APPENDIX H –
HYDROGEOLOGIC INVESTIGATIONS

APPENDIX H.1

TECHNICAL EVALUATION OF HYDROGEOLOGY

Appendix H.1 – Technical Evaluation of Hydrogeology

TDEC Commissioner’s Order:
Environmental Assessment Report
Kingston Fossil Plant
Harriman, Tennessee

March 12, 2024

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

TVA TENNESSEE VALLEY AUTHORITY

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	EAR Submittal to TDEC	May 30, 2023
1	Addresses August 16, 2023 TDEC Review Comments and Issued for TDEC	November 14, 2023
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Sign-off Sheet

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Prepared by ______________________

Mark Densmore, Senior Geologist

Reviewed by ______________________

Rebekah Brooks, PG, Senior Principal Hydrogeologist

Approved by ______________________

John Griggs, PG, Senior Principal

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LIST OF EXHIBITS

LIST OF ATTACHMENTS

Abbreviations

CARA	Corrective Action/Risk Assessment
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations Part 257
CFR	Code of Federal Regulations
cm/sec	Centimeters Per Second
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
GSL	Groundwater Screening Level
KIF Plant	Kingston Fossil Plant
%	Percent
PLM	Polarized Light Microscopy
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
Redox	Oxidation/Reduction Potential
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	TDEC Commissioner’s Order OGC15-0177
TI	Technical Instructions
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

Stantec Consulting Services Inc (Stantec), on behalf of the Tennessee Valley Authority (TVA), has prepared this technical evaluation appendix to summarize historical and recent evaluations of hydrogeological and analytical results for groundwater and geochemical data at TVA's Kingston Fossil Plant (KIF Plant) in Harriman, Tennessee. This technical appendix also provides a characterization of the extent of contamination and preliminary explanation for the observed occurrences of coal combustion residuals (CCR) constituents in groundwater to support information provided in the Environmental Assessment Report (EAR) and to fulfill the requirements for the Tennessee Department of Environment and Conservation (TDEC)-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015). Further evaluation of the need for corrective actions and the associated extent of groundwater contamination will be provided in the Corrective Action/Risk Assessment (CARA) Plan. For purposes of this document, the following hydrogeological terms as they are defined below are used throughout this document.

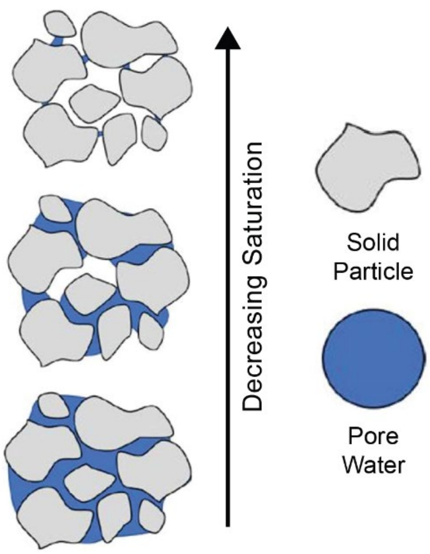
- Pore water – subsurface water that occurs in pore spaces in CCR material
- Groundwater – subsurface water that occurs in pore spaces in unconsolidated or geologic materials (e.g., soil, bedrock)
- Aquifer – a geologic formation capable of yielding useable quantities of groundwater
- Unconfined aquifer - an aquifer in which the water table forms the upper boundary
- Saturated – Unconsolidated or geologic materials (e.g., soil, bedrock) or CCR material where all of the pore space is filled with water. The use of the term "saturated" in reference to the moisture content of CCR material does not imply that the pore water is readily separable from the CCR material.
- Moisture content – the measure of the amount of water contained within unconsolidated or geologic materials (e.g., soil, bedrock) or CCR material. Moisture content of saturated material can be variable because the characteristics of the material determine the amount of pore space available for water to fill.
- Phreatic surface – the surface of pore water at which pressure is atmospheric and below which CCR material may be saturated with pore water. Pore water levels are measured at locations where temporary wells or piezometers were installed within CCR material. The measured pore water levels are used to infer pore water levels between the wells and piezometers to develop the phreatic surface.
- Uppermost aquifer - the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within a facility's property boundary

- Water table – the surface of groundwater at which pressure is atmospheric and below which geologic materials (e.g., soil or bedrock) may be saturated with groundwater. The measured groundwater levels are used to infer groundwater levels between the wells and piezometers to develop the water table surface. Groundwater levels are measured at locations where wells or piezometers were installed at depths near the water table surface.

Groundwater level measurements from wells or piezometers installed around the CCR management units[1] and at multiple depths below the water table for unconfined aquifers provide information about the direction of groundwater movement.

The figures below show examples of an unconfined aquifer. In an unconfined aquifer, groundwater levels measured in monitoring wells installed near the water table are used to infer the elevation of the water table surface.

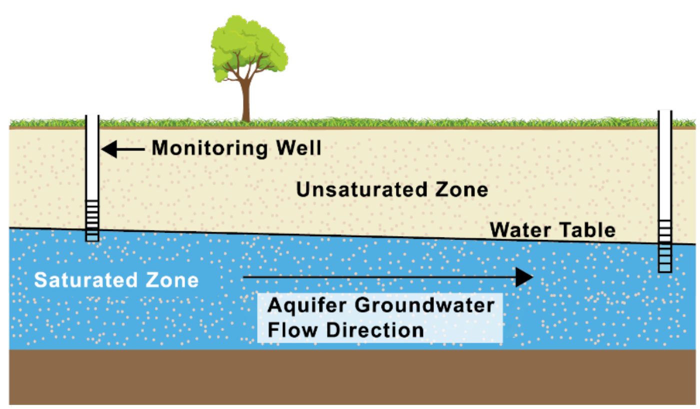
Pore Water



Benson, C., *Water Flow in Coal Combustion Products and Drainage of Free Water*, Report No. 3002021963, Electric Power Research Institute, Palo Alto, CA.

This figure depicts how subsurface water occurs in the pore spaces in CCR material (referred to as “pore water” in this EAR), and how saturation varies within the CCR material. The phreatic surface is the surface of pore water at which pressure is atmospheric and below which CCR material may be saturated with pore water.

Unconfined Aquifer



Groundwater is subsurface water that occurs in pore spaces in soil or bedrock. Groundwater level measurements taken in a well screened near the water table in an unconfined aquifer represent the water level in the aquifer. Groundwater level measurements are used to estimate directions of groundwater movement. Groundwater generally flows much more slowly than water in a surface stream or river.

[1] The term “CCR management unit” is used in this document generally and is not intended to be a designation under federal or state regulations.

2.0 GROUNDWATER AND HYDROGEOLOGICAL INVESTIGATIONS

The purpose of the groundwater and hydrogeological investigations was to further characterize and evaluate subsurface conditions in proximity to the three TDEC Order CCR management units at the KIF Plant, which include the Sluice Trench and Area East of Sluice Trench, Interim Ash Staging Area, and the Stilling Pond. For these investigations, TVA reviewed information from previous studies and assessments, completed field sampling programs, and conducted evaluations related to geology, hydrogeology, groundwater quality, and CCR material characteristics as part of the TDEC Order Environmental Investigation (EI).

The following sections summarize the previous studies and present overall hydrogeological investigation and evaluation findings related to the KIF Plant TDEC Order CCR management units based on data obtained during previous studies and the EI.

2.1 PREVIOUS STUDIES AND ASSESSMENTS

This section provides a summary of prior studies that have been conducted at the KIF Plant and provide useable information related to geology, hydrogeology, groundwater quality, and CCR material characteristics. In addition to the studies summarized below, information from other hydrogeological and geotechnical studies that met the data quality objectives of the Environmental Investigation Plan (EIP) (TVA 2018) is incorporated into the evaluation presented in this appendix. Previously closed CCR management units were closed in accordance with applicable regulations in effect at the time of closure.

Early studies by TVA investigated and characterized the geology of the KIF Plant by advancing over 40 borings to characterize the amount of unconsolidated materials, depth of weathering of bedrock, and the character of the bedrock to evaluate the suitability of the foundation for a proposed power plant (TVA 1951, 1964).

In 1988, TVA completed a groundwater investigation to identify the predominant lithology, depth to bedrock, and groundwater elevation (TVA 1988). Unconsolidated materials were found to consist of clay to silty clay ranging in color from dark red to brown to yellow. Subsequently, 16 monitoring wells were installed by Law Engineering (Law Engineering 1988) which made up the monitoring well network at the KIF Plant until 2009 when the entire monitoring network was replaced. Unconsolidated materials consisting of alluvium, fill, and residuum were observed, with two distinct types of fill consisting of fly ash and “relocated soils common to the area”. A groundwater assessment was conducted in 1991 to predict temporal and spatial groundwater characteristics in and around the ash ponds using data from the monitoring well network existing at the time over a period of three years (Velasco and Bohac 1991). Mineralogical data were incorporated from soil samples collected at various locations across the KIF Plant.

In 2009, TVA completed a geologic investigation to support the *Root Cause Analysis of TVA Kingston Dredge Pond Failure on December 22, 2008* (AECOM 2009). Primary activities consisted of drilling and sampling CCR material and unconsolidated materials. Groundwater elevation and flow information were deduced through data collected from piezometers installed at various locations around the KIF Plant.

In 2010, TVA installed two vibrating wire piezometers in the area of the present-day Interim Ash Staging Area (MACTEC Engineering and Consulting, Inc. 2010) and completed an evaluation of the leaching behavior of the CCR material in association with up to six percent (%) lime to quantify the constituent contribution that may result from the CCR material (Jacobs 2011a). TVA evaluated the leaching properties of the ash and lime-treated ash and soil-cement monolith leaching potential to inform decisions related to the Kingston Recovery Project (Jacobs 2011a).

A groundwater fate and transport model was developed in 2011 to evaluate potential loading from groundwater to the Emory River and to assess potential long-term risk to receptors in the Emory River resulting from the Kingston Recovery Project (Jacobs 2011b). Risk-based screening levels for surface water were calculated and primary constituents of interest for the transport model were evaluated using geochemical modeling that incorporated site-specific soil, groundwater, pore water, and CCR material data. Ultimately, three-dimensional fate and transport model simulations were run to predict future concentrations of arsenic, selenium, and radium-226 in groundwater and used to evaluate potential long-term risk to human and aquatic receptors.

In 2018, activities were conducted to develop a groundwater monitoring system that met criteria of Title 40, Code of Federal Regulations (40 CFR) Part 257 (CCR Rule), including the installation of new wells. Other activities included well redevelopment, dedicated sampling pump installations, and field survey of wells remaining in-service. Five monitoring wells were installed. Well construction diagrams are included in Appendix C.3. Groundwater monitoring under the CCR Rule was initiated in January 2019 and is ongoing. Information about compliance with the CCR Rule can be found at TVA's publicly-accessible web-site: https://www.tva.com/environment/environmental-stewardship/coal-combustion-residuals/kingston

In 2018, TVA included historical information in Appendix N of the *EIP* regarding previously existing, abandoned, or closed piezometers and wells, including available construction and abandonment information for the borings, piezometers, and monitoring wells from previous studies and assessments. Historical groundwater quality data from these previous studies were provided in Tables 1A through 1C of Appendix N and included groundwater elevations and chemical and physical parameters.

2.2 CURRENT AND ONGOING GROUNDWATER MONITORING

Current and ongoing compliance groundwater monitoring at the KIF Plant TDEC Order CCR management units consists of two programs:

- **CCR Rule Monitoring Program**: Monitoring at the Sluice Trench and Area East of Sluice Trench and Stilling Pond is conducted per the CCR Rule. In accordance with the CCR Rule, TVA established two certified groundwater monitoring systems. One system was certified for the Sluice Trench and Area East of Sluice Trench. A second system was certified for the Stilling Pond. Baseline sampling, detection monitoring, and assessment monitoring phases were implemented from 2019 to 2021. Groundwater elevation and analytical data have been and continue to be provided to TDEC and posted to TVA's CCR Rule Compliance Data and Information public website.

TVA completed a statistical evaluation of the collected groundwater data from the Sluice Trench and Area East of Sluice Trench and Stilling Pond and determined that constituents detected at downgradient monitoring wells had statistically significant levels above the groundwater protection standards established for the CCR Rule (TVA 2022a, b). Based on the statistical evaluation, TVA prepared an *Assessment of Corrective Measures Report* for each groundwater monitoring system (TVA 2021) in accordance with the CCR Rule. Subsequently, the remedy selection process began to select a remedy that meets the requirements of the CCR Rule. TVA will continue to produce semiannual remedy selection reports describing the progress made toward the selection and design of remedies and annual groundwater monitoring and corrective action reports describing groundwater analytical results from continued groundwater assessment monitoring.

- **TDEC Permitted Landfill Monitoring Program**: From 2009 to the present, TVA has conducted groundwater monitoring at the TDEC permitted landfill (KRP Ash Landfill) under Solid Waste Disposal Permit No. IDL 73-0094. Certain wells included in the groundwater monitoring system for that program (6AR, AD-1, AD-2, and AD-3) are also background or downgradient monitoring wells for the TDEC Order CCR management units. Analytical data for groundwater samples collected under the KRP Ash Landfill program for the above wells are included in the assessment presented in this appendix. The sampling has been conducted in accordance with the *Groundwater Monitoring Plan* (TVA 2014). Groundwater analytical data reports have been and continue to be provided to TDEC as part of this program.

Exhibit H.1-1 shows the current groundwater monitoring well and piezometer networks. Appendix E.3 provides a list of the wells and their associated monitoring program.

2.3 HYDROGEOLOGY

The objectives of the TDEC Order hydrogeological and groundwater investigations were to characterize the hydrogeology and groundwater quality and evaluate groundwater flow conditions in the vicinity of the KIF Plant TDEC Order CCR management units.

TVA performed well installation and groundwater sample collection activities in accordance with the EIP, *Groundwater Investigation and Hydrogeological Investigation Sampling and Analysis Plans (SAPs)* (Stantec 2018a and b), *Quality Assurance Project Plan* (*QAPP)* (Environmental Standards, Inc. 2018) and TVA's Environmental Technical Instructions (TIs). Well installation and sample location selection, sample collection methodology, sample analyses, and quality assurance/quality control completed for the investigations are provided in the *Hydrogeological Investigation Sampling and Analysis Report (SAR)* (Appendix H.2) and the *Groundwater Investigation SARs* for the six sampling events (Appendices H.3 through H.8).

As reported in the *Groundwater and Hydrogeological Investigation SARs*, the data collected during these investigations were deemed usable for reporting and evaluation in this EAR because they met the objectives of the *EIP*. An analysis of results and discussion of the dataset from these investigations along with data collected under other *TDEC Order SAPs* and data collected under other TDEC permitted landfill and CCR Rule compliance programs is presented in the sections below.

2.3.1 Scope of Work

The scope of work for the EI hydrogeological and groundwater investigations included drilling soil borings, coring bedrock, installing permanent wells at five planned locations, collecting soil samples from the screened interval of one proposed background well location, obtaining saturated zone hydraulic conductivity data, and conducting six groundwater sampling events. In addition, groundwater was sampled at previously existing well GW-2 for the purpose of evaluating the location as a potential background well. Encountered field conditions resulted in modifications to the original plan defined in the *SAP*. These changes are discussed in Section 2.4.2.

The groundwater sampling events included gauging groundwater and pore water levels in permanent and temporary monitoring wells installed as part of the EI and other existing monitoring wells and piezometers near the TDEC Order CCR management units. The groundwater and soil samples were analyzed for the CCR Parameters and additional parameters listed in the *SAPs*. Table H.1-1 provides a summary of the boring and well locations associated with the hydrogeological investigation and the rationale for each well location. The locations of the EI wells and other program well locations are shown on Exhibit H.1-1.

2.3.2 Well Installation

The hydrogeological investigation well installation activities were conducted between October 1, 2018 and January 30, 2020 in support of the CCR Rule and TDEC Order. Wells were installed for the dual purpose of complying with both programs. Field activities consisted of hollow stem auger drilling, rock coring, roto-sonic drilling, and direct push technology, downhole geophysical testing, well installation, well development, slug testing, pump installation, and well surveys. Stantec performed field activities based on guidance and specifications listed in TVA's TIs, the *SAPs*, and the *QAPP*.

Two exploratory borings (6AR-D and AD-2-D) were advanced into the bedrock. Boring 6AR-D was drilled at the Stilling Pond near well 6AR. Boring AD-2-D was drilled east of the Sluice Trench and Area East of Sluice Trench near well AD-2. Both borings were advanced to approximately 100 feet in depth into the limestones and shales of the Conasauga Group. Rock coring and downhole geophysical testing were conducted to characterize bedrock at these two borings locations. Based on the rock core data and geophysical well logging results, no intervals within bedrock were identified that would be defined as the uppermost aquifer because measured hydraulic conductivities were equal to or less than 1.2×10^{-5} centimeters per second (cm/sec). Therefore, no monitoring wells were installed in bedrock. After the geophysical testing was completed, the borings were sealed with bentonite grout.

The proposed background permanent well (KIF-102) was planned at a location west of the CCR management units to provide groundwater samples that have not been affected by the CCR management units and to be representative of background conditions; however, none of the eleven borings advanced in the vicinity of this location was completed as a well because saturated unconsolidated materials were not encountered above bedrock. Soil samples were not collected within the screened interval of proposed background monitoring well KIF-102 because the well was not installed.

The remaining downgradient permanent wells (KIF-103, KIF-104, KIF-105, and KIF-106) were installed in unconsolidated materials downgradient of the TDEC Order CCR management units to provide additional locations to evaluate groundwater levels and quality.

2.3.3 Well Construction

Permanent monitoring wells were installed by qualified drill crews working under the direction of a Stantec Professional Geologist and a licensed Tennessee driller. Wells were constructed of four-inch diameter Schedule 40 polyvinyl chloride (PVC) pre-packed well screens (0.010-inch slots) and riser. The screen and riser consisted of flush-joint, threaded PVC pipe. The screen length was 10 feet. Well construction details are included in the *Hydrogeological Investigation SAR.* Table H.1-2 shows the well construction summary for wells KIF-103 through KIF-106 and other previously existing wells shown on Exhibit H.1-1. Individual well construction details are included in Appendix C of the EAR.

2.3.4 Well Development

Each new permanent well was developed using a combination of bailing, surging, and pumping after a minimum of 24 hours following well installation. A summary of initial and final water quality measurements collected during well development is presented in Table B.2 in Appendix B of the *Hydrogeological Investigation SAR* (Appendix H.2).

2.3.5 Aquifer Testing

2.3.5.1 Pressure Testing

Upon completion of coring in borings that terminated in bedrock as part of the CCR Rule groundwater program, Stantec performed pressure testing to estimate hydraulic conductivity of upper bedrock in one bedrock boring (KIF-AD-2-D) at depths of 7.3 to 41.3 feet below the competent bedrock contact (63.0 to 97.0 feet below ground surface). The bedrock was tested by isolating interval lengths of 5 feet of the borehole with inflatable rubber packers. Potable water was pumped into each interval at constant pressure, typically for five minutes, with the volume of water lost into the bedrock formation measured using a flow meter. Tests were repeated within each interval over a range of pressures, typically in five pounds per square inch increments.

Estimated hydraulic conductivity values were calculated from the field data based on the rate of flow into the formation at each location. Table H.1-3 provides the equations used and a summary of the estimated bedrock hydraulic conductivities in each tested interval. The bedrock hydraulic conductivity ranged from 5.8×10^{-7} cm/sec to 1.2×10^{-5} cm/sec. The geometric mean of the hydraulic conductivities is 1.0×10^{-6} cm/sec.

2.3.5.2 Slug Testing

After development of the wells installed as part of the hydrogeological investigation, Stantec performed slug testing in the four permanent wells (KIF-103, KIF-104, KIF-105, and KIF-106) to estimate the hydraulic conductivity of the unconsolidated materials within the screened interval of each well. A pressure transducer with a data recorder was used to collect water level information from the wells.

The field data were analyzed using AQTESOLV™ Version 4.50 Professional software to estimate the hydraulic conductivity of the saturated unconsolidated materials in the screened interval of each tested monitoring well. Calculated hydraulic conductivities are summarized in Table B.3 in Appendix B of the *Hydrogeological Investigation SAR* (Appendix H.2), and the software output package is provided in Appendix E of the *Hydrogeological Investigation SAR*. The hydraulic conductivity in the four EI permanent wells (KIF-103, KIF-104, KIF-105, and KIF-106) ranged from 3.29×10^{-6} cm/sec to 1.62×10^{-3} cm/sec.

A summary of the EI slug test results combined with the results of slug test data conducted in monitoring wells from other groundwater programs is provided in Table H.1-4. The hydraulic conductivity results are grouped by CCR management unit. The geometric mean of the hydraulic conductivities measured in the unconsolidated materials was 4.01×10^{-4} cm/sec for the Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area, and 3.41×10^{-5} cm/sec for the Stilling Pond.

2.3.6 Groundwater Sampling

Groundwater samples were collected during six events on the following dates:

- Event 1 – April 2-4, 2019
- Event 2 – June 18-21, 2019
- Event 3 – August 20-21, 2019
- Event 4 – October 22-24, 2019
- Event 5 – December 17-18, 2019
- Event 6 – February 18-20, 2020.

TVA performed investigation sample and data collection activities in accordance with the *Groundwater Investigation SAP,* TVA's TIs, and the *QAPP*. Permanent wells were purged using dedicated bladder pumps equipped with dedicated tubing and low-flow purging and sampling techniques. Details of each sampling event are provided in the *Groundwater Investigation SARs*, Events #1 through #6 (Appendices H.3 through H.8).

2.3.7 Hydrogeologic Assessment Results

Several soil boring, well, and piezometer installation projects at and in the vicinity of the KIF Plant TDEC Order CCR management units yielded information about the geology, hydrogeologic properties of the geologic formations, groundwater elevations, groundwater flow direction, and groundwater quality.

This section provides an evaluation of the hydrogeological setting of the KIF Plant TDEC Order CCR management units.

2.3.7.1 Well Construction and Presence of CCR Material

Well KIF-107 was installed for the CCR Rule program in unconsolidated materials on the southeast side of the Sluice Trench and Area East of Sluice Trench and upgradient of the Engineered Wetland. Based on the reported analytical results for samples collected from this well, TVA conducted supplemental analysis using polarized light microscopy (PLM) of retained cores from the original borehole. PLM is a laboratory method used to identify the potential presence of ash on a percentage basis. The results of the PLM analyses indicated that a 3-foot-thick interval consisting of 30% to 38% CCR material existed within the screened interval. The zone containing CCR material was identified from 9.0 to 12.0 feet below ground surface. The analytical results of water samples collected from well KIF-107 are thus found to be representative of pore water, not groundwater. The laboratory report containing the results of the PLM analyses is provided in Attachment H.1-A. Exhibit D.2 (Appendix D) shows a cross-section of the Sluice Trench and Area East of Sluice Trench and Interim Ash Storage Area, including the location of well KIF-107 and the position of the well screen.

Because the analytical results of samples collected from well KIF-107 are representative of pore water, they are not included in the groundwater quality evaluation below. Between December 7 to 9, 2020, TVA installed additional well KIF-109 for the CCR Rule program in unconsolidated native material above bedrock approximately 48 feet east of KIF-107. Exhibit H.1-1 shows the well location. Analytical results of groundwater samples collected from well KIF-109 are included in the groundwater quality discussion in this appendix.

Because of the results of PLM testing of solid material samples collected from the boring for well KIF-107, a review of boring logs and additional PLM testing was conducted for monitoring wells that have reported concentrations of CCR constituents above a TDEC-approved groundwater screening level (GSL). The PLM investigation was conducted from September to October 2021 and consisted of drilling three borings near well 6AR and two borings near well AD-2 and collecting samples for PLM analysis from ground surface to a depth near the base of the well screen. The results indicated that the presence of ash was non-detect to 23% near well 6AR and non-detect to 17% near well AD-2. This indicates that CCR material is present near and may have been encountered in the borings for these wells. While the screened interval of these monitoring wells is not within the depth interval where CCR material was reported, the presence of CCR material near or directly above the well screens and construction of the wells without an outer casing to isolate the CCR material creates uncertainty about the representativeness of groundwater samples collected from these wells. The results of the boring log review and PLM testing may lead to a re-evaluation of the certified groundwater monitoring systems for compliance with the CCR Rule and TDEC permitted landfill groundwater monitoring programs. Laboratory reports for the PLM analysis are provided in Attachment H.1-A.

2.3.7.2 Geology and Lithology

Chapter 2.4 of the EAR provides a discussion of the regional geologic setting for the KIF Plant. This section provides a discussion of the site-specific geology and lithology of the KIF Plant. Use of the terminology “fill material” in the following discussions excludes CCR material. A discussion of CCR material is provided in Appendix G.1. Exhibit H.1-2 shows a three-dimensional representation of the extent of CCR material at the KIF Plant.

The KIF Plant is located within a valley of the Valley and Ridge province of the Appalachian Highlands, with Pine Ridge to the west and a secondary parallel northeast- to southwest-trending ridge to the east of the Emory River.

The natural unconsolidated materials consist primarily of residuum and alluvium overlying bedrock. Residuum is the material that remains after bedrock has weathered to a point that it is no longer considered rock. Residuum commonly consists of clay or silt but can have layers of coarser materials such as sand and gravel. Alluvium refers to native materials (i.e., clay, silt, sand, or gravel) that are deposited by moving water. The alluvium can be differentiated into silts, clays, and sands, which exhibit a coarsening downward sequence. The upper fine-grained alluvium layer varies in thickness from 2.5 to 27.5 feet and is primarily comprised of clay and silty clays. Clay soils of variable thickness are present under the TDEC Order CCR management units, although they are believed to be discontinuous in areas based on geotechnical drilling records. The lower alluvial layer, ranging in thickness from 0.5 to 52.5 ft, is primarily sand and silty sand. Exhibits H.1-3 and H.1-4 show three-dimensional representations of the extent of the unconsolidated materials consisting primarily of silts and clays, and sands and silty sands, respectively.

Recent understanding of the unconsolidated materials existing downgradient of the TDEC Order CCR management units has led to a reinterpretation of some of the boring logs for monitoring wells AD-2, AD-3, and 6AR. These wells were logged as containing residuum within the screened interval but are now known to have been screened within dike fill material based on a review of historical topographic maps and KIF Plant construction drawings.

Bedrock underlying the TDEC Order CCR management units is the Conasauga Group Shale (Moore et al. 1993), which is comprised of sandstone, siltstone, shale, limestone, and dolomite and is of low permeability. Exhibit H.1-5 is a geologic map of the KIF Plant. The KIF Plant is situated between the Chattanooga Fault to the north and the Kingston Fault to the south. Exhibit H.1-6 shows the regional geology and the location of the nearby mapped faults.

