24 18:37	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	02/15/24 14:46	02/20/24 18:37	7440-43-9	
Chromium	**0.0070**	mg/L	0.0050	0.0019	1	02/15/24 14:46	02/20/24 18:37	7440-47-3	
Cobalt	**0.0039J**	mg/L	0.0050	0.00032	1	02/15/24 14:46	02/20/24 18:37	7440-48-4	
Lead	**0.0021**	mg/L	0.0010	0.00016	1	02/15/24 14:46	02/20/24 18:37	7439-92-1	
Lithium	**0.0088J**	mg/L	0.030	0.0016	1	02/15/24 14:46	02/20/24 18:37	7439-93-2	
Molybdenum	**0.022**	mg/L	0.010	0.00062	1	02/15/24 14:46	02/20/24 18:37	7439-98-7	
Selenium	**0.011**	mg/L	0.0050	0.00096	1	02/15/24 14:46	02/20/24 18:37	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	02/15/24 14:46	02/20/24 18:37	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.0020J**	mg/L	0.0030	0.00054	1	02/15/24 12:45	02/20/24 16:53	7440-36-0	
Arsenic, Dissolved	**0.0032J**	mg/L	0.0050	0.00084	1	02/15/24 12:45	02/20/24 16:53	7440-38-2	
Barium, Dissolved	**0.036**	mg/L	0.0050	0.00047	1	02/15/24 12:45	02/20/24 16:53	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	02/15/24 12:45	02/20/24 16:53	7440-41-7	
Cadmium, Dissolved	ND	mg/L	0.00050	0.00010	1	02/15/24 12:45	02/20/24 16:53	7440-43-9	
Chromium, Dissolved	**0.016**	mg/L	0.0050	0.0019	1	02/15/24 12:45	02/20/24 16:53	7440-47-3	
Cobalt, Dissolved	**0.00043J**	mg/L	0.0050	0.00032	1	02/15/24 12:45	02/20/24 16:53	7440-48-4	
Iron, Dissolved	**0.12**	mg/L	0.040	0.0075	1	02/15/24 12:45	02/20/24 16:53	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	02/15/24 12:45	02/20/24 16:53	7439-92-1	
Lithium, Dissolved	ND	mg/L	0.030	0.0016	1	02/15/24 12:45	02/20/24 16:53	7439-93-2	
Manganese, Dissolved	**0.0027J**	mg/L	0.010	0.00098	1	02/15/24 12:45	02/20/24 16:53	7439-96-5	
Molybdenum, Dissolved	**0.021**	mg/L	0.010	0.00062	1	02/15/24 12:45	02/20/24 16:53	7439-98-7	
Selenium, Dissolved	**0.010**	mg/L	0.0050	0.00096	1	02/15/24 12:45	02/20/24 16:53	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	02/15/24 12:45	02/20/24 16:53	7440-28-0	

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

QC Batch: 832671
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92713388001, 92713388002, 92713388003, 92713388004, 92713388005, 92713388006, 92713388007, 92713388008, 92713388009, 92713388010

METHOD BLANK: 4302968 Matrix: Water
Associated Lab Samples: 92713388001, 92713388002, 92713388003, 92713388004, 92713388005, 92713388006, 92713388007, 92713388008, 92713388009, 92713388010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0030	0.00054	02/20/24 17:43	
Arsenic	mg/L	ND	0.0050	0.00084	02/20/24 17:43	
Barium	mg/L	ND	0.0050	0.00047	02/20/24 17:43	
Beryllium	mg/L	ND	0.00050	0.000094	02/20/24 17:43	
Cadmium	mg/L	ND	0.00050	0.00010	02/20/24 17:43	
Chromium	mg/L	ND	0.0050	0.0019	02/20/24 17:43	
Cobalt	mg/L	ND	0.0050	0.00032	02/20/24 17:43	
Lead	mg/L	ND	0.0010	0.00016	02/20/24 17:43	
Lithium	mg/L	ND	0.030	0.0016	02/20/24 17:43	
Molybdenum	mg/L	ND	0.010	0.00062	02/20/24 17:43	
Selenium	mg/L	ND	0.0050	0.00096	02/20/24 17:43	
Thallium	mg/L	ND	0.0010	0.00038	02/20/24 17:43	

LABORATORY CONTROL SAMPLE: 4302969

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.11	105	80-120	
Arsenic	mg/L	0.1	0.10	104	80-120	
Barium	mg/L	0.1	0.10	103	80-120	
Beryllium	mg/L	0.1	0.10	100	80-120	
Cadmium	mg/L	0.1	0.098	98	80-120	
Chromium	mg/L	0.1	0.10	100	80-120	
Cobalt	mg/L	0.1	0.096	96	80-120	
Lead	mg/L	0.1	0.10	102	80-120	
Lithium	mg/L	0.1	0.10	104	80-120	
Molybdenum	mg/L	0.1	0.10	104	80-120	
Selenium	mg/L	0.1	0.10	104	80-120	
Thallium	mg/L	0.1	0.11	105	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

QC Batch: 832618
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92713388001, 92713388002, 92713388003, 92713388004, 92713388005, 92713388006, 92713388007, 92713388008, 92713388009, 92713388010

METHOD BLANK: 4302702 Matrix: Water
Associated Lab Samples: 92713388001, 92713388002, 92713388003, 92713388004, 92713388005, 92713388006, 92713388007, 92713388008, 92713388009, 92713388010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.00054	02/20/24 15:50	
Arsenic, Dissolved	mg/L	ND	0.0050	0.00084	02/20/24 15:50	
Barium, Dissolved	mg/L	ND	0.0050	0.00047	02/20/24 15:50	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000094	02/20/24 15:50	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00010	02/20/24 15:50	
Chromium, Dissolved	mg/L	ND	0.0050	0.0019	02/20/24 15:50	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00032	02/20/24 15:50	
Iron, Dissolved	mg/L	ND	0.040	0.0075	02/20/24 15:50	
Lead, Dissolved	mg/L	ND	0.0010	0.00016	02/20/24 15:50	
Lithium, Dissolved	mg/L	ND	0.030	0.0016	02/20/24 15:50	
Manganese, Dissolved	mg/L	ND	0.010	0.00098	02/20/24 15:50	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00062	02/20/24 15:50	
Selenium, Dissolved	mg/L	ND	0.0050	0.00096	02/20/24 15:50	
Thallium, Dissolved	mg/L	ND	0.0010	0.00038	02/20/24 15:50	

LABORATORY CONTROL SAMPLE: 4302703

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.11	107	80-120	
Arsenic, Dissolved	mg/L	0.1	0.10	101	80-120	
Barium, Dissolved	mg/L	0.1	0.10	103	80-120	
Beryllium, Dissolved	mg/L	0.1	0.10	101	80-120	
Cadmium, Dissolved	mg/L	0.1	0.099	99	80-120	
Chromium, Dissolved	mg/L	0.1	0.10	101	80-120	
Cobalt, Dissolved	mg/L	0.1	0.098	98	80-120	
Iron, Dissolved	mg/L	1	0.99	99	80-120	
Lead, Dissolved	mg/L	0.1	0.10	101	80-120	
Lithium, Dissolved	mg/L	0.1	0.10	104	80-120	
Manganese, Dissolved	mg/L	0.1	0.10	104	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.10	103	80-120	
Selenium, Dissolved	mg/L	0.1	0.099	99	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	103	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Georgia Power Yates Cobalt
Pace Project No.: 92713388

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92713388001	**Reactor 1B: Control, GW (2wk)**	EPA 3005A	832671	EPA 6020B	832788
92713388002	**Reactor 2B: Control, GW+Solids**	EPA 3005A	832671	EPA 6020B	832788
92713388003	**Reactor 3B: Unmodified Regenes**	EPA 3005A	832671	EPA 6020B	832788
92713388004	**Reactor 4B: Modified Regenesis**	EPA 3005A	832671	EPA 6020B	832788
92713388005	**Reactor 5B: Unmodified Aqua Ae**	EPA 3005A	832671	EPA 6020B	832788
92713388006	**Reactor 6B: Modified Aqua Aero**	EPA 3005A	832671	EPA 6020B	832788
92713388007	**Reactor 7B: CleanER iZVI (2wk)**	EPA 3005A	832671	EPA 6020B	832788
92713388008	**Reactor 8B: CleanER-5 (2wk)**	EPA 3005A	832671	EPA 6020B	832788
92713388009	**Reactor 9B: Sodium Carbonate 2**	EPA 3005A	832671	EPA 6020B	832788
92713388010	**Reactor 10B: Sodium Carbonate**	EPA 3005A	832671	EPA 6020B	832788
92713388001	**Reactor 1B: Control, GW (2wk)**	EPA 3005A	832618	EPA 6020B	832731
92713388002	**Reactor 2B: Control, GW+Solids**	EPA 3005A	832618	EPA 6020B	832731
92713388003	**Reactor 3B: Unmodified Regenes**	EPA 3005A	832618	EPA 6020B	832731
92713388004	**Reactor 4B: Modified Regenesis**	EPA 3005A	832618	EPA 6020B	832731
92713388005	**Reactor 5B: Unmodified Aqua Ae**	EPA 3005A	832618	EPA 6020B	832731
92713388006	**Reactor 6B: Modified Aqua Aero**	EPA 3005A	832618	EPA 6020B	832731
92713388007	**Reactor 7B: CleanER iZVI (2wk)**	EPA 3005A	832618	EPA 6020B	832731
92713388008	**Reactor 8B: CleanER-5 (2wk)**	EPA 3005A	832618	EPA 6020B	832731
92713388009	**Reactor 9B: Sodium Carbonate 2**	EPA 3005A	832618	EPA 6020B	832731
92713388010	**Reactor 10B: Sodium Carbonate**	EPA 3005A	832618	EPA 6020B	832731

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Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-HUN1-0083 v03_Sample Condition Upon Receipt
	Effective Date: 12/01/2023

Laboratory receiving samples:
Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

Client Name: Agradis CGA-Power

Project #: WO# : 92713388

92713388

Courier: ☐ Commercial ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ Other:____

Custody Seal Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No ☐ N/A

Date/Initials Person Examining Contents: 7/17/24 CAH

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Thermometer: ☐ IR Gun ID: 083

Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp: 5.8 **Correction Factor:** Add/Subtract (°C) 0.0

Cooler Temp Corrected (°C): 5.8

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☐ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☑ Yes	☐ No	☐ N/A	8.
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	9.
-Includes Date/Time/ID/Analysis Matrix: W				
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY
775171783844

Field Data Required? ☐ Yes ☐ No

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ Date: _____

Project Manager SRF Review: _____ Date: _____

Qualtrax ID: 69614

DC#_Title: ENV-FRM-HUN1-0083 v03_Sample Condition Upon Receipt

Effective Date: 12/01/2023

WO#: 92713388

PM: BV Due Date: 02/28/24

CLIENT: 92-GP-Yates

*Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

Project #

**Bottom half of box is to list number of bottles

***Check all unpreserved Nitrates for chlorine

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1						2																							
2						2																							
3						2																							
4						2																							
5						2																							
6						2																							
7						2																							
8						2																							
9						2																							
10						2																							
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

LAB REFERENCE NUMBER:

Page _1_ of _1_

PROJECT NUMBER	PROJECT NAME	SAMPLE ORIGIN
30143622 Task 138	Georgia Power Yates Cobalt	Yates, GA
SEND RESULTS TO: David Liles	EMAIL ADDRESS:david.liles@arcadis.com	TELEPHONE: 9193285574
SAMPLERS: Tessa Davis		

SAMPLE ID	DATE	TIME	MATRIX	COMPOSITE /GRAB	QUANTITY	REQUESTED ANALYSES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
Reator 1B: Control, GW (2wk)	2/13/24	14:25	GW	C	2	X	X														
Reactor 2B: Control, GW + Solids (2wk)	2/13/24	14:35	GW	C	2	X	X														
Reactor 3B: Unmodified Regenesis/Coconut (2wk)	2/13/24	14:45	GW	C	2	X	X														
Reactor 4B: Modified Regenesis/Coconut (2wk)	2/13/24	14:50	GW	C	2	X	X														
Reactor 5B: Unmodified Aqua Aerobics/Bitumen (2wk)	2/13/24	14:55	GW	C	2	X	X														
Reactor 6B: Modified Aqua Aerobics/Bitumen (2wk)	2/13/24	15:10	GW	C	2	X	X														
Reactor 7B: CleanER iZVI (2wk)	2/13/24	15:15	GW	C	2	X	X														
Reactor 8B: CleanER-S (2wk)	2/13/24	15:20	GW	C	2	X	X														
Reactor 9B: Sodium Carbonate 2 g/L (2wk)	2/13/24	15:25	GW	C	2	X	X														
Reactor 10B: Sodium Carbonate 5 g/L (2wk)	2/13/24	15:30	GW	C	2	X	X														

	Requested Analyses	Container	Pres.
1	Total Metals 6020: see "Special Instructions"	250mL HDPE	HNO3
2	Dissolved Metals 6020: see "Special Instructions"	250mL HDPE	HNO4
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Special Instructions/Comments:

Please analyze for the following metals:
Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lead, Lithium, Molybdenum, Selenium, Thallium.
For dissolved metals, please also test for Iron and Manganese

☐ Special QA/QC Instructions
☐ USDA Regulated
☐ Packed with Ice

Laboratory Information and Receipt

Lab Name: Pace Labs Peachtree
Lab Project Manager: Bonnie Vang
Shipping Tracking #: 775171783844
Specify Turnaround Requirements: Standard

☐ Custody seal intact
☐ Samples intact

Sample Receipt:
Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
[signature]	02/13/24	17:00	[signature]	2/14/24	0950
Relinquished by:	DATE	TIME	Received by:	DATE	TIME

Pace Analytical Services, LLC
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

March 07, 2024

Lauren Hartley
Southern Company
241 Ralph McGill Blvd NE
Bin 10160
Atlanta, GA 30308

RE: Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Dear Lauren Hartley:

Enclosed are the analytical results for sample(s) received by the laboratory on February 28, 2024. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Peachtree Corners, GA

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Bonnie Vang
bonnie.vang@pacelabs.com
704-977-0968
Project Manager

Enclosures

cc: Geoffrey Gay, Arcadis-ATL
Laura Midkiff, Southern Company
Alex Simpson, Arcadis
Becky Steever, Arcadis
Jessica Ware, Arcadis
Albert Zumbuhl, Arcadis

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CERTIFICATIONS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Pace Analytical Services Peachtree Corners
110 Technology Pkwy, Peachtree Corners, GA 30092
Florida DOH Certification #: E87315
Georgia DW Inorganics Certification #: 812
North Carolina Certification #: 381
South Carolina Certification #: 98011001
Virginia Certification #: 460204

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab ID	Sample ID	Matrix	Date Collected	Date Received
92715745001	**Reactor 1: DIW + 400g**	Water	02/27/24 14:45	02/28/24 10:01
92715745002	**Reactor 2: GW Only**	Water	02/27/24 12:45	02/28/24 10:01
92715745003	**Reactor 3: GW + 0.5g**	Water	02/27/24 13:07	02/28/24 10:01
92715745004	**Reactor 4: GW + 5g**	Water	02/27/24 13:15	02/28/24 10:01
92715745005	**Reactor 5: GW + 50g**	Water	02/27/24 13:30	02/28/24 10:01
92715745006	**Reactor 6: GW + 50g**	Water	02/27/24 13:40	02/28/24 10:01
92715745007	**Reactor 7: GW + 400g**	Water	02/27/24 10:45	02/28/24 10:01

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SAMPLE ANALYTE COUNT

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab ID	Sample ID	Method	Analysts	Analytes Reported
92715745001	**Reactor 1: DIW + 400g**	EPA 6020B	CW1	12
92715745002	**Reactor 2: GW Only**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92715745003	**Reactor 3: GW + 0.5g**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92715745004	**Reactor 4: GW + 5g**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92715745005	**Reactor 5: GW + 50g**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92715745006	**Reactor 6: GW + 50g**	EPA 6020B	CW1	12
		EPA 6020B	CW1	14
92715745007	**Reactor 7: GW + 400g**	EPA 6020B	CW1	12

PASI-GA = Pace Analytical Services - Peachtree Corners, GA

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92715745001	**Reactor 1: DIW + 400g**					
EPA 6020B	Antimony	0.0013J	mg/L	0.0030	03/06/24 17:40	
EPA 6020B	Arsenic	0.0012J	mg/L	0.0050	03/06/24 17:40	B
EPA 6020B	Barium	0.029	mg/L	0.0050	03/06/24 17:40	
EPA 6020B	Beryllium	0.00054	mg/L	0.00050	03/06/24 17:40	
EPA 6020B	Cobalt	0.0019J	mg/L	0.0050	03/06/24 17:40	
EPA 6020B	Lithium	0.0016J	mg/L	0.030	03/06/24 17:40	
EPA 6020B	Selenium	0.0022J	mg/L	0.0050	03/06/24 17:40	
92715745002	**Reactor 2: GW Only**					
EPA 6020B	Arsenic	0.0027J	mg/L	0.0050	03/06/24 17:45	B
EPA 6020B	Barium	0.030	mg/L	0.0050	03/06/24 17:45	
EPA 6020B	Beryllium	0.00015J	mg/L	0.00050	03/06/24 17:45	
EPA 6020B	Cadmium	0.00026J	mg/L	0.00050	03/06/24 17:45	
EPA 6020B	Cobalt	0.11	mg/L	0.0050	03/06/24 17:45	
EPA 6020B	Lithium	0.040	mg/L	0.030	03/06/24 17:45	
EPA 6020B	Molybdenum	0.0044J	mg/L	0.010	03/06/24 17:45	
EPA 6020B	Selenium	0.0083	mg/L	0.0050	03/06/24 17:45	
EPA 6020B	Antimony, Dissolved	0.00080J	mg/L	0.0030	03/06/24 16:08	
EPA 6020B	Arsenic, Dissolved	0.0029J	mg/L	0.0050	03/06/24 16:08	B
EPA 6020B	Barium, Dissolved	0.029	mg/L	0.0050	03/06/24 16:08	
EPA 6020B	Beryllium, Dissolved	0.00016J	mg/L	0.00050	03/06/24 16:08	
EPA 6020B	Cadmium, Dissolved	0.00025J	mg/L	0.00050	03/06/24 16:08	
EPA 6020B	Cobalt, Dissolved	0.11	mg/L	0.0050	03/06/24 16:08	
EPA 6020B	Lithium, Dissolved	0.039	mg/L	0.030	03/06/24 16:08	
EPA 6020B	Manganese, Dissolved	0.51	mg/L	0.010	03/06/24 16:08	
EPA 6020B	Molybdenum, Dissolved	0.0044J	mg/L	0.010	03/06/24 16:08	
EPA 6020B	Selenium, Dissolved	0.0086	mg/L	0.0050	03/06/24 16:08	
92715745003	**Reactor 3: GW + 0.5g**					
EPA 6020B	Arsenic	0.0030J	mg/L	0.0050	03/06/24 17:49	B
EPA 6020B	Barium	0.041	mg/L	0.0050	03/06/24 17:49	
EPA 6020B	Beryllium	0.00015J	mg/L	0.00050	03/06/24 17:49	
EPA 6020B	Cadmium	0.00024J	mg/L	0.00050	03/06/24 17:49	
EPA 6020B	Cobalt	0.10	mg/L	0.0050	03/06/24 17:49	
EPA 6020B	Lithium	0.038	mg/L	0.030	03/06/24 17:49	
EPA 6020B	Molybdenum	0.0044J	mg/L	0.010	03/06/24 17:49	
EPA 6020B	Selenium	0.0089	mg/L	0.0050	03/06/24 17:49	
EPA 6020B	Antimony, Dissolved	0.00071J	mg/L	0.0030	03/06/24 16:42	
EPA 6020B	Arsenic, Dissolved	0.0036J	mg/L	0.0050	03/06/24 16:42	B
EPA 6020B	Barium, Dissolved	0.038	mg/L	0.0050	03/06/24 16:42	
EPA 6020B	Cadmium, Dissolved	0.00023J	mg/L	0.00050	03/06/24 16:42	
EPA 6020B	Cobalt, Dissolved	0.094	mg/L	0.0050	03/06/24 16:42	
EPA 6020B	Iron, Dissolved	0.010J	mg/L	0.040	03/06/24 16:42	
EPA 6020B	Lithium, Dissolved	0.038	mg/L	0.030	03/06/24 16:42	
EPA 6020B	Manganese, Dissolved	0.48	mg/L	0.010	03/06/24 16:42	
EPA 6020B	Molybdenum, Dissolved	0.0041J	mg/L	0.010	03/06/24 16:42	
EPA 6020B	Selenium, Dissolved	0.0088	mg/L	0.0050	03/06/24 16:42	

REPORT OF LABORATORY ANALYSIS

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SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92715745004	**Reactor 4: GW + 5g**					
EPA 6020B	Arsenic	0.0031J	mg/L	0.0050	03/06/24 17:53	B
EPA 6020B	Barium	0.063	mg/L	0.0050	03/06/24 17:53	
EPA 6020B	Beryllium	0.00018J	mg/L	0.00050	03/06/24 17:53	
EPA 6020B	Cadmium	0.00019J	mg/L	0.00050	03/06/24 17:53	
EPA 6020B	Cobalt	0.052	mg/L	0.0050	03/06/24 17:53	
EPA 6020B	Lead	0.00037J	mg/L	0.0010	03/06/24 17:53	
EPA 6020B	Lithium	0.034	mg/L	0.030	03/06/24 17:53	
EPA 6020B	Molybdenum	0.0048J	mg/L	0.010	03/06/24 17:53	
EPA 6020B	Selenium	0.0093	mg/L	0.0050	03/06/24 17:53	
EPA 6020B	Antimony, Dissolved	0.00061J	mg/L	0.0030	03/06/24 16:51	
EPA 6020B	Arsenic, Dissolved	0.0033J	mg/L	0.0050	03/06/24 16:51	B
EPA 6020B	Barium, Dissolved	0.053	mg/L	0.0050	03/06/24 16:51	
EPA 6020B	Cadmium, Dissolved	0.00016J	mg/L	0.00050	03/06/24 16:51	
EPA 6020B	Cobalt, Dissolved	0.049	mg/L	0.0050	03/06/24 16:51	
EPA 6020B	Iron, Dissolved	0.014J	mg/L	0.040	03/06/24 16:51	
EPA 6020B	Lithium, Dissolved	0.034	mg/L	0.030	03/06/24 16:51	
EPA 6020B	Manganese, Dissolved	0.59	mg/L	0.010	03/06/24 16:51	
EPA 6020B	Molybdenum, Dissolved	0.0045J	mg/L	0.010	03/06/24 16:51	
EPA 6020B	Selenium, Dissolved	0.0073	mg/L	0.0050	03/06/24 16:51	
92715745005	**Reactor 5: GW + 50g**					
EPA 6020B	Arsenic	0.0030J	mg/L	0.0050	03/06/24 17:57	B
EPA 6020B	Barium	0.076	mg/L	0.0050	03/06/24 17:57	
EPA 6020B	Beryllium	0.00034J	mg/L	0.00050	03/06/24 17:57	
EPA 6020B	Cadmium	0.00013J	mg/L	0.00050	03/06/24 17:57	
EPA 6020B	Cobalt	0.025	mg/L	0.0050	03/06/24 17:57	
EPA 6020B	Lead	0.00029J	mg/L	0.0010	03/06/24 17:57	
EPA 6020B	Lithium	0.0091J	mg/L	0.030	03/06/24 17:57	
EPA 6020B	Molybdenum	0.0011J	mg/L	0.010	03/06/24 17:57	
EPA 6020B	Selenium	0.0080	mg/L	0.0050	03/06/24 17:57	
EPA 6020B	Antimony, Dissolved	0.00066J	mg/L	0.0030	03/06/24 16:59	
EPA 6020B	Arsenic, Dissolved	0.0028J	mg/L	0.0050	03/06/24 16:59	B
EPA 6020B	Barium, Dissolved	0.067	mg/L	0.0050	03/06/24 16:59	
EPA 6020B	Beryllium, Dissolved	0.00025J	mg/L	0.00050	03/06/24 16:59	
EPA 6020B	Cadmium, Dissolved	0.00013J	mg/L	0.00050	03/06/24 16:59	
EPA 6020B	Cobalt, Dissolved	0.024	mg/L	0.0050	03/06/24 16:59	
EPA 6020B	Iron, Dissolved	0.011J	mg/L	0.040	03/06/24 16:59	
EPA 6020B	Lithium, Dissolved	0.0087J	mg/L	0.030	03/06/24 16:59	
EPA 6020B	Manganese, Dissolved	1.2	mg/L	0.050	03/06/24 17:03	
EPA 6020B	Molybdenum, Dissolved	0.0010J	mg/L	0.010	03/06/24 16:59	
EPA 6020B	Selenium, Dissolved	0.0074	mg/L	0.0050	03/06/24 16:59	
92715745006	**Reactor 6: GW + 50g**					
EPA 6020B	Arsenic	0.0030J	mg/L	0.0050	03/06/24 18:01	B
EPA 6020B	Barium	0.078	mg/L	0.0050	03/06/24 18:01	
EPA 6020B	Beryllium	0.00037J	mg/L	0.00050	03/06/24 18:01	
EPA 6020B	Cadmium	0.00015J	mg/L	0.00050	03/06/24 18:01	
EPA 6020B	Cobalt	0.028	mg/L	0.0050	03/06/24 18:01	

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(704)875-9092

SUMMARY OF DETECTION

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab Sample ID / Method	Client Sample ID / Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
92715745006	**Reactor 6: GW + 50g**					
EPA 6020B	Lead	0.00023J	mg/L	0.0010	03/06/24 18:01	
EPA 6020B	Lithium	0.0096J	mg/L	0.030	03/06/24 18:01	
EPA 6020B	Molybdenum	0.00079J	mg/L	0.010	03/06/24 18:01	
EPA 6020B	Selenium	0.0074	mg/L	0.0050	03/06/24 18:01	
EPA 6020B	Antimony, Dissolved	0.00084J	mg/L	0.0030	03/06/24 17:16	
EPA 6020B	Arsenic, Dissolved	0.0029J	mg/L	0.0050	03/06/24 17:16	B
EPA 6020B	Barium, Dissolved	0.071	mg/L	0.0050	03/06/24 17:16	
EPA 6020B	Beryllium, Dissolved	0.00031J	mg/L	0.00050	03/06/24 17:16	
EPA 6020B	Cadmium, Dissolved	0.00013J	mg/L	0.00050	03/06/24 17:16	
EPA 6020B	Cobalt, Dissolved	0.028	mg/L	0.0050	03/06/24 17:16	
EPA 6020B	Iron, Dissolved	0.0076J	mg/L	0.040	03/06/24 17:16	
EPA 6020B	Lithium, Dissolved	0.0090J	mg/L	0.030	03/06/24 17:16	
EPA 6020B	Manganese, Dissolved	1.2	mg/L	0.050	03/06/24 17:20	
EPA 6020B	Molybdenum, Dissolved	0.00068J	mg/L	0.010	03/06/24 17:16	
EPA 6020B	Selenium, Dissolved	0.0075	mg/L	0.0050	03/06/24 17:16	
92715745007	**Reactor 7: GW + 400g**					
EPA 6020B	Antimony	0.00073J	mg/L	0.0030	03/06/24 18:05	
EPA 6020B	Arsenic	0.0028J	mg/L	0.0050	03/06/24 18:05	B
EPA 6020B	Barium	0.074	mg/L	0.0050	03/06/24 18:05	
EPA 6020B	Beryllium	0.0020	mg/L	0.00050	03/06/24 18:05	
EPA 6020B	Cadmium	0.00015J	mg/L	0.00050	03/06/24 18:05	
EPA 6020B	Cobalt	0.017	mg/L	0.0050	03/06/24 18:05	
EPA 6020B	Lead	0.00036J	mg/L	0.0010	03/06/24 18:05	
EPA 6020B	Lithium	0.0061J	mg/L	0.030	03/06/24 18:05	
EPA 6020B	Selenium	0.0086	mg/L	0.0050	03/06/24 18:05	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 1: DIW + 400g **Lab ID: 92715745001** Collected: 02/27/24 14:45 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.0013J**	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 17:40	7440-36-0	
Arsenic	**0.0012J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 17:40	7440-38-2	B
Barium	**0.029**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 17:40	7440-39-3	
Beryllium	**0.00054**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 17:40	7440-41-7	
Cadmium	ND	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 17:40	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 17:40	7440-47-3	
Cobalt	**0.0019J**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 17:40	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 17:40	7439-92-1	
Lithium	**0.0016J**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 17:40	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 17:40	7439-98-7	
Selenium	**0.0022J**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 17:40	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 17:40	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 2: GW Only **Lab ID: 92715745002** Collected: 02/27/24 12:45 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 17:45	7440-36-0	
Arsenic	**0.0027J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 17:45	7440-38-2	B
Barium	**0.030**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 17:45	7440-39-3	
Beryllium	**0.00015J**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 17:45	7440-41-7	
Cadmium	**0.00026J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 17:45	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 17:45	7440-47-3	
Cobalt	**0.11**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 17:45	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 17:45	7439-92-1	
Lithium	**0.040**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 17:45	7439-93-2	
Molybdenum	**0.0044J**	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 17:45	7439-98-7	
Selenium	**0.0083**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 17:45	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 17:45	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00080J**	mg/L	0.0030	0.00054	1	03/02/24 05:48	03/06/24 16:08	7440-36-0	
Arsenic, Dissolved	**0.0029J**	mg/L	0.0050	0.00084	1	03/02/24 05:48	03/06/24 16:08	7440-38-2	B
Barium, Dissolved	**0.029**	mg/L	0.0050	0.00047	1	03/02/24 05:48	03/06/24 16:08	7440-39-3	
Beryllium, Dissolved	**0.00016J**	mg/L	0.00050	0.000094	1	03/02/24 05:48	03/06/24 16:08	7440-41-7	
Cadmium, Dissolved	**0.00025J**	mg/L	0.00050	0.00010	1	03/02/24 05:48	03/06/24 16:08	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	03/02/24 05:48	03/06/24 16:08	7440-47-3	
Cobalt, Dissolved	**0.11**	mg/L	0.0050	0.00032	1	03/02/24 05:48	03/06/24 16:08	7440-48-4	
Iron, Dissolved	ND	mg/L	0.040	0.0075	1	03/02/24 05:48	03/06/24 16:08	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	03/02/24 05:48	03/06/24 16:08	7439-92-1	
Lithium, Dissolved	**0.039**	mg/L	0.030	0.0016	1	03/02/24 05:48	03/06/24 16:08	7439-93-2	
Manganese, Dissolved	**0.51**	mg/L	0.010	0.00098	1	03/02/24 05:48	03/06/24 16:08	7439-96-5	
Molybdenum, Dissolved	**0.0044J**	mg/L	0.010	0.00062	1	03/02/24 05:48	03/06/24 16:08	7439-98-7	
Selenium, Dissolved	**0.0086**	mg/L	0.0050	0.00096	1	03/02/24 05:48	03/06/24 16:08	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	03/02/24 05:48	03/06/24 16:08	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 3: GW + 0.5g **Lab ID: 92715745003** Collected: 02/27/24 13:07 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 17:49	7440-36-0	
Arsenic	**0.0030J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 17:49	7440-38-2	B
Barium	**0.041**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 17:49	7440-39-3	
Beryllium	**0.00015J**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 17:49	7440-41-7	
Cadmium	**0.00024J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 17:49	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 17:49	7440-47-3	
Cobalt	**0.10**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 17:49	7440-48-4	
Lead	ND	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 17:49	7439-92-1	
Lithium	**0.038**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 17:49	7439-93-2	
Molybdenum	**0.0044J**	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 17:49	7439-98-7	
Selenium	**0.0089**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 17:49	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 17:49	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00071J**	mg/L	0.0030	0.00054	1	03/02/24 05:48	03/06/24 16:42	7440-36-0	
Arsenic, Dissolved	**0.0036J**	mg/L	0.0050	0.00084	1	03/02/24 05:48	03/06/24 16:42	7440-38-2	B
Barium, Dissolved	**0.038**	mg/L	0.0050	0.00047	1	03/02/24 05:48	03/06/24 16:42	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	03/02/24 05:48	03/06/24 16:42	7440-41-7	
Cadmium, Dissolved	**0.00023J**	mg/L	0.00050	0.00010	1	03/02/24 05:48	03/06/24 16:42	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	03/02/24 05:48	03/06/24 16:42	7440-47-3	
Cobalt, Dissolved	**0.094**	mg/L	0.0050	0.00032	1	03/02/24 05:48	03/06/24 16:42	7440-48-4	
Iron, Dissolved	**0.010J**	mg/L	0.040	0.0075	1	03/02/24 05:48	03/06/24 16:42	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	03/02/24 05:48	03/06/24 16:42	7439-92-1	
Lithium, Dissolved	**0.038**	mg/L	0.030	0.0016	1	03/02/24 05:48	03/06/24 16:42	7439-93-2	
Manganese, Dissolved	**0.48**	mg/L	0.010	0.00098	1	03/02/24 05:48	03/06/24 16:42	7439-96-5	
Molybdenum, Dissolved	**0.0041J**	mg/L	0.010	0.00062	1	03/02/24 05:48	03/06/24 16:42	7439-98-7	
Selenium, Dissolved	**0.0088**	mg/L	0.0050	0.00096	1	03/02/24 05:48	03/06/24 16:42	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	03/02/24 05:48	03/06/24 16:42	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 4: GW + 5g **Lab ID: 92715745004** Collected: 02/27/24 13:15 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 17:53	7440-36-0	
Arsenic	**0.0031J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 17:53	7440-38-2	B
Barium	**0.063**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 17:53	7440-39-3	
Beryllium	**0.00018J**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 17:53	7440-41-7	
Cadmium	**0.00019J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 17:53	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 17:53	7440-47-3	
Cobalt	**0.052**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 17:53	7440-48-4	
Lead	**0.00037J**	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 17:53	7439-92-1	
Lithium	**0.034**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 17:53	7439-93-2	
Molybdenum	**0.0048J**	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 17:53	7439-98-7	
Selenium	**0.0093**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 17:53	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 17:53	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00061J**	mg/L	0.0030	0.00054	1	03/02/24 05:48	03/06/24 16:51	7440-36-0	
Arsenic, Dissolved	**0.0033J**	mg/L	0.0050	0.00084	1	03/02/24 05:48	03/06/24 16:51	7440-38-2	B
Barium, Dissolved	**0.053**	mg/L	0.0050	0.00047	1	03/02/24 05:48	03/06/24 16:51	7440-39-3	
Beryllium, Dissolved	ND	mg/L	0.00050	0.000094	1	03/02/24 05:48	03/06/24 16:51	7440-41-7	
Cadmium, Dissolved	**0.00016J**	mg/L	0.00050	0.00010	1	03/02/24 05:48	03/06/24 16:51	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	03/02/24 05:48	03/06/24 16:51	7440-47-3	
Cobalt, Dissolved	**0.049**	mg/L	0.0050	0.00032	1	03/02/24 05:48	03/06/24 16:51	7440-48-4	
Iron, Dissolved	**0.014J**	mg/L	0.040	0.0075	1	03/02/24 05:48	03/06/24 16:51	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	03/02/24 05:48	03/06/24 16:51	7439-92-1	
Lithium, Dissolved	**0.034**	mg/L	0.030	0.0016	1	03/02/24 05:48	03/06/24 16:51	7439-93-2	
Manganese, Dissolved	**0.59**	mg/L	0.010	0.00098	1	03/02/24 05:48	03/06/24 16:51	7439-96-5	
Molybdenum, Dissolved	**0.0045J**	mg/L	0.010	0.00062	1	03/02/24 05:48	03/06/24 16:51	7439-98-7	
Selenium, Dissolved	**0.0073**	mg/L	0.0050	0.00096	1	03/02/24 05:48	03/06/24 16:51	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	03/02/24 05:48	03/06/24 16:51	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 5: GW + 50g **Lab ID: 92715745005** Collected: 02/27/24 13:30 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 17:57	7440-36-0	
Arsenic	**0.0030J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 17:57	7440-38-2	B
Barium	**0.076**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 17:57	7440-39-3	
Beryllium	**0.00034J**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 17:57	7440-41-7	
Cadmium	**0.00013J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 17:57	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 17:57	7440-47-3	
Cobalt	**0.025**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 17:57	7440-48-4	
Lead	**0.00029J**	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 17:57	7439-92-1	
Lithium	**0.0091J**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 17:57	7439-93-2	
Molybdenum	**0.0011J**	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 17:57	7439-98-7	
Selenium	**0.0080**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 17:57	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 17:57	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00066J**	mg/L	0.0030	0.00054	1	03/02/24 05:48	03/06/24 16:59	7440-36-0	
Arsenic, Dissolved	**0.0028J**	mg/L	0.0050	0.00084	1	03/02/24 05:48	03/06/24 16:59	7440-38-2	B
Barium, Dissolved	**0.067**	mg/L	0.0050	0.00047	1	03/02/24 05:48	03/06/24 16:59	7440-39-3	
Beryllium, Dissolved	**0.00025J**	mg/L	0.00050	0.000094	1	03/02/24 05:48	03/06/24 16:59	7440-41-7	
Cadmium, Dissolved	**0.00013J**	mg/L	0.00050	0.00010	1	03/02/24 05:48	03/06/24 16:59	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	03/02/24 05:48	03/06/24 16:59	7440-47-3	
Cobalt, Dissolved	**0.024**	mg/L	0.0050	0.00032	1	03/02/24 05:48	03/06/24 16:59	7440-48-4	
Iron, Dissolved	**0.011J**	mg/L	0.040	0.0075	1	03/02/24 05:48	03/06/24 16:59	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	03/02/24 05:48	03/06/24 16:59	7439-92-1	
Lithium, Dissolved	**0.0087J**	mg/L	0.030	0.0016	1	03/02/24 05:48	03/06/24 16:59	7439-93-2	
Manganese, Dissolved	**1.2**	mg/L	0.050	0.0049	5	03/02/24 05:48	03/06/24 17:03	7439-96-5	
Molybdenum, Dissolved	**0.0010J**	mg/L	0.010	0.00062	1	03/02/24 05:48	03/06/24 16:59	7439-98-7	
Selenium, Dissolved	**0.0074**	mg/L	0.0050	0.00096	1	03/02/24 05:48	03/06/24 16:59	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	03/02/24 05:48	03/06/24 16:59	7440-28-0	

REPORT OF LABORATORY ANALYSIS

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(704)875-9092

ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 6: GW + 50g **Lab ID: 92715745006** Collected: 02/27/24 13:40 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	ND	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 18:01	7440-36-0	
Arsenic	**0.0030J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 18:01	7440-38-2	B
Barium	**0.078**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 18:01	7440-39-3	
Beryllium	**0.00037J**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 18:01	7440-41-7	
Cadmium	**0.00015J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 18:01	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 18:01	7440-47-3	
Cobalt	**0.028**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 18:01	7440-48-4	
Lead	**0.00023J**	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 18:01	7439-92-1	
Lithium	**0.0096J**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 18:01	7439-93-2	
Molybdenum	**0.00079J**	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 18:01	7439-98-7	
Selenium	**0.0074**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 18:01	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 18:01	7440-28-0	
6020 MET ICPMS, Dissolved	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony, Dissolved	**0.00084J**	mg/L	0.0030	0.00054	1	03/02/24 05:48	03/06/24 17:16	7440-36-0	
Arsenic, Dissolved	**0.0029J**	mg/L	0.0050	0.00084	1	03/02/24 05:48	03/06/24 17:16	7440-38-2	B
Barium, Dissolved	**0.071**	mg/L	0.0050	0.00047	1	03/02/24 05:48	03/06/24 17:16	7440-39-3	
Beryllium, Dissolved	**0.00031J**	mg/L	0.00050	0.000094	1	03/02/24 05:48	03/06/24 17:16	7440-41-7	
Cadmium, Dissolved	**0.00013J**	mg/L	0.00050	0.00010	1	03/02/24 05:48	03/06/24 17:16	7440-43-9	
Chromium, Dissolved	ND	mg/L	0.0050	0.0019	1	03/02/24 05:48	03/06/24 17:16	7440-47-3	
Cobalt, Dissolved	**0.028**	mg/L	0.0050	0.00032	1	03/02/24 05:48	03/06/24 17:16	7440-48-4	
Iron, Dissolved	**0.0076J**	mg/L	0.040	0.0075	1	03/02/24 05:48	03/06/24 17:16	7439-89-6	
Lead, Dissolved	ND	mg/L	0.0010	0.00016	1	03/02/24 05:48	03/06/24 17:16	7439-92-1	
Lithium, Dissolved	**0.0090J**	mg/L	0.030	0.0016	1	03/02/24 05:48	03/06/24 17:16	7439-93-2	
Manganese, Dissolved	**1.2**	mg/L	0.050	0.0049	5	03/02/24 05:48	03/06/24 17:20	7439-96-5	
Molybdenum, Dissolved	**0.00068J**	mg/L	0.010	0.00062	1	03/02/24 05:48	03/06/24 17:16	7439-98-7	
Selenium, Dissolved	**0.0075**	mg/L	0.0050	0.00096	1	03/02/24 05:48	03/06/24 17:16	7782-49-2	
Thallium, Dissolved	ND	mg/L	0.0010	0.00038	1	03/02/24 05:48	03/06/24 17:16	7440-28-0	

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ANALYTICAL RESULTS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Sample: Reactor 7: GW + 400g **Lab ID: 92715745007** Collected: 02/27/24 10:45 Received: 02/28/24 10:01 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3005A Pace Analytical Services - Peachtree Corners, GA								
Antimony	**0.00073J**	mg/L	0.0030	0.00054	1	03/02/24 05:32	03/06/24 18:05	7440-36-0	
Arsenic	**0.0028J**	mg/L	0.0050	0.00084	1	03/02/24 05:32	03/06/24 18:05	7440-38-2	B
Barium	**0.074**	mg/L	0.0050	0.00047	1	03/02/24 05:32	03/06/24 18:05	7440-39-3	
Beryllium	**0.0020**	mg/L	0.00050	0.000094	1	03/02/24 05:32	03/06/24 18:05	7440-41-7	
Cadmium	**0.00015J**	mg/L	0.00050	0.00010	1	03/02/24 05:32	03/06/24 18:05	7440-43-9	
Chromium	ND	mg/L	0.0050	0.0019	1	03/02/24 05:32	03/06/24 18:05	7440-47-3	
Cobalt	**0.017**	mg/L	0.0050	0.00032	1	03/02/24 05:32	03/06/24 18:05	7440-48-4	
Lead	**0.00036J**	mg/L	0.0010	0.00016	1	03/02/24 05:32	03/06/24 18:05	7439-92-1	
Lithium	**0.0061J**	mg/L	0.030	0.0016	1	03/02/24 05:32	03/06/24 18:05	7439-93-2	
Molybdenum	ND	mg/L	0.010	0.00062	1	03/02/24 05:32	03/06/24 18:05	7439-98-7	
Selenium	**0.0086**	mg/L	0.0050	0.00096	1	03/02/24 05:32	03/06/24 18:05	7782-49-2	
Thallium	ND	mg/L	0.0010	0.00038	1	03/02/24 05:32	03/06/24 18:05	7440-28-0	

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

QC Batch: 836224
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92715745001, 92715745002, 92715745003, 92715745004, 92715745005, 92715745006, 92715745007

METHOD BLANK: 4319831 Matrix: Water
Associated Lab Samples: 92715745001, 92715745002, 92715745003, 92715745004, 92715745005, 92715745006, 92715745007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0030	0.00054	03/06/24 17:32	
Arsenic	mg/L	0.0019J	0.0050	0.00084	03/06/24 17:32	
Barium	mg/L	ND	0.0050	0.00047	03/06/24 17:32	
Beryllium	mg/L	ND	0.00050	0.000094	03/06/24 17:32	
Cadmium	mg/L	ND	0.00050	0.00010	03/06/24 17:32	
Chromium	mg/L	ND	0.0050	0.0019	03/06/24 17:32	
Cobalt	mg/L	ND	0.0050	0.00032	03/06/24 17:32	
Lead	mg/L	ND	0.0010	0.00016	03/06/24 17:32	
Lithium	mg/L	ND	0.030	0.0016	03/06/24 17:32	
Molybdenum	mg/L	ND	0.010	0.00062	03/06/24 17:32	
Selenium	mg/L	ND	0.0050	0.00096	03/06/24 17:32	
Thallium	mg/L	ND	0.0010	0.00038	03/06/24 17:32	

LABORATORY CONTROL SAMPLE: 4319832

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	0.1	0.11	107	80-120	
Arsenic	mg/L	0.1	0.096	96	80-120	
Barium	mg/L	0.1	0.10	102	80-120	
Beryllium	mg/L	0.1	0.11	107	80-120	
Cadmium	mg/L	0.1	0.10	101	80-120	
Chromium	mg/L	0.1	0.10	102	80-120	
Cobalt	mg/L	0.1	0.10	101	80-120	
Lead	mg/L	0.1	0.10	103	80-120	
Lithium	mg/L	0.1	0.11	106	80-120	
Molybdenum	mg/L	0.1	0.10	101	80-120	
Selenium	mg/L	0.1	0.091	91	80-120	
Thallium	mg/L	0.1	0.10	101	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

QC Batch: 836335
QC Batch Method: EPA 3005A
Analysis Method: EPA 6020B
Analysis Description: 6020 MET Dissolved
Laboratory: Pace Analytical Services - Peachtree Corners, GA
Associated Lab Samples: 92715745002, 92715745003, 92715745004, 92715745005, 92715745006

METHOD BLANK: 4320437 Matrix: Water
Associated Lab Samples: 92715745002, 92715745003, 92715745004, 92715745005, 92715745006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony, Dissolved	mg/L	ND	0.0030	0.00054	03/06/24 15:59	
Arsenic, Dissolved	mg/L	0.0012J	0.0050	0.00084	03/06/24 15:59	
Barium, Dissolved	mg/L	ND	0.0050	0.00047	03/06/24 15:59	
Beryllium, Dissolved	mg/L	ND	0.00050	0.000094	03/06/24 15:59	
Cadmium, Dissolved	mg/L	ND	0.00050	0.00010	03/06/24 15:59	
Chromium, Dissolved	mg/L	ND	0.0050	0.0019	03/06/24 15:59	
Cobalt, Dissolved	mg/L	ND	0.0050	0.00032	03/06/24 15:59	
Iron, Dissolved	mg/L	ND	0.040	0.0075	03/06/24 15:59	
Lead, Dissolved	mg/L	ND	0.0010	0.00016	03/06/24 15:59	
Lithium, Dissolved	mg/L	ND	0.030	0.0016	03/06/24 15:59	
Manganese, Dissolved	mg/L	ND	0.010	0.00098	03/06/24 15:59	
Molybdenum, Dissolved	mg/L	ND	0.010	0.00062	03/06/24 15:59	
Selenium, Dissolved	mg/L	ND	0.0050	0.00096	03/06/24 15:59	
Thallium, Dissolved	mg/L	ND	0.0010	0.00038	03/06/24 15:59	

LABORATORY CONTROL SAMPLE: 4320438

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony, Dissolved	mg/L	0.1	0.11	106	80-120	
Arsenic, Dissolved	mg/L	0.1	0.098	98	80-120	
Barium, Dissolved	mg/L	0.1	0.10	103	80-120	
Beryllium, Dissolved	mg/L	0.1	0.10	101	80-120	
Cadmium, Dissolved	mg/L	0.1	0.10	101	80-120	
Chromium, Dissolved	mg/L	0.1	0.10	103	80-120	
Cobalt, Dissolved	mg/L	0.1	0.10	101	80-120	
Iron, Dissolved	mg/L	1	1.0	101	80-120	
Lead, Dissolved	mg/L	0.1	0.10	103	80-120	
Lithium, Dissolved	mg/L	0.1	0.10	100	80-120	
Manganese, Dissolved	mg/L	0.1	0.10	103	80-120	
Molybdenum, Dissolved	mg/L	0.1	0.10	101	80-120	
Selenium, Dissolved	mg/L	0.1	0.095	95	80-120	
Thallium, Dissolved	mg/L	0.1	0.10	102	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Georgia Power Yates Cobalt
Pace Project No.: 92715745

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92715745001	**Reactor 1: DIW + 400g**	EPA 3005A	836224	EPA 6020B	836356
92715745002	**Reactor 2: GW Only**	EPA 3005A	836224	EPA 6020B	836356
92715745003	**Reactor 3: GW + 0.5g**	EPA 3005A	836224	EPA 6020B	836356
92715745004	**Reactor 4: GW + 5g**	EPA 3005A	836224	EPA 6020B	836356
92715745005	**Reactor 5: GW + 50g**	EPA 3005A	836224	EPA 6020B	836356
92715745006	**Reactor 6: GW + 50g**	EPA 3005A	836224	EPA 6020B	836356
92715745007	**Reactor 7: GW + 400g**	EPA 3005A	836224	EPA 6020B	836356
92715745002	**Reactor 2: GW Only**	EPA 3005A	836335	EPA 6020B	836358
92715745003	**Reactor 3: GW + 0.5g**	EPA 3005A	836335	EPA 6020B	836358
92715745004	**Reactor 4: GW + 5g**	EPA 3005A	836335	EPA 6020B	836358
92715745005	**Reactor 5: GW + 50g**	EPA 3005A	836335	EPA 6020B	836358
92715745006	**Reactor 6: GW + 50g**	EPA 3005A	836335	EPA 6020B	836358

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Pace	DC#_Title: ENV-FRM-HUN1-0083 v03_Sample Condition Upon Receipt
	Effective Date: 12/01/2023

Laboratory receiving samples:
Asheville ☐ Eden ☐ Greenwood ☐ Huntersville ☐ Raleigh ☐ Mechanicsville ☐ Atlanta ☑ Kernersville ☐

Sample Condition Upon Receipt

Client Name: Arcadis

Project #:

WO# : 92715745

92715745

Courier: ☐ Commercial ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ Other:____

Custody Seal Present? ☐ Yes ☑ No Seals Intact? ☐ Yes ☐ No ☑ N/A

Date/Initials Person Examining Contents: JG 2/28/24

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other

Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Thermometer:
☑ IR Gun ID: 214 Type of Ice: ☑ Wet ☐ Blue ☐ None

Cooler Temp: 4.1 Correction Factor: Add/Subtract (°C) -0.1

Cooler Temp Corrected (°C): 4.0

Temp should be above freezing to 6°C
☐ Samples out of temp criteria. Samples on ice, cooling process has begun

USDA Regulated Soil (☐ N/A, water sample)
Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

				Comments/Discrepancy:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	2.
Short Hold Time Analysis (<72 hr.)?	☐ Yes	☑ No	☐ N/A	3.
Rush Turn Around Time Requested?	☐ Yes	☐ No	☐ N/A	4.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	5.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	6.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	7.
Dissolved analysis: Samples Field Filtered?	☑ Yes	☐ No	☐ N/A	8.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: AQ	☑ Yes	☐ No	☐ N/A	9.
Headspace in VOA Vials (>5-6mm)?	☐ Yes	☐ No	☑ N/A	10.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	11.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	

COMMENTS/SAMPLE DISCREPANCY

Field Data Required? ☐ Yes ☐ No

Tracking # 7753 3644 6488

Lot ID of split containers:

CLIENT NOTIFICATION/RESOLUTION

Person contacted: _____ Date/Time: _____

Project Manager SCURF Review: _____ Date: _____

Project Manager SRF Review: _____ Date: _____

Qualtrax ID: 69614

Pace	DC#_Title: ENV-FRM-HUN1-0083 v03_Sample Condition Upon Receipt
	Effective Date: 12/01/2023

WO# : 92715745

PM: BV Due Date: 03/13/24

CLIENT: 92-GP-Yates

*Check mark top half of box if pH and/or dechlorination is verified and within the acceptance range for preservation samples.

Project #

Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC, LLHg

**Bottom half of box is to list number of bottles

***Check all unpreserved Nitrates for chlorine

Item#	BP4U-125 mL Plastic Unpreserved (N/A) (Cl-)	BP3U-250 mL Plastic Unpreserved (N/A)	BP2U-500 mL Plastic Unpreserved (N/A)	BP1U-1 liter Plastic Unpreserved (N/A)	BP4S-125 mL Plastic H2SO4 (pH < 2) (Cl-)	BP3N-250 mL plastic HNO3 (pH < 2)	BP4Z-125 mL Plastic ZN Acetate & NaOH (>9)	BP4B-125 mL Plastic NaOH (pH > 12) (Cl-)	WGFU-Wide-mouthed Glass jar Unpreserved	AG1U-1 liter Amber Unpreserved (N/A) (Cl-)	AG1H-1 liter Amber HCl (pH < 2)	AG3U-250 mL Amber Unpreserved (N/A) (Cl-)	AG1S-1 liter Amber H2SO4 (pH < 2)	AG3S-250 mL Amber H2SO4 (pH < 2)	DG94-40 mL Amber NH4Cl (N/A)(Cl-)	DG9H-40 mL VOA HCl (N/A)	VG9T-40 mL VOA Na2S2O3 (N/A)	VG9U-40 mL VOA Unpreserved (N/A)	DG9V-40 mL VOA H3PO4 (N/A)	KP7U-50 mL Plastic Unpreserved (N/A)	V/GK (3 vials per kit)-VPH/Gas kit (N/A)	SP5T-125 mL Sterile Plastic (N/A – lab)	SP2T-250 mL Sterile Plastic (N/A – lab)		BP3R-250 mL Plastic (NH2)2SO4 (9.3-9.7)	AG0U-100 mL Amber Unpreserved (N/A) (Cl-)	VSGU-20 mL Scintillation vials (N/A)	DG9U-40 mL Amber Unpreserved vials (N/A)
1						1																							
2						2																							
3						2																							
4						2																							
5						2																							
6						2																							
7						1																							
8																													
9																													
10																													
11																													
12																													

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers.