As part of the vacatur drilling activities, borings 6AR-D and AD-2-D were advanced into bedrock using wireline coring. Observations of the cores confirmed that the shallow bedrock in these areas consisted primarily of fractured limestone and shale. See the logs for borings 6AR-D and AD-2-D in Appendix B.5 of the EAR. Exhibit H.1-7 shows a three-dimensional representation of the bedrock surface.

The fractured zones were assessed from geophysical borehole logging that was conducted in borehole AD-2-D. Various downhole geophysical tools were used to collect continuous, depth-wise information on rock bedding and fracture orientation, rock quality and composition, secondary porosity features, and potential groundwater flow conditions under ambient and pumping conditions. The borehole geophysics logging was conducted during the 2018 vacatur drilling activities. The logging consisted of natural gamma, fluid temperature, fluid resistivity, caliper, optical televiewer, acoustic televiewer, and heat pulse flow meter. Based on the borehole logging, the mean strike of the bedding planes is northeast /southwest and the dip of the planes is to the southeast. The mean strike of the fractures is northeast/southwest and the dip of the fracture set is toward the southeast. Voids or karst features were not observed. The heat pulse flow meter identified producing/receiving intervals between the depths of 54- and 88-feet during pumping conditions. For comparison, the hydraulic conductivities calculated for pressure tests conducted within or near this depth ranged from 6.2×10^{-7} cm/sec to 1.2×10^{-5} cm/sec (Table H.1-3). Most observed flow occurred in the upper 20 feet of bedrock under pumping conditions. The borehole geophysics logging is summarized in a report by ARM Geophysics (2018) and is included as Attachment H.1-B. Collapsing hole conditions prevented geophysical borehole logging in 6AR-D.

2.3.7.3 Hydrostratigraphic Units and the Uppermost Aquifer

Hydrostratigraphic units are geological formations have been defined to characterize the hydrogeology of the KIF Plant to understand where and how groundwater is flowing. Groundwater flows from higher groundwater elevations to lower elevations. In saturated geological formations that have higher permeability than adjacent formations, groundwater flows in a mostly horizontal direction. In saturated geological formations that have lower permeability than adjacent formations, groundwater flows in a more vertical direction. Geological formations, groups of formations, or parts of a formation capable of yielding useable quantities of groundwater to wells or springs are called aquifers. Aquifers are targeted for development as water sources by property owners. Hydraulic characteristics of hydrostratigraphic units are used to classify aquifers. If an aquifer's upper boundary forms the water table, then it is called an unconfined aquifer.

In state and federal regulations, the term uppermost aquifer is used. This is the aquifer nearest the natural ground surface, as well as lower aquifers that are hydraulically interconnected with this aquifer within a facility's property boundary that are capable of yielding usable quantities of groundwater. Regulations are designed to protect the groundwater in the uppermost aquifer because it could be used by property owners as a source of water. The term uppermost aquifer is used in this report.

Based on the geology and hydraulic conductivities measured in the vicinity of the TDEC Order CCR management units, the unconsolidated materials shown on Exhibit D-2 in Appendix D of the EAR are considered to be the uppermost aquifer and are under unconfined conditions. The following discussions of groundwater elevations and flow are focused on data from wells that monitor the uppermost aquifer, but also rely on data collected from wells or piezometers installed in the CCR management units or other hydrogeological units as part of other programs to support the evaluations.

2.3.7.4 Groundwater Flow

This section provides a discussion of how groundwater flows at the KIF Plant. Groundwater flow occurs because gravity moves groundwater from areas of higher groundwater elevations to areas of lower elevations along flow paths that are generally perpendicular to groundwater elevation contours. Physiographic and hydrogeological features affect how groundwater flows. Hydrogeological barriers (i.e., rivers and surface streams) and divides (i.e., ridges that form watershed boundaries) bound the extent of groundwater flow. Groundwater flows toward, but not across, hydrogeological barriers and away from hydrogeological divides.

Exhibit H.1-8 shows the physiographic setting of the KIF Plant within the floodplain of the Emory River. The key characteristic of the setting is that the plant is situated in a low-lying area along the Emory River with a higher elevation ridge to the northwest and west of the plant. Physiographic features that affect groundwater flow in the vicinity of the KIF Plant include the steep topography of Pine Ridge to the northwest, and the Emory River and the Plant Intake Channel to the east-southeast and downgradient of the TDEC Order CCR management units. To the west and upgradient of the plant is Pine Ridge, which serves as a topographic divide to groundwater flow (Exhibit H.1-9).

Groundwater levels in the uppermost aquifer were measured in 14 wells and used for groundwater elevation contour map development. Groundwater level measurements were also obtained from nine piezometers installed for other programs. Surface water level measurements for the Emory River were continuously recorded as part of TVA's plant operations. The automated reading recorded closest to noon on the gauging date was used for comparison to manually gauged groundwater levels. The groundwater level measurements were converted to elevations. Table H.1-5 provides groundwater and Emory River level and elevation data from Event #3 in August 2019. Table H.1-6 provides elevation data from the groundwater investigation. Exhibit H.1-9 provides a representative groundwater elevation contour map for the unconsolidated materials for the August 2019 event. Groundwater elevation contour maps for other sampling events can be found in Appendices H.3, H.4, H.6, H.7, and H.8.

At the KIF Plant, groundwater levels were measured within the unconsolidated materials. Generally, the horizontal groundwater flow direction is to the east-southeast toward the Emory River or Plant Intake Channel. Groundwater flow in the unconsolidated materials is bounded to the east and southeast by the Emory River and Plant Intake Channel. Exhibit H.1-9 from groundwater sampling Event #3 in August 2020 is a representative groundwater contour map for the unconsolidated materials.

Horizontal groundwater flow rates were calculated using groundwater elevation data acquired during the six EI groundwater sampling events and a mean hydraulic conductivity derived from the results of slug testing data (Table H.1-4) for the Sluice Trench and Area East of Sluice Trench, Interim Ash Staging Area, and the Stilling Pond. Horizontal groundwater flow direction and hydraulic gradient were estimated using the triangulation method and groundwater elevations for each event. The flow rate was calculated using typical effective porosity percentages based on soil type, constant hydraulic conductivity values based on geometric mean calculations from slug testing (Table H.1-4), and the groundwater elevation inputs specific to each gauging event. Table H.1-7 provides a summary of the calculations used to estimate the average horizontal flow rate and the results of the calculations for each groundwater sampling event.

For unconsolidated materials at the Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area, the values used to calculate groundwater flow rates follow:

- Geometric mean of hydraulic conductivity of 4.01×10^{-4} cm/sec
- Average horizontal hydraulic gradient ranging from 0.0116 feet/foot (Event #5) to 0.0132 feet/foot (Event #6)
- Effective porosity of 33% (TVA 2011).

The average groundwater flow rate for the unconsolidated deposits at the Sluice Trench and Area East of Sluice Trench, and Interim Ash Staging Area ranged from 14.6 feet/year (Event #5) to 16.6 feet/year (Event #6). These calculated groundwater flow rates, and those presented below, are generally much slower than water flow in surface streams or rivers. Flow rates in surface streams or rivers generally are measured in feet per second (United States Geological Survey 1999).

For unconsolidated materials at the Stilling Pond, the values used to calculate groundwater flow rates follow:

- Geometric mean of hydraulic conductivity of 3.41 x 10^{-5} cm/sec
- Average horizontal hydraulic gradient ranged from 0.0101 feet/foot (Event #5) to 0.0241 feet/foot (Event #6)
- Effective porosity of 33% (TVA 2011).

The average groundwater flow rate for the unconsolidated deposits at the Stilling Pond ranged from 1.1 feet/year (Event #5) to 2.6 feet/year (Event #6).

2.3.7.5 Groundwater/Surface Stream/Pore Water Relationships

This section provides a discussion of groundwater, surface stream, and pore water elevation relationships. The discussion consists of two parts. The first part of the discussion is focused on a general comparison of differences in pore water and inferred groundwater elevations in the vicinity of each of the TDEC Order CCR management units. The second part of the discussion is focused on correlations between fluctuations in groundwater, surface stream, and pore water levels and includes an evaluation of the effect of precipitation events. Exhibit H.1-1 shows the locations of wells and piezometers used to manually gauge groundwater and pore water elevations. Exhibit H.1-10 shows locations of wells and piezometers that are automated to record pore water and groundwater elevations. Exhibit H.1-11 provides hydrographs of the Emory River and groundwater elevations (for automated piezometers). Exhibit H.1-12 provides hydrographs of the Emory River and groundwater elevations (manually gauged or read wells and piezometers). Exhibit H.1-13 provides hydrographs of the Emory River and pore water elevations (for automated piezometers). Exhibit H.1-14 provides hydrographs of the Emory River and pore water elevations (for manually gauged or read wells and piezometers). Table H.1-6 provides a comparison of the groundwater elevations at wells and piezometers and the Emory River for the six sampling events. A complete set of hydrographs for available instrumentation is provided in Attachment H.1-D.

<u>General Comparison of Pore Water and Groundwater Elevations</u>

Within the Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area, the pore water phreatic surface and groundwater levels were inferred to be at similar elevations during the EI. Near the upgradient, western edge of the Interim Ash Staging Area, groundwater elevations in AD-1 were higher than pore water elevations within the TDEC Order CCR management units (see Exhibit H.1-9). This information indicates that pore water levels were not causing a reversal of the groundwater flow direction (sometimes referred to as mounding) along the upgradient edge of these TDEC Order CCR management units.

Within the Stilling Pond, the pore water phreatic surface and groundwater levels were inferred to be at similar elevations during the EI. The Stilling Pond is bounded on its upgradient edge by the KRP Ash Landfill. The inferred groundwater flow direction along the upgradient edge is from the KRP Ash Landfill toward the Stilling Pond, and pore water levels were not causing a reversal of the groundwater flow direction along the upgradient edge of the Stilling Pond. The elevations of pore water within groundwater in the vicinity of the Stilling Pond are generally within 5 feet of the Emory River stage.

<u>Correlations Between Fluctuations in Groundwater, Surface Stream, and Pore Water Levels</u>

The following are observations regarding correlation of fluctuations in water levels between the Emory River, groundwater, pore water, and precipitation.

- **Emory River**: Exhibit H.1-11 shows a hydrograph for the Emory River and a timeline of precipitation events, including the amount of precipitation. The river stage fluctuations appear to correlate with winter and summer pool changes that are part of the management of water levels in Watts Bar Reservoir (Exhibit H.1-11). The seasonal influence of the operating reservoir levels is apparent, with the lowest stages generally occurring during the late fall through early spring months and the highest stages generally occurring during the late spring through early fall months. Larger precipitation events sometimes correlate with higher elevations of the Emory River stage, especially during the lower water stage of winter pool.

- **Stilling Pond**: Exhibit H.1-11 shows a comparison of river stage and groundwater level fluctuations at monitored locations near the Stilling Pond. The groundwater hydrograph for automated location KIF-PZ126BC, which is located adjacent to the Emory River, has a fluctuation pattern that is correlated with the Emory River stage fluctuations, and the response to precipitation events is similar. The groundwater hydrographs for automated locations KIF-RS43-17-3-2, KIF-RS42-17-1-1, and KIF-RS43-17-2-3 have fluctuation patterns that are correlated with the Emory River stage fluctuations, but the magnitude of the fluctuations is subdued, especially with respect to precipitation events.

  The groundwater hydrographs for the manually gauged or read instruments show a similar fluctuation pattern to the river stage fluctuations, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events (Exhibit H.1-12).

  Exhibit H.1-13 shows a comparison of river stage and pore water level fluctuations at monitored locations within the Stilling Pond. The pore water hydrographs for automated locations KIF-RS42-17-2-1 and KIF-RS43-17-3-1 have a general, though subdued, correlation to the river stage fluctuations. The pore water hydrographs show less correlations to the river stage than the groundwater hydrographs. The pore water hydrograph for automated location KIF-PZ126AC has a strong correlation with river stage fluctuations when pore water is above the sensor elevation.

The pore water hydrographs for the manually gauged or read instruments show generally stable pore water elevations, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events (Exhibit H.1-14).

- **Sluice Trench and Area East of Sluice Trench/Interim Ash Staging Area**: Exhibit H.1-12 shows a comparison of river stage and groundwater level fluctuations. There are only manual groundwater gauged or read instruments for these TDEC Order CCR management units. The groundwater hydrographs show that groundwater level fluctuations for AD-2, KIF-105, KIF-106, KIF-PZ-C1B and KIF-PZ-C2, and KIF-PZ-D1A generally show a correlation with the river stage trends, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events. Groundwater level fluctuations for well AD-3 do not appear to be correlated with river stage fluctuations.

  Exhibit H.1-14 shows a comparison of river stage and pore water level fluctuations. There are only manual pore water gauged or read instruments for these TDEC Order CCR management units. The pore water hydrographs show that pore water level fluctuations for KIF-107, KIF-TW01, KIF-TW02, KIF-TW03 KIF-TW04, KIF-TW05, KIF-PZ-A1, and KIF-PZ-B1 do not show an obvious correlation with the river fluctuation trends and do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events.

In summary, the inferred groundwater and pore water elevations in the vicinity of the TDEC Order CCR management units at the KIF Plant were similar. The elevations of pore water levels within and groundwater levels in the vicinity of the Stilling Pond were generally within 5 feet of the Emory River stage. For the Stilling Pond, the pore water and groundwater level fluctuations at most locations showed a similar, but subdued, correlation with the fluctuation pattern of the Emory River stage. Pore water level fluctuations were more subdued in comparison to groundwater level fluctuations. At the Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area, the pore water and groundwater hydrographs based on manual or read readings generally show a correlation with the river stage trends, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events.

2.4 GROUNDWATER QUALITY

This section provides a discussion of the analytical results for groundwater samples collected from monitoring wells installed as part of the EI and previously installed wells monitored as part of the TDEC permitted landfill and CCR Rule groundwater monitoring programs. The purpose of the statistical evaluation is to provide an objective method to inform decisions about the need for corrective action as of the date of the latest sampling event. The statistical evaluation is not intended to predict future groundwater quality. The purpose of ongoing groundwater monitoring is to identify changes in groundwater quality. Future analytical results reported for the ongoing groundwater monitoring programs, and the need for continued groundwater monitoring, will be further evaluated as part of the CARA Plan. If further statistical evaluation conducted as part of the CARA Plan process concludes that a corrective action is or is not required, then the supporting information will be included in the CARA Plan.

The groundwater quality evaluation is based on a statistical evaluation of constituents listed in Appendix I of TDEC Rule 0400-11-01-.04 (TDEC Appendix I) and Appendices III and IV of the CCR Rule. The analytical results were compared to GSLs approved by TDEC (see Appendix A.2). The results of the statistical evaluation are shown in a color-coded format where green indicates no statistically significant concentration greater than or equal to the GSL for constituents other than pH and no statistically significant difference outside the GSL range for pH, and red indicates a statistically significant concentration greater than or equal to the GSL for constituents other than pH or a statistically significant difference outside the GSL range for pH. The statistical methods applied to determine the green and red categories are discussed in the statistical evaluation of groundwater analytical data provided in Appendix E.3, and the results are summarized below. Table H.1-8 provides the analytical results of groundwater samples used in the statistical evaluation. Table H.1-9 provides a summary of groundwater quality parameters used for the statistical analyses. Table H.1-10 lists the approved GSLs. Table H.1-11 shows the results of the statistical evaluation with the color-coded format described above.

The dataset compiled for statistical analysis included available analytical data for groundwater samples collected between June 2009 and December 2022, although the specific start date and frequency of sampling may vary between wells based on date of well installation and the applicable monitoring program. Only wells installed for the TDEC permitted landfill groundwater monitoring systems prior to 2016 (AD-1, AD-2, AD-3, and 6AR) were sampled prior to June 2016. Four groundwater monitoring wells installed for the EI (KIF-103, KIF-104, KIF105, and KIF-106) were also sampled between January 2019 and September 2022 to complete baseline and semiannual groundwater sampling events in accordance with the CCR Rule. Three of the six sampling events required by the approved TDEC Order *Groundwater Investigation SAP* were also included in the CCR Rule sampling. In addition, well KIF-109, which was installed in December 2020 for the CCR Rule, was sampled between January 2021 and September 2022.

The results of the statistical evaluations are dependent on the dataset and method used for the evaluation. The dataset used for the evaluation conducted for the EAR is different than the one used for reporting required by the CCR Rule or the TDEC permitted landfill programs. Also, the statistical method is different than the method used for TDEC permitted landfill reporting. Because of these differences, the results of the statistical evaluations conducted for the CCR Rule and TDEC permitted landfill monitoring programs may differ from the results discussed below.

The statistical evaluation included screening for outliers, which are abnormally high or low values that may represent anomalous data or data errors. Statistical outliers were identified and eliminated from further statistical analysis. Appendix E.3 provides additional information regarding the outlier evaluation and methods used to compare results to the GSLs.

The statistical evaluation identified 18 CCR Rule Appendix III well-constituent pairs with statistically significantly concentrations above a GSL or outside the GSL range for pH. These included pH, sulfate, and total dissolved solids. Five well-constituent pairs for the CCR Rule Appendix IV constituents (which are also TDEC Appendix I constituents) had a statistically significant concentration above a GSL. Cobalt (6AR, KIF-103, KIF-104, AD-2, and KIF-105) was the only Appendix IV constituent with a statistically significant concentration above the approved level. Table H.1-11 provides a summary of the statistical evaluation. Exhibit H.1-15 provides the results of the statistical evaluations for CCR Rule Appendix IV and TDEC Appendix I constituents with at least one detection above the GSL for the Sluice Trench and Area East of Sluice Trench, Interim Ash Staging Area, and Stilling Pond. A detailed explanation of the interpretation of the graphs inset on this exhibit is provided in Appendix E.3.

For the well-constituent pairs identified with statistically significant concentrations greater than or equal to a GSL or outside the GSL range for pH, linear regression analysis identified three statistically significant decreasing trends and 15 statistically significant increasing trends. Table H.1-12 provides a summary of the trend evaluation.

2.4.1 Piper Diagrams

Another approach to characterize the groundwater analytical results included the use of Piper diagrams, which are graphical representations of the major ion chemistry of groundwater. Available groundwater data were used to develop the diagrams, which were used to visually evaluate similarities and differences in the general chemistry characteristics of the groundwater samples and assess whether the results potentially indicated influences from the various sources of groundwater. A Piper diagram from the February 2020 groundwater sampling event is depicted in Exhibit H.1-16, which is considered to be representative of the major ion distribution of the groundwater near the KIF Plant TDEC Order CCR management units over the sampling time period. Piper diagrams for the remaining five events conducted between April 2019 and February 2020 are provided in Attachment H.1-C.

The groundwater-type of the background well AD-1 was observed to be predominantly sodium-bicarbonate-type water. Groundwater monitoring wells downgradient of the Sluice Trench and Area East of Sluice Trench, and Interim Ash Staging Area were observed to be calcium-sulfate type groundwater in general, with the exception of KIF-106, which trended more towards a calcium-sulfate-bicarbonate type groundwater. Similarly, the groundwater monitoring wells downgradient of the Stilling Pond were observed to be calcium-sulfate-type water with the exception of 6AR, which trended towards a calcium-sulfate-bicarbonate-type water. Well GW-2 groundwater was also classified as calcium-sulfate-bicarbonate type groundwater. Additional information regarding groundwater geochemistry is provided in Section 2.4.3

2.4.2 Well GW-2 Groundwater Quality Assessment

Monitoring well GW-2 was installed in 2010 for the purpose of evaluating groundwater elevations in the unconsolidated material upgradient of the KIF Plant CCR management units and as a potential background well. The groundwater quality observed at well GW-2 was comparable to that measured at background well AD-1 in that concentrations of CCR constituents were measured at low concentrations, including boron, calcium, chloride, fluoride, sulfate, and total dissolved solids. The pH measured at GW-2 was lower than the pH measured at background well AD-1, but similar to that of the downgradient monitoring wells installed in unconsolidated materials. In addition, Appendix IV constituents were measured at concentrations below the respective GSLs. The groundwater quality data produced for this well demonstrate that it is not impacted by CCR constituents.

2.4.3 Geochemistry of Soils-Groundwater Interaction

Groundwater quality is affected by numerous geochemical processes during groundwater flow through geological materials. The distinct difference between the chemical characteristics of pore water within the CCR material, presented in Appendix G.1, and the characteristics of groundwater quality downgradient of the TDEC Order CCR management units at the KIF Plant is difficult to explain without the aid of geochemistry. It is well documented in the literature that certain CCR constituents that are detected in pore water (typically at higher concentrations than in groundwater) can be affected by geochemical processes that occur between constituents dissolved in groundwater and geological materials through which it flows. The effects of these geochemical processes, which often result in the attenuation of CCR constituents (i.e., reduced concentrations) can explain observed differences between the characteristics of pore water and groundwater. The extent of the interactions between dissolved constituents in groundwater and geological materials ranges from limited interaction for constituents such as boron, chloride and sulfate, to strong interactions for constituents such as arsenic and cobalt.

Descriptions of the geochemical interactions between geological materials and constituents dissolved in groundwater are provided in many textbooks (e.g., Appelo and Postma 1996). Geochemical reactions or processes that can affect CCR constituents include:

- Adsorption/desorption on the surfaces of metal hydroxides – an interaction whereby constituents adsorb to metal hydroxide soil minerals; the process is reversible and controlled by the pH and oxidation/reduction potential (redox) of groundwater.
- Cation exchange with clay minerals – a process where positively charged constituents (cations) absorb to negatively charged clay minerals, subject to competition and concentrations relative to other constituents. The strength of the electrostatic bond formed varies with the constituents involved, but in general cation exchange reactions are reversible.
- Mineral precipitation or dissolution – a process where dissolved constituents in groundwater combine to form a soil mineral; minerals are also subject to dissolution (i.e., reaction is reversible) under certain conditions of groundwater pH and redox.

Observations of groundwater and pore water chemistry can indicate the extent to which geochemical processes chemically change groundwater and influence groundwater quality at the KIF Plant. Boron, chloride, and sulfate commonly occur in high concentrations in pore water and are minimally attenuated by geochemical processes. Thus, they can be used to infer locations in the groundwater monitoring program where there is an influence from pore water. This is because boron and chloride are considered non-reactive because neither constituent is subject to geochemical reactions that would materially change concentrations in groundwater during flow through geological materials. Sulfate is considered a low-reactive constituent because there are geochemical conditions in some CCR influenced groundwater where the concentration of sulfate can be reduced by mineral precipitation.

In contrast, those CCR constituents most likely to be influenced by interactions between geological materials and groundwater (e.g., arsenic, lithium, and molybdenum) typically show concentrations in groundwater monitoring wells that are much different than those observed in pore water, indicating that groundwater is being chemically changed relative to pore water by some physical or geochemical process (or a combination of both) occurring as it flows through geological materials. Groundwater quality measured at a given groundwater monitoring location is a result not only of the interactions between its constituents and the geological materials through which it flows, but also of flow from upgradient sources (including background). Thus, the area upgradient of a groundwater monitoring well can be thought of as an interacting geochemical and hydrogeologic system, including:

- Materials that contribute chemical mass to groundwater
- The physical properties of the geological materials that govern direction and rate of groundwater flow
- Minerals in the geologic materials that can interact with constituents being transported by groundwater
- The pH and redox conditions of groundwater.

This geochemical and hydrogeological system, which includes natural and anthropogenic sources and interactions with natural geologic materials, is referred to as the upgradient system.

Understanding the geochemistry of geological materials is important in interpreting the processes influencing current conditions of groundwater chemistry at the KIF Plant and evaluating effects of activities, such as capping or groundwater remediation, on the evolution of groundwater quality. Further evaluation of the geochemical processes acting in the upgradient system at the KIF Plant to influence groundwater quality will be included in the CARA Plan during assessments of remedies, where needed.

2.4.4 Summary

Downgradient of the TDEC Order CCR management units, one TDEC Appendix I and CCR Rule Appendix IV CCR constituent, cobalt, had statistically significant concentrations in onsite groundwater above the GSL in five wells (6AR, KIF-103, KIF-104, AD-2, and KIF-105). The groundwater impacts described above are limited to onsite areas downgradient along the perimeter of the TDEC Order CCR management units. Cobalt and onsite groundwater from these wells will be further evaluated in the CARA Plan to determine the need for corrective actions.

3.0 SUMMARY

The objectives of the TDEC Order hydrogeological and groundwater investigations were to characterize the hydrogeology and groundwater quality and evaluate groundwater flow conditions in the vicinity of the KIF Plant TDEC Order CCR management units. The key findings of the KIF Plant hydrogeological and groundwater investigations are summarized below:

- TVA evaluated analytical results for groundwater in support of the EAR based on data collected under three groundwater monitoring programs (some of which overlap), including the EI, CCR Rule, and TDEC permitted landfill monitoring programs. Monitoring well locations and CCR constituents that will require further evaluation in the CARA Plan are provided below.

Summary of Findings Requiring Further Evaluation in the CARA Plan	
TDEC Order CCR Management Unit	**Groundwater**
Interim Ash Staging Area	Cobalt (Wells AD-2, and KIF-105)
Sluice Trench and Area East of Sluice Trench	Cobalt (Wells AD-2 and KIF-105)
Stilling Pond	Cobalt (Wells 6AR, KIF-103, and KIF-104)

- The results of a review of boring logs and PLM testing results indicated that the presence of CCR material within or near the screened interval of monitoring wells might be influencing the analytical results of groundwater samples collected from the existing groundwater monitoring systems. This finding may lead to a re-evaluation of the certified groundwater monitoring systems for compliance with the CCR Rule and TDEC permitted landfill groundwater monitoring programs.

- Drainage improvements or potential corrective actions are expected to reduce concentrations of CCR constituents to below GSLs in groundwater at downgradient monitoring locations.

- Pore water within the CCR material has specific chemical characteristics that are different from the characteristics of groundwater downgradient of the TDEC Order CCR management units. Certain CCR constituents that have been detected in pore water are affected by geochemical processes during groundwater flow through geological materials. The effect of these geochemical processes, which can result in the attenuation of CCR constituents and reduced dissolved groundwater concentrations, can explain the observed differences between the characteristics of pore water and groundwater quality.

- The inferred groundwater and pore water elevations in the vicinity of the TDEC Order CCR management units were similar. The elevations of pore water levels within and groundwater levels in the vicinity of the Stilling Pond were generally within five feet of the Emory River stage. Pore water level fluctuations at most locations within the TDEC Order CCR management units showed a similar, but subdued, correlation with the fluctuation pattern of the Emory River stage. Pore water level fluctuations were more subdued in comparison to groundwater level fluctuations, suggesting that foundation soils are impeding the flow of pore water. The use of the term flow, or other terms such as “saturated” in reference to the moisture content of CCR material does not imply that the pore water is readily separable from the CCR material.

- The unconsolidated materials are considered to be the uppermost aquifer and are under unconfined conditions. The bedrock underlying the KIF Plant was found to have low hydraulic conductivity based on pressure testing.
- The groundwater flow direction within the uppermost aquifer beneath the TDEC Order CCR management units is generally to the east-southeast toward the Emory River and the Plant Intake Channel. Groundwater flow in the vicinity of the TDEC Order CCR management units is bounded to the east and southeast by the Emory River and the Plant Intake Channel. Pine Ridge to the west and upgradient of the plant serves as a topographic divide to groundwater flow.

TVA will continue to monitor the trends of cobalt and conduct further evaluation in the CARA Plan to determine if corrective actions are needed. The influence of geochemical processes on groundwater quality will be further evaluated in the CARA Plan as part of the assessment of remedies, where needed.

4.0 REFERENCES

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TABLES

Table H.1-1 - Summary of Environmental Investigation Boring and Monitoring Well Locations
Kingston Fossil Plant

Boring ID	Well ID	Location	Rationale
KIF-102	NC	West of TDEC Order CCR management units	Proposed to assess background conditions upgradient from the TDEC Order CCR management units. Background well not installed since initial borings hit shallow refusal and did not encounter groundwater
KIF-102a	NC		
KIF-TB01	NC		
KIF-TB02	NC		
KIF-TB03	NC		
KIF-TB04	NC		
KIF-TB05	NC		
KIF-TB05A	NC		
KIF-TB06	NC		
KIF-TB07	NC		
KIF-TB08	NC		
KIF-103	KIF-103	Southwest portion of Stilling Pond	To assess local groundwater flow and quality downgradient of the TDEC Order CCR management units
KIF-104	NC	East portion of Stilling Pond	To assess local groundwater flow and quality downgradient of the TDEC Order CCR management units
KIF-104b	KIF-104		
KIF-105	NC	East of Sluice Trench and Area East of Sluice Trench	To assess local groundwater flow and quality downgradient of the TDEC Order CCR management units
KIF-105b	KIF-105		
KIF-106	NC	Southeast of Sluice Trench and Area East of Sluice Trench	To assess local groundwater flow and quality downgradient of the TDEC Order CCR management units
KIF-106b	KIF-106		

Notes:

CCR - Coal Combustion Residuals

ID - Identification

NC - Not completed as a monitoring well

Table H.1-2 - Summary of Monitoring Well Construction Specifications
Kingston Fossil Plant

	Top of Casing		Bottom of Well			Screened Interval					
Well ID	Stickup	Elevation	Depth	Depth	Elevation	Depth Top	Depth Bottom	Depth Top	Depth Bottom	Elevation Top	Elevation Bottom
	ft ags	ft NGVD29	ft bgs	ft btoc	ft NGVD29	ft bgs	ft bgs	ft btoc	ft btoc	ft NGVD29	ft NGVD29
22A	3.5	759.12	47.0	50.5	708.6	16.7	46.7	20.2	50.2	738.9	708.9
22B*	4.2	759.18	78.0	82.2	677.0	55.7	77.2	59.9	81.4	699.3	677.8
27A	4.3	757.97	43.5	47.8	710.2	27.1	43.2	31.4	47.5	726.6	710.5
27B*	4.0	758.15	68.5	72.5	685.7	46.4	67.9	50.4	71.9	707.8	686.3
6AR	4.0	758.01	40.7	44.7	713.3	30.5	40.2	34.5	44.2	723.5	713.8
AD-1	3.7	781.13	32.0	35.7	745.4	21.8	31.7	25.5	35.4	755.6	745.7
AD-2	4.1	757.10	24.5	28.6	728.5	14.4	24.3	18.5	28.4	738.6	728.7
AD-3	3.9	752.30	15.0	18.9	733.4	10.0	14.9	13.9	18.8	738.4	733.5
GW-2	3.3	769.98	19.5	22.8	747.2	10.2	19.5	13.5	22.8	756.5	747.2
KIF-22C	5.7	761.23	44.5	50.2	711.0	34.0	44.5	39.7	50.2	721.5	711.0
KIF-103	3.6	760.30	35.5	39.1	721.2	25.5	35.1	29.1	38.7	731.2	721.6
KIF-104	3.5	758.60	35.1	38.6	720.0	24.6	34.6	28.1	38.1	730.5	720.5
KIF-105	4.3	757.30	44.8	49.1	708.2	34.4	44.4	38.7	48.7	718.6	708.6
KIF-106	3.7	761.30	39.4	43.1	718.2	29.0	39.0	32.7	42.7	728.6	718.6
KIF-109	3.6	761.23	50.0	53.6	707.6	39.0	49.6	42.6	53.2	718.6	708.0

Notes:

ft ags — feet above ground surface
ft bgs — feet below ground surface
ft btoc — feet below top of casing
ft NGVD29 — elevation in feet based on the National Geodetic Vertical Datum of 1929
ID — identification
* — Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.

Table H.1-3 - Summary of Hydraulic Conductivity Estimates Derived from Pressure Testing in Rock
Kingston Fossil Plant

Boring ID	Ground Surface Elevation (ft)	Depth Interval (ft)		Test Interval Elevation (ft)		Test Length (ft)	Flow Rate (gal/min)	Total Head (ft)	Hydraulic Conductivity (cm/sec)
AD-2-D	753.9	63.0	68.0	690.9	685.9	5.0	0.04	84.5	3.8E-06
AD-2-D	753.9	63.0	68.0	690.9	685.9	5.0	0.04	96.1	8.3E-07
AD-2-D	753.9	63.0	68.0	690.9	685.9	5.0	0.04	107.6	7.4E-07
AD-2-D	753.9	63.0	68.0	690.9	685.9	5.0	0.04	96.1	8.3E-07
AD-2-D	753.9	63.0	68.0	690.9	685.9	5.0	0.04	84.5	9.4E-07
AD-2-D	753.9	68.5	73.5	685.4	680.4	5.0	0.04	89.5	3.6E-06
AD-2-D	753.9	68.5	73.5	685.4	680.4	5.0	0.04	101.1	7.9E-07
AD-2-D	753.9	68.5	73.5	685.4	680.4	5.0	0.04	112.6	7.1E-07
AD-2-D	753.9	68.5	73.5	685.4	680.4	5.0	0.04	101.1	7.9E-07
AD-2-D	753.9	68.5	73.5	685.4	680.4	5.0	0.04	89.5	8.9E-07
AD-2-D	753.9	74.0	79.0	679.9	674.9	5.0	0.00	94.6	8.4E-07
AD-2-D	753.9	74.0	79.0	679.9	674.9	5.0	0.00	106.2	7.5E-07
AD-2-D	753.9	74.0	79.0	679.9	674.9	5.0	0.00	117.7	6.8E-07
AD-2-D	753.9	74.0	79.0	679.9	674.9	5.0	0.00	106.2	7.5E-07
AD-2-D	753.9	74.0	79.0	679.9	674.9	5.0	0.00	94.6	8.4E-07
AD-2-D	753.9	86.0	91.0	667.9	662.9	5.0	0.16	105.5	1.2E-05
AD-2-D	753.9	86.0	91.0	667.9	662.9	5.0	0.16	117.1	6.8E-07
AD-2-D	753.9	86.0	91.0	667.9	662.9	5.0	0.16	128.6	6.2E-07
AD-2-D	753.9	86.0	91.0	667.9	662.9	5.0	0.16	117.1	6.8E-07
AD-2-D	753.9	86.0	91.0	667.9	662.9	5.0	0.16	105.5	7.6E-07
AD-2-D	753.9	92.0	97.0	661.9	656.9	5.0	0.10	114.5	7.0E-06
AD-2-D	753.9	92.0	97.0	661.9	656.9	5.0	0.10	126.1	6.3E-07
AD-2-D	753.9	92.0	97.0	661.9	656.9	5.0	0.10	137.6	5.8E-07
AD-2-D	753.9	92.0	97.0	661.9	656.9	5.0	0.10	126.1	6.3E-07
AD-2-D	753.9	92.0	97.0	661.9	656.9	5.0	0.10	114.5	7.0E-07
							Geometric Mean (cm/sec)		**1.0E-06**

Notes:

cm / sec	centimeter per second
ft	feet
gal / min	gallon per minute
ID	identification

Hydraulic Conductivity Calculation:

$$K = \frac{CQ}{2\pi LH} * \ln(L/r)$$

K	hydraulic conductivity (cm/sec)
Q	flow rate (gal/min)
L	test length (ft)
H	total head (ft)
r	borehole radius (0.1250) (ft)
C	conversion factor (0.0679) (cm-min-ft^3)/(ft-sec-gal)

Total Head Calculation:

$$H = P * C_{pressure} + \left(\frac{D_{top} - D_{bottom}}{2} + H_{gauge}\right)$$

H	total head (ft)
P	pressure (psi)
$C_{pressure}$	conversion factor (psi to head ft)
D_{top}	top test depth (ft)
D_{bottom}	bottom test depth (ft)
H_{gauge}	gauge height (ft)

Preene, M (2019). Design and interpretation of packer permeability tests for geotechnical purposes.
Quarterly Journal Of Engineering Geology, 52, 2, May, 182–200.

Stantec

Table H.1-4 - Summary of Hydraulic Conductivity Results from Slug Test Data
Kingston Fossil Plant

Monitoring Well ID	Monitoring Well Designation	Slug Test Hydraulic Conductivity (cm/sec)
Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area		
AD-1	Background	1.10E-05
AD-2	Downgradient	1.30E-04
AD-3	Downgradient	1.10E-03
KIF-105	Downgradient	1.62E-03
KIF-106	Downgradient	5.09E-04
KIF-109	Downgradient	3.19E-03
Geometric Mean of Hydraulic Conductivity Unconsolidated Materials (cm/sec)		**4.01E-04**
Stilling Pond		
AD-1	Background	1.10E-05
KIF-103	Downgradient	9.08E-05
KIF-104	Downgradient	3.29E-06
6AR	Downgradient	4.10E-04
Geometric Mean of Hydraulic Conductivity Unconsolidated Materials (cm/sec)		**3.41E-05**

Notes

ID - identification

cm/sec - centimeters per second

Due to a rounding discrepancy in Table B.3 of the *Hydrogeological Investigation Sampling and Analysis Report (SAR)*, the values reported for the Slug Test Hydraulic Conductivity are reflected differently for the EI wells (KIF-103, KIF-104, KIF-105, and KIF-106) in this table and in the *HGI SAR*.

Table H.1-5 – Groundwater Level Measurements, Groundwater Sampling Event #3 (August 19, 2019)
Kingston Fossil Plant

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	19-Aug-19	18.16	759.12	740.96	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	19-Aug-19	18.18	759.18	741.00	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	19-Aug-19	16.88	757.97	741.09	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	19-Aug-19	16.50	758.15	741.65	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	19-Aug-19	17.15	758.01	740.86	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	19-Aug-19	10.49	781.13	770.64	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	19-Aug-19	10.25	757.10	746.85	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	19-Aug-19	9.56	752.30	742.74	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	19-Aug-19	20.62	769.98	749.36	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	19-Aug-19	20.21	761.23	741.02	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	19-Aug-19	19.30	760.33	741.03	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	19-Aug-19	17.04	758.60	741.56	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	19-Aug-19	8.13	757.26	749.13	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	19-Aug-19	9.11	761.27	752.16	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	19-Aug-19	n/a	n/a	741.6	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	19-Aug-19	n/a	n/a	742.6	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	19-Aug-19	n/a	n/a	742.8	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	19-Aug-19	n/a	n/a	742.5	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	19-Aug-19	n/a	n/a	741.0	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B**	19-Aug-19	7.67	751.92	744.25	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2**	19-Aug-19	4.79	746.88	742.09	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A**	19-Aug-19	10.33	752.05	741.72	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B**	19-Aug-19	5.43	748.70	743.27	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River gauge	n/a	19-Aug-19	n/a	n/a	740.69	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs.
   Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec, 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.

Table H.1-6 - Emory River and Groundwater Elevation Comparison
Kingston Fossil Plant

	Groundwater Elevation by Date (ft amsl)					
Well/Piezometer ID	**4/2/2019**	**6/17/2019**	**8/19/2019**	**10/21/2019**	**12/16/2019**	**2/17/2020**
22A	NM	741.01	740.96	740.75	737.51	739.26
22B	NM	741.12	741.00	740.84	737.56	739.33
27A	NM	741.23	741.09	740.88	738.28	739.68
27B	NM	741.74	741.65	741.48	739.03	740.45
6AR	737.68	740.90	740.86	740.68	737.03	738.95
AD-1	775.22	772.70	770.64	769.01	775.64	776.44
AD-2	745.56	746.98	746.85	746.19	744.75	746.57
AD-3	742.83	743.28	742.74	742.32	743.51	744.20
GW-2	NM	750.78	749.36	748.90	751.55	752.97
KIF-22C	NM	NM	741.02	740.85	737.54	739.28
KIF-103	737.77	741.03	741.03	740.85	737.23	738.83
KIF-104	738.61	741.10	741.56	741.48	739.07	740.66
KIF-105	748.20	749.23	749.13	748.31	747.47	749.16
KIF-106	751.72	752.30	752.16	751.16	751.37	753.42
KIF_PZ126BC	739.59	741.38	741.58	741.32	739.15	740.50
KIF_PZ20C	740.84	742.71	742.57	742.27	740.40	741.70
KIF-17-01-1	741.50	742.49	742.80	742.43	741.37	742.08
KIF-17-02-3	741.90	742.25	742.50	742.29	741.60	741.77
KIF-17-03-2	739.60	740.70	741.00	740.70	739.30	740.10
PZ-C1B	NM	NM	744.25	743.92	741.47	NM
PZ-C2	NM	NM	742.09	741.77	738.82	NM
PZ-D1A	NM	NM	741.72	745.97	738.43	NM
PZ-D1B	NM	NM	743.27	738.18	742.01	NM
Emory River	737.63	740.98	740.69	740.54	736.80	738.10

Notes:

ft amsl	feet above mean sea level
ID	identification
NM	not measured

Table H.1-7 - Rate and Direction of Groundwater Flow Summary
Kingston Fossil Plant

Sluice Trench and Area East of Sluice Trench and Interim Ash Staging Area

Unconsolidated Materials

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	6/17/2019	4/2/2019	8/19/2019	12/16/2019	10/21/2019	2/17/2020
Horizontal Gradient (ft/ft)	0.0124	0.0130	0.0120	0.0129	0.0116	0.0132
Hydraulic Conductivity (cm/sec) [1]	4.01E-04	4.01E-04	4.01E-04	4.01E-04	4.01E-04	4.01E-04
Effective Porosity [2]	33%	33%	33%	33%	33%	33%
Flow Direction	Southeast	Southeast	Southeast	Southeast	Southeast	Southeast
Flow Rate (ft/yr)	15.6	16.3	15.1	16.2	14.6	16.6

Stilling Pond

Unconsolidated Materials

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	6/17/2019	4/2/2019	8/19/2019	12/16/2019	10/21/2019	2/17/2020
Horizontal Gradient (ft/ft)	0.0194	0.0224	0.0189	0.0238	0.0101	0.0241
Hydraulic Conductivity (cm/sec) [1]	3.41E-05	3.41E-05	3.41E-05	3.41E-05	3.41E-05	3.41E-05
Effective Porosity [2]	33%	33%	33%	33%	33%	33%
Flow Direction	Southeast	Southeast	Southeast	Southeast	Southeast	Southeast
Flow Rate (ft/yr)	2.1	2.4	2.0	2.5	1.1	2.6

Notes:

ft/ft - feet per foot

cm/sec - centimeter per second

ft/yr - feet per year

1. The hydraulic conductivity values used in the calculation includes the hydraulic conductivity of the upgradient well AD-1 in the geometric mean for each unit.
2. TVA, Kingston Ash Recovery Project Groundwater Flow and Transport Model Report. EPA-RPT-1002. July 2011.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR										
Sample Date		14-Sep-09	17-Dec-09	10-Mar-10	10-Mar-10	19-Apr-10	16-Jun-10	25-Aug-10	28-Sep-10	28-Sep-10	29-Nov-10	15-Dec-10
Sample ID		KIF-6AR-GW-091409	KIF-6AR-GW-121709-B	KIF-6AR-GW-031010	KIF-6AR-AW-031010	KIF-6A-GW-041910	KIF-6A-GW-061610	KIF-6AR-GW-082510	KIF-6AR-GW-092810-A	KIF-6AR-GW-092810-B	KIF-6AR-GW-112910	KIF-6AR-GW-121510
Parent Sample ID					KIF-6AR-GW-031010							
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals												
Aluminum	ug/L	204	-	220 J	189 J	207	172	-	180 J	-	-	243
Antimony	ug/L	<0.33	-	<0.33	<0.33	0.42 U*	<0.33	-	0.33 UJ	-	-	<0.33
Arsenic	ug/L	0.34 J	-	0.45 J	0.4 J	<0.33	0.46 J	-	0.33 UJ	-	-	<0.33
Barium	ug/L	43.2	-	31.9	30.3	31	30.2	-	27.5	-	-	26.2
Beryllium	ug/L	0.63 J	-	0.71 J	0.67 J	0.66 J	0.76 J	0.87 J	0.34 J	-	0.42 J	0.59 J
Boron	ug/L	664	-	621	605	623	632	-	643	-	-	664
Cadmium	ug/L	2.25	-	1.89	1.87	2.12	2.24	2.89 J	2.12	-	2.4	2.19
Calcium	ug/L	43,100	-	41,000	40,200	48,200	46,800	-	47,500	-	-	47,500
Chromium	ug/L	0.7 J	-	<0.33	<0.33	0.34 J	0.42 J	-	0.5 UJ	-	-	<0.33
Cobalt	ug/L	85.8	-	88.5	85.6	90.7	99.1	99.7	92	-	106	104
Copper	ug/L	0.77 J	-	0.34 J	<0.33	0.46 U*	<0.33	-	<0.33	-	-	<0.33
Iron	ug/L	326	-	652	595	593	955	-	384	-	-	575
Lead	ug/L	<0.33	-	<0.33	<0.33	0.51 U*	<0.33	-	<0.33	-	-	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	12,900	-	12,500	12,300	13,600	13,000	-	13,000 J	-	-	14,100
Manganese	ug/L	33,400	-	27,000	26,800	27,200	31,800	-	32,200 J	-	-	33,200
Mercury	ug/L	<0.2	-	0.2 UJ	0.2 UJ	<0.2	<0.2	-	0.15 UJ	-	-	<0.2
Molybdenum	ug/L	0.38 U*	-	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	-	<0.33
Nickel	ug/L	41.2	-	41.2	40.1	41.6	45.3	41.4	39.2	-	44.3	43.8
Potassium	ug/L	612 J	-	796 J	679 J	855 J	877 J	-	906 J	-	-	744 J
Selenium	ug/L	0.33 UJ	-	0.33 UJ	0.33 UJ	0.33 UJ	0.33 UJ	-	0.33 UJ	-	-	<0.33
Silver	ug/L	<0.33	-	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	-	<0.33
Sodium	ug/L	7,180	-	7,300 J	6,380 J	7,200	7,120	-	6,760	-	-	7,450
Strontium	ug/L	126	-	126	123	125	126	-	117	-	-	128
Thallium	ug/L	0.41 U*	-	<0.25	<0.25	0.61 U*	<0.5	-	0.5 UJ	-	-	<0.5
Uranium	ug/L	-	<1	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.23 U*	-	1.1 J	1.12 J	<1	<1	-	1 UJ	-	-	<1
Zinc	ug/L	35.5 J	-	39.6 J	37.8 J	38.6 J	39.7 J	-	32.7 J	-	-	37.8 J
Radiological Parameters												
Radium-226	pCi/L	-	0.276 +/-(0.2872)U	-	-	-	-	-	-	0.114 +/-(0.247)U	-	-
Radium-228	pCi/L	-	2.3040 +/-(0.8456)J	-	-	-	-	-	-	-0.63 +/-(0.680)U	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	10.1	-	4.57	4.53	4.59	4.70	-	4.95	-	-	4.56 J
Fluoride	mg/L	0.189 U*	-	0.129	0.112	0.153	0.127	-	0.243	-	-	0.141
Sulfate	mg/L	18.9	-	218	218	219	214	-	253	-	-	215
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	376	-	328	334	349	398	-	370	-	-	355

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR											
Sample Date		8-Feb-11	29-Jun-11	3-Aug-11	3-Aug-11	5-Dec-11	25-Jan-12	25-Jan-12	18-Jun-12	10-Dec-12	24-Jun-13	4-Dec-13	11-Jun-14
Sample ID		KIF-6AR-GW-020811	KIF-6AR-GW-062911	KIF-6AR-GW-080311	KIF-6AR-AW-080311	KIF-6AR-GW-120511	KIF-6AR-GW-012512	KIF-6AR-AW-012512	KIF-6AR-GW-061812	KIF-6AR-GW-121012	KIF-6AR-GW-062413	KIF-6AR-GW-120413	KIF-6AR-GW-061114
Parent Sample ID					KIF-6AR-GW-080311			KIF-6AR-GW-012512					
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals													
Aluminum	ug/L	-	285	-	-	219	-	-	162	199	142	141	<500
Antimony	ug/L	-	<0.33	-	-	<0.33	-	-	<0.33	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	-	0.62 J	-	-	<0.33	-	-	<0.33	0.394 J	0.493 J	0.685 U*	1.19 J
Barium	ug/L	-	25.1	-	-	22.1	-	-	22.7	22.9	25.8	22.8	<50
Beryllium	ug/L	0.61 J	0.69 J	0.63 J	0.6 J	0.54 J	0.54 J	0.52 J	0.7 J	0.689 J	0.802 J	0.602 J	0.657 J
Boron	ug/L	-	634	-	-	583	-	-	620	684	723	634	708
Cadmium	ug/L	2.42	2.23	2.6	2.38	2.25	2.25	2.3	2.53	2.41	2.21	2.39	2.48
Calcium	ug/L	-	45,200	-	-	42,500	-	-	44,200	45,800	49,700	49,700	55,600
Chromium	ug/L	-	0.54 U*	-	-	<0.33	-	-	<0.33	<0.33	<0.33	<0.33	<0.33
Cobalt	ug/L	102	111	97.5	89.8	84.2	98.2	96.4	96.2	106	117	111	117
Copper	ug/L	-	0.39 J	-	-	<0.33	-	-	0.35 J	<0.33	<0.33	0.594 J	<0.33
Iron	ug/L	-	1,430 J	-	-	1,090	-	-	1,680	1,160	2,010	1,820	3,580
Lead	ug/L	-	<0.33	-	-	<0.33	-	-	<0.33	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	-	8,400	-	-	11,600	-	-	13,300	13,700	14,700	13,900	16,400
Manganese	ug/L	-	35,800	-	-	30,600	-	-	36,400	36,400	38,600	40,600	42,800
Mercury	ug/L	-	<0.15	-	-	<0.15	-	-	<0.15	<0.15	<0.15	<0.15	<0.15
Molybdenum	ug/L	-	<0.33	-	-	<0.33	-	-	<0.33	<0.33	<0.33	<0.33	<0.33
Nickel	ug/L	42.6	42.8	39.7	37	35.3	40.6	40.2	39	42.1	44.1	41.8	41.9
Potassium	ug/L	-	939 J	-	-	687 J	-	-	800 J	836 J	823 J	928 J	<5,000
Selenium	ug/L	-	<0.33	-	-	<0.33	-	-	<0.33	<0.33	1.32 J	<0.33	0.401 J
Silver	ug/L	-	<0.33	-	-	<0.33	-	-	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	-	6,840	-	-	6,340	-	-	6,800	7,310	7,320	7,270	8,700 J
Strontium	ug/L	-	119	-	-	109	-	-	118	124	131	126	<300
Thallium	ug/L	-	<0.5	-	-	<0.5	-	-	<0.5	0.724 J	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	1.16 U*	-	-	<1	-	-	<1	<1	<1	1.26 U*	2.55
Zinc	ug/L	-	39.6 J	-	-	31.7 J	-	-	33.9 J	34.5 J	36.2	33.7	35.6
Radiological Parameters													
Radium-226	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Radium-228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	-	4.02	-	-	4.32	-	-	5.11	4.38	5.93	5.64	5.38
Fluoride	mg/L	-	<0.100	-	-	<0.100	-	-	<0.100	<0.100	0.127	<0.100	<0.100
Sulfate	mg/L	-	229	-	-	212	-	-	245	255	242	233	289
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	-	361	-	-	359	-	-	365	365	385	375	428

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR											
Sample Date		10-Dec-14	10-Dec-14	23-Mar-16	23-Mar-16	15-Jun-16	15-Jun-16	15-Jun-16	15-Jun-16	22-Sep-16	22-Sep-16	1-Dec-16	1-Dec-16
Sample ID		KIF-6AR-GW-121014-A	KIF-6AR-GW-121014-B	KIF-6AR-GW-032316-A	KIF-6AR-GW-032316-B	KIF-6AR-GW-061516-A	KIF-6AR-GW-061516-B	KIF-6AR-AW-061516-A	KIF-6AR-AW-061516-B	KIF-6AR-GW-092216-A	KIF-6AR-GW-092216-B	KIF-6AR-GW-120116-A	KIF-6AR-GW-120116-B
Parent Sample ID								KIF-6AR-GW-061516-A	KIF-6AR-GW-061516-B				
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	State Compliance	Recovery Project	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	Recovery Project	State Compliance	Recovery Project
Total Metals													
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<0.5	-	<2	-	<2	-	<2	-	<2	-	<0.303	-
Arsenic	ug/L	0.685 J	-	<2	-	<2	-	<2	-	<2	-	<0.0743	-
Barium	ug/L	23	-	21.5	-	22.5	-	23.3	-	23	-	21.7	-
Beryllium	ug/L	0.656 J	-	<2	-	<2	-	<2	-	<2	-	<0.064	-
Boron	ug/L	-	-	<1,000	-	<1,000	-	<1,000	-	<1,000	-	<2.49	-
Cadmium	ug/L	2.56	-	3.42	-	3.17	-	3.25	-	3.22	-	3.03	-
Calcium	ug/L	-	-	55,800	-	60,500	-	61,000	-	60,300	-	56,400	-
Chromium	ug/L	<0.5	-	<2	-	<2	-	<2	-	<2	-	<0.09	-
Cobalt	ug/L	120	-	140	-	130	-	130	-	131	-	132	-
Copper	ug/L	<0.5	-	<2	-	<2	-	<2	-	<2	-	<0.398	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<0.2	-	<2	-	<2	-	<2	-	<2	-	<0.0603	-
Lithium	ug/L	-	-	<50	-	<50	-	<50	-	<50	-	<0.794	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.15	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.0392	-
Molybdenum	ug/L	-	-	<2	-	<2	-	<2	-	<2	-	<1.09	-
Nickel	ug/L	44.1	-	51.3	-	48.5	-	48	-	53.3	-	50.9	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<0.6	-	<2	-	<2	-	<2	-	<2	-	<0.316	-
Silver	ug/L	<0.5	-	<2	-	<2	-	<2	-	<2	-	<0.0878	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.2	-	<2	-	<2	-	<2	-	<2	-	<0.0239	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.1	-	<4	-	<4	-	<4	-	<4	-	<0.13	-
Zinc	ug/L	37.7	-	44.7	-	49.7	-	45.1	-	47.4	-	48.5	-
Radiological Parameters													
Radium-226	pCi/L	-	0.00755 +/-()U ++	-	0.0474 +/-()U ++	-	1 +/-()< ++	-	0.0859 +/-() ++	-	0.266 +/-()J ++	-	0.0679 +/-()U ++
Radium-228	pCi/L	-	0.103 +/-()U ++	-	0.148 +/-()U ++	-	1 +/-()< ++	-	1 +/-()< ++	-	0.589 +/-()J ++	-	0.173 +/-()U ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	-	-	5.97	-	8.40	-	7.60	-	7.15	-	5.23	-
Fluoride	mg/L	<0.500	-	<0.100	-	<0.100	-	<0.100	-	<0.100	-	<0.100	-
Sulfate	mg/L	-	-	263	-	297	-	286	-	311	-	267	-
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	4.6	-	4.7	-	-	-	4.7	-	4.6	-
Total Dissolved Solids	mg/L	-	-	454	-	482	-	475	-	462	-	461	-