ARCADIS

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

LAB REFERENCE NUMBER:

PROJECT NUMBER	PROJECT NAME	SAMPLE ORIGIN
30143622 Task 13B	Georgia Power Yates Cobalt	Yates, GA
SEND RESULTS TO: David Liles	EMAIL ADDRESS:david.liles@arcadis.com	TELEPHONE: 9193285574
SAMPLERS: Tessa Davis		

SAMPLE ID	DATE	TIME	MATRIX	/ GRAB	QUANTITY	REQUESTED ANALYSES 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	REMARKS
Reactor 1: DiW + 400g	2/27/24	14:45	Aq	Comp	1	X															001
Reactor 2: GW only	2/28/24	12:45	Aq	Comp	2	X	X														002
Reactor 3: GW + 0.5g	2/29/24	13:07	Aq	Comp	2	X	X														003
Reactor 4: GW + 5g	3/1/24	13:15	Aq	Comp	2	X	X														004
Reactor 5: GW + 50g	3/2/24	13:30	Aq	Comp	2	X	X														005
Reactor 6: GW + 50g	3/3/24	13:40	Aq	Comp	2	X	X														006
Reactor 7: GW + 400g	3/4/24	10:45	Aq	Comp	1	X															007

	Requested Analyses	Container	Pres.
1	Total Metals 6020: see "Special Instructions"	250mL HDPE	HNO3
2	Dissolved Metals 6020: see "Special Instructions"	250mL HDPE	HNO3
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Special Instructions/Comments:

Please analyze for the following metals:
Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lead, Lithium, Molybdenum, Selenium, Thallium.
For dissolved metals, please also test for Iron and Manganese

☐ Special QA/QC Instructions

☐ USDA Regulated

☑ Packed with Ice

Laboratory Information and Receipt

Lab Name: Pace Labs Peachtree

Lab Project Manager: Bonnie Vang

Shipping Tracking #: 775336446488

Specify Turnaround Requirements: Standard

☐ Custody seal intact

☐ Samples intact

Sample Receipt:

Condition/Cooler Temp:

Relinquished by:	DATE	TIME	Received by:	DATE	TIME
Tessa Davis	02/27/24	16:00	[signature]	2/28/24	1201
Relinquished by:	DATE	TIME	Received by:	DATE	TIME

Attachment 4

Phreeqc Input Script

```
title   Plant Yates Batch

# Use minteq.v4 database

## Ion exchange model from wateq4f database.  Exchange model not included in minteq.v4
database, but wateq4f database does not include cobalt.

EXCHANGE_MASTER_SPECIES
        X       X-

EXCHANGE_SPECIES
        X- = X-
        log_k           0.0

        Na+ + X- = NaX
        log_k           0.0

        K+ + X- = KX
        log_k           0.7

# Modified Li+ IX constant
        Li+ + X- = LiX
        log_k           1.0 # -0.08

#         H+ + X- = HX
#         log_k           1.0

        NH4+ + X- = NH4X
        log_k           0.6

        Ca+2 + 2X- = CaX2
        log_k           0.8

        Mg+2 + 2X- = MgX2
        log_k           0.6

        Sr+2 + 2X- = SrX2
        log_k           0.91

        Ba+2 + 2X- = BaX2
        log_k           0.91

        Mn+2 + 2X- = MnX2
        log_k           0.52

        Fe+2 + 2X- = FeX2
        log_k           0.44

        Cu+2 + 2X- = CuX2
        log_k           0.6

        Zn+2 + 2X- = ZnX2
        log_k           0.8
```

```
        Cd+2 + 2X- = CdX2
        log_k           0.8

        Pb+2 + 2X- = PbX2
        log_k           1.05

        Al+3 + 3X- = AlX3
        log_k           0.67

END

SELECTED_OUTPUT 1
        -file                   yates-bat-02.sel
        -reset                  false
        -time                   true
        -solution               true
        -time                   true
        -step                   true
        -pe                             false
        -pH                             true
        -alkalinity             true
        -ionic_strength true
        -water                  true
        -percent_error  true
#       -totals                 Se(6)  Se(4)  Se  Se(-2) Fe(2) Fe(3)

USER_PUNCH
-headings   Alk_ppm  Cl_ppm  Na_ppm  totC_ppm  Ca_ppm  Mg_ppm  Sulfate_ppm  Cobalt_ppm
Lithium_ppm
-start

10    Alk_ppm = ALK * 50.05 * 1000
20    Cl_ppm = TOT("Cl") * 35.453 * 1000
40    Na_ppm = TOT("Na") * 22.9898 * 1000
50    totC_ppm = TOT("C") * (1.008+12.0111+3*16.0) * 1000
60    Ca_ppm = TOT("Ca") * 40.08 * 1000
65    Mg_ppm = TOT("Mg") * 24.305 * 1000
70    Sulfate_ppm = TOT("S(6)") * 96.0616 * 1000
80    Cobalt_ppm = TOT("Co(2)") * 58.9332 * 1000
90    Lithium_ppm = TOT("Li") * 6.941 * 1000

100   punch alk_ppm
200   punch Cl_ppm
400   punch Na_ppm
500       punch totC_ppm
600   punch Ca_ppm
650   punch Mg_ppm
700   punch Sulfate_ppm
800   punch Cobalt_ppm
900       punch Lithium_ppm

END
```

```
SOLUTION 1 # YAMW-3 - Cobalt exceedance well
        units           mg/kgw
        O(0)            1.5
        temp            22.6
        pH                      6.05
        Alkalinity      53.6    as Ca.5(CO3).5
        Ca                      33.4
        Ba                      0.033
        Mg                      67.4
        Ba                      0.033
        Na                      55.0    charge
        K                       15.93
        S(6)            334.8
        Cl                      5.74
        Co                      0.110 # 0.095  - 0.110 = bench test condition, 0.095 = average
        Li                      0.039 # 0.0454 - 0.039 = bench test condition, 0.0454 = average

SOLUTION 2 # YGWC-42 - Lithium exceedance well
        units           mg/kgw
        O(0)            1.3
        temp            20.2
        pH                      5.71
        Alkalinity      36.28   as Ca.5(CO3).5
        Ca                      108.6
        Ba                      0.034
        Mg                      89.1
        Ba                      0.034
        Na                      33.23   charge
        K                       11.53
        S(6)            620.2
        Cl                      3.75
        Co                      0.0018
        Li                      0.05 # 0.0424 (Long term average but increased over time)

SOLUTION 3 # YGWA-40 - Upgradient of Co/Li impacts
        units           mg/kgw
        O(0)            4.07
        temp            19.1
        pH                      5.25
        Alkalinity      18.9    as Ca.5(CO3).5
        Ca                      5.7
        Ba                      0.041
        Mg                      3.15
        Ba                      0.04
        Na                      9.3             charge
        K                       2.05
        S(6)            28.68
        Cl                      5.15
        Co                      0.0004
        Li                      0.001

SOLUTION 4 # YGWC-41 - Upgradient of Co/Li impacts
```

```
        units           mg/kgw
        O(0)            2.93
        temp            19.5
        pH                      4.95
        Alkalinity      5.28    as Ca.5(CO3).5
        Ca                      27.2
        Mg                      22.0
        Ba                      0.023
        Na                      15.83   charge
        K                       2.65
        S(6)            211.5
        Cl                      3.54
        Co                      0.0004
        Li                      0.0029

END

## Batch Lithium Uptake Model

EXCHANGE 1 # 500 mL water to 0.5 g PWR
X                       0.00025 #  0.01 eq/kg-s (1 meq/100g)
-equilibrate with Solution 3

EXCHANGE 2 # 500 mL water to 5 g PWR
X                       0.0025
-equilibrate with Solution 3

EXCHANGE 3 # 500 mL water to 50 g PWR
X                       0.025
-equilibrate with Solution 3

EXCHANGE 4 # 500 mL water to 400 g PWR
X                       0.2
-equilibrate with Solution 3

END

SURFACE 1
-equilibrate with Solution 3
Hfo_w   1.798E-04       598.9   0.08
Hfo_s   4.494E-05

SURFACE 2
-equilibrate with Solution 3
Hfo_w   1.798E-03       598.9   0.8
Hfo_s   4.494E-04

SURFACE 3
-equilibrate with Solution 3
Hfo_w   1.798E-02       598.9   8
Hfo_s   4.494E-03

SURFACE 4
```

```
-equilibrate with Solution 3
Hfo_w   1.438E-01       598.9   64
Hfo_s   3.596E-02

END


USE SOLUTION 1
USE EXCHANGE 1
USE SURFACE 1
SAVE SOLUTION 11
END

USE SOLUTION 1
USE EXCHANGE 2
USE SURFACE 2
SAVE SOLUTION 12
END

USE SOLUTION 1
USE EXCHANGE 3
USE SURFACE 3
SAVE SOLUTION 13
END

USE SOLUTION 1
USE EXCHANGE 4
USE SURFACE 4
SAVE SOLUTION 14
END
```

Appendix C

Groundwater Flow and Transport Model

Appendix C
Transport Model Report

Plant Yates
Newnan, Georgia

08/26/2022

Plant Yates Transport Model Report

Plat Yates

Newnan, Georgia

08/26/2022

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Figure 9 (A and B) – Predicted Concentration Trend Plots at Monitoring Wells MNA VS In-Situ Injection

Acronyms and Abbreviations

ACM	assessment of corrective measures
AMA	ash management area
AP	Ash Pond
AP-3	Ash Pond 3
AP-A	Ash Pond A
AP-B	Ash Pond B
AP-B’	Ash Pond B’
Arcadis	Arcadis U.S., Inc.
BCT	Block-Centered Transport
bgs	below ground surface
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
CLN	connected linear network
cm/sec	centimeter per second
ET	evapotranspiration
°F	degrees Fahrenheit
ft^2/d	square foot per day
GA EPD	Georgia Environmental Protection Division
gpm	gallon per minute
GWF	groundwater flow
GWPS	Groundwater Protection Standards
in/yr	inch per year
L/kg	liter per kilogram
MDL	method detection limit
mg/kg	milligram per kilogram
mg/L	milligram per liter
MNA	monitored natural attenuation
msl	mean sea level
MTC	mass transfer coefficient

NAVD88	North American Vertical Datum of 1988
PWR	Partially Weathered Rock
SCS	Southern Company Services
SSL	statistically significant level
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
ZVI	zero-valent iron

Executive Summary

This report documents the groundwater transport model developed to support remedy selection for selenium detected at statistically significant levels (SSL) above groundwater protection standards (GWPS) in compliance wells YGWC-38 and PZ-37 at Plant Yates AP-3, 3, B, B' and R6 CCR Landfill (the Site).The groundwater transport model was used to evaluate the corrective measures proposed in the Remedy Selection Report (Arcadis, 2022a) and to estimate the timeframe by which the GWPS can be met at the waste boundary compliance wells for each of the proposed remedial alternatives. The model is designed to simulate historical average flow conditions and the fate and transport of selenium from historical periods through post-closure near the R6 CCR Landfill. The transport model construction and parameter initialization are based on the existing geochemical conceptual site model (CSM; Arcadis 2022a, Appendix B).

The simulation of the fate and transport of selenium in the groundwater transport model is based on the three-dimensional groundwater flow model developed using MODFLOW-USG transport (USGT [Panday 2020]). Selenium transport was modeled from 1978 to 2020 to match the measured selenium concentration near the R6 CCR Landfill. The calibration results indicate a satisfactory match between observed and simulated selenium concentrations, which indicates that the transport model is a robust tool for simulation of future selenium migration and for evaluation of the effectiveness of various remedial alternatives at the R6 CCR Landfill and AMA at Plant Yates. The overall modeling approach includes parameterization, calibration and verification process employed by Arcadis for this study (and in general) is in accordance with the GA EPD's guidance on groundwater contaminant fate and transport modeling (GA EPD, 2016).

The primary objective of the transport model is to simulate the fate and transport of selenium under the proposed corrective measure alternatives being evaluated for groundwater remedy selection. The predictive transport model was developed to represent a post-closure period of 30 years. The predictive transport model incorporated relevant closure activities that hydraulically impact groundwater flow and transport at the Site (i.e., Engineering Measure drain and cover installation). Details of closure activities are described in the Remedy Selection Report (Arcadis 2022a) and Semiannual Groundwater Monitoring and Corrective Action Report (Arcadis 2022b). Note that this transport model report is included as an appendix to the remedy selection report (Arcadis 2020a). Based on the remedy selection process, Arcadis has identified two corrective measures as potentially applicable to remediate groundwater at the Site and were evaluated with the predictive transport model as corrective measures alternatives:

1. Monitored Natural Attenuation [MNA] and

2. Geochemical Manipulation via In-Situ Injections.

The findings from this transport modeling indicate that the Engineering Measure drain is an effective control measure for capturing groundwater under and reducing the saturation footprint of CCR materials at the R6 CCR Landfill and AMA. As groundwater levels decline, the pumping rate of the Engineering Measure drain exponentially declines and eventually reaches a near steady-state condition within 10 to 15 years of active pumping operation. The transport simulations suggest the GWPS can be attained at the R6 CCR Landfill boundary within about 10 years with either Alternative 1 or Alternative 2.

Introduction

Georgia Power Company operates a natural gas-fired station at Plant Yates approximately 8 miles northwest of Newnan, Coweta County, Georgia. There are currently several inactive ash-related units at Plant Yates that are being closed in accordance with state and federal regulations; namely, the Georgia Environmental Protection Division (GA EPD) Rules of Solid Waste Management 391-3-4-.10 and the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule 40 Code of Federal Regulations (CFR) 257 Subpart D. The coal ash impoundments that are subject to the CCR Rule are shown on **Figure 1**. CCR placement in AP-3, AP-A, AP-B, and AP-B' ceased in 2014. Closure activities were initiated on December 7, 2015 (AP-A) and April 20, 2018 (AP-B, AP-B', and AP-3). AP-B' and AP-3 are being closed in place. AP-A and AP-B are being closed by removal with consolidation of CCR from those impoundments placed in AP-B' and AP-3, which make up the footprint of the Ash Management Area (AMA). CCR placement in the R6 CCR Landfill ceased in October 2015. The R6 CCR Landfill is being closed in place and covered in accordance with the closure plan. Due to the configuration of the units and overall groundwater flow direction, the monitoring systems of AP-3, A, B, and B' and the R6 CCR Landfill were combined into a single multi-unit monitoring system that meets federal and state monitoring requirements. These units will be referred as AMA-R6 (the Site) herein after in this report.

Georgia Power has completed a detailed evaluation of corrective measures to address selenium in groundwater at statistically significant levels (SSLs) above the Groundwater Protection Standards (GWPS) at monitoring wells YGWC-38 and PZ-37[1]. An evaluation of potential corrective measures to address selenium in groundwater is presented in the remedy selection report (Arcadis, 2022a). The groundwater transport model simulates CCR pond closure methods and two potential corrective measures alternatives (MNA and In-Situ Injections) being evaluated in the Draft Remedy Selection Report. This transport model report summarizes the details of the transport model development, calibration, and assessment of predictive simulation of the two potential corrective measures alternatives.

Background

Information relevant to the transport model includes location, geology, geochemical environment, groundwater flow, event timing, and constituent transport and sorption properties. The Site is located on the southwestern portion of the Plant Yates property **Figure 1**. Groundwater at the Site is monitored using a comprehensive multi-unit monitoring system of wells installed to meet federal and state monitoring requirements. Routine sampling and reporting began in 2017 after the completion of eight background sampling events. Based on groundwater conditions at the Site, an assessment monitoring program was established on January 14, 2018, at AP-3, AP-B, and AP-B'; in September 2019 for AP-A; and on January 31, 2020 for the R6 CCR Landfill.

CCR from the ash ponds placed within the AMA waste footprint is dewatered, moisture conditioned, spread, compacted, and capped with the final cover system. The final cover system will be graded to prevent erosion, provide adequate levels of slope stability, and promote positive drainage for surface water runoff. The cover system consists of a prepared subgrade overlain with a plastic liner covered by an engineered synthetic turf and a specified, treated sand infill material. The final cover system will eliminate infiltration to the maximum extent feasible.

[1] On behalf of Georgia Power, Arcadis has prepared a Groundwater Monitoring and Corrective Action Report (Arcadis 2021a) that identifies Appendix IV constituents detected in groundwater at SSLs above the GWPS.

CCR placement in the R6 CCR Landfill ceased in October 2015. Closure construction for the R6 CCR Landfill consisted of closure in place and covered in accordance with its closure plan. R6 CCR Landfill cover installation started September 2014 and was completed December 2016. The final cover consists of a minimum 18-inch thickness infiltration barrier layer of clayey soil placed and compacted in accordance with the design specifications and a 6-inch minimum thickness surface layer of topsoil capable of supporting vegetation. Numerous clay liner samples were collected from 57 locations at the R6 CCR Landfill, and laboratory testing indicated that the permeability of the clay liner ranges from 8.7E-08 centimeter per second (cm/sec) to 9.5E-06 cm/sec with a geometric mean of 2.7E-6 cm/sec, which is expected to significantly reduce the infiltration into the CCR material (SCS, 2022). Following completion of closure, the R6 CCR Landfill and AMA will enter post-closure care for a minimum period of 30 years.

Georgia Power is implementing an Engineering Measure drain to enhance the protection of groundwater and closure effectiveness. The Engineering Measure drain is a sub-surface drainage system installed in 2019 with pumping risers for the collection and conveyance of subsurface water. The purpose of the subsurface Engineering Measure drain, associated risers, and pumps is to collect and remove groundwater from the area, which will result in lowering the potentiometric surface within the R6 CCR Landfill and the AMA.

Regional Climate, Topography, and Hydrology

The climate of Newnan, Georgia is characterized as humid continental with an average rainfall of approximately 51.4 inches annually, based on 85 years of data from weather station Newnan 4 NE, located approximately 10 miles southeast of the Site. The average maximum temperature is 74.5 degrees Fahrenheit (°F), and the average minimum temperature is 49.9 °F with an average temperature around 61 °F. The warmest time of year is generally early to mid-August, when highs are regularly around 91.6 °F with temperatures rarely dropping below 69.7 °F at night.

Topography near Plant Yates is characterized by moderate relief. Plant Yates is located within the northeast quarter of the Whitesburg, GA United States Geological Survey (USGS) 7.5-minute topographic quadrangle (USGS, 1965). Elevations range from approximately 700 feet above mean sea level (msl) in areas close to the river to more than 800 feet msl near the northern portion and a maximum of 870 feet near the southern portion of the Site (ACC 2020). Drainage across the Site occurs from both the northern and southern areas towards a central valley and then to the Chattahoochee River. The nearest active USGS monitoring station (02338000) is located on the Chattahoochee River at U.S. Highway 27, approximately 2 miles north of the Site.

Geology and Hydrogeology

Plant Yates is in the Inner Piedmont Physiographic Province of western Georgia, immediately southeast of the Brevard Zone, a regional fault zone that separates the Piedmont from the Blue Ridge. Rock units at Plant Yates are primarily interlayered gneiss and schists. The rocks in the area have been subjected to extensive metamorphism, deformation, and igneous intrusions. Surface expressions of fracture sets and their orientation include rectilinear drainage and lineaments shown on topographic maps and aerial photos of the Plant Yates area (ACC 2020), which indicate fractured bedrock.

A layer of soil up to 10 feet thick overlays the saprolite. The saprolite extends 20 to 40 feet below ground surface (bgs), was formed in place by the physical and chemical weathering of the underlying metamorphic rocks. The saprolite typically consists of clay- and silt-rich soils that grade to sandy soils with depth. A zone of variable thickness (approximately 5 to 20 feet) of transitionally weathered rock typically exists between the saprolite and

competent bedrock. The lithology of this zone is highly variable and ranges from medium to coarse unconsolidated material to highly fractured and weathered rock fragments. Localized alluvial soils consisting of generally coarser material (silty-sand, clayey silt, and silty clay with well-rounded gravel and cobbles) are associated with present river and stream channels (Arcadis 2021a).

At Plant Yates, groundwater is typically encountered slightly above the saprolite/weathered rock interface. Groundwater flow in the saprolite zone is through interconnected pores and relict textures and fractures. As the rock becomes increasingly competent with depth, groundwater flow occurs mainly through joints and fractures (i.e., secondary porosity). Recharge to the water-bearing zones in fractured bedrock takes place by seepage through the overlying mantle of soil/saprolite or by direct entrance through openings in outcrops. The average depth of the water table at Plant Yates varies with topography, ranging from approximately 5 to 50 feet bgs. The water table occurs in the saprolite and in the transitionally weathered zone, at least several feet above the top of rock (Arcadis 2021a).

Current Groundwater Flow Direction

Saprolite, transition zone, and shallow bedrock groundwater elevation data were used to prepare potentiometric surface elevation contour maps for September 2020 (Arcadis, 2021a). Groundwater elevations ranged from 728.37 feet (PZ-35) to 796.55 feet (YGWA-39). The general site-wide groundwater flow direction is from the east to west, with localized flow direction controlled by surface water bodies and eventually towards the Chattahoochee River. The groundwater flow direction for the saprolite, transition zone, and shallow bedrock wells is generally towards the west, northeast, and east from the southern portion of the R6 CCR Landfill area, which serves as a topographic high point (Arcadis, 2021a). Groundwater flows west from the eastern portions of the AMA, Ash Pond 3, and Ash Pond B' areas to the central portion of the Site. The groundwater flow direction is consistent with historical patterns (ACC, 2020).

Nature and Extent of Groundwater Selenium

Selenium concentrations above the groundwater protection standards are noted at two wells, YGWC-38 and PZ-37, located on the southeastern side of R6 CCR Landfill. Selenium concentrations below the GWPS ranging from 0.03 to 0.043 mg/L are observed in two wells, YGWC-41 and YGWC-42, located on the southwestern side of the R6 CCR Landfill. The spatial extent of selenium in groundwater is limited to two areas of the R6 CCR Landfill and these two areas have a relatively small footprint compared to the landfill area.

Wells with elevated selenium concentrations (YGWC-41, YGWC-42, YGWC-38, and PZ-37, and YAMW-5) have demonstrated decreases in concentrations since closure of the R6 CCR Landfill at the end of 2016. The Geochemical CSM (Arcadis 2022a, Appendix B) has time-series plots of groundwater analytical data illustrating changing groundwater conditions due to CCR pond closures. Decreasing selenium concentration trends are observed on the southeast side of the unit at YGWC-38 and PZ-37. On the west side of the R6 CCR Landfill, selenium concentrations at YGWC-41 have decreased from a maximum of 0.071 milligram per liter (mg/L) in February 2018 to 0.027 mg/L in August 2021, below the GWPS of 0.05 mg/L. Selenium concentrations in well YGWC-42 also decreased from the maximum concentration of 0.059 mg/L (October 2017) and stabilized to 0.043 mg/L in August 2021, below the GWPS. Monitoring wells YGWC-41, YGWC-42, and YAMW-5 have never statistically exceeded the GWPS and are therefore not the subject of the Draft Remedy Selection Report. However, selenium data from these wells was useful in calibrating the model to field conditions, so information pertaining to these wells is included herein.

Model Objectives

The primary objective of the groundwater transport model is to support evaluation of two corrective measure alternatives (Alternative 1 – MNA; Alternative 2 – In-Situ Injections) evaluated in the remedy selection study and to estimate the timeframe in which the GWPS can be met at the compliance boundary for each of the remedial alternatives at wells YGWC-38 and PZ-37, located on the southeastern side of R6 CCR Landfill. The timeframe is considered in the comparative criteria for evaluation of the two alternatives. The model is also designed to simulate historical average flow conditions and the fate and transport of constituents from historical periods through post-closure. This includes model calibration to historical water quality conditions done in preparation for post-closure predictive modeling.

Model Scope

The transport modeling scope includes primarily three tasks as illustrated below:

- Develop and calibrate a historical transport model using historical data.
- Develop a predictive transport model.
- Evaluate proposed corrective measures to assess time to achieve GWPS at YGWC-38 and PZ-37 and evaluate concentration reductions in YGWC-38 and PZ-37 and surrounding wells during the remedy period.

The simulation of contaminant fate and transport requires specification of various transport parameters that control the rate, movement, mixing, and geochemical equilibrium of constituents in the subsurface. The transport model relies on the updated groundwater flow model and most recent water level and water quality data. For this transport modeling analysis, the fate and transport of selenium were simulated by incorporating the processes of advection, adsorption (assuming geochemical equilibrium and geochemical reactions), and mixing.

Development of the transport model includes the estimation of the historical ash distribution, transport parameters and geochemical processes that reasonably represent the fate and transport of selenium. Historical aerial photos and operational history provided by SCS were used to understand the ash placement sequence and to provide a basis for delineating ash source and extent. Site data were used to calibrate the simulated selenium leaching concentrations from CCR materials in the R6 Landfill (Arcadis 2022a, Appendix B).

To begin the historical calibration, a historical transport model consisting of two phases was developed to evaluate fate and transport of selenium from the beginning of landfill operations to the current period (i.e., 1978 through 2020). The transport model was calibrated by replicating observed temporal trends in selenium concentrations to improve confidence in the model's predictive ability. Ash source extent and concentration and other transport parameters were adjusted systematically to match historical selenium water quality data collected from nearby monitoring wells

After calibration, the model was applied for predictive modeling of closure conditions. The calibrated groundwater transport model serves as the basis for performing long-term transient evaluations of proposed corrective measures in the remedy selection study.

Transport Model Description

The simulation of the fate and transport of solutes in a groundwater transport model is based on the three-dimensional groundwater flow model structure and simulated groundwater flow field. A thorough discussion of the development and calibration of the existing groundwater flow model is included in the previous modeling report submitted in 2020 (TRC 2020). The previous modeling report included the basis for conceptualization of the hydrostratigraphy, hydrogeology, and groundwater/surface water dynamics at the Site as well as a preliminary evaluation of the groundwater flow condition and closure approach proposed at the Site.

Before developing the transport model, Arcadis updated the existing numerical groundwater flow model to incorporate recent bathymetry data collected from the Chattahoochee River and CCR ponds to represent on-site pond features more accurately during the flow model simulation. Transient climate data, including rainfall and evapotranspiration (ET), were also included to improve representation of the water balance at the Site. The updated groundwater flow model resulted in adjustment of the model domain and model structure adjustments for new data with a more detailed hydrostratigraphic framework including structural data collected in the vicinity of the Engineering Measure drain. The updated groundwater flow model was calibrated to 2017 observed water levels under steady-state conditions. The steady-state heads were then used as a starting condition for a transient simulation for calibration to groundwater levels from 2018 to 2020. The transient simulation included changing stresses such as pond closure, seasonal rainfall and ET. Additionally, hydraulic conductivity zones and values were updated with additional slug testing results from each hydrostratigraphic unit. Residual statistics for the steady-state calibrated groundwater flow model indicate good agreement between simulated and measured groundwater elevations and to replicate observed temporal trends in groundwater elevations. The simulated groundwater elevations and groundwater flow directions are consistent with historical patterns based on observed water levels. The model indicates groundwater flow direction for the saprolite, PWR, and shallow bedrock wells is generally towards the west, northeast, and east from the southern portion of the R6 CCR Landfill. Groundwater flows west from the eastern portions of the AMA, Ash Pond 3, and Ash Pond B areas to the central portion of the Site. The model also simulates the vertical motion of groundwater, e.g., primarily vertically downward gradients near recharge divides (topographic ridge areas) then transitioning to vertically upward gradient near groundwater discharge features. Across the R6 CCR Landfill area vertical gradients transition from downward in the upland area to upward towards the downgradient area of the Landfill.

An initial performance test of the Engineering Measure drain was completed in early 2022 after the flow model calibration period was completed. The as-built Engineering Measure drain was also incorporated and simulated during the post closure period in the updated model. The model predicted Engineering Measure drain extraction rates were found to be consistent with the rates achieved during the performance test.

After the groundwater flow model was constructed and calibrated, a site-specific transport model was developed to evaluate the current and future migration potential of selenium under the selected corrective measure scenarios. The transport model was first calibrated using historical source conditions to match recently observed concentration data, afterwards the model was used in a predictive manner to evaluate the fate and transport of constituents for the two alternatives including MNA and geochemical manipulation via In-Situ Injection.

Transport Model Description

Code Selection

Arcadis used the transport module Block-Centered Transport (BCT) process of MODFLOW-USGT (unstructured grid transport) (Panday 2017; Panday 2020), which is fully integrated with the existing MODFLOW-USGT groundwater flow module for the transport modeling application. MODFLOW-USGT is publicly available, features extensive code documentation and verification, and was developed to accommodate solute migration between the groundwater flow (GWF) domain and a connected linear network (CLN) domain as part of the solution.

MODFLOW-USGT solves the groundwater flow equation and provides the cell-by-cell flows used by the transport function to develop a velocity field for the transport simulation. MODFLOW-USGT code has a comprehensive set of options and capabilities for simulating advection, sorption/desorption, dispersion/diffusion, and chemical reactions of constituents in groundwater flow systems under various hydrogeologic conditions. The MODFLOW-USGT code was used for this modeling assessment because:

- It was fully compatible with the MODFLOW-USGT flow module; and
- It incorporates the dual-domain formulation.

The dual-domain formulation mentioned above is a more realistic alternative to the classical single-domain advection-dispersion equation, making it the most up-to-date platform for state-of-the-art transport modeling. The dual-domain approach conceptualizes aquifer heterogeneities by representing the aquifer as two overlapping domains: (1) a mobile domain in which transport through the aquifer matrix is dominated by advection and (2) an immobile domain in which transport occurs mainly through diffusion. These domains are defined in terms of mobile and immobile porosity.

Typically, as a pulse of constituent mass migrates through the porous media, portions of the constituent plume move quickly in the migratory pore space, while other portions of the plume diffuse and migrate into less mobile zones (Anderson et.al, 2015). Eventually, as the bulk of the plume mass migrates past a point in the system, mass stored in the less mobile zones diffuses or contributes mass back into the more active pore space through diffusion (Gillham et al. 1984). Mass transfer into and out of the less mobile zone is generally slow because the process is controlled by diffusion. A mass-transfer coefficient is used to characterize the exchange between the two domains (porosities). This effect is described clearly in the literature as well as the mathematics to support the concept (Gillham et al. 1984; Molz et al. 2006; Flach et al. 2004; Harvey and Gorelick 2000; Feehley et al. 2000; Julian et al. 2001; Zheng and Bennett 2002). The following expression describes the dual-domain model for a given contaminant:

$$\theta_m \frac{\partial C_m}{\partial t} + \theta_{im} \frac{\partial C_{im}}{\partial t} = \frac{\partial}{\partial x_i}(\theta_m D_{ij} \frac{\partial C_m}{\partial x_j}) - \frac{\partial}{\partial x_i}(q_i C_m) + q_s C_s$$

$$\theta_{im} \frac{\partial C_{im}}{\partial t} = \beta (C_m - C_{im})$$

Where C_m is the solute concentration in the mobile domain, C_{im} is the solute concentration in the immobile phase, C_s is the boundary source concentration, θ_m is the porosity of the mobile domain, θ_{im} is the porosity of the immobile domain, and β is the first-order mass transfer rate coefficient between the mobile and immobile domains. Note: $\theta_{total} = \theta_{im} + \theta_m$. D_{ij} is the hydrodynamic dispersion tensor, q_i is the specific discharge, and q_s is the volumetric flow rate per unit volume of aquifer representing fluid sources (positive) or sinks (negative).

Transport Parameters

The simulation of contaminant fate and transport requires specification of various transport parameters that control the rate, movement, mixing, and adsorption of site-related constituents in the subsurface. The following sections discuss the initialization of various transport parameters.

Adsorption

Adsorption is the process by which a solute adheres to a solid surface. Adsorption results in the solute, which was originally in solution, to become distributed between the solution and the solid phase, a process called partitioning. As a result of adsorption, a solute will move more slowly through the aquifer than the groundwater. This effect is called retardation. Adsorption is mathematically represented using a partitioning coefficient (Kd), which is the ratio of the concentration of the constituent in the sorbed (i.e., solid) phase to the concentration of the constituent in the dissolved phase:

$$K_d = \frac{C_s}{C_d}$$

Where Cs is the concentration of the constituent in the sorbed phase (milligrams per kilogram [mg/kg]), and Cd is the concentration of the constituent in the dissolved phase (mg/L).

To assess the sorption mechanisms, capacity, and stability of the aquifer matrix to attenuate dissolved selenium in groundwater, a series of bench-scale sorption tests was completed on the saprolite and bedrock solids (Arcadis 2022a, Appendix B). The bench-scale sorption tests incorporated groundwater collected from YGWC-38, where the initial concentration of selenium was approximately 0.075 mg/L. Soil samples used were representative of saprolite and gneiss bedrock (Arcadis 2022a, Appendix B). The results of the sorption test suggest that the saprolite capacity was 0.008 to 0.13 μg/kg, and the fine-grained bedrock capacity was 0.007 to 0.009 μg/kg. No measurable sorption was observed for the coarse-grained bedrock sample during the test. Sorption coefficient (Kd) values of 0.12 liter per kilogram (L/kg) to 0.25 L/kg were also calculated for saprolite, 0.1 to 0.16 L/kg for the fine-grained bedrock sample and 0.0 L/kg for coarse-grained bedrock sample from the study. Sorption results measured from the bench-scale test were used to initialize the adsorption parameter in the model and were further adjusted within the parameter range during calibration. The calibrated partitioning coefficients (Kd) for selenium were 0.2 L/kg, 0.12 L/kg, and 0 (zero) L/kg for saprolite, partial weathered bedrock, and bedrock, respectively (**Table 1**).

Mobile and Immobile Porosity

Dual-domain approach is appropriate for use in fractured media or heterogenous porous media. Given the hydrogeological setting at Plant Yates, solute transport was simulated using the dual-domain option that requires assignment of two porosity terms: mobile and immobile porosity. The mobile porosity is the mobile domain in

which most groundwater flow and transport occur, whereas the immobile porosity represents the immobile domain, in which groundwater velocity is much slower and transport is dominated by molecular diffusion. Molecular diffusion is the result of the thermal motion of individual molecules which causes a flux of dissolved solutes from area of higher concentration to areas of lower concentration and it dominates the solute transport when groundwater is relatively stagnant in the immobile domain. Compared to a single domain model, the dual domain better represents the amount of solute mass in a system because both mobile and immobile porosities are used, however, the advection is based only on the mobile porosity.

Arcadis performed a geotechnical analysis and geophysical borehole investigation to provide additional characterization of porosity for the on-site hydrogeologic units. Geotechnical analysis (Timely Engineering, 2021) indicates an average total porosity of 37 percent for saprolite and partially weathered rock (PWR). Total porosity was partitioned into a 17 percent mobile porosity and a 20 percent immobile porosity based on field measurements (Arcadis, 2021b) and transport calibration. These values are consistent with literature values (Payne et al. 2008; Fetter 2001), as well as Arcadis' experience at similar sites with overburden materials and semi-consolidated deposits. The acoustic televiewer log from the installation of bedrock wells PZ-52D and PZ-53D (Arcadis 2021b) was used to identify void space and measure aperture thickness and orientation. The porosity can be estimated by the ratio of cumulative aperture thickness over the total thickness of the bedrock units in which the apertures were observed over the interval of that specific bedrock unit. Note that additional geologic information should be considered when evaluating the interconnectivity of various fracture zones because it cannot be directly inferred from the geophysical boring study alone (Arcadis 2021b). The estimated porosity values were refined during the historical transport calibration. **Table 1** presents the calibrated mobile and immobile porosity in the transport model.

Mass Transfer Coefficient

The diffusive exchange between the mobile and immobile domain discussed above is typically defined by a lumped kinetic mass transfer term that takes into account the size and nature of small-scale heterogeneity. Mathematically, the mass transfer coefficient (MTC) describes the rate at which contaminant mass transfers between the mobile and immobile fractions in the model. The MTC values were calibrated to be $1x10^{-4}$ (1/day) in model layers 1 through 4 and $1x10^{-5}$ (1/day) in model layers 5 through 6 to evaluate the effects on plume movement during the historical transport calibration. These values are within the range of literature values for models of similar dimensions and aquifer properties (Gillham et al. 1984; Molz et al. 2006; Flach et al. 2004; Harvey and Gorelick 2000; Feehley et al. 2000; Julian et al. 2001).

Dispersion

Dispersion causes the paths of dissolved chemicals to diverge and spread from the average direction and speed of groundwater flow. Dispersion is the sum of mechanical dispersion and molecular diffusion and can be effectively approximated by dispersivity times fluid velocity. Dispersivity can be further decomposed into three principal components (Bear 2012) due to heterogeneity of aquifers as list below:

- longitudinal,
- horizontal transverse, and
- vertical transverse

Field measurements from Gehar et.al (1992) showed an order of magnitude higher ratio of longitudinal to horizontal transverse dispersivities, and in all cases, the vertical transverse dispersivity is one to two orders of

magnitude smaller than the horizontal transverse dispersivity The dispersivity trends in the overburden – fractured bedrock aquifer at Plant Yates is also expected to follow anisotropic pattern with a higher horizontal dispersivity because of low-angle, near-horizontal fractures predominant in the bedrock, as evident from borehole geophysical data from the site and groundwater flow expected to follow relict foliations in the overburden, as evident in the borehole lithological data. At the Plant Yates Site, longitudinal dispersivity, horizontal transverse dispersivity, and vertical transverse dispersivity were calibrated be 10 ft, 1 ft, and 0.1 ft, respectively to represent the anisotropic spreading of solute plumes due to heterogeneity.

Historical Transport Calibration

Calibration of the transport model was performed with numerous simulations of relevant transport parameters discussed above that would affect selenium transport in groundwater at the Site. The ultimate goal was to develop a transport model to simulate the selenium concentrations under current and future closure conditions under different corrective measure alternatives. Due to uncertainties regarding the occurrence and distribution of selenium concentrations at the R6 CCR Landfill boundary, historical transport simulations were performed to simulate constituent concentrations observed through time at the perimeter monitoring wells. The transport calibration was completed by specifying historical source terms at the R6 CCR Landfill area in the model and simulating the resulting selenium distribution from 1978 to 2020. A soil cover was installed at the R6 CCR Landfill as part of the R6 closure. During the historical transport simulation period from 1978 to 2020, the infiltration rate over the R6 CCR Landfill from 1978 to 2014 was calibrated to 17 inches per year (in/yr), which represents the average natural groundwater recharge before capping. For the remainder of the period from 2014 to 2020, the calibrated infiltration rate of 1 in/yr (ACC, 2020) was used, which represents the infiltration rate after installation of the soil cover between 2014 and 2016. The effects of source strength and extent, as well as transport parameters, were adjusted until the selenium concentrations and trends computed by the model reasonably matched measured concentrations over time. The source strength and extents were implemented in the model by assigning recharge concentrations over the R6 CCR Landfill area. The recharge concentrations were continued throughout the historical transport calibration period.

Historical Source Development

Based on historical aerial photographs and an engineering plan submitted in 1984 (Hendon, 1984), the placement of CCR material in approximately 73 acres at the R6 CCR Landfill area likely started in 1978 (**Figures 2 A, B, and C**). From 1978 to 1999, CCR material placement had approximately covered the entire area of the R6 CCR Landfill according to the proposed phasing plan in the engineering design document (**Figures 2 A**). From 1999 to 2014, placement was expanded vertically by stacking, spreading, and compaction of ash within the grading limits. Starting in approximately September 2014, the Phase I final cover was installed over the southern R6 CCR Landfill area. After completion of the Phase I cover, the Phase II final cover installation continued over the northern R6 CCR Landfill area and was completed around December 2016 (**Figure 2B)**. Based on the communication with SCS/GPC and received design documents, some CCR materials found outside of the current R6 CCR Landfill boundary were excavated and removed during the cover installation (**Figure 2C**).

Historical transport simulations were developed to model the placement of CCR materials into different areas within the R6 CCR Landfill overtime (1978 to 2014), cover installation at R6 CCR Landfill (2014 to 2016), and post-closure period of R6 CCR Landfill (2017 to 2020). **Table 2** outlines the model stress periods of the historical transport model simulation. From stress periods 1 through 9, the transport model was run as steady-state flow –

transient transport mode because the hydraulic conditions are anticipated to have remained relatively constant from 1978 to 2016. Between 2017 and 2020, the transport model was run as transient flow – transient transport mode to be consistent with time discretization of the calibrated flow model and because a majority of water quality data became available in 2017 for concentration matching.

Figure 3 shows the calibrated source footprints of selenium distribution under the R6 CCR Landfill. These source footprints or zones were assigned as recharge concentrations in the model and the source mass flux or loading is represented by the product of the recharge rate and the recharge concentration. Initially, the shape and extent of the source areas were delineated based on historical aerial photographs and the engineering plan of CCR placement (Hendon, 1984). Initial estimates of the source concentrations were based on the maximum observed concentration sampled from R6 CCR Landfill monitoring wells. The ash extent changed slightly due to CCR removal that happened in parallel with cover installation from 2014 to 2016 (SCS 2014), and the source footprint was revised to align with the existing R6 CCR Landfill boundary. During the historical transport calibration, the shape and extent of the source footprint, including source strengths, were adjusted within reason to obtain an acceptable match between simulated groundwater concentrations and temporal-measured concentration distributions for selenium. Because the recharge rate across the R6 CCR Landfill varies over time, the associated source mass loading also varies with the recharge rate, i.e., the source mass loading is reduced after capping. Note that the source concentrations were not assigned on the north side of the R6 CCR Landfill, as they are not sensitive to the simulated selenium concentrations at the existing monitoring well network around the R6 CCR Landfill during transport calibration.

Transport Calibration Methodology

No groundwater chemistry data are available historically until after June 2016, when initial groundwater samples were taken from monitoring wells at the perimeter of the R6 CCR Landfill. Groundwater concentration data have been collected for selenium since 2016.

The transport stress periods were derived based on the ash deposition sequence, installation of the R6 CCR Landfill cover, and transient flow calibration period. Transport calibration was performed by adjusting basic transport parameters including source concentration and extent to match water quality data. The observed selenium concentrations were compared with simulated concentration values to evaluate the quality of the fit between observed and simulated values.

Transport Calibration Results

Table 1 presents the calibrated transport parameters for different model layers. Adsorption (Kd), porosity, and MTC are the main factors that affect the calibrated model. After numerous transport simulations, the following parameter zonation and values were found to produce the best match between the observed and simulated concentrations and trends for selenium from 2016 to 2020:

- K_d values of 0.2 L/kg, 0.2 L/kg, 0.12 L/kg, and 0 L/kg for selenium in Layers 1, 2, 3, and 4 through 6, respectively;
- An MTC value of $1x10^{-4}$ (1/day) and $1x10^{-5}$ (1/day) in Layers 1 through 4, and Layers 5 through 6, respectively;
- Mobile and immobile porosity as shown in **Table 2**; and

- Calibrated source concentrations and source extent shown on **Figure 3.**

Figure 3 presents the model calibrated selenium extent and concentration under the R6 CCR Landfill. Transport calibration estimated higher source concentration on the southeast and southwest sides of the unit, which are consistent with selenium concentrations observed at YGWC-38, PZ-37, YAMW-5, YGWC-41, YGWC-42, and YGWC-43. **Figure 4** shows a comparison of observed versus simulated selenium concentration hydrographs, particularly between 2016 and 2020. Nearby monitoring wells (YGWA-39, YGWA-40, YGWC-23S, PZ-52D, and YAMW-3) were also selected as calibration targets to provide spatial constraints during source concentration estimation. At each well, temporal water quality data were reviewed, and only measured concentration values with valid lab qualifiers (i.e., J - the reported value is above the method detection limit [MDL] but below the reporting limit) were selected for concentration matching. Water quality data with a "U" qualifier (i.e., U- the analyte was not detected in the sample above the MDL) were not considered a valid concentration target value during transport calibration. **Figure 4** illustrates the color code meaning for each data qualifier.

On the west side of the R6 CCR Landfill, the observed selenium concentration hydrographs at monitoring wells YGWC-41 andYGWC-42 show a decreasing concentration trend following the R6 CCR Landfill cover installation. The simulated selenium concentrations show that the transient transport simulation successfully matches the observed selenium concentrations and declining trends during the simulation period. The calibration concentrations and trends illustrate a good fit to the data, except when the concentrations were (low) nearer to the MDL. For example, the transport model overestimated the selenium concentration of 0.006 mg/L at YAMW-3 compared to the observed concentration of 0.0013 mg/L with the MDL qualifier. However, the simulated selenium is considered conservative given the MDL variation and low selenium concentration, which is almost an order of magnitude lower than the federal GWPS of 0.05 mg/L.

On the southeast side of the R6 CCR Landfill unit, the calibrated concentration plots also indicate reasonable matches between the modeled and observed selenium concentrations at the nearby monitoring wells (YGWA-40, YGWC-38, PZ-37, YAMW-5). At YGWC-38, it shows a satisfactory match of the simulated selenium concentrations and trends to the observed concentration data. The sharp drop of observed concentration at YGWA-39 is attributed to a change in MDL value similar to that at YGWC-43. No water quality data are available at PZ-52D during the transport calibration period between 2016 and 2020, as this well was constructed in 2021. However, a sample collected in November 2021 was used as a qualitative constraint to evaluate the transport calibration at PZ-52D. The simulated selenium concentration of 0.0025 mg/L at the end of 2020 matches reasonably well to the measured selenium concentration of 0.0034 mg/L in November 2021. The model slightly overestimated the selenium concentration as 0.057 mg/L at YGWC-23S compared to the observed concentration of 0.037 mg/L. Numerous calibration simulations were performed to try to achieve a balance of over- and underpredictions across wells YGWC-38, YGWC-23S, and PZ-37. Overall, there is a reasonable fit of measured and simulated concentrations, given the low concentrations of selenium noted at several wells.

Based on the ability of the model to provide a satisfactory match between observed and simulated selenium concentrations, the transport model calibration has demonstrated its robustness to estimate the spatial distribution of the source extent and assumed source concentrations, determine the appropriate transport parameters, and to simulate the temporal trend of the observed change in selenium concentration after the closure of the R6 CCR Landfill. During calibration, sensitivities of various transport parameters were evaluated. Dispersivity and porosity for the deep bedrock units were only mildly sensitive, therefore reasonable values from literature were used to define those parameters in the transport model. Overall, the calibrated groundwater transport model is a valid tool

to simulate selenium transport and evaluate the effect of various remedial alternatives at the R6 CCR Landfill at Plant Yates.

Predictive Transport Simulation

Following the development and calibration of the historical transport model, predictive transport model scenarios were developed to simulate selenium transport for the two corrective measures alternatives being evaluated for remedy selection. The magnitude and distribution of selenium source concentrations calibrated during the historical transport calibration was continued in the predictive simulations. However, the mass flux of selenium to groundwater is significantly reduced by the R6 CCR Landfill cover installation since 2017.

The predictive transport model was developed to represent a post-closure period of 30 years. **Table 3** outlines the stress period setup of the predictive transport model. The predictive transport model was run using quarterly stress periods for 4 years, followed by a 1-year stress period, and then a single 25-year stress period. The predictive transport model incorporated relevant closure conditions that have hydraulic impact on groundwater flow and transport at the Site, primarily at the R6 CCR Landfill and AMA. Details of closure are described in the Draft Remedy Selection Report (Arcadis 2022a) and Annual Groundwater Monitoring and Corrective Action Report (Arcadis 2022b). The groundwater heads and selenium distribution from the end of the historic transport calibration (i.e., December 2020) were used as the starting condition for the predictive transport scenarios in 2021. The recharge source concentration distribution over the R6 CCR Landfill was also continued in the predictive simulations.

In summary, CCR material is being consolidated into the AMA and R6 CCR Landfill area, and both are being capped to reduce impacts to groundwater by eliminating or significantly reducing precipitation infiltration through CCR materials. Distinct from the two corrective measures being considered at the Site, an Engineering Measure drain has been constructed along the portions of the eastern and northern boundary of the R6 CCR Landfill as part of the closure design for the site (SCS, 2019). The purpose of the Engineering Measure drain, associated risers, and pumps is to collect and remove groundwater from the area, which will result in lowering the potentiometric surface within the R6 CCR Landfill and the AMA. The effect of the decrease in the groundwater elevation translates into a reduction in the volume of CCR present below the potentiometric surface compared to pre-closure conditions (TRC 2020). When simulating the active dewatering of Engineering Measure drains through the pump risers, drain boundary cells were connected to the CLN cells that represented the pump riser locations (**Figure 5**). The groundwater extraction from the Engineering Measure drain can be regulated by adjusting drain elevation of the connected drain boundary cells. When the drain elevation is lowered at the connected drain boundary cells, the extracted flows will be reduced and vice versa. This head dependent flow approach is used to prevent over-drafting at the pump risers. Effectively, the drains operate like pumps set with a head or elevation control to limit pumping. To evaluate appropriate pumping rates from subsurface drains, the model was run to steady-state conditions first to assess potential capture extent at various drain elevations or flow rates. Based on the assessment of corrective measures process, Arcadis has identified two corrective measures as potential alternatives. Both alternatives were modeled for the remedy selection evaluation.

Predictive Transport Scenarios

Alternative 1: Monitored Natural Attenuation – MNA

Alternative 1 is defined as the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) within a timeframe that is reasonable compared to that offered by other more active methods (USEPA 2007). MNA is a remedial solution that takes advantage of natural attenuation processes to reduce constituent concentrations in groundwater. The conceptual remedy design for Alternative 1 is shown on **Figure 5**.

Since the Engineering Measure drain is part of the groundwater control measure in the closure design, this feature was also incorporated into the MNA alternative scenario. Calibrated transport parameters (source area concentrations, porosity, MTC, and adsorption partition coefficient) were used to simulate the advection, dispersion, dilution, and sorption mechanisms of selenium transport for the long-term predictive simulation at the Site. The Engineering Measure drain (subsurface drain) was represented with CLN cells in the model at locations according to the survey coordinates from the as-built drawings. Conductance values were assigned to each CLN cell to represent the interaction between the subsurface drain (CLN cells) and the surrounding aquifer (groundwater cell). The conductance term of 6,800 square feet per day (ft^2/d) is based on a drain design of a 4-foot bedding width, 20-foot model grid node length, and a 1-foot-thick aggregate layer of the crushed stone with a hydraulic conductivity of 85 ft/d (TRC, 2020).

Other groundwater control measures were incorporated during the development of both alternatives. The cover system at AMA consists of a prepared subgrade overlain with a plastic liner and covered by an engineered synthetic turf. The final cover system will eliminate infiltration through the CCR. The final cover system on the R6 CCR Landfill consists of a minimum 18-inch infiltration barrier layer of clayey soil, placed and compacted in accordance with the design specifications, and a 6-inch minimum surface layer of topsoil capable of supporting vegetation growth. As a result, groundwater recharge rates of 0 in/yr and 1 in/yr were assigned at the AMA and the R6 CCR Landfill, respectively, to simulate the impact of the cover system on infiltration through the CCR units.

Alternative 2: In-Situ Injections

Alternative 2 includes the transport mechanisms and groundwater control measures included in Alternative 1 and also includes the application of reagents in the subsurface to influence the solubility, mobility, and/or toxicity of inorganic constituents. The injection of a chemical or organic substrate is intended to alter geochemical conditions to those more favorable for stabilization of selenium concentrations.

In-Situ Injections can stabilize selenium concentrations by altering geochemical conditions in groundwater. For purposes of comparison, the model assumes the injections will use zero-valent iron (ZVI) to immobilize selenium through reduction and adsorption. They are incorporated into the model along two transects to create in-situ reactive zones such that, as groundwater passes through the zone, selenium will be immobilized. Each transect in the model consists of approximately 15 to 20 injection points, spaced 10 feet apart, with injections occurring in impacted saprolite and PWR units. The conceptual remedial design for Alternative 2 is shown on **Figure 6**.

The effect of selenium removal by ZVI was modeled through the degradation module of MODFLOW USG. A degradation zone of 200 feet wide and 20 feet long (along the current groundwater flow direction) was delineated in the model to simulate the reaction process of selenium with ZVI. No site-specific half-life of selenium reduction

through ZVI was available; however, a literature study indicated that the half-life of selenium reduction is less than 2 hours (Liang et al. 2013). To be conservative, a safety factor of 2 was used, resulting in a simulated half-life of 4 hours within the degradation zone to represent in-situ treatment of selenium in the transport model. Note that the reaction process was only simulated within the degradation zone shown on **Figure 6** within the saprolite and PWR to target the higher selenium concentrations. It is assumed that the injected ZVI would fully contact groundwater within the degradation zone. No degradation zones were needed or simulated in the lower units of the model due to minimal selenium concentrations. The model assumed that full-scale in-situ injection would start in year 2025 after the implementation of pilot test and the full-scale injection system.

Transport Simulation Results

Simulated groundwater elevation contours and capture extent are presented in **Figure 7** when the Engineering Measure drain is pumping at about 80 gallons per minute (gpm) under steady-state conditions. It should be noted that the time varying rates of the Engineering Measure drain in the model are consistent with recent performance testing of the Engineering Measure drain.

The desired combination of drain elevations was then simulated transiently to represent the long-term operation of the Engineering Measure drain. The Engineering Measure drain was not active during the first year of the predictive transport simulation and was simulated to be active in 2022. However, the Engineering Measure drain has yet to be activated. The model simulation suggests that the dewatering rates of the Engineering Measure drains would follow an exponential reduction, as groundwater levels are continuously being lowered near the Engineering Measure drain. **Figure 8** shows the initial simulated pumping rate of the Engineering Measure drain to be as high as 200 gpm, followed by a gradual decline to the steady-state flow rate of about 80 gpm over the next 6 years from 2022 to 2028. The flow performance of Engineering Measure drain will be fully evaluated once the Engineering Measure drain goes to active operation.

Predicted selenium concentrations fall below the GWPS of 0.050 mg/L for each of the corrective measure options retained at the compliance boundary (R6 CCR Landfill boundary). **Figure 9** illustrates the long-term predicted selenium concentration plots at compliance monitoring wells around the R6 CCR Landfill. Wells that exhibited elevated selenium concentrations (YGWC-41, YGWC-38, PZ-37, and YAMW-5) have demonstrated decreases in concentration since closure of the R6 CCR Landfill in 2016. Currently, PZ-37 has the highest selenium concentration at 0.2 mg/L. The predicted selenium concentrations at PZ-37 indicate that Alternative 1 – MNA and Alternative 2 –In-Situ Injections would attain GWPS at Year 2032 (approximately 10 years of MNA monitoring) and by 2026 (within a year of in-situ operation), respectively. Predictive transport model simulations suggests that selenium concentrations at YGWC-38 and YGWC-23S would decrease to less than GWPS within 1 or 2 years of operation of either Alternative 1 or Alternative 2. The table below summarizes the final years to attain GWPS at compliance monitoring wells under each modeling scenario:

Monitoring Well	Alternative 1	Alternative 2
PZ-37	May 2032	December 2025
YGWC-38	August 2021	August 2021
YGWC-23S	March 2023	March 2023

Groundwater Transport Model Findings and Recommendations

Groundwater Model Findings

The transport modeling evaluation consisted of first performing a transport calibration of historical conditions to match observed concentration data, and afterwards, performing predictive simulations to assess the fate and transport of selenium for two corrective measures alternatives: MNA and In-Situ Injections.

During the historical transport calibration, satisfactory matches were achieved between observed and simulated selenium concentrations. The estimated extent of the sources for selenium were determined through calibration and suggest that the higher selenium concentrations are potentially located on the southeast side (near YGWC-38 and PZ-37) and the west side (near YGWC-41, and YGWC-42) of the R6 CCR Landfill. The maximum concentration of selenium was calibrated to 0.95 mg/L near monitoring wells YGWC-38 and PZ-37. The transport model replicated the decreasing concentration trend at various wells that have exhibited elevated selenium concentrations since the closure of the R6 CCR Landfill in 2016. The decreases in selenium concentration around 2016/2017 also demonstrate the effectiveness of cover installation of the R6 CCR Landfill in reducing groundwater infiltration. Thus, the calibration results have demonstrated reliability of the model and the model's ability to be used for predictive analysis of fate and transport of selenium under proposed corrective measure scenarios.

Following the development and calibration of the historical transport model, predictive transport model scenarios were developed to simulate selenium fate and transport for two corrective measures alternatives (MNA and In-Situ Injections). The model demonstrates that the Engineering Measure drain is an effective groundwater control measure for capturing groundwater under and reducing the saturation footprint of CCR materials at the R6 CCR Landfill and AMA. As groundwater levels decline, the pumping rates of the Engineering Measure drain exponentially declines and eventually attains a steady-state condition within 10 to 15 years of active pumping operation. Predictive transport model simulations suggests that the GWPS can be attained at the R6 CCR Landfill boundary within 10 years for either Alternative 1 or Alternative 2.

Future Work and Recommendations

The current groundwater monitoring program shows selenium concentrations exceeding the GWPS in two monitoring wells with a limited area on the southeast part of the Site and decreasing selenium concentration trends in these wells. The model developed for this study, agrees with the site monitoring data showing a limited area of selenium exceedances in groundwater (i.e., above GWPS) along the southeast side of the R6 CCR Landfill boundary. Predictive transport simulations also indicate attainment of GWPS at the waste boundary within the next 10 years. However, as with any modeling exercise, a level of uncertainty is present in the construction of a complex, multi-layer numerical transport model to predict water quality response to an action at an area of interest. Where the available data and information are lacking or infeasible to collect, assumptions were made regarding the various inputs into the model. As such, additional information and/or actions are recommended as detailed below.

- A monitoring well (YGWC-50) is planned at a location hydraulically downgradient of the R6 CCR Landfill along Dyer Road (ACC 2020) to sample the water quality and refine the CSM at this area after CCR removal activities are completed. Results from first sampling event could be used to better constrain the estimated source concentration of selenium in the transport model in north side of the R6 CCR Landfill.

- Transport simulation results suggests that the MNA alternative is favorable due to the reasonable remedial timeframe to attain the GWPS at the waste boundary. In-Situ Injection offers improvements in the time to attain the GWPS at the waste boundary. However, the effectiveness of ZVI for removal of selenium under site specific conditions is uncertain and would require bench testing and pilot testing to verify treatability and kinetics and to optimize iron dosing.

- Results from longer term operation of the Engineering Measure drain should be incorporated into the model to improve the parameter values assigned in the model near the R6 CCR Landfill.

- Continue monitoring of all groundwater monitoring wells during semi-annual sampling events to establish a comprehensive dataset of water level data and water quality data for future model updates and model evaluations.

- Updated information regarding ongoing closure should be represented in future updates to any predictive simulations of fate and transport of selenium distribution at the R6 CCR Landfill.