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR											
Sample Date		2-Mar-17	2-Mar-17	2-Mar-17	2-Mar-17	7-Jun-17	7-Jun-17	12-Sep-17	12-Sep-17	12-Dec-17	12-Dec-17	27-Mar-18	27-Mar-18
Sample ID		KIF-6AR-GW-030217-A	KIF-6AR-GW-030217-B	KIF-6AR-GW-DUP-030217-A	KIF-6AR-GW-DUP-030217-B	KIF-6AR-GW-060717-A	KIF-6AR-GW-060717-B	KIF-6AR-GW-091217-A	KIF-6AR-GW-091217-B	KIF-6AR-GW-1206107-B	KIF-6AR-GW-121217-A	KIF-6AR-GW-032718-A	KIF-6AR-GW-032718-B
Parent Sample ID				KIF-6AR-GW-030217-A	KIF-6AR-GW-030217-B								
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	Recovery Project	Recovery Project	Recovery Project	State Compliance	Recovery Project	State Compliance	Recovery Project	Recovery Project	State Compliance	State Compliance	State Compliance
Total Metals													
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<2	-	<2	-	<2	-	2.74	-	-	<2	<2	-
Arsenic	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Barium	ug/L	23.2	-	22.9	-	21.5	-	22	-	-	20.2	22.9	-
Beryllium	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Boron	ug/L	<1,000	-	<1,000	-	<1,000	-	<1,000	-	-	<1,000	<1,000	-
Cadmium	ug/L	3.24	-	3.14	-	1.88	-	1.79	-	-	1.66	2.22	-
Calcium	ug/L	66,600	-	65,400	-	61,900	-	62,000	-	-	57,900	66,100	-
Chromium	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Cobalt	ug/L	153	-	153	-	136	-	136	-	-	133	143	-
Copper	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Lithium	ug/L	<50	-	<50	-	<50	-	<50	-	-	<50	<50	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	0.2 UJ	-	0.2 UJ	-	<0.2	-	<0.2	-	-	<0.2	<0.2	-
Molybdenum	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Nickel	ug/L	59.8	-	59.8	-	53.8	-	51.5	-	-	55.1	54.9	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Silver	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<2	-	<2	-	<2	-	<2	-	-	<2	<2	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	<4	-	<4	-	<4	-	-	<4	<4	-
Zinc	ug/L	54.9	-	54.2	-	46.9	-	46.4	-	-	45.5	47.4	-
Radiological Parameters													
Radium-226	pCi/L	-	0.0233 +/-()U ++	-	0.0450 +/-()U ++	-	0.0803 +/-()U ++	-	0.112 +/-() ++	0.109 +/-() ++	-	-	0.038 +/-()< ++
Radium-228	pCi/L	-	0.0358 +/-()U ++	-	0.340 +/-()U ++	-	0.0667 +/-()U ++	-	0.0624 +/-()U ++	0.263 +/-()U ++	-	-	0.203 +/-()< ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	7.63	-	7.60	-	7.52	-	7.68	-	-	6.99	7.80	-
Fluoride	mg/L	<0.100	-	<0.100	-	<0.100	-	<0.100	-	-	<0.250	<0.100	-
Sulfate	mg/L	327	-	329	-	305	-	282	-	-	290	273	-
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	5.7	-	-	-	5.27	-	4.66	-	-	4.82	4.52	-
Total Dissolved Solids	mg/L	509	-	510	-	495	-	458	-	-	447	460	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR											
Sample Date		27-Jun-18	27-Jun-18	10-Sep-18	10-Sep-18	11-Dec-18	23-Jan-19	31-Jan-19	6-Feb-19	14-Feb-19	21-Feb-19	27-Feb-19	12-Mar-19
Sample ID		KIF-6AR-GW-062718-A	KIF-6AR-GW-062718-B	KIF-6AR-GW-091018-A	KIF-6AR-GW-091018-B	KIF-6AR-GW-121118	KIF-GW-005-01232019	KIF-GW-005-01312019	KIF-GW-005-02062019	KIF-GW-005-02142019	KIF-GW-005-02212019	KIF-GW-005-02272019	KIF-6AR-GW-031219
Parent Sample ID													
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance
Total Metals													
Aluminum	ug/L	-	-	-	-	-	116	112 U*	115	163	161	144	-
Antimony	ug/L	<2	-	<2	-	<2	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<2	-	<1	-	<2	0.602 J	0.338 J	0.633 J	0.4 J	0.466 J	0.666 J	0.448 U*
Barium	ug/L	23	-	<200	-	21.2	22.8	22.1	27.1	21.1	25	22.8	22.2
Beryllium	ug/L	<2	-	<1	-	<2	0.649 J	0.745 J	0.61 J	0.745 J	0.829 J	0.807 J	0.726 J
Boron	ug/L	<1,000	-	578	-	<1,000	577	664	611	569	644	645	561
Cadmium	ug/L	1.31	-	1.57	-	1.88	0.491 J	1.28	0.405 J	2.09	1.39	1.12	2.55
Calcium	ug/L	60,900	-	55,600	-	59,700	54,500	56,900	57,400	64,800	62,100	66,000	61,000
Chromium	ug/L	<2	-	<2	-	<2	1.4 U*	<1.53	<1.53	<1.53	<1.53	<1.53	1.73 U*
Cobalt	ug/L	118	-	125	-	130	115	120	121	130	137	140	138
Copper	ug/L	<2	-	<2	-	<2	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	-	-	-	-	-	3,320	2,140	3,750	941	1,400	1,340	-
Lead	ug/L	<2	-	<1	-	<2	<0.094	<0.128	<0.128	0.165 J	0.143 J	0.162 J	0.248 J
Lithium	ug/L	<50	-	<5	-	<50	<2.56	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14
Magnesium	ug/L	-	-	-	-	-	16,800	16,000	16,900	18,200	19,600	18,700	-
Manganese	ug/L	-	-	-	-	-	43,200	42,900	46,000	44,200	48,500	47,400	-
Mercury	ug/L	<0.2	-	0.2 UJ	-	<0.2	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<2	-	<5	-	<2	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	46.3	-	49.6	-	49.4	42.1	44.5	43.9	51.5	53.3	54.7	54.8
Potassium	ug/L	-	-	-	-	-	871	748	866	859 U*	930	935	-
Selenium	ug/L	<2	-	<5	-	<2	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	<2	-	<1	-	<2	<0.121	<0.121	<0.121	<0.121	<0.121	0.315 J	<0.121
Sodium	ug/L	-	-	-	-	-	8,200	7,640	8,280	8,150	9,040	8,530	-
Strontium	ug/L	-	-	-	-	-	124	131	135	129	159	136	-
Thallium	ug/L	<2	-	<1	-	<2	0.073 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	1.58 U*	-	<4	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	1.08 U*
Zinc	ug/L	38.5	-	42.9	-	45.4	33.4	39.4	33.9	48.5	45.6	49.9	51.9
Radiological Parameters													
Radium-226	pCi/L	-	0.161 +/-(0.116)U*	-	0.232 +/-(0.0814)U*	0.149 +/-(0.0882)	0.0482 +/-(0.0463)U	0.118 +/-(0.0728)	0.0150 +/-(0.0515)U	0.0370 +/-(0.0593)U	0.0511 +/-(0.0574)UJ	0.0960 +/-(0.0712)U	0.0652 +/-(0.0743)U
Radium-228	pCi/L	-	0.406 +/-(0.271)U	-	0.413 +/-(0.222)U*	1.01 +/-(0.291)	0.179 +/-(0.234)UJ	0.229 +/-(0.252)U	0.298 +/-(0.276)UJ	0.147 +/-(0.212)U	0.131 +/-(0.353)U	0.250 +/-(0.208)U	0.0797 +/-(0.196)U
Radium-226+228	pCi/L	-	-	-	-	-	0.228 +/-(0.239)UJ	0.347 +/-(0.262)J	0.313 +/-(0.281)UJ	0.184 +/-(0.220)U	0.183 +/-(0.358)UJ	0.346 +/-(0.220)U	-
Anions													
Chloride	mg/L	6.95	-	7.22	-	7.68	7.28	7.54	7.18	7.27	7.56	9.61	6.81
Fluoride	mg/L	<0.100	-	<0.100	-	<0.100	0.0601 J	<0.0263	0.0286 J	0.0382 J	0.0445 J	0.118	0.0558 U*
Sulfate	mg/L	287	-	276	-	267	268	229	274	296	284	277	266
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	28.3	30.3	26.0	28.0	26.0	28.0	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-
pH (field)	SU	-	-	5.05	-	4.67	5.12	4.63	4.92	4.77	4.94	4.89	4.72
Total Dissolved Solids	mg/L	508	-	449	-	427	385	466	447	458	447	458	443

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR											
Sample Date		20-Mar-19	26-Mar-19	4-Apr-19	18-Jun-19	18-Sep-19	20-Nov-19	18-Dec-19	9-Jan-20	20-Feb-20	12-Jun-20	1-Sep-20	1-Sep-20
Sample ID		KIF-GW-005-03202019	KIF-GW-005-03262019	KIF-GW-005-04042019	KIF-6AR-GW-061819	KIF-GW-005-09182019	KIF-GW-005-11202019	KIF-GW-6AR-121819	KIF-GW-005-01092020	KIF-GW-005-02202020	KIF-GW-005-06122020	KIF-GW-005-09012020	KIF-GW-903-09012020
Parent Sample ID													KIF-GW-005-09012020
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	105	76.4	90.2	148	107	106	-	145	95.1	135	67.5	73.2
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.629 U*	1.24	1.24	0.492 J	0.549 J	0.468 J	0.437 J	0.547 U*	<0.313	<0.313	<0.313	0.331 J
Barium	ug/L	21.3	20.8	25.6	21.8	23.9	22.8	22.5	24.2	21.5	20.9	25.6	24.9
Beryllium	ug/L	0.59 J	0.546 J	0.619 J	0.761 J	0.700 J	0.877 J	0.977 J	1.07 U*	0.637 J	0.789 J	0.499 J	0.520 J
Boron	ug/L	465	489	528	607	552	584	541	583	596	565	674	630
Cadmium	ug/L	1.52	0.147 J	0.16 J	9.52	1.74	4.14	3.33	2.16	3.23	5.66	2.41	2.35
Calcium	ug/L	53,200	44,800	52,600	60,600	51,700	54,900	57,800	58,500	53,400	58,000	54,100	54,300
Chromium	ug/L	1.6 U*	<1.53	2.86 U*	2.12	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	124	84.1	113	165	117	132	127	134	118	137	123	122
Copper	ug/L	<0.627	<0.627	<0.627	0.746 J	4.12 U*	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	1,980	3,060	5,380	1,340	4,960	1,830	-	1,040	1,850	1,740	4,650	4,630
Lead	ug/L	<0.128	<0.128	<0.128	0.427 J	0.185 J	0.154 J	0.161 J	0.131 J	0.181 J	0.197 J	<0.128	<0.128
Lithium	ug/L	<3.14	<3.14	5.96 U*	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	17,100	11,900	16,600	18,600	16,100	16,600	-	19,100	16,400	17,100	14,100	14,100
Manganese	ug/L	44,200	49,400	42,900	43,100	40,700	47,100	-	43,300	43,900	45,000	43,400	42,600
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.101 UJ	<0.101	0.130 UJ	<0.130	<0.130
Molybdenum	ug/L	<0.61	0.777 U*	<0.61	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	46.2	30.4	41.1	65.8	44.0	49.6	50.0	53.2	42.9	53.7	43.7	42.6
Potassium	ug/L	784	654	910	798	800	746	-	795	812	881	853	875
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	8,340	6,640	8,260	8,330	7,370	7,810	-	8,080	8,530	8,070	7,180	7,190
Strontium	ug/L	132	117	136	160	123	122	-	133	114	149	148	144
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.148	0.189 J	0.391 J	<0.148	0.250 U*	<0.148	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.01 U*	<0.899	1.19	0.973 J	1.17 U*	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	40.1	28.1	34	73.9	40.5	41.5	48.1	42.6	37.1	51.8	37.8	37.1
Radiological Parameters													
Radium-226	pCi/L	0.115 +/-(0.0770)U*	0.0810 +/-(0.0722)U	0.118 +/-(0.0940)UJ	-0.100 +/-(0.179)UJ	-0.00549 +/-(0.398)UJ	0.0805 +/-(0.267)U	-0.0636 +/-(0.376)U	0.180 +/-(0.500)U	1.05 +/-(0.750)U*	0.0618 +/-(0.260)U	0.0850 +/-(0.236)U	0.118 +/-(0.370)U
Radium-228	pCi/L	0.211 +/-(0.257)U	0.234 +/-(0.273)U	0.162 +/-(0.213)U	1.18 +/-(1.24)UJ	-0.206 +/-(0.314)U	0.303 +/-(0.315)U	-0.0142 +/-(0.307)U	0.0723 +/-(0.323)U	0.139 +/-(0.629)U	0.196 +/-(0.257)U	0.0738 +/-(0.429)U	0.376 +/-(0.349)U
Radium-226+228	pCi/L	0.326 +/-(0.268)U*	0.315 +/-(0.282)U	0.281 +/-(0.233)UJ	1.18 +/-(1.25)UJ	0.00 +/-(0.507)UJ	0.384 +/-(0.413)U	0.00 +/-(0.485)U	0.252 +/-(0.595)U	1.19 +/-(0.978)U*	0.258 +/-(0.366)U	0.159 +/-(0.490)U	0.494 +/-(0.508)U
Anions													
Chloride	mg/L	6.00	6.19	6.99	7.28	7.35	6.85	6.92	7.20	7.48	7.92	7.22	7.43
Fluoride	mg/L	0.0359 J	0.0343 J	0.0272 J	0.0534 U*	0.0533 U*	0.0341 J	0.0360 J	0.0348 J	0.0364 J	0.0268 J	0.0443 U*	0.0463 U*
Sulfate	mg/L	256	253	281	281	293 J	251	224	283	245	274	311	308
General Chemistry													
Alkalinity, Bicarbonate	mg/L	16.7	30.5	28.4	-	27.1	29.6	24.9	24.4	28.1	24.2	27.1	27.4
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.00	5.17	5.09	4.78	5.20	5.19	4.82	5.18	5.09	4.96	5.07	-
Total Dissolved Solids	mg/L	427	413	488	550 J	492	400	445	482	439	501	461	429

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR									
Sample Date		14-Dec-20	19-Jan-21	5-Mar-21	11-Jun-21	20-Jul-21	24-Aug-21	8-Nov-21	7-Feb-22	23-Mar-22	9-Jun-22
Sample ID		KIF-GW-005-12142020	KIF-GW-6AR-01192021	KIF-GW-6AR-03052021	KIF-GW-6AR-06112021	KIF-GW-6AR-07202021	KIF-GW-6AR-08242021	KIF-GW-6AR-11082021	KIF-GW-6AR-02072022	KIF-GW-6AR-03232022	KIF-GW-6AR-06092022
Parent Sample ID											
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	-	99.5	68.4	-	38.2	37.6	-	61.8	111	-
Antimony	ug/L	0.775 J	0.432 J	<0.378	2.93	1.62 J	0.453 J	<0.378	<0.506	<0.506	0.541 J
Arsenic	ug/L	0.403 J	0.881 J	0.653 J	<0.313	0.382 J	0.650 J	0.465 J	0.785 J	0.560 U*	<0.282
Barium	ug/L	22.4	24.8	29.9	21.4	34.7	34.1	22.2	31.1	20.8	23.5
Beryllium	ug/L	0.477 J	0.552 J	0.195 J	0.750 J	0.352 J	0.376 J	0.728 J	0.379 J	0.744 J	0.773 J
Boron	ug/L	679	616	551	574	560	601	584	534	623	502
Cadmium	ug/L	2.08	1.94	1.14	35.7	9.75	2.66	2.57	1.27	2.80	5.91
Calcium	ug/L	51,400	56,600	53,700	56,800	54,400	54,500	56,100	54,300	47,600	54,400
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	113	121	111	121	117	109	135	109	124	125
Copper	ug/L	<0.627	<0.627	<0.627	2.75	<0.627	<0.627	<0.627	<1.14	<1.14	<1.14
Iron	ug/L	-	4,660	8,310	-	10,700	11,900	-	8,960	2,080	-
Lead	ug/L	<0.128	0.226 J	<0.128	0.386 J	<0.128	<0.128	0.153 U*	<0.167	0.231 J	<0.167
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	0.855 J	<0.831	0.867 J
Magnesium	ug/L	-	16,000	15,300	-	16,100	16,400	-	15,200	15,100	-
Manganese	ug/L	-	48,100	48,700	-	43,400	45,100	-	45,500	44,200	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	0.130 UJ	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	36.6	40.7	35.7	49.5	41.4	38.6	50.8	34.6	44.3	49.1
Potassium	ug/L	-	929	860	-	812	825	-	835	794	-
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.739	<0.739	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.223	<0.223	<0.223
Sodium	ug/L	-	7,960	7,990	-	8,470	8,090	-	8,140	8,580	-
Strontium	ug/L	-	132	128	-	147	138	-	131	132	-
Thallium	ug/L	<0.148	0.501 J	<0.148	<0.148	<0.148	<0.148	0.213 U*	<0.472	0.509 J	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.776	<0.776	<0.776
Zinc	ug/L	29.8	30.9	26.5	59.5	41.0	30.7	49.0	27.7	39.5	50.4
Radiological Parameters											
Radium-226	pCi/L	0.215 +/-(0.352)U	0.543 +/-(0.600)U	0.103 +/-(0.357)U	0.175 +/-(0.350)U	0.307 +/-(0.275)U	-0.0476 +/-(0.186)U	0.486 +/-(0.385)	0.211 +/-(0.315)U	0.238 +/-(0.219)U	0.0931 +/-(0.403)U
Radium-228	pCi/L	0.195 +/-(0.378)U	-0.0859 +/-(0.428)U	0.711 +/-(0.481)U*	0.00307 +/-(0.287)U	0.116 +/-(0.290)U	0.566 +/-(0.416)U	-0.00660 +/-(0.290)U	0.250 +/-(0.304)UJ	0.194 +/-(0.411)U	0.116 +/-(0.392)U
Radium-226+228	pCi/L	0.410 +/-(0.516)U	0.543 +/-(0.737)U	0.814 +/-(0.599)U*	0.178 +/-(0.453)U	0.423 +/-(0.400)U	0.566 +/-(0.455)U	0.486 +/-(0.482)J	0.461 +/-(0.438)UJ	0.431 +/-(0.466)U	0.209 +/-(0.562)U
Anions											
Chloride	mg/L	8.25	8.67	8.29	7.91	7.68	8.59	7.59	7.54	7.79	7.55
Fluoride	mg/L	<0.0440	0.0578 J	0.0360 J	0.0362 J	0.0417 J	0.0732 U*	0.0590 J	0.0356 J	0.0366 U*	0.0269 J
Sulfate	mg/L	249	273	248	274	297	305	241	239	257	271 J
General Chemistry											
Alkalinity, Bicarbonate	mg/L	29.6	36.5	36.8	24.6	31.6 J	41.3	31.4	33.3	28.0	27.6
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.50	4.99	5.42	5.02	5.38	-	5.11	5.84	5.13	4.99
Total Dissolved Solids	mg/L	391	448	446	457	479	501	378	441	419	452

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		6AR			AD-1							
Sample Date		3-Aug-22	27-Sep-22	29-Nov-22	11-Jun-09	17-Nov-09	15-Dec-09	15-Dec-09	11-Jan-10	16-Feb-10	16-Feb-10	8-Mar-10
Sample ID		KIF-GW-6AR-08032022	KIF-GW-6AR-09272022	KIF-GW-6AR-11292022	KIF-AD1-GW-061109	KIF-AD1-GW-111709	KIF-AD1-GW-121509-A	KIF-AD1-GW-121509-B	KIF-AD1-GW-011110	KIF-AD1-GW-021610	KIF-AD1-AW-021610	KIF-AD1-GW-030810
Parent Sample ID											KIF-AD1-GW-021610	
Sample Depth		34 ft	34 ft	34 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	CCR Program			Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals												
Aluminum	ug/L	62.4	64.9 U*	-	1,170	201	165 J	-	112	198 U*	237 U*	400
Antimony	ug/L	2.22	1.06 U*	0.856 U*	<2	0.74 U*	<0.33	-	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	1.26	3.24	0.459 J	<2	0.6 J	0.54 J	-	0.58 J	0.56 J	0.55 J	0.48 J
Barium	ug/L	32.3	32.2 J	20.5	101	55.3	61	-	47.4	54.6	54.9	47.5
Beryllium	ug/L	0.552 J	0.294 J	0.516 J	<2	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33
Boron	ug/L	562	564	473	116	132	134	-	130	136	137	129
Cadmium	ug/L	2.43	0.270 J	0.858 J	<1	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	56,900	48,200	46,900	8,850	4,490	6,170	-	3,380	3,980	4,000	3,070
Chromium	ug/L	<1.53	<1.53	1.67 J	2.9	0.6 J	0.45 U*	-	0.6 J	0.43 J	0.42 J	0.4 J
Cobalt	ug/L	111	101	104	<2	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33
Copper	ug/L	<1.14	<1.14	<1.14	<5	1.51 J	1.22 U*	-	1.13 J	1.16 J	1.18 J	0.92 J
Iron	ug/L	7,190	16,900	-	920	172	161	-	34.3 J	146	150	159
Lead	ug/L	<0.167	<0.167	<0.167	<2	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	<0.831	<0.831	<0.831	-	-	-	-	-	-	-	-
Magnesium	ug/L	16,800	15,700	-	2,160	1,050	1,440	-	796 J	976 J	982 J	758 J
Manganese	ug/L	40,300	46,600	-	176 U*	67.5	107	-	41.7	57.4 J	55.9 J	34.4
Mercury	ug/L	<0.130	<0.130	<0.130	<0.2	0.2 UJ	<0.2	-	<0.15	<0.15	<0.15	<0.2
Molybdenum	ug/L	<0.610	<0.610	<0.610	<5	0.57 J	0.48 U*	-	0.57 J	0.5 J	0.48 J	0.46 J
Nickel	ug/L	44.3	37.1	37.8	<5	0.4 J	<0.33	-	<0.33	0.33 J	0.33 J	0.4 J
Potassium	ug/L	933	3,090	-	2,840	2,090 J	2,330	-	1,730 J	1,970 J	1,990 J	1,700 J
Selenium	ug/L	<0.739	<0.739	<0.739	<2	0.33 UR	<0.33	-	<0.33	<0.33	<0.33	<0.33
Silver	ug/L	<0.223	<0.223	<0.223	2 UJ	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	9,420	8,920	-	94,300	93,400	87,200	-	93,200	80,400	82,800	89,800
Strontium	ug/L	147	132	-	201	120	150	-	98.1	111	111	91.6
Thallium	ug/L	<0.472	<0.472	<0.472	<2	0.41 J	<0.25	-	0.41 J	<0.25	<0.25	<0.25
Uranium	ug/L	-	-	-	-	-	-	<1	-	-	-	-
Vanadium	ug/L	<0.776	<0.776	<0.776	5.22 U*	0.62 J	0.59 J	-	0.82 J	<1	<1	<1
Zinc	ug/L	61.9	25.5	37.7	<50	<8.3	<8.3	-	<8.3	<8.3	<8.3	<8.3
Radiological Parameters												
Radium-226	pCi/L	0.130 +/-(0.401)U	-0.129 +/-(0.314)U	0.0556 +/-(0.345)U	-	-	-	0.0444 +/-(0.1683)U	-	-	-	-
Radium-228	pCi/L	0.142 +/-(0.321)U	1.22 +/-(0.667)	0.787 +/-(0.503)	-	-	-	1.66 +/-(0.9079)UJ	-	-	-	-
Radium-226+228	pCi/L	0.272 +/-(0.514)U	1.22 +/-(0.737)J	0.843 +/-(0.610)J	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	7.31	7.58	7.56	1.56	1.49	1.66 U*	-	1.56 U*	1.54	1.58	1.50
Fluoride	mg/L	0.0260 UJ	0.0660 U*	<0.0260	0.233	0.320	0.300	-	0.310	0.303	0.316	0.302
Sulfate	mg/L	227	243	245	28.7	24.4	25.2	-	23.5	25.2	25.7	23.9
General Chemistry												
Alkalinity, Bicarbonate	mg/L	36.4 J	55.4	25.0	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	5.00 UJ	<2.60	<5.00	-	-	-	-	-	-	-	-
pH (field)	SU	5.29	5.54	5.09	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	426	434	413	259	196	251	-	212	247	238	243

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1											
Sample Date		13-Apr-10	10-May-10	10-May-10	15-Jun-10	13-Jul-10	27-Sep-10	27-Sep-10	16-Dec-10	20-Jan-11	8-Mar-11	8-Mar-11	28-Jun-11
Sample ID		KIF-AD1-GW-041310	KIF-AD1-GW-051010	KIF-AD1-AW-051010	KIF-AD1-GW-061510	KIF-AD1-GW-071310	KIF-AD1-GW-092710-A	KIF-AD1-GW-092710-B	KIF-AD1-GW-121610	KIF-AD1-GW-012011	KIF-AD1-GW-030811	KIF-AD1-AW-030811	KIF-AD1-GW-062811
Parent Sample ID				KIF-AD1-GW-051010								KIF-AD1-GW-030811	
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals													
Aluminum	ug/L	133	112	113	94.8 J	90.6 J	70.7 J	-	<50	-	136	121	115
Antimony	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	0.33 UJ	-	<0.33	-	<0.33	<0.33	<0.33
Arsenic	ug/L	0.44 J	0.57 J	0.53 J	0.51 J	0.56 J	0.4 J	-	0.79 J	-	0.81 J	0.64 J	0.58 J
Barium	ug/L	45.9	49.2	49.6	45.6	43.9	51.5	-	59.2	-	68.7	68.5	47.9
Beryllium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Boron	ug/L	134	136	137	134	130	128	-	128 J	-	139	137	136
Cadmium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Calcium	ug/L	3,180	3,700	3,730	3,150	3,110	4,470	-	6,490	-	6,920	6,770	3,540
Chromium	ug/L	<0.33	0.4 J	0.4 J	0.52 J	0.41 J	0.5 UJ	-	<0.33	-	<0.33	<0.33	<0.33
Cobalt	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Copper	ug/L	0.63 U*	0.63 J	0.59 J	0.39 J	0.41 U*	<0.33	-	<0.33	-	0.46 J	0.42 J	0.56 J
Iron	ug/L	92.6	85.4	84.6	68.4	66.1	69 J	-	72.6	-	89.6	85.9	74.4
Lead	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	794 J	923 J	940 J	752 J	765 J	1,070	-	1,530	-	1,700	1,680	857 J
Manganese	ug/L	41.9	52	53.4	45.7	35.8	98.5 J	-	146	-	149	151	59.3
Mercury	ug/L	<0.2	<0.2	<0.2	<0.15	<0.15	<0.15	-	<0.2	-	<0.15	<0.15	<0.15
Molybdenum	ug/L	0.47 J	0.57 J	0.53 J	0.52 J	0.5 J	0.34 J	-	0.43 J	-	0.39 J	0.4 J	0.68 J
Nickel	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Potassium	ug/L	1,500	1,560	1,580	1,500	1,370	1,530	-	1,580	-	1,650	1,630	1,370
Selenium	ug/L	0.33 UJ	0.33 UJ	0.33 UJ	0.33 UJ	<0.33	0.33 UJ	-	<0.33	-	<0.33	<0.33	<0.33
Silver	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	-	<0.33	-	<0.33	<0.33	<0.33
Sodium	ug/L	86,000	88,900	89,400	88,700	89,900	85,000	-	92,900	-	91,100	88,200	86,200
Strontium	ug/L	92.4	107	107	92.4	94.5	119	-	162	-	177	172	101
Thallium	ug/L	<0.25	0.5 J	<0.5	<0.5	<0.5	0.5 UJ	-	<0.5	-	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	<1	<1	<1	<1	1 UJ	-	<1	-	<1	<1	<1
Zinc	ug/L	8.3 UJ	8.3 UJ	8.3 UJ	<8.3	<8.3	8.3 UJ	-	<8.3	-	<8.3	<8.3	<8.3
Radiological Parameters													
Radium-226	pCi/L	-	-	-	-	-	-	-0.0487 +/-(0.370)U	-	0.780 +/-(0.495)	-	-	-
Radium-228	pCi/L	-	-	-	-	-	-	1.56 +/-(0.499)J	-	+/-(0.350)U	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	1.55 U*	1.43	1.44	1.62 U*	5.10 U*	1.76	-	1.85 U*	-	1.96 U*	1.78 U*	1.66
Fluoride	mg/L	0.296	0.287	0.285	0.307	0.330	0.429	-	0.317	-	0.321	0.293	0.333
Sulfate	mg/L	23.7	23.8	23.8	20.9	24.0	25.2	-	23.6	-	24.4 J	22.9 J	21.4
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	252	251	251	248	246	246	-	246	-	242 J	164 J	243

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1												
Sample Date		27-Sep-11	6-Dec-11	20-Mar-12	19-Jun-12	19-Jun-12	17-Sep-12	11-Dec-12	18-Mar-13	18-Mar-13	25-Jun-13	4-Sep-13	2-Dec-13	2-Dec-13
Sample ID		KIF-AD1-GW-092711	KIF-AD1-GW-120611	KIF-AD1-GW-032012	KIF-AD1-GW-061912	KIF-AD1-AW-061912	KIF-AD1-GW-091712	KIF-AD1-GW-121112	KIF-AD1-GW-031813	KIF-AD1-AW-031813	KIF-AD1-GW-062513	KIF-AD1-GW-090413	KIF-AD1-GW-120213	KIF-AD1-AW-120213
Parent Sample ID						KIF-AD1-GW-061912				KIF-AD1-GW-031813				KIF-AD1-GW-120213
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	<50	62.6 J	61.6 J	123	84.6 J	<50	54 J	152	132	67 J	183	170	68.3 J
Antimony	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	0.695 J	<0.33	<0.33
Arsenic	ug/L	0.58 J	0.43 J	0.46 J	0.41 J	<0.33	0.362 J	0.403 J	0.582 J	0.54 J	0.478 J	<0.33	1.09 U*	0.985 U*
Barium	ug/L	49.7	55.9	64.3	49.2	49.1	48.4	49.2	80.4	78.2	71.8	58.6	91.3	89.8
Beryllium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Boron	ug/L	110	124	133	106 J	97.5 J	126 J	143	148	150	140	148	125	126
Cadmium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	4,800	5,040	5,070	2,940	2,880	2,920 J	2,790	6,750	6,660	5,150	3,400	9,690	9,450
Chromium	ug/L	0.38 J	0.37 U*	<0.33	<0.33	<0.33	0.353 J	<0.33	<0.33	<0.33	0.501 J	0.331 J	0.551 J	0.359 J
Cobalt	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Copper	ug/L	0.47 J	0.36 J	0.46 J	<0.33	0.37 J	0.619 U*	0.557 J	1.19 J	0.92 J	0.613 J	0.551 J	1.16 J	0.649 J
Iron	ug/L	78.7	124	91.1	88.1	108	115 U*	103	142	154	135	257	227 J	109 U*
Lead	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	1,160	1,180	1,280	785 J	710 J	763 J	743 J	1,620	1,650	1,300	850 J	2,270	2,180
Manganese	ug/L	90.2	99.2	98.2	32	36.4	28.3	22.5	167	167	126	42.6	210	208
Mercury	ug/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Molybdenum	ug/L	0.38 J	0.36 J	0.61 J	0.48 J	0.43 J	0.525 J	0.439 J	0.441 J	0.416 J	0.444 J	0.695 J	0.453 J	0.433 J
Nickel	ug/L	<0.33	0.69 J	<0.33	<0.33	<0.33	0.402 J	<0.33	<0.33	<0.33	0.473 J	0.33 UJ	0.338 J	<0.33
Potassium	ug/L	1,420	1,340	1,480	1,400	1,290	1,640 U*	1,340	1,620 J	1,650 J	1,460	1,290	2,210	2,150
Selenium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Silver	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	74,500	79,200	85,100	91,600	90,400	85,900 J	87,300	95,600	93,800	92,700	91,900	91,500 J	86,500 J
Strontium	ug/L	128	133	135	91.2	90.6	89.5	88.1	169	171	146	106	242	239
Thallium	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.33	<0.5	<0.5	0.672 J	<0.5	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.23 U*	1.91 U*
Zinc	ug/L	<8.3	<8.3	<8.3	<8.3	13.9 J	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3
Radiological Parameters														
Radium-226	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Radium-228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	1.73 U*	1.76 U*	3.24 U*	1.56	1.52	1.19	1.29	1.64	1.73	1.46	1.23	1.81	1.77
Fluoride	mg/L	0.244	0.257 U*	0.252	0.245	0.240	0.259	<0.100	0.238	0.232	0.229	0.208	0.208	0.235
Sulfate	mg/L	21.8	22.7	23.4	21.6	21.1	19.0	<1.00	22.9	22.7	22.6	20.0	28.4	28.4
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	252	259	254	245	242	256	260	260	253	248	246	247	249

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location								AD-1							
Sample Date		5-Mar-14	10-Jun-14	16-Sep-14	16-Sep-14	9-Dec-14	9-Dec-14	21-Mar-16	21-Mar-16	21-Mar-16	21-Mar-16	13-Jun-16	13-Jun-16	20-Sep-16
Sample ID		KIF-AD1-GW-030514	KIF-AD1-GW-061014	KIF-AD1-GW-091614	KIF-AD1-AW-091614	KIF-AD1-GW-120914-A	KIF-AD1-GW-120914-B	KIF-AD1-GW-032116-A	KIF-AD1-GW-032116-B	KIF-AD1-AW-032116-A	KIF-AD1-AW-032116-B	KIF-AD1-GW-061316-A	KIF-AD1-GW-061316-B	KIF-AD1-GW-092016-A
Parent Sample ID					KIF-AD1-GW-091614					KIF-AD1-GW-032116-A	KIF-AD1-GW-032116-B			
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	State Compliance	Recovery Project	Recovery Project	Recovery Project	State Compliance	State Compliance	State Compliance
Total Metals														
Aluminum	ug/L	151	94.6 J	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	0.361 J	<0.33	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	-	<2	-	<2
Arsenic	ug/L	0.589 J	0.36 J	<0.5	0.516 J	0.562 J	-	<0.5	-	<0.5	-	<2	-	<2
Barium	ug/L	66.8	54.4	53.3	54	70.4	-	87.2	-	86	-	60.5	-	62.8
Beryllium	ug/L	<0.33	<0.33	<0.5	<0.5	<0.5	-	<1	-	<1	-	< 2	-	<2
Boron	ug/L	138	135	-	-	-	-	<0.7	-	<0.7	-	<1,000	-	<1,000
Cadmium	ug/L	<0.33	<0.33	<0.4	<0.4	<0.4	-	<0.4	-	<0.4	-	<1	-	<1
Calcium	ug/L	5,520	3,030	-	-	-	-	7,420	-	6,970	-	5,540	-	4,250
Chromium	ug/L	0.53 R	0.33 UR	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	-	<2	-	<2
Cobalt	ug/L	<0.33	<0.33	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	-	<2	-	<2
Copper	ug/L	0.667 U*	0.345 U*	<0.5	<0.5	<0.5	-	<1	-	<1	-	<2	-	<2
Iron	ug/L	143	92.1 J	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<0.33	<0.33	<0.2	<0.2	<0.2	-	<0.2	-	<0.2	-	<2	-	<2
Lithium	ug/L	-	-	-	-	-	-	<0.8	-	<0.8	-	<50	-	<50
Magnesium	ug/L	1,330	769 J	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	107	33.9	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.15	<0.15	<1.5	<1.5	<0.15	-	<0.1	-	<0.1	-	<0.2	-	<0.2
Molybdenum	ug/L	0.378 J	0.575 J	-	-	-	-	<0.5	-	<0.5	-	<2	-	<2
Nickel	ug/L	<0.33	<0.33	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	-	<2	-	<2
Potassium	ug/L	1,460	1,230	1,310	1,330	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<0.33	<0.33	<0.6	<0.6	<0.6	-	<0.6	-	<0.6	-	<2	-	<2
Silver	ug/L	<0.33	<0.33	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	-	<2	-	<2
Sodium	ug/L	87,000	91,600	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	143	92.8	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.5	<0.5	<0.2	<0.2	<0.2	-	<0.5	-	<0.5	-	<2	-	<2
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.23 U*	<1	0.217 U*	0.676 U*	<0.1	-	<2.1	-	<2.1	-	<4	-	<4
Zinc	ug/L	<8.3	<8.3	<10	<10	<10	-	<10	-	<10	-	<25	-	<25
Radiological Parameters														
Radium-226	pCi/L	-	-	+/-()U ++	+/-()U ++	-	-0.0152 +/-()U ++	-	0.00439 +/-()U ++	-	0.0719 +/-()U ++	-	1 +/-()< ++	-
Radium-228	pCi/L	-	-	0.490 +/-() ++	+/-()U ++	-	0.0568 +/-()U ++	-	0.0518 +/-()U ++	-	0.0720 +/-()U ++	-	1 +/-()< ++	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	1.46	1.21	-	-	-	-	1.56 J	-	1.58 J	-	1.36 J	-	1.44
Fluoride	mg/L	0.170	0.214	0.269	0.254	0.216	-	0.236	-	0.243	-	0.268 J	-	0.249
Sulfate	mg/L	23.1	21.5	-	-	-	-	24.3	-	24.4	-	23.0	-	21.7
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	8.6	-	-	-	8.6	-	8.6
Total Dissolved Solids	mg/L	249	252	-	-	-	-	253	-	258	-	1,500	-	238

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location								AD-1						
Sample Date		20-Sep-16	28-Nov-16	28-Nov-16	28-Nov-16	28-Nov-16	28-Feb-17	28-Feb-17	5-Jun-17	5-Jun-17	13-Sep-17	13-Sep-17	13-Sep-17	13-Sep-17
Sample ID		KIF-AD1-GW-092016-B	KIF-AD1-GW-112816-A	KIF-AD1-GW-112816-B	KIF-AD1-AW-112816-A	KIF-AD1-AW-112816-B	KIF-AD1-GW-022817-A	KIF-AD1-GW-022817-B	KIF-AD1-GW-060517-B	KIF-AD1-GW-060617-A	KIF-AD1-GW-091317-A	KIF-AD1-GW-091317-B	KIF-AD1-AW-091317-A	KIF-AD1-AW-091317-B
Parent Sample ID					KIF-AD1-GW-112816-A	KIF-AD1-GW-112816-B							KIF-AD1-GW-091317-A	KIF-AD1-GW-091317-B
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample
Program	Units	Recovery Project	State Compliance	Recovery Project	Recovery Project	Recovery Project	State Compliance	Recovery Project	Recovery Project	State Compliance	State Compliance	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	-	<0.303	-	<0.303	-	<2	-	-	<2	<2	-	<2	-
Arsenic	ug/L	-	<0.0743	-	<0.0743	-	<2	-	-	<2	<2	-	<2	-
Barium	ug/L	-	74.8	-	76	-	63.8	-	-	56.1	62.6	-	62	-
Beryllium	ug/L	-	<0.064	-	<0.064	-	<2	-	-	<2	<2	-	<2	-
Boron	ug/L	-	<2.49	-	<2.49	-	<1,000	-	-	<1,000	<1,000	-	<1,000	-
Cadmium	ug/L	-	<0.157	-	<0.157	-	<1	-	-	<1	<1	-	<1	-
Calcium	ug/L	-	6,740	-	6,880	-	5,950	-	-	3,310	4,800	-	4,960	-
Chromium	ug/L	-	<0.09	-	<0.09	-	<2	-	-	<2	<2	-	<2	-
Cobalt	ug/L	-	<0.0246	-	<0.0246	-	<2	-	-	<2	<2	-	<2	-
Copper	ug/L	-	<0.398	-	<0.398	-	<2	-	-	<2	<2	-	<2	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	-	<0.0603	-	<0.0603	-	<2	-	-	<2	<2	-	<2	-
Lithium	ug/L	-	<0.794	-	<0.794	-	<50	-	-	<50	<50	-	<50	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	-	<0.0392	-	<0.0392	-	<0.2	-	-	<0.2	<0.2	-	<0.2	-
Molybdenum	ug/L	-	<1.09	-	<1.09	-	<2	-	-	<2	<2	-	<2	-
Nickel	ug/L	-	<0.243	-	<0.243	-	<2	-	-	<2	<2	-	<2	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	-	<0.316	-	<0.316	-	<2	-	-	<2	<2	-	<2	-
Silver	ug/L	-	<0.0878	-	<0.0878	-	<2	-	-	<2	<2	-	<2	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	-	<0.0239	-	<0.0239	-	<2	-	-	<2	<2	-	<2	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	<0.13	-	<0.13	-	<4	-	-	<4	<4	-	<4	-
Zinc	ug/L	-	<1.83	-	<1.83	-	<25	-	-	<25	<25	-	<25	-
Radiological Parameters														
Radium-226	pCi/L	0.0703 +/-()U ++	-	0.268 +/-()U ++	-	0.109 +/-()U ++	-	0.106 +/-()U* ++	0.0326 +/-()U ++	-	-	0.0936 +/-()J ++	-	0.0558 +/-()UJ ++
Radium-228	pCi/L	0.0545 +/-()U ++	-	0.288 +/-()U ++	-	1.17 +/-() ++	-	0.318 +/-()U ++	0.0248 +/-()U ++	-	-	0.283 +/-()U ++	-	0.125 +/-()U ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	-	1.72	-	1.33	-	1.36	-	-	1.53	1.43	-	1.57	-
Fluoride	mg/L	-	0.277	-	0.217	-	0.156	-	-	0.250	0.229	-	0.250	-
Sulfate	mg/L	-	27.5	-	22.5	-	27.1	-	-	24.1	24.6	-	24.5	-
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	8.7	-	-	-	8.8	-	-	8.86	8.62	-	-	-
Total Dissolved Solids	mg/L	-	251	-	254	-	265	-	-	267	251	-	255	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1												
Sample Date		6-Dec-17	6-Dec-17	6-Dec-17	6-Dec-17	19-Mar-18	19-Mar-18	12-Jun-18	12-Jun-18	10-Sep-18	10-Sep-18	12-Dec-18	12-Dec-18	22-Jan-19
Sample ID		KIF-AD1-GW-120617-A	KIF-AD1-GW-120617-B	KIF-AD1-AW-120617-A	KIF-AD1-AW-120617-B	KIF-AD1-GW-031918-A	KIF-AD1-GW-031918-B	KIF-AD1-GW-061218-A	KIF-AD1-GW-061218-B	KIF-AD-1-GW-091018-A	KIF-AD-1-GW-091018-B	KIF-AD1-GW-121218	KIF-AD1-GW-DUP-121218	KIF-GW-006-01222019
Parent Sample ID				KIF-AD1-GW-120617-A	KIF-AD1-GW-120617-B								KIF-AD1-GW-121218	
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	State Compliance	Recovery Project	Recovery Project	Recovery Project	State Compliance	State Compliance	State Compliance	CCR Program	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program
Total Metals														
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	54.4
Antimony	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<2	<2	<1.12
Arsenic	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	0.501 J
Barium	ug/L	67	-	65.2	-	61.8	-	55	-	<200	-	88.7	95.8	69.7
Beryllium	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	<0.057
Boron	ug/L	<1,000	-	<1,000	-	<1,000	-	<1,000	-	140	-	<1,000	<1,000	132
Cadmium	ug/L	<1	-	<1	-	<1	-	<1	-	<1	-	<1	<1	<0.125
Calcium	ug/L	5,770	-	5,620	-	5,820	-	3,690	-	5,170	-	8,920	9,150	5,970
Chromium	ug/L	<2	-	<2	-	<2	-	<2	-	2.1	-	<2	<2	<0.631
Cobalt	ug/L	<2	-	<2	-	<2	-	<2	-	<0.5	-	<2	<2	<0.075
Copper	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<2	<2	<1.3
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	39.7 J
Lead	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	<0.094
Lithium	ug/L	<50	-	<50	-	<50	-	<50	-	22.1	-	<50	<50	24.5
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	1,510
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	106
Mercury	ug/L	<0.2	-	<0.2	-	<0.2	-	<0.2	-	0.2 UJ	-	<0.2	<0.2	<0.101
Molybdenum	ug/L	<2	-	<2	-	<2	-	<2	-	<5	-	<2	<2	<0.474
Nickel	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	1.39 U*
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	1,560
Selenium	ug/L	<2	-	<2	-	<2	-	<2	-	<5	-	<2	<2	<0.813
Silver	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	<0.121
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	101,000
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	167
Thallium	ug/L	<2	-	<2	-	<2	-	<2	-	<1	-	<2	<2	<0.063
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	<4	-	<4	-	<4	-	1.88 U*	-	<4	<4	<0.899
Zinc	ug/L	<25	-	<25	-	<25	-	<25	-	<5	-	<25	<25	<2.42
Radiological Parameters														
Radium-226	pCi/L	-	0.0697 +/-()U ++	-	0.0697 +/-()U ++	-	0.0491 +/-()< ++	-	0.120 +/-(0.145)U	-	0.161 +/-(0.0708)U*	0.0644 +/-(0.0556)U	0.0331 +/-(0.0507)U	0.0363 +/-(0.0418)U
Radium-228	pCi/L	-	0.332 +/-()U ++	-	0.332 +/-()U ++	-	0.133 +/-()< ++	-	0.288 +/-(0.174)	-	0.443 +/-(0.237)U*	0.220 +/-(0.243)U	0.513 +/-(0.265)U*	0.504 +/-(0.269)J
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	0.540 +/-(0.272)J
Anions														
Chloride	mg/L	1.58	-	1.43	-	1.56	-	1.47	-	1.63	-	1.67	1.63	1.47
Fluoride	mg/L	0.190	-	0.228	-	0.245	-	0.254	-	0.298	-	0.233	0.239	0.244
Sulfate	mg/L	24.7	-	23.3	-	23.5	-	23.2 J	-	24.4	-	26.1	26.7	26.4
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	190
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	12.1
pH (field)	SU	8.52	-	-	-	8.19	-	-	-	8.72	-	8.62	-	8.80
Total Dissolved Solids	mg/L	241	-	230	-	253	-	256	-	244	-	238	238	252

See notes on last page.

Stantec

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1											
Sample Date		31-Jan-19	31-Jan-19	5-Feb-19	12-Feb-19	19-Feb-19	26-Feb-19	12-Mar-19	21-Mar-19	26-Mar-19	2-Apr-19	19-Jun-19	19-Sep-19
Sample ID		KIF-GW-006-01312019	KIF-GW-903-01312019	KIF-GW-006-02052019	KIF-GW-006-02122019	KIF-GW-006-02192019	KIF-GW-006-02262019	KIF-AD1-GW-031219	KIF-GW-006-03212019	KIF-GW-006-03262019	KIF-GW-006-04022019	KIF-GW-006-06192019	KIF-GW-006-09192019
Parent Sample ID			KIF-GW-006-01312019										
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program
Total Metals													
Aluminum	ug/L	217	189	76.3 U*	49.3	28.5 J	34.9	-	1,090	596	1,340	34.9	29.6 J
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.654 J	0.591 J	0.404 J	0.535 J	0.504 J	0.529 J	0.716 U*	0.767 U*	0.551 J	2.46	0.740 J	0.387 J
Barium	ug/L	90.1	90.8	61.3	83	87.9	91.8	86.3	107	68.9	86.9	91.6	67.9
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182
Boron	ug/L	148 U*	163 U*	143	130	137 U*	138	132	150 U*	108 U*	227	138	133
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	9,330	8,950	4,860	8,010	10,400	9,370	9,390	10,200	6,200	8,090	9,050	4,170
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	3.31 U*	<1.53	2.45 U*	2.00 U*	<1.53
Cobalt	ug/L	0.093 J	0.084 J	<0.075	<0.075	<0.075	<0.075	<0.075	0.707	0.263 J	0.139 J	<0.0750	<0.0750
Copper	ug/L	1.59 J	1.75 J	0.757 J	<0.627	<0.627	<0.627	<0.627	9.54	4.1	2.19	<0.627	2.52 U*
Iron	ug/L	188 U*	220 U*	402	41.4 J	24.7 J	31.3 J	-	810	315	561 U*	32.0 J	29.7 J
Lead	ug/L	0.189 U*	0.225 U*	<0.128	<0.128	<0.128	<0.128	<0.128	0.625 J	0.303 J	1.74	<0.128	<0.128
Lithium	ug/L	21.6	21.9	21.9	23.3	22.7	22.2	20.7	20.9	20.3	25.5	18.9	22.1
Magnesium	ug/L	2,100	1,960	1,130	1,960	2,300	2,190	-	2,580	1,380	1,480	2,150	1,060
Manganese	ug/L	196	206	40.1	93.8	105	128	-	111	75	14.1 U*	217	110
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	1.28 J	<0.610	<0.610
Nickel	ug/L	<0.312	<0.312	0.508 U*	<0.312	<0.312	<0.312	<0.312	1.49	0.652 J	0.691 J	<0.312	<0.336
Potassium	ug/L	1,660	1,580	1,300	1,710	1,670	1,680	-	2,080	1,310	2,540	1,650	1,300
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51
Silver	ug/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177
Sodium	ug/L	89,700	87,600	90,700	101,000	94,700	97,800	-	99,300	78,900	152,000	100,000	90,400
Strontium	ug/L	230	216	134	184	200	224	-	215	172	228	190	113
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	0.919 J	0.953 J	<0.899	<0.899	<0.899	<0.899	1.52 U*	2.72 U*	<0.899	4.33 U*	1.23 U*	1.25 U*
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	18.1 U*	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	0.0207 +/-(0.0509)U	0.0613 +/-(0.0589)U	0.0137 +/-(0.0493)U	0.0253 +/-(0.0561)U	0.0215 +/-(0.0422)UJ	0.00696 +/-(0.0482)U	0.00903 +/-(0.0542)U	0.0900 +/-(0.0822)U	0.00856 +/-(0.0388)U	0.150 +/-(0.110)J	-0.0134 +/-(0.0406)UJ	0.0246 +/-(0.266)UJ
Radium-228	pCi/L	0.163 +/-(0.235)U	0.412 +/-(0.213)	-0.150 +/-(0.193)U	0.109 +/-(0.190)U	0.186 +/-(0.244)U	0.272 +/-(0.231)U	0.183 +/-(0.219)U	0.561 +/-(0.375)U	0.135 +/-(0.234)U	0.386 +/-(0.325)U	0.195 +/-(0.229)U	0.311 +/-(0.333)U
Radium-226+228	pCi/L	0.184 +/-(0.240)U	0.474 +/-(0.221)J	0.0137 +/-(0.199)U	0.134 +/-(0.198)U	0.207 +/-(0.248)UJ	0.279 +/-(0.236)U	-	0.651 +/-(0.384)U	0.144 +/-(0.237)U	0.536 +/-(0.343)J	0.195 +/-(0.233)UJ	0.335 +/-(0.426)UJ
Anions													
Chloride	mg/L	1.51	1.50	1.45	1.59	1.62	1.53	1.36	1.35	1.36	1.59	1.77	1.49
Fluoride	mg/L	0.222	0.233	0.261	0.240	0.246	0.236	0.194 U*	0.186	0.206	0.707	0.178 U*	0.241
Sulfate	mg/L	28.5	27.0	24.8	25.3	27.8	26.7	26.7	27.9	24.3	51.8	27.9	23.4
General Chemistry													
Alkalinity, Bicarbonate	mg/L	224	224	212	192	204	210	-	217	209	240	181	171
Alkalinity, Carbonate	mg/L	12.1	12.1	12.1	<5.00	12.0	16.0	-	<5.00	16.2	44.7	13.5	22.9
pH (field)	SU	8.87	-	8.44	6.81	8.70	8.70	8.36	8.52	8.67	9.11	8.43	8.46
Total Dissolved Solids	mg/L	270	259	229	251	257	246	253	246	261	376	254	255