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Tables

Table 1
Calibrated Transport Model Parameters
Plant Yates, George Power
Newnan, Georgia

Model Structure		Transport Model Parameters						
		Adsorption (L/kg)	Porosity		Mass Transfer Coefficient	Dispersivity (ft)		
Hydrostratigraphic Unit	Model Layer		Mobile	Immobile		Longitudinal	Horizontal Transverse	Vertical Transverse
Coal Ash	1	0.20	17%	20%	1.0E-04	10	1	0.1
Saprolite	2	0.20	17%	20%	1.0E-04	10	1	0.1
PWR	3	0.12	10%	15%	1.0E-04	10	1	0.1
Slightly Fractured Bedrock	4	0.00	10%	15%	1.0E-04	10	1	0.1
Upper Deep Bedrock	5	0.00	4%	10%	1.0E-05	10	1	0.1
Lower Deep Bedrock	6	0.00	1%	9%	1.0E-05	10	1	0.1

Notes:
L/kg = Liter per kilogram
ft = feet
PWR = Partially Weathered Rock

Table 2
Historical Transport Model Stress Period Summary
Plant Yates, George Power
Newnan, Georgia

Model Stress Period	Stress Period Type: Flow	Stress Period Type: Transport	Start Date	End Date	Stress Period Length (days)	Cumulative Time (days)	No. of Time Step	R6 Construction Activities
1	Steady State	Transient	1/1/1978	12/31/1984	2557	2557	1	Phase 1 Construction
2	Steady State	Transient	1/1/1985	12/31/1988	1461	4018	1	Phase 2 Construction
3	Steady State	Transient	1/1/1989	2/28/1993	1520	5538	1	Phase 3 Construction
4	Steady State	Transient	3/1/1993	12/31/1996	1402	6940	1	Phase 4 Construction
5	Steady State	Transient	1/1/1997	2/28/1999	789	7729	1	Phase 5 Construction
6	Steady State	Transient	3/1/1999	7/31/2005	2345	10074	1	Vertical Stacking only - no horizontal expansioin
7	Steady State	Transient	8/1/2005	9/14/2014	3332	13406	1	Temporary Cover Installation
8	Steady State	Transient	9/15/2014	10/17/2015	398	13804	1	Permanant Cover Installation - Southern half R6 Landfill
9	Steady State	Transient	10/18/2015	12/31/2016	441	14245	1	Permanant Cover Installation - Northern half R6 Landfill
10	Transient	Transient	1/1/2017	12/31/2017	365	14610	1	Permanant Cover Installation - Complete
11	Transient	Transient	1/1/2018	3/31/2018	90	14700	4	Permanant Cover Installation - Complete
12	Transient	Transient	4/1/2018	6/30/2018	91	14791	4	Permanant Cover Installation - Complete
13	Transient	Transient	7/1/2018	9/30/2018	92	14883	4	Permanant Cover Installation - Complete
14	Transient	Transient	10/1/2018	12/31/2018	92	14975	4	Permanant Cover Installation - Complete
15	Transient	Transient	1/1/2019	3/31/2019	90	15065	4	Permanant Cover Installation - Complete
16	Transient	Transient	4/1/2019	6/30/2019	91	15156	4	Permanant Cover Installation - Complete
17	Transient	Transient	7/1/2019	9/30/2019	92	15248	4	Permanant Cover Installation - Complete
18	Transient	Transient	10/1/2019	12/31/2019	92	15340	4	Permanant Cover Installation - Complete
19	Transient	Transient	1/1/2020	3/31/2020	91	15431	4	Permanant Cover Installation - Complete
20	Transient	Transient	4/1/2020	6/30/2020	91	15522	4	Permanant Cover Installation - Complete
21	Transient	Transient	7/1/2020	9/30/2020	92	15614	4	Permanant Cover Installation - Complete
22	Transient	Transient	10/1/2020	12/31/2020	92	15706	4	Permanant Cover Installation - Complete

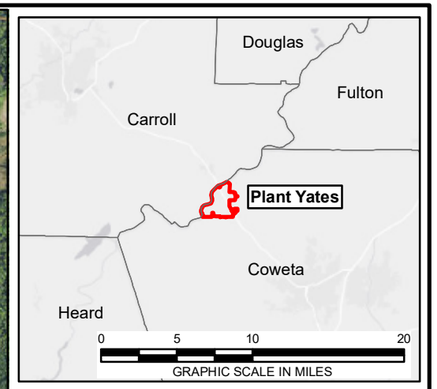
Table 3
Predictive Transport Model Stress Period Summary
Plant Yates, George Power
Newnan, Georgia

Model Stress Period	Stress Period Type: Flow	Stress Period Type: Transport	Start Date	End Date	Stress Period Length (days)	Cumulative Time (days)	No. of Time Step	Closure Activities (Alternative 1)	Closure Activities (Alternative 2)
1	Transient	Transient	1/1/2021	3/31/2021	90	90	4	DRD Start, Cover Installation for AMA in progress	DRD Start, Cover Installation for AMA in progress
2	Transient	Transient	4/1/2021	6/30/2021	91	181	4	DRD in progress, Cover Installation for AMA in progress	DRD in progress, Cover Installation for AMA in progress
3	Transient	Transient	7/1/2021	9/30/2021	92	273	4	DRD in progress, Cover Installation for AMA in progress	DRD in progress, Cover Installation for AMA in progress
4	Transient	Transient	10/1/2021	12/31/2021	92	365	4	DRD in progress, Cover Installation for AMA in progress	DRD in progress, Cover Installation for AMA in progress
5	Transient	Transient	1/1/2022	3/31/2022	90	455	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
6	Transient	Transient	4/1/2022	6/30/2022	91	546	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
7	Transient	Transient	7/1/2022	9/30/2022	92	638	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
8	Transient	Transient	10/1/2022	12/31/2022	92	730	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
9	Transient	Transient	1/1/2023	3/31/2023	90	820	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
10	Transient	Transient	4/1/2023	6/30/2023	91	911	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
11	Transient	Transient	7/1/2023	9/30/2023	92	1003	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
12	Transient	Transient	10/1/2023	12/31/2023	92	1095	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
13	Transient	Transient	1/1/2024	3/31/2024	91	1186	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
14	Transient	Transient	4/1/2024	6/30/2024	91	1277	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
15	Transient	Transient	7/1/2024	9/30/2024	92	1369	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
16	Transient	Transient	10/1/2024	12/31/2024	92	1461	4	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed
17	Transient	Transient	1/1/2025	12/31/2025	365	1826	12	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed, In-Situ Injection
18	Transient	Transient	1/1/2026	12/31/2050	9131	10957	12	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed	DRD Ends, EM Drain Pumping, Cover Installation for AMA Completed, In-Situ Injection

Notes:
DRD = Dyer Road Dewatering
EM = Engineering Measure
AMA = Ash Management Area
Alternative 1 = Monitored Natural Attenuation
Alternative 2 = In-Situ Injections

Figures





LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

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GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

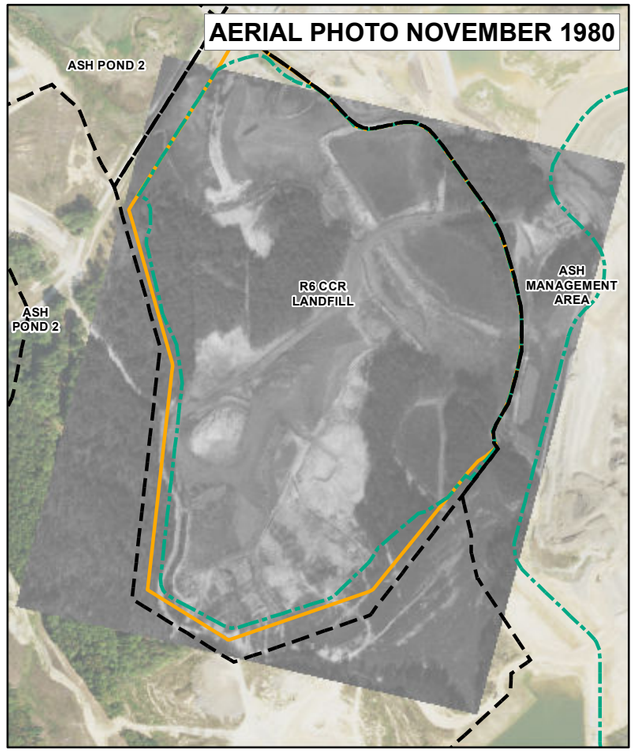
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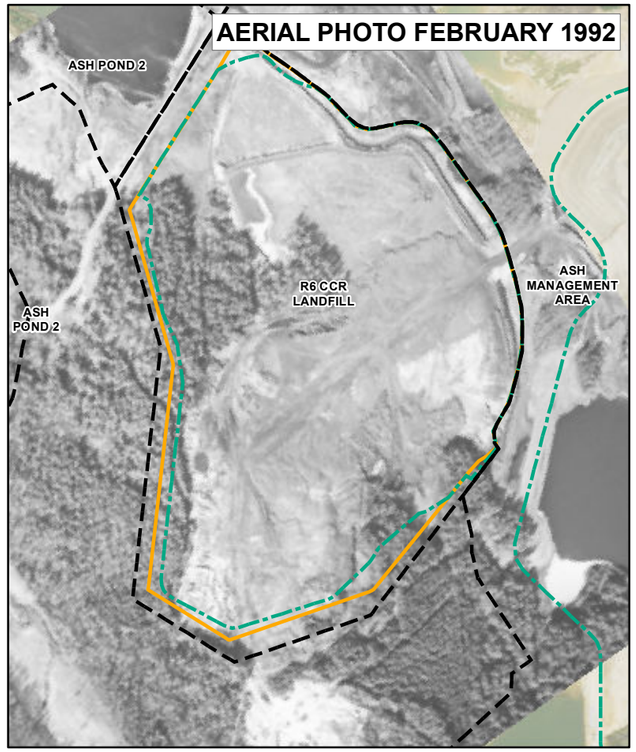
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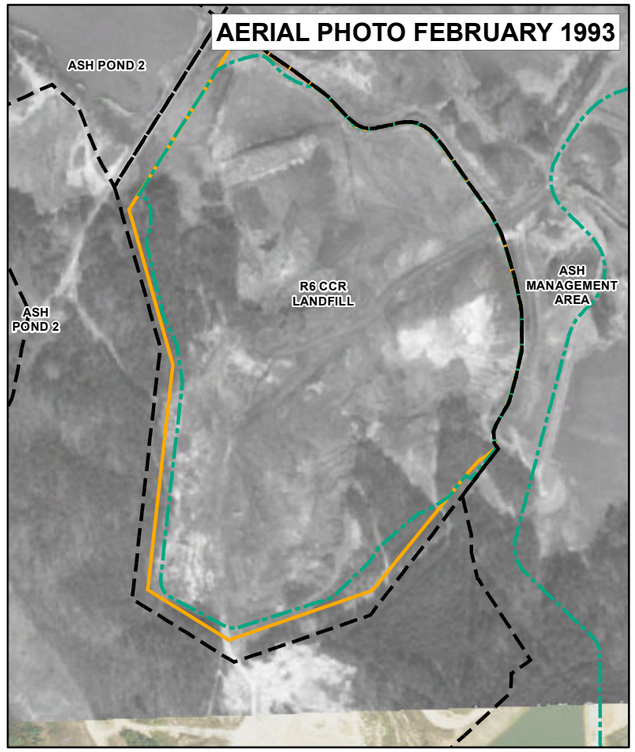
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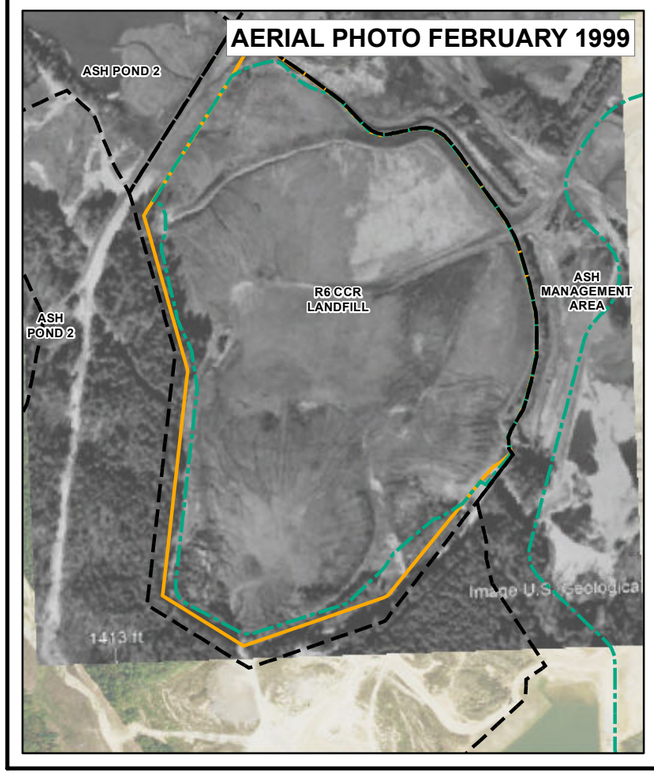
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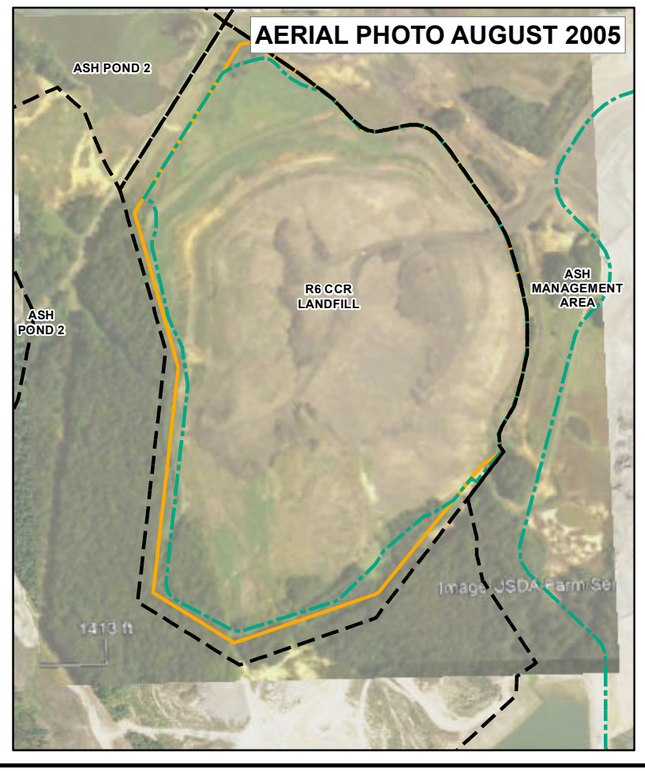
FIGURE
1

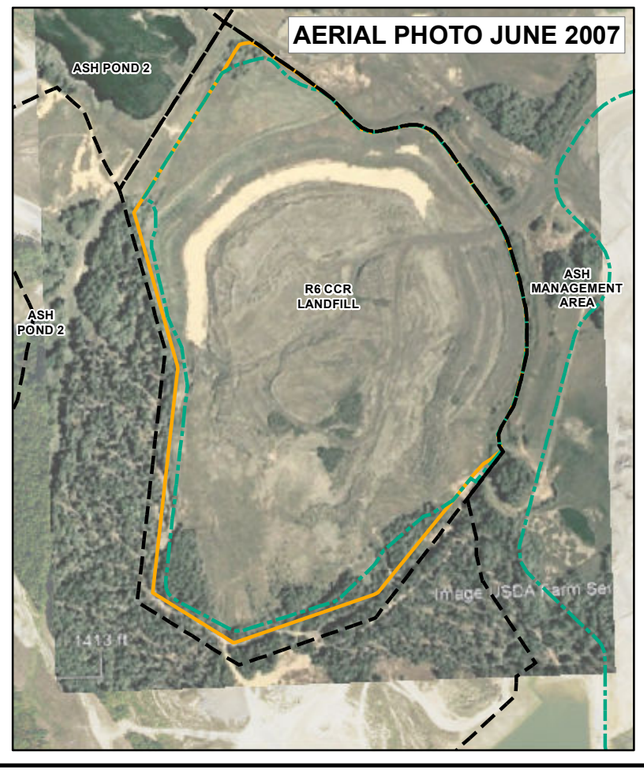


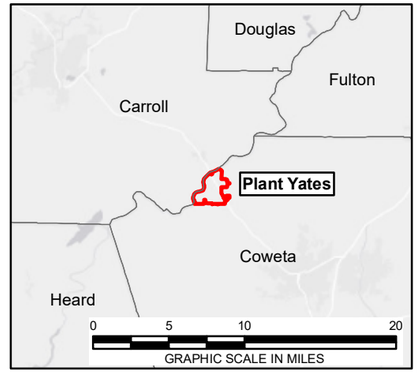












LEGEND

- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

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GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

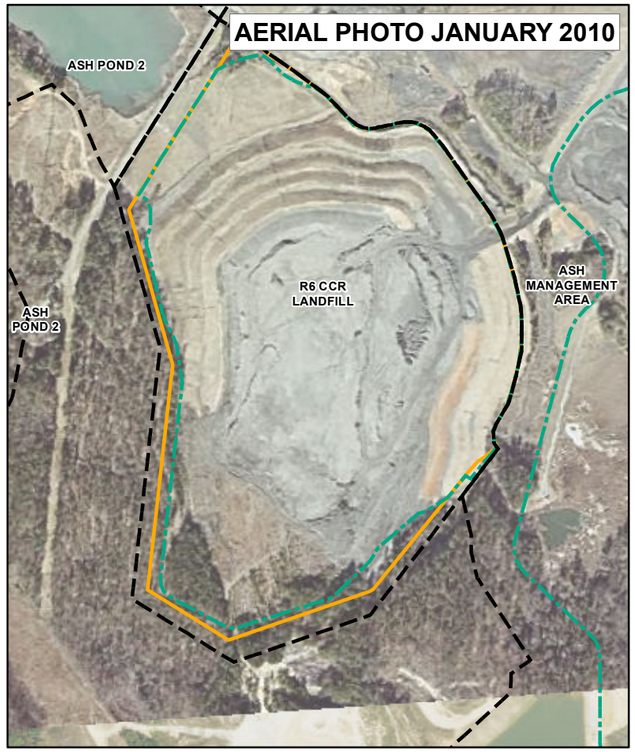
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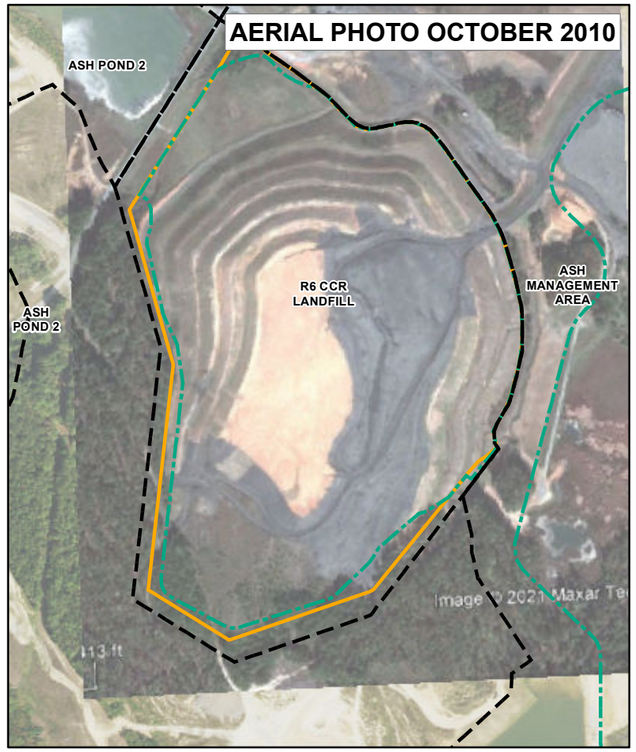
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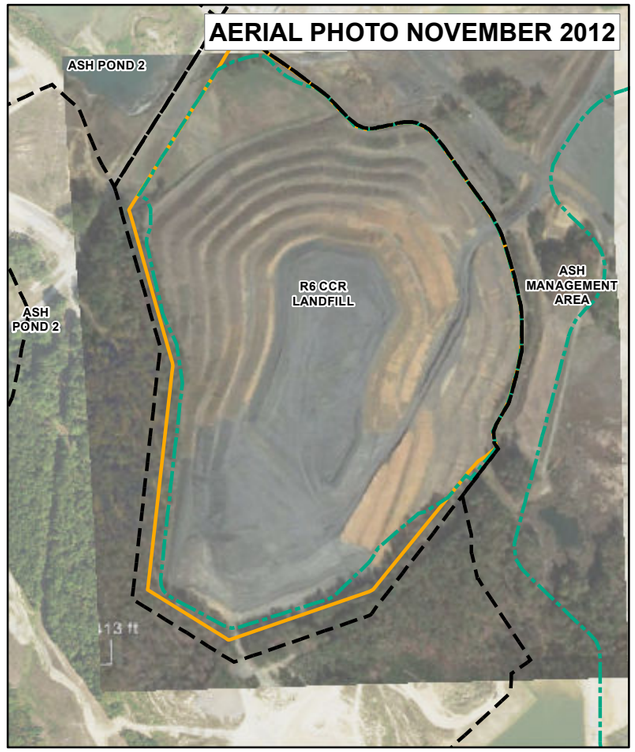
HISTORICAL AERIAL PHOTOS OF R6 CCR LANDFILL

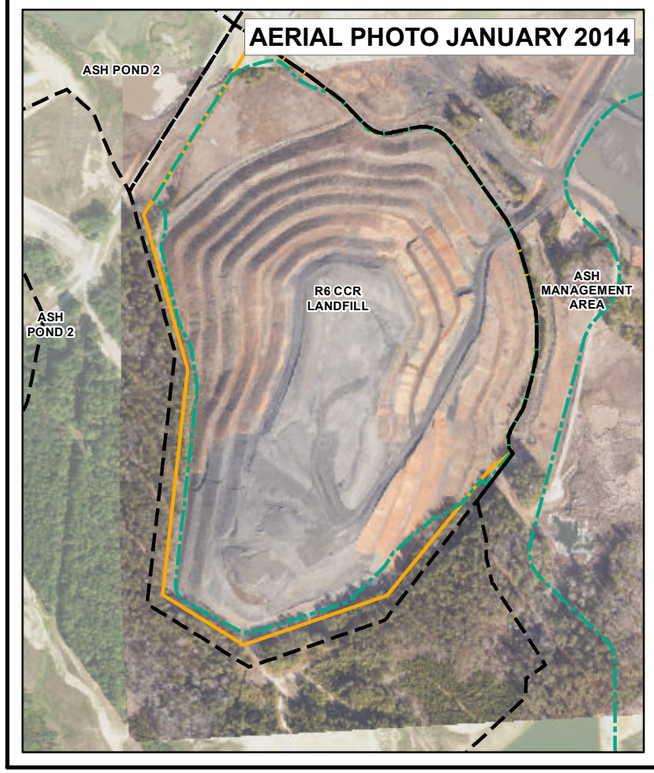
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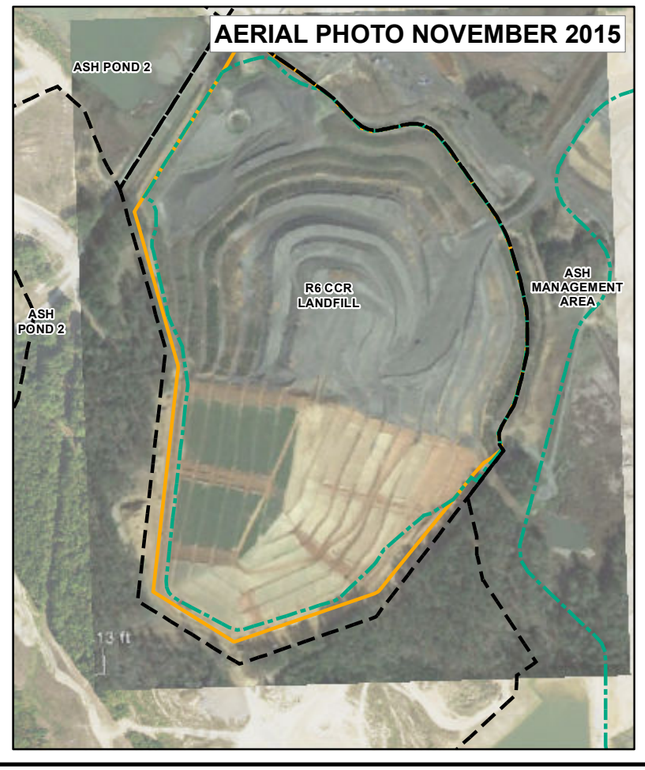
FIGURE **2A**

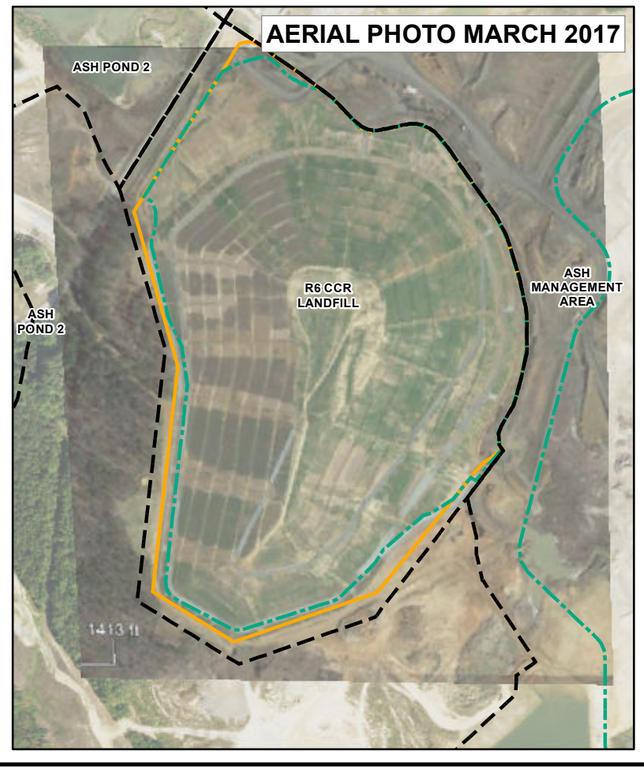


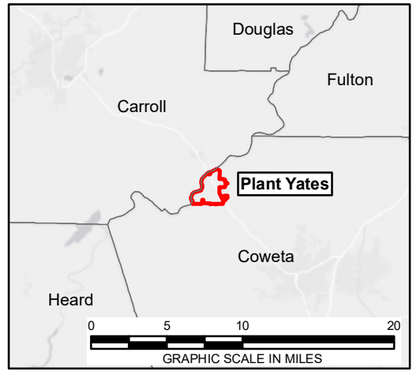












LEGEND

- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

0 350 700 1,400

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

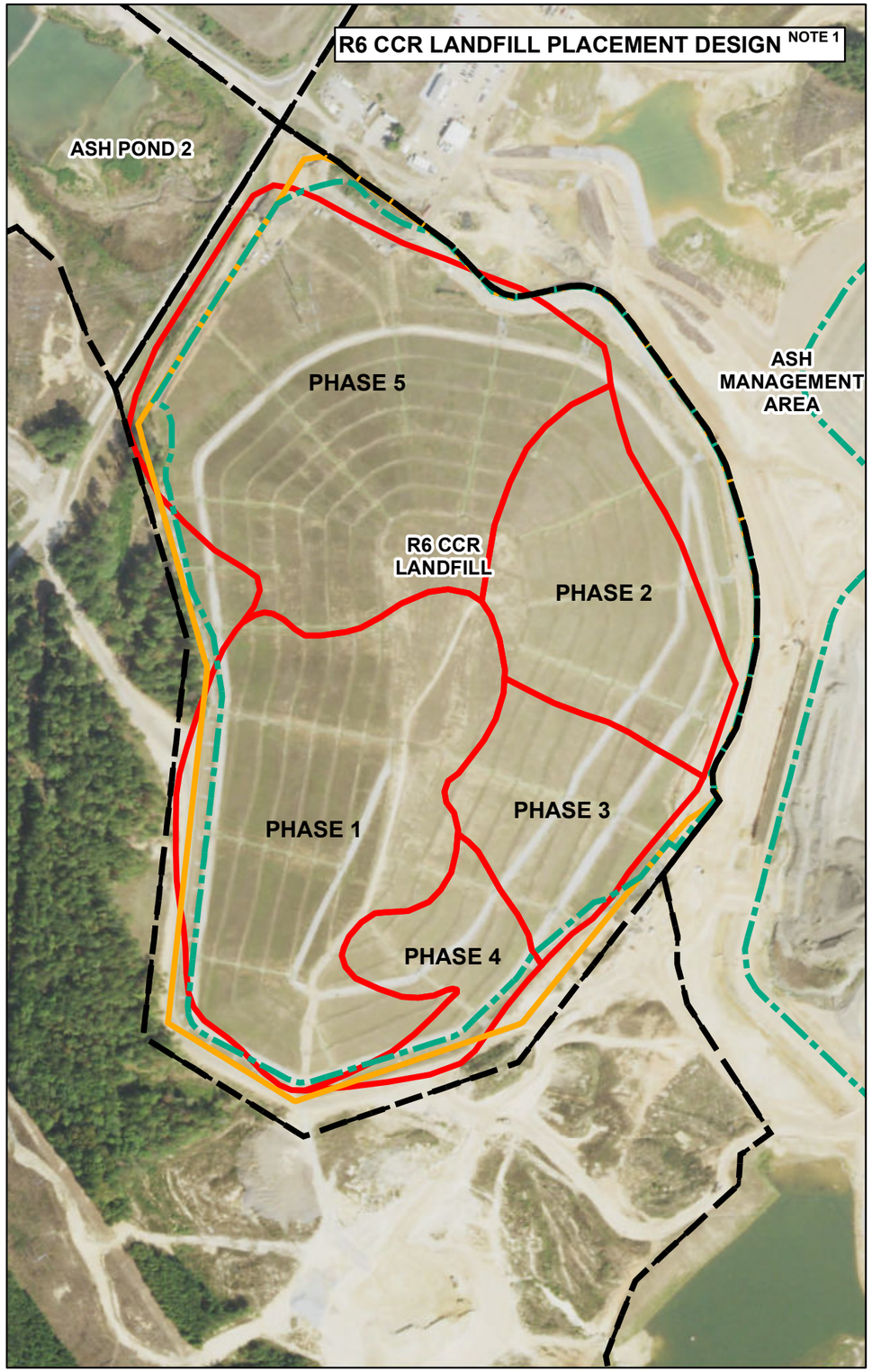
PLANT YATES
NEWNAN, GA

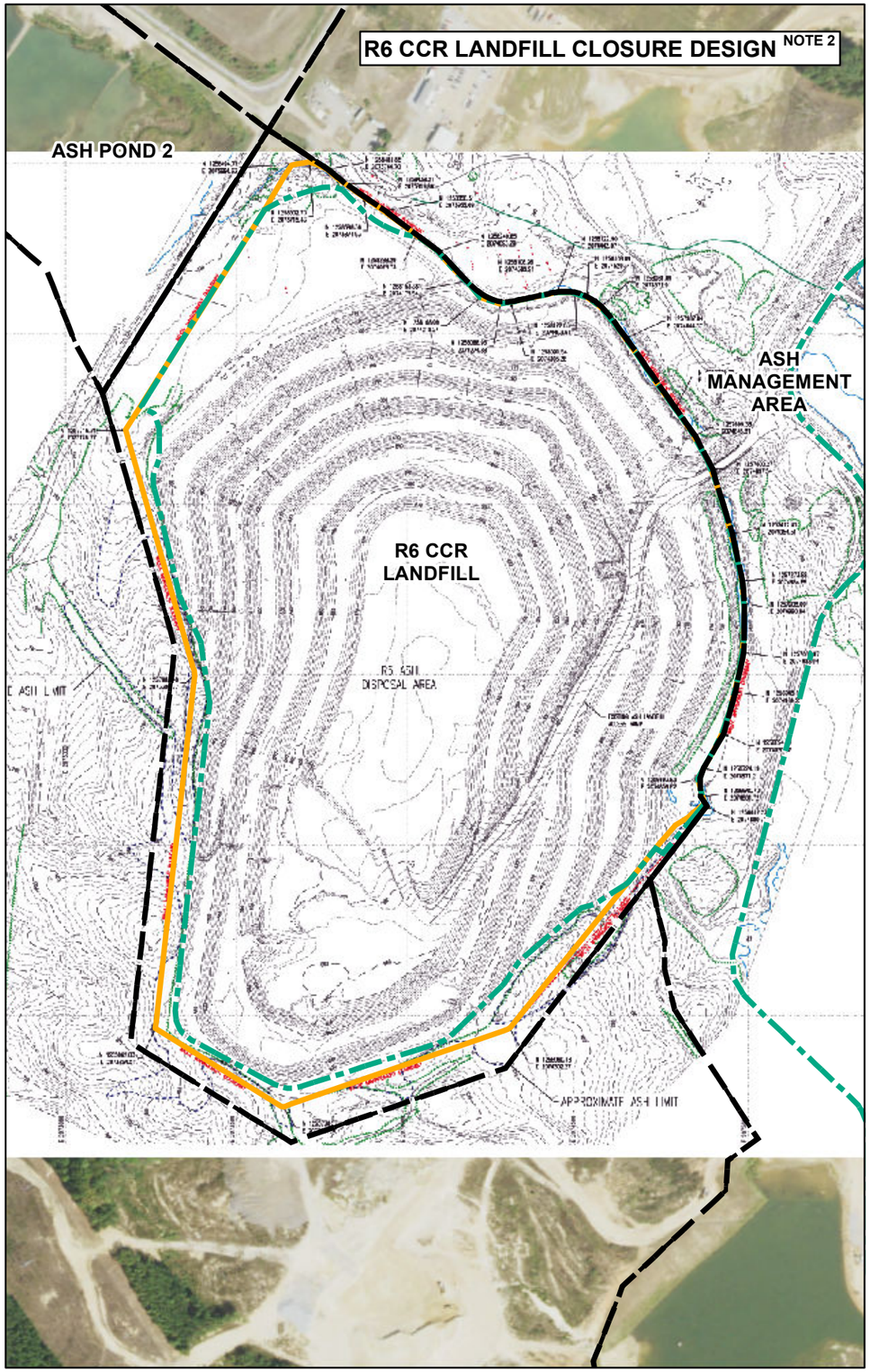
TRANSPORT MODEL REPORT

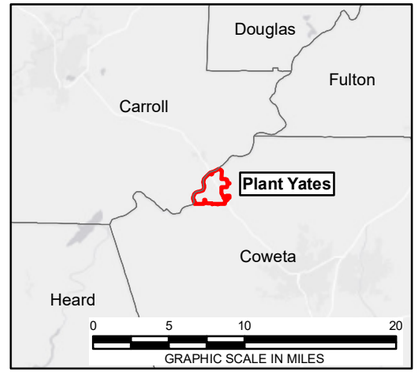
HISTORICAL AERIAL PHOTOS OF R6 CCR LANDFILL

ARCADIS

FIGURE **2B**







LEGEND

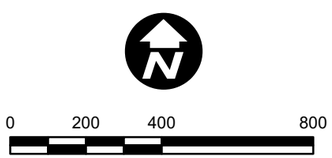
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT
- DESIGNED CCR PLACEMENT BOUNDARIES
- CCR COAL COMBUSTION RESIDUALS

NOTES:

1. DATA SOURCE - HENDON ENGINEERING ASSOCIATES, INC., 1984. R-6 FLY ASH LANDFILL, FLY ASH STOCKPILE. DECEMBER, 1984.

2. DATA SOURCE - SOUTHERN COPMANY GENERATION ENGINEERING AND CONSTRUCTION SERVICES FOR GEORGIA POWER COMPANY, 2014. PLANT YATES R6 ASH MONOFILL CLOSURE EXISTING SITE TOPOGRAPHIC MAP. DRAWING NUMBER E16329. PREPARED 5/30/2014.

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.



COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

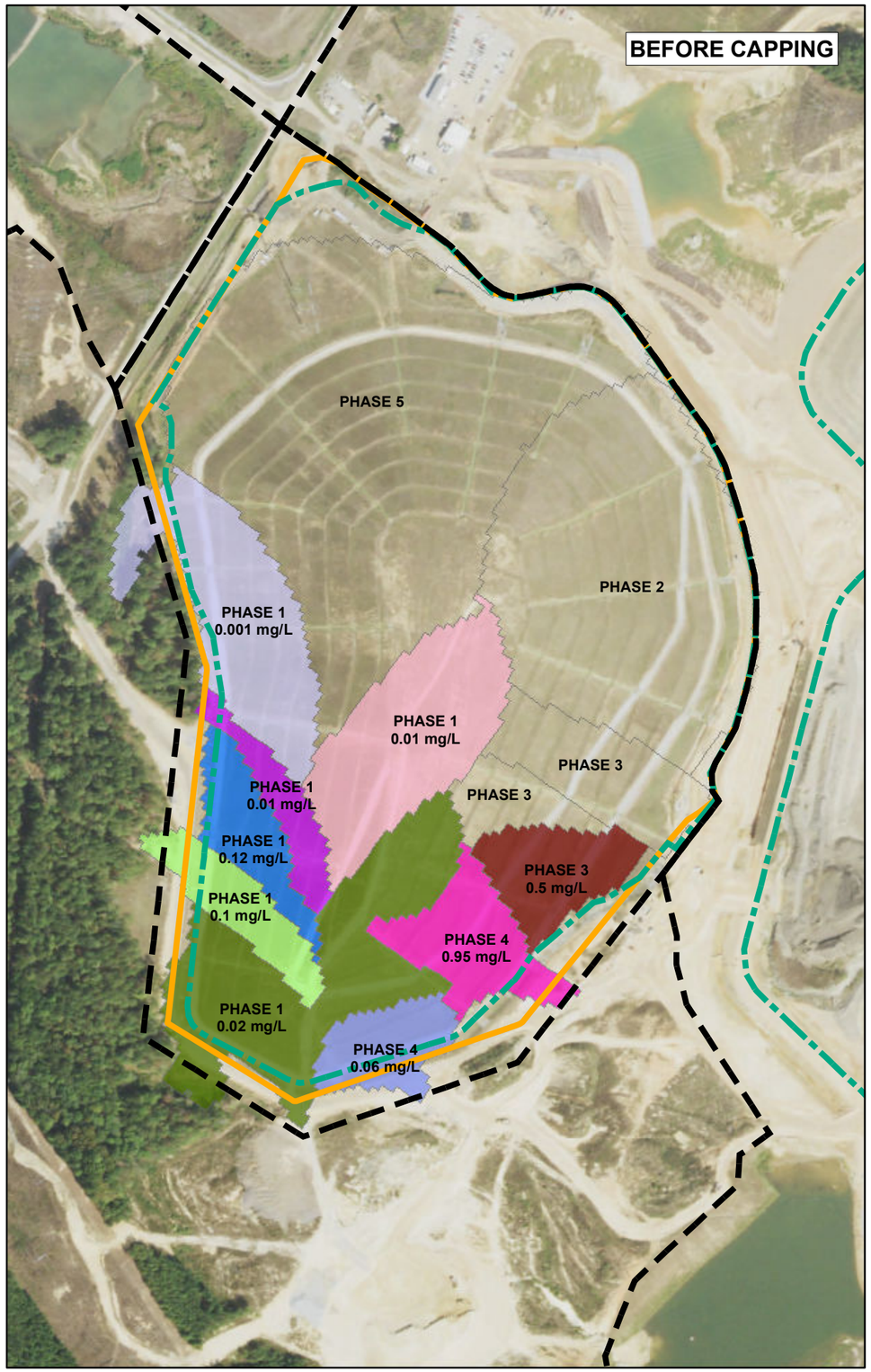
Georgia Power
PLANT YATES
NEWNAN, GA

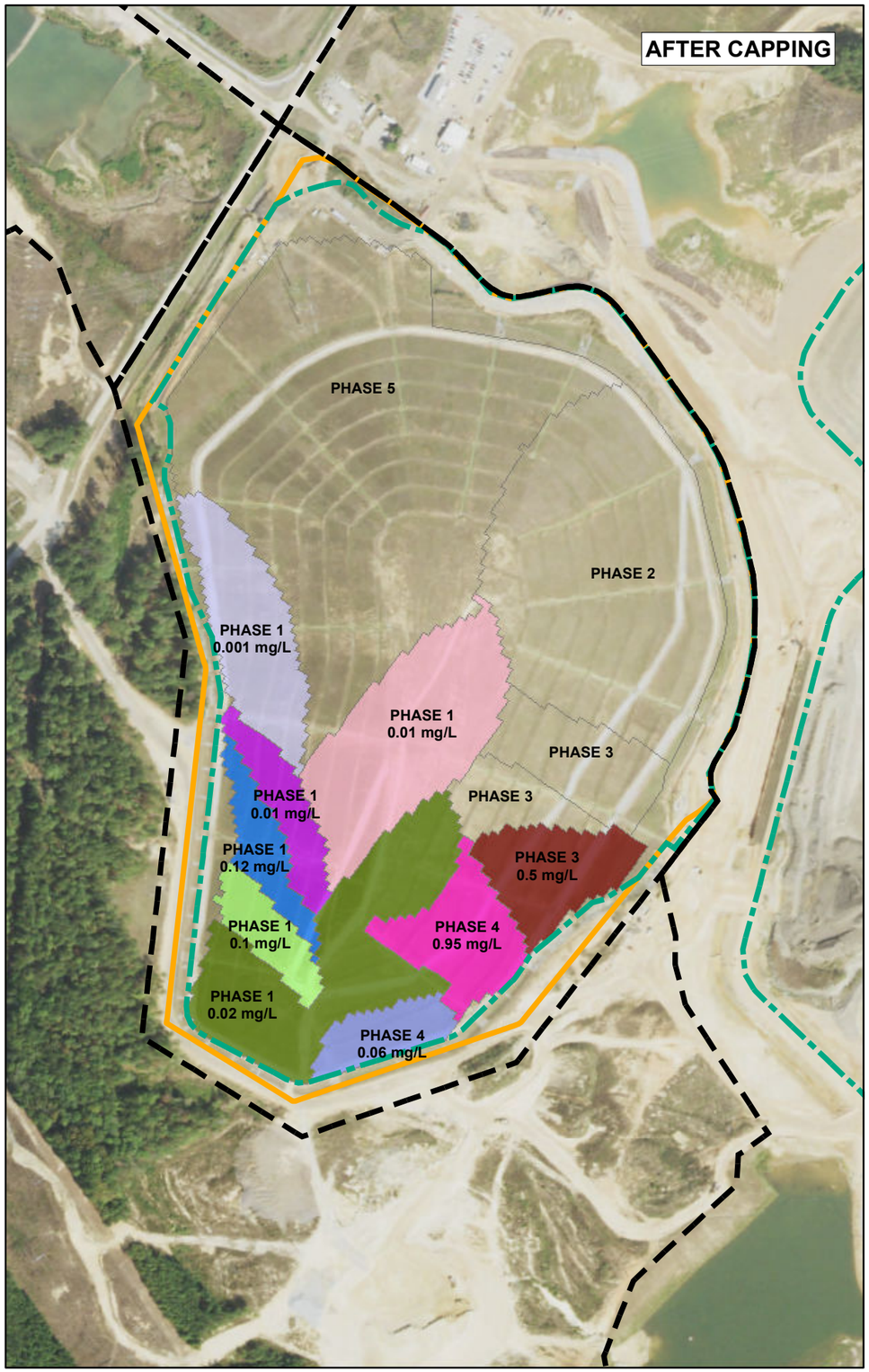
TRANSPORT MODEL REPORT

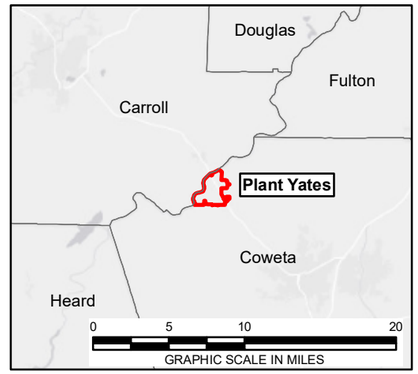
CCR PLACEMENT DESIGN AND CCR CLOSURE DESIGN OF R6 CCR LANDFILL

ARCADIS

FIGURE
2C







LEGEND

- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- PHASE # 0.2 mg/L — SIMULATED SOURCE CONCENTRATION AND SOURCE EXTENT AT DIFFERENT PHASES OF CCR PLACEMENT
- PHASE # — SOURCE CONCENTRATION WAS NOT SIMULATED BECAUSE IT IS NOT SENSITIVE DURING THE TRANSPORT CALIBRATION
- CCR — COAL COMBUSTION RESIDUALS
- mg/L — MILLIGRAM PER LITER

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

N

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

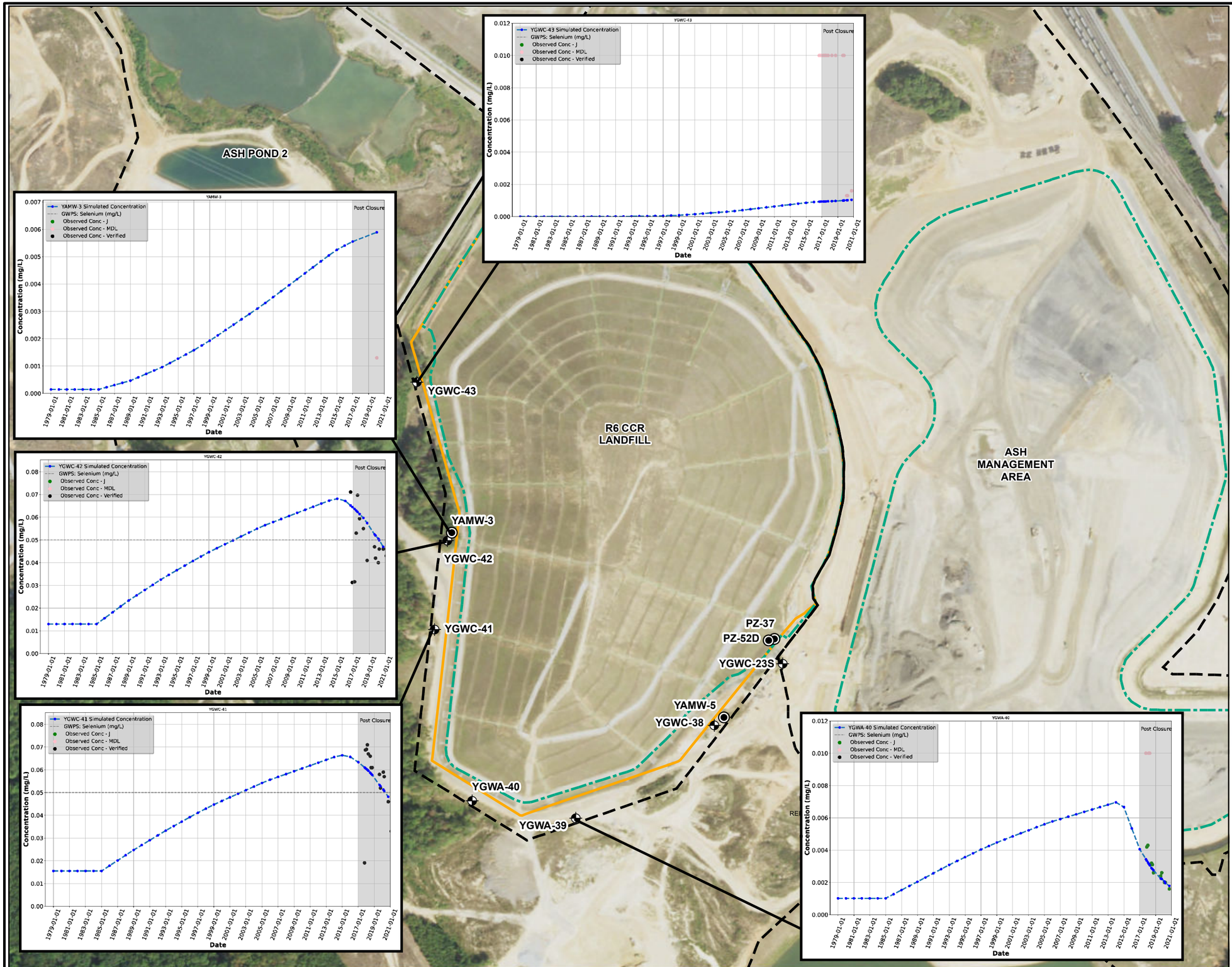
PLANT YATES
NEWNAN, GA

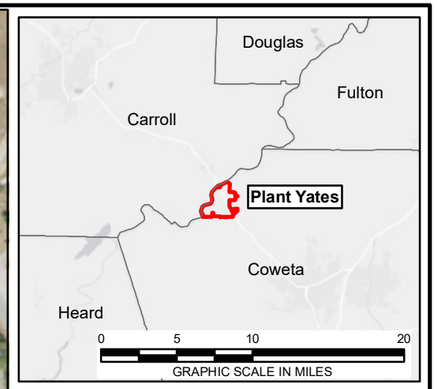
TRANSPORT MODEL REPORT

SIMULATED SOURCE DISTRIBUTION OF SELENIUM (BEFORE CAPPING AND AFTER CAPPING)

ARCADIS

FIGURE
3





LEGEND

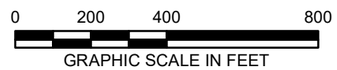
- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MDL — METHOD DETECTION LIMIT
- GWPS — GROUNDWATER PROTECTION STANDARDS
- MDL (U) — THE ANALYTE WAS NOT DETECTED IN THE SAMPLE ABOVE THE MDL WERE NOT CONSIDERED A VALID CONCENTRATION TARGET VALUE DURING TRANSPORT CALIBRATION
- J — THE REPORTED VALUE IS ABOVE THE METHOD DETECTION LIMIT (MDL) BUT BELOW THE REPORTING LIMIT WERE SELECTED FOR CONCENTRATION MATCHING

NOTE:

1. OBSERVED SELENIUM CONCENTRATION DATA PRESENTED ON THE GRAPH ARE COLLECTED FROM JUNE 2016 TO DECEMBER 2020

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.





COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

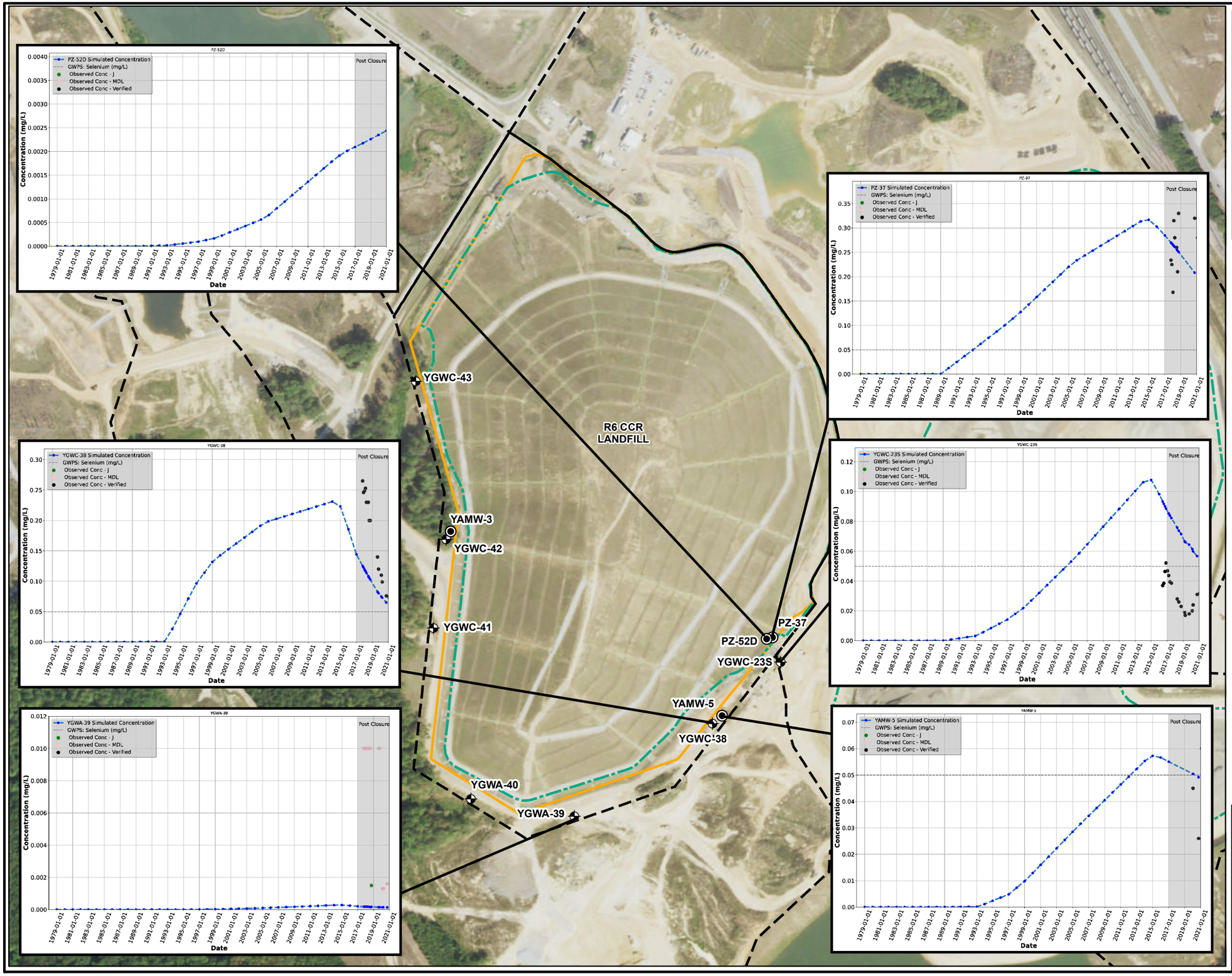
Georgia Power
PLANT YATES
NEWNAN, GA

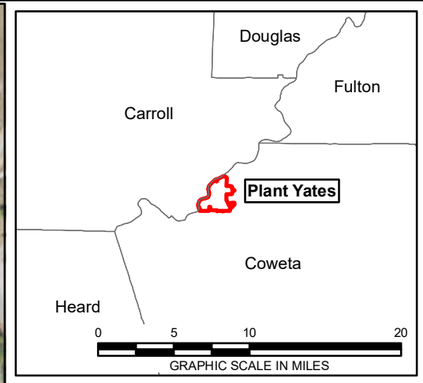
TRANSPORT MODEL REPORT

SIMULATED SELENIUM CONCENTRATION VS OBSERVED SELENIUM CONCENTRATION

ARCADIS

FIGURE
4A





LEGEND

- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MDL METHOD DETECTION LIMIT
- GWPS GROUNDWATER PROTECTION STANDARDS
- MDL (U) THE ANALYTE WAS NOT DETECTED IN THE SAMPLE ABOVE THE MDL WERE NOT CONSIDERED A VALID CONCENTRATION TARGET VALUE DURING TRANSPORT CALIBRATION
- J THE REPORTED VALUE IS ABOVE THE METHOD DETECTION LIMIT (MDL) BUT BELOW THE REPORTING LIMIT WERE SELECTED FOR CONCENTRATION MATCHING

NOTE:

1. OBSERVED SELENIUM CONCENTRATION DATA PRESENTED ON THE GRAPH ARE COLLECTED FROM JUNE 2016 TO DECEMBER 2020

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

PLANT YATES
NEWNAN, GA

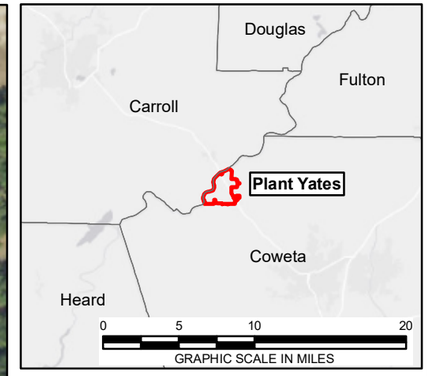
TRANSPORT MODEL REPORT

SIMULATED SELENIUM CONCENTRATION VS OBSERVED SELENIUM CONCENTRATION

ARCADIS

FIGURE
4B





LEGEND

- DYER ROAD DEWATERING WELL TEMPORARILY RUNNING FROM 2020 TO 2021
- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- DRAIN CELLS WERE USED TO REGULATE THE EXTRACTED FLOWS FROM PUMP RISERS
- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- DYER ROAD BARRIER WALL-HORIZONTAL FLOW BARRIER PACKAGE
- ENGINEERING MEASURE DRAIN CONNECTED LINEAR NETWORK PACKAGE
- SURFACE WATER FEATURES-DRAIN PACKAGE
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MNA MONITORED NATURAL ATTENUATION

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

N

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

PLANT YATES
NEWNAN, GA

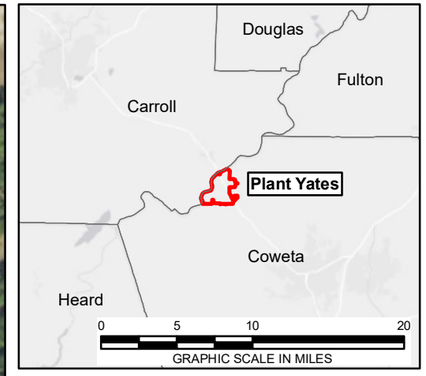
TRANSPORT MODEL REPORT

PREDICTIVE SCENARIOS DESIGN LAYOUT ALTERNATIVE 1 (MNA)

ARCADIS

FIGURE
5





LEGEND

- DYER ROAD DEWATERING WELL TEMPORARILY RUNNING FROM 2020 TO 2021
- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- DRAIN CELLS WERE USED TO REGULATE THE EXTRACTED FLOWS FROM PUMP RISERS
- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- DYER ROAD BARRIER WALL-HORIZONTAL FLOW BARRIER PACKAGE
- ENGINEERING MEASURE DRAIN CONNECTED LINEAR NETWORK PACKAGE
- IN-SITU ZVI INJECTION - CHEMICAL REACTION ZONE
- SURFACE WATER FEATURES-DRAIN PACKAGE
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY

MNA MONITORED NATURAL ATTENUATION

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

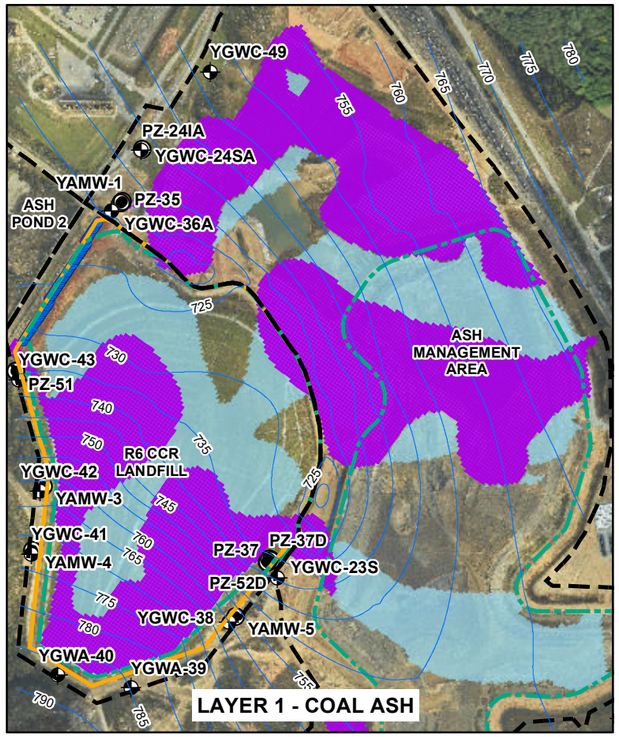
PLANT YATES
NEWNAN, GA

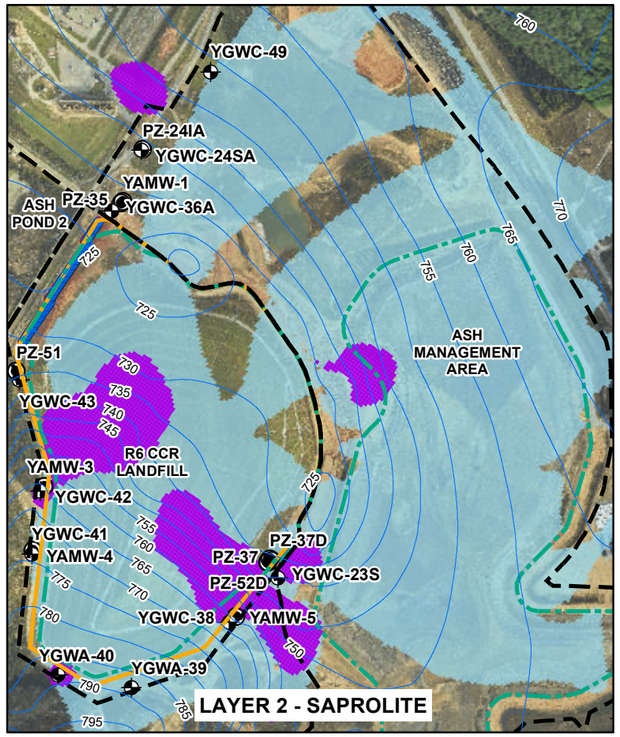
TRANSPORT MODEL REPORT

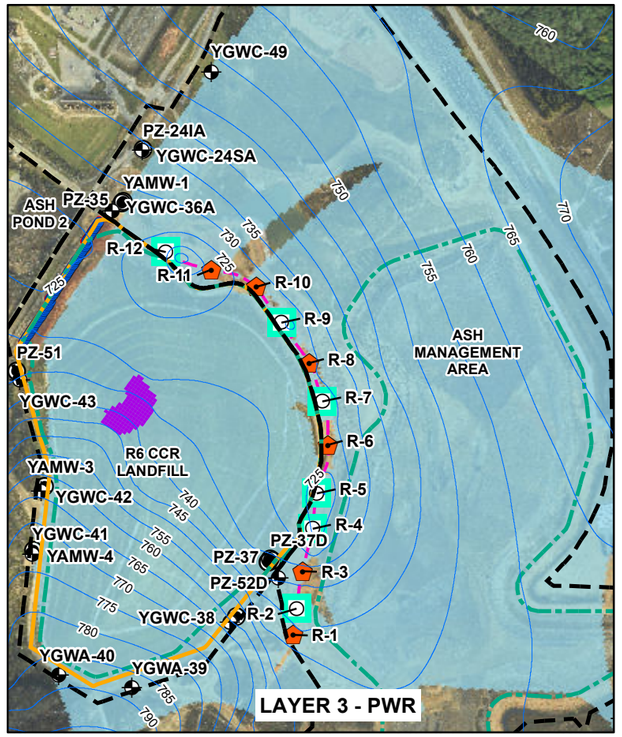
PREDICTIVE SCENARIOS DESIGN LAYOUT ALTERNATIVE 2 (IN-SITU INJECTION)

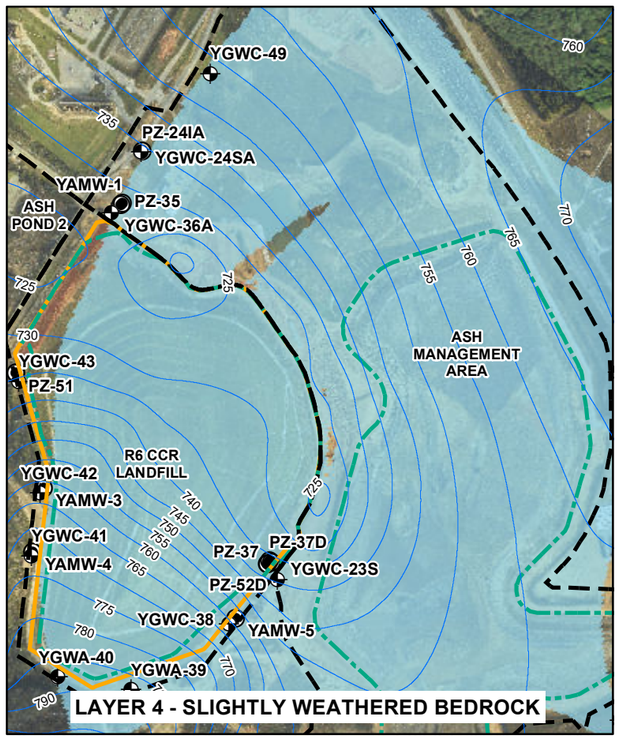
ARCADIS

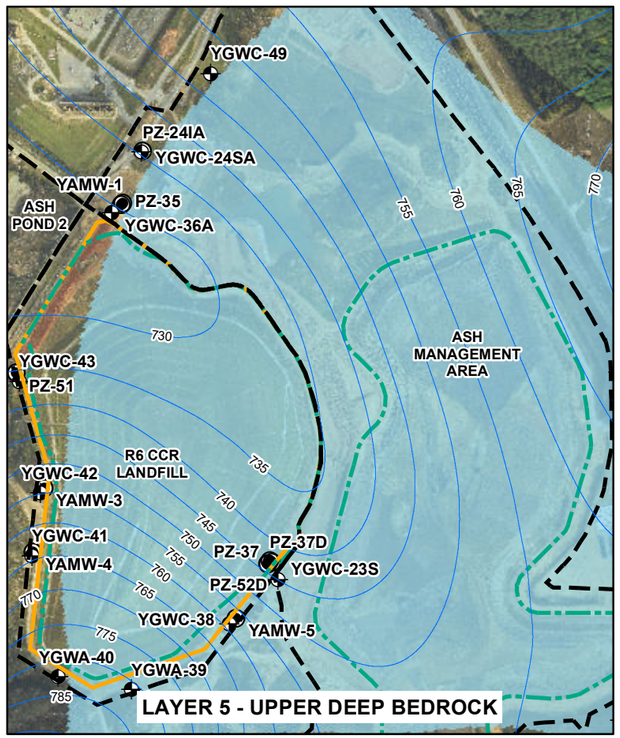
FIGURE
6

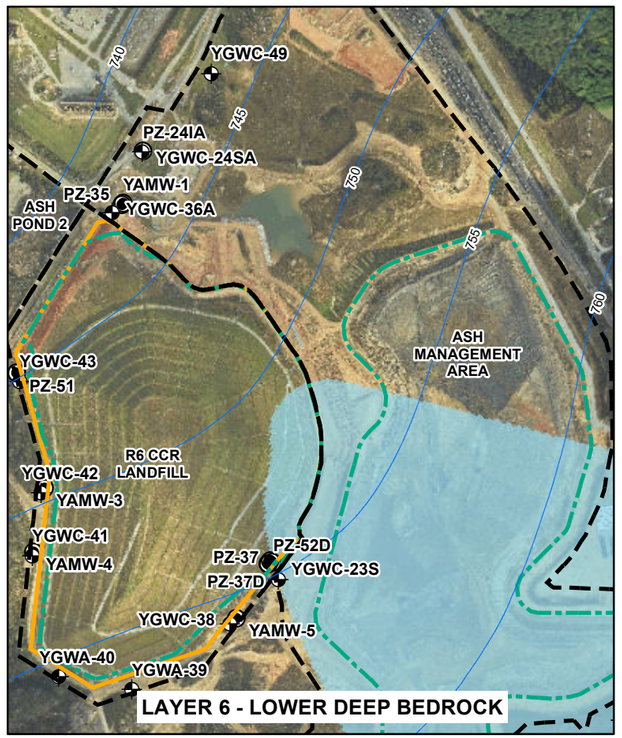


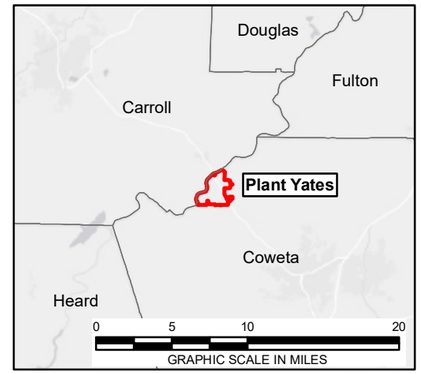












LEGEND

- DYER ROAD DEWATERING WELL TEMPORARILY RUNNING FROM 2020 TO 2021
- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- DRAIN CELLS WERE USED TO REGULATE THE EXTRACTED FLOWS FROM PUMP RISERS
- MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- DYER ROAD BARRIER WALL-HORIZONTAL FLOW BARRIER PACKAGE
- ENGINEERING MEASURE DRAIN CONNECTED LINEAR NETWORK PACKAGE
- SIMULATED GROUNDWATER ELEVATION CONTOUR
- SIMULATED GROUNDWATER DRY CELL
- SIMULATED GROUNDWATER CAPTURE
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MNA MONITORED NATURAL ATTENUATION

AERIAL IMAGE SOURCES: NOVEMBER 11, 2020 IMAGERY FLOWN AND PROCESSED BY SAM LLC; NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

0 450 900 1,800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

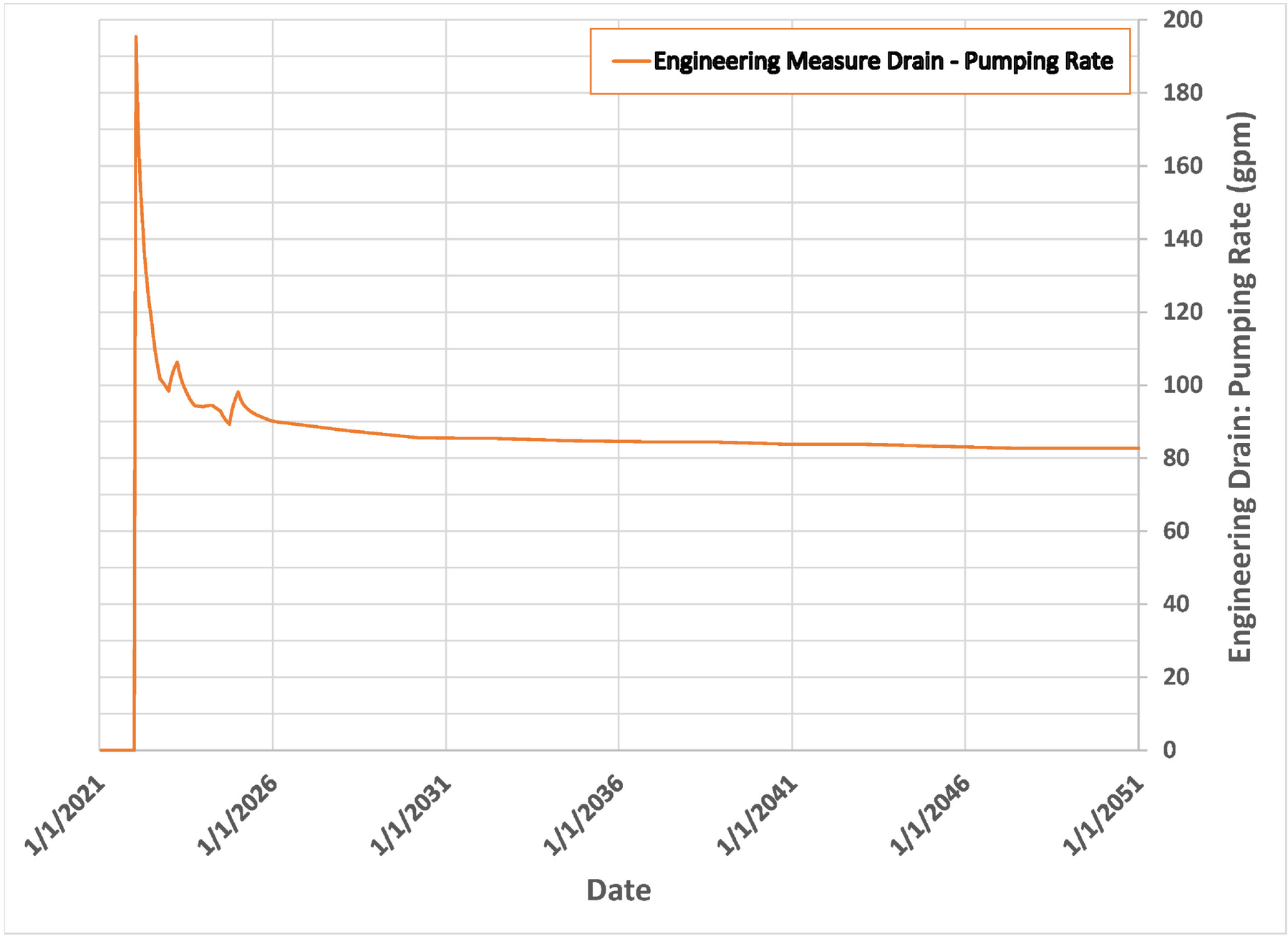
PLANT YATES
NEWNAN, GA

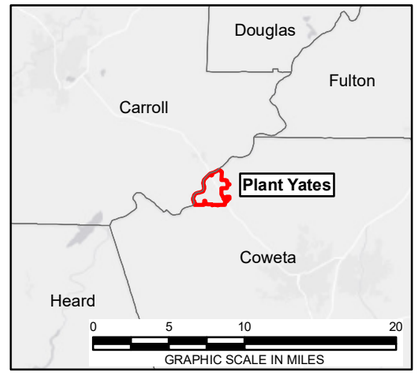
TRANSPORT MODEL REPORT

SIMULATED WATER-LEVEL CONTOURS AND CAPTURE EXTENT OF ALTERNATIVE 1 (MNA)

ARCADIS

FIGURE
7





LEGEND

MNA MONITORED NATURAL ATTENUATION

gpm GALLONS PER MINUTE

Georgia Power

PLANT YATES
NEWNAN, GA

TRANSPORT MODEL REPORT

SIMULATED GROUNDWATER PUMPING RATE OF ALTERNATIVE 1 (MNA)

ARCADIS

FIGURE
8

ASH POND 2

ASH POND 2

YGWC-24SA PZ-24IA

PZ-25I PZ-25S

PZ-35 YAMW-1

YGWC-36A

PZ-31S

R-12

R-11

R-10

R-9

R-8

R-7

R-6

R-5

R-4

R-3

R-2

PZ-51

YGWC-43

R6 CCR LANDFILL

ASH MANAGEMENT AREA

YGWC-42 YAMW-3

YAMW-2

YGWC-41 YAMW-4 PZ-41

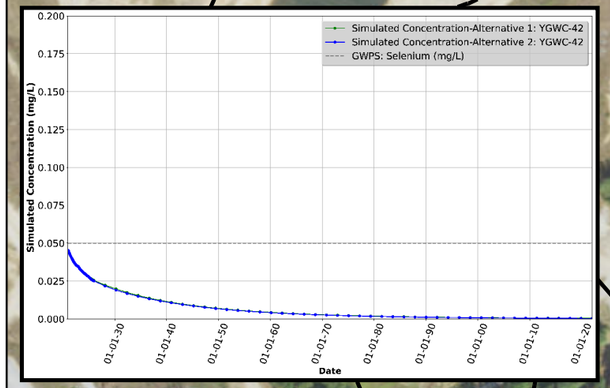
PZ-52D PZ-37D PZ-37

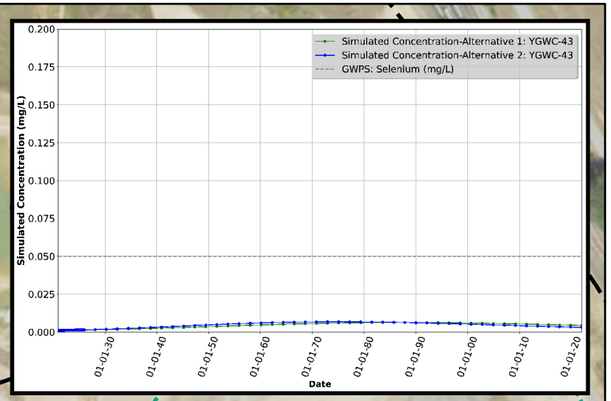
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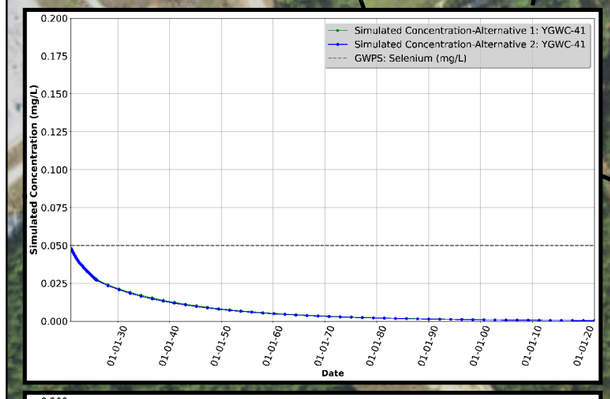
YGWC-38 PZ-38 YAMW-5

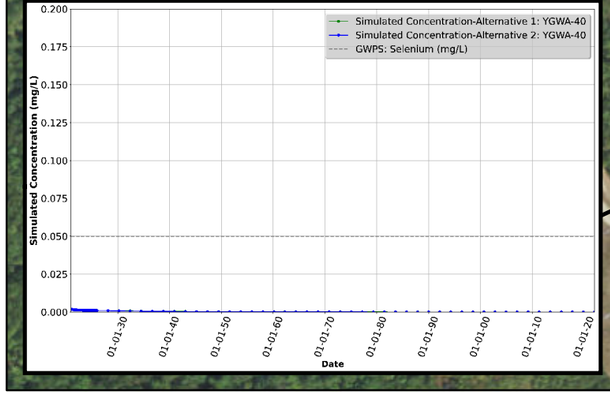
PZ-40 YGWA-40

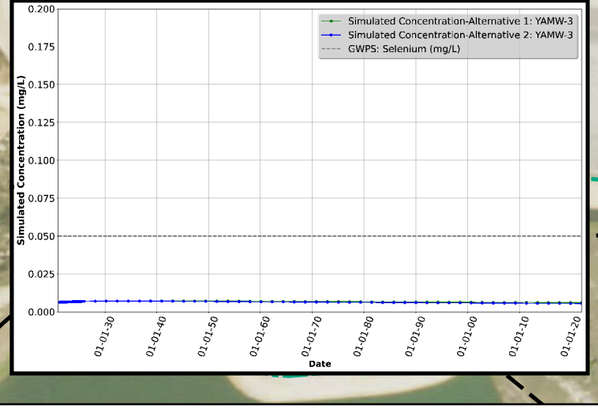
PZ-39 YGWA-39

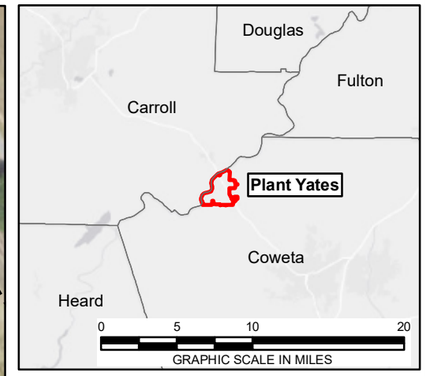












LEGEND

- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- DRAIN CELLS WERE USED TO REGULATE THE EXTRACTED FLOWS FROM PUMP RISERS
- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- ENGINEERING MEASURE DRAIN CONNECTED LINEAR NETWORK PACKAGE
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MNA MONITORED NATURAL ATTENUATION
- GWPS GROUNDWATER PROTECTION STANDARDS

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

N

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

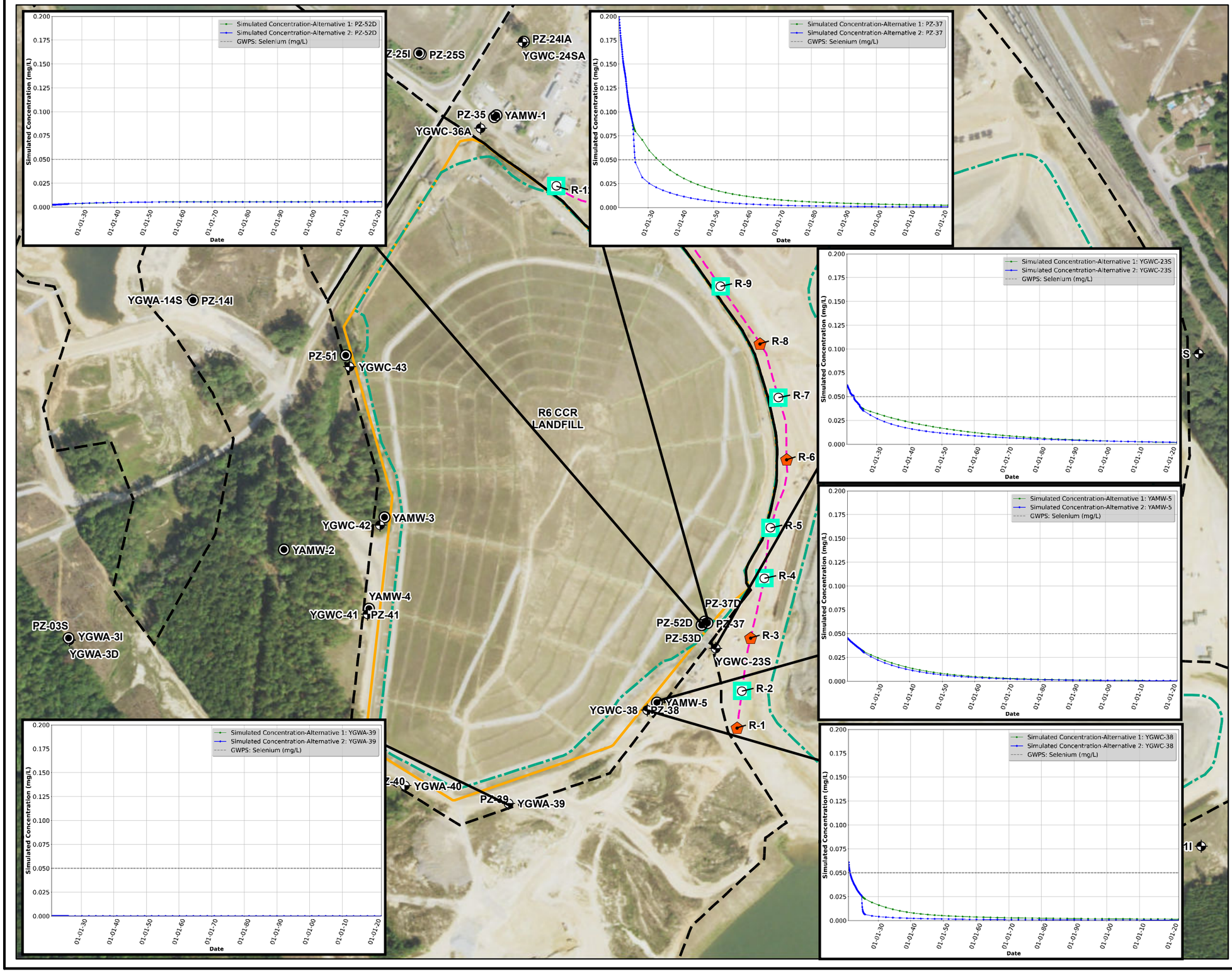
PLANT YATES
NEWNAN, GA

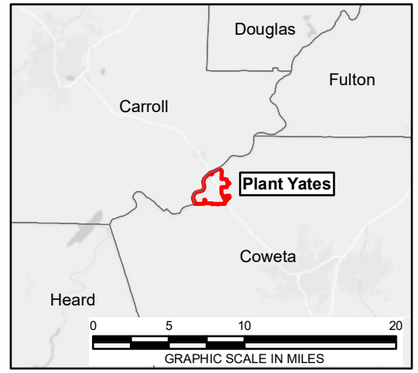
TRANSPORT MODEL REPORT

PREDICTED CONCENTRATION TREND PLOTS AT MONITORING WELLS MNA VS IN-SITU INJECTION

ARCADIS

FIGURE **9A**





LEGEND

- INSTALLED CLEANOUT
- INSTALLED PUMP RISER
- DRAIN CELLS WERE USED TO REGULATE THE EXTRACTED FLOWS FROM PUMP RISERS
- ACTIVE MONITORING WELL LOCATION
- NON-NETWORK WELL/PIEZOMETER
- ENGINEERING MEASURE DRAIN CONNECTED LINEAR NETWORK PACKAGE
- EXTENT OF FINAL COVER
- PERMITTED UNIT BOUNDARY
- R6 WASTE MANAGEMENT BOUNDARY
- MNA MONITORED NATURAL ATTENUATION
- GWPS GROUNDWATER PROTECTION STANDARDS

AERIAL IMAGE SOURCES: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) 2019 IMAGERY.

N

0 200 400 800

GRAPHIC SCALE IN FEET

COORDINATE SYSTEM: NAD 1983 STATEPLANE GEORGIA WEST FIPS 1002 FEET

Georgia Power

PLANT YATES
NEWNAN, GA

TRANSPORT MODEL REPORT

PREDICTED CONCENTRATION TREND PLOTS AT MONITORING WELLS MNA VS IN-SITU INJECTION

ARCADIS

FIGURE **9B**

Appendix D

Risk Evaluation Report

RISK EVALUATION REPORT

PLANT YATES
R6 CCR LANDFILL AND ASH MANAGEMENT AREA
COWETA COUNTY, GEORGIA

Prepared for

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Project Number 6123-23-2542

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LIST OF ACRONYMS AND ABBREVIATIONS

ACC	Atlantic Coast Consulting
AMA	Ash Management Area
AP	Ash Pond
CCR	Coal Combustion Residual
CEM	Conceptual Exposure Model
CFR	Code of Federal Regulations
COI	Constituent of Interest
COPI	Constituent of Potential Interest
EPC	Exposure Point Concentration
EPD	[Georgia] Environmental Protection Division
ft	feet
ft/day	feet per day
GWPS	Groundwater Protection Standard
HSRA	Hazardous Site Response Act
IRIS	Integrated Risk Information System
K	Hydraulic Conductivity
mg/L	Milligrams per liter
amsl	above mean sea level
ProUCL	ProUCL software version 5.2
PZ	Piezometer
RME	Reasonable Maximum Exposure
RRS	Risk Reduction Standards
RSL	Regional Screening Level
SSL	Statistically Significant Level
UCL	95 Percent Upper Confidence Limit of the Arithmetic Mean
USEPA	United States Environmental Protection Agency
VRP	Voluntary Remediation Program

EXECUTIVE SUMMARY

Georgia Power's Plant Yates (site) is a former seven-unit coal-fired, electric-generating facility approximately 8 miles northwest of Newnan and 13 miles southeast of the city of Carrollton, Georgia in Coweta County, Georgia. Plant Yates began operations in 1982. In compliance with applicable regulations, coal combustion residual (CCR) material resulting from power generation has historically been transferred and stored at the site's CCR units which include the Gypsum Stack Landfill, R6 CCR Landfill (R6), AP-1, AP-2, AP-3, AP-A, AP-B, and AP-B'. The Ash Management Area (AMA) includes the former footprints of ash ponds AP-3, AP-A, AP-B, and AP-B'.

Georgia Power is currently in the permitting process for the closures of R6 and the AMA in place by consolidating the excavated CCR material to a smaller footprint and grading to promote drainage with placement of a final impermeable cover system in accordance with the Federal CCR Rule, 40 Code of Federal Regulations (C.F.R.) § 257[1], and the State CCR Rule, Georgia Environmental Protection Division (EPD) Coal Combustion Residuals Rule 391-3-4-.10. Two permit applications were submitted to Georgia EPD in November 2018: one for the AMA and another for R6. Due to the configuration of the units and overall groundwater flow direction, both permit applications propose combining the monitoring systems of R6 and AMA into a single multi-unit monitoring system that meets federal and state monitoring requirements. The combined monitoring system is hereafter referred to in this report as R6-AMA. Post closure care including semiannual groundwater monitoring and reporting for R6-AMA is required for at least 30 years following closure in place of these units.

This report focuses on R6-AMA and presents the results of a human health risk and ecological evaluation for CCR constituents that exhibit statistically significant levels (SSLs) in groundwater at the site. Note that SSL-related constituents in groundwater were delineated within the plant boundary. Therefore, evaluation of off-site ecological receptors associated with the surface water pathway was not necessary. A conservative, health-protective approach was used that is generally consistent with United States Environmental Protection Agency (USEPA) risk assessment guidance, Georgia EPD regulations and guidance, and standard practice for risk assessment in the State of Georgia. Using the groundwater protection standards (GWPS) established for R6-AMA according to Federal and State CCR Rules, cobalt, lithium, and selenium were identified as SSL-related constituents in 2024 (Arcadis, 2024a; 2024b). The risk evaluation relies

[1] The full citation for the Federal CCR Rule is: 40 C.F.R. § 257, Subpart D – *Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments*. The rule was finalized with an effective date of October 14, 2015 and last amended May 8, 2024 with an effective date of November 8, 2024 (USEPA, 2024a).

on recent groundwater data collected by Georgia Power between 2016 to 2024 in compliance with the Federal and State CCR Rules.

Generally consistent with USEPA guidance, this risk evaluation used a tiered approach to evaluate potential risks, which included the following steps:

1. Development of a conceptual exposure model (CEM) for R6-AMA.
2. Initial groundwater risk screening: Comparison of groundwater concentrations for SSL-related constituents (cobalt, lithium, and selenium) to conservative, health-protective criteria and/or site-specific background concentrations to assess whether constituents pose a risk to human health.
3. Refined groundwater risk evaluation: Performance of a more refined analysis for Constituents of Potential Interest (COPIs) that were retained in the initial risk screening in order to evaluate the potential risks for hypothetical off-site residential receptors exposed to groundwater.
4. Development of risk conclusions and identification of associated uncertainties.

Using this approach that includes multiple conservative assumptions, SSL-related constituents in on-site groundwater monitoring wells were delineated to concentrations not exceeding site-specific background (cobalt) or health-protective screening criteria (lithium and selenium) within the plant boundary (i.e., either within R6-AMA or the downgradient AP-2 groundwater monitoring networks). Therefore, no further risk evaluation of groundwater is warranted. Compliance groundwater monitoring for R6-AMA under the Federal and State CCR Rules will continue. Georgia Power will proactively evaluate the data and update this evaluation, if necessary.

1 INTRODUCTION

This report summarizes a risk evaluation of R6-AMA located at Georgia Power's Plant Yates in Coweta County, Georgia (**Figure 1**). R6-AMA is to the east of AP-2 and to the southeast of AP-1. Georgia Power is currently in the permitting process to close R6-AMA in accordance with the Federal CCR Rule (USEPA, 2024a), and the State CCR Rule (EPD, 2022). Two permit applications were submitted to the Georgia EPD in November 2018: one for AMA and another for R6. Due to the configuration of the units and overall groundwater flow direction, both permits proposed combining the monitoring systems of AMA and R6 into a single multi-unit monitoring system that meets federal and state monitoring requirements.

This risk evaluation provides additional technical review of the human health and environmental protectiveness associated with R6-AMA with respect to constituent concentrations in groundwater identified at SSLs above the GWPS. Cobalt, lithium, and selenium were identified as SSL-related constituents using the GWPS established for R6-AMA according to Federal and State CCR Rules (Arcadis, 2024a; 2024b). The evaluation relies on a conservative, health-protective approach that is generally consistent with the risk approaches outlined in the Voluntary Remediation Program (VRP) (Georgia Voluntary Remediation Act, O.C.G.A. § 12-8-100) (EPD, 2009) and components of the Risk Assessment Guidance for Superfund (RAGS) as included in the USEPA Regional Screening Levels (RSLs) User's Guide (USEPA, 2024b). This evaluation also incorporated principles and assumptions generally consistent with Federal and State CCR Rules.

The risk evaluation includes the development of a site-specific CEM and a stepwise risk screening process for identified SSL-related constituents for R6-AMA. Cobalt was identified as an SSL-related constituent in YAMW-3, and lithium was identified as an SSL-related constituent in YAMW-3 and YGWC-42 (**Figure 2**). Selenium was also identified as an SSL-related constituent in YGWC-38 and PZ-37 (**Figure 2**). Based on the results of the risk evaluation for SSL-related constituents, a site-specific recommended path forward is provided.

The remainder of the report is organized as follows:

- ***Section 2, Basis and Background for the Development of the Conceptual Exposure Model*** – Presents site-specific information related to the site history, monitoring network, topography and surface hydrology, geology and hydrogeology, potential transport pathways, and receptors that could potentially be exposed to SSL-related constituents.

- ***Section 3, Risk Evaluation Screening*** – Describes the process for the initial risk-based screening of SSL-related constituents to identify COPIs in groundwater.

- ***Section 4, Refined Risk Evaluation –*** Describes the risk screening process for the groundwater COPIs, including calculation of exposure point concentrations (EPCs) and analysis of concentration trends over time.

- ***Section 5, Uncertainty Assessment*** – Describes the uncertainties associated with the risk screening process.

- ***Section 6, Conclusions*** – Presents the conclusions of the risk evaluation.

- ***Section 7, References*** – Provides reference information for the sources cited in this document.

2 BASIS AND BACKGROUND FOR THE DEVELOPMENT OF THE CONCEPTUAL EXPOSURE MODEL

This section provides a brief overview of the site location and operational history, site regulatory status, and geology/hydrogeology.

A CEM representing the site-specific processes and conditions that are relevant to the potential migration of groundwater and potential exposure to SSL-related constituents has been developed based on a review and compilation of information previously presented for R6-AMA, including the *Hydrogeologic Assessment Report* (ACC, 2021), *2023 Annual Groundwater Monitoring and Corrective Action Report* (Arcadis, 2024a), and *2024 Semiannual Groundwater Monitoring and Correction Action Report* (Arcadis, 2024b). The CEM includes a conservative evaluation of potential exposure pathways, and potential human and ecological receptors.

2.1 Site Description

Plant Yates is located on the east bank of the Chattahoochee River in Coweta County, Georgia near the Coweta and Carroll County line, approximately 8 miles northwest of the city of Newnan and 13 miles southeast of the city of Carrollton. Plant Yates occupies approximately 2,400 acres and is bordered by the Chattahoochee River on the west (**Figure 1**). Plant Yates was once a coal-fired power generating facility but was converted to natural gas combustion turbines in 2014. Of the original seven coal-fired steam generating units (Units 1 – 7), Units 1 through 5 were retired in 2015 and Units 6 and 7 were converted from coal to natural gas and remain in service. CCR units at Plant Yates include the Gypsum Stack Landfill, AP-1, AP-2, and R6-AMA. The units included in R6-AMA for this report are described below (ACC, 2021):

- R6 is an inactive CCR landfill as defined in the Georgia Rules for Solid Waste Management, Rule 391-3-4-.10(2)(a)3, because it no longer received CCR on or after October 19, 2015. R6 will be closed in place in accordance with the solid waste permit and the CCR Rules.

- Once consolidated and closed in place, the AMA footprint will consist of CCR from AP-1, AP-2, AP-3, AP-A, AP-B, and AP-B'. AP-1 is a 23.4-acre former CCR surface impoundment that completed CCR removal in July 2017. AP-2 is a 60-acre former CCR surface impoundment that completed CCR removal in September 2023. AP-3 is an inactive 55-acre surface impoundment currently undergoing closure in place including consolidation to reduce the footprint. AP-A is an 8.9-acre former CCR surface impoundment that completed CCR removal in June 2017. AP-B is an inactive 6.3-acre CCR surface impoundment currently undergoing CCR removal. AP-B' is an inactive 29.8-acre surface impoundment

currently undergoing closure in place including consolidation to reduce the footprint.

Semiannual groundwater monitoring and reporting for Plant Yates R6-AMA is performed in accordance with the monitoring program requirements of the Federal CCR Rule and Georgia EPD Solid Waste Management Program. In accordance with 40 CFR § 257.91, a certified compliance groundwater monitoring network was installed to monitor groundwater quality both upgradient and downgradient of R6-AMA. There are also non-network wells/piezometers that may be utilized for water level measurements or non-routine sample collection. The two AP-2 wells farthest downgradient of R6-AMA (YGWC-26S and YGWC-26I) were included in the risk evaluation because groundwater flows from R6-AMA into AP-2 and through the area near YGWC-26S and YGWC-26I, as discussed in Section 2.1.2. The locations of the certified compliance well network, non-network wells/piezometers, and the additional wells included in the risk evaluation are provided on **Figure 2**.

2.1.1 Topography and Surface Hydrology

The site is located within the Piedmont Physiographic Province of central Georgia, which is characterized by gently rolling hills and narrow valleys, with locally pronounced linear ridges. R6-AMA is located within the Middle Chattahoochee River Basin, where annual average rainfall ranges from 50 to 54 inches per year. Topography drops from an elevation of approximately 830 feet (ft) above mean sea level (amsl) along the southeastern border of the site to 700 ft amsl adjacent to the Chattahoochee River located west of R6-AMA. This drop occurs over a distance of approximately 8,300 ft and does not take into account the elevation variations across the site due to manmade features (i.e., CCR units). The Chattahoochee River is a southward flowing river that originates in the Valley and Ridge Physiographic Province near Helen, Georgia.

2.1.2 Geology and Hydrogeology

The geologic and hydrogeologic characteristics of the site have been extensively evaluated and compiled in previous reports. The following presents a brief summary of this information from the *2023 Annual Groundwater Monitoring and Corrective Action Report* (Arcadis, 2024a) for R6-AMA:

> *Plant Yates is located in the Inner Piedmont Physiographic Province of western Georgia, immediately southeast of the Brevard Zone, a regional fault zone that separates the Piedmont from the Blue Ridge. Rock units at Plant Yates are primarily interlayered gneiss and schists. The rocks in the area have been subjected to extensive metamorphism, deformation, and igneous intrusions. Extensive fracture sets are present in the underlying bedrock. Surface expressions of these fractures are observed on topographic maps and aerial photographs of the Plant Yates area (ACC 2021).*

A thin layer of soil from 1 to 2 feet thick overlies a thick layer of saprolite. The saprolite, which extends to typical depths of 20 to 40 feet below ground surface, was formed in-place by the physical and chemical weathering of the underlying metamorphic rocks. The saprolite typically consists of clay- and silt-rich soils that grade to sandier soils with depth. A zone of variable thickness (approximately 5 to 20 feet) of transitionally weathered rock typically exists between the saprolite and competent bedrock. The lithology of the transition zone is highly variable and ranges from medium to coarse unconsolidated material to highly fractured and weathered rock fragments. Localized alluvial soils consisting of generally coarser material (silty-sand, clayey silt, and silty clay with well rounded gravel and cobbles) that have been observed in saprolite may be related to historical river channel migration.

At Plant Yates, groundwater is typically encountered slightly above the saprolite/weathered rock interface. Groundwater flow in the saprolite zone is through interconnected pores and relict textures and fractures. As the rock becomes increasingly competent with depth, groundwater flow occurs mainly through joints and fractures (i.e., secondary porosity). Recharge to the water-bearing zones in fractured bedrock takes place by seepage through the overlying mantle of soil/saprolite or by direct entrance through openings in outcrops and varies with topography. The water table occurs in the saprolite and in the transitionally weathered zone, at least several feet above the top of rock.

Field hydraulic conductivity tests (i.e., slug tests) have been performed in saprolite and weathered bedrock at multiple locations at the site. The hydraulic conductivity at these locations typically ranges from 10^{-3} to 10^{-4} centimeters per second, based on multiple rising-head and falling-head slug tests (ACC 2019). This indicates a fairly uniform medium across the saprolite and weathered rock horizon. The hydraulic conductivity values from the field tests fall within a range consistent with that of Piedmont overburden (Newell et al. 1990).

The potentiometric surface elevation contours for February 2024 are presented in **Figure 3**. Pertinent hydrogeologic information from the *Hydrogeologic Assessment Report* (ACC, 2021) is presented below:

Groundwater flow in the upper aquifer is under unconfined conditions and the water table is typically noted in the saprolite near the bedrock interface. Deeper groundwater flow is within the fractured bedrock and along discontinuities.

Groundwater flow direction in the upper aquifer is controlled by topography and by drainage features such as creeks, man-made ash impoundments, and the Chattahoochee River. The general site-wide groundwater flow direction is from the east-northeast to west-southwest. Groundwater flow at R6-AMA is from three directions; south to north, southeast to northwest and from northeast to southwest.

Groundwater flow across the R6-AMA area ultimately flows west-northwest as it leaves the R6-AMA area and flows into the area surrounding AP-2. Based on the depression formed by the interpreted 710-foot contour line shown on **Figure 3**, groundwater from R6-AMA is anticipated to flow west-northwest towards the river and funnel through the area near YGWC-26S and YGWC-26I.

2.2 Potential Transport Pathways

A variety of geologic, hydrogeologic, and geochemical mechanisms can occur in the subsurface and serve to attenuate constituent concentrations in groundwater such as soil or rock characteristics, the local geology and hydrogeology, and the distance the groundwater must travel before reaching a potential receptor. A summary of potential transport pathways is shown on the CEM in **Figure 4**.

The Chattahoochee River is located to the west of the site and flows in a southward direction (**Figure 2**). SSL-related constituent concentrations in groundwater were delineated below site-specific background (cobalt) or health-protective screening criteria in on-site groundwater (lithium and selenium); therefore, evaluation of the surface water pathway was not necessary.

2.3 Potential Exposure Pathways and Receptors

The exposure pathways for groundwater assumed to be complete based on site-specific information were used to identify potential receptors and estimate potential risk. The CEM (**Figure 4)** depicts the conservative potential exposure pathways and receptors included in the risk evaluation.

The following potential exposure pathways and receptors were considered:

- On-site industrial worker: The groundwater exposure pathway for the on-site industrial worker was considered incomplete because there are no wells on-site that are classified for use as potable wells.

- On-site construction worker: While there is a potential for limited exposure to groundwater by a construction worker through dermal contact with on-site shallow groundwater during subsurface activities, construction workers would be expected to have little to no direct contact with on-site groundwater due to safety procedures outlined in their site-specific health and safety plans.

- On-site resident: The groundwater exposure pathway for on-site residents was considered incomplete because there is no residential use on-site under current site conditions. Future residential use of the permitted R6-AMA is precluded during post-closure care. Land use surrounding the site is zoned Rural Conservation District (Coweta County, 2020). Beyond the Chattahoochee River

to the west, land use is predominantly zoned Industrial and Agricultural with some scattered Residential land use also present (Carroll County, 2021).

- Off-site industrial/construction worker: The potential for off-site worker exposure through direct contact with groundwater was addressed through the evaluation of hypothetical off-site residential receptors. Health-protective screening levels for residential receptors would be more conservative than industrial and construction worker screening levels.

- Off-site resident: The groundwater exposure pathway for hypothetical off-site residential receptors was assumed potentially complete for the purpose of this evaluation. Multiple surveys of potential water supply wells were conducted at the site. These surveys consisted of reviewing Federal, State, and County records and online sources, in addition to conducting windshield surveys of the area.

    - NewFields conducted a survey in 2020 which covered a 3-mile radius for water supply wells (**Appendix A**).

    - Updated surveys of water wells were conducted in 2021 and 2023 within a 2-mile radius of the site by Arcadis (2022; 2024a).

  The findings from the 2021 and 2023 surveys (Arcadis, 2022; 2024a) were generally consistent with the 2020 NewFields survey, with three additional wells west of the Chattahoochee River identified in the 2021 survey. The results of all the surveys up to a 3-mile radius have been combined and are presented on **Figure 5**.

  Combining well information from all sources with parcel data, over 700 parcels likely to be associated with an active or inactive private well within the three-mile radius were identified. Although water lines near the site were constructed in the mid-1990s, there are likely homes near water lines that may still be on wells. The surveys identified several private wells in the vicinity of the site with the closest being:

    - South of the site and near the southeast corner of AP-3 near Wagers Mill Road, up to Sol Bridges Road (upgradient of the site);
    - East of AP-B' near Stapler Road (upgradient of the site);
    - Southeast and northeast (upgradient of the site) along Old Carrollton Road, Sewell Mill Road and Daniel Road; and
    - West of the Chattahoochee River (upgradient of the site and up to 2 miles away).

  No private wells are located downgradient of R6-AMA prior to reaching the Chattahoochee River which is considered a hydraulic discharge boundary. In

addition, SSL-related constituent concentrations were delineated below site-specific background (cobalt) or health-protective screening criteria in on-site groundwater (lithium and selenium) prior to reaching the Chattahoochee River.

Two public wells are also located within the three-mile radius. These wells, operated by the City of Whitesburg, are located approximately three miles northwest of the site across the Chattahoochee River. Because the Chattahoochee River serves as the site and regional hydraulic discharge boundary for groundwater flow in the upper aquifer, groundwater flow on the west side of the river flows from the north and west to the Chattahoochee River, and is therefore, upgradient of the site.

No surface water intakes have been identified for public water supplies within a three-mile radius of the site. Use of surface water as a drinking water source within three miles of the site is an incomplete exposure pathway; therefore, drinking water exposure assumptions for surface water do not apply.

As a conservative measure, potential off-site residential exposure to SSL-related constituents was evaluated using on-site groundwater wells/piezometers downgradient of R6-AMA and the farthest downgradient wells in AP-2. This comparison makes the conservative assumption that SSL-related constituents in on-site groundwater may potentially migrate to off-site drinking water wells, through advective transport in groundwater without any attenuation within the aquifer media through factors such as dilution, dispersion, or adsorption. The risk evaluation screening conservatively assumed that hypothetical off-site residential receptors could be exposed to the concentrations of SSL-related constituents in groundwater through its use as a potable water supply by ingestion and dermal contact with groundwater.

- Off-site recreational surface water receptors: The surface water exposure pathway for recreational receptors was addressed qualitatively through the evaluation of on-site groundwater data. SSL-related constituent concentrations were delineated below site-specific background (cobalt) or health-protective screening criteria in on-site groundwater (lithium and selenium); therefore, evaluation of the surface water pathway was not necessary.

- Off-site ecological surface water receptors: The surface water exposure pathway for off-site ecological receptors was addressed qualitatively through the evaluation of on-site groundwater data. SSL-related constituent concentrations were delineated below site-specific background (cobalt) or health-protective screening criteria in on-site groundwater (lithium and selenium); therefore, evaluation of the surface water pathway was not necessary.

3 RISK EVALUATION SCREENING

The CEM developed in Section 2 was used to identify the potentially complete exposure pathways to human receptors that are considered in the risk evaluation. The initial step in the risk evaluation is the comparison of SSL-related constituents in groundwater to site-specific background or health-protective levels for potentially complete exposure pathways. The approach used is generally consistent with the Georgia EPD regulations and guidance, USEPA guidance, and standard practice for risk assessment in the State of Georgia. The Georgia EPD allows for the site-specific evaluation of risk in programs such as the Voluntary Remediation Program (EPD, 2009).

The initial risk evaluation screening was performed for the potential groundwater exposure pathway by comparing the concentrations of on-site groundwater wells determined to have SSL-related constituents to site-specific background or appropriate health-protective screening criteria. These criteria included the risk reduction standards (RRS) established in accordance with the Hazardous Site Response Act (HSRA)[2] for drinking water and site-specific background for the protection of human health. If the maximum concentration of an SSL-related constituent exceeded the screening criterion, the constituent was identified as a COPI for further evaluation in the refined risk evaluation. The methodology and screening criteria used were identified in accordance with regulatory guidance and standard risk assessment practices using an approach designed to conservatively overestimate possible exposures and risks, providing an additional level of confidence in the conclusions. The methodology is summarized on **Figure 6** and discussed in more detail below.

3.1 Data Used in Risk Evaluation Screening

This section provides information on the groundwater dataset used in the risk evaluation screening.

3.1.1 Groundwater Data

For the initial risk screening evaluation, groundwater data from samples collected between 2016 and February 2024 from the on-site wells that were identified to have SSL-related constituents (YAMW-3 for cobalt; YAMW-3 and YGWC-42 for lithium; and YGWC-38 and PZ-37 for selenium) were used in the risk screening evaluation for hypothetical off-site residential exposure. Data from these wells for the SSL-related constituents were screened against site-specific background or appropriate health-protective screening criteria. The wells with SSL-related constituents are depicted on **Figure 2** and the groundwater dataset used in the risk evaluation for wells exhibiting SSLs is presented in **Appendix B.** Method detection limits for the groundwater dataset

[2] HSRA and the VRP were updated in 2018 for consistency with USEPA's RAGS for the calculation of RSLs.

used in the risk evaluation were reviewed and confirmed to be less than the screening levels. All groundwater data were validated in accordance with USEPA guidance.

3.1.2 Background Groundwater Quality

Statistical analysis of groundwater monitoring data is performed at Plant Yates pursuant to 40 CFR §257.93-95 following the professional engineer (PE)-certified Statistical Analysis Method Certification (Rev 01, amended January 2020) (Georgia Power, 2020) for R6-AMA and the Unified Guidance (USEPA, 2009); background values are routinely updated under the program. Nineteen monitoring wells in the certified monitoring well network were designated as upgradient or background locations, including YGWA-4I, YGWA-5D, YGWA-5I, YGWA-17S, YGWA-18S, YGWA-18I, YGWA-20S, YGWA-21I, YGWA-39, YGWA-40, YGWA-1I, YGWA-1D, YGWA-2I, YGWA-3I, YGWA-3D, YGWA-14S, YGWA-30I, YGWA-47, and GWA-2. The statistical analyses performed on the groundwater data using Sanitas groundwater statistical software, as described in the *2023 Annual Groundwater Monitoring and Corrective Action Report* (Arcadis, 2024a), is presented below:

> *Interwell parametric tolerance limits were used to calculate background limits from pooled upgradient well data for the wells identified in Table 1A for Appendix IV constituents with a target of 95 percent confidence and 95 percent coverage. When data contained greater than 50 percent non-detects or did not follow a normal or transformed-normal distribution, non-parametric tolerance limits are [sic] were used. The confidence and coverage levels for nonparametric tolerance limits are dependent upon the number of background samples. The background levels are then used when determining the groundwater protection standards (GWPS) in accordance with 40 CFR § 257.95(h) and GAEPD Rule 391-3-4-.10(6)(a).*

Naturally occurring or site-specific background concentrations can exceed health-protective screening criteria. Therefore, site-specific background values may be used as the groundwater screening values if background concentrations were identified as greater than the groundwater screening values.

3.2 Groundwater Screening Evaluation

The process of screening SSL-related constituents in groundwater against human health screening levels for groundwater is discussed below and presented in **Figure 6**. The HSRA RRS evaluated under the VRP approach presented herein included Type 1 and Type 2 standards for off-site residential receptors. The Hazardous Site Response Act, Rule 391-3-19.07(1) notes that "*[a]ll risk reduction standards will, when implemented, provide adequate protection of human health and the environment.*" In addition, Rule 391-3-19.07(3) notes a corrective action, if needed, may be considered complete when "*a site meets any or a combination of the applicable risk reduction standards described in Rule 391-3-19-.07."*

In accordance with standard practice and methodologies approved by the Georgia EPD, the screening level hierarchy for the SSL-related constituents is as follows:

- The higher of the Type 1 or Type 2 RRS for potential future off-site residential exposures, which are considered protective of human health for those constituents regulated under HSRA (i.e., lithium and selenium).

  Type 2 RRSs were used for lithium (0.040 mg/L) and selenium (0.10 mg/L), which are the lower of the calculated carcinogenic and non-carcinogenic values derived using the default exposure factors for residential receptors and the methodology found in Appendix III of the HSRA rule (EPD, 2018). Toxicity values for lithium and selenium used for the Type 2 RRS calculations were identified in the Integrated Risk Information System (IRIS) (USEPA, 2024c). The risk-based Type 2 RRS were calculated using USEPA's RSL calculator (USEPA, 2024b) assuming a target cancer risk of 1×10^{-5} and a target hazard quotient of 1, consistent with Georgia EPD guidance (EPD, 2018). The calculations of the Type 2 RRS values for the SSL-related constituents are presented in **Appendix C**.

- If site-specific background concentrations are greater than the criteria described above, then the site-specific background concentration is used as the screening level in accordance with the CCR methodology for development of groundwater protection standards (USEPA, 2024a). The site-specific background level for cobalt (0.035 mg/L) is higher than the Type 2 RRS as well as the GWPS established under the CCR Rule (0.006 mg/L); therefore, in accordance with the CCR Rule, background was used as the cobalt screening level in the evaluation.

Table 1 presents the maximum detected concentration of each SSL-related constituent, which was used to represent potential off-site groundwater quality for comparison to the selected screening levels for hypothetical off-site residential receptors. The maximum detected concentrations of cobalt (0.16 mg/L), lithium (0.059 mg/L), and selenium (0.33 mg/L) exceeded respective screening levels. Cobalt, lithium, and selenium were thereby identified as COPIs and retained for further evaluation in the refined risk evaluation.

4 REFINED RISK EVALUATION

A refined risk evaluation was conducted for the groundwater COPIs (i.e., cobalt, lithium, and selenium) that were detected at concentrations exceeding site-specific background or the health-protective screening criteria. The refined risk evaluation identified EPCs for cobalt, lithium, and selenium in groundwater for the purposes of characterizing potential risk to human receptors.

4.1 Refined Groundwater Risk Evaluation

Potential risk associated with exposure to the COPIs by hypothetical off-site residential receptors was refined using the methodology described in HSRA and VRP and other supporting guidance (EPD, 2018; EPD, 2009; EPD, 2015), as presented in the following section and on **Figure 7**.

For the refined risk evaluation, groundwater data from samples collected between 2016 and February 2024 from the on-site wells that were identified to have SSL-related constituents and downgradient monitoring wells/piezometers that represent groundwater flow in the same hydrologically downgradient direction were used to evaluate hypothetical off-site residential exposure.

The downgradient groundwater monitoring wells and piezometers included in the refined risk evaluation are depicted with yellow well labels on **Figure 2**. The following list of wells used to assess hypothetical off-site residential exposure includes those wells with SSL-related constituents along with the wells and piezometers downgradient of the wells exhibiting SSLs:

Cobalt

- YAMW-3 (SSL well), YGWC-42, YGWC-43, YGWC-50, PZ-51, PZ-55, YGWC-26I (AP-2), and YGWC-26S (AP-2)

Lithium

- YAMW-3 (SSL well), YGWC-42 (SSL well), YGWC-43, YGWC-50, PZ-51, PZ-55, YGWC-26I (AP-2), and YGWC-26S (AP-2)

Selenium

- YGWC-38 (SSL well), PZ-37 (SSL well), YAMW-5, PZ-37D, PZ-52D, YGWC-23S, YGWC-50, YGWC-26I (AP-2), and YGWC-26S (AP-2)

Groundwater data used in the risk screening level evaluation were collected from the uppermost aquifer and are considered to be representative of groundwater conditions at the site. The groundwater dataset used in the refined risk evaluation is presented in **Appendix B.**

4.1.1 Groundwater Exposure Point Calculation

The refined risk evaluation for COPIs includes the development of EPCs. The EPC is a conservative estimate of potential exposure to a receptor. The EPC is based on the 95 percent upper confidence limit of the arithmetic mean (UCL) and accounts for uncertainty and variability in the dataset (USEPA, 2002). Consistent with USEPA guidance for developing groundwater EPCs (USEPA, 2014), UCLs were calculated using USEPA ProUCL 5.2 software (ProUCL) (USEPA, 2022a) and user's guide (USEPA, 2022b). For the refined risk evaluation, the UCLs for the COPIs in groundwater were calculated for the following specific datasets:

- UCLs for the individual well(s) with SSL-related constituents;
- UCLs based on combined data from the well(s) with SSL-related constituents and other well(s)/piezometer(s) in the general vicinity that represent groundwater flow in the same hydrologically downgradient direction; and
- UCLs based on the combined data from the farthest downgradient well(s)/piezometer(s) that are hydrologically downgradient of the well(s) with an SSL-related constituent.

Other assumptions made in the calculations of the UCLs include:

- Primary samples (no duplicates) were used to calculate EPCs as duplicate samples were analyzed for quality assurance purposes.
- If the calculated UCL exceeded the maximum detected concentration, then the maximum detected concentration was used as the EPC.

ProUCL software calculates multiple UCLs and provides a recommended UCL that was selected as the EPC. If there were multiple UCLs recommended by ProUCL, the maximum UCL value was selected as a conservative measure. **Appendix D-1** provides a detailed summary of the UCLs calculated using the methods described above, and **Appendix D-2** presents figures showing the wells used in the calculation of the EPCs for selenium. **Appendix D-3** provides the input and output files associated with the ProUCL software.

Table 2 summarizes the groundwater EPCs selected for cobalt, lithium, and selenium. This table shows the number of samples, the maximum detected concentration, the UCL recommended by ProUCL software, and the selected EPC.

4.1.2 COPI Concentration Trend Analysis

Concentration trends over time were evaluated as one line of evidence in the refined risk evaluation for cobalt, lithium, and selenium. The Mann-Kendall trend test with an alpha value equal to 0.05 and the Theil-Sen line test were conducted on the data from well/constituent pairs with SSLs to evaluate the trends in concentrations over time. The tests were conducted using the USEPA ProUCL 5.2 software (USEPA, 2022a).

Results of the Mann-Kendall and Theil-Sen test results are summarized below and presented on time series graphs in **Appendix D-4.**

4.1.2.1 Cobalt

There was insufficient evidence of a statistically significant trend in 2022-2024 cobalt concentrations at YAMW-3. Cobalt was detected in all five samples at concentrations ranging from 0.051 to 0.16 mg/L, which exceed the site-specific background concentration of 0.035 mg/L. It should be noted that detections of cobalt in nearby and the nearest downgradient wells (YGWC-42, YGWC-43, PZ-55, PZ-51, and YGWC-50) are below the site-specific background concentration of 0.035 mg/L.

4.1.2.2 Lithium

There was insufficient evidence of a statistically significant trend in 2021-2024 lithium concentrations at YAMW-3. Lithium detections at YAMW-3 ranged from 0.040 to 0.054 mg/L, with exceedances of the screening level of 0.040 mg/L in six out of seven samples.

A statistically significant increasing trend was identified in 2016-2024 lithium concentrations at YGWC-42. Detected concentrations of lithium in YGWC-42 ranged from 0.021 J to 0.059 mg/L, with exceedances of the screening level of 0.040 mg/L in 12 out of 21 samples.

It should be noted that detections of lithium in the nearest downgradient wells (YGWC-43, PZ-55, PZ-51, and YGWC-50) are below the screening level of 0.040 mg/L.

4.1.2.3 Selenium

Detected concentrations of selenium (2017-2024) at PZ-37 ranged from 0.13 to 0.33 mg/L. Although all 19 sample results exceeded the screening level of 0.10 mg/L, a statistically significant decreasing trend in selenium was identified at PZ-37. Although selenium was detected at the nearby piezometer (PZ-37D) immediately after installation in 2021 at concentrations slightly exceeding the screening level of 0.10 mg/L (0.14 and 0.18 mg/L), selenium has been non-detect at a PQL of 0.005 mg/L in the eight subsequent samples.

Detected concentrations of selenium (2017-2024) at YGWC-38 ranged from 0.048 to 0.27 mg/L. The screening level of 0.10 mg/L was exceeded in 11 of 21 samples; however, concentrations of selenium have been below the respective screening level since March 2020 and a statistically significant decreasing trend was identified. Selenium concentrations at the remaining nearby and downgradient wells YAMW-5, PZ-52D, YGWC-23S, and YGWC-50 are below the screening level of 0.10 mg/L.