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1											
Sample Date		19-Nov-19	18-Dec-19	7-Jan-20	18-Feb-20	8-Jun-20	13-Jul-20	2-Sep-20	8-Dec-20	20-Jan-21	8-Mar-21	14-Jun-21	20-Jul-21
Sample ID		KIF-GW-006-11192019	KIF-GW-AD1-121819	KIF-GW-006-01072020	KIF-GW-006-02182020	KIF-GW-006-06082020	KIF-GW-AD1-071320	KIF-GW-006-09022020	KIF-GW-AD1-120820	KIF-GW-AD-1-01202021	KIF-GW-AD-1-03082021	KIF-GW-AD-1-06142021	KIF-GW-AD-1-07202021
Parent Sample ID													
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	49.8	-	27.3 J	<12.5	22.2 J	-	23.8 J	-	40.4	12.5 J	-	19.0 J
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.699 J	0.638 J	1.32 U*	0.787 J	0.595 U*	0.729 U*	0.579 J	1.00	0.850 J	0.866 J	0.716 J	0.638 J
Barium	ug/L	104	113	115	99.3	52.2	65.7	89.0 J	106	58.9	79.0	73.9	70.1
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.460 U*	<0.182	0.252 U*	<0.182	<0.182
Boron	ug/L	118	139	128	211 J	172 U*	177	120 U*	133	159 U*	159 U*	136	156
Cadmium	ug/L	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	11,700	15,600	14,800	9,910	5,770	5,450	9,870	16,300	7,650	12,700	11,100	7,090
Chromium	ug/L	2.06 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	<0.0750	<0.0750	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134
Copper	ug/L	0.737 J	<0.627	0.967 U*	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	56.6	-	54.7 U*	<19.5	<19.5	-	21.5 J	-	22.5 J	<19.5	-	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	0.141 U*	0.141 U*	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	18.3	21.0 U*	17.6	15.5 U*	21.2	20.6	18.5 J	15.2	19.5	16.1	16.7	18.6
Magnesium	ug/L	2,730	-	3,600	2,680	1,170	-	2,070	-	1,600	2,670	-	1,560
Manganese	ug/L	314	-	331	343	36.0	-	242	-	87.4	103	-	182
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	<0.336	<0.336	1.27 U*	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336
Potassium	ug/L	1,840	-	1,880	1,710	1,360	-	1,550	-	1,550	1,630	-	1,340
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	96,900	-	87,500	79,600	92,000	-	92,600	-	93,900	88,400	-	95,000
Strontium	ug/L	232	-	322	248	128	-	233	-	169	258	-	171
Thallium	ug/L	<0.148	<0.148	0.322 J	<0.148	0.196 U*	<0.148	<0.148	0.609 U*	<0.148	0.277 U*	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.23 U*	<0.991	<0.991	<4.96	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	3.33 U*	<3.22	<3.22	<3.22	9.18	<3.22	<3.22	<3.22	<3.22	3.58 J	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	0.590 +/-(0.620)U	0.473 +/-(0.519)U	0.260 +/-(0.432)U	0.112 +/-(0.500)U	-0.138 +/-(0.282)U	-	-0.156 +/-(0.277)U	-0.134 +/-(0.402)U	0.149 +/-(0.466)U	0.550 +/-(0.394)	0.352 +/-(0.325)U	0.232 +/-(0.292)U
Radium-228	pCi/L	0.281 +/-(0.570)U	0.218 +/-(0.262)U	0.294 +/-(0.397)U	0.0584 +/-(0.480)U	-0.110 +/-(0.298)U	-	0.0453 +/-(0.255)U	-0.0188 +/-(0.335)U	0.168 +/-(0.443)U	0.309 +/-(0.375)U	0.116 +/-(0.262)U	0.401 +/-(0.498)U
Radium-226+228	pCi/L	0.871 +/-(0.842)U	0.691 +/-(0.581)U	0.553 +/-(0.587)U	0.171 +/-(0.693)U	0.000 +/-(0.410)U	-	0.0453 +/-(0.376)U	0.000 +/-(0.523)U	0.316 +/-(0.642)U	0.859 +/-(0.544)J	0.468 +/-(0.417)U	0.633 +/-(0.577)U
Anions													
Chloride	mg/L	1.68	1.90	1.79	6.73	1.52	-	1.70	1.71	1.85	1.65	3.11	1.80
Fluoride	mg/L	0.205	0.211	0.211	0.0284 J	0.213	-	0.259	0.173	0.303	0.197	0.239	0.271
Sulfate	mg/L	26.3	31.6	28.4	83.4 J	23.3	-	26.6	29.7	25.6	26.4	28.7	24.0
General Chemistry													
Alkalinity, Bicarbonate	mg/L	204	203	201	183	180	-	186	205	202	208	199	211
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	25.0	-	16.2	<5.00	<5.00	<5.00	5.14	6.07
pH (field)	SU	8.57	7.91	8.15	7.69	8.81	-	8.16	8.00	8.65	8.01	8.30	8.74
Total Dissolved Solids	mg/L	284	271	275	260	295	-	230	263	258	256	261	255

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-1								
Sample Date		27-Aug-21	2-Sep-21	9-Nov-21	10-Feb-22	22-Mar-22	9-Jun-22	2-Aug-22	23-Sep-22	5-Dec-22
Sample ID		KIF-GW-AD-1-08272021	KIF-GW-AD-1-09022021	KIF-GW-AD-1-11092021	KIF-GW-AD-1-02102022	KIF-GW-AD-1-03222022	KIF-GW-AD-1-06092022	KIF-GW-AD-1-08022022	KIF-GW-AD-1-09232022	KIF-GW-AD-1-12052022
Parent Sample ID										
Sample Depth		30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program		
Total Metals										
Aluminum	ug/L	-	<12.5	-	<15.5	<15.5	-	<15.5	28.8 U*	-
Antimony	ug/L	-	<0.378	<0.378	<0.506	<0.506	0.605 J	<0.506	<0.506	<0.506
Arsenic	ug/L	-	0.957 J	0.707 J	0.580 J	0.739 U*	0.423 J	0.592 J	0.421 J	0.460 J
Barium	ug/L	-	113	66.5	74.6	74.3	56.5	90.5	49.4	85.6
Beryllium	ug/L	-	<0.182	<0.182	<0.274	<0.274	<0.274	<0.274	<0.274	<0.274
Boron	ug/L	-	155	117	157	134 U*	145	146	131	139
Cadmium	ug/L	-	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	-	18,100	8,430	12,600	12,300	5,080	12,400	4,520	10,500
Chromium	ug/L	-	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	-	<0.134	<0.134	<0.261	<0.261	<0.261	<0.261	<0.261	<0.261
Copper	ug/L	-	1.03 U*	<0.627	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14
Iron	ug/L	-	<19.5	-	<27.7	<27.7	-	<27.7	<27.7	-
Lead	ug/L	-	<0.128	<0.128	<0.167	<0.167	<0.167	<0.167	<0.167	<0.167
Lithium	ug/L	-	15.9	16.8	17.2	15.2	19.4	18.4	19.8	18.8
Magnesium	ug/L	-	3,850	-	2,650	2,660	-	2,620	955	-
Manganese	ug/L	-	473	-	55.0	124	-	251	71.0	-
Mercury	ug/L	-	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	-	<0.610	<0.610	2.72 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	-	<0.336	<0.336	<0.517	<0.517	<0.517	<0.517	0.596 U*	<0.517
Potassium	ug/L	-	2,070	-	1,880	1,670	-	1,730	1,260	-
Selenium	ug/L	-	<1.51	<1.51	<0.739	<0.739	<0.739	<0.739	<0.739	<0.739
Silver	ug/L	-	<0.177	<0.177	<0.223	<0.223	<0.223	<0.223	<0.223	<0.223
Sodium	ug/L	-	86,600	-	85,800	85,200	-	93,400	88,800	-
Strontium	ug/L	-	398	-	235	269	-	264	108	-
Thallium	ug/L	-	<0.148	<0.148	<0.472	<0.472	<0.472	<0.472	<0.472	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	<0.991	<0.991	<0.776	<0.776	<0.776	<0.776	<0.776	<0.776
Zinc	ug/L	-	<3.22	<3.22	<2.88	<2.88	<2.88	<2.88	5.53	5.23
Radiological Parameters										
Radium-226	pCi/L	-0.0231 +/-(0.338)U	-	0.122 +/-(0.292)U	0.118 +/-(0.355)U	0.00448 +/-(0.140)U	-0.0354 +/-(0.417)U	0.0782 +/-(0.359)U	0.158 +/-(0.416)U	0.0252 +/-(0.269)U
Radium-228	pCi/L	1.11 +/-(0.647)U*	-	-0.121 +/-(0.460)U	0.377 +/-(0.376)U	0.00996 +/-(0.311)U	-0.00190 +/-(0.260)U	0.184 +/-(0.498)U	1.09 +/-(0.588)	1.02 +/-(0.588)U*
Radium-226+228	pCi/L	1.11 +/-(0.730)U*	-	0.122 +/-(0.545)U	0.495 +/-(0.517)U	0.0144 +/-(0.341)U	0.000 +/-(0.492)U	0.262 +/-(0.614)U	1.25 +/-(0.720)J	1.05 +/-(0.646)U*
Anions										
Chloride	mg/L	-	1.97	1.58 J	1.76	1.79	1.53	1.85	1.68	1.71
Fluoride	mg/L	-	0.175	0.256 J	0.264	0.189 U*	0.246	0.221	0.256	0.177
Sulfate	mg/L	-	32.8	22.9 J	28.5	29.0	22.0 J	27.2	23.5	25.3
General Chemistry										
Alkalinity, Bicarbonate	mg/L	-	221	184	206	190	182	210 J	172	163
Alkalinity, Carbonate	mg/L	-	<5.00	14.4	<5.00	<5.00	14.8	5.00 UJ	25.9	16.4
pH (field)	SU	8.38	8.15	8.85	8.41	8.34	8.74	8.73	9.15	8.80
Total Dissolved Solids	mg/L	-	292	255	253	254	308	258	276	256

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2												
Sample Date		11-Jun-09	11-Jun-09	14-Dec-09	14-Dec-09	12-Jan-10	17-Feb-10	8-Mar-10	12-Apr-10	12-Apr-10	11-May-10	15-Jun-10	12-Jul-10	12-Jul-10
Sample ID		KIF-AD2-GW-061109	KIF-AD2-AW-061109	KIF-AD2-GW-121409-B	KIF-AD2-AW-121409-B	KIF-AD2-GW-011210	KIF-AD2-GW-021710	KIF-AD2-GW-030810	KIF-AD2-GW-041210	KIF-AD2-AW-041210	KIF-AD2-GW-051110	KIF-AD2-GW-061510	KIF-AD2-GW-071210	KIF-AD2-AW-071210
Parent Sample ID			KIF-AD2-GW-061109		KIF-AD2-GW-121409-B					KIF-AD2-GW-041210				KIF-AD2-GW-071210
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	<100	<100	-	-	<25	55.9 U*	<50	25.1 J	<25	<50	<50	50 UJ	50 UJ
Antimony	ug/L	<2	<2	-	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	29.7	29.5	-	-	5.09	4.38	2.54	2.12	2.21	3.91	2.72	2.43	2.24
Barium	ug/L	41.9	43.7	-	-	41.5	43.6	42.1	44	44.9	45.5	48.6	47.5	47.7
Beryllium	ug/L	<2	<2	-	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	0.37 J	<0.33
Boron	ug/L	412	429	-	-	372	374	358	379	384	389	426	438	428
Cadmium	ug/L	<1	<1	-	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	25,700	27,900	-	-	33,300	35,800	37,400	43,000	43,900	46,300	54,400	53,900	53,500
Chromium	ug/L	<2	<2	-	-	<0.33	0.49 J	<0.33	<0.33	<0.33	<0.33	<0.33	0.33 J	<0.33
Cobalt	ug/L	3.72	3.56	-	-	4.74	4.85	4.66	5.51	5.43	5.67	5.21	6.4	6.44
Copper	ug/L	<5	<5	-	-	0.48 U*	0.45 U*	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Iron	ug/L	1,040	1,030	-	-	1,380	1,320	1,190	1,220	1,260	2,240	1,440	1,570	1,540
Lead	ug/L	<2	<2	-	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	0.42 J	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	3,810	4,020	-	-	5,150	5,610	5,850	6,610	6,720	7,130	8,100	8,370	8,260
Manganese	ug/L	500 U*	534 U*	-	-	742	739	832	892	861	950	931	933	940
Mercury	ug/L	<0.2	<0.2	-	-	<0.15	<0.15	<0.2	<0.2	<0.2	<0.2	<0.15	<0.15	<0.15
Molybdenum	ug/L	<5	<5	-	-	0.87 J	0.58 J	0.71 J	0.73 J	0.71 J	0.97 J	0.55 J	0.42 J	0.37 J
Nickel	ug/L	<5	<5	-	-	2.06 J	2.22 J	2.1 J	2.37 J	2.4 J	2.33 J	1.96 J	2.92 J	2.86 J
Potassium	ug/L	3,140	3,290	-	-	3,660	3,800	3,550 J	4,210	4,320	4,180	4,660	4,670	4,580
Selenium	ug/L	<2	<2	-	-	<0.33	<0.33	<0.33	0.33 UJ	0.33 UJ	0.33 UJ	0.33 UJ	<0.33	<0.33
Silver	ug/L	2 UJ	2 UJ	-	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	12,000	12,700	-	-	13,300	13,800	12,700	14,400	14,600	14,200	14,800	14,700	14,400
Strontium	ug/L	260	274	-	-	346	362	385	422	431	451	531	563	552
Thallium	ug/L	<2	<2	-	-	0.8 U*	<0.25	0.35 J	0.47 U*	<0.25	<0.5	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	<1	<1	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	<4	-	-	0.4 U*	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	ug/L	<50	<50	-	-	<8.3	<8.3	<8.3	8.3 UJ	8.3 UJ	<8.3	<8.3	<8.3	<8.3
Radiological Parameters														
Radium-226	pCi/L	-	-	0.0315 +/-(0.1335)U	0.0315 +/-(0.3487)U	-	-	-	-	-	-	-	-	-
Radium-228	pCi/L	-	-	2.43 +/-(0.9754)U*	2.43 +/-(0.7500)U*	-	-	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	16.9	17.6	-	-	9.47 J	10.2	8.64	8.08	8.22	8.18 J	-	8.74	8.93
Fluoride	mg/L	<0.100	<0.100	-	-	0.140	0.119	0.114	0.117	0.115	0.113 J	-	0.110	<0.100
Sulfate	mg/L	69.6	71.0	-	-	96.5	108	121	130	130	138	-	185	186
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	171	168	-	-	28.0 J	201	231	237	236	272	298	301	301

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location								AD-2						
Sample Date		**22-Sep-10**	**22-Sep-10**	**22-Sep-10**	**22-Sep-10**	**16-Dec-10**	**20-Jan-11**	**7-Mar-11**	**28-Jun-11**	**28-Sep-11**	**28-Sep-11**	**6-Dec-11**	**19-Mar-12**	**19-Mar-12**
Sample ID		KIF-AD2-GW-092210-A	KIF-AD2-GW-092210-B	KIF-AD2-AW-092210-A	KIF-AD2-AW-092210-B	KIF-AD2-GW-121610	KIF-AD2-GW-012011	KIF-AD2-GW-030711	KIF-AD2-GW-062811	KIF-AD2-GW-092811	KIF-AD2-AW-092811	KIF-AD2-GW-120611	KIF-AD2-GW-031912	KIF-AD2-AW-031912
Parent Sample ID				KIF-AD2-GW-092210-A	KIF-AD2-GW-092210-B						KIF-AD2-GW-092811			KIF-AD2-GW-031912
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	**Units**	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	66.9 J	-	61.1 J	-	121	-	54.1 J	76.9 J	70.1 J	60.9 J	51 J	56.5 J	<50
Antimony	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	1.43 J	-	1.49 J	-	3.34	-	1.59 J	4.4	1.39 J	1.28 J	0.98 J	1.37 J	1.43 J
Barium	ug/L	48.2	-	48.2	-	45.3	-	44.2	38	30.4	30.4	33.9	32.9	33.4
Beryllium	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Boron	ug/L	550	-	550	-	636	-	668	728	772	768	878	896	899
Cadmium	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	64,700	-	65,000	-	73,200	-	82,600	79,800	69,800	69,900	85,700	86,400	86,100
Chromium	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Cobalt	ug/L	6.06	-	6.1	-	8.41	-	7.94	7.68	6.9	6.78	8.58	9.96	10
Copper	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Iron	ug/L	1,700	-	1,730	-	2,920	-	2,060	3,320	1,860	1,820	2,090	2,720	2,740
Lead	ug/L	0.33 J	-	<0.33	-	1.27 J	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	10,500	-	10,500	-	12,100	-	13,600	13,300	11,800	11,900	13,400	14,500	14,400
Manganese	ug/L	964	-	918	-	1,340 J	-	1,650	1,350	1,170	1,090	1,290	1,360	1,360
Mercury	ug/L	<0.15	-	<0.15	-	<0.2	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Molybdenum	ug/L	<0.33	-	0.34 J	-	2.35 J	-	1.57 J	2.52 J	0.74 J	0.74 J	1.48 J	2.72 J	2.81 J
Nickel	ug/L	2.63 J	-	2.65 J	-	3.5 J	-	3.38 J	3.64 J	2.97 J	2.96 J	3.54 J	3.99 J	3.99 J
Potassium	ug/L	5,160	-	5,220	-	5,480	-	5,540	5,270	4,920	4,920	5,150	5,140	5,180
Selenium	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Silver	ug/L	<0.33	-	<0.33	-	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	14,900	-	15,000	-	15,300	-	14,100	12,700	10,700	10,700	11,800	11,800	11,900
Strontium	ug/L	650	-	654	-	742	-	798	781	705	705	831	828	832
Thallium	ug/L	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	-	<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1
Zinc	ug/L	<8.3	-	<8.3	-	<8.3	-	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3
Radiological Parameters														
Radium-226	pCi/L	-	0.639 +/-(0.490)U	-	0.639 +/-(0.174)U	-	0.629 +/-(0.408)	-	-	-	-	-	-	-
Radium-228	pCi/L	-	0.198 +/-(0.334)U	-	0.753 +/-(0.359)	-	+/-(0.560)U	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	8.46	-	8.61	-	10.8	-	8.77	7.98	7.98 J	8.21 J	8.19	9.27	9.39
Fluoride	mg/L	<0.100	-	0.124	-	0.131	-	0.128	0.162	0.100 UJ	0.100 UJ	<0.100	<0.100	<0.100
Sulfate	mg/L	198	-	198	-	212	-	226	226	244	241	304	447 J	361 J
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	337	-	337	-	371	-	392	414	443	431	451	436	467