4.1.3 Refined Groundwater Risk Evaluation Results

Cobalt, lithium, and selenium were identified as groundwater COPIs in the initial screening. In the refined risk evaluation, comparison of the calculated EPC to the screening level was used to identify constituents of interest (COIs) that may pose a potential risk to hypothetical off-site residential receptors exposed through the use of groundwater as potable water. If the EPC from the farthest downgradient well(s) is greater than the respective screening level, then the constituent is identified as having the potential for risk that warrants additional evaluation (e.g., performing a surface water evaluation).

4.1.3.1 Cobalt

Cobalt was detected in 5 out of 5 groundwater samples in wells YAMW-3 at concentrations that exceeded the groundwater screening level for residential receptors. For the refined risk evaluation, the following EPCs were calculated for cobalt using the monitoring wells/piezometers shown in **Appendices D-1** and **D-2**:

- Data from YAMW-3 were combined to determine if the UCL was less than the screening level (EPC Step 1 in **Appendix D-1**).

- Data from YAMW-3 and the nearby and downgradient wells/piezometers (YGWC-42, YGWC-43, YGWC-50, PZ-51, PZ-55, YGWC-26I (AP-2), and YGWC-26S (AP-2)) were combined to represent groundwater exposure in the same hydraulically downgradient direction (EPC Step 2 in **Appendix D-1**).

- Data from YGWC-26S (AP-2) and YGWC-26I (AP-2) were combined to represent groundwater exposure using the wells that are the farthest hydraulically downgradient of R6-AMA well YAMW-3 (EPC Step 3 in **Appendix D-1**).

Although EPC Step 1 (0.14 mg/L) exceeded the applicable screening level, both EPC Steps 2 and 3 (0.010 mg/L, and 0.0014 mg/L, respectively) were below the site-specific background concentration for cobalt (0.035 mg/L). Cobalt concentrations in on-site groundwater monitoring wells were delineated within the plant boundary to concentrations below site-specific background.

4.1.3.2 Lithium

Lithium was detected in 18 out of 28 groundwater samples in wells YAMW-3 and YGWC-42 at concentrations that exceeded the groundwater screening level for residential receptors. For the refined risk evaluation, the following EPCs were calculated for lithium using the monitoring wells/piezometers shown in **Appendices D-1** and **D-2**:

- Data from YAMW-3 and YGWC-42 were combined to determine if the UCL was less than the screening level (EPC Step 1 in **Appendix D-1**).

- Data from YAMW-3, YGWC-42, and the downgradient wells/piezometers YGWC-43, YGWC-50, PZ-51, PZ-55, YGWC-26I (AP-2), and YGWC-26S(AP-2) were combined to represent groundwater exposure in the same hydraulically downgradient direction (EPC Step 2 in **Appendix D-1**).

- Data from YGWC-26S (AP-2) and YGWC-26I (AP-2) were combined to represent groundwater exposure using the wells that are the farthest hydraulically downgradient of R6-AMA wells YAMW-3 and YGWC-42 (EPC Step 3 in **Appendix D-1**).

Although EPC Step 1 (0.047 mg/L) exceeded the applicable screening level, both EPC Steps 2 and 3 (0.019 mg/L and 0.0047 mg/L, respectively) were below the applicable screening level for lithium (0.040 mg/L). Lithium concentrations in on-site groundwater monitoring wells were delineated within the plant boundary to concentrations not exceeding the health-protective screening level.

4.1.3.3 Selenium

Selenium was detected in 30 out of 40 groundwater samples in wells YGWC-38 and PZ-37 at concentrations that exceeded the groundwater screening level for residential receptors. For the refined risk evaluation, the following EPCs were calculated for selenium using the monitoring wells/piezometers shown in **Appendices D-1** and **D-2**:

- Data from YGWC-38 and PZ-37 were combined to determine if the UCL was less than the screening level (EPC Step 1 in **Appendix D-1**).

- Data from YGWC-38 and PZ-37 and the nearby and downgradient wells/piezometers (YAMW-5, PZ-37D, PZ-52D, YGWC-23S, YGWC-50, YGWC-26S (AP-2), and YGWC-26I (AP-2)) were combined to represent groundwater exposure in the same hydraulically downgradient direction (EPC Step 2 in **Appendix D-1**).

- Data from YGWC-26S (AP-2) and YGWC-26I (AP-2) were combined to represent groundwater exposure using the wells that are the farthest hydraulically

downgradient of R6-AMA wells YGWC-38 and PZ-37 (EPC Step 3 in **Appendix D-1**).

Although EPC Step 1 (0.20 mg/L) exceeded the applicable screening level, both EPC Steps 2 and 3 (0.076 mg/L and 0.0019 mg/L) were below the applicable screening level for selenium (0.10 mg/L). Selenium concentrations in on-site groundwater monitoring wells were delineated within the plant boundary to concentrations not exceeding the health-protective screening level.

4.1.3.4 Summary

Although EPCs for Step 1 were above the applicable screening levels for cobalt, lithium, and selenium, EPCs for Steps 2 and 3 were below. **Table 3** presents the results of the refined screening comparing the farthest hydrologically downgradient EPCs (EPC Step 3) to the screening levels. There are no groundwater COIs for hypothetical off-site residential receptors. Therefore, cobalt, lithium, and selenium are not expected to pose a risk to human health through potable water use.

4.1.4 Refined Groundwater Risk Evaluation Summary and Conclusions

Detections of cobalt, lithium, and selenium were reported at concentrations above respective groundwater screening levels. However, the results of the refined risk evaluation for groundwater indicate the following:

- Cobalt, lithium, and selenium are not expected to pose a risk to hypothetical off-site residential receptors.
- All of the individual data points used to calculate the cobalt and lithium EPCs for Steps 2 and 3 to represent potential groundwater exposure for hypothetical off-site residential receptors were below the health-protective screening level for lithium and the site-specific background concentration for cobalt.
- All of the individual data points used to calculate the selenium EPC for Step 3 were below the health-protective screening level.
- A statistically significant decreasing trend over time in selenium concentrations at PZ-37 and YGWC-38 have been observed.
    - Although selenium concentrations exceed the screening level of 0.10 mg/L in all samples from PZ-37, concentrations have been trending downwards and are approaching the abovementioned screening level (selenium detected at 0.13 mg/L in the February 2024 sample).

    - Concentrations of selenium at YGWC-38 have been below the screening level of 0.10 mg/L since March 2020.

- A statistically significant increasing trend over time in lithium concentrations at YGWC-42 was identified. It should be noted that detections of lithium in the nearest downgradient wells YGWC-43, PZ-55, PZ-51, and YGWC-50 are below the screening level of 0.040 mg/L.

- Although there was insufficient evidence of a statistically significant trend in cobalt concentrations at YAMW-3, it should be noted that detections of cobalt in nearby and the nearest downgradient wells (YGWC-42, YGWC-43, PZ-55, PZ-51, and YGWC-50) are below the site-specific background concentration of 0.035 mg/L.

Therefore, based on the multiple lines of evidence and various conservative assumptions, further risk evaluation for groundwater is not warranted. Compliance groundwater monitoring under the Federal and State CCR Rules will continue. Downgradient monitoring wells YGWC-26I and YGWC-26S will also continue to be monitored under the AP-2 compliance groundwater monitoring program.

5 UNCERTAINTY ASSESSMENT

USEPA guidance stresses the importance of providing an analysis of uncertainties so that risk managers are better informed when evaluating risk assessment conclusions (USEPA, 1989). The uncertainty assessment provides a better understanding of the key uncertainties that are most likely to affect the risk assessment results and conclusions.

The potential uncertainties associated with the risk evaluation are as follows:

Health-Protective Screening Criteria Uncertainties:

- In accordance with standard practice and methodologies approved by the Georgia EPD, the higher of the Type 1 or Type 2 standard was selected for screening criteria. Selection of the screening criteria per standard practice is considered appropriate for risk quantification for R6-AMA. The Hazardous Site Response Act, Rule 391-3-19.07(1) notes that "*[a]ll risk reduction standards will, when implemented, provide adequate protection of human health and the environment*". Thus, this approach is likely to overestimate risks for hypothetical off-site receptors.

- Screening criteria based on RRSs, including lithium and selenium, represent the reasonable maximum exposure (RME). The RME is defined as "the highest exposure that is reasonably expected to occur at a site but that is still within the range of possible exposures" (USEPA, 1989). USEPA (1989) states that the "intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures". Potential receptors will likely have lower exposures than those presented in this risk evaluation (i.e., a majority of the site concentrations will be less than the UCL), and therefore, potential exposures are likely overestimated.

Exposure Uncertainties:

- The maximum detected concentrations of SSL-related constituents were compared to conservative screening criteria to identify the COPIs. Use of the maximum detected concentration is generally consistent with standard risk assessment practice; however, use of the maximum detected concentration for exposure likely overestimates potential risk.

- The constituents included in the risk evaluation occur naturally in the site geologic setting. Although background concentrations were evaluated and used in the screening process, contributions to exposure and risk were assumed to be entirely CCR-related and natural background sources were not quantified. Thus, SSL-related exposures were likely overestimated.

- Hypothetical off-site residential exposure was evaluated using on-site groundwater data from wells downgradient of R6-AMA, including data from two AP-2 wells. This comparison makes the conservative assumption that on-site groundwater may potentially migrate to off-site drinking water wells through advective transport in groundwater, but without any attenuation within the aquifer media through factors such as dilution, dispersion, or adsorption. This assumption may overestimate exposure and risk hypothetical off-site receptors.

- EPCs for metals in groundwater were assumed to be 100 percent bioavailable by ingestion and dermal contact. This assumption may tend to overestimate risk.

- Multiple surveys of potential water supply wells were conducted at the site (NewFields, 2020; Arcadis, 2022; 2024a). These surveys consisted of reviewing Federal, State, and County records and online sources, in addition to conducting windshield surveys of the area. WSP relied on the data collected by Newfields and Arcadis. The results of all the surveys up to a 3-mile radius have been combined and are presented on **Figure 5**.

  Although off-site potable wells identified in the well survey were not included in the risk evaluation, the presence of these wells do not appear to change the conclusions of the risk evaluation because concentrations of cobalt, lithium, and selenium were delineated to concentrations below site-specific background or health-protective screening criteria within the plant boundary (i.e., either within R6-AMA or the downgradient AP-2 groundwater monitoring networks).

Toxicity Uncertainties:

- Toxicity factors used to calculate health-protective criteria are established at conservative levels to account for uncertainties and often result in criteria that are many times lower than the levels observed to cause effects in human or animal studies. Therefore, a screening level exceedance does not necessarily equate to an adverse effect.

6 CONCLUSIONS

This human health risk and ecological evaluation for SSL-related constituents in groundwater at the site was conducted using methods generally consistent with Georgia EPD and USEPA guidance and included multiple conservative assumptions. Based on this evaluation, cobalt, lithium, and selenium are not expected to pose a risk to human health or the environment.

Accordingly, no further risk evaluation of groundwater is recommended. Compliance groundwater monitoring for R6-AMA under the Federal and State CCR Rules will continue. Georgia Power will proactively evaluate the data and update this evaluation, if necessary.

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TABLES

Table 1
SSL-Related Constituent Groundwater Screening
Yates R6-AMA Risk Evaluation Report
Plant Yates, Newnan, Coweta County, GA

CCR Rule Designation	Constituent	CAS No.	Detection Frequency[1]	Exceedance Frequency[2]	Maximum Concentration (mg/L)	Screening Level (mg/L)	Source	Site-Specific Background (mg/L)	COPI? (Y/N)	Rationale[3]
Appendix IV	Cobalt	7440-48-4	5 / 5	5 / 5	0.16	0.035	Background[4]	0.035	Y	ASL
	Lithium	7439-93-2	28 / 28	18 / 28	0.059	0.040	Type 2 RRS[5]	0.030	Y	ASL
	Selenium	7782-49-2	40 / 40	30 / 40	0.33	0.10	Type 2 RRS[5]	0.005	Y	ASL

Notes:

[1] Evaluation includes 2016 through February 2024 groundwater analytical data from wells YAMW-3 for cobalt, YAMW-3 and YGWC-42 for lithium, and YGWC-38 and PZ-37 for selenium.
[2] The exceedance frequency is based on the number of samples with detected concentrations that exceed the identified screening level.
[3] Rationale for classification of constituent as a COPI or exclusion as a COPI:
ASL = Above respective screening level
BSL = Equal to or below respective screening level
[4] For sites with site-specific background concentrations greater than applicable screening values, the site-specific background value was used as the screening value.
[5] The Type 2 RRSs are calculated by the EPA RSL calculator using residential exposure factor inputs from HSRA Appendix III, Table 3.

Definitions:
CAS = Chemical Abstract Service
CCR = Coal Combustion Residuals
COPI = Constituent of Potential Interest
RRS = Risk Reduction Standard
mg/L = milligrams per Liter

Prepared by/Date: JHG 05/28/2024
Checked by/Date: LO 05/28/2024

Table 2
Groundwater Exposure Point Concentration Summary
Yates R6-AMA Risk Evaluation Report
Plant Yates, Newnan, Coweta County, GA

Exposure Unit	CCR Rule Designation	Constituent	CAS No.	Detection Frequency	Maximum Concentration (mg/L)	95% UCL (mg/L)	Recommended UCL Method	Selected EPC[1] (mg/L)
R6-AMA	Appendix IV	Cobalt	7440-48-4	24 / 50	0.0033	0.0014	95% KM (t) UCL	0.0014
		Lithium	7439-93-2	25 / 50	0.0086	0.0047	95% KM (t) UCL	0.0047
		Selenium	7782-49-2	25 / 46	0.0046	0.0019	95% KM (t) UCL	0.0019

Notes:
[1] EPCs calculated in accordance with USEPA, 2014. Memorandum for Determining Groundwater Exposure Point Concentrations, Supplemental Guidance. OSWER Directive 9283.1-42, February 2014. Located at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917. For further detail on the selected EPC, refer to Appendix D.

Definitions:
CAS = Chemical Abstract Service
CCR = Coal Combustion Residuals
mg/L = milligrams per liter
95% UCL = 95 percent upper confidence limit
EPC = Exposure Point Concentration

Prepared by/Date: JHG 04/23/24
Checked by/Date: LO 04/25/24

Table 3
Downgradient Groundwater Refined Screening
Yates R6-AMA Risk Evaluation Report
Plant Yates, Newnan, Coweta County, GA

Exposure Unit	CCR Rule Designation	Constituent	CAS No.	Detection Frequency	Exceedance Frequency[1]	Selected EPC[2] (mg/L)	Screening Level (mg/L)	Source	Site-Specific Background (mg/L)	COI? (Y/N)	Rationale[3]
R6-AMA	Appendix IV	Cobalt	7440-48-4	24 / 50	0 / 50	0.0014	0.035	Background[4]	0.035	N	BSL
		Lithium	7439-93-2	25 / 50	0 / 50	0.0047	0.040	Type 2 RRS[5]	0.030	N	BSL
		Selenium	7782-49-2	25 / 46	0 / 46	0.0019	0.10	Type 2 RRS[5]	0.005	N	BSL

Notes:

[1] The exceedance frequency is based on the number of samples with detected concentrations that exceed the identified screening level.

[2] EPCs calculated in accordance with USEPA, 2014. Memorandum for Determining Groundwater Exposure Point Concentrations, Supplemental Guidance. OSWER Directive 9283.1-42, February 2014. Located at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917. For further detail on the selected EPC, refer to Appendix D.

[3] Rationale for classification of constituent as a COI or exclusion as a COI:

ASL = Above respective screening level

BSL = Below respective screening level

[4] For sites with site-specific background concentrations greater than applicable screening values, the site-specific background value was used as the screening value.

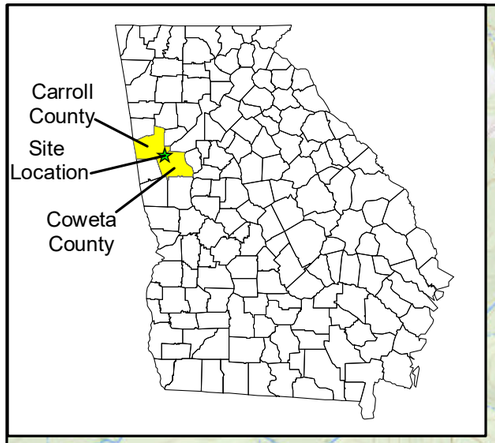
[5] The Type 2 RRSs are calculated by the EPA RSL calculator using residential exposure factor inputs from HSRA Appendix III, Table 3.

Definitions:

CAS = Chemical Abstract Service
CCR = Coal Combustion Residuals
COI = Constituent of Interest
mg/L = milligrams per liter
EPC = Exposure Point Concentration

Prepared by/Date: JHG 04/23/24
Checked by/Date: LO 04/25/24

FIGURES



N

Ash Pond 1
Gypsum Stack Landfill
Ash Pond A
Ash Pond 2
Ash Pond B
Ash Pond B'
R6 CCR Landfill
Ash Pond 3
Ash Management Area

Chattahoochee River
Cedar Creek
Wahoo Creek
CARROLL COUNTY
COWETA COUNTY
Yates
Porches Creek Airport

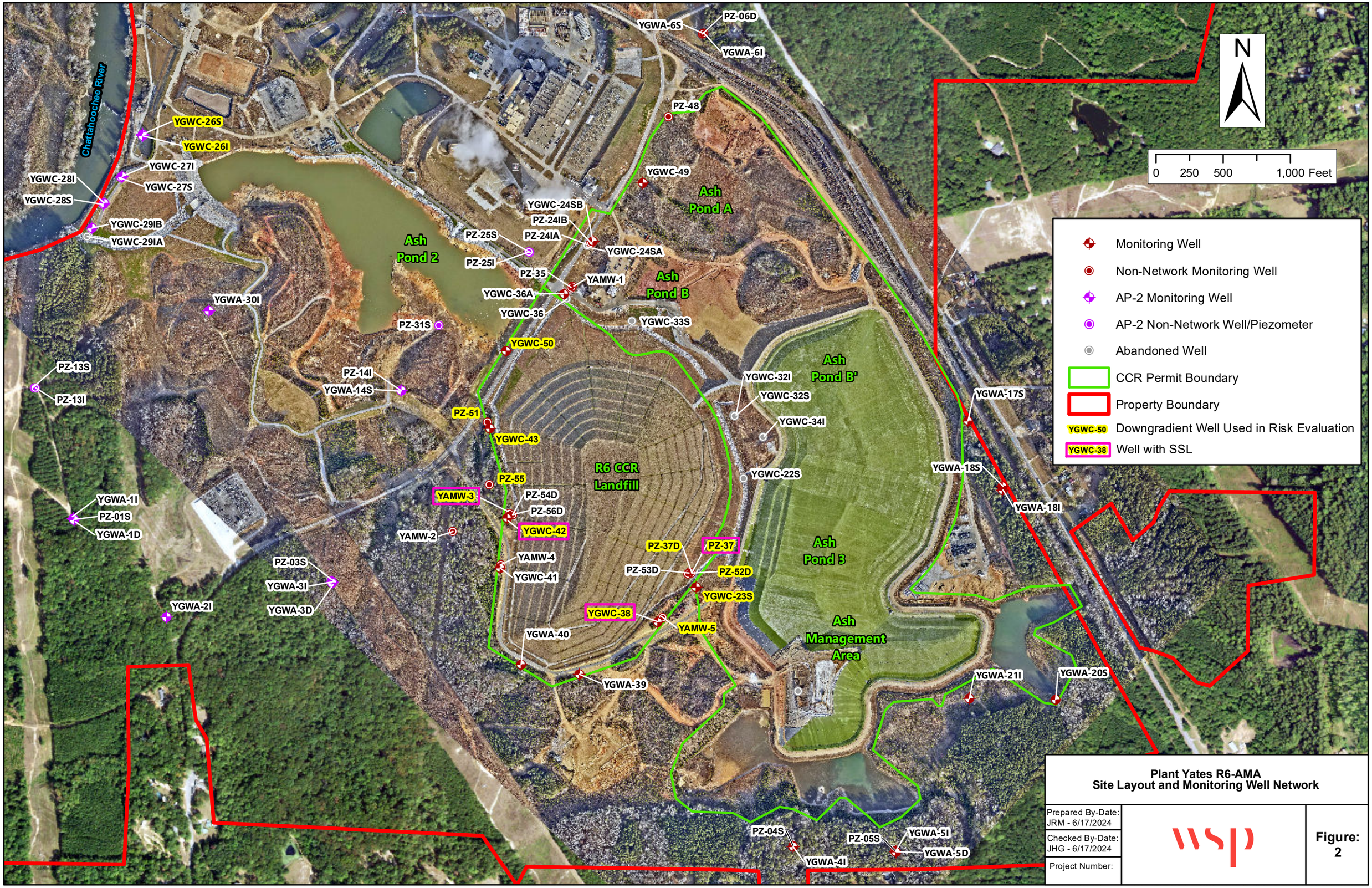
CCR Permit Boundary
Property Boundary

0 0.25 0.5 1 Miles

Service Layer Credits: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names

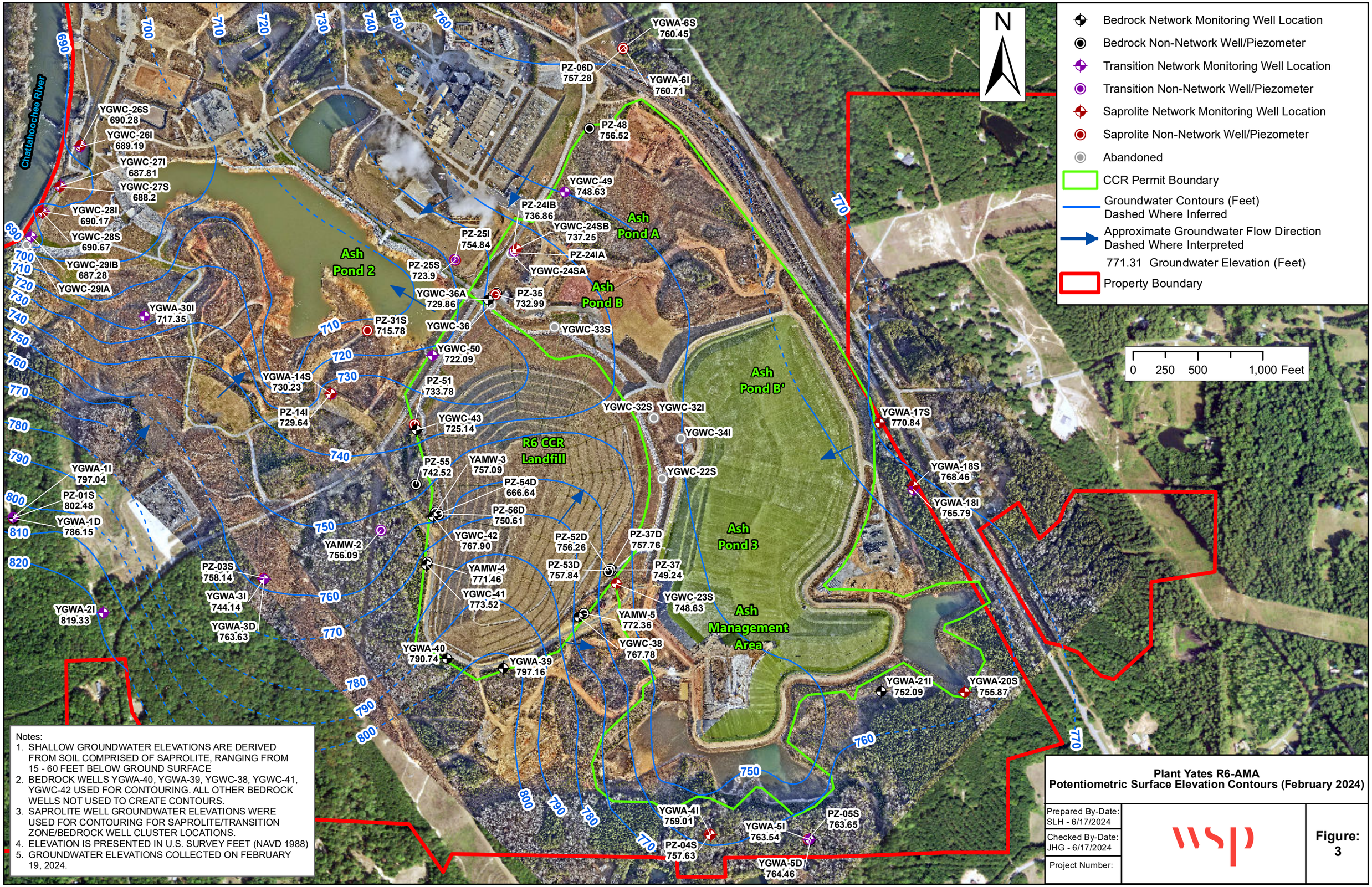
Plant Yates R6-AMA
Site Location

Prepared By-Date: JRM - 5/28/2024	wsp	Figure: 1
Checked By-Date: JHG - 5/28/2024		
Project Number:		



Plant Yates R6-AMA
Site Layout and Monitoring Well Network

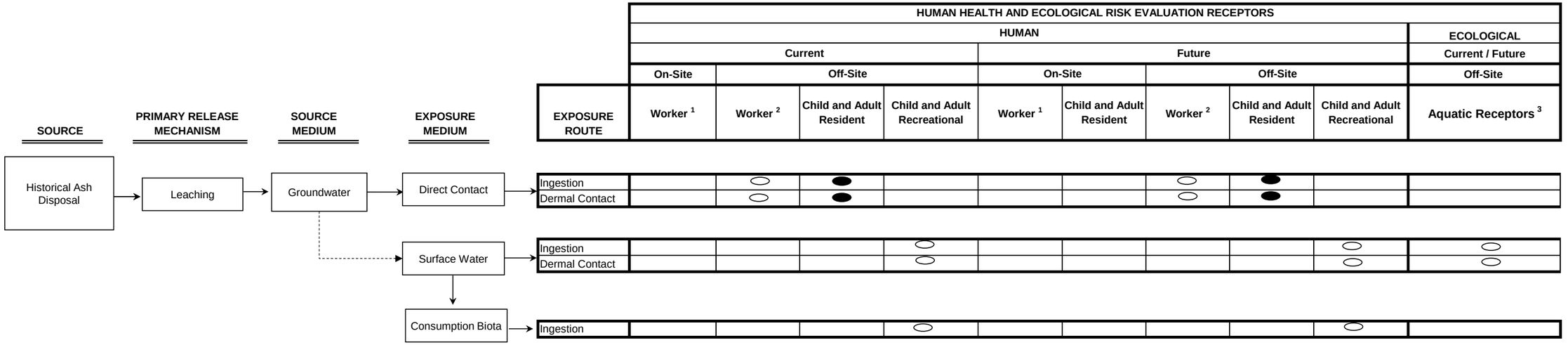
Prepared By-Date: JRM - 6/17/2024	wsp	Figure: 2
Checked By-Date: JHG - 6/17/2024		
Project Number:		



Notes:
1. SHALLOW GROUNDWATER ELEVATIONS ARE DERIVED FROM SOIL COMPRISED OF SAPROLITE, RANGING FROM 15 - 60 FEET BELOW GROUND SURFACE
2. BEDROCK WELLS YGWA-40, YGWA-39, YGWC-38, YGWC-41, YGWC-42 USED FOR CONTOURING. ALL OTHER BEDROCK WELLS NOT USED TO CREATE CONTOURS.
3. SAPROLITE WELL GROUNDWATER ELEVATIONS WERE USED FOR CONTOURING FOR SAPROLITE/TRANSITION ZONE/BEDROCK WELL CLUSTER LOCATIONS.
4. ELEVATION IS PRESENTED IN U.S. SURVEY FEET (NAVD 1988)
5. GROUNDWATER ELEVATIONS COLLECTED ON FEBRUARY 19, 2024.

Plant Yates R6-AMA
Potentiometric Surface Elevation Contours (February 2024)

Prepared By-Date: SLH - 6/17/2024	wsp	Figure: 3
Checked By-Date: JHG - 6/17/2024		
Project Number:		



Legend

A conservative assumption for this assessment was made that groundwater from the site flows to the downgradient surface water.

Indicates potentially complete pathway, which is evaluated quantitatively.

Indicates potentially complete pathway, which is evaluated qualitatively.

Footnotes

1. The industrial worker was considered to have no complete pathways because there are no wells on-site that are classified for use as potable wells. On-site construction workers would be expected to have little to no direct contact with on-site groundwater due to safety procedures outlined in their site-specific health and safety plans.
2. Off-site industrial/construction worker addressed through the evaluation of hypothetical off-site residential receptors as health-protective screening levels for residential receptors would be more conservative than industrial and construction worker screening levels.
3. Generalized receptor for ecological health risk evaluation.

Plant Yates R6-AMA
Conceptual Exposure Model

Figure 4

Project Number

Prepared by/Date: LO 04/30/24
Checked by/Date: NSR 05/17/24

CCR Permit Boundary

Property Boundary

Private Drinking Well

Irrigation/Inactive Drinking Well

Public Drinking Well

N

0 0.5 1 Miles

Whitesburg

Carroll

Coweta

Acorn Creek

Gypsum Stack Landfill

Ash Pond 1

Ash Pond B

Ash Pond A

Ash Pond B'

Ash Pond 3

Ash Pond 2

R6 CCR Landfill

Ash Management Area

Chattahoochee River

Carroll

Coweta

Wahoo Creek

Hurricane Creek

Panther Creek

Bibb Lake

Wahoo Creek

Crawdad Creek

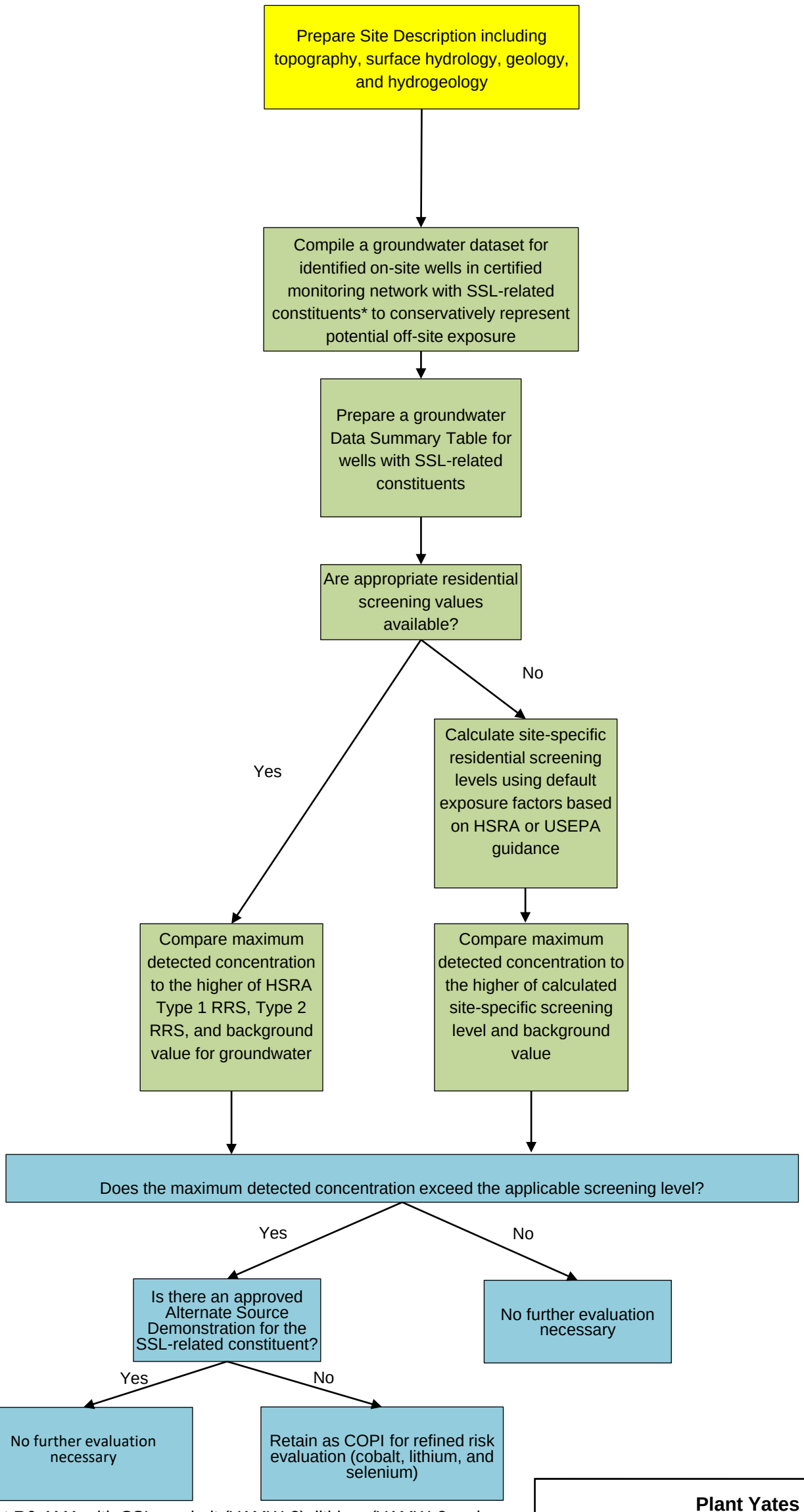
Source:
- NewFields, 2020. Plant Yates Well Survey, Plant Yates Ash Pond 3, Ash Pond A, Ash Pond B, ash Pond B', Coweta County, GA.
- Arcadis 2022. Plant Yates, Ash Ponds 3, A, B, and B'/R6 CCR Landfill – Groundwater Remedy Selection Report.
- Arcadis 2024. Plant Yates, Ash Ponds 3, A, B, and B'/R6 CCR Landfill – 2023 Annual Groundwater Monitoring and Corrective Action Report.

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Plant Yates R6-AMA
Off-Site Well Survey Results

Prepared By-Date: JRM - 5/27/2024	wsp	Figure: 5
Checked By-Date: JHG - 5/27/2024		
Project Number:		

Groundwater Risk Screening Approach for R6-AMA



Notes:
*Initial screen evaluates wells at R6-AMA with SSLs: cobalt (YAMW-3), lithium (YAMW-3 and YGWC-42), and selenium (YGWC-38 and PZ-37).
SSL = Statistically Significant Level
COPI = Constituent of Potential Interest
HSRA = Hazardous Site Response Act
RRS = Risk Reduction Standard
USEPA = United States Environmental Protection Agency

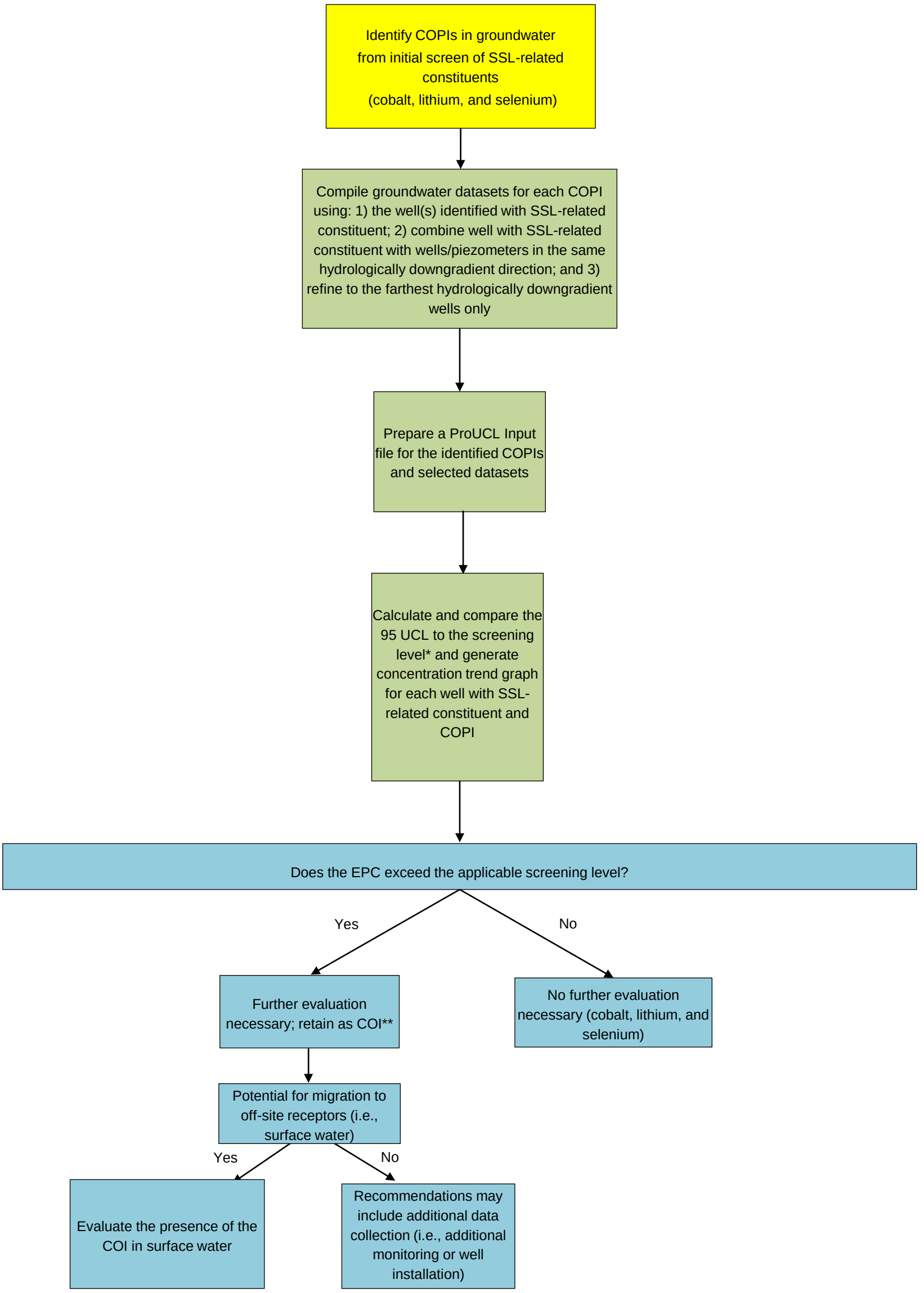
Plant Yates R6-AMA
Groundwater Risk Screening Approach

Figure 6

Project Number

Prepared by/Date: LO 04/30/2024
Checked by/Date: NSR 05/20/2024

Refined Groundwater Risk Screening Approach for R6-AMA



Notes:
*If the 95 UCL exceeds the maximum concentration, use the maximum as the EPC.
**This step is not necessary for Yates R6-AMA.
SSL = Statistically Significant Level
COPI = Constituent of Potential Interest
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit
COI = Constituent of Interest

Plant Yates R6-AMA
Approach for Refined Groundwater Risk Evaluation

Figure 7

Project Number	Prepared by/Date: LO 04/30/2024 Checked by/Date: NSR 05/20/2024

APPENDIX A

Plant Yates Well Survey (Off-Site)

Well Survey

Plant Yates

Ash Pond 3, Ash Pond A, Ash Pond B, Ash Pond B'

Coweta County, GA

Prepared for

Georgia Power Company

241 Ralph McGill Blvd., Atlanta, GA 30308

Prepared by

NewFields

1349 W. Peachtree Street, Suite 2000

Atlanta, GA 30309

March 5, 2020

Introduction

Plant Yates is located at 708 Dyer Road in Coweta County.

Newfields conducted a well survey within a three-mile radius of the Coal Combustion Residual (CCR) facilities at Yates: Ash Pond 3 (AP-3), Ash Pond A (AP-A), Ash Pond B (AP-B), and Ash Pond B' (AP-B'). This area is referred to in this report as the Investigated Area, and is shown on Figure 1.

As part of this survey, NewFields accessed and reviewed information from a number of Federal, State, and County records and online sources, as well as a windshield surveys of the Investigated Area. Information from each identified well was then compiled into a geographic information system (GIS) database.

Information Collection

This section summarizes the sources utilized for identifying potential drinking water wells within the Investigated Area.

1. Federal Sources
    a. **United States Geological Survey (USGS).** USGS maintains an inventory database of any well sampled by a USGS-affiliated program for ground-water levels or water quality parameters at any time in the past.[1] Well information and coordinates were downloaded for the state of Georgia and compiled into the GIS database. Wells in this database are labelled 'human drinking water wells' or 'monitoring wells'; however, many of these appear to be co-located with drinking water wells. Some of these USGS monitoring wells may in fact be private drinking water wells utilized for monitoring purposes by USGS. Some listings in this database are over 50 years old and may be inactive.

    b. **Safe Drinking Water Information System (SDWIS).** This EPA database has listings of public water systems but does not have well location information. SDWIS information was used to help identify the suppliers of public water in the vicinity of the facility. Public water is available throughout the entire Investigated Area, supplied by the Carroll County Water Authority, Coweta County Water Authority, and the City of Whitesburg.

2. State Sources
    a. **Georgia Environmental Protection Division**
        i. **Drinking Water Branch.** EPD maintains records about municipal and industrial wells, whose presence or absence within a radius of a site can be ascertained by contacting the agency. An email was sent to Michael Gillis of EPD on October 23rd, 2019 requesting information about wells in the investigated area. Mr. Gillis responded stating that two wells for the City of Whitesburg are located within the Investigated Area. The City of Whitesburg system serves 931 people. NewFields

[1] http://waterdata.usgs.gov/ga/nwis/inventory?introduction

identified the location of the wells using a combination of aerial photography, parcel data indicating which parcels are owned by the city, and well information from the EPD's Drinking Water Branch online database. These two drinking water wells are located approximately 2.7 and just under 3 miles to the northwest of the Plant Yates Ash Ponds.

ii. **EPD Pesticide Project.** From 2000 to 2004, EPD undertook a project to sample private drinking water wells for pesticides. EPD solicited volunteers state-wide to participate in the well sampling program. The final report includes the list of private water wells sampled, their coordinates, and depths when available.[2] Information about wells within the Investigated Area were compiled into the GIS database.

iii. **Hazardous Site Inventory (HSI) files.** EPD maintains files for HSI files for site which are undergoing state-led corrective action. These files usually contain groundwater data and well surveys. There are no HSI sites within the Investigated Area.

iv. **Hazardous Site Response Act (HSRA) notifications.** EPD maintains non-HSI HSRA notification reports (i.e., notifications submitted after releases of reportable substances). NewFields reviewed reports associated with sites in Carroll and Coweta County. No wells were identified within the Investigated Area.

b. **Agricultural and Environmental Services Laboratory (AESL) records.** The University of Georgia's AESL Laboratory tests drinking water samples submitted by private individuals to their local county extension service. Maps of these sampling results can viewed online.[3] Precise coordinates of sampling locations are not available, but NewFields was able to use online images to find approximate locations.

3. County Sources
   a. **County Health Departments.** County health departments (DOH) maintain records of the permits for "on-site sewage management systems" (septic tanks). These permits indicate whether the permittee has private or public water supply, and often identify the exact location of the well on a map. Coweta County does not maintain these records in a manner where they are easily searchable using geographic criteria. However, Carroll County Health Department conducted a search for permits along the major roads within Investigated Areas and provided copies of nearly three dozen permits from this area. These wells were geolocated based on address.
   b. **Coweta County Water and Sewerage Authority.** The Authority provided a shapefile showing the waterlines in Coweta County, including the dates of construction. Public water is

[2] https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/PR-55.pdf
[3] http://aesl.ces.uga.edu/water/map/

available throughout the area. Earliest lines in the area were built in the mid-1980s; water mains closest to the plant were not built until the mid-1990s.

c. **Tax Assessor Records.** Tax parcel shapefiles were acquired from the Coweta County GIS Department on October 2, 2019. Additional tax parcel data, including information about the age of structures on the property, was obtained on October 14, 2019 from the County Tax Assessor's Office. Carroll County Tax Assessor's office provided tax parcel shape and improvement data on October 23, 2019.

d. **Tax Assessor Web site.** The Carrol County Tax Assessor's Web site[4] lists information about the water source for each parcel. However, this data cannot be downloaded, but must be searched for parcels one at a time. NewFields used the Web site to check the water source for wells identified using all other sources. NewFields determined that public water use is widespread regardless of the age of homes.

4. Windshield Surveys
   a. A windshield survey of the Investigated Area was conducted on October 15th, 2019. During the survey a number of wells were visually identified, which were subsequently compiled into the GIS database. A windshield survey update was conducted on October 15th, 2019. The majority of wells identified during the survey were near residences.

Summary

In addition to identifying specific wells from the above listed sources, NewFields used a combination of parcel data and information about the presence and age of public water infrastructure in Coweta County to identify parcels that may be using well water as their drinking water source or had drinking water wells at some time. Many of these parcels may be (or have been) sharing wells, so a well might not exist for each identified parcel. A large number of structures in Coweta County significantly predate the nearest waterlines. While these wells are labelled 'drinking water wells', many of those may be inactive. Some parcels may not each have their own well, but may have shared wells.

In the Carroll County portion of the Investigated Area, NewFields did not use parcel data to identify potential wells. The search of the Tax Assessor's Web site showed that public water use is widespread in this area, even in older homes and homes with visible windshield survey wells. Most wells seen in Carroll County were therefore assumed to be irrigation wells or inactive drinking water wells, with exception of a small number of apparently active drinking water wells confirmed with Tax Assessor data.

Dense parcels in Arnco and Sargent, between 2 and 3 miles southeast of Plant Yates and within the Investigated Area, were assumed to be connected to public water. These small communities appear to have had their own water supply in the past and later switched to Coweta County.

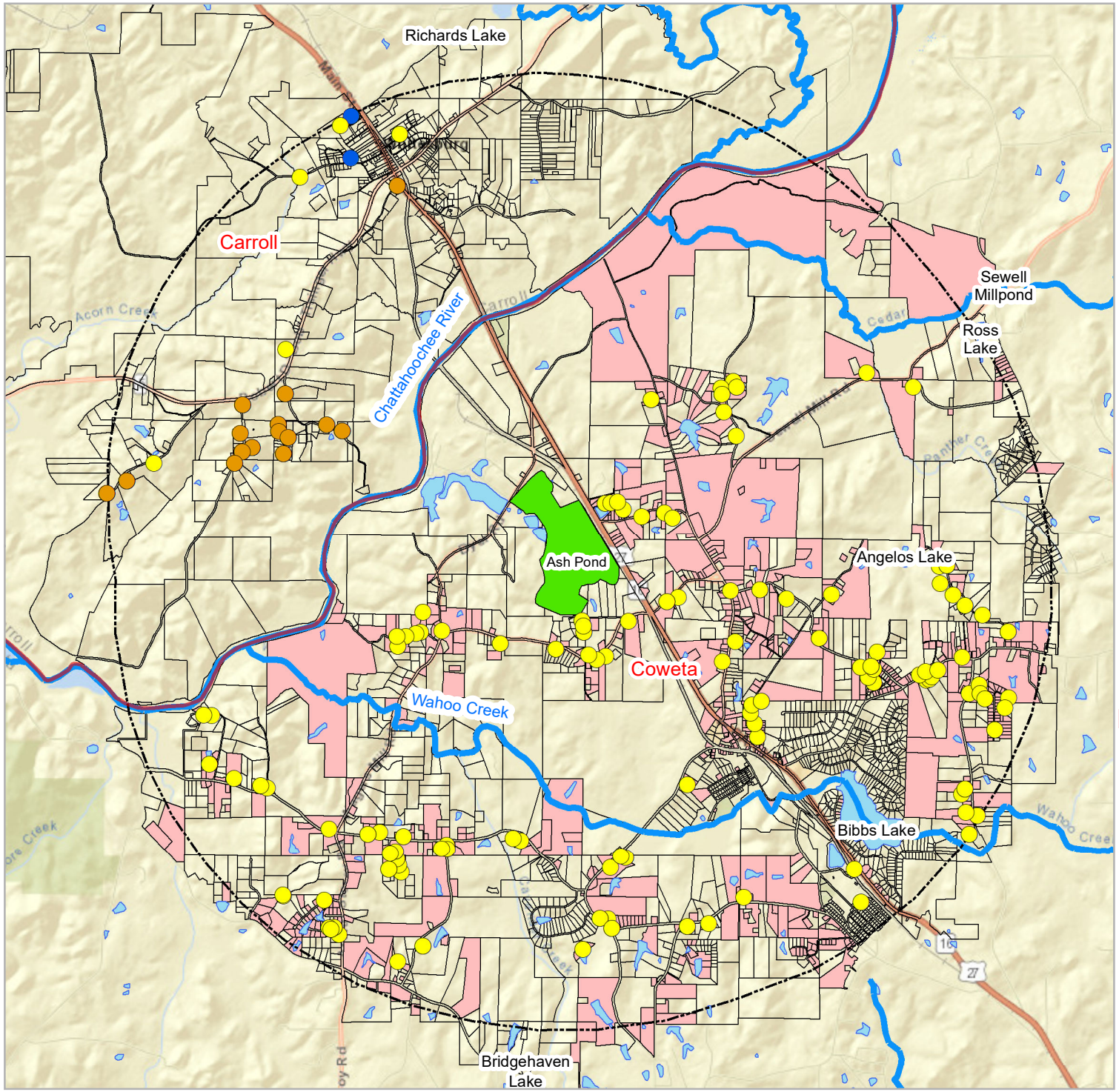
Public water is available throughout the entire surveyed area, supplied by the Carroll County Water Authority, Coweta County Water Authority, and the City of Whitesburg. Two public wells are located

[4] https://qpublic.schneidercorp.com/Application.aspx?App=CarrollCountyGA&Layer=Parcels&PageType=Search

within the Investigated Area, northeast of the Ash Ponds. These wells belong to the City of Whitesburg, a system that serves 931 people via 358 connections. The approximate locations of these wells are shown on Figure 1, which shows points for all identified wells, and shades parcels that were identified from parcel data as likely to are likely to contain wells. When viewed as a PDF file, the figure is interactive, and wells identified using different sources can be turned on and off.

Combining well data from all sources with parcel data, NewFields identified 728 total parcels likely to be associated with an active or inactive private well within the Investigated Area. Of these, 665 parcels were identified using parcel data. One hundred and twenty-five (125) wells were identified during the windshield survey. Twelve (12) of the wells seen during the windshield survey in Carroll County were assumed to be inactive or irrigation wells, since the tax assessor's Web site stated these properties were on public water. Eighteen (18) wells were identified using USGS sources, and one (1) from the EPD's Pesticide Sampling Project. Many wells were identified by multiple sources.[5]

[5] USGS monitoring wells located on Georgia Power property were also considered not to be drinking water wells and omitted.