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2												
Sample Date		20-Jun-12	17-Sep-12	12-Dec-12	12-Dec-12	19-Mar-13	25-Jun-13	3-Sep-13	3-Sep-13	3-Dec-13	5-Mar-14	9-Jun-14	9-Jun-14	15-Sep-14
Sample ID		KIF-AD2-GW-062012	KIF-AD2-GW-091712	KIF-AD2-GW-121212	KIF-AD2-AW-121212	KIF-AD2-GW-031913	KIF-AD2-GW-062513	KIF-AD2-GW-090313	KIF-AD2-AW-090313	KIF-AD2-GW-120313	KIF-AD2-GW-030514	KIF-AD2-GW-060914	KIF-AD2-AW-060914	KIF-AD2-GW-091514
Parent Sample ID					KIF-AD2-GW-121212				KIF-AD2-GW-090313				KIF-AD2-GW-060914	
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	88.4 J	123	56.5 J	<50	74.5 J	<50	<50	<50	<67.8	<67.8	<50	<50	-
Antimony	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	0.435 J	<0.33	<0.33	<0.33	<0.33	<0.5
Arsenic	ug/L	3.14	3.79	1.13 J	1.25 J	1.62 J	1.48 J	1.92 J	1.92 J	2.48	4.9	2.08	1.91 J	1.74 J
Barium	ug/L	46	36.3	31.8	29	25.4	23.8	28.1	23.2	24.8	22.4	24.4	22	26.4
Beryllium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.5
Boron	ug/L	1,160	1,360	1,300	1,300	1,270	1,310	1,330	1,300	1,250	983	936	888	-
Cadmium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.4
Calcium	ug/L	96,000	95,300	82,900	82,600	67,200	58,700	53,600	51,600	49,100	42,100	40,200	37,800	-
Chromium	ug/L	0.59 J	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	1.52 J	4.63 J	0.33 UJ	<0.5
Cobalt	ug/L	6.76 J	10.1	11.3	11.1	10.8	8.87	6.94	6.84	7.46	7.98	6.55	6.39	5.18
Copper	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.5
Iron	ug/L	4,410	3,110	2,490	2,480	2,590	2,700	2,540	2,510	1,550	2,890	1,840	1,670	-
Lead	ug/L	<0.33	0.59 J	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.2
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	17,000	17,900	14,400	14,300	12,100	10,400	9,120	8,870	8,320	7,100	7,090	6,690	-
Manganese	ug/L	1,080 J	1,670	1,550	1,430	1,510	1,010	1,010 J	988 J	967	973	713	701	-
Mercury	ug/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5
Molybdenum	ug/L	4.73 J	5.17	5.03	4.82 J	5.82	3.63	4.76	4.69	7.77	9.76	2.7	2.58	-
Nickel	ug/L	4.61 J	3.95 J	4.25 J	4.61 J	4.21 J	3.33	2.77	2.8	3.03	3.74	2.41	2.58	2
Potassium	ug/L	6,040	5,980	5,440	5,430	4,850	4,740	4,280	4,140	4,910	3,970	3,990	3,780	3,890
Selenium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	1.02 J	0.752 J	0.846 J	<0.33	0.401 J	<0.33	<0.33	<0.6
Silver	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.5
Sodium	ug/L	12,800	11,900	10,300	10,200	9,680	8,890	8,620	8,340	8,460 J	7,150	7,370	6,910	-
Strontium	ug/L	945	957	789	788	666	599	543	528	492	413	417	392	-
Thallium	ug/L	<0.5	<0.33	<0.5	<0.5	0.706 J	<0.5	<0.5	<0.5	0.593 J	<0.5	0.507 J	0.646 J	<0.2
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	<1	<1	<1	<1	<1	<1	<1	1.3 U*	<1	3.64	3.3	0.159 U*
Zinc	ug/L	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	8.41 J	<8.3	9 J	<8.3	<10
Radiological Parameters														
Radium-226	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	0.102 +/-() ++
Radium-228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	+/-()U ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	8.04	7.96	7.07	7.20	7.38	6.73	6.13	6.11	5.68	5.94	5.92	5.89	-
Fluoride	mg/L	0.107	<0.0800	0.100 UJ	0.100 UJ	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Sulfate	mg/L	282	269	246	245	208	165	166	159	133	119	129	131	-
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	459	498	435	410	337	292	270	271	251	225	215	224	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2											
Sample Date		9-Dec-14	9-Dec-14	23-Mar-16	23-Mar-16	14-Jun-16	14-Jun-16	21-Sep-16	1-Dec-16	1-Mar-17	1-Mar-17	7-Jun-17	7-Jun-17
Sample ID		KIF-AD2-GW-120914-A	KIF-AD2-GW-120914-B	KIF-AD2-GW-032316-A	KIF-AD2-GW-032316-B	KIF-AD2-GW-061416-A	KIF-AD2-AW-061416-A	KIF-AD2-GW-092116-A	KIF-AD2-GW-120116-A	KIF-AD2-GW-030117-A	KIF-AD2-GW-DUP-030117-A	KIF-AD2-GW-060717-A	KIF-AD2-GW-060717-B
Parent Sample ID							KIF-AD2-GW-061416-A				KIF-AD2-GW-030117-A		
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	State Compliance	Recovery Project	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	Recovery Project	State Compliance	Recovery Project
Total Metals													
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<0.5	-	<2	-	<2	<2	<2	<0.303	<2	<2	<2	-
Arsenic	ug/L	1.5 J	-	<2	-	<2	<2	<2	<0.0743	9.39 J	2.88 J	<2	-
Barium	ug/L	25	-	28.1	-	26.1	27.7	31.1	26.7	28.2	29.1	32.4	-
Beryllium	ug/L	<0.5	-	<2	-	<2	<2	<2	<0.064	<2	<2	<2	-
Boron	ug/L	-	-	<1,000	-	<1,000	<1,000	<1,000	1,030	<1,000	<1,000	<1,000	-
Cadmium	ug/L	<0.4	-	<1	-	<1	<1	<1	<0.157	<1	<1	<1	-
Calcium	ug/L	-	-	41,000	-	40,500	42,700	45,800	37,800	42,900	43,500	53,900	-
Chromium	ug/L	<0.5	-	<2	-	<2	<2	<2	<0.09	<2	<2	<2	-
Cobalt	ug/L	7.02	-	5.36	-	4.64	4.88	5.29	5.53	5.55	5.75	5.79	-
Copper	ug/L	<0.5	-	<2	-	<2	<2	<2	<0.398	<2	<2	<2	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<0.2	-	<2	-	<2	<2	<2	<0.0603	<2	<2	<2	-
Lithium	ug/L	-	-	<50	-	<50	<50	<50	<0.794	<50	<50	<50	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.15	-	<0.2	-	<0.2	<0.2	<0.2	<0.0392	<0.2	<0.2	<0.2	-
Molybdenum	ug/L	-	-	<2	-	<2	<2	<2	<1.09	2.19	3.5	<2	-
Nickel	ug/L	5.11	-	<2	-	<2	<2	2.49	2.56	3.07	3.89	2.74	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<0.6	-	<2	-	<2	<2	<2	<0.316	<2	<2	<2	-
Silver	ug/L	<0.5	-	<2	-	<2	<2	<2	<0.0878	<2	<2	<2	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.2	-	<2	-	<2	<2	<2	<0.0239	<2	<2	<2	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.1	-	<4	-	<4	<4	<4	<0.13	<4	<4	<4	-
Zinc	ug/L	<10	-	<25	-	<25	<25	<25	<1.83	<25	<25	<25	-
Radiological Parameters													
Radium-226	pCi/L	-	0.101 +/-()U ++	-	0.0714 +/-()U ++	-	-	-	-	-	-	-	0.0839 +/-() ++
Radium-228	pCi/L	-	0.00366 +/-()U ++	-	0.237 +/-()U ++	-	-	-	-	-	-	-	-0.0434 +/-()U ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	-	-	4.91	-	6.53 J	6.71 J	6.78 J	5.79	7.27	7.22	8.15	-
Fluoride	mg/L	<0.100	-	<0.100	-	<0.100	0.102	0.149 J	0.144	<0.100	<0.100	<0.100	-
Sulfate	mg/L	-	-	115	-	124	128	119	103	136	136	187	-
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	5.9	-	5.8	-	5.7	5.9	5.9	-	6.04	-
Total Dissolved Solids	mg/L	-	-	214	-	221	222	212	204	222	232	313	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2											
Sample Date		11-Sep-17	11-Sep-17	5-Dec-17	5-Dec-17	20-Mar-18	20-Mar-18	20-Mar-18	20-Mar-18	13-Jun-18	13-Jun-18	5-Sep-18	5-Sep-18
Sample ID		KIF-AD2-GW-091117-A	KIF-AD2-GW-091117-B	KIF-AD2-GW-120517-A	KIF-AD2-GW-120517-B	KIF-AD2-GW-032018-A	KIF-AD2-GW-032018-B	KIF-AD2-AW-032018-A	KIF-AD2-AW-032018-B	KIF-AD2-GW-061318-A	KIF-AD2-GW-061318-B	KIF-AD2-GW-090518-A	KIF-AD2-GW-090518-B
Parent Sample ID								KIF-AD2-GW-032018-A	KIF-AD2-GW-032018-B				
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	Recovery Project	State Compliance	Recovery Project	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals													
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	2 UJ	-
Arsenic	ug/L	9.32	-	<2	-	<2	-	<2	-	<2	-	2.18 J	-
Barium	ug/L	38.3	-	39.2	-	35.5	-	35.5	-	40.8	-	<200	-
Beryllium	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<1	-
Boron	ug/L	<1,000	-	<1,000	-	<1,000	-	<1,000	-	<1,000	-	999	-
Cadmium	ug/L	<1	-	<1	-	<1	-	<1	-	<1	-	<1	-
Calcium	ug/L	76,600	-	89,800	-	97,300	-	96,400	-	115,000	-	112,000	-
Chromium	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	2.2	-
Cobalt	ug/L	9.41	-	8.81	-	7.94	-	7.82	-	10.2	-	10.9 J	-
Copper	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	5.91	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<1	-
Lithium	ug/L	<50	-	<50	-	<50	-	<50	-	<50	-	9.85	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-
Molybdenum	ug/L	4.07	-	<2	-	<2	-	<2	-	<2	-	5 UJ	-
Nickel	ug/L	3.61	-	3.59	-	3.53	-	3.43	-	4.54	-	6.06 J	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<5	-
Silver	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<1	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<2	-	<2	-	<2	-	<2	-	<2	-	<1	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	<4	-	<4	-	<4	-	<4	-	2.03 U*	-
Zinc	ug/L	<25	-	<25	-	<25	-	<25	-	<25	-	12,500 J	-
Radiological Parameters													
Radium-226	pCi/L	-	0.029 +/-()U ++	-	0.0452 +/-()U ++	-	0.0776 +/-()< ++	-	0.0701 +/-()< ++	-	0.0754 +/-(0.105)U	-	0.191 +/-(0.0799)U*
Radium-228	pCi/L	-	0.404 +/-()U* ++	-	0.961 +/-() ++	-	0.528 +/-() ++	-	0.452 +/-() ++	-	0.358 +/-(0.227)U*	-	0.289 +/-(0.212)U
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	8.76	-	8.55	-	8.42	-	8.22	-	7.90	-	7.84	-
Fluoride	mg/L	<0.100	-	<0.100	-	<0.100	-	<0.100	-	<0.100	-	<0.100	-
Sulfate	mg/L	224	-	284	-	311	-	292	-	357	-	364	-
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	5.61	-	5.69	-	5.42	-	-	-	-	-	5.78	-
Total Dissolved Solids	mg/L	373	-	441	-	479	-	471	-	567	-	612	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2											
Sample Date		4-Dec-18	24-Jan-19	29-Jan-19	5-Feb-19	5-Feb-19	13-Feb-19	19-Feb-19	26-Feb-19	18-Mar-19	21-Mar-19	27-Mar-19	3-Apr-19
Sample ID		KIF-AD2-GW-120418	KIF-GW-007-01242019	KIF-GW-007-01292019	KIF-GW-007-02052019	KIF-GW-903-02052019	KIF-GW-007-02132019	KIF-GW-007-02192019	KIF-GW-007-02262019	KIF-AD2-GW-031819	KIF-GW-007-03212019	KIF-GW-007-03272019	KIF-GW-007-04032019
Parent Sample ID						KIF-GW-007-02052019							
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	-	41.1	28.7 J	28.1 U*	22.7 U*	28 J	24.8 J	30.3	-	22.7 J	20.5 J	15.9 J
Antimony	ug/L	<2	<1.12	<1.12	0.398 J	1.89 J	<0.378	0.38 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	2.62	1.36	0.782 J	1.16	0.982 J	0.566 J	0.516 J	0.512 J	0.821 U*	0.875 U*	0.938 J	1.16
Barium	ug/L	39.6	34	39.5	35.7	41.1	39.8	39.8	42.4	38.4	38.5	39.7	33.5
Beryllium	ug/L	<2	0.193 J	0.124 J	0.279 J	0.334 J	0.23 J	0.226 J	0.221 J	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	1,170	1,120	1,050	1,100	1,080	908	1,100	984	871	868	964	921
Cadmium	ug/L	<1	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	129,000	129,000	129,000	143,000	139,000	134,000	146,000	139,000	134,000	135,000	139,000	137,000
Chromium	ug/L	<2	1.38 U*	<0.631	<1.53	<1.53	<1.53	<1.53	<1.53	2.3 U*	1.82 U*	1.94 J	<1.53
Cobalt	ug/L	12.8	10.7	10.6	11	10.4	11.7	12.2	12.3	12.4	16.5	18	14.4
Copper	ug/L	<2	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	-	4,150	3,990	3,680	3,440	4,080	4,170	4,240	-	3,840	4,050	3,810
Lead	ug/L	<2	0.327 U*	0.348 U*	0.317 J	0.283 J	0.302 J	0.245 J	0.306 J	0.265 J	0.251 J	0.236 J	0.312 J
Lithium	ug/L	<50	10.9	9.71	11.5	11.5	12.1	11.9	11.4	10.6	10.3	12.2	12.5 U*
Magnesium	ug/L	-	26,200	26,200	24,000	23,400	26,300	26,100	26,600	-	25,600	26,300	22,700
Manganese	ug/L	-	2,060	1,950	2,070	1,990	2,080	2,120	2,160	-	2,090	2,020	2,010
Mercury	ug/L	<0.2	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<2	1.24 J	0.798 J	1.5 J	1.9 J	0.61 J	0.655 J	<0.61	0.644 J	0.758 J	0.781 J	1.11 J
Nickel	ug/L	5.38	4.9	4.66	4.35	4.46	5.15	5.03	5.08	4.95	5.01	5.35	4.08 J
Potassium	ug/L	-	6,930	6,920	6,380	6,220	7,010	6,760	7,050	-	6,900	6,790	6,130
Selenium	ug/L	<2	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	<2	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Sodium	ug/L	-	9,900	9,620	9,240	9,080	10,100	10,000	10,200	-	9,950	9,860	8,530
Strontium	ug/L	-	1,320	1,350	1,260	1,240	1,360	1,260	1,530	-	1,240	1,490	1,190
Thallium	ug/L	<2	0.068 J	0.081 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	1.84 U*	1.64 U*	1.14	<0.899
Zinc	ug/L	<25	7.09	6.66	6.39	5.61	7.04	6.9	6.33	6.24	6.49	6.65 U*	6.29
Radiological Parameters													
Radium-226	pCi/L	0.0411 +/-(0.0598)U	0.141 +/-(0.0627)	0.0314 +/-(0.0511)UJ	0.0913 +/-(0.0640)	0.0640 +/-(0.0564)U	0.0676 +/-(0.0664)U	0.0367 +/-(0.0514)UJ	0.0289 +/-(0.0518)U	0.0513 +/-(0.0929)UJ	0.112 +/-(0.0828)U	0.111 +/-(0.0760)	0.0706 +/-(0.0623)U
Radium-228	pCi/L	0.465 +/-(0.257)U*	0.305 +/-(0.270)UJ	0.145 +/-(0.257)U	0.00244 +/-(0.231)U	-0.101 +/-(0.237)U	0.386 +/-(0.275)U	0.436 +/-(0.235)	0.130 +/-(0.215)U	0.328 +/-(0.245)U	0.405 +/-(0.249)U*	0.447 +/-(0.324)U	0.191 +/-(0.263)U
Radium-226+228	pCi/L	-	0.446 +/-(0.277)J	0.177 +/-(0.262)UJ	0.0938 +/-(0.240)J	0.0640 +/-(0.244)U	0.454 +/-(0.283)U	0.472 +/-(0.241)J	0.159 +/-(0.221)U	-	0.517 +/-(0.262)U*	0.558 +/-(0.333)J	0.262 +/-(0.270)U
Anions													
Chloride	mg/L	8.15	8.87	9.31	9.16	8.95	9.32	9.44	9.23	10.4	10.0	9.65	9.52
Fluoride	mg/L	<0.100	0.0986 U*	0.0661 J	0.0623 J	0.0546 J	0.0684 J	0.0465 J	0.0452 J	0.0665 U*	0.0730 J	0.0695 J	0.0697 J
Sulfate	mg/L	399	456	452	430	457	412	431	424	439	413	400	375 J
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	28.3	50.5	42.4 J	68.7 J	34.0	14.5	26.0	-	44.7	36.5	30.5
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-	<5.00	<5.00	<5.00
pH (field)	SU	5.75	5.84	5.81	5.86	-	5.77	5.86	5.81	5.63	5.82	5.83	5.89
Total Dissolved Solids	mg/L	642	659	678	666	643	657	662	670	644	644	614	632

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2											
Sample Date		17-Jun-19	17-Sep-19	21-Nov-19	18-Dec-19	7-Jan-20	18-Feb-20	9-Jun-20	3-Sep-20	9-Dec-20	22-Jan-21	2-Mar-21	10-Jun-21
Sample ID		KIF-AD2-GW-061719	KIF-GW-007-09172019	KIF-GW-007-11212019	KIF-GW-AD2-121819	KIF-GW-007-01072020	KIF-GW-007-02182020	KIF-GW-007-06092020	KIF-GW-007-09032020	KIF-GW-AD2-120920	KIF-GW-AD-2-01222021	KIF-GW-AD-2-03022021	KIF-GW-AD-2-06102021
Parent Sample ID													
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	27.7 J	64.6	42.9	-	86.3	109	30.5	40.5	-	35.7	36.3	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.774 J
Arsenic	ug/L	1.66	3.25	3.04	1.44	2.92	3.66	1.78	2.33	3.06	1.52	1.62	9.28
Barium	ug/L	32.7	33.9	34.1	29.2	36.3	33.7	32.4 U*	32.7	31.9	32.8	32.9	33.1
Beryllium	ug/L	0.244 J	0.308 J	0.260 J	0.339 J	0.478 U*	0.304 J	0.302 J	<0.182	0.201 J	0.212 J	0.293 J	0.403 J
Boron	ug/L	936	856	922	963	966	1,090	841	847	802	729	871	798
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	125,000	125,000	129,000	121,000	130,000	90,500	138,000	147,000	150,000	158,000	163,000	173,000
Chromium	ug/L	<1.53	2.44	<1.53	<1.53	<1.53	2.67	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	13.4	11.1	12.1	16.3	11.3	10.9	13.0	15.5	15.9	14.6	13.6	15.5
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	1.05 J
Iron	ug/L	4,740	4,670	4,920	-	4,600	7,400	5,150	5,390	-	5,030	5,470	-
Lead	ug/L	0.305 J	0.433 J	0.380 J	0.265 J	0.449 J	0.727 U*	0.331 U*	0.236 J	0.244 J	0.283 J	0.376 J	0.799 J
Lithium	ug/L	10.1	11.9	13.0	19.1 U*	13.7	12.0 U*	13.7	12.1	13.1	15.4	14.7	12.9
Magnesium	ug/L	22,500	22,700	23,800	-	24,800	19,500	24,200	22,200	-	26,900	26,200	-
Manganese	ug/L	1,840	1,780	1,870	-	1,890	2,060	1,910	2,080	-	2,350	2,140	-
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	0.755 J	1.50 J	1.49 J	1.39 J	1.61 J	2.45 J	0.749 J	1.15 J	1.43 J	1.47 J	1.12 J	4.05 J
Nickel	ug/L	5.46	4.45	5.05	7.01	5.71 U*	5.10	5.21	5.86 U*	5.83	6.35	5.58	6.09
Potassium	ug/L	6,060	6,330	6,710	-	6,590	5,740	6,290	6,410	-	6,750	6,780	-
Selenium	ug/L	<2.62	<1.51	<1.51	<1.51	<1.51	1.66 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	9,440	9,530	10,900	-	10,100	8,740	10,600	10,100	-	12,300	12,100	-
Strontium	ug/L	1,350	1,310	1,180	-	1,140	1,010	1,330	1,500	-	1,520 J	1,530	-
Thallium	ug/L	<0.128	<0.148	<0.148	<0.148	0.195 J	<0.148	0.178 U*	<0.148	<0.148	0.243 U*	0.329 J	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	0.970 J	1.36 U*	1.10 U*	<0.991	<0.991	<4.96	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	6.29	8.52	10.3 U*	7.77	6.17	8.74	7.00	8.98	8.32	8.37	8.01	11.1
Radiological Parameters													
Radium-226	pCi/L	0.0571 +/-(0.152)U	0.266 +/-(0.445)UJ	0.0616 +/-(0.274)U	0.249 +/-(0.413)U	0.200 +/-(0.505)U	-0.325 +/-(0.402)U	0.137 +/-(0.385)U	0.175 +/-(0.437)U	0.437 +/-(0.531)U	0.323 +/-(0.470)U	1.03 +/-(0.731)U*	0.317 +/-(0.383)U
Radium-228	pCi/L	0.436 +/-(0.681)U	0.588 +/-(0.420)U	0.268 +/-(0.268)U	0.353 +/-(0.337)U	-0.246 +/-(0.418)U	-0.226 +/-(0.269)U	0.0264 +/-(0.201)U	-0.0390 +/-(0.339)U	0.267 +/-(0.339)U	0.151 +/-(0.537)U	0.243 +/-(0.325)U	0.439 +/-(0.313)U
Radium-226+228	pCi/L	0.493 +/-(0.698)U	0.854 +/-(0.612)UJ	0.330 +/-(0.383)U	0.602 +/-(0.533)U	0.200 +/-(0.656)U	0.000 +/-(0.484)U	0.163 +/-(0.434)U	0.175 +/-(0.553)U	0.704 +/-(0.630)U	0.474 +/-(0.714)U	1.27 +/-(0.800)U*	0.756 +/-(0.495)U
Anions													
Chloride	mg/L	12.6	15.0	14.5	16.7	17.3	19.0	20.5	21.2	19.2	18.8	17.5	16.4
Fluoride	mg/L	0.0638 J	0.0578 J	0.0710 J	0.0722 J	0.0672 J	0.0679 J	0.0669 J	0.0647 U*	0.0771 J	0.101	0.0686 J	0.0712 J
Sulfate	mg/L	358	367 J	341	345	388	402 J	410	430	439 J	474	438	473
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	30.0	33.9	33.9	31.2	22.6 J	34.3	36.7	42.2	51.0	39.6	39.9
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	5.00 UJ	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.69	5.81	6.04	5.85	5.88	5.78	5.83	5.74	5.84	5.77	5.85	-
Total Dissolved Solids	mg/L	683 J	588	589	630	653	612	664	675	696	733	729	757

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-2								
Sample Date		22-Jul-21	26-Aug-21	15-Nov-21	9-Feb-22	24-Mar-22	10-Jun-22	4-Aug-22	26-Sep-22	30-Nov-22
Sample ID		KIF-GW-AD-2-07222021	KIF-GW-AD-2-08262021	KIF-GW-AD-2-11152021	KIF-GW-AD-2-02092022	KIF-GW-AD-2-03242022	KIF-GW-AD-2-06102022	KIF-GW-AD-2-08042022	KIF-GW-AD-2-09262022	KIF-GW-AD-2-11302022
Parent Sample ID										
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program		
Total Metals										
Aluminum	ug/L	44.9	37.6	-	59.7	42.7	-	35.7	75.0 U*	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.506	<0.506	0.629 U*	<0.506	0.798 U*	0.908 U*
Arsenic	ug/L	2.07	1.74	2.70	2.10	1.21 U*	10.2	2.34	2.18	2.20
Barium	ug/L	31.4	31.8 U*	33.2	31.5	30.2	29.6	29.8	29.0 J	28.6
Beryllium	ug/L	0.215 J	0.272 J	0.222 J	0.279 J	0.406 J	0.436 J	<0.274	<0.274	<0.274
Boron	ug/L	819	782	759	817	869	747	740	731	794
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	155,000	168,000	174,000	182,000	171,000	166,000	179,000	167,000	173,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	17.1	14.8	16.9	18.7	16.2	15.5	14.5	17.1	15.0
Copper	ug/L	<0.627	0.783 U*	0.703 J	1.89 J	2.09	1.99 J	<1.14	<1.14	<1.14
Iron	ug/L	6,170	5,760	-	5,550	4,560	-	6,480	5,350	-
Lead	ug/L	0.218 J	0.458 J	0.357 J	0.577 J	0.550 U*	1.32	0.269 J	0.300 J	0.208 J
Lithium	ug/L	13.9	12.5	13.7	13.6	14.8	14.0	13.7	13.0	13.4
Magnesium	ug/L	26,900	26,900	-	29,900	28,000	-	31,000	29,900	-
Manganese	ug/L	2,330	2,030	-	2,750	2,330	-	2,290	2,530	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	1.13 J	0.938 J	1.98 J	1.79 J	1.91 J	5.77	1.56 J	1.95 J	1.90 J
Nickel	ug/L	6.39	6.45	6.56	7.84	6.64	6.17	5.44	6.96	5.51
Potassium	ug/L	6,640	6,730	-	6,900	6,530	-	6,930	6,560	-
Selenium	ug/L	<1.51	<1.51	<1.51	<0.739	0.740 J	<0.739	<0.739	<0.739	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.223	<0.223	<0.223	<0.223	<0.223	<0.223
Sodium	ug/L	12,100	12,000	-	12,700	12,100	-	12,400	11,900	-
Strontium	ug/L	1,600	1,620	-	1,750	1,680	-	1,810	1,580	-
Thallium	ug/L	<0.148	0.226 J	0.183 J	<0.472	0.752 J	<0.472	<0.472	<0.472	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.776	<0.776	<0.776	<0.776	<0.776	<0.776
Zinc	ug/L	8.11	8.10	12.6	17.5	20.0	13.8 U*	6.33	10.7 U*	35.3
Radiological Parameters										
Radium-226	pCi/L	0.216 +/-(0.405)U	0.618 +/-(0.593)U	0.238 +/-(0.382)U	-0.124 +/-(0.198)U	0.380 +/-(0.291)	0.429 +/-(0.549)U	0.340 +/-(0.345)U	0.338 +/-(0.547)U	0.268 +/-(0.472)U
Radium-228	pCi/L	0.808 +/-(0.514)	0.282 +/-(0.321)U	0.853 +/-(0.499)	0.0809 +/-(0.264)U	0.752 +/-(0.472)	0.475 +/-(0.418)U	-0.101 +/-(0.352)U	0.524 +/-(0.491)U	-0.317 +/-(0.464)U
Radium-226+228	pCi/L	1.02 +/-(0.654)J	0.900 +/-(0.674)U	1.09 +/-(0.628)J	0.0809 +/-(0.330)U	1.13 +/-(0.554)	0.904 +/-(0.690)U	0.340 +/-(0.493)U	0.863 +/-(0.735)U	0.268 +/-(0.662)U
Anions										
Chloride	mg/L	16.8	15.4	14.1	11.5	11.0	11.0	10.7	10.0	9.63
Fluoride	mg/L	0.0538 J	0.112	0.128	0.112	0.130 U*	0.132 J	0.0396 J	0.106 U*	0.0894 J
Sulfate	mg/L	493	466	515	506	513	474 J	501	510	534
General Chemistry										
Alkalinity, Bicarbonate	mg/L	41.6	49.3	46.3	42.2	40.4	46.6	46.7 J	53.3	45.6
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	5.00 UJ	<2.60	<5.00
pH (field)	SU	5.92	-	5.91	6.27	5.89	5.84	6.03	6.03	5.96
Total Dissolved Solids	mg/L	759	784	771	824	823	859	853	857	878

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3											
Sample Date		11-Jun-09	14-Dec-09	13-Jan-10	13-Jan-10	17-Feb-10	9-Mar-10	9-Mar-10	13-Apr-10	11-May-10	14-Jun-10	14-Jun-10	13-Jul-10
Sample ID		KIF-AD3-GW-061109	KIF-AD3-GW-121409-B	KIF-AD3-GW-011310	KIF-AD3-AW-011310	KIF-AD3-GW-021710	KIF-AD3-GW-030910	KIF-AD3-AW-030910	KIF-AD3-GW-041310	KIF-AD3-GW-051110	KIF-AD3-GW-061410	KIF-AD3-AW-061410	KIF-AD3-GW-071310
Parent Sample ID					KIF-AD3-GW-011310			KIF-AD3-GW-030910				KIF-AD3-GW-061410	
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals													
Aluminum	ug/L	<100	-	57.7 U*	50.2 U*	58.5 U*	<50	<50	<25	<50	<50	<50	50 UJ
Antimony	ug/L	<2	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	2.05	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	0.34 J	<0.33	<0.33	0.38 J
Barium	ug/L	39.6	-	29.1	28.2	27.8	26.2	25.6	28.9	32.6	36.6	37.6	37.5
Beryllium	ug/L	<2	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Boron	ug/L	587	-	436	428	388	364	361	443	554	731	751	841
Cadmium	ug/L	<1	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	261,000	-	124,000	123,000	122,000	120,000	118,000	140,000	149,000	156,000	158,000	162,000
Chromium	ug/L	<2	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Cobalt	ug/L	3.26	-	2.97	2.95	2.96	2.79	2.6	2.99	3.33	3.71	3.7	4.1
Copper	ug/L	<5	-	<0.33	0.33 J	<0.33	<0.33	0.38 U*	<0.33	<0.33	<0.33	<0.33	<0.33
Iron	ug/L	331	-	155 J	123 J	186	140 J	134 J	46.3 J	33.1 J	46.6 J	49.1 J	62.9
Lead	ug/L	<2	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	35,100	-	17,000	16,800	16,700	16,400	16,200	18,100	19,500	20,400	21,000	20,200
Manganese	ug/L	7,820 U*	-	5,600	5,680	5,130	5,380	5,310	5,210 J	6,660	6,680	6,890	7,450
Mercury	ug/L	<0.2	-	<0.15	<0.15	<0.15	0.15 UJ	0.15 UJ	<0.2	<0.2	<0.2	<0.2	<0.15
Molybdenum	ug/L	<5	-	0.52 U*	0.6 U*	<0.33	<0.33	<0.33	<0.33	0.36 J	0.37 J	0.34 J	<0.33
Nickel	ug/L	<5	-	1.28 J	1.29 J	1.27 J	1.34 U*	1.17 U*	1.33 U*	1.46 J	1.7 J	1.7 J	1.75 J
Potassium	ug/L	3,810	-	3,550 J	3,480 J	3,360	3,060 J	2,990 J	3,600	3,850	4,480	4,620	4,560
Selenium	ug/L	<2	-	<0.33	<0.33	<0.33	<0.33	<0.33	0.33 UJ	0.33 UJ	<0.33	<0.33	<0.33
Silver	ug/L	2 UJ	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	18,100	-	11,100	10,400	9,530	8,720	8,550	9,160	9,020	10,100	10,400	9,740
Strontium	ug/L	550	-	694	692	685	684	676	743	780	847	870	809
Thallium	ug/L	<2	-	0.89 J	0.62 J	<0.25	<0.25	<0.25	<0.25	0.56 J	0.51 J	<0.5	<0.5
Uranium	ug/L	-	<1	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	0.47 U*	0.49 U*	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	ug/L	<50	-	<8.3	<8.3	<8.3	<8.3	<8.3	8.3 UJ	<8.3	8.3 UJ	8.3 UJ	<8.3
Radiological Parameters													
Radium-226	pCi/L	-	0.257 +/-(0.2892)U	-	-	-	-	-	-	-	-	-	-
Radium-228	pCi/L	-	1.23 +/-(0.9403)UJ	-	-	-	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	7.73	-	8.43	8.32	7.46	6.97	6.85	6.84	6.01 J	3.37	3.47	3.96 U*
Fluoride	mg/L	0.140	-	0.270	0.280	0.235	0.219	0.220	0.243	0.258 J	0.308	0.322	0.309
Sulfate	mg/L	574	-	202	206	213	221	224	248	253	245	255	186
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	1,110	-	510	508	511	536	533	580	620	643	648	666