Title	Plant Yates – AP-A, AP-3, AP-B, and AP-B'
Project	GPC Plants Georgia
NewFields	Two Midtown Plaza 1349 W. Peachtree St, #2000 Atlanta, Georgia 30309 Tel: 404-347-9050
Date: 10/28/2019	Rev. No.: 0
MXD: gpc_ccr_2019/agis	Figure No.: 1

APPENDIX B
Data Used in Risk Evaluation

Appendix B
Site Groundwater Data (2016-2024) for Evaluation of SSLs
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Well	Date	CAS	Constituent	Units	Result_Detect	Flag	MDL	PQL
YAMW-3	2/10/2022	7440-48-4	Cobalt	mg/L	0.16		0.00039	0.005
YAMW-3	9/1/2022	7440-48-4	Cobalt	mg/L	0.058		0.00039	0.005
YAMW-3	2/9/2023	7440-48-4	Cobalt	mg/L	0.066		0.00039	0.005
YAMW-3	8/16/2023	7440-48-4	Cobalt	mg/L	0.14		0.00039	0.005
YAMW-3	2/21/2024	7440-48-4	Cobalt	mg/L	0.051		0.00032	0.005
YGWC-42	8/30/2016	7440-48-4	Cobalt	mg/L	0.0025	J	0.0005	0.01
YGWC-42	11/16/2016	7440-48-4	Cobalt	mg/L	0.002	J	0.0005	0.01
YGWC-42	2/27/2017	7440-48-4	Cobalt	mg/L	0.0021	J	0.0005	0.01
YGWC-42	5/10/2017	7440-48-4	Cobalt	mg/L	0.0021	J	0.0005	0.01
YGWC-42	7/11/2017	7440-48-4	Cobalt	mg/L	0.0014	J	0.0003	0.01
YGWC-42	10/12/2017	7440-48-4	Cobalt	mg/L	0.0017	J	0.0003	0.01
YGWC-42	4/4/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-42	9/20/2018	7440-48-4	Cobalt	mg/L	0.003	J	0.00052	0.01
YGWC-42	8/22/2019	7440-48-4	Cobalt	mg/L	0.0019	J	0.0003	0.005
YGWC-42	10/9/2019	7440-48-4	Cobalt	mg/L	0.0019	J	0.0003	0.005
YGWC-42	2/14/2020	7440-48-4	Cobalt	mg/L	0.0019	J	0.0003	0.005
YGWC-42	3/25/2020	7440-48-4	Cobalt	mg/L	0.0018	J	0.0003	0.005
YGWC-42	9/24/2020	7440-48-4	Cobalt	mg/L	0.0017	J	0.00038	0.005
YGWC-42	2/10/2021	7440-48-4	Cobalt	mg/L	0.0019	J	0.00038	0.005
YGWC-42	3/4/2021	7440-48-4	Cobalt	mg/L	0.0018	J	0.00038	0.005
YGWC-42	8/25/2021	7440-48-4	Cobalt	mg/L	0.0014	J	0.00039	0.005
YGWC-42	2/10/2022	7440-48-4	Cobalt	mg/L	0.0017	J	0.00039	0.005
YGWC-42	9/1/2022	7440-48-4	Cobalt	mg/L	0.0015	J	0.00039	0.005
YGWC-42	2/8/2023	7440-48-4	Cobalt	mg/L	0.0018	J	0.00039	0.005
YGWC-42	8/16/2023	7440-48-4	Cobalt	mg/L	0.0014	J	0.00039	0.005
YGWC-42	2/22/2024	7440-48-4	Cobalt	mg/L	0.0023	J	0.00032	0.005
PZ-51	2/10/2022	7440-48-4	Cobalt	mg/L	0.033		0.00039	0.005
PZ-51	9/1/2022	7440-48-4	Cobalt	mg/L	0.018		0.00039	0.005
PZ-51	2/9/2023	7440-48-4	Cobalt	mg/L	0.0071		0.00039	0.005
PZ-51	8/16/2023	7440-48-4	Cobalt	mg/L	0.0056		0.00039	0.005
PZ-51	2/22/2024	7440-48-4	Cobalt	mg/L	0.0051		0.00032	0.005
PZ-55	2/22/2024	7440-48-4	Cobalt	mg/L	0.0041	J	0.00032	0.005
YGWC-43	8/31/2016	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-43	11/16/2016	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-43	2/24/2017	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-43	5/10/2017	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-43	7/11/2017	7440-48-4	Cobalt	mg/L		ND	0.0003	0.01
YGWC-43	10/12/2017	7440-48-4	Cobalt	mg/L	0.0006	J	0.0003	0.01
YGWC-43	4/4/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-43	9/20/2018	7440-48-4	Cobalt	mg/L	0.0034	J	0.00052	0.01
YGWC-43	8/21/2019	7440-48-4	Cobalt	mg/L	0.0026	J	0.0003	0.005
YGWC-43	10/9/2019	7440-48-4	Cobalt	mg/L	0.0023	J	0.0003	0.005

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Well	Date	CAS	Constituent	Units	Result_Detect	Flag	MDL	PQL
YGWC-43	2/17/2020	7440-48-4	Cobalt	mg/L	0.00088	J	0.0003	0.005
YGWC-43	3/25/2020	7440-48-4	Cobalt	mg/L	0.0016	J	0.0003	0.005
YGWC-43	9/25/2020	7440-48-4	Cobalt	mg/L	0.0018	J	0.00038	0.005
YGWC-43	2/9/2021	7440-48-4	Cobalt	mg/L	0.0017	J	0.00038	0.005
YGWC-43	3/4/2021	7440-48-4	Cobalt	mg/L	0.0015	J	0.00038	0.005
YGWC-43	9/27/2021	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-43	2/8/2022	7440-48-4	Cobalt	mg/L	0.00045	J	0.00039	0.005
YGWC-43	9/1/2022	7440-48-4	Cobalt	mg/L	0.0005	J	0.00039	0.005
YGWC-43	2/8/2023	7440-48-4	Cobalt	mg/L	0.00049	J	0.00039	0.005
YGWC-43	8/16/2023	7440-48-4	Cobalt	mg/L	0.00046	J	0.00039	0.005
YGWC-43	2/22/2024	7440-48-4	Cobalt	mg/L	0.00038	J	0.00032	0.005
YGWC-50	8/17/2023	7440-48-4	Cobalt	mg/L	0.0086		0.00039	0.005
YGWC-50	12/20/2023	7440-48-4	Cobalt	mg/L	0.0052		0.00032	0.005
YGWC-50	2/22/2024	7440-48-4	Cobalt	mg/L	0.0063		0.00032	0.005
YGWC-26S	6/8/2016	7440-48-4	Cobalt	mg/L	0.0032		0.0004	0.0025
YGWC-26S	8/1/2016	7440-48-4	Cobalt	mg/L	0.003	J	0.0003	0.01
YGWC-26S	9/20/2016	7440-48-4	Cobalt	mg/L	0.003	J	0.0005	0.01
YGWC-26S	11/7/2016	7440-48-4	Cobalt	mg/L	0.0025	J	0.0005	0.01
YGWC-26S	1/18/2017	7440-48-4	Cobalt	mg/L	0.0022	J	0.0005	0.01
YGWC-26S	2/21/2017	7440-48-4	Cobalt	mg/L	0.0022	J	0.0005	0.01
YGWC-26S	5/3/2017	7440-48-4	Cobalt	mg/L	0.002	J	0.0005	0.01
YGWC-26S	7/10/2017	7440-48-4	Cobalt	mg/L	0.002	J	0.0003	0.01
YGWC-26S	3/30/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26S	6/13/2018	7440-48-4	Cobalt	mg/L	0.0017	J	0.00052	0.01
YGWC-26S	10/2/2018	7440-48-4	Cobalt	mg/L	0.0016	J	0.00052	0.01
YGWC-26S	2/27/2019	7440-48-4	Cobalt	mg/L	0.0017	J	0.00052	0.01
YGWC-26S	4/2/2019	7440-48-4	Cobalt	mg/L	0.0022	J	0.00052	0.01
YGWC-26S	9/25/2019	7440-48-4	Cobalt	mg/L	0.0033	J	0.0003	0.005
YGWC-26S	2/13/2020	7440-48-4	Cobalt	mg/L	0.0019	J	0.0003	0.005
YGWC-26S	3/19/2020	7440-48-4	Cobalt	mg/L	0.0021	J	0.0003	0.005
YGWC-26S	9/24/2020	7440-48-4	Cobalt	mg/L	0.0011	J	0.00038	0.005
YGWC-26S	2/10/2021	7440-48-4	Cobalt	mg/L	0.0017	J	0.00038	0.005
YGWC-26S	3/2/2021	7440-48-4	Cobalt	mg/L	0.0021	J	0.00038	0.005
YGWC-26S	8/19/2021	7440-48-4	Cobalt	mg/L	0.0017	J	0.00039	0.005
YGWC-26S	2/10/2022	7440-48-4	Cobalt	mg/L	0.0026	J	0.00039	0.005
YGWC-26S	8/31/2022	7440-48-4	Cobalt	mg/L	0.0026	J	0.00039	0.005
YGWC-26S	2/9/2023	7440-48-4	Cobalt	mg/L	0.0017	J	0.00039	0.005
YGWC-26S	8/17/2023	7440-48-4	Cobalt	mg/L	0.00088	J	0.00039	0.005
YGWC-26S	2/22/2024	7440-48-4	Cobalt	mg/L	0.0012	J	0.00032	0.005
YGWC-26I	6/8/2016	7440-48-4	Cobalt	mg/L		ND	0.0004	0.0025
YGWC-26I	8/1/2016	7440-48-4	Cobalt	mg/L		ND	0.0003	0.01
YGWC-26I	9/20/2016	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01

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YGWC-26I	11/7/2016	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-26I	1/18/2017	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-26I	2/21/2017	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-26I	5/8/2017	7440-48-4	Cobalt	mg/L		ND	0.0005	0.01
YGWC-26I	7/10/2017	7440-48-4	Cobalt	mg/L		ND	0.0003	0.01
YGWC-26I	3/30/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26I	6/13/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26I	10/2/2018	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26I	2/27/2019	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26I	4/2/2019	7440-48-4	Cobalt	mg/L		ND	0.00052	0.01
YGWC-26I	9/25/2019	7440-48-4	Cobalt	mg/L		ND	0.0003	0.005
YGWC-26I	2/13/2020	7440-48-4	Cobalt	mg/L		ND	0.0003	0.005
YGWC-26I	3/20/2020	7440-48-4	Cobalt	mg/L		ND	0.0003	0.005
YGWC-26I	9/24/2020	7440-48-4	Cobalt	mg/L		ND	0.00038	0.005
YGWC-26I	2/10/2021	7440-48-4	Cobalt	mg/L		ND	0.00038	0.005
YGWC-26I	3/3/2021	7440-48-4	Cobalt	mg/L		ND	0.00038	0.005
YGWC-26I	8/20/2021	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-26I	2/10/2022	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-26I	8/31/2022	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-26I	2/9/2023	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-26I	8/17/2023	7440-48-4	Cobalt	mg/L		ND	0.00039	0.005
YGWC-26I	2/22/2024	7440-48-4	Cobalt	mg/L		ND	0.00032	0.005
YAMW-3	11/17/2021	7439-93-2	Lithium	mg/L	0.046		0.00073	0.03
YAMW-3	12/9/2021	7439-93-2	Lithium	mg/L	0.042		0.00073	0.03
YAMW-3	2/10/2022	7439-93-2	Lithium	mg/L	0.054		0.00073	0.03
YAMW-3	9/1/2022	7439-93-2	Lithium	mg/L	0.041		0.00073	0.03
YAMW-3	2/9/2023	7439-93-2	Lithium	mg/L	0.048		0.00073	0.03
YAMW-3	8/16/2023	7439-93-2	Lithium	mg/L	0.04		0.00073	0.03
YAMW-3	2/21/2024	7439-93-2	Lithium	mg/L	0.047		0.0016	0.03
YGWC-42	8/30/2016	7439-93-2	Lithium	mg/L	0.0257	J	0.0021	0.05
YGWC-42	11/16/2016	7439-93-2	Lithium	mg/L	0.0221	J	0.0021	0.05
YGWC-42	2/27/2017	7439-93-2	Lithium	mg/L	0.0208	J	0.0021	0.05
YGWC-42	5/10/2017	7439-93-2	Lithium	mg/L	0.0316	J	0.0011	0.05
YGWC-42	7/11/2017	7439-93-2	Lithium	mg/L	0.0281	J	0.0015	0.05
YGWC-42	10/12/2017	7439-93-2	Lithium	mg/L	0.0331	J	0.0015	0.05
YGWC-42	4/4/2018	7439-93-2	Lithium	mg/L	0.037	J	0.00097	0.05
YGWC-42	9/20/2018	7439-93-2	Lithium	mg/L	0.049	J	0.00097	0.05
YGWC-42	8/22/2019	7439-93-2	Lithium	mg/L	0.047		0.00078	0.03
YGWC-42	10/9/2019	7439-93-2	Lithium	mg/L	0.037		0.00078	0.03
YGWC-42	2/14/2020	7439-93-2	Lithium	mg/L	0.038		0.00078	0.03
YGWC-42	3/25/2020	7439-93-2	Lithium	mg/L	0.045		0.00078	0.03
YGWC-42	9/24/2020	7439-93-2	Lithium	mg/L	0.05		0.00081	0.03

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YGWC-42	2/10/2021	7439-93-2	Lithium	mg/L	0.058		0.00081	0.03
YGWC-42	3/4/2021	7439-93-2	Lithium	mg/L	0.059		0.00081	0.03
YGWC-42	8/25/2021	7439-93-2	Lithium	mg/L	0.053		0.00073	0.03
YGWC-42	2/10/2022	7439-93-2	Lithium	mg/L	0.052		0.00073	0.03
YGWC-42	9/1/2022	7439-93-2	Lithium	mg/L	0.054		0.00073	0.03
YGWC-42	2/8/2023	7439-93-2	Lithium	mg/L	0.046		0.00073	0.03
YGWC-42	8/16/2023	7439-93-2	Lithium	mg/L	0.054		0.00073	0.03
YGWC-42	2/22/2024	7439-93-2	Lithium	mg/L	0.049		0.0016	0.03
PZ-51	11/17/2021	7439-93-2	Lithium	mg/L	0.0049	J	0.00073	0.03
PZ-51	2/10/2022	7439-93-2	Lithium	mg/L	0.006	J	0.00073	0.03
PZ-51	9/1/2022	7439-93-2	Lithium	mg/L	0.0051	J	0.00073	0.03
PZ-51	2/9/2023	7439-93-2	Lithium	mg/L	0.0045	J	0.00073	0.03
PZ-51	8/16/2023	7439-93-2	Lithium	mg/L	0.0048	J	0.00073	0.03
PZ-51	2/22/2024	7439-93-2	Lithium	mg/L	0.005	J	0.0016	0.03
PZ-55	2/22/2024	7439-93-2	Lithium	mg/L	0.0034	J	0.0016	0.03
YGWC-43	8/31/2016	7439-93-2	Lithium	mg/L	0.006	J	0.0021	0.05
YGWC-43	11/16/2016	7439-93-2	Lithium	mg/L	0.0095	J	0.0021	0.05
YGWC-43	2/24/2017	7439-93-2	Lithium	mg/L	0.0104	J	0.0021	0.05
YGWC-43	5/10/2017	7439-93-2	Lithium	mg/L	0.0123	J	0.0011	0.05
YGWC-43	7/11/2017	7439-93-2	Lithium	mg/L	0.0131	J	0.0015	0.05
YGWC-43	10/12/2017	7439-93-2	Lithium	mg/L	0.013	J	0.0015	0.05
YGWC-43	4/4/2018	7439-93-2	Lithium	mg/L	0.016	J	0.00097	0.05
YGWC-43	9/20/2018	7439-93-2	Lithium	mg/L	0.019	J	0.00097	0.05
YGWC-43	8/21/2019	7439-93-2	Lithium	mg/L	0.015	J	0.00078	0.03
YGWC-43	10/9/2019	7439-93-2	Lithium	mg/L	0.018	J	0.00078	0.03
YGWC-43	2/17/2020	7439-93-2	Lithium	mg/L	0.015	J	0.00078	0.03
YGWC-43	3/25/2020	7439-93-2	Lithium	mg/L	0.016	J	0.00078	0.03
YGWC-43	9/25/2020	7439-93-2	Lithium	mg/L	0.018	J	0.00081	0.03
YGWC-43	2/9/2021	7439-93-2	Lithium	mg/L	0.024	J	0.00081	0.03
YGWC-43	3/4/2021	7439-93-2	Lithium	mg/L	0.025	J	0.00081	0.03
YGWC-43	9/27/2021	7439-93-2	Lithium	mg/L	0.0092	J	0.00073	0.03
YGWC-43	2/8/2022	7439-93-2	Lithium	mg/L	0.016	J	0.00073	0.03
YGWC-43	9/1/2022	7439-93-2	Lithium	mg/L	0.014	J	0.00073	0.03
YGWC-43	2/8/2023	7439-93-2	Lithium	mg/L	0.015	J	0.00073	0.03
YGWC-43	8/16/2023	7439-93-2	Lithium	mg/L	0.015	J	0.00073	0.03
YGWC-43	2/22/2024	7439-93-2	Lithium	mg/L	0.015	J	0.0016	0.03
YGWC-50	8/17/2023	7439-93-2	Lithium	mg/L	0.0033	J	0.00073	0.03
YGWC-50	12/20/2023	7439-93-2	Lithium	mg/L	0.0035	J	0.0016	0.03
YGWC-50	2/22/2024	7439-93-2	Lithium	mg/L	0.0036	J	0.0016	0.03
YGWC-26S	6/8/2016	7439-93-2	Lithium	mg/L		ND	0.0032	0.005
YGWC-26S	8/1/2016	7439-93-2	Lithium	mg/L		ND	0.0012	0.05
YGWC-26S	9/20/2016	7439-93-2	Lithium	mg/L		ND	0.0021	0.05

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YGWC-26S	11/7/2016	7439-93-2	Lithium	mg/L		ND	0.0021	0.05
YGWC-26S	1/18/2017	7439-93-2	Lithium	mg/L		ND	0.0021	0.05
YGWC-26S	2/21/2017	7439-93-2	Lithium	mg/L		ND	0.0021	0.05
YGWC-26S	5/3/2017	7439-93-2	Lithium	mg/L		ND	0.0011	0.05
YGWC-26S	7/10/2017	7439-93-2	Lithium	mg/L		ND	0.0015	0.05
YGWC-26S	3/30/2018	7439-93-2	Lithium	mg/L		ND	0.00097	0.05
YGWC-26S	6/13/2018	7439-93-2	Lithium	mg/L		ND	0.00097	0.05
YGWC-26S	10/2/2018	7439-93-2	Lithium	mg/L		ND	0.00097	0.05
YGWC-26S	2/27/2019	7439-93-2	Lithium	mg/L		ND	0.00097	0.05
YGWC-26S	4/2/2019	7439-93-2	Lithium	mg/L		ND	0.00097	0.05
YGWC-26S	9/25/2019	7439-93-2	Lithium	mg/L		ND	0.00078	0.03
YGWC-26S	2/13/2020	7439-93-2	Lithium	mg/L		ND	0.00078	0.03
YGWC-26S	3/19/2020	7439-93-2	Lithium	mg/L		ND	0.00078	0.03
YGWC-26S	9/24/2020	7439-93-2	Lithium	mg/L		ND	0.00081	0.03
YGWC-26S	2/10/2021	7439-93-2	Lithium	mg/L		ND	0.00081	0.03
YGWC-26S	3/2/2021	7439-93-2	Lithium	mg/L		ND	0.00081	0.03
YGWC-26S	8/19/2021	7439-93-2	Lithium	mg/L		ND	0.00073	0.03
YGWC-26S	2/10/2022	7439-93-2	Lithium	mg/L		ND	0.00073	0.03
YGWC-26S	8/31/2022	7439-93-2	Lithium	mg/L		ND	0.00073	0.03
YGWC-26S	2/9/2023	7439-93-2	Lithium	mg/L		ND	0.00073	0.03
YGWC-26S	8/17/2023	7439-93-2	Lithium	mg/L		ND	0.00073	0.03
YGWC-26S	2/22/2024	7439-93-2	Lithium	mg/L		ND	0.0016	0.03
YGWC-26I	6/8/2016	7439-93-2	Lithium	mg/L	0.007		0.0032	0.005
YGWC-26I	8/1/2016	7439-93-2	Lithium	mg/L	0.0068	J	0.0012	0.05
YGWC-26I	9/20/2016	7439-93-2	Lithium	mg/L	0.0062	J	0.0021	0.05
YGWC-26I	11/7/2016	7439-93-2	Lithium	mg/L	0.0057	J	0.0021	0.05
YGWC-26I	1/18/2017	7439-93-2	Lithium	mg/L	0.0066	J	0.0021	0.05
YGWC-26I	2/21/2017	7439-93-2	Lithium	mg/L	0.0067	J	0.0021	0.05
YGWC-26I	5/8/2017	7439-93-2	Lithium	mg/L	0.007	J	0.0011	0.05
YGWC-26I	7/10/2017	7439-93-2	Lithium	mg/L	0.0064	J	0.0015	0.05
YGWC-26I	3/30/2018	7439-93-2	Lithium	mg/L	0.0068	J	0.00097	0.05
YGWC-26I	6/13/2018	7439-93-2	Lithium	mg/L	0.0071	J	0.00097	0.05
YGWC-26I	10/2/2018	7439-93-2	Lithium	mg/L	0.0064	J	0.0049	0.25
YGWC-26I	2/27/2019	7439-93-2	Lithium	mg/L	0.0069	J	0.00097	0.05
YGWC-26I	4/2/2019	7439-93-2	Lithium	mg/L	0.0064	J	0.00097	0.05
YGWC-26I	9/25/2019	7439-93-2	Lithium	mg/L	0.0073	J	0.00078	0.03
YGWC-26I	2/13/2020	7439-93-2	Lithium	mg/L	0.0073	J	0.00078	0.03
YGWC-26I	3/20/2020	7439-93-2	Lithium	mg/L	0.0072	J	0.00078	0.03
YGWC-26I	9/24/2020	7439-93-2	Lithium	mg/L	0.0074	J	0.00081	0.03
YGWC-26I	2/10/2021	7439-93-2	Lithium	mg/L	0.0067	J	0.00081	0.03
YGWC-26I	3/3/2021	7439-93-2	Lithium	mg/L	0.0077	J	0.00081	0.03
YGWC-26I	8/20/2021	7439-93-2	Lithium	mg/L	0.0079	J	0.00073	0.03

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YGWC-26I	2/10/2022	7439-93-2	Lithium	mg/L	0.0086	J	0.00073	0.03
YGWC-26I	8/31/2022	7439-93-2	Lithium	mg/L	0.0074	J	0.00073	0.03
YGWC-26I	2/9/2023	7439-93-2	Lithium	mg/L	0.0075	J	0.00073	0.03
YGWC-26I	8/17/2023	7439-93-2	Lithium	mg/L	0.0077	J	0.00073	0.03
YGWC-26I	2/22/2024	7439-93-2	Lithium	mg/L	0.0078	J	0.0016	0.03
YGWC-38	10/12/2017	7782-49-2	Selenium	mg/L	0.265		0.0018	0.01
YGWC-38	11/20/2017	7782-49-2	Selenium	mg/L	0.246		0.0018	0.01
YGWC-38	1/12/2018	7782-49-2	Selenium	mg/L	0.249		0.0018	0.01
YGWC-38	2/20/2018	7782-49-2	Selenium	mg/L	0.25		0.0014	0.01
YGWC-38	4/3/2018	7782-49-2	Selenium	mg/L	0.23		0.0014	0.01
YGWC-38	6/28/2018	7782-49-2	Selenium	mg/L	0.23		0.0014	0.01
YGWC-38	8/7/2018	7782-49-2	Selenium	mg/L	0.2		0.0014	0.01
YGWC-38	9/24/2018	7782-49-2	Selenium	mg/L	0.2		0.0014	0.01
YGWC-38	8/22/2019	7782-49-2	Selenium	mg/L	0.14		0.0013	0.01
YGWC-38	10/9/2019	7782-49-2	Selenium	mg/L	0.12		0.0013	0.01
YGWC-38	2/14/2020	7782-49-2	Selenium	mg/L	0.11		0.0013	0.01
YGWC-38	3/25/2020	7782-49-2	Selenium	mg/L	0.099		0.0013	0.01
YGWC-38	9/25/2020	7782-49-2	Selenium	mg/L	0.076		0.0016	0.01
YGWC-38	2/9/2021	7782-49-2	Selenium	mg/L	0.073		0.0016	0.01
YGWC-38	3/4/2021	7782-49-2	Selenium	mg/L	0.076		0.0016	0.005
YGWC-38	8/26/2021	7782-49-2	Selenium	mg/L	0.06		0.0014	0.005
YGWC-38	2/10/2022	7782-49-2	Selenium	mg/L	0.064		0.0014	0.005
YGWC-38	9/1/2022	7782-49-2	Selenium	mg/L	0.055		0.0014	0.005
YGWC-38	2/8/2023	7782-49-2	Selenium	mg/L	0.056		0.0014	0.005
YGWC-38	8/16/2023	7782-49-2	Selenium	mg/L	0.053		0.0014	0.005
YGWC-38	2/22/2024	7782-49-2	Selenium	mg/L	0.048		0.00096	0.005
PZ-37	10/12/2017	7782-49-2	Selenium	mg/L	0.234		0.0018	0.01
PZ-37	11/21/2017	7782-49-2	Selenium	mg/L	0.225		0.0018	0.01
PZ-37	1/11/2018	7782-49-2	Selenium	mg/L	0.168		0.0018	0.01
PZ-37	2/20/2018	7782-49-2	Selenium	mg/L	0.32		0.0014	0.01
PZ-37	4/3/2018	7782-49-2	Selenium	mg/L	0.28		0.0014	0.01
PZ-37	6/29/2018	7782-49-2	Selenium	mg/L	0.26		0.0014	0.01
PZ-37	8/6/2018	7782-49-2	Selenium	mg/L	0.21		0.0014	0.01
PZ-37	9/24/2018	7782-49-2	Selenium	mg/L	0.33		0.0014	0.01
PZ-37	9/25/2020	7782-49-2	Selenium	mg/L	0.32		0.0016	0.01
PZ-37	2/9/2021	7782-49-2	Selenium	mg/L	0.28		0.0016	0.01
PZ-37	3/4/2021	7782-49-2	Selenium	mg/L	0.27		0.0016	0.005
PZ-37	8/25/2021	7782-49-2	Selenium	mg/L	0.2		0.0014	0.005
PZ-37	2/10/2022	7782-49-2	Selenium	mg/L	0.2		0.0014	0.005
PZ-37	4/4/2022	7782-49-2	Selenium	mg/L	0.18		0.0014	0.005
PZ-37	4/7/2022	7782-49-2	Selenium	mg/L	0.18		0.0014	0.005
PZ-37	9/1/2022	7782-49-2	Selenium	mg/L	0.17		0.0014	0.005

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PZ-37	2/8/2023	7782-49-2	Selenium	mg/L	0.16		0.0014	0.005
PZ-37	8/17/2023	7782-49-2	Selenium	mg/L	0.15		0.0014	0.005
PZ-37	2/21/2024	7782-49-2	Selenium	mg/L	0.13		0.00096	0.005
YAMW-5	1/15/2020	7782-49-2	Selenium	mg/L	0.045		0.0013	0.01
YAMW-5	9/24/2020	7782-49-2	Selenium	mg/L	0.026		0.0016	0.01
YAMW-5	2/9/2021	7782-49-2	Selenium	mg/L	0.06		0.0016	0.01
YAMW-5	3/4/2021	7782-49-2	Selenium	mg/L	0.061		0.0016	0.005
YAMW-5	8/26/2021	7782-49-2	Selenium	mg/L	0.055		0.0014	0.005
YAMW-5	2/10/2022	7782-49-2	Selenium	mg/L	0.057		0.0014	0.005
YAMW-5	9/1/2022	7782-49-2	Selenium	mg/L	0.048		0.0014	0.005
YAMW-5	2/8/2023	7782-49-2	Selenium	mg/L	0.052		0.0014	0.005
YAMW-5	8/16/2023	7782-49-2	Selenium	mg/L	0.054		0.0014	0.005
YAMW-5	2/22/2024	7782-49-2	Selenium	mg/L	0.053		0.00096	0.005
PZ-37D	4/6/2021	7782-49-2	Selenium	mg/L	0.14		0.0016	0.005
PZ-37D	4/8/2021	7782-49-2	Selenium	mg/L	0.18		0.0016	0.005
PZ-37D	4/14/2021	7782-49-2	Selenium	mg/L		ND	0.0016	0.005
PZ-37D	5/13/2021	7782-49-2	Selenium	mg/L		ND	0.0016	0.005
PZ-37D	9/3/2021	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
PZ-37D	2/11/2022	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
PZ-37D	9/1/2022	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
PZ-37D	2/8/2023	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
PZ-37D	8/16/2023	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
PZ-37D	2/21/2024	7782-49-2	Selenium	mg/L		ND	0.00096	0.005
PZ-52D	11/4/2021	7782-49-2	Selenium	mg/L	0.0034	J	0.0014	0.005
PZ-52D	2/11/2022	7782-49-2	Selenium	mg/L	0.0025	J	0.0014	0.005
PZ-52D	9/1/2022	7782-49-2	Selenium	mg/L	0.0041	J	0.0014	0.005
PZ-52D	2/8/2023	7782-49-2	Selenium	mg/L	0.0057		0.0014	0.005
PZ-52D	8/17/2023	7782-49-2	Selenium	mg/L	0.011		0.0014	0.005
PZ-52D	2/21/2024	7782-49-2	Selenium	mg/L	0.0099		0.00096	0.005
YGWC-23S	6/7/2016	7782-49-2	Selenium	mg/L	0.037		0.00024	0.0013
YGWC-23S	7/28/2016	7782-49-2	Selenium	mg/L	0.0385		0.0009	0.01
YGWC-23S	9/20/2016	7782-49-2	Selenium	mg/L	0.0464		0.001	0.01
YGWC-23S	11/8/2016	7782-49-2	Selenium	mg/L	0.0521		0.001	0.01
YGWC-23S	1/16/2017	7782-49-2	Selenium	mg/L	0.0469		0.001	0.01
YGWC-23S	3/9/2017	7782-49-2	Selenium	mg/L	0.0437		0.0014	0.01
YGWC-23S	5/2/2017	7782-49-2	Selenium	mg/L	0.0395		0.0014	0.01
YGWC-23S	7/10/2017	7782-49-2	Selenium	mg/L	0.0386		0.0018	0.01
YGWC-23S	3/30/2018	7782-49-2	Selenium	mg/L	0.028		0.0014	0.01
YGWC-23S	6/12/2018	7782-49-2	Selenium	mg/L	0.026		0.0014	0.01
YGWC-23S	9/27/2018	7782-49-2	Selenium	mg/L	0.023		0.0014	0.01
YGWC-23S	3/6/2019	7782-49-2	Selenium	mg/L	0.019		0.0014	0.01
YGWC-23S	4/4/2019	7782-49-2	Selenium	mg/L	0.017		0.0014	0.01

Appendix B
Site Groundwater Data (2016-2024) for Evaluation of SSLs
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Well	Date	CAS	Constituent	Units	Result_Detect	Flag	MDL	PQL
YGWC-23S	9/27/2019	7782-49-2	Selenium	mg/L	0.018		0.0013	0.01
YGWC-23S	2/17/2020	7782-49-2	Selenium	mg/L	0.02		0.0013	0.01
YGWC-23S	3/26/2020	7782-49-2	Selenium	mg/L	0.024		0.0013	0.01
YGWC-23S	9/24/2020	7782-49-2	Selenium	mg/L	0.031		0.0016	0.01
YGWC-23S	2/9/2021	7782-49-2	Selenium	mg/L	0.032		0.0016	0.01
YGWC-23S	3/4/2021	7782-49-2	Selenium	mg/L	0.037		0.0016	0.005
YGWC-23S	8/25/2021	7782-49-2	Selenium	mg/L	0.032		0.0014	0.005
YGWC-23S	2/10/2022	7782-49-2	Selenium	mg/L	0.039		0.0014	0.005
YGWC-23S	9/1/2022	7782-49-2	Selenium	mg/L	0.036		0.0014	0.005
YGWC-23S	2/8/2023	7782-49-2	Selenium	mg/L	0.035		0.0014	0.005
YGWC-23S	8/16/2023	7782-49-2	Selenium	mg/L	0.03		0.0014	0.005
YGWC-23S	2/21/2024	7782-49-2	Selenium	mg/L	0.031		0.00096	0.005
YGWC-50	8/17/2023	7782-49-2	Selenium	mg/L	0.0018		0.0014	0.005
YGWC-50	12/20/2023	7782-49-2	Selenium	mg/L	0.0015		0.00096	0.005
YGWC-50	2/22/2024	7782-49-2	Selenium	mg/L		ND	0.00096	0.005
YGWC-26S	6/8/2016	7782-49-2	Selenium	mg/L	0.0003	J	0.00024	0.0013
YGWC-26S	8/1/2016	7782-49-2	Selenium	mg/L	0.0014	J	0.0009	0.01
YGWC-26S	9/20/2016	7782-49-2	Selenium	mg/L		ND	0.001	0.01
YGWC-26S	11/7/2016	7782-49-2	Selenium	mg/L		ND	0.001	0.01
YGWC-26S	1/18/2017	7782-49-2	Selenium	mg/L	0.0012	J	0.001	0.01
YGWC-26S	2/21/2017	7782-49-2	Selenium	mg/L	0.0014	J	0.001	0.01
YGWC-26S	5/3/2017	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26S	7/10/2017	7782-49-2	Selenium	mg/L		ND	0.0018	0.01
YGWC-26S	3/30/2018	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26S	2/27/2019	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26S	4/2/2019	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26S	9/25/2019	7782-49-2	Selenium	mg/L		ND	0.0013	0.01
YGWC-26S	2/13/2020	7782-49-2	Selenium	mg/L		ND	0.0013	0.01
YGWC-26S	3/19/2020	7782-49-2	Selenium	mg/L		ND	0.0013	0.01
YGWC-26S	9/24/2020	7782-49-2	Selenium	mg/L		ND	0.0016	0.01
YGWC-26S	2/10/2021	7782-49-2	Selenium	mg/L		ND	0.0016	0.01
YGWC-26S	3/2/2021	7782-49-2	Selenium	mg/L		ND	0.0016	0.005
YGWC-26S	8/19/2021	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
YGWC-26S	2/10/2022	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
YGWC-26S	8/31/2022	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
YGWC-26S	2/9/2023	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
YGWC-26S	8/17/2023	7782-49-2	Selenium	mg/L		ND	0.0014	0.005
YGWC-26S	2/22/2024	7782-49-2	Selenium	mg/L		ND	0.00096	0.005
YGWC-26I	6/8/2016	7782-49-2	Selenium	mg/L	0.0016		0.00024	0.0013
YGWC-26I	8/1/2016	7782-49-2	Selenium	mg/L	0.0023	J	0.0009	0.01
YGWC-26I	9/20/2016	7782-49-2	Selenium	mg/L	0.0022	J	0.001	0.01
YGWC-26I	11/7/2016	7782-49-2	Selenium	mg/L	0.0017	J	0.001	0.01

Appendix B
Site Groundwater Data (2016-2024) for Evaluation of SSLs
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Well	Date	CAS	Constituent	Units	Result_Detect	Flag	MDL	PQL
YGWC-26I	1/18/2017	7782-49-2	Selenium	mg/L	0.002	J	0.001	0.01
YGWC-26I	2/21/2017	7782-49-2	Selenium	mg/L	0.0018	J	0.001	0.01
YGWC-26I	5/8/2017	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26I	7/10/2017	7782-49-2	Selenium	mg/L	0.002	J	0.0018	0.01
YGWC-26I	3/30/2018	7782-49-2	Selenium	mg/L		ND	0.0014	0.01
YGWC-26I	2/27/2019	7782-49-2	Selenium	mg/L	0.002	J	0.0014	0.01
YGWC-26I	4/2/2019	7782-49-2	Selenium	mg/L	0.0017	J	0.0014	0.01
YGWC-26I	9/25/2019	7782-49-2	Selenium	mg/L	0.0019	J	0.0013	0.01
YGWC-26I	2/13/2020	7782-49-2	Selenium	mg/L	0.0019	J	0.0013	0.01
YGWC-26I	3/20/2020	7782-49-2	Selenium	mg/L	0.0019	J	0.0013	0.01
YGWC-26I	9/24/2020	7782-49-2	Selenium	mg/L	0.0031	J	0.0016	0.01
YGWC-26I	2/10/2021	7782-49-2	Selenium	mg/L	0.0026	J	0.0016	0.01
YGWC-26I	3/3/2021	7782-49-2	Selenium	mg/L	0.0034	J	0.0016	0.005
YGWC-26I	8/20/2021	7782-49-2	Selenium	mg/L	0.0026	J	0.0014	0.005
YGWC-26I	2/10/2022	7782-49-2	Selenium	mg/L	0.0042	J	0.0014	0.005
YGWC-26I	8/31/2022	7782-49-2	Selenium	mg/L	0.0036	J	0.0014	0.005
YGWC-26I	2/9/2023	7782-49-2	Selenium	mg/L	0.0042	J	0.0014	0.005
YGWC-26I	8/17/2023	7782-49-2	Selenium	mg/L	0.0046	J	0.0014	0.005
YGWC-26I	2/22/2024	7782-49-2	Selenium	mg/L	0.0041	J	0.00096	0.005

Notes:

1) Highlighted rows indicate constituent identified in the well at a statistically significant level (SSL).

J - indicates an estimated value; the substance was detected between the laboratory MDL and PQL.
MDL - method detection limit
mg/L - milligrams per liter
n/a - not available
ND - not detected above the laboratory MDL
PQL - practical quantitation limit

Prepared By/Date: JHG 05/28/24
Checked By/Date: LO 05/28/24

APPENDIX C

USEPA RSL Calculator Generated Residential Screening Levels

Appendix C-1
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Appendix C-1
Yates R6-AMA
Plant Yates Coweta County, GA

Variable	Value
THQ (target hazard quotient) unitless	1
TR (target risk) unitless	0.00001
LT (lifetime) years	70
K (volatilization factor of Andelman) L/m^3	0.5
I_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{res} (exposure duration - resident) year	26
ED_{res-c} (exposure duration - child) year	6
ED_{res-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration first phase) year	2
ED_{2-6} (mutagenic exposure duration second phase) year	4
ED_{6-16} (mutagenic exposure duration third phase) year	10
ED_{16-26} (mutagenic exposure duration fourth phase) year	10
EF_{res} (exposure frequency) days/yea	350
EF_{res-c} (exposure frequency - child) days/yea	350
EF_{res-a} (exposure frequency - adult) days/yea	350
EF_{0-2} (mutagenic exposure frequency first phase) days/yea	350
EF_{2-6} (mutagenic exposure frequency second phase) days/yea	350
EF_{6-16} (mutagenic exposure frequency third phase) days/yea	350
EF_{16-26} (mutagenic exposure frequency fourth phase) days/yea	350
$ET_{event-res-adj}$ (age-adjusted exposure time) hours/even	0.67077
$ET_{event-res-madj}$ (mutagenic age-adjusted exposure time) hours/ever	0.67077
ET_{res} (exposure time) hours/day	24
ET_{res-c} (dermal exposure time - child) hours/ever	0.54
ET_{res-a} (dermal exposure time - adult) hours/ever	0.71
ET_{res-c} (inhalation exposure time - child) hours/da	24
ET_{res-a} (inhalation exposure time - adult) hours/da	24
ET_{0-2} (mutagenic inhalation exposure time first phase) hours/da	24
ET_{2-6} (mutagenic inhalation exposure time second phase) hours/da	24
ET_{6-16} (mutagenic inhalation exposure time third phase) hours/da	24
ET_{16-26} (mutagenic inhalation exposure time fourth phase) hours/da	24
ET_{0-2} (mutagenic dermal exposure time first phase) hours/ever	0.54

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Yates R6-AMA
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ET_{2-6} (mutagenic dermal exposure time second phase) hours/ever	0.54
ET_{6-16} (mutagenic dermal exposure time third phase) hours/ever	0.71
ET_{16-26} (mutagenic dermal exposure time fourth phase) hours/ever	0.71
BW_{res-a} (body weight - adult) kg	80
BW_{res-c} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{res-c} (water intake rate - child) L/day	0.78
IRW_{res-a} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{res-a} (events - adult) per day	1
EV_{res-c} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	8191633
SA_{res-c} (skin surface area - child) cm^2	6365
SA_{res-a} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652

Output generated 10APR2024:16:32:16

Appendix C-2
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Default

Resident Risk-Based Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF_o $(mg/kg\text{-}day)^{-1}$	SF_o Ref	IUR $(ug/m^3)^{-1}$	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m^3)	RfC Ref	GIABS	K_p (cm/hr)
Cobalt	7440-48-4	No	No	Inorganics	-		9.00E-03	P	3.00E-04	P	6.00E-06	P	1.00E+00	4.00E-04
Lithium	7439-93-2	No	No	Inorganics	-		-		2.00E-03	P	-		1.00E+00	1.00E-03
Selenium	7782-49-2	No	No	Inorganics	-		-		5.00E-03	I	2.00E-02	C	1.00E+00	1.00E-03

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Yates Risk Evaluation Report
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Resident Risk-Based Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	MW	B (unitless)	t^*(hr)	τ_{event}(hr/event)	FA (unitless)	In EPD?	$DA_{event\ (ca)}$
Cobalt	7440-48-4	No	No	Inorganics	5.89E+01	1.18E-03	5.40E-01	2.25E-01	1.00E+00	Yes	-
Lithium	7439-93-2	No	No	Inorganics	6.94E+00	1.01E-03	2.76E-01	1.15E-01	1.00E+00	Yes	-
Selenium	7782-49-2	No	No	Inorganics	7.90E+01	3.42E-03	6.99E-01	2.91E-01	1.00E+00	Yes	-

Output generated 10APR2024:16:32:16

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Yates Risk Evaluation Report
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Resident Risk-Based Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	MCL (ug/L)	Ingestion SL TR=1E-05 (ug/L)	Dermal SL TR=1E-05 (ug/L)	Inhalation SL TR=1E-05 (ug/L)
Cobalt	7440-48-4	No	No	Inorganics	7.37E-04	1.27E-03	-	-	-	-
Lithium	7439-93-2	No	No	Inorganics	4.92E-03	8.49E-03	-	-	-	-
Selenium	7782-49-2	No	No	Inorganics	1.23E-02	2.12E-02	5.00E+01	-	-	-

Output generated 10APR2024:16:32:16

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Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

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Resident Risk-Based Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	Carcinogenic SL TR=1E-05 (ug/L)	Ingestion SL Child THQ=1 (ug/L)	Dermal SL Child THQ=1 (ug/L)	Inhalation SL Child THQ=1 (ug/L)	Noncarcinogenic SL Child THI=1 (ug/L)
Cobalt	7440-48-4	No	No	Inorganics	-	6.02E+00	3.41E+03	-	6.01E+00
Lithium	7439-93-2	No	No	Inorganics	-	4.01E+01	9.10E+03	-	3.99E+01
Selenium	7782-49-2	No	No	Inorganics	-	1.00E+02	2.28E+04	-	9.98E+01

Output generated 10APR2024:16:32:16

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Yates Risk Evaluation Report
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Resident Risk-Based Regional Screening Levels (RSL) for Tap Water

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	Ingestion SL Adult THQ=1 (ug/L)	Dermal SL Adult THQ=1 (ug/L)	Inhalation SL Adult THQ=1 (ug/L)	Noncarcinogenic SL Adult THI=1 (ug/L)	Screening Level (ug/L)
Cobalt	7440-48-4	No	No	Inorganics	1.00E+01	4.48E+03	-	9.99E+00	6.01E+00 nc
Lithium	7439-93-2	No	No	Inorganics	6.67E+01	1.20E+04	-	6.64E+01	3.99E+01 nc
Selenium	7782-49-2	No	No	Inorganics	1.67E+02	2.99E+04	-	1.66E+02	9.98E+01 nc

Output generated 10APR2024:16:32:16

APPENDIX D

Support for Refined Risk Evaluation

Appendix D-1

Exposure Point Concentration Calculation Results

Appendix D-1
Exposure Point Concentration Calculation Results[1]
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

CCR Rule Designation	Constituent	Well IDs Included	Maximum Concentration (mg/L)	Detection Frequency	Exceedance Frequency	EPC Step 1	EPC Step 2	EPC Step 3
						Individual Target Well(s) 2016-2024 (mg/L)	Target Well(s) & Downgradient Well(s) 2016-2024 (mg/L)	Farthest Downgradient Well(s) 2016-2024 (mg/L)
Appendix IV	Cobalt	YAMW-3	0.16	5 / 5	5 / 5	0.14		
		YAMW-3 YGWC-42 PZ-55 PZ-51 YGWC-43 YGWC-50 YGWC-26S (AP-2) YGWC-26I (AP-2)	0.16	72 / 106	5 / 106		0.010	
		YGWC-26S (AP-2) YGWC-26I (AP-2)	0.0033	24 / 50	0 / 50			0.0014
Appendix IV	Lithium	YAMW-3 YGWC-42	0.059	28 / 28	18 / 28	0.047		
		YAMW-3 YGWC-42 PZ-55 PZ-51 YGWC-43 YGWC-50 YGWC-26S (AP-2) YGWC-26I (AP-2)	0.059	84 / 109	18 / 109		0.019	
		YGWC-26S (AP-2) YGWC-26I (AP-2)	0.0086	25 / 50	0 / 50			0.0047
Appendix IV	Selenium	YGWC-38 PZ-37	0.33	40 / 40	30 / 40	0.20		
		YGWC-38 PZ-37 YAMW-5 YGWC-50 PZ-37D YGWC-23S PZ-52D YGWC-26S (AP-2) YGWC-26I (AP-2)	0.33	110 / 140	32 / 140		0.076	
		YGWC-26S (AP-2) YGWC-26I (AP-2)	0.0046	25 / 46	0 / 46			0.0019

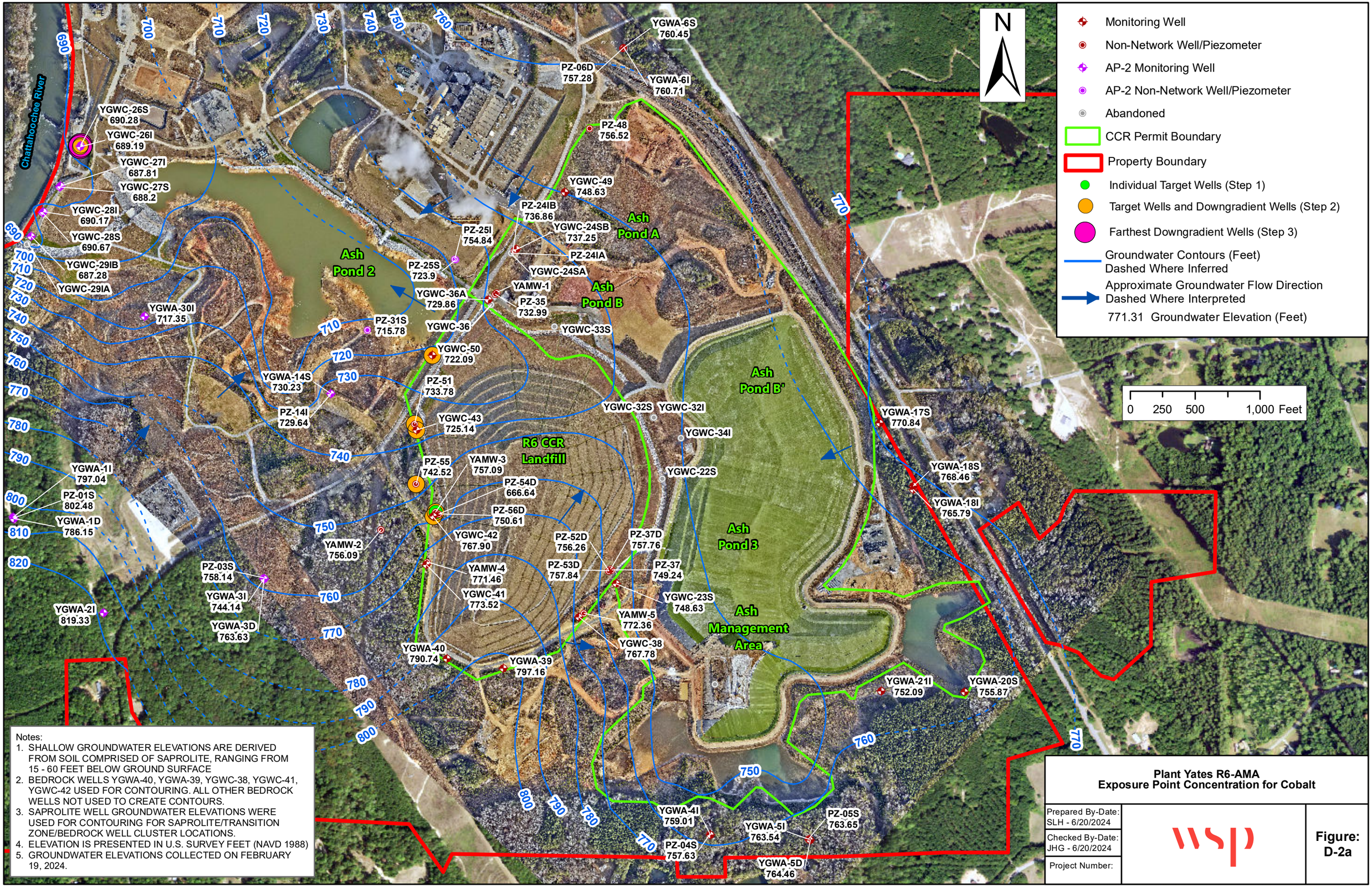
Notes:
Highlighted value is the EPC selected for the refined screening.
1 - EPCs calculated in accordance with USEPA, 2014. Memorandum for Determining Groundwater Exposure Point Concentrations, Supplemental Guidance. OSWER Directive 9283.1-42, February 2014. Located at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917

Definitions:
EPC = Exposure Point Concentration
mg/L = milligrams per liter

Prepared by/Date: JHG 07/11/24
Checked by/Date: LO 08/12/24

Appendix D-2

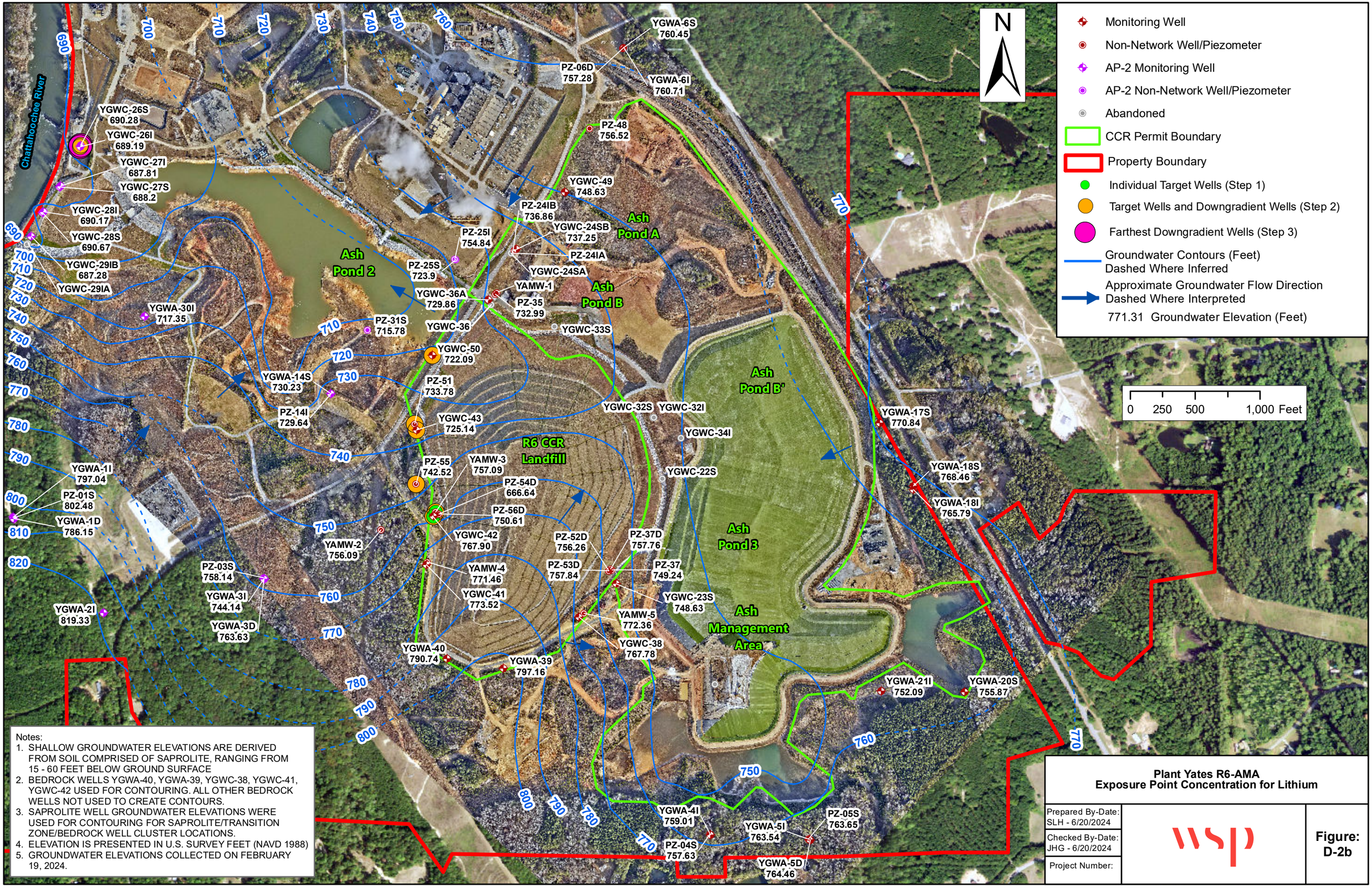
Exposure Point Concentration Figures



Notes:
1. SHALLOW GROUNDWATER ELEVATIONS ARE DERIVED FROM SOIL COMPRISED OF SAPROLITE, RANGING FROM 15 - 60 FEET BELOW GROUND SURFACE
2. BEDROCK WELLS YGWA-40, YGWA-39, YGWC-38, YGWC-41, YGWC-42 USED FOR CONTOURING. ALL OTHER BEDROCK WELLS NOT USED TO CREATE CONTOURS.
3. SAPROLITE WELL GROUNDWATER ELEVATIONS WERE USED FOR CONTOURING FOR SAPROLITE/TRANSITION ZONE/BEDROCK WELL CLUSTER LOCATIONS.
4. ELEVATION IS PRESENTED IN U.S. SURVEY FEET (NAVD 1988)
5. GROUNDWATER ELEVATIONS COLLECTED ON FEBRUARY 19, 2024.

Plant Yates R6-AMA
Exposure Point Concentration for Cobalt

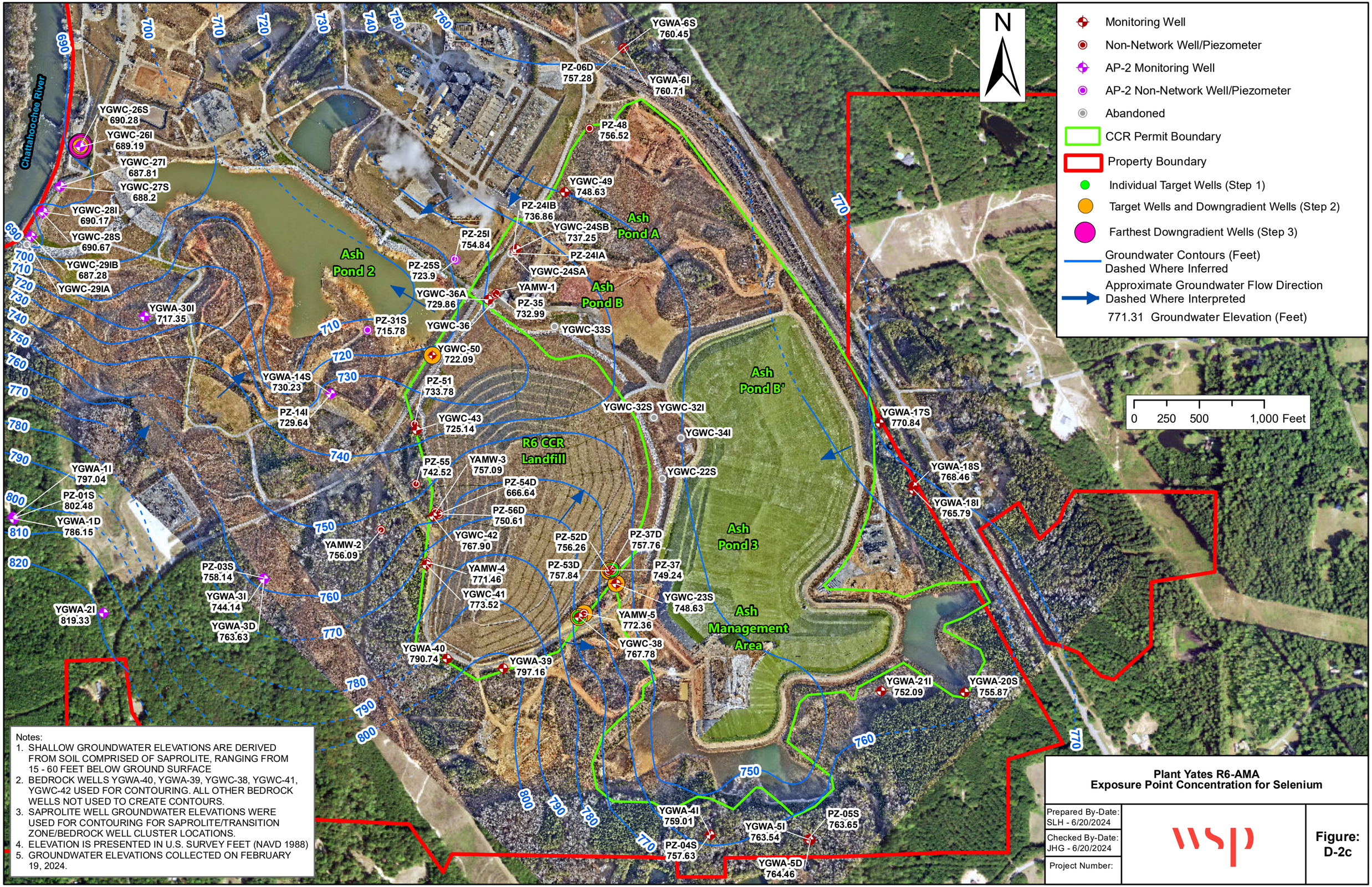
Prepared By-Date: SLH - 6/20/2024	wsp	Figure: D-2a
Checked By-Date: JHG - 6/20/2024		
Project Number:		



Notes:
1. SHALLOW GROUNDWATER ELEVATIONS ARE DERIVED FROM SOIL COMPRISED OF SAPROLITE, RANGING FROM 15 - 60 FEET BELOW GROUND SURFACE
2. BEDROCK WELLS YGWA-40, YGWA-39, YGWC-38, YGWC-41, YGWC-42 USED FOR CONTOURING. ALL OTHER BEDROCK WELLS NOT USED TO CREATE CONTOURS.
3. SAPROLITE WELL GROUNDWATER ELEVATIONS WERE USED FOR CONTOURING FOR SAPROLITE/TRANSITION ZONE/BEDROCK WELL CLUSTER LOCATIONS.
4. ELEVATION IS PRESENTED IN U.S. SURVEY FEET (NAVD 1988)
5. GROUNDWATER ELEVATIONS COLLECTED ON FEBRUARY 19, 2024.

Plant Yates R6-AMA
Exposure Point Concentration for Lithium

Prepared By-Date: SLH - 6/20/2024	wsp	Figure: D-2b
Checked By-Date: JHG - 6/20/2024		
Project Number:		



Notes:
1. SHALLOW GROUNDWATER ELEVATIONS ARE DERIVED FROM SOIL COMPRISED OF SAPROLITE, RANGING FROM 15 - 60 FEET BELOW GROUND SURFACE
2. BEDROCK WELLS YGWA-40, YGWA-39, YGWC-38, YGWC-41, YGWC-42 USED FOR CONTOURING. ALL OTHER BEDROCK WELLS NOT USED TO CREATE CONTOURS.
3. SAPROLITE WELL GROUNDWATER ELEVATIONS WERE USED FOR CONTOURING FOR SAPROLITE/TRANSITION ZONE/BEDROCK WELL CLUSTER LOCATIONS.
4. ELEVATION IS PRESENTED IN U.S. SURVEY FEET (NAVD 1988)
5. GROUNDWATER ELEVATIONS COLLECTED ON FEBRUARY 19, 2024.

Plant Yates R6-AMA
Exposure Point Concentration for Selenium

Prepared By-Date: SLH - 6/20/2024	wsp	Figure: D-2c
Checked By-Date: JHG - 6/20/2024		
Project Number:		

Appendix D-3

ProUCL Input/Output Files

Appendix D-3a
Groundwater ProUCL Input - Cobalt
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1

Well(1)	Date(1)	Cobalt(1)	D_Cobalt(1)
YAMW-3	2/10/2022	0.16	1
YAMW-3	9/1/2022	0.058	1
YAMW-3	2/9/2023	0.066	1
YAMW-3	8/16/2023	0.14	1
YAMW-3	2/21/2024	0.051	1

Step 2

Well(2)	Date(2)	Cobalt(2)	D_Cobalt(2)
YGWC-42	8/30/2016	0.0025	1
YGWC-43	8/31/2016	0.0005	0
YGWC-42	11/16/2016	0.002	1
YGWC-43	11/16/2016	0.0005	0
YGWC-43	2/24/2017	0.0005	0
YGWC-42	2/27/2017	0.0021	1
YGWC-43	5/10/2017	0.0005	0
YGWC-42	5/10/2017	0.0021	1
YGWC-42	7/11/2017	0.0014	1
YGWC-43	7/11/2017	0.0003	0
YGWC-42	10/12/2017	0.0017	1
YGWC-43	10/12/2017	0.0006	1
YGWC-42	4/4/2018	0.00052	0
YGWC-43	4/4/2018	0.00052	0
YGWC-42	9/20/2018	0.003	1
YGWC-43	9/20/2018	0.0034	1
YGWC-43	8/21/2019	0.0026	1
YGWC-42	8/22/2019	0.0019	1
YGWC-42	10/9/2019	0.0019	1
YGWC-43	10/9/2019	0.0023	1
YGWC-42	2/14/2020	0.0019	1
YGWC-43	2/17/2020	0.00088	1
YGWC-42	3/25/2020	0.0018	1
YGWC-43	3/25/2020	0.0016	1
YGWC-42	9/24/2020	0.0017	1
YGWC-43	9/25/2020	0.0018	1
YGWC-43	2/9/2021	0.0017	1
YGWC-42	2/10/2021	0.0019	1
YGWC-42	3/4/2021	0.0018	1
YGWC-43	3/4/2021	0.0015	1
YGWC-42	8/25/2021	0.0014	1
YGWC-43	9/27/2021	0.00039	0
YGWC-43	2/8/2022	0.00045	1
YAMW-3	2/10/2022	0.16	1
YGWC-42	2/10/2022	0.0017	1
PZ-51	2/10/2022	0.033	1
YAMW-3	9/1/2022	0.058	1
YGWC-42	9/1/2022	0.0015	1
PZ-51	9/1/2022	0.018	1
YGWC-43	9/1/2022	0.0005	1
YGWC-42	2/8/2023	0.0018	1
YGWC-43	2/8/2023	0.00049	1
YAMW-3	2/9/2023	0.066	1
PZ-51	2/9/2023	0.0071	1
PZ-51	8/16/2023	0.0056	1
YGWC-43	8/16/2023	0.00046	1
YAMW-3	8/16/2023	0.14	1
YGWC-42	8/16/2023	0.0014	1
YGWC-50	8/17/2023	0.0086	1
YGWC-50	12/20/2023	0.0052	1
YAMW-3	2/21/2024	0.051	1
YGWC-50	2/22/2024	0.0063	1
YGWC-43	2/22/2024	0.00038	1
YGWC-42	2/22/2024	0.0023	1
PZ-51	2/22/2024	0.0051	1
PZ-55	2/22/2024	0.0041	1
YGWC-26I	6/8/2016	0.0004	0
YGWC-26I	8/1/2016	0.0003	0
YGWC-26I	9/20/2016	0.0005	0
YGWC-26I	11/7/2016	0.0005	0
YGWC-26I	1/18/2017	0.0005	0
YGWC-26I	2/21/2017	0.0005	0
YGWC-26I	5/8/2017	0.0005	0
YGWC-26I	7/10/2017	0.0003	0
YGWC-26I	3/30/2018	0.00052	0
YGWC-26I	6/13/2018	0.00052	0
YGWC-26I	10/2/2018	0.00052	0
YGWC-26I	2/27/2019	0.00052	0

Step 3

Well(3)	Date(3)	Cobalt(3)	D_Cobalt(3)
YGWC-26I	6/8/2016	0.0004	0
YGWC-26I	8/1/2016	0.0003	0
YGWC-26I	9/20/2016	0.0005	0
YGWC-26I	11/7/2016	0.0005	0
YGWC-26I	1/18/2017	0.0005	0
YGWC-26I	2/21/2017	0.0005	0
YGWC-26I	5/8/2017	0.0005	0
YGWC-26I	7/10/2017	0.0003	0
YGWC-26I	3/30/2018	0.00052	0
YGWC-26I	6/13/2018	0.00052	0
YGWC-26I	10/2/2018	0.00052	0
YGWC-26I	2/27/2019	0.00052	0
YGWC-26I	4/2/2019	0.00052	0
YGWC-26I	9/25/2019	0.0003	0
YGWC-26I	2/13/2020	0.0003	0
YGWC-26I	3/20/2020	0.0003	0
YGWC-26I	9/24/2020	0.00038	0
YGWC-26I	2/10/2021	0.00038	0
YGWC-26I	3/3/2021	0.00038	0
YGWC-26I	8/20/2021	0.00039	0
YGWC-26I	2/10/2022	0.00039	0
YGWC-26I	8/31/2022	0.00039	0
YGWC-26I	2/9/2023	0.00039	0
YGWC-26I	8/17/2023	0.00039	0
YGWC-26I	2/22/2024	0.00032	0
YGWC-26S	6/8/2016	0.0032	1
YGWC-26S	8/1/2016	0.003	1
YGWC-26S	9/20/2016	0.003	1
YGWC-26S	11/7/2016	0.0025	1
YGWC-26S	1/18/2017	0.0022	1
YGWC-26S	2/21/2017	0.0022	1
YGWC-26S	5/3/2017	0.002	1
YGWC-26S	7/10/2017	0.002	1
YGWC-26S	3/30/2018	0.00052	0
YGWC-26S	6/13/2018	0.0017	1
YGWC-26S	10/2/2018	0.0016	1
YGWC-26S	2/27/2019	0.0017	1
YGWC-26S	4/2/2019	0.0022	1
YGWC-26S	9/25/2019	0.0033	1
YGWC-26S	2/13/2020	0.0019	1
YGWC-26S	3/19/2020	0.0021	1
YGWC-26S	9/24/2020	0.0011	1
YGWC-26S	2/10/2021	0.0017	1
YGWC-26S	3/2/2021	0.0021	1
YGWC-26S	8/19/2021	0.0017	1
YGWC-26S	2/10/2022	0.0026	1
YGWC-26S	8/31/2022	0.0026	1
YGWC-26S	2/9/2023	0.0017	1
YGWC-26S	8/17/2023	0.00088	1
YGWC-26S	2/22/2024	0.0012	1

Appendix D-3a
Groundwater ProUCL Input - Cobalt
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1			
Well(1)	Date(1)	Cobalt(1)	D_Cobalt(1)

Step 2			
Well(2)	Date(2)	Cobalt(2)	D_Cobalt(2)
YGWC-26I	4/2/2019	0.00052	0
YGWC-26I	9/25/2019	0.0003	0
YGWC-26I	2/13/2020	0.0003	0
YGWC-26I	3/20/2020	0.0003	0
YGWC-26I	9/24/2020	0.00038	0
YGWC-26I	2/10/2021	0.00038	0
YGWC-26I	3/3/2021	0.00038	0
YGWC-26I	8/20/2021	0.00039	0
YGWC-26I	2/10/2022	0.00039	0
YGWC-26I	8/31/2022	0.00039	0
YGWC-26I	2/9/2023	0.00039	0
YGWC-26I	8/17/2023	0.00039	0
YGWC-26I	2/22/2024	0.00032	0
YGWC-26S	6/8/2016	0.0032	1
YGWC-26S	8/1/2016	0.003	1
YGWC-26S	9/20/2016	0.003	1
YGWC-26S	11/7/2016	0.0025	1
YGWC-26S	1/18/2017	0.0022	1
YGWC-26S	2/21/2017	0.0022	1
YGWC-26S	5/3/2017	0.002	1
YGWC-26S	7/10/2017	0.002	1
YGWC-26S	3/30/2018	0.00052	0
YGWC-26S	6/13/2018	0.0017	1
YGWC-26S	10/2/2018	0.0016	1
YGWC-26S	2/27/2019	0.0017	1
YGWC-26S	4/2/2019	0.0022	1
YGWC-26S	9/25/2019	0.0033	1
YGWC-26S	2/13/2020	0.0019	1
YGWC-26S	3/19/2020	0.0021	1
YGWC-26S	9/24/2020	0.0011	1
YGWC-26S	2/10/2021	0.0017	1
YGWC-26S	3/2/2021	0.0021	1
YGWC-26S	8/19/2021	0.0017	1
YGWC-26S	2/10/2022	0.0026	1
YGWC-26S	8/31/2022	0.0026	1
YGWC-26S	2/9/2023	0.0017	1
YGWC-26S	8/17/2023	0.00088	1
YGWC-26S	2/22/2024	0.0012	1

Step 3			
Well(3)	Date(3)	Cobalt(3)	D_Cobalt(3)

Notes:
1) Concentrations in units of mg/L.

Prepared by/Date: JHG 04/24/2024
Checked by/Date: LO 04/25/2024

Appendix D-3b
Groundwater ProUCL Input - Lithium
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1

Well(1)	Date(1)	Lithium(1)	D_Lithium(1)
YAMW-3	11/17/2021	0.046	1
YAMW-3	12/9/2021	0.042	1
YAMW-3	2/10/2022	0.054	1
YAMW-3	9/1/2022	0.041	1
YAMW-3	2/9/2023	0.048	1
YAMW-3	8/16/2023	0.04	1
YAMW-3	2/21/2024	0.047	1
YGWC-42	8/30/2016	0.0257	1
YGWC-42	11/16/2016	0.0221	1
YGWC-42	2/27/2017	0.0208	1
YGWC-42	5/10/2017	0.0316	1
YGWC-42	7/11/2017	0.0281	1
YGWC-42	10/12/2017	0.0331	1
YGWC-42	4/4/2018	0.037	1
YGWC-42	9/20/2018	0.049	1
YGWC-42	8/22/2019	0.047	1
YGWC-42	10/9/2019	0.037	1
YGWC-42	2/14/2020	0.038	1
YGWC-42	3/25/2020	0.045	1
YGWC-42	9/24/2020	0.05	1
YGWC-42	2/10/2021	0.058	1
YGWC-42	3/4/2021	0.059	1
YGWC-42	8/25/2021	0.053	1
YGWC-42	2/10/2022	0.052	1
YGWC-42	9/1/2022	0.054	1
YGWC-42	2/8/2023	0.046	1
YGWC-42	8/16/2023	0.054	1
YGWC-42	2/22/2024	0.049	1

Step 2

Well(2)	Date(2)	Lithium(2)	D_Lithium(2)
YGWC-42	8/30/2016	0.0257	1
YGWC-43	8/31/2016	0.006	1
YGWC-42	11/16/2016	0.0221	1
YGWC-43	11/16/2016	0.0095	1
YGWC-43	2/24/2017	0.0104	1
YGWC-42	2/27/2017	0.0208	1
YGWC-43	5/10/2017	0.0123	1
YGWC-42	5/10/2017	0.0316	1
YGWC-42	7/11/2017	0.0281	1
YGWC-43	7/11/2017	0.0131	1
YGWC-42	10/12/2017	0.0331	1
YGWC-43	10/12/2017	0.013	1
YGWC-42	4/4/2018	0.037	1
YGWC-43	4/4/2018	0.016	1
YGWC-42	9/20/2018	0.049	1
YGWC-43	9/20/2018	0.019	1
YGWC-43	8/21/2019	0.015	1
YGWC-42	8/22/2019	0.047	1
YGWC-42	10/9/2019	0.037	1
YGWC-43	10/9/2019	0.018	1
YGWC-42	2/14/2020	0.038	1
YGWC-43	2/17/2020	0.015	1
YGWC-42	3/25/2020	0.045	1
YGWC-43	3/25/2020	0.016	1
YGWC-42	9/24/2020	0.05	1
YGWC-43	9/25/2020	0.018	1
YGWC-43	2/9/2021	0.024	1
YGWC-42	2/10/2021	0.058	1
YGWC-42	3/4/2021	0.059	1
YGWC-43	3/4/2021	0.025	1
YGWC-42	8/25/2021	0.053	1
YGWC-43	9/27/2021	0.0092	1
YAMW-3	11/17/2021	0.046	1
PZ-51	11/17/2021	0.0049	1
PZ-55	2/22/2024	0.0034	1
YAMW-3	12/9/2021	0.042	1
YGWC-43	2/8/2022	0.016	1
YAMW-3	2/10/2022	0.054	1
YGWC-42	2/10/2022	0.052	1
PZ-51	2/10/2022	0.006	1
YAMW-3	9/1/2022	0.041	1
YGWC-42	9/1/2022	0.054	1
PZ-51	9/1/2022	0.0051	1
YGWC-43	9/1/2022	0.014	1
YGWC-42	2/8/2023	0.046	1
YGWC-43	2/8/2023	0.015	1
YAMW-3	2/9/2023	0.048	1
PZ-51	2/9/2023	0.0045	1
PZ-51	8/16/2023	0.0048	1
YGWC-43	8/16/2023	0.015	1
YAMW-3	8/16/2023	0.04	1
YGWC-42	8/16/2023	0.054	1
YGWC-50	8/17/2023	0.0033	1
YGWC-50	12/20/2023	0.0035	1
YAMW-3	2/21/2024	0.047	1
YGWC-50	2/22/2024	0.0036	1
YGWC-43	2/22/2024	0.015	1
YGWC-42	2/22/2024	0.049	1
PZ-51	2/22/2024	0.005	1
YGWC-26I	6/8/2016	0.007	1
YGWC-26I	8/1/2016	0.0068	1
YGWC-26I	9/20/2016	0.0062	1
YGWC-26I	11/7/2016	0.0057	1
YGWC-26I	1/18/2017	0.0066	1
YGWC-26I	2/21/2017	0.0067	1
YGWC-26I	5/8/2017	0.007	1
YGWC-26I	7/10/2017	0.0064	1
YGWC-26I	3/30/2018	0.0068	1

Step 3

Well(3)	Date(3)	Lithium(3)	D_Lithium(3)
YGWC-26I	6/8/2016	0.007	1
YGWC-26I	8/1/2016	0.0068	1
YGWC-26I	9/20/2016	0.0062	1
YGWC-26I	11/7/2016	0.0057	1
YGWC-26I	1/18/2017	0.0066	1
YGWC-26I	2/21/2017	0.0067	1
YGWC-26I	5/8/2017	0.007	1
YGWC-26I	7/10/2017	0.0064	1
YGWC-26I	3/30/2018	0.0068	1
YGWC-26I	6/13/2018	0.0071	1
YGWC-26I	10/2/2018	0.0064	1
YGWC-26I	2/27/2019	0.0069	1
YGWC-26I	4/2/2019	0.0064	1
YGWC-26I	9/25/2019	0.0073	1
YGWC-26I	2/13/2020	0.0073	1
YGWC-26I	3/20/2020	0.0072	1
YGWC-26I	9/24/2020	0.0074	1
YGWC-26I	2/10/2021	0.0067	1
YGWC-26I	3/3/2021	0.0077	1
YGWC-26I	8/20/2021	0.0079	1
YGWC-26I	2/10/2022	0.0086	1
YGWC-26I	8/31/2022	0.0074	1
YGWC-26I	2/9/2023	0.0075	1
YGWC-26I	8/17/2023	0.0077	1
YGWC-26I	2/22/2024	0.0078	1
YGWC-26S	6/8/2016	0.0032	0
YGWC-26S	8/1/2016	0.0012	0
YGWC-26S	9/20/2016	0.0021	0
YGWC-26S	11/7/2016	0.0021	0
YGWC-26S	1/18/2017	0.0021	0
YGWC-26S	2/21/2017	0.0021	0
YGWC-26S	5/3/2017	0.0011	0
YGWC-26S	7/10/2017	0.0015	0
YGWC-26S	3/30/2018	0.00097	0
YGWC-26S	6/13/2018	0.00097	0
YGWC-26S	10/2/2018	0.00097	0
YGWC-26S	2/27/2019	0.00097	0
YGWC-26S	4/2/2019	0.00097	0
YGWC-26S	9/25/2019	0.00078	0
YGWC-26S	2/13/2020	0.00078	0
YGWC-26S	3/19/2020	0.00078	0
YGWC-26S	9/24/2020	0.00081	0
YGWC-26S	2/10/2021	0.00081	0
YGWC-26S	3/2/2021	0.00081	0
YGWC-26S	8/19/2021	0.00073	0
YGWC-26S	2/10/2022	0.00073	0
YGWC-26S	8/31/2022	0.00073	0
YGWC-26S	2/9/2023	0.00073	0
YGWC-26S	8/17/2023	0.00073	0
YGWC-26S	2/22/2024	0.0016	0

Appendix D-3b
Groundwater ProUCL Input - Lithium
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1			
Well(1)	Date(1)	Lithium(1)	D_Lithium(1)

Step 2			
Well(2)	Date(2)	Lithium(2)	D_Lithium(2)
YGWC-26I	6/13/2018	0.0071	1
YGWC-26I	10/2/2018	0.0064	1
YGWC-26I	2/27/2019	0.0069	1
YGWC-26I	4/2/2019	0.0064	1
YGWC-26I	9/25/2019	0.0073	1
YGWC-26I	2/13/2020	0.0073	1
YGWC-26I	3/20/2020	0.0072	1
YGWC-26I	9/24/2020	0.0074	1
YGWC-26I	2/10/2021	0.0067	1
YGWC-26I	3/3/2021	0.0077	1
YGWC-26I	8/20/2021	0.0079	1
YGWC-26I	2/10/2022	0.0086	1
YGWC-26I	8/31/2022	0.0074	1
YGWC-26I	2/9/2023	0.0075	1
YGWC-26I	8/17/2023	0.0077	1
YGWC-26I	2/22/2024	0.0078	1
YGWC-26S	6/8/2016	0.0032	0
YGWC-26S	8/1/2016	0.0012	0
YGWC-26S	9/20/2016	0.0021	0
YGWC-26S	11/7/2016	0.0021	0
YGWC-26S	1/18/2017	0.0021	0
YGWC-26S	2/21/2017	0.0021	0
YGWC-26S	5/3/2017	0.0011	0
YGWC-26S	7/10/2017	0.0015	0
YGWC-26S	3/30/2018	0.00097	0
YGWC-26S	6/13/2018	0.00097	0
YGWC-26S	10/2/2018	0.00097	0
YGWC-26S	2/27/2019	0.00097	0
YGWC-26S	4/2/2019	0.00097	0
YGWC-26S	9/25/2019	0.00078	0
YGWC-26S	2/13/2020	0.00078	0
YGWC-26S	3/19/2020	0.00078	0
YGWC-26S	9/24/2020	0.00081	0
YGWC-26S	2/10/2021	0.00081	0
YGWC-26S	3/2/2021	0.00081	0
YGWC-26S	8/19/2021	0.00073	0
YGWC-26S	2/10/2022	0.00073	0
YGWC-26S	8/31/2022	0.00073	0
YGWC-26S	2/9/2023	0.00073	0
YGWC-26S	8/17/2023	0.00073	0
YGWC-26S	2/22/2024	0.0016	0

Step 3			
Well(3)	Date(3)	Lithium(3)	D_Lithium(3)

Notes:
1) Concentrations in units of mg/L.

Prepared by/Date: JHG 04/24/2024
Checked by/Date: LO 04/25/2024

Appendix D-3c
Groundwater ProUCL Input - Selenium
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1

Well(1)	Date(1)	Selenium(1)	D_Selenium(1)
YGWC-38	10/12/2017	0.265	1
YGWC-38	11/20/2017	0.246	1
YGWC-38	1/12/2018	0.249	1
YGWC-38	2/20/2018	0.25	1
YGWC-38	4/3/2018	0.23	1
YGWC-38	6/28/2018	0.23	1
YGWC-38	8/7/2018	0.2	1
YGWC-38	9/24/2018	0.2	1
YGWC-38	8/22/2019	0.14	1
YGWC-38	10/9/2019	0.12	1
YGWC-38	2/14/2020	0.11	1
YGWC-38	3/25/2020	0.099	1
YGWC-38	9/25/2020	0.076	1
YGWC-38	2/9/2021	0.073	1
YGWC-38	3/4/2021	0.076	1
YGWC-38	8/26/2021	0.06	1
YGWC-38	2/10/2022	0.064	1
YGWC-38	9/1/2022	0.055	1
YGWC-38	2/8/2023	0.056	1
YGWC-38	8/16/2023	0.053	1
YGWC-38	2/22/2024	0.048	1
PZ-37	10/12/2017	0.234	1
PZ-37	11/21/2017	0.225	1
PZ-37	1/11/2018	0.168	1
PZ-37	2/20/2018	0.32	1
PZ-37	4/3/2018	0.28	1
PZ-37	6/29/2018	0.26	1
PZ-37	8/6/2018	0.21	1
PZ-37	9/24/2018	0.33	1
PZ-37	9/25/2020	0.32	1
PZ-37	2/9/2021	0.28	1
PZ-37	3/4/2021	0.27	1
PZ-37	8/25/2021	0.2	1
PZ-37	2/10/2022	0.2	1
PZ-37	4/4/2022	0.18	1
PZ-37	4/7/2022	0.18	1
PZ-37	9/1/2022	0.17	1
PZ-37	2/8/2023	0.16	1
PZ-37	8/17/2023	0.15	1
PZ-37	2/21/2024	0.13	1

Step 2

Well(2)	Date(2)	Selenium(2)	D_Selenium(2)
PZ-37	06/07/16	0.33	1
PZ-37	06/08/16	0.27	1
PZ-37	06/08/16	0.15	1
PZ-37	07/28/16	0.28	1
PZ-37	08/01/16	0.18	1
PZ-37	09/20/16	0.18	1
PZ-37	09/21/16	0.13	1
PZ-37	01/18/17	0.17	1
PZ-37	03/08/17	0.26	1
PZ-37	05/02/17	0.21	1
PZ-37	03/30/18	0.2	1
PZ-37	04/02/19	0.16	1
PZ-37	09/24/20	0.225	1
PZ-37	09/24/20	0.32	1
PZ-37	02/09/21	0.168	1
PZ-37	02/09/21	0.28	1
PZ-37	03/03/21	0.2	1
PZ-37	08/26/21	0.32	1
PZ-37	09/01/21	0.234	1
PZ-37D	06/08/16	0.0014	0
PZ-37D	11/07/16	0.0014	0
PZ-37D	01/17/17	0.00096	0
PZ-37D	01/18/17	0.14	1
PZ-37D	02/21/17	0.18	1
PZ-37D	05/08/17	0.0016	0
PZ-37D	07/10/17	0.0016	0
PZ-37D	02/13/20	0.0014	0
PZ-37D	03/19/20	0.0014	0
PZ-37D	02/10/22	0.0014	0
PZ-52D	07/29/16	0.011	1
PZ-52D	11/10/16	0.0099	1
PZ-52D	05/03/17	0.0041	1
PZ-52D	02/13/20	0.0057	1
PZ-52D	03/20/20	0.0034	1
PZ-52D	02/10/22	0.0025	1
YAMW-5	11/07/16	0.061	1
YAMW-5	02/21/17	0.048	1
YAMW-5	07/11/17	0.053	1
YAMW-5	03/30/18	0.045	1
YAMW-5	04/02/19	0.055	1
YAMW-5	09/25/19	0.052	1
YAMW-5	09/27/19	0.026	1
YAMW-5	02/10/21	0.057	1
YAMW-5	03/04/21	0.06	1
YAMW-5	08/19/21	0.054	1
YGWC-23S	06/07/16	0.028	1
YGWC-23S	08/01/16	0.037	1
YGWC-23S	09/20/16	0.023	1
YGWC-23S	11/08/16	0.019	1
YGWC-23S	11/09/16	0.026	1
YGWC-23S	01/16/17	0.017	1
YGWC-23S	03/01/17	0.031	1
YGWC-23S	05/02/17	0.018	1
YGWC-23S	11/21/2017	0.0464	1
YGWC-23S	03/30/18	0.036	1
YGWC-23S	04/03/18	0.0521	1
YGWC-23S	09/27/18	0.02	1
YGWC-23S	10/16/2018	0.037	1
YGWC-23S	02/27/19	0.032	1
YGWC-23S	04/04/19	0.024	1
YGWC-23S	02/17/20	0.031	1
YGWC-23S	09/24/20	0.035	1
YGWC-23S	09/24/20	0.0386	1
YGWC-23S	09/25/20	0.0469	1
YGWC-23S	03/02/21	0.03	1
YGWC-23S	3/4/2021	0.0385	1
YGWC-23S	08/20/21	0.039	1
YGWC-23S	08/25/21	0.032	1
YGWC-23S	02/11/22	0.0395	1
YGWC-23S	02/11/22	0.0437	1
YGWC-26I	06/08/16	0.0016	1
YGWC-26I	06/08/16	0.0014	0
YGWC-26I	07/28/16	0.002	1
YGWC-26I	07/29/16	0.0023	1
YGWC-26I	09/02/16	0.0034	1
YGWC-26I	09/21/16	0.0022	1
YGWC-26I	09/21/16	0.0017	1

Step 3

Well(3)	Date(3)	Selenium(3)	D_Selenium(3)
YGWC-26I	6/8/2016	0.0016	1
YGWC-26I	8/1/2016	0.0023	1
YGWC-26I	9/20/2016	0.0022	1
YGWC-26I	11/7/2016	0.0017	1
YGWC-26I	1/18/2017	0.002	1
YGWC-26I	2/21/2017	0.0018	1
YGWC-26I	5/8/2017	0.0014	0
YGWC-26I	7/10/2017	0.002	1
YGWC-26I	3/30/2018	0.0014	0
YGWC-26I	2/27/2019	0.002	1
YGWC-26I	4/2/2019	0.0017	1
YGWC-26I	9/25/2019	0.0019	1
YGWC-26I	2/13/2020	0.0019	1
YGWC-26I	3/20/2020	0.0019	1
YGWC-26I	9/24/2020	0.0031	1
YGWC-26I	2/10/2021	0.0026	1
YGWC-26I	3/3/2021	0.0034	1
YGWC-26I	8/20/2021	0.0026	1
YGWC-26I	2/10/2022	0.0042	1
YGWC-26I	8/31/2022	0.0036	1
YGWC-26I	2/9/2023	0.0042	1
YGWC-26I	8/17/2023	0.0046	1
YGWC-26I	2/22/2024	0.0041	1
YGWC-26S	6/8/2016	0.0003	1
YGWC-26S	8/1/2016	0.0014	1
YGWC-26S	9/20/2016	0.001	0
YGWC-26S	11/7/2016	0.001	0
YGWC-26S	1/18/2017	0.0012	1
YGWC-26S	2/21/2017	0.0014	1
YGWC-26S	5/3/2017	0.0014	0
YGWC-26S	7/10/2017	0.0018	0
YGWC-26S	3/30/2018	0.0014	0
YGWC-26S	2/27/2019	0.0014	0
YGWC-26S	4/2/2019	0.0014	0
YGWC-26S	9/25/2019	0.0013	0
YGWC-26S	2/13/2020	0.0013	0
YGWC-26S	3/19/2020	0.0013	0
YGWC-26S	9/24/2020	0.0016	0
YGWC-26S	2/10/2021	0.0016	0
YGWC-26S	3/2/2021	0.0016	0
YGWC-26S	8/19/2021	0.0014	0
YGWC-26S	2/10/2022	0.0014	0
YGWC-26S	8/31/2022	0.0014	0
YGWC-26S	2/9/2023	0.0014	0
YGWC-26S	8/17/2023	0.0014	0
YGWC-26S	2/22/2024	0.00096	0

Appendix D-3c
Groundwater ProUCL Input - Selenium
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Step 1			
Well(1)	Date(1)	Selenium(1)	D_Selenium(1)

Step 2			
Well(2)	Date(2)	Selenium(2)	D_Selenium(2)
YGWC-26I	11/09/16	0.0017	1
YGWC-26I	11/09/16	0.0019	1
YGWC-26I	11/14/16	0.0026	1
YGWC-26I	01/17/17	0.002	1
YGWC-26I	01/17/17	0.0019	1
YGWC-26I	02/28/17	0.0019	1
YGWC-26I	02/28/17	0.0042	1
YGWC-26I	03/01/17	0.0018	1
YGWC-26I	05/02/17	0.0031	1
YGWC-26I	05/03/17	0.0014	0
YGWC-26I	05/09/17	0.0036	1
YGWC-26I	07/10/17	0.0026	1
YGWC-26I	07/11/17	0.002	1
YGWC-26I	07/13/17	0.0042	1
YGWC-26I	09/22/17	0.0046	1
YGWC-26I	09/29/17	0.0041	1
YGWC-26S	10/06/17	0.0003	1
YGWC-26S	10/12/17	0.0016	0
YGWC-26S	11/20/17	0.0016	0
YGWC-26S	01/12/18	0.0016	0
YGWC-26S	02/20/18	0.0014	0
YGWC-26S	03/30/18	0.0014	1
YGWC-26S	04/03/18	0.0014	0
YGWC-26S	06/13/18	0.001	0
YGWC-26S	06/28/18	0.0014	0
YGWC-26S	08/07/18	0.0014	0
YGWC-26S	09/24/18	0.0014	0
YGWC-26S	09/26/18	0.001	0
YGWC-26S	03/06/19	0.0012	1
YGWC-26S	04/04/19	0.0014	1
YGWC-26S	08/22/19	0.00096	0
YGWC-26S	09/26/19	0.0014	0
YGWC-26S	02/14/20	0.0018	0
YGWC-26S	03/25/20	0.0014	0
YGWC-26S	10/07/20	0.0014	0
YGWC-26S	02/10/21	0.0014	0
YGWC-26S	03/04/21	0.0013	0
YGWC-26S	09/03/21	0.0013	0
YGWC-26S	02/11/22	0.0013	0
YGWC-50	08/17/23	0.0018	1
YGWC-50	12/20/23	0.0015	1
YGWC-50	02/22/24	0.00096	0
YGWC-38	07/28/16	0.2	1
YGWC-38	09/19/16	0.23	1
YGWC-38	09/20/16	0.076	1
YGWC-38	01/16/17	0.23	1
YGWC-38	03/09/17	0.14	1
YGWC-38	05/03/17	0.048	1
YGWC-38	07/05/17	0.2	1
YGWC-38	07/10/17	0.12	1
YGWC-38	07/10/17	0.055	1
YGWC-38	06/12/18	0.11	1
YGWC-38	02/27/19	0.056	1
YGWC-38	03/06/19	0.099	1
YGWC-38	09/25/19	0.06	1
YGWC-38	01/15/20	0.246	1
YGWC-38	03/26/20	0.076	1
YGWC-38	09/24/20	0.064	1
YGWC-38	02/10/21	0.053	1
YGWC-38	03/04/21	0.249	1
YGWC-38	02/10/22	0.25	1
YGWC-38	02/10/22	0.265	1
YGWC-38	02/10/22	0.073	1

Step 3			
Well(3)	Date(3)	Selenium(3)	D_Selenium(3)

Notes:
1) Concentrations in units of mg/L.

Prepared by/Date: JHG 04/24/2024
Checked by/Date: LO 08/14/2024

Appendix D-3d
Groundwater ProUCL Output
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 5/28/2024 2:10:46 PM
From File	Yates Tables 2 3 SSL GW EPC Summary and Screening - Regulatory Report_d.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (cobalt.step 1)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.051	Mean	0.095
Maximum	0.16	Median	0.066
SD	0.051	Std. Error of Mean	0.0228
Coefficient of Variation	0.537	Skewness	0.646

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.315	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.396	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level
Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.144	95% Adjusted-CLT UCL (Chen-1995)	0.14
		95% Modified-t UCL (Johnson-1978)	0.145

Gamma GOF Test

A-D Test Statistic	0.549	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.681	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.316	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level
Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	4.541	k star (bias corrected MLE)	1.95
Theta hat (MLE)	0.0209	Theta star (bias corrected MLE)	0.0487
nu hat (MLE)	45.41	nu star (bias corrected)	19.5
MLE Mean (bias corrected)	0.095	MLE Sd (bias corrected)	0.068
		Approximate Chi Square Value (0.05)	10.48
Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	7.758

Assuming Gamma Distribution

Appendix D-3d
Groundwater ProUCL Output
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

95% Approximate Gamma UCL	0.177	95% Adjusted Gamma UCL	0.239

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.806	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.319	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-2.976	Mean of logged Data	-2.468
Maximum of Logged Data	-1.833	SD of logged Data	0.529

Assuming Lognormal Distribution

95% H-UCL	0.218	90% Chebyshev (MVUE) UCL	0.161
95% Chebyshev (MVUE) UCL	0.191	97.5% Chebyshev (MVUE) UCL	0.233
99% Chebyshev (MVUE) UCL	0.315		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.133	95% BCA Bootstrap UCL	0.133
95% Standard Bootstrap UCL	0.129	95% Bootstrap-t UCL	0.378
95% Hall's Bootstrap UCL	0.614	95% Percentile Bootstrap UCL	0.132
90% Chebyshev(Mean, Sd) UCL	0.163	95% Chebyshev(Mean, Sd) UCL	0.194
97.5% Chebyshev(Mean, Sd) UCL	0.237	99% Chebyshev(Mean, Sd) UCL	0.322

Suggested UCL to Use

95% Student's-t UCL 0.144

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (cobalt.step 2)

General Statistics

Total Number of Observations	106	Number of Distinct Observations	44
Number of Detects	72	Number of Non-Detects	34
Number of Distinct Detects	39	Number of Distinct Non-Detects	7
Minimum Detect	3.8000E-4	Minimum Non-Detect	3.0000E-4
Maximum Detect	0.16	Maximum Non-Detect	5.2000E-4
Variance Detects	7.1976E-4	Percent Non-Detects	32.08%
Mean Detects	0.00937	SD Detects	0.0268
Median Detects	0.002	CV Detects	2.863
Skewness Detects	4.504	Kurtosis Detects	21.29
Mean of Logged Detects	-5.932	SD of Logged Detects	1.208

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.348	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.423	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.121	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Appendix D-3d
Groundwater ProUCL Output
Yates Risk Evaluation Report
Yates R6-AMA
Plant Yates, Coweta County, GA

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00647	KM Standard Error of Mean	0.00219
90KM SD	0.0224	95% KM (BCA) UCL	0.0106
95% KM (t) UCL	0.0101	95% KM (Percentile Bootstrap) UCL	0.0103
95% KM (z) UCL	0.0101	95% KM Bootstrap t UCL	0.0144
90% KM Chebyshev UCL	0.013	95% KM Chebyshev UCL	0.016
97.5% KM Chebyshev UCL	0.0201	99% KM Chebyshev UCL	0.0282

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	12.22	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.817	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.354	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.111	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.503	k star (bias corrected MLE)	0.491
Theta hat (MLE)	0.0186	Theta star (bias corrected MLE)	0.0191
nu hat (MLE)	72.43	nu star (bias corrected)	70.75
Mean (detects)	0.00937		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.8000E-4	Mean	0.00957
Maximum	0.16	Median	0.003
SD	0.0221	CV	2.305
k hat (MLE)	0.704	k star (bias corrected MLE)	0.691
Theta hat (MLE)	0.0136	Theta star (bias corrected MLE)	0.0139
nu hat (MLE)	149.3	nu star (bias corrected)	146.4
Adjusted Level of Significance (β)	0.0477		
Approximate Chi Square Value (146.41, α)	119.4	Adjusted Chi Square Value (146.41, β)	119.1
95% Gamma Approximate UCL	0.0117	95% Gamma Adjusted UCL	0.0118

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00647	SD (KM)	0.0224
Variance (KM)	4.9996E-4	SE of Mean (KM)	0.00219
k hat (KM)	0.0836	k star (KM)	0.0876
nu hat (KM)	17.73	nu star (KM)	18.56
theta hat (KM)	0.0773	theta star (KM)	0.0739
80% gamma percentile (KM)	0.00363	90% gamma percentile (KM)	0.0162
95% gamma percentile (KM)	0.0377	99% gamma percentile (KM)	0.11

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.56, α)	9.799	Adjusted Chi Square Value (18.56, β)	9.711
95% KM Approximate Gamma UCL	0.0123	95% KM Adjusted Gamma UCL	0.0124

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.799	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	1.626E-13	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0955	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

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Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00644	Mean in Log Scale	-6.767
SD in Original Scale	0.0225	SD in Log Scale	1.614
95% t UCL (assumes normality of ROS data)	0.0101	95% Percentile Bootstrap UCL	0.0104
95% BCA Bootstrap UCL	0.0114	95% Bootstrap t UCL	0.0135
95% H-UCL (Log ROS)	0.00663		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.616	KM Geo Mean	0.00134
KM SD (logged)	1.405	95% Critical H Value (KM-Log)	2.616
KM Standard Error of Mean (logged)	0.138	95% H-UCL (KM -Log)	0.00514
KM SD (logged)	1.405	95% Critical H Value (KM-Log)	2.616
KM Standard Error of Mean (logged)	0.138		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00643	Mean in Log Scale	-6.744
SD in Original Scale	0.0225	SD in Log Scale	1.552
95% t UCL (Assumes normality)	0.0101	95% H-Stat UCL	0.00599

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.0101

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (cobalt.step 3)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	21
Number of Detects	24	Number of Non-Detects	26
Number of Distinct Detects	14	Number of Distinct Non-Detects	7
Minimum Detect	8.8000E-4	Minimum Non-Detect	3.0000E-4
Maximum Detect	0.0033	Maximum Non-Detect	5.2000E-4
Variance Detects	4.0723E-7	Percent Non-Detects	52%
Mean Detects	0.00209	SD Detects	6.3815E-4
Median Detects	0.00205	CV Detects	0.305
Skewness Detects	0.199	Kurtosis Detects	-0.337
Mean of Logged Detects	-6.219	SD of Logged Detects	0.329

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.884	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.205	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

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Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00116	KM Standard Error of Mean	1.4358E-4
90KM SD	9.9389E-4	95% KM (BCA) UCL	0.00139
95% KM (t) UCL	0.0014	95% KM (Percentile Bootstrap) UCL	0.0014
95% KM (z) UCL	0.0014	95% KM Bootstrap t UCL	0.00141
90% KM Chebyshev UCL	0.00159	95% KM Chebyshev UCL	0.00179
97.5% KM Chebyshev UCL	0.00206	99% KM Chebyshev UCL	0.00259

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.35	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.128	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	10.42	k star (bias corrected MLE)	9.149
Theta hat (MLE)	2.0057E-4	Theta star (bias corrected MLE)	2.2853E-4
nu hat (MLE)	500.4	nu star (bias corrected)	439.1
Mean (detects)	0.00209		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	8.8000E-4	Mean	0.0062
Maximum	0.01	Median	0.01
SD	0.00402	CV	0.647
k hat (MLE)	1.832	k star (bias corrected MLE)	1.735
Theta hat (MLE)	0.00339	Theta star (bias corrected MLE)	0.00358
nu hat (MLE)	183.2	nu star (bias corrected)	173.5
Adjusted Level of Significance (β)	0.0452		
Approximate Chi Square Value (173.52, α)	144.1	Adjusted Chi Square Value (173.52, β)	143.3
95% Gamma Approximate UCL	0.00747	95% Gamma Adjusted UCL	0.00751

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00116	SD (KM)	9.9389E-4
Variance (KM)	9.8782E-7	SE of Mean (KM)	1.4358E-4
k hat (KM)	1.361	k star (KM)	1.293
nu hat (KM)	136.1	nu star (KM)	129.3
theta hat (KM)	8.5186E-4	theta star (KM)	8.9689E-4
80% gamma percentile (KM)	0.00182	90% gamma percentile (KM)	0.00251
95% gamma percentile (KM)	0.00318	99% gamma percentile (KM)	0.00471

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (129.29, α)	104	Adjusted Chi Square Value (129.29, β)	103.4
95% KM Approximate Gamma UCL	0.00144	95% KM Adjusted Gamma UCL	0.00145

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.93	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.162	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

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Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00146	Mean in Log Scale	-6.658
SD in Original Scale	7.6476E-4	SD in Log Scale	0.509
95% t UCL (assumes normality of ROS data)	0.00164	95% Percentile Bootstrap UCL	0.00163
95% BCA Bootstrap UCL	0.00164	95% Bootstrap t UCL	0.00166
95% H-UCL (Log ROS)	0.00168		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.203	KM Geo Mean	7.4421E-4
KM SD (logged)	0.972	95% Critical H Value (KM-Log)	2.313
KM Standard Error of Mean (logged)	0.14	95% H-UCL (KM -Log)	0.00165
KM SD (logged)	0.972	95% Critical H Value (KM-Log)	2.313
KM Standard Error of Mean (logged)	0.14		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00111	Mean in Log Scale	-7.399
SD in Original Scale	0.00105	SD in Log Scale	1.177
95% t UCL (Assumes normality)	0.00136	95% H-Stat UCL	0.00188

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.0014

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (lithium.step 1)

General Statistics

Total Number of Observations	28	Number of Distinct Observations	22
		Number of Missing Observations	0
Minimum	0.0208	Mean	0.0431
Maximum	0.059	Median	0.046
SD	0.0106	Std. Error of Mean	0.002
Coefficient of Variation	0.245	Skewness	-0.623

Normal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.896	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.191	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0465	95% Adjusted-CLT UCL (Chen-1995)	0.0462
		95% Modified-t UCL (Johnson-1978)	0.0465

Gamma GOF Test

A-D Test Statistic	0.866	**Anderson-Darling Gamma GOF Test**	

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5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.165	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.6	k star (bias corrected MLE)	13.06
Theta hat (MLE)	0.00295	Theta star (bias corrected MLE)	0.0033
nu hat (MLE)	817.5	nu star (bias corrected)	731.2
MLE Mean (bias corrected)	0.0431	MLE Sd (bias corrected)	0.0119
		Approximate Chi Square Value (0.05)	669.5
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	665.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.0471	95% Adjusted Gamma UCL	0.0474

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.151	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.873	Mean of logged Data	-3.178
Maximum of Logged Data	-2.83	SD of logged Data	0.282

Assuming Lognormal Distribution

95% H-UCL	0.0478	90% Chebyshev (MVUE) UCL	0.0503
95% Chebyshev (MVUE) UCL	0.0535	97.5% Chebyshev (MVUE) UCL	0.0579
99% Chebyshev (MVUE) UCL	0.0665		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0464	95% BCA Bootstrap UCL	0.0461
95% Standard Bootstrap UCL	0.0464	95% Bootstrap-t UCL	0.0465
95% Hall's Bootstrap UCL	0.0463	95% Percentile Bootstrap UCL	0.0463
90% Chebyshev(Mean, Sd) UCL	0.0491	95% Chebyshev(Mean, Sd) UCL	0.0518
97.5% Chebyshev(Mean, Sd) UCL	0.0556	99% Chebyshev(Mean, Sd) UCL	0.063

Suggested UCL to Use

95% Student's-t UCL 0.0465

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Result (lithium.step 2)

General Statistics

Total Number of Observations	109	Number of Distinct Observations	72
Number of Detects	84	Number of Non-Detects	25

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Number of Distinct Detects	62	Number of Distinct Non-Detects	10
Minimum Detect	0.0033	Minimum Non-Detect	7.3000E-4
Maximum Detect	0.059	Maximum Non-Detect	0.0032
Variance Detects	3.0723E-4	Percent Non-Detects	22.94%
Mean Detects	0.0207	SD Detects	0.0175
Median Detects	0.0136	CV Detects	0.845
Skewness Detects	0.869	Kurtosis Detects	-0.786
Mean of Logged Detects	-4.245	SD of Logged Detects	0.876

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.799	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	1.110E-16	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.112	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0162	KM Standard Error of Mean	0.00168
90KM SD	0.0175	95% KM (BCA) UCL	0.0189
95% KM (t) UCL	0.0189	95% KM (Percentile Bootstrap) UCL	0.0189
95% KM (z) UCL	0.0189	95% KM Bootstrap t UCL	0.0191
90% KM Chebyshev UCL	0.0212	95% KM Chebyshev UCL	0.0235
97.5% KM Chebyshev UCL	0.0267	99% KM Chebyshev UCL	0.0329

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.468	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.771	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0993	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.499	k star (bias corrected MLE)	1.454
Theta hat (MLE)	0.0138	Theta star (bias corrected MLE)	0.0143
nu hat (MLE)	251.9	nu star (bias corrected)	244.2
Mean (detects)	0.0207		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0033	Mean	0.0183
Maximum	0.059	Median	0.01
SD	0.016	CV	0.876
k hat (MLE)	1.684	k star (bias corrected MLE)	1.644
Theta hat (MLE)	0.0109	Theta star (bias corrected MLE)	0.0111
nu hat (MLE)	367.1	nu star (bias corrected)	358.4
Adjusted Level of Significance (β)	0.0478		
Approximate Chi Square Value (358.37, α)	315.5	Adjusted Chi Square Value (358.37, β)	315
95% Gamma Approximate UCL	0.0208	95% Gamma Adjusted UCL	0.0208

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0162	SD (KM)	0.0175
Variance (KM)	3.0475E-4	SE of Mean (KM)	0.00168
k hat (KM)	0.856	k star (KM)	0.839

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nu hat (KM)	186.7	nu star (KM)	182.9
theta hat (KM)	0.0189	theta star (KM)	0.0193
80% gamma percentile (KM)	0.0263	90% gamma percentile (KM)	0.0388
95% gamma percentile (KM)	0.0515	99% gamma percentile (KM)	0.0814

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (182.86, α)	152.6	Adjusted Chi Square Value (182.86, β)	152.2
95% KM Approximate Gamma UCL	0.0194	95% KM Adjusted Gamma UCL	0.0194

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.895	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	9.0992E-8	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0886	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0165	Mean in Log Scale	-4.684
SD in Original Scale	0.0172	SD in Log Scale	1.125
95% t UCL (assumes normality of ROS data)	0.0192	95% Percentile Bootstrap UCL	0.0193
95% BCA Bootstrap UCL	0.0194	95% Bootstrap t UCL	0.0195
95% H-UCL (Log ROS)	0.0224		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.928	KM Geo Mean	0.00724
KM SD (logged)	1.467	95% Critical H Value (KM-Log)	2.689
KM Standard Error of Mean (logged)	0.141	95% H-UCL (KM -Log)	0.031
KM SD (logged)	1.467	95% Critical H Value (KM-Log)	2.689
KM Standard Error of Mean (logged)	0.141		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0161	Mean in Log Scale	-4.994
SD in Original Scale	0.0176	SD in Log Scale	1.593
95% t UCL (Assumes normality)	0.0189	95% H-Stat UCL	0.0372

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.0189

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (lithium.step 3)

General Statistics

Total Number of Observations	50	Number of Distinct Observations	27
Number of Detects	25	Number of Non-Detects	25
Number of Distinct Detects	17	Number of Distinct Non-Detects	10
Minimum Detect	0.0057	Minimum Non-Detect	7.3000E-4
Maximum Detect	0.0086	Maximum Non-Detect	0.0032
Variance Detects	3.9750E-7	Percent Non-Detects	50%
Mean Detects	0.00706	SD Detects	6.3048E-4

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Median Detects	0.007	CV Detects	0.0893
Skewness Detects	0.203	Kurtosis Detects	0.465
Mean of Logged Detects	-4.957	SD of Logged Detects	0.0894

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.989	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.886	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.0676	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.201	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0039	KM Standard Error of Mean	4.6116E-4
90KM SD	0.0032	95% KM (BCA) UCL	0.00462
95% KM (t) UCL	0.00467	95% KM (Percentile Bootstrap) UCL	0.00465
95% KM (z) UCL	0.00465	95% KM Bootstrap t UCL	0.00465
90% KM Chebyshev UCL	0.00528	95% KM Chebyshev UCL	0.00591
97.5% KM Chebyshev UCL	0.00677	99% KM Chebyshev UCL	0.00848

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.138	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0613	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.174	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	130.7	k star (bias corrected MLE)	115
Theta hat (MLE)	5.4021E-5	Theta star (bias corrected MLE)	6.1373E-5
nu hat (MLE)	6534	nu star (bias corrected)	5752
Mean (detects)	0.00706		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0057	Mean	0.00853
Maximum	0.01	Median	0.0093
SD	0.00155	CV	0.182
k hat (MLE)	29.6	k star (bias corrected MLE)	27.83
Theta hat (MLE)	2.8822E-4	Theta star (bias corrected MLE)	3.0647E-4
nu hat (MLE)	2960	nu star (bias corrected)	2783
Adjusted Level of Significance (β)	0.0452		
Approximate Chi Square Value (N/A, α)	2662	Adjusted Chi Square Value (N/A, β)	2658
95% Gamma Approximate UCL	0.00892	95% Gamma Adjusted UCL	0.00893

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0039	SD (KM)	0.0032
Variance (KM)	1.0208E-5	SE of Mean (KM)	4.6116E-4
k hat (KM)	1.486	k star (KM)	1.41
nu hat (KM)	148.6	nu star (KM)	141
theta hat (KM)	0.00262	theta star (KM)	0.00276
80% gamma percentile (KM)	0.00607	90% gamma percentile (KM)	0.00824
95% gamma percentile (KM)	0.0104	99% gamma percentile (KM)	0.0152

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Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (141.03, α)	114.6	Adjusted Chi Square Value (141.03, β)	113.9
95% KM Approximate Gamma UCL	0.00479	95% KM Adjusted Gamma UCL	0.00482

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0658	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00632	Mean in Log Scale	-5.074
SD in Original Scale	8.9448E-4	SD in Log Scale	0.139
95% t UCL (assumes normality of ROS data)	0.00653	95% Percentile Bootstrap UCL	0.00652
95% BCA Bootstrap UCL	0.00652	95% Bootstrap t UCL	0.00655
95% H-UCL (Log ROS)	0.00654		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.09	KM Geo Mean	0.00227
KM SD (logged)	1.134	95% Critical H Value (KM-Log)	2.493
KM Standard Error of Mean (logged)	0.164	95% H-UCL (KM -Log)	0.00646
KM SD (logged)	1.134	95% Critical H Value (KM-Log)	2.493
KM Standard Error of Mean (logged)	0.164		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00383	Mean in Log Scale	-6.235
SD in Original Scale	0.0033	SD in Log Scale	1.329
95% t UCL (Assumes normality)	0.00461	95% H-Stat UCL	0.00794

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.00467

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (selenium.step 1)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	32
		Number of Missing Observations	0
Minimum	0.048	Mean	0.179
Maximum	0.33	Median	0.19
SD	0.0841	Std. Error of Mean	0.0133
Coefficient of Variation	0.47	Skewness	-0.0621

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**

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1% Lilliefors Critical Value	0.162	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.202	95% Adjusted-CLT UCL (Chen-1995)	0.201
		95% Modified-t UCL (Johnson-1978)	0.202

Gamma GOF Test

A-D Test Statistic	1.143	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.14	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.695	k star (bias corrected MLE)	3.435
Theta hat (MLE)	0.0485	Theta star (bias corrected MLE)	0.0522
nu hat (MLE)	295.6	nu star (bias corrected)	274.8
MLE Mean (bias corrected)	0.179	MLE Sd (bias corrected)	0.0967
		Approximate Chi Square Value (0.05)	237.4
Adjusted Level of Significance	0.044	Adjusted Chi Square Value	236.1

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.207	95% Adjusted Gamma UCL	0.209

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.949	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.128	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.037	Mean of logged Data	-1.861
Maximum of Logged Data	-1.109	SD of logged Data	0.582

Assuming Lognormal Distribution

95% H-UCL	0.222	90% Chebyshev (MVUE) UCL	0.237
95% Chebyshev (MVUE) UCL	0.262	97.5% Chebyshev (MVUE) UCL	0.295
99% Chebyshev (MVUE) UCL	0.362		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.201	95% BCA Bootstrap UCL	0.2
95% Standard Bootstrap UCL	0.201	95% Bootstrap-t UCL	0.201
95% Hall's Bootstrap UCL	0.2	95% Percentile Bootstrap UCL	0.2
90% Chebyshev(Mean, Sd) UCL	0.219	95% Chebyshev(Mean, Sd) UCL	0.237
97.5% Chebyshev(Mean, Sd) UCL	0.262	99% Chebyshev(Mean, Sd) UCL	0.312

Suggested UCL to Use

95% Student's-t UCL 0.202

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

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However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Result (selenium.step 2)

General Statistics

Total Number of Observations	140	Number of Distinct Observations	84
Number of Detects	110	Number of Non-Detects	30
Number of Distinct Detects	81	Number of Distinct Non-Detects	6
Minimum Detect	3.0000E-4	Minimum Non-Detect	9.6000E-4
Maximum Detect	0.33	Maximum Non-Detect	0.0018
Variance Detects	0.00868	Percent Non-Detects	21.43%
Mean Detects	0.0811	SD Detects	0.0931
Median Detects	0.0416	CV Detects	1.149
Skewness Detects	1.151	Kurtosis Detects	0.036
Mean of Logged Detects	-3.571	SD of Logged Detects	1.797

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.784	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.098	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0638	KM Standard Error of Mean	0.00752
90KM SD	0.0886	95% KM (BCA) UCL	0.0765
95% KM (t) UCL	0.0763	95% KM (Percentile Bootstrap) UCL	0.0761
95% KM (z) UCL	0.0762	95% KM Bootstrap t UCL	0.0776
90% KM Chebyshev UCL	0.0864	95% KM Chebyshev UCL	0.0966
97.5% KM Chebyshev UCL	0.111	99% KM Chebyshev UCL	0.139

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.995	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.811	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.122	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0913	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.586	k star (bias corrected MLE)	0.576
Theta hat (MLE)	0.138	Theta star (bias corrected MLE)	0.141
nu hat (MLE)	128.9	nu star (bias corrected)	126.7
Mean (detects)	0.0811		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.0000E-4	Mean	0.0658
Maximum	0.33	Median	0.026
SD	0.0875	CV	1.329
k hat (MLE)	0.579	k star (bias corrected MLE)	0.572

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Theta hat (MLE)	0.114	Theta star (bias corrected MLE)	0.115
nu hat (MLE)	162.2	nu star (bias corrected)	160.1
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (160.05, α)	131.8	Adjusted Chi Square Value (160.05, β)	131.5
95% Gamma Approximate UCL	0.08	95% Gamma Adjusted UCL	0.0801

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0638	SD (KM)	0.0886
Variance (KM)	0.00785	SE of Mean (KM)	0.00752
k hat (KM)	0.518	k star (KM)	0.512
nu hat (KM)	145.2	nu star (KM)	143.4
theta hat (KM)	0.123	theta star (KM)	0.125
80% gamma percentile (KM)	0.105	90% gamma percentile (KM)	0.172
95% gamma percentile (KM)	0.243	99% gamma percentile (KM)	0.418

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (143.38, α)	116.7	Adjusted Chi Square Value (143.38, β)	116.5
95% KM Approximate Gamma UCL	0.0784	95% KM Adjusted Gamma UCL	0.0785

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.895	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	1.126E-10	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0776	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0639	Mean in Log Scale	-4.364
SD in Original Scale	0.0888	SD in Log Scale	2.233
95% t UCL (assumes normality of ROS data)	0.0763	95% Percentile Bootstrap UCL	0.0763
95% BCA Bootstrap UCL	0.0765	95% Bootstrap t UCL	0.0775
95% H-UCL (Log ROS)	0.303		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.502	KM Geo Mean	0.0111
KM SD (logged)	2.397	95% Critical H Value (KM-Log)	3.768
KM Standard Error of Mean (logged)	0.207	95% H-UCL (KM -Log)	0.421
KM SD (logged)	2.397	95% Critical H Value (KM-Log)	3.768
KM Standard Error of Mean (logged)	0.207		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0638	Mean in Log Scale	-4.37
SD in Original Scale	0.0889	SD in Log Scale	2.213
95% t UCL (Assumes normality)	0.0763	95% H-Stat UCL	0.285

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.0763

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

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Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Result (selenium.step 3)

General Statistics

Total Number of Observations	46	Number of Distinct Observations	20
Number of Detects	25	Number of Non-Detects	21
Number of Distinct Detects	17	Number of Distinct Non-Detects	6
Minimum Detect	3.0000E-4	Minimum Non-Detect	9.6000E-4
Maximum Detect	0.0046	Maximum Non-Detect	0.0018
Variance Detects	1.1803E-6	Percent Non-Detects	45.65%
Mean Detects	0.00239	SD Detects	0.00109
Median Detects	0.002	CV Detects	0.455
Skewness Detects	0.578	Kurtosis Detects	-0.277
Mean of Logged Detects	-6.158	SD of Logged Detects	0.557

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.886	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.201	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00152	KM Standard Error of Mean	2.0279E-4
90KM SD	0.00126	95% KM (BCA) UCL	0.00206
95% KM (t) UCL	0.00186	95% KM (Percentile Bootstrap) UCL	0.00198
95% KM (z) UCL	0.00185	95% KM Bootstrap t UCL	0.00183
90% KM Chebyshev UCL	0.00212	95% KM Chebyshev UCL	0.0024
97.5% KM Chebyshev UCL	0.00278	99% KM Chebyshev UCL	0.00353

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.641	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.137	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.175	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.312	k star (bias corrected MLE)	3.821
Theta hat (MLE)	5.5380E-4	Theta star (bias corrected MLE)	6.2493E-4
nu hat (MLE)	215.6	nu star (bias corrected)	191.1
Mean (detects)	0.00239		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.0000E-4	Mean	0.00586
Maximum	0.01	Median	0.0042
SD	0.00391	CV	0.668
k hat (MLE)	1.762	k star (bias corrected MLE)	1.662

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Theta hat (MLE)	0.00333	Theta star (bias corrected MLE)	0.00353
nu hat (MLE)	162.1	nu star (bias corrected)	152.9
Adjusted Level of Significance (β)	0.0448		
Approximate Chi Square Value (152.86, α)	125.3	Adjusted Chi Square Value (152.86, β)	124.5
95% Gamma Approximate UCL	0.00715	95% Gamma Adjusted UCL	0.0072

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00152	SD (KM)	0.00126
Variance (KM)	1.5838E-6	SE of Mean (KM)	2.0279E-4
k hat (KM)	1.45	k star (KM)	1.37
nu hat (KM)	133.4	nu star (KM)	126
theta hat (KM)	0.00105	theta star (KM)	0.00111
80% gamma percentile (KM)	0.00237	90% gamma percentile (KM)	0.00323
95% gamma percentile (KM)	0.00407	99% gamma percentile (KM)	0.00598

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (126.05, α)	101.1	Adjusted Chi Square Value (126.05, β)	100.4
95% KM Approximate Gamma UCL	0.00189	95% KM Adjusted Gamma UCL	0.0019

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00162	Mean in Log Scale	-6.687
SD in Original Scale	0.00117	SD in Log Scale	0.747
95% t UCL (assumes normality of ROS data)	0.00191	95% Percentile Bootstrap UCL	0.00191
95% BCA Bootstrap UCL	0.00193	95% Bootstrap t UCL	0.00194
95% H-UCL (Log ROS)	0.00208		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.928	KM Geo Mean	9.8032E-4
KM SD (logged)	1.004	95% Critical H Value (KM-Log)	2.331
KM Standard Error of Mean (logged)	0.188	95% H-UCL (KM -Log)	0.0023
KM SD (logged)	1.004	95% Critical H Value (KM-Log)	2.331
KM Standard Error of Mean (logged)	0.188		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00161	Mean in Log Scale	-6.676
SD in Original Scale	0.00117	SD in Log Scale	0.71
95% t UCL (Assumes normality)	0.0019	95% H-Stat UCL	0.00201

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

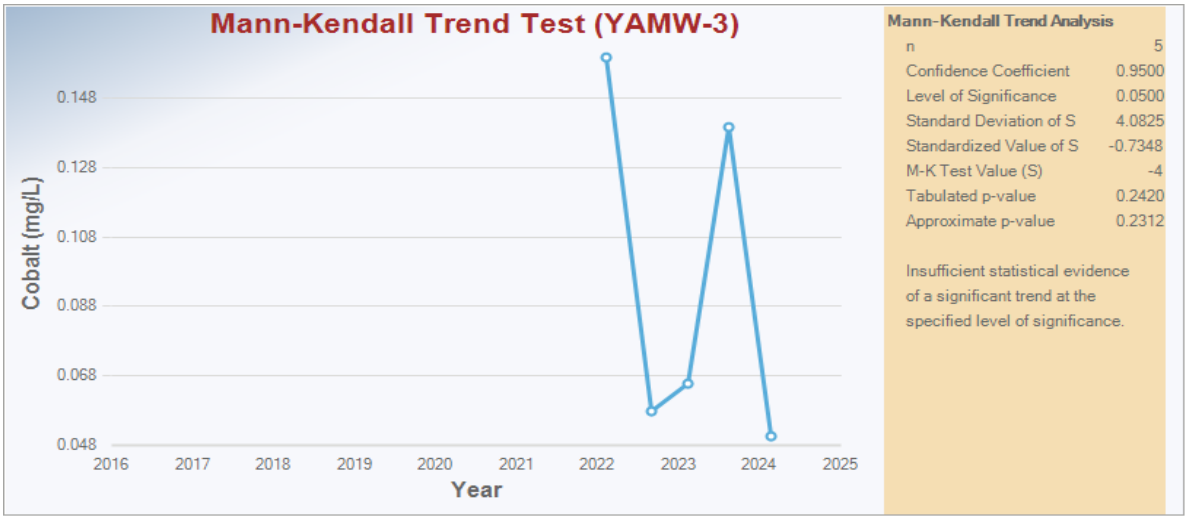
95% KM (t) UCL 0.00186

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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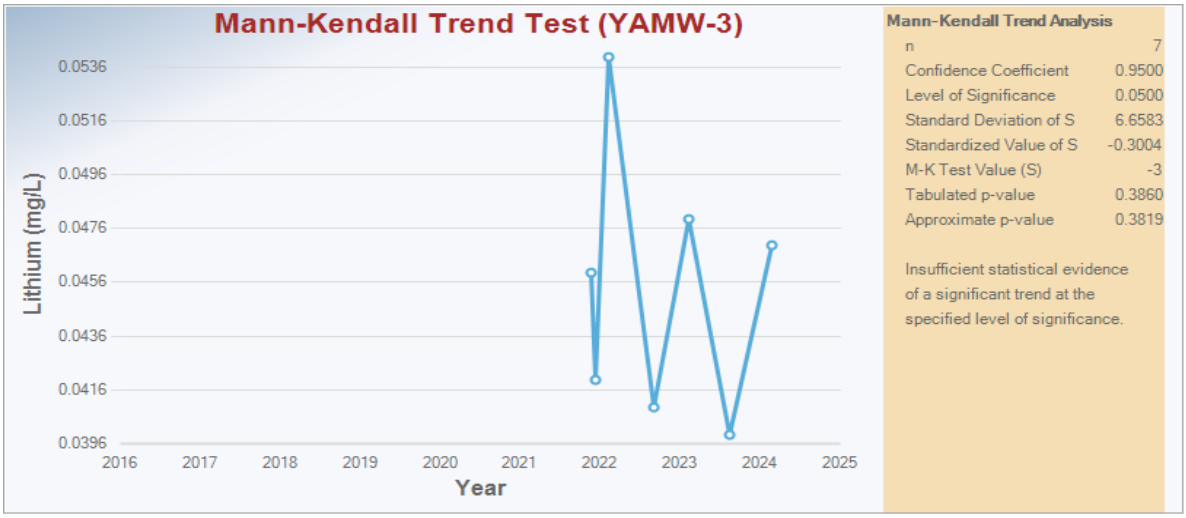
Groundwater Trend Graphs

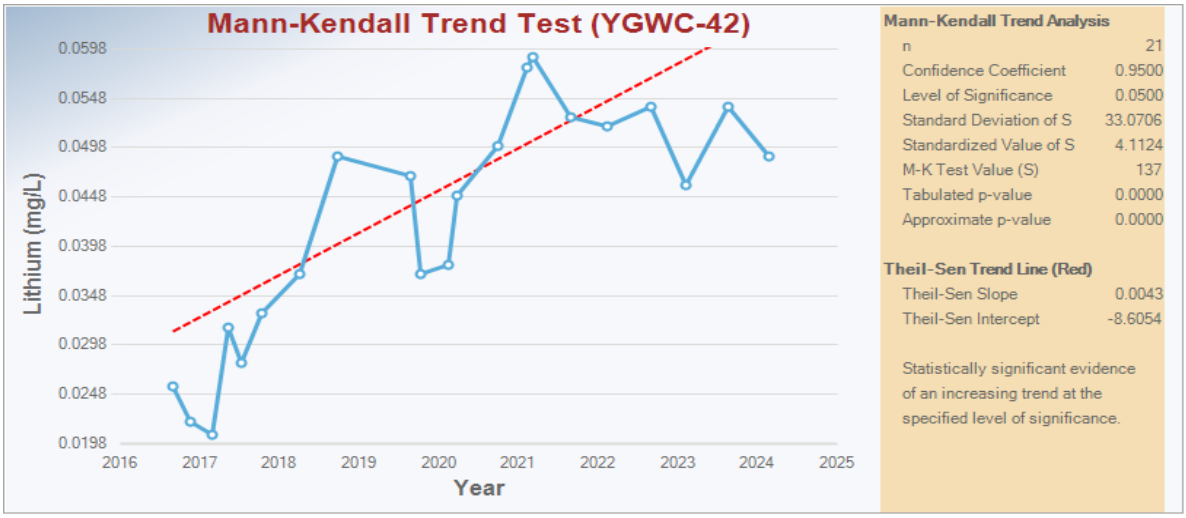
Appendix D-4
Groundwater Mann-Kendall Trend Graphs - Cobalt
Yates Risk Evaluation Report
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Plant Yates, Coweta County, GA



Prepared by/Date: JHG 04/24/2024
Prepared by/Date: LO 04/26/2024

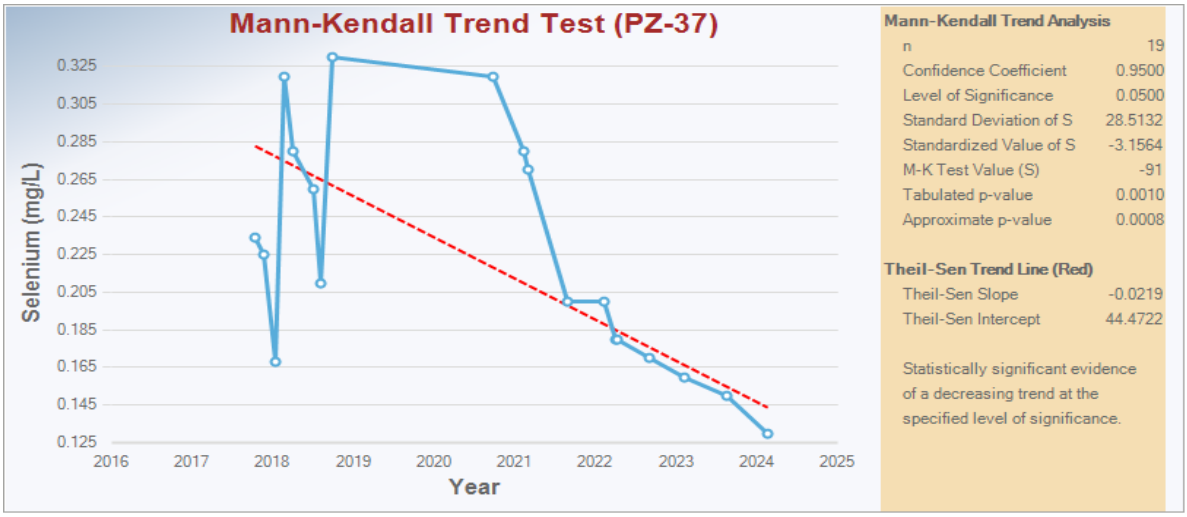
Appendix D-4
Groundwater Mann-Kendall Trend Graphs - Lithium
Yates Risk Evaluation Report
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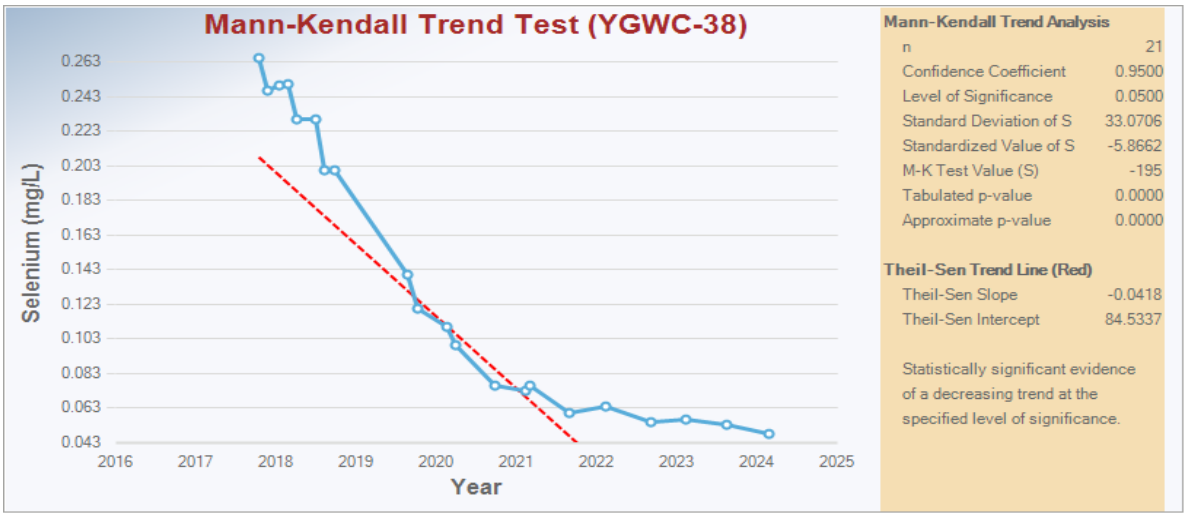




Prepared by/Date: JHG 04/24/2024
Prepared by/Date: LO 04/26/2024

Appendix D-4
Groundwater Mann-Kendall Trend Graphs - Selenium
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Prepared by/Date: JHG 04/24/2024
Prepared by/Date: LO 04/26/2024

Appendix E

Statistical Trend and Timeframe Analysis

Appendix E – Statistical Trend Analysis of Selenium, Cobalt, and Lithium

A statistical evaluation of selenium, cobalt, and lithium concentration trends, using a Mann-Kendall analysis, was performed on datasets that met the following criteria:

1) Current exceedances of the Groundwater Protection Standard (GWPS)
2) At least four datapoints are available.
3) Greater than 50 percent of detected concentrations are at least 1/10th the applicable Groundwater Protection Standard (GWPS). 1/10th the selenium (0.05 milligrams per liter [mg/L]), cobalt (0.035 mg/L), and lithium (0.04 mg/L) GWPS, is equal to 0.005, 0.0035, and 0.004 mg/L, respectively.

Available data was evaluated from October 2017 through February 2024. In some cases, i.e. selenium at PZ-37 and lithium YGWC-42, a change in trend was apparent during this time period and is interpreted to be a response to the R6 CCR Landfill closure. In those cases, a statistical analysis was also performed for a truncated data set representing the period once the change following closure was realized, as detailed below.

Based on the above criteria, statistical trend analyses were performed for the following monitoring wells and constituents:

- Selenium concentration trends were evaluated at monitoring wells YGWC-38 and PZ-37 for the full dataset and for a truncated dataset. The Mann-Kendall trend test was completed using 19 sample results for YGWC-38 from October 2017 to February 2024, 17 sample results from October 2017 through February 2024 for the full data set for PZ-37 and 10 sample results from September 2018 to February 2024 for the truncated dataset for PZ-37. Monitoring location YAMW-5 exhibits selenium concentrations that exceed the GWPS, however, statistically significant levels (SSLs) have not been identified.
- Lithium concentration trends were evaluated at monitoring well YGWC-42 using the full dataset of 21 sample results from August 2016 through February 2024 and a truncated dataset using the most recent 6 sample results to evaluate observed change in lithium concentration trend which changed from increasing from August 2016 to March 2021 to a period of relative stability from August 2021 to the most resent sample result in February 2024. At YAMW-3, the Mann-Kendall trend test was completed using the 5 available sample results for cobalt. YAMW-3 also exhibits lithium concentrations that exceed the GWPS, however, statistically significant levels (SSLs) have not been identified.

The Mann-Kendall trend test was completed using the guidelines in Gilbert (1987)-and GSI Environmental (2012). The Mann-Kendall trend test is a nonparametric test that determines trend based on ranked data. As such, it is relatively insensitive to small datasets, outlier values, and non-detect concentrations, and does not require the data to fit a specific model. The basic Mann-Kendall trend test is performed by listing the concentrations of the constituent of interest in temporal order and computing the differences between a given measurement and earlier measurements (Gilbert 1987; USEPA 2009). Based on USEPA guidance, non-detect values are set to one value less than that of any detections (USEPA 2009). For this analysis, non-detect values were set to 50 percent of the lower of the lowest detected value or reporting

limit. The Mann-Kendall test statistic (sum of trend [S]) is the difference between the number of strictly positive differences and the number of strictly negative differences. If S is positive, an increasing trend is indicated; if S is negative, a decreasing trend is indicated; and if S is near zero, no trend is apparent. The coefficient of variation (CV) is a quantitative measure that can be used to evaluate if concentrations are stable in cases where a statistically significant trend is not apparent. Based on the probability values and coefficient of variation, trends are classified as follows (GSI 2012, Aziz et al 2003):

- Probability >95% = increasing or decreasing
- Probability > 90% = Probably increasing or probably decreasing
- Probability < 90% and S > 0 = no trend
- Probability < 90% and S $\leq$ 0 and CV $\geq$ 1 = no trend
- Probability < 90% and COV < 1 = stable

Sen's slope estimates were used to project a range of years, based on the lower confidence limit and upper confidence limits at confidence level of 90 percent, for statistically significant decreasing trends observed for selenium at YGWC-38 and PZ-37. Using the truncated dataset representing current trends, selenium concentrations at PZ-37 are projected to decrease below GWPS between 2026 and 2029; while concentrations at YGWC-38 decreased below GWPS as of February 2024. Statistically significant decreasing trends were not observed for lithium at YGWC-42 or cobalt at YAMW-3; as such, Sen's slope was not estimated.

Summary statistics and Mann-Kendall trend analysis results are presented in **Attachment A**. Mann-Kendall trend charts are presented in **Attachment B**.

MANN-KENDALL TREND RESULTS

- Selenium concentrations at monitoring locations YGWC-38 and PZ-37 are statistically significant decreasing at 90 percent confidence, based on Mann-Kendall trend analysis, using the full dataset for YGWC-38 and using both the full and truncated dataset for PZ-37. Selenium concentrations at YGWC-38 are below GWPS as of February 2024. Based on Sen's slope estimates, selenium concentrations at PZ-37 are projected to achieve the GWPS as follows:
  - PZ-37 (truncated dataset): within 2 to 5 years, i.e. between 2026 and 2029
- Concentrations of selenium at YAMW-5 were not incorporated into the statistical evaluation.
- Using the entire dataset, August 2016 through February 2024, lithium concentrations at YGWC-42 were determined to be increasing, However, using a truncated dataset for the time period after concentrations of lithium stopped increasing post-closure (August 2021 through February 2024), lithium was determined to be stable.
- Cobalt concentrations at YAMW-3 are stable, based on all 5 available sample results from February 2022 to February 2024.

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ATTACHMENTS

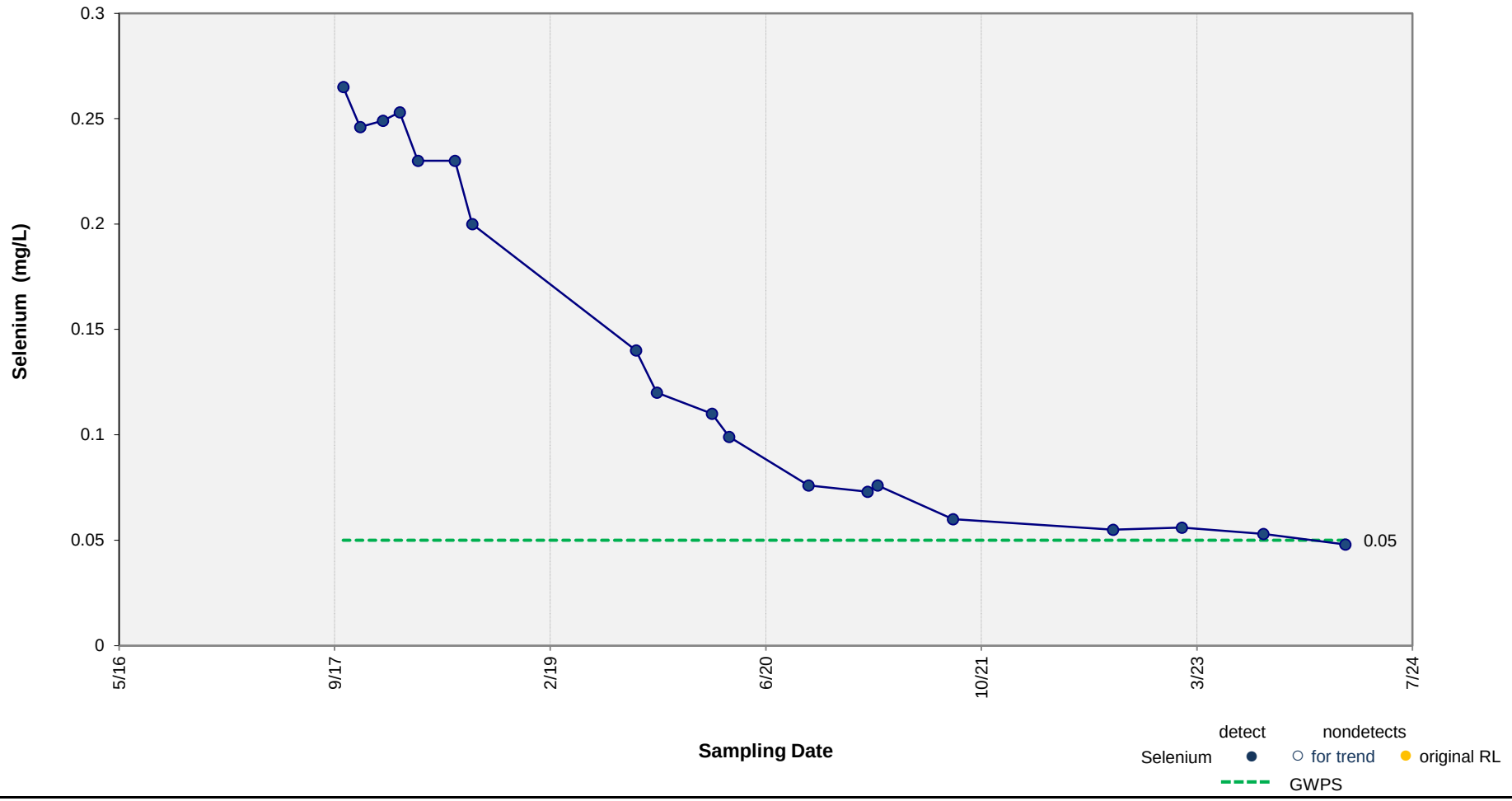
Attachment A – Summary Statistics and Mann-Kendall Results

Attachment B – Mann-Kendall Trend Charts

Attachment A. Summary Statistics and Mann-Kendall Results
Plant Yates, Georgia Power Company

Monitoring Well	Constituent	GWPS (mg/L)	Start Date	End Date	n	Minimum Concentration (mg/L)	Maximum Concentration (mg/L) [1]	Most Recent Concentration (mg/L)	% Detect	CV	Mann-Kendall Analysis				Sen's Slope Estimates [2]			
											S-Statistic	p-value	Trend Direction	Statistical Significance	90% LCL	Median	90% UCL	Projected Year to GWPS
YGWC-38	Selenium	0.05	10/12/2017	2/22/2024	19	0.048	0.265	0.048	100	0.6	-141	< 0.001	Decreasing	Significant	-1.5E-04	-1.1E-04	-9.0E-05	--
PZ-37 (full)	Selenium	0.05	10/12/2017	2/21/2024	17	0.13	0.33	0.13	100	0.3	-115	0.007	Decreasing	Significant	-8.00E-05	-5.70E-05	-2.20E-05	2029 - 2043
PZ-37 (truncated)	Selenium	0.05	9/24/2018	2/21/2024	10	0.13	0.33	0.13	100	0.3	-44	< 0.001	Decreasing	Significant	-1.80E-04	-1.20E-04	-9.20E-05	2026 - 2029
YGWC-42 (full)	Lithium	0.04	8/30/2016	2/22/2024	21	0.0208	0.059	0.049	100	0.3	137	< 0.001	Increasing	No Significance	--	--	--	--
YGWC-42 (truncated)	Lithium	0.04	8/25/2021	2/22/2024	6	0.046	0.054	0.049	100	0.1	-2	0.430	Stable	No Significance	--	--	--	--
YAMW-3	Cobalt	0.05	2/10/2022	2/21/2024	5	0.051	0.16	0.051	100	0.1	-3	0.242	Stable	No Significance	--	--	--	--

Notes:
n = number of samples included in analysis
% = percent
CV = coefficient of variation; low values indicate stable concentrations. Values near or greater than 1 suggest variability and/or a temporal trend. Non-detect values were taken at the RL for CV calculations.
GWPS = groundwater protection standard
LCL = lower confidence limit
mg/L = milligrams per liter
UCL = upper confidence limit
[1] For datasets where the maximum concentration is a non-detect value, the maximum detected value is presented in brackets [].
[2] Sen's Slope estimates shown for statistically significant decreasing trends.



Results of Mann-Kendall Test for Trend: **DECREASING TREND**

p value = <0.001 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

Results of Sen's Estimator of Slope: **DECREASING TREND**

Median Slope Estimate = -1.1E-04 mg/L Per Day

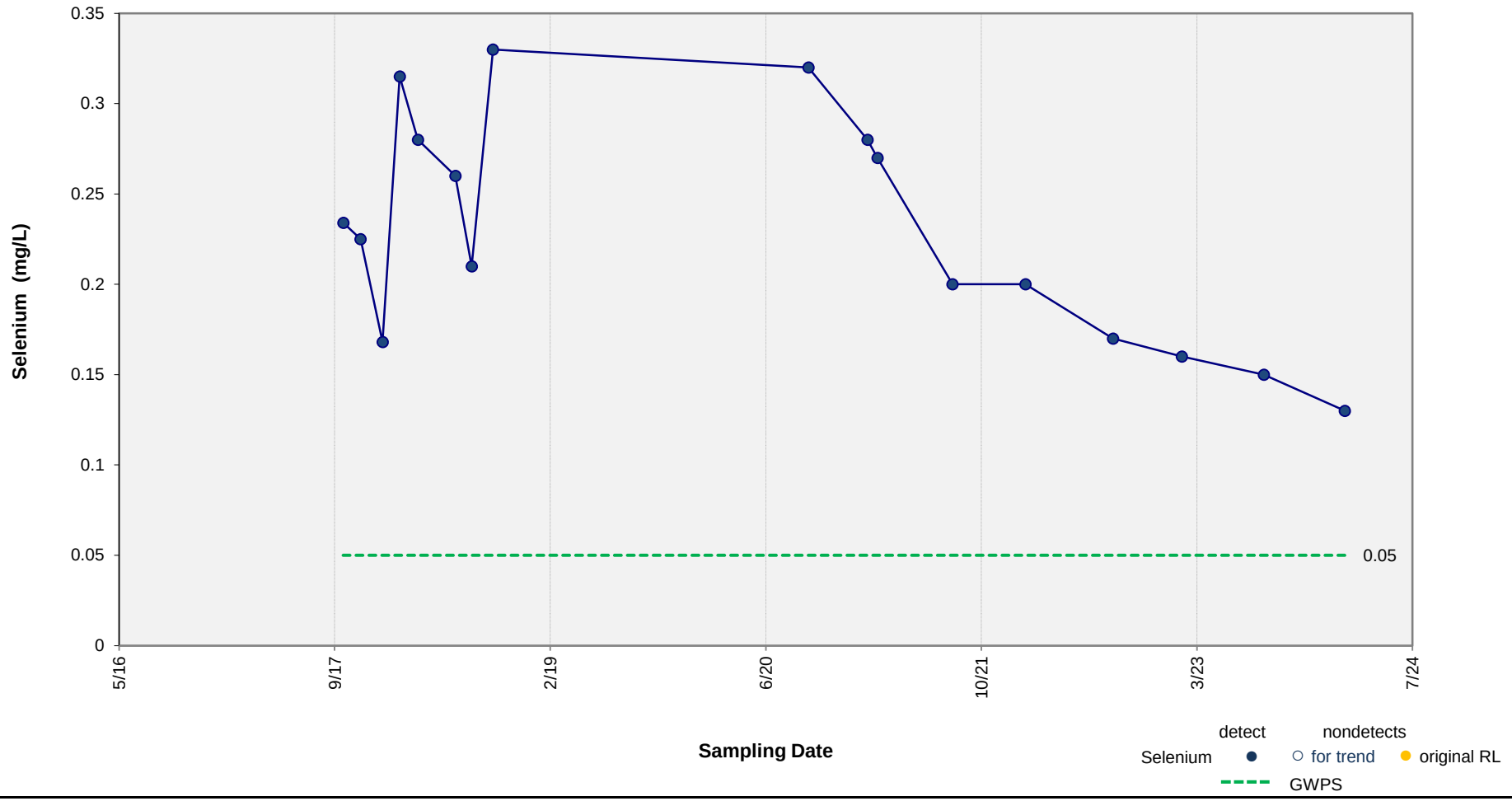
90% Confidence Interval = -1.5E-04 to -9.0E-05 mg/L Per Day

ARCADIS

Concentration vs. Time Plot - Selenium in YGWC-38

Pant Yates, Georgia Power Company

Figure B-1



Results of Mann-Kendall Test for Trend: **DECREASING TREND**

p value = 0.007 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

Results of Sen's Estimator of Slope: **DECREASING TREND**

Median Slope Estimate = -5.7E-05 mg/L Per Day

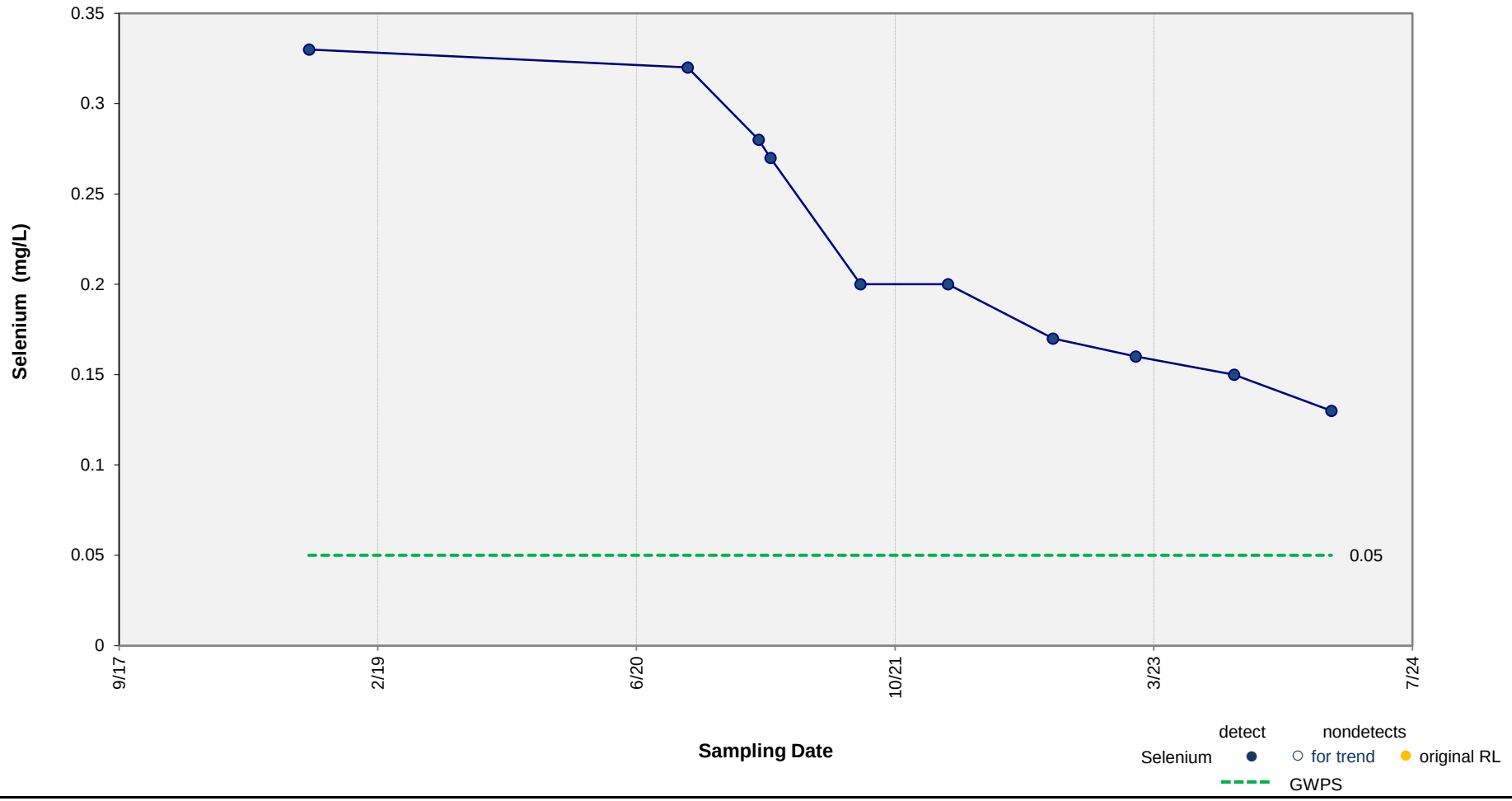
90% Confidence Interval = -8.0E-05 to -2.2E-05 mg/L Per Day

ARCADIS

Concentration vs. Time Plot - Selenium in PZ-37 - Full Dataset

Pant Yates, Georgia Power Company

Figure B-2a



Results of Mann-Kendall Test for Trend: **DECREASING TREND**

p value = <0.001 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

Results of Sen's Estimator of Slope: **DECREASING TREND**

Median Slope Estimate = -1.2E-04 mg/L Per Day

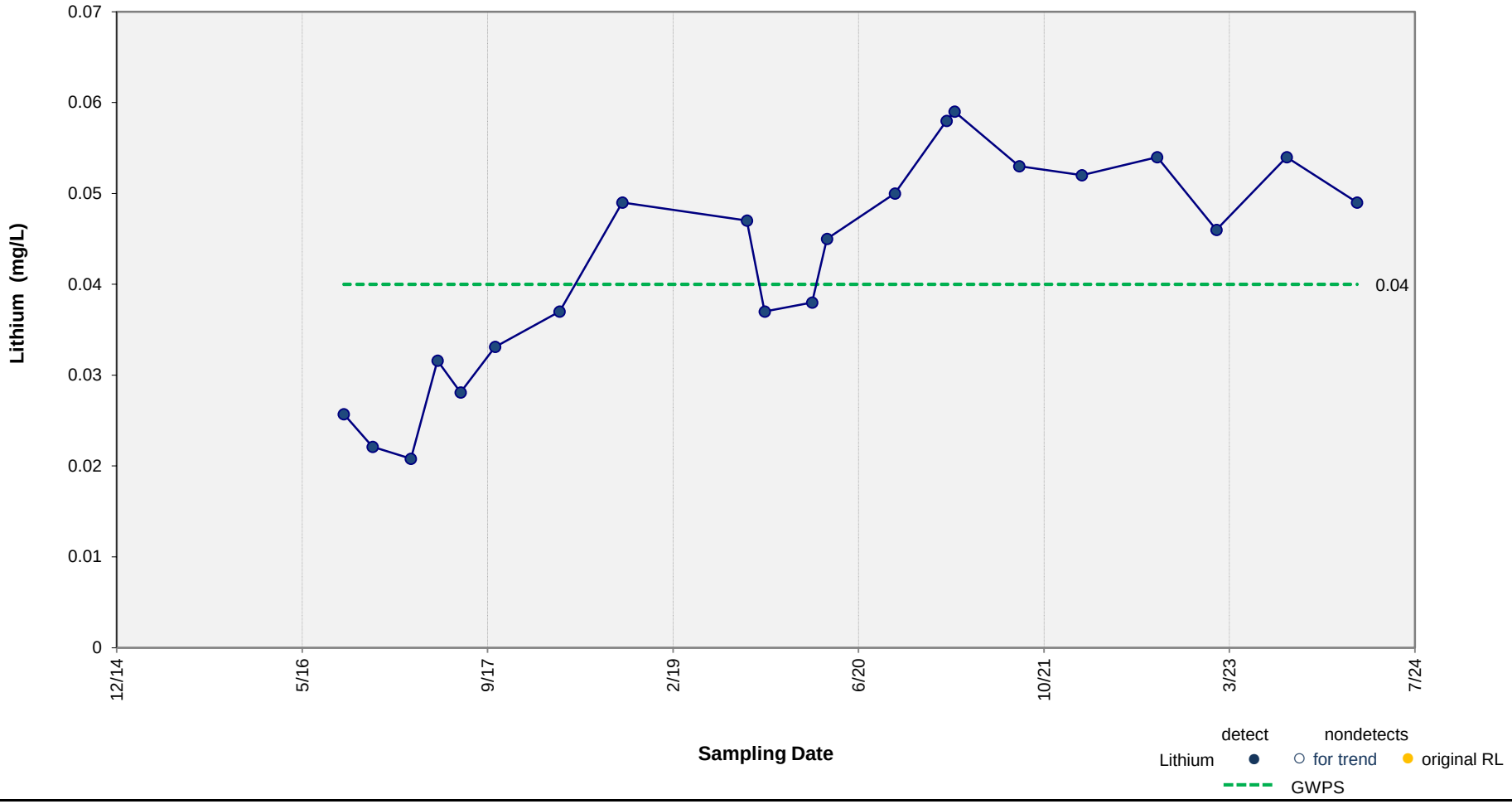
90% Confidence Interval = -1.8E-04 to -9.2E-05 mg/L Per Day

ARCADIS

Concentration vs. Time Plot - Selenium in PZ-37 - Truncated Dataset

Pant Yates, Georgia Power Company

Figure B-2b



Results of Mann-Kendall Test for Trend: **INCREASING TREND**

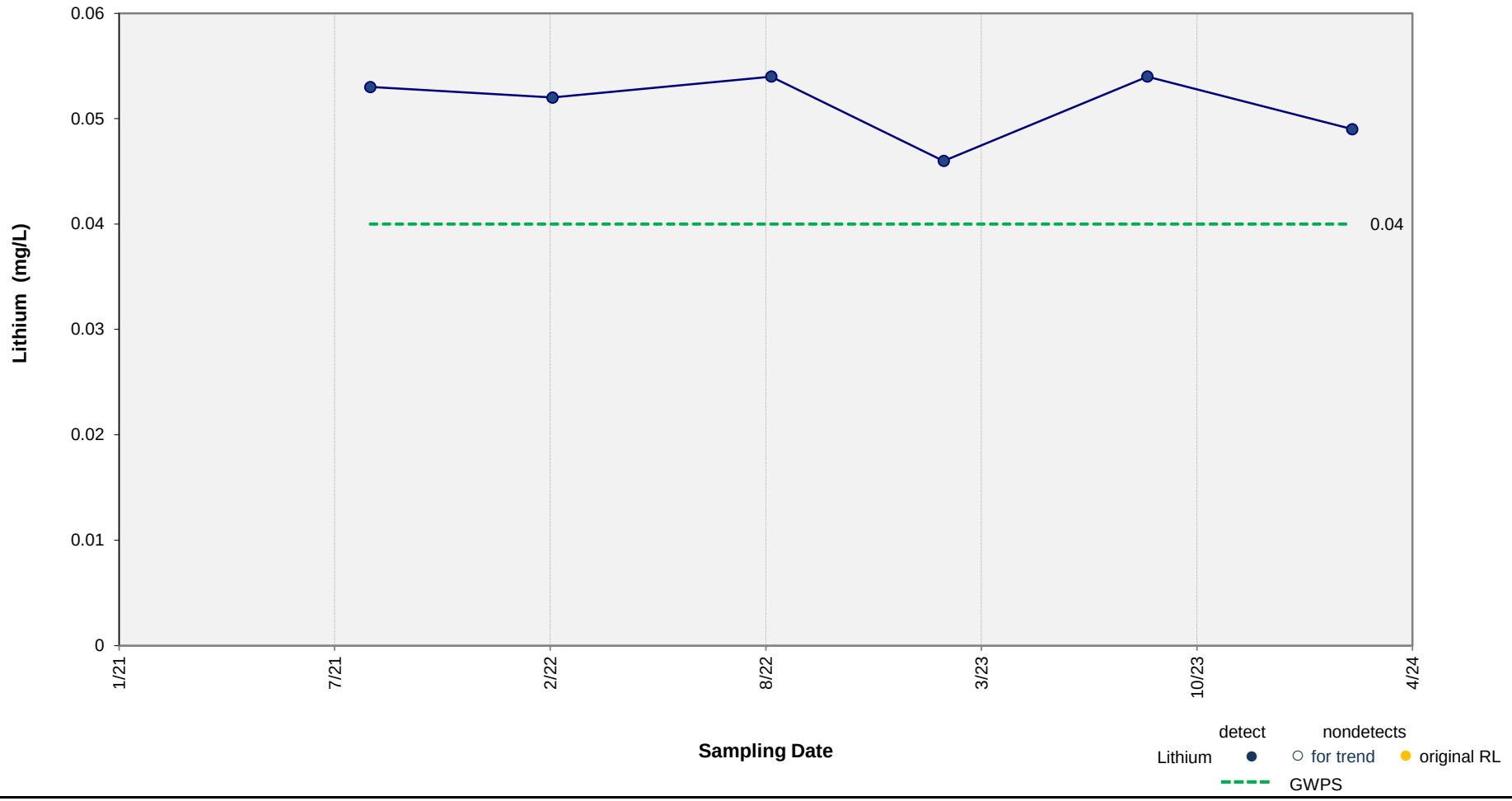
p value = <0.001 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

ARCADIS

Concentration vs. Time Plot - Lithium in YGWC-42 - Full Dataset

Pant Yates, Georgia Power Company

Figure B-3a



Results of Mann-Kendall Test for Trend: **No Significant Trend**

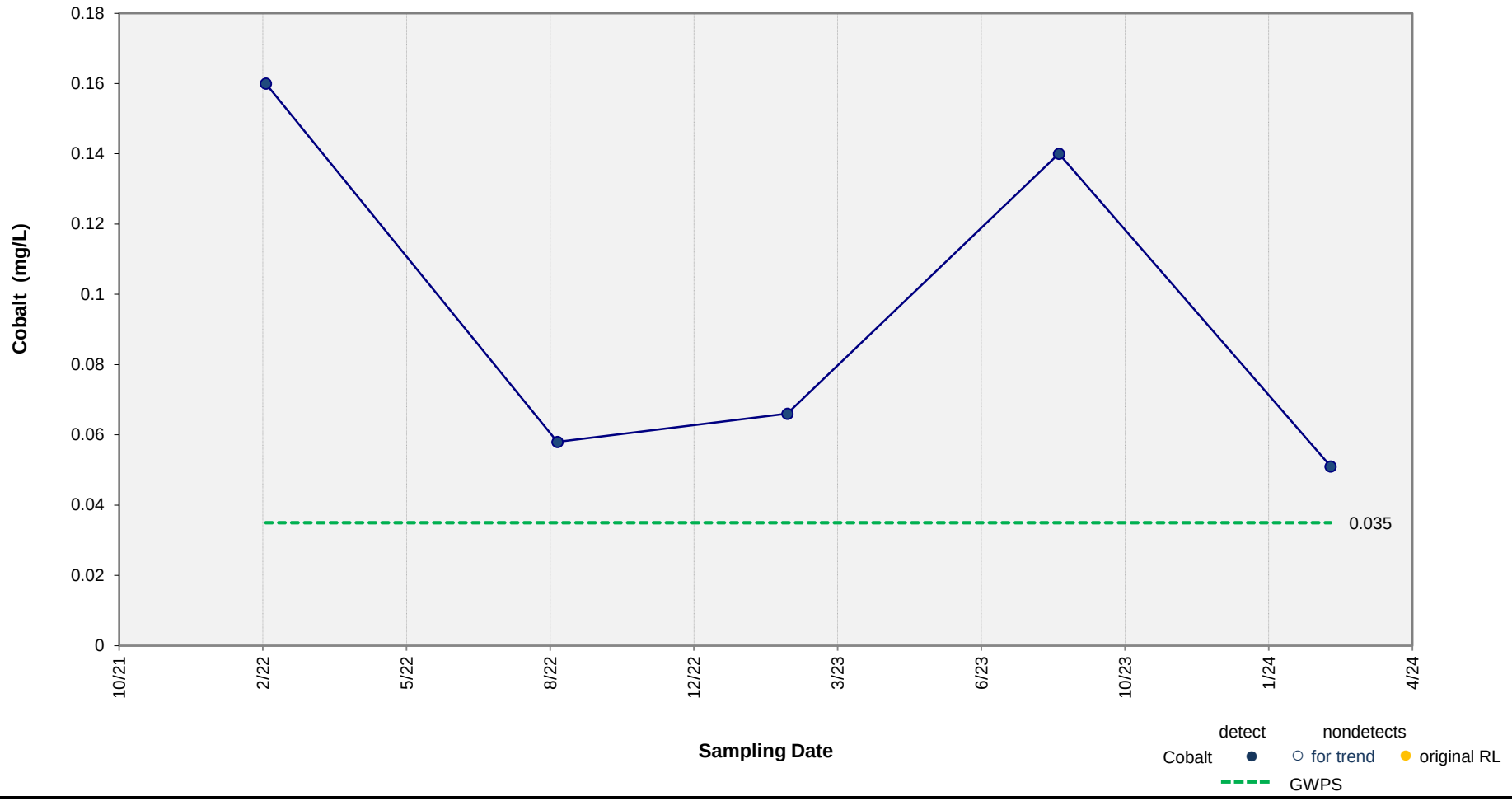
p value = 0.430 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

ARCADIS

Concentration vs. Time Plot - Lithium in YGWC-42 - Truncated Dataset

Pant Yates, Georgia Power Company

Figure B-3b



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.242 Note: p value < 0.1 indicates a statistically significant trend (90% confidence level).

ARCADIS

Concentration vs. Time Plot - Cobalt in YAMW-3

Pant Yates, Georgia Power Company

Figure B-4

Appendix F

Site Specific Demonstration of Natural Attenuation

Appendix F – Site-Specific Demonstration of Natural Attenuation

This Site-Specific Demonstration of Natural Attenuation provides the supporting technical information to demonstrate the progressive evaluation of Monitored Natural Attenuation (MNA) at the Plant Yates R6 Coal Combustion Residual Landfill (R6 CCR Landfill), located in Newnan, Georgia (site), using the framework established by the United States Environmental Protection Agency (USEPA) guidelines for MNA (USEPA 2007, 2015). This Site-Specific Demonstration of Natural Attenuation is provided as Appendix F to the Draft Remedy Selection Report.

In 2007, the USEPA issued MNA technical guidance specific to inorganic constituents (USEPA 2007) that contained four tiers. The 2015 MNA guidance (USEPA 2015) retains these four tiers but describes them as phases as discussed below. Characterization activities were completed to evaluate the existing and long-term effectiveness of attenuation processes in the aquifer and to reduce uncertainty for decision making at each of the following screening steps (i.e., phase):

- Phase I: Demonstration that the groundwater plume is *not expanding*.
- Phase II: Determination that the *mechanism and rate* of the attenuation process are sufficient.
- Phase III: Determination that the *capacity* of the aquifer is sufficient to attenuate the mass of contaminant within the plume and the *stability* of the immobilized contaminant is sufficient to resist remobilization.
- Phase IV: Design of a *performance monitoring program* based on an understanding of the mechanism of the attenuation process, and establishment of contingency remedies tailored to site-specific characteristics.

Each phase of the MNA analysis for the site is discussed further below. Supporting data and interpretations from the Geochemical Conceptual Site Model Report (Geochemical CSM Report; Appendix B to the Draft Remedy Selection Report) are incorporated to demonstrate the site-specific conditions that favor the attenuation of selenium, cobalt, and lithium in the R6 CCR Landfill aquifer materials.

Phase I: Stable and Decreasing Concentrations

Phase I of the evaluation of MNA as a viable remedy for the site includes the demonstration of groundwater plume stability. Where a groundwater plume is stable and/or decreasing, MNA may be retained as a viable remedy. Historical and recent groundwater quality (through February 2024) have been evaluated to determine how groundwater is changing as a result of closure.

Selenium

As demonstrated in Section 3.1 of the Draft Remedy Selection Report, the extent of groundwater with selenium concentrations greater than the Groundwater Protection Standard (GWPS) has been delineated vertically and horizontally. The stability of the delineated areas is demonstrated through the trend analysis provided in Appendices B and E to the Draft Remedy Selection Report. In the R6 CCR Landfill area, concentrations of target Appendix III indicator constituents (boron, sulfate, and total dissolved solids) have decreased through time on the southeastern side of the waste boundary, where selenium statistically significant levels (SSLs) and GWPS exceedances are observed (YGWC-38, PZ-37, and YAMW-5). Selenium concentrations at the R6 CCR Landfill

compliance wells are limited to select wells, suggesting that coal combustion residual (CCR) materials placed in some cells leached selenium while others did not and/or leached lesser amounts. Wells that historically exhibited selenium concentrations greater than the GWPS (YGWC-41, YGWC-38, and PZ-37) have demonstrated decreases since closure of the R6 CCR Landfill was completed in 2016.

To determine whether the observed decreasing selenium concentrations are statistically significant, a Mann-Kendall trend analysis was completed for YGWC-38 and PZ-37, where selenium concentrations are greater than the GWPS and there are sufficient data for analysis. Although YAMW-5 has selenium concentrations greater than the GWPS, it does not have SSLs and as such was not included. The Mann-Kendall statistical calculations and analysis are provided in Appendix E to the Draft Remedy Selection Report. The results of the Mann-Kendall analysis showed a statistically significant decreasing trend for concentrations of selenium at YGWC-38. The selenium concentrations were determined to be stable at PZ-37 for the entire dataset (October 2017 through February 2024). However, using a truncated dataset for the time period when concentrations of selenium began to decrease through time as a result of closure measures (September 2018 through February 2024), a statistically significant decreasing trend was determined.

The observed statistically significant decreasing trends at YGWC-38 and PZ-37 from September 2018 through February 2024 are further supported by the groundwater solute-transport model simulations, which predict declines in concentrations to less than the GWPS (Appendix C to the Draft Remedy Selection Report). Although an overall trend of decreasing concentrations is observed, it is anticipated that short-term perturbations in groundwater flow and geochemistry due to closure may cause temporary increases in constituent concentrations at some locations, such as selenium at YAMW-5.

Cobalt and Lithium

The extent of the cobalt and lithium concentrations that are greater than the GWPS has been vertically and horizontally delineated as described in Section 3.1and the limited extent of SSLs is shown on Figure 8, of the Draft Remedy Selection Report. In the R6 CCR Landfill area, concentrations of target Appendix III indicator constituents (boron, sulfate, and total dissolved solids) have decreased through time or are low on the western side of the waste boundary, where lithium and cobalt SSLs are observed (YGWC-42 and YAMW-3).

Using the entire dataset, August 2016 through February 2024, lithium concentrations at YGWC-42 were determined to be increasing (Appendix E to the Draft Remedy Selection Report). However, using a truncated dataset for the time period after concentrations of lithium stopped increasing post-closure (August 2021 through February 2024), lithium was determined to be stable (Appendix E to the Draft Remedy Selection Report). Collection of cobalt data at YAMW-3 began in February 2022. Mann Kendall analysis of the cobalt dataset at YAMW-3 from February 2022 through February 2024 indicated the cobalt trend is stable, although concentrations range from 0.051 to 0.16 milligrams per liter (Appendix E to the Draft Remedy Selection Report). Although YAMW-3 also has lithium concentrations greater than GWPS, it does not have SSLs and was not included in trend analysis.

Phase II: Mechanism and Rate of Attenuation

Phase II of the MNA evaluation is a determination that the mechanism and rate of the attenuation process are sufficient. This section evaluates selenium, cobalt, and lithium with respect to this phase.

Selenium

Mechanisms accounting for the attenuation of selenium at the site include sorption, dilution, and dispersion. Geochemical data also indicate that selenium reduction may be a potential mechanism in some portions of the site (Appendix B to the Draft Remedy Selection Report). Under Phase II of the phased MNA evaluation, sufficient attenuation rates to meet the GWPS within a reasonable timeframe must be demonstrated, based on site geochemical conditions (USEPA 2007).

The attenuation mechanism of selenium sorption was evaluated and demonstrated through speciation analysis, general chemical analysis, mineralogical analysis, and sorption studies as detailed in the Geochemical CSM Report (Appendix B to the Draft Remedy Selection Report). The dominant species of selenium observed at YGWC-38 and YGWC-41 is selenate. Selenate forms outer sphere complexes with aluminum oxides and aluminosilicates; there is also evidence that selenate can form inner sphere complexes on iron oxides, with inner sphere complexes forming at low pH (Peak and Sparks 2002). The mineralogical analysis and drilling observations demonstrated the presence of aluminosilicates (i.e., kaolinite) and iron oxides that serve as sorption surfaces for selenate.

General groundwater chemistry indicates favorable pH and redox conditions for sorption, with mildly acidic site groundwater favoring sorption of both selenite and selenate (Zachara et al. 1994). The presence of elevated sulfate concentrations at YGWC-38, YGWC-41, and PZ-37 inhibits the sorption of selenate through competitive sorption. However, concentrations of sulfate have been declining at the R6 CCR Landfill monitoring wells since closure, allowing for stronger sorption of selenium through time with reduced competition from sulfate (Zachara et al. 1994).

To support the evaluation of attenuation rates for the monitoring locations that exhibit current exceedances of the GWPS, Sen's slope calculations were completed to project a range of years, based on the lower and upper confidence limits at a confidence level of 90 percent, for statistically significant decreasing trends. Based on the Mann-Kendall analysis completed (Appendix E to the Draft Remedy Selection Report), selenium concentrations at YGWC-38 and PZ-37 are decreasing at a statistically significant rate with 90 percent confidence. The downward statistical trend in selenium concentrations following closure at PZ-37 began in September 2018; as such, Sen's slope calculations were completed on a truncated dataset for PZ-37, (September 2018 through February 2024) to analyse the most recent statistically significant declining trend in selenium concentrations. Based on Sen's slope estimates, selenium concentrations are projected to achieve the GWPS between 2 to 5 years (between 2026 and 2029) at PZ-37. Selenium concentrations at YGWC-38 declined below the GWPS in February 2024.

Concentrations of selenium at YAMW-5 were not incorporated into the statistical evaluation; however, concentrations at YAMW-5 are anticipated to decrease after a period of time following closure, similar to YGWC-38 and PZ-37. In addition, the solute-transport model predicts that attenuation to concentrations less than the GWPS at the waste boundary will occur by 2032, or approximately 8 years from the date of this report, based on a 2022 modeling prediction of 10 years (Appendix C to the Draft Remedy Selection Report).

Cobalt and Lithium

The attenuation mechanism of cobalt and lithium sorption was evaluated and demonstrated through general chemical analysis, mineralogical analysis, and sorption studies as detailed in the Geochemical CSM Report (Appendix B to the Draft Remedy Selection Report). Sorption experiments using site aquifer solids and groundwater collected from YAMW-3 confirm that natural attenuation mechanisms for cobalt and lithium are present at the site. Geochemical data analysis indicates that sorption via caion exchange is the likely attenuation

mechanism for lithium at the site, as discussed in Appendix B to the Draft Remedy Selection Report. Meanwhile, multiple sorption mechanisms may be involved for the attenuation of cobalt including adsorption, surface complexation, and/or cation exchange. The mineralogical analysis, drilling observations, and elemental assay confirmed the presence of phyllosilicates (i.e., muscovite, biotite, and clinochlore) as well as iron and aluminum oxide and hydroxide phases on the west side of the R6 CCR Landfill that can serve as cation exchangers and/or adsorption surfaces for cobalt and lithium.

General groundwater chemistry on the western side of the R6 CCR Landfill indicates overall declining concentrations of cationic Appendix III constituents such as calcium (i.e., YGMW-41 and YGWC-42) that can potentially displace lithium and/or cobalt from aquifer solids. As such, lithium concentrations on the western side of the R6 CCR Landfill have the potential to decrease after a period of time following closure as freshwater with relatively low calcium and magnesium, as seen at upgradient well YGWC-40, flushes through the system.

Phase III: Capacity and Stability of Aquifer Solids

The determination of sufficient attenuation capacity to immobilize the mass of selenium required to the GWPS within a reasonable timeframe is the primary goal of the evaluation under Phase III (USEPA 2007).

Selenium

To assess the sorption capacity and stability of the aquifer matrix to attenuate dissolved selenium in groundwater, an aquifer matrix composition analysis and a series of bench-scale sorption tests were completed on the saprolite and bedrock solids (Appendix B to the Draft Remedy Selection Report). Attenuation capacity is supported by results from the mineralogical evaluation, which demonstrated the presence of aluminosilicates (i.e., kaolinite) by x-ray diffraction. The presence and abundance of aluminum and iron were determined by assay, and results suggest a strong potential for secondary aluminum and iron oxides to form during the weathering of saprolite, partially weathered rock, and bedrock (Appendix B to the Draft Remedy Selection Report). These phases, along with kaolinite and other clays, are known to contain attenuation capacity for trace constituents, such as selenium. Sorption capacity was measured in the saprolite and fine-grained bedrock, where the capacity was exceeded (i.e., no measurable sorption observed) when loaded with more than 0.5 milligram per kilogram (mg/kg) of selenium. When loaded with lower amounts of selenium, the saprolite capacity was 0.008 to 0.13 mg/kg and the fine-grained bedrock capacity was 0.007 to 0.009 mg/kg (Appendix B to the Draft Remedy Selection Report). These estimates likely represent the low end of the range for the site. Sorption at other locations, such as PZ-37, may be higher due to localized lower pH (4.8), low(er) dissolved oxygen conditions, and declining sulfate concentrations, allowing for stronger sorption of selenium with reduced competition from sulfate (Zachara et al. 1994).

Groundwater chemistry through time is the main determinant of whether selenium immobilized onto aquifer solids by natural attenuation processes will remain stable (Su et al. 2007). Immobilization of selenium through sorption at the site is currently favored by mildly acidic groundwater conditions (generally 5 to 7; Appendix B) and inhibited by the presence of elevated sulfate. Sulfate is a competing anion for sorption with selenate. After reaching the GWPS via natural attenuation, groundwater conditions are anticipated to remain favorable for selenium sorption, promoting stability. The decreasing sulfate concentrations observed (Appendix B to the Draft Remedy Selection Report) will favor the sorption of selenate through time because the presence of that competing anion for sorption is reduced. The pH of upgradient water at the R6 CCR Landfill is mildly acidic and will continue to favor sorption of selenate after reaching the GWPS.

Cobalt and Lithium

To assess the sorption capacity and stability of the aquifer matrix to attenuate dissolved cobalt and lithium in groundwater, an aquifer matrix composition analysis and bench-scale sorption tests were completed (Appendix B to the Draft Remedy Selection Report). Attenuation capacity is supported by results from the mineralogical evaluation drilling observations, and elemental assay confirmed the presence of phyllosilicates (i.e., muscovite, biotite, and clinochlore) as well as iron and aluminum oxide and hydroxide phases on the western side of the R6 CCR Landfill that can serve as cation exchangers and/or adsorption surfaces for cobalt and lithium. Given the trace concentrations of cobalt and lithium in groundwater, little attenuation capacity is needed to attenuate these constituents. Sorption capacity of the solids was measured and was not exceeded at the greatest cobalt-to-solids mass ratio tested (16 milligram cobalt per kilogram solids). For lithium, only 3 percent lithium removal was observed when the solids were loaded with the greatest lithium-to-solids mass ratio tested, indicating the sorption capacity of the solids was nearly, but not completely, exceeded at the maximum lithium loading tested (1 mg lithium per kilogram solids).

Phase IV: Performance Monitoring Program

The final phase of the MNA evaluation is the assessment of the long-term performance of the remedy through the development of a performance monitoring program to observe for changes in site conditions and potential alternatives required to attain the GWPS (USEPA 2015). A conceptual layout of the source control measures with the MNA groundwater remedy is shown on Figure 9 of the Draft Remedy Selection Report. The performance monitoring network locations selected will represent adequate spatial (aerial and vertical) distribution of wells to monitor the area(s) impacted by CCR, as well as areas in which selenium, cobalt, and lithium attenuation are occurring. A finalized list of monitoring locations will be forthcoming in the Corrective Action Monitoring Plan, which will be developed following approval of the Draft Remedy Selection Report.

A contingency corrective action technology, if MNA proves insufficient to reduce concentrations of selenium, cobalt, and lithium to less than the GWPS, will also be discussed in the Corrective Action Monitoring Plan. Bench testing for selenium, cobalt, and lithium removal from groundwater by various chemical reagents was conducted and reported in Appendix B to the Draft Remedy Selection Report. The results of this site-specific bench testing show that a form of zero valent iron (ZVI) was effective for immobilizing all three constituents. These results support the retention of in situ ZVI injections as a potential continency corrective action at the site.

Summary

The site-specific demonstration of natural attenuation at the R6 CCR Landfill followed USEPA (2007, 2015) guidance to progressively evaluate and demonstrate the long-term stability and effectiveness of MNA at the site. Using the phased approach, the conditions observed are summarized below.

Selenium

- Statistically significant decreasing concentrations of selenium at YGWC-38 and PZ-37 from September 2018 through February 2024 (Phase I).
- Favorable pH and redox conditions, in combination with declining sulfate concentrations, support the sorption of selenite and selenate in groundwater. Under the Phase II evaluation, the time to reach selenium concentrations less than the GWPS is 8 years or less.

- Capacity for attenuation (Phase III) was demonstrated through mineralogical and assay analysis, which identified clay mineral phases and constituents (aluminum and iron) that are associated with sorption. Sorption studies showed the removal of selenium from solution for the saprolite and fine bedrock fraction.
- The development of a performance monitoring program is forthcoming upon approval of the Draft Remedy Selection Report.

Cobalt and Lithium

- Stable concentrations of cobalt and lithium at YAMW-3 and YGWC-42, from February 2022 and November 2021, respectively, through February 2024 (Phase I).
- Sorption experiments using site aquifer solids and groundwater collected from YAMW-3 confirm that natural attenuation mechanisms for cobalt and lithium are present to support the attenuation of cobalt and lithium in groundwater (Phase II).
- Capacity for attenuation (Phase III) was quantified during bench-scale sorption studies and demonstrated through mineralogical analysis, drilling observations, and elemental assays, which identified phyllosilicate mineral phases (i.e., muscovite, biotite, and clinochlore) and iron and aluminum oxides and hydroxides that are associated with sorption.
- The development of a performance monitoring program, to be summarized in a Corrective Action Monitoring Plan, is forthcoming upon approval of the Draft Remedy Selection Report.

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