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3										
Sample Date		23-Sep-10	23-Sep-10	29-Nov-10	17-Dec-10	17-Dec-10	20-Jan-11	8-Feb-11	7-Mar-11	27-Jun-11	27-Jun-11	3-Aug-11
Sample ID		KIF-AD3-GW-092310-A	KIF-AD3-GW-092310-B	KIF-AD3-GW-112910	KIF-AD3-GW-121710	KIF-AD3-AW-121710	KIF-AD3-GW-012011	KIF-AD3-GW-020811	KIF-AD3-GW-030711	KIF-AD3-GW-062711	KIF-AD3-AW-062711	KIF-AD3-GW-080311
Parent Sample ID						KIF-AD3-GW-121710					KIF-AD3-GW-062711	
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals												
Aluminum	ug/L	<50	-	-	<50	<50	-	-	<50	<50	<50	-
Antimony	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Arsenic	ug/L	0.48 J	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Barium	ug/L	48.3	-	-	36.2	37.2	-	-	31.3	35.6	35.8	-
Beryllium	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Boron	ug/L	1,060	-	-	795 J	834 J	-	-	709	1,270	1,290	-
Cadmium	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Calcium	ug/L	175,000	-	-	170,000	179,000	-	-	159,000	304,000	309,000	-
Chromium	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Cobalt	ug/L	3.86	-	3.99	3.49	3.67	-	3.24	3.11	6.3	6.19	8.57
Copper	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Iron	ug/L	57.5	-	-	139	148	-	-	523	124	122	-
Lead	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	22,400	-	-	22,200	23,400	-	-	21,200	41,000	41,200	-
Manganese	ug/L	7,900	-	-	6,540	6,820	-	-	8,190	13,900	13,600 J	-
Mercury	ug/L	<0.15	-	-	<0.2	<0.2	-	-	<0.15	<0.15	<0.15	-
Molybdenum	ug/L	0.43 J	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Nickel	ug/L	1.52 J	-	-	1.43 J	1.48 J	-	-	1.24 J	3.18 J	3.05 J	-
Potassium	ug/L	5,000	-	-	4,170	4,380	-	-	3,570	3,760	3,830	-
Selenium	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	<0.33	<0.33	-
Silver	ug/L	<0.33	-	-	<0.33	<0.33	-	-	<0.33	0.33 UJ	0.33 UJ	-
Sodium	ug/L	12,300	-	-	9,640	10,200	-	-	8,240	9,330	9,480	-
Strontium	ug/L	903	-	-	924	978	-	-	821	632	640	-
Thallium	ug/L	0.6 J	-	-	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	-	-	<1	<1	-	-	<1	<1	<1	-
Zinc	ug/L	<8.3	-	-	<8.3	<8.3	-	-	<8.3	<8.3	<8.3	-
Radiological Parameters												
Radium-226	pCi/L	-	0.941 +/-(0.446)	-	-	-	1.06 +/-(0.504)	-	-	-	-	-
Radium-228	pCi/L	-	0.750 +/-(0.400)	-	-	-	0.413 +/-(0.556)U	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	6.94	-	-	7.51	7.63	-	-	7.27	5.26	5.28	-
Fluoride	mg/L	0.426	-	-	0.271	0.263	-	-	0.256	0.253	0.237	-
Sulfate	mg/L	259	-	-	265	267	-	-	255	545	559	-
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	698	-	-	655	657	-	-	645	1,220	1,210	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3											
Sample Date		27-Sep-11	7-Dec-11	7-Dec-11	25-Jan-12	20-Mar-12	20-Jun-12	18-Sep-12	18-Sep-12	11-Dec-12	19-Mar-13	26-Jun-13	26-Jun-13
Sample ID		KIF-AD3-GW-092711	KIF-AD3-GW-120711	KIF-AD3-AW-120711	KIF-AD3-GW-012512	KIF-AD3-GW-032012	KIF-AD3-GW-062012	KIF-AD3-GW-091812	KIF-AD3-AW-091812	KIF-AD3-GW-121112	KIF-AD3-GW-031913	KIF-AD3-GW-062613	KIF-AD3-AW-062613
Parent Sample ID				KIF-AD3-GW-120711					KIF-AD3-GW-091812				KIF-AD3-GW-062613
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals													
Aluminum	ug/L	<50	<50	<50	-	<50	<50	<50	104	<50	<50	<50	<50
Antimony	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Arsenic	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	0.347 J	0.342 J	0.349 J	<0.33	0.352 J	0.345 J
Barium	ug/L	23.5	26.9	27.2	-	25	57.9	30.9	30	32.4	24.7	51.7	43.1
Beryllium	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Boron	ug/L	1,250	1,060	1,070	-	884	1,790	1,870	1,860	1,500	1,100	1,670	1,680
Cadmium	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Calcium	ug/L	153,000	156,000	160,000	-	126,000	390,000	148,000	147,000	168,000	132,000	315,000	287,000
Chromium	ug/L	<0.33	<0.33	<0.33	-	<0.33	0.36 J	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Cobalt	ug/L	3.02	3.2	3.22	2.63	2.56	8.31	3.66	3.52	3.41	2.57	7.43	7.24
Copper	ug/L	<0.33	0.53 J	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	0.33 UJ	<0.33	<0.33
Iron	ug/L	131	211	208	-	139	120	82.1 J	85.5 J	191	94.3 J	100	100
Lead	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	ug/L	21,200	19,500	19,700	-	17,100	56,500	21,300	21,200	22,200	18,300	43,900	39,800
Manganese	ug/L	6,380	6,530	6,230	-	5,160	13,500	7,060	6,800	7,270	6,100	10,900	10,300
Mercury	ug/L	<0.15	<0.15	<0.15	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Molybdenum	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	0.372 J	0.353 J	<0.33	<0.33	<0.33	<0.33
Nickel	ug/L	1.47 J	1.21 J	1.18 J	-	0.97 J	3.59 J	1.49 J	1.47 J	1.57 J	1.07 J	3.5	2.94
Potassium	ug/L	3,960	3,730	3,750	-	3,270	5,110	4,460	4,390	4,320	3,280	3,880	3,820
Selenium	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Silver	ug/L	<0.33	<0.33	<0.33	-	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
Sodium	ug/L	7,350	6,830	6,980	-	5,470	10,300	6,360	6,340	6,120	5,270	8,130	7,740
Strontium	ug/L	624	768	784	-	634	952	724	721	852	691	800	738
Thallium	ug/L	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.33	<0.33	<0.5	<0.5	<0.5	<0.5
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	ug/L	<8.3	<8.3	<8.3	-	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3
Radiological Parameters													
Radium-226	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Radium-228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-
Anions													
Chloride	mg/L	6.60	6.60	6.60	-	6.04 U*	4.92	5.63	5.53	<1.00	6.00	4.79	4.79
Fluoride	mg/L	0.196	0.242	0.283	-	0.210	0.245	0.212	0.222	<0.100	0.188	0.167	0.163
Sulfate	mg/L	279	253	254	-	206	696	251	294	<1.00	230	518	550
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	753	652	664	-	524	1,310	717	715	650	452	1,120	1,110

See notes on last page.

Stantec

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location								AD-3						
Sample Date		4-Sep-13	3-Dec-13	4-Mar-14	4-Mar-14	10-Jun-14	15-Sep-14	8-Dec-14	8-Dec-14	8-Dec-14	8-Dec-14	22-Mar-16	22-Mar-16	13-Jun-16
Sample ID		KIF-AD3-GW-090413	KIF-AD3-GW-120313	KIF-AD3-GW-030414	KIF-AD3-AW-030414	KIF-AD3-GW-061014	KIF-AD3-GW-091514	KIF-AD3-GW-120814-A	KIF-AD3-GW-120814-B	KIF-AD3-AW-120814-A	KIF-AD3-AW-120814-B	KIF-AD3-GW-032216-A	KIF-AD3-GW-032216-B	AD-3_0613161200_490-105604-2
Parent Sample ID					KIF-AD3-GW-030414					KIF-AD3-GW-120814-A	KIF-AD3-GW-120814-B			
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	State Compliance
Total Metals														
Aluminum	ug/L	<50	<67.8	<67.8	<67.8	<50	-	-	-	-	-	-	-	-
Antimony	ug/L	<0.33	<0.33	0.345 J	<0.33	<0.33	<0.5	<0.5	-	<0.5	-	<2	-	-
Arsenic	ug/L	<0.33	1.21 U*	0.514 J	0.679 J	2.57	<0.5	<0.5	-	<0.5	-	<2	-	-
Barium	ug/L	47.4	32.3	23.6	25.3	44.7	42.7	30.4	-	31.2	-	28.4	-	-
Beryllium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.5	<0.5	-	<0.5	-	<2	-	-
Boron	ug/L	1,780	1,460	829	840	1,540	-	-	-	-	-	<1,000	-	-
Cadmium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.4	<0.4	-	<0.4	-	<1	-	-
Calcium	ug/L	397,000	164,000	127,000	129,000	200,000	-	-	-	-	-	145,000	-	-
Chromium	ug/L	<0.33	0.333 J	5.64 J	0.33 UJ	<0.33	<0.5	<0.5	-	<0.5	-	<2	-	-
Cobalt	ug/L	7.72	3.87	2.35	3.18	4.99	5.26	3.42	-	3.77	-	3.14	-	-
Copper	ug/L	<0.33	0.757 U*	<0.33	<0.33	0.33 UR	<0.5	<0.5	-	<0.5	-	<2	-	-
Iron	ug/L	92.4 J	148 U*	119	150	630	-	-	-	-	-	-	-	-
Lead	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.2	<0.2	-	<0.2	-	<2	-	-
Lithium	ug/L	-	-	-	-	-	-	-	-	-	-	<50	-	-
Magnesium	ug/L	54,200	21,500	16,600	16,800	27,400	-	-	-	-	-	-	-	-
Manganese	ug/L	15,900	6,920	6,140	5,940	8,630	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.15	<0.15	<0.15	<0.15	<0.15	<1.5	<0.15	-	<0.15	-	<0.2	-	-
Molybdenum	ug/L	<0.33	<0.33	<0.33	0.376 J	0.538 J	-	-	-	-	-	<2	-	-
Nickel	ug/L	3.6	1.87 J	1 J	1.12 J	1.55 J	2.93	1.61 J	-	1.94 J	-	<2	-	-
Potassium	ug/L	4,190	4,730	3,130	3,170	4,450	4,500	-	-	-	-	-	-	-
Selenium	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.6	<0.6	-	<0.6	-	<2	-	-
Silver	ug/L	<0.33	<0.33	<0.33	<0.33	<0.33	<0.5	<0.5	-	<0.5	-	<2	-	-
Sodium	ug/L	9,790	6,490 J	4,470	4,570	6,240	-	-	-	-	-	-	-	-
Strontium	ug/L	801	778	625	636	1,030	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	-	<0.2	-	<2	-	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<1	1.21 U*	<1	<1	2.56	0.188 U*	<0.1	-	<0.1	-	<4	-	-
Zinc	ug/L	<8.3	11.2 J	<8.3	<8.3	<8.3	<10	<10	-	<10	-	<25	-	-
Radiological Parameters														
Radium-226	pCi/L	-	-	-	-	-	0.0842 +/-()U ++	-	0.085 +/-()U ++	-	0.085 +/-()U ++	-	0.0444 +/-()U ++	1 +/-()< ++
Radium-228	pCi/L	-	-	-	-	-	0.456 +/-() ++	-	0.151 +/-()U ++	-	0.151 +/-()U ++	-	0.0157 +/-()U ++	1 +/-()< ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	5.96	8.45	6.01	6.03	3.89	-	-	-	-	-	4.88	-	-
Fluoride	mg/L	0.142	0.189	0.136	0.140	0.197	0.256	0.225	-	0.229	-	0.316	-	-
Sulfate	mg/L	739	208	188	189	412	-	-	-	-	-	217	-	-
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	-	-	-	-	-	-	-	-	-	-	6.9	-	-
Total Dissolved Solids	mg/L	1,600	549	506	504	865	-	-	-	-	-	521	-	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3												
Sample Date		13-Jun-16	21-Sep-16	21-Sep-16	21-Sep-16	21-Sep-16	30-Nov-16	30-Nov-16	2-Mar-17	2-Mar-17	6-Jun-17	6-Jun-17	6-Jun-17	6-Jun-17
Sample ID		KIF-AD3-GW-061316-A	KIF-AD3-GW-092116-A	KIF-AD3-GW-092116-B	KIF-AD3-AW-092116-A	KIF-AD3-AW-092116-B	KIF-AD3-GW-113016-A	KIF-AD3-GW-113016-B	KIF-AD3-GW-030217-A	KIF-AD3-GW-030217-B	KIF-AD3-GW-060617-A	KIF-AD3-GW-060617-B	KIF-AD3-AW-060617-A	KIF-AD3-AW-060617-B
Parent Sample ID					KIF-AD3-GW-092116-A	KIF-AD3-GW-092116-B							KIF-AD3-GW-060617-A	KIF-AD3-GW-060617-B
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project
Total Metals														
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<2	<2	-	<2	-	<0.303	-	<2	-	<2	-	<2	-
Arsenic	ug/L	<2	<2	-	<2	-	<0.0743	-	<2	-	<2	-	<2	-
Barium	ug/L	46.5	33	-	35.1	-	32.8	-	26.9	-	36.7	-	40.1	-
Beryllium	ug/L	<2	<2	-	<2	-	<0.064	-	<2	-	<2	-	<2	-
Boron	ug/L	1,450	1,550	-	1,540	-	1,460	-	<1,000	-	1,370	-	1,460	-
Cadmium	ug/L	<1	<1	-	<1	-	<0.157	-	<1	-	<1	-	<1	-
Calcium	ug/L	380,000	307,000	-	336,000	-	177,000	-	137,000	-	348,000	-	356,000	-
Chromium	ug/L	<2	<2	-	<2	-	<0.09	-	<2	-	<2	-	<2	-
Cobalt	ug/L	6.31	5.98	-	6.57	-	4.21	-	2.93	-	6.32	-	6.59	-
Copper	ug/L	<2	<2	-	<2	-	<0.398	-	<2	-	<2	-	<2	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<2	<2	-	<2	-	<0.0603	-	<2	-	<2	-	<2	-
Lithium	ug/L	<50	<50	-	<50	-	<0.794	-	<50	-	<50	-	<50	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.2	<0.2	-	<0.2	-	<0.0392	-	0.2 UJ	-	<0.2	-	<0.2	-
Molybdenum	ug/L	<2	<2	-	<2	-	<1.09	-	<2	-	<2	-	<2	-
Nickel	ug/L	2.78	2.6	-	3.32	-	7.78	-	<2	-	3.26	-	3.56	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<2	<2	-	<2	-	<0.316	-	<2	-	<2	-	<2	-
Silver	ug/L	<2	<2	-	<2	-	<0.0878	-	<2	-	<2	-	<2	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<2	<2	-	<2	-	<0.0239	-	<2	-	<2	-	<2	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	<4	-	<4	-	<0.13	-	<4	-	<4	-	<4	-
Zinc	ug/L	<25	<25	-	<25	-	<1.83	-	<25	-	<25	-	<25	-
Radiological Parameters														
Radium-226	pCi/L	-	-	0.120 +/-() ++	-	0.160 +/-() ++	-	0.262 +/-()U ++	-	0.0634 +/-()U ++	-	0.0751 +/-()U ++	-	0.0427 +/-()U ++
Radium-228	pCi/L	-	-	0.297 +/-()U ++	-	0.313 +/-()U ++	-	0.306 +/-()U ++	-	0.0385 +/-()U ++	-	0.047 +/-()U ++	-	-0.0823 +/-()U ++
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions														
Chloride	mg/L	20.0 UJ	7.14 J	-	7.32 J	-	4.89	-	7.58	-	7.14	-	7.11	-
Fluoride	mg/L	2.00 UJ	0.152 J	-	0.151 J	-	0.187	-	0.133	-	0.108	-	0.103	-
Sulfate	mg/L	971	661	-	658	-	189	-	225	-	809	-	824	-
General Chemistry														
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	6.3	6.3	-	-	-	6.8	-	7.3	-	6.46	-	-	-
Total Dissolved Solids	mg/L	247	1,310	-	1,310	-	659	-	547	-	1,610	-	1,610	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3									
Sample Date		12-Sep-17	12-Sep-17	5-Dec-17	5-Dec-17	20-Mar-18	20-Mar-18	13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18
Sample ID		KIF-AD3-GW-091217-A	KIF-AD3-GW-091217-B	KIF-AD3-GW-120517-A	KIF-AD3-GW-120517-B	AD-3_0320181200_180-76087-2	KIF-AD3-GW-032018-A	KIF-AD3-GW-061318-A	KIF-AD3-GW-061318-B	KIF-AD3-AW-061318-A	KIF-AD3-AW-061318-B
Parent Sample ID										KIF-AD3-GW-061318-A	KIF-AD3-GW-061318-B
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	State Compliance	Recovery Project	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals											
Aluminum	ug/L	-	-	-	-	-	-	-	-	-	-
Antimony	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Arsenic	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Barium	ug/L	31.7	-	27.4	-	-	21.6	28.2	-	28.1	-
Beryllium	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Boron	ug/L	1,740	-	1,170	-	-	<1,000	1,470	-	1,470	-
Cadmium	ug/L	<1	-	<1	-	-	<1	<1	-	<1	-
Calcium	ug/L	432,000	-	256,000	-	-	239,000	430,000	-	424,000	-
Chromium	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Cobalt	ug/L	7.69	-	5.48	-	-	4.5	7.04	-	7.12	-
Copper	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Iron	ug/L	-	-	-	-	-	-	-	-	-	-
Lead	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Lithium	ug/L	<50	-	<50	-	-	<50	<50	-	<50	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L	<0.2	-	<0.2	-	-	<0.2	<0.2	-	<0.2	-
Molybdenum	ug/L	<2	-	<2	-	-	<2	<2	-	2.36	-
Nickel	ug/L	4.01	-	2.59	-	-	<2	3.11	-	3.38	-
Potassium	ug/L	-	-	-	-	-	-	-	-	-	-
Selenium	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Silver	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Sodium	ug/L	-	-	-	-	-	-	-	-	-	-
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<2	-	<2	-	-	<2	<2	-	<2	-
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<4	-	<4	-	-	<4	<4	-	<4	-
Zinc	ug/L	<25	-	<25	-	-	<25	<25	-	<25	-
Radiological Parameters											
Radium-226	pCi/L	-	0.0578 +/-()UJ ++	-	0.0813 +/-() ++	0.0107 +/-()< ++	-	-	0.151 +/-(0.170)U	-	0.155 +/-(0.179)U
Radium-228	pCi/L	-	0.218 +/-()U ++	-	0.432 +/-()U* ++	0.0853 +/-()< ++	-	-	0.469 +/-(0.203)	-	0.418 +/-(0.216)
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-
Anions											
Chloride	mg/L	8.08	-	4.01	-	-	3.54	7.29	-	7.30	-
Fluoride	mg/L	<0.100	-	0.174	-	-	0.151	<0.100	-	0.123	-
Sulfate	mg/L	994	-	523	-	-	455	936 J	-	946 J	-
General Chemistry											
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	-	-	-
pH (field)	SU	6.27	-	6.54	-	-	6.39	-	-	-	-
Total Dissolved Solids	mg/L	1,870	-	1,080	-	-	959	1,780	-	1,760	-

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3											
Sample Date		5-Sep-18	5-Sep-18	5-Sep-18	5-Sep-18	4-Dec-18	21-Feb-19	27-Feb-19	11-Mar-19	11-Mar-19	21-Mar-19	27-Mar-19	27-Mar-19
Sample ID		KIF-AD-3-GW-090518-A	KIF-AD-3-GW-090518-B	KIF-AD-3-AW-090518-A	KIF-AD-3-AW-090518-B	KIF-AD3-GW-120418	KIF-GW-008-02212019	KIF-GW-008-02272019	KIF-AD3-GW-031119	KIF-AD3-AW-031119	KIF-GW-008-03212019	KIF-GW-008-03272019	KIF-GW-903-03272019
Parent Sample ID				KIF-AD-3-GW-090518-A	KIF-AD-3-GW-090518-B					KIF-AD3-GW-031119			KIF-GW-008-03272019
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	-	-	-	-	-	<12.5	<12.5	-	-	<12.5	<12.5	<12.5
Antimony	ug/L	2 UJ	-	2 UJ	-	<2	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1 UJ	-	1 UJ	-	<2	<0.323	<0.323	<0.323	<0.323	0.43 U*	0.409 J	0.346 J
Barium	ug/L	<200	-	<200	-	27.8	20.5	22.2	18.2	17.1	20.5	19.4	17.7
Beryllium	ug/L	<1	-	<1	-	<2	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	1,790	-	1,770	-	1,030	731	838	751	783	661	711	662
Cadmium	ug/L	<1	-	<1	-	<1	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	357,000	-	362,000	-	387,000	349,000	387,000	296,000	293,000	345,000	325,000	300,000
Chromium	ug/L	<2	-	<2	-	<2	<1.53	<1.53	<1.53	<1.53	1.83 U*	2.3	1.79 J
Cobalt	ug/L	6.46 J	-	6.75 J	-	7.98	7.05	7.75	6.66	6.71	8.02	7.17	6.63
Copper	ug/L	14.4 J	-	8.68 J	-	<2	<0.627	<0.627	<0.627	<0.627	0.689 J	<0.627	<0.627
Iron	ug/L	-	-	-	-	-	81.4	85.1 U*	-	-	127	165 U*	181 U*
Lead	ug/L	<1	-	<1	-	<2	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	6.92	-	7.42	-	<50	11.1	10.7	10.5	10.6	9.61	10.6	9.96
Magnesium	ug/L	-	-	-	-	-	51,000	53,300	-	-	51,000	48,400	43,900
Manganese	ug/L	-	-	-	-	-	12,900	13,600	-	-	12,700	10,900	10,100
Mercury	ug/L	<0.2	-	<0.2	-	<0.2	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	5 UJ	-	5 UJ	-	<2	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	3.75 J	-	3.79 J	-	3.15	2.82	3.08	2.59	2.53	3.09	2.95	2.64
Potassium	ug/L	-	-	-	-	-	5,250	5,260	-	-	4,950	4,940	4,510
Selenium	ug/L	<5	-	<5	-	<2	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	<1	-	<1	-	<2	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Sodium	ug/L	-	-	-	-	-	6,400	6,950	-	-	6,210	5,860	5,380
Strontium	ug/L	-	-	-	-	-	1,700	1,450	-	-	1,430	1,580	1,450
Thallium	ug/L	<1	-	<1	-	<2	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.99 U*	-	1.61 U*	-	<4	<0.899	<0.899	1.07 U*	1.08 U*	1.65 U*	1.21	0.994 J
Zinc	ug/L	6,570 J	-	5 J	-	<25	<3.22	<3.22	<3.22	<3.22	8.73	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	-	0.202 +/-(0.0774)U*	-	0.191 +/-(0.0763)U*	0.0510 +/-(0.0639)U	0.0862 +/-(0.0622)U*	0.0231 +/-(0.0409)U	0.0389 +/-(0.0617)U	0.0761 +/-(0.0564)	-0.00394 +/-(0.0469)U	0.00659 +/-(0.0432)U	0.0376 +/-(0.0570)U
Radium-228	pCi/L	-	0.370 +/-(0.225)U*	-	0.0790 +/-(0.187)U	0.354 +/-(0.233)U*	0.128 +/-(0.266)U	0.297 +/-(0.220)U	0.190 +/-(0.225)U	0.386 +/-(0.228)	0.422 +/-(0.262)U*	0.433 +/-(0.273)	0.260 +/-(0.312)U
Radium-226+228	pCi/L	-	-	-	-	-	0.214 +/-(0.273)U*	0.320 +/-(0.224)U	-	-	0.422 +/-(0.266)U*	0.440 +/-(0.276)J	0.297 +/-(0.317)U
Anions													
Chloride	mg/L	7.39	-	7.37	-	1.83	2.25	2.93	1.99	1.90	1.71	1.76	1.73
Fluoride	mg/L	<0.100	-	<0.100	-	0.150	0.139	0.135	0.124 U*	0.125 U*	0.118	0.120	0.120
Sulfate	mg/L	900	-	912	-	932	831	874	772	788	710	746	754
General Chemistry													
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	302	324	-	-	311	323	292
Alkalinity, Carbonate	mg/L	-	-	-	-	-	<5.00	<5.00	-	-	<5.00	<5.00	<5.00
pH (field)	SU	6.41	-	-	-	6.67	6.78	6.71	6.54	-	6.72	6.61	-
Total Dissolved Solids	mg/L	1,810	-	1,810	-	1,750	1,470	1,600	1,370	1,370	1,420	1,470	1,400

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3												
Sample Date		3-Apr-19	17-Jun-19	20-Aug-19	20-Aug-19	12-Sep-19	12-Sep-19	18-Sep-19	18-Sep-19	10-Oct-19	10-Oct-19	6-Nov-19	6-Nov-19	20-Nov-19
Sample ID		KIF-GW-008-04032019	KIF-AD3-GW-061719	KIF-GW-008-08202019	KIF-GW-903-08202019	KIF-GW-008-09122019	KIF-GW-903-09122019	KIF-GW-008-09182019	KIF-GW-903-09182019	KIF-GW-008-10102019	KIF-GW-903-10102019	KIF-GW-008-11062019	KIF-GW-903-11062019	KIF-GW-008-11202019
Parent Sample ID					KIF-GW-008-08202019		KIF-GW-008-09122019		KIF-GW-008-09182019		KIF-GW-008-10102019		KIF-GW-008-11062019	
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals														
Aluminum	ug/L	69.8	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	18.4 J	<12.5	<12.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.323	0.469 J	0.625 U*	0.651 U*	<0.323	<0.323	<0.323	<0.323	<0.323	0.472 J	0.372 U*	0.410 U*	0.795 J
Barium	ug/L	17.6	20.1	19.9	20.2	20.3	22.1	17.2	17.5	19.6	18.9	20.8	19.4	17.8
Beryllium	ug/L	<0.155	0.205 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.241 U*	<0.182	<0.182	<0.182
Boron	ug/L	698	1,470	1,680	1,670	1,650	1,710	1,600	1,610	1,620	1,520	1,070	1,030	1,100
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.150 J	<0.125	<0.125	<0.125
Calcium	ug/L	365,000	390,000	351,000	362,000	353,000	372,000	364,000	367,000	399,000	391,000	339,000	336,000	354,000
Chromium	ug/L	<1.53	2.58	4.10 U*	3.84 U*	<1.53	<1.53	<1.53	<1.53	<1.53	1.86 J	1.72 U*	2.08 U*	<1.53
Cobalt	ug/L	7.26	7.89	6.27	6.46	6.47	6.99	5.59	6.34	6.46	6.30	6.41	6.20	6.52
Copper	ug/L	<0.627	1.36 U*	0.872 J	1.05 J	0.645 J	<0.627	3.92 U*	4.84 U*	<0.627	<0.627	0.819 U*	0.862 U*	<0.627
Iron	ug/L	180 U*	31.3 J	26.4 J	22.8 J	78.1	78.3	45.9 J	49.3 J	107 J	38.5 J	58.7	41.5 J	54.4
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.136 J	<0.128	<0.128	<0.128
Lithium	ug/L	11.9 U*	7.43	8.78 U*	9.22 U*	8.91 U*	12.1 U*	4.92 J	4.66 J	5.90	6.60	11.9	12.1	13.9
Magnesium	ug/L	46,800	57,300	57,000	57,400	53,800	56,900	52,600	54,200	61,200	60,100	51,900	50,300	49,500
Manganese	ug/L	13,600	13,000	13,100	13,100	11,700	12,300	12,000	12,300	12,300	12,100	10,600	10,400	10,700
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.101 UJ	0.101 UJ	<0.101
Molybdenum	ug/L	<0.61	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.769 J
Nickel	ug/L	2.43	4.09	3.70	3.64	3.60	3.74	3.23	3.34	3.71	3.60	3.48	3.55	4.68 U*
Potassium	ug/L	4,600	4,000	3,990	4,100	4,070	4,360	3,820	3,900	4,350	4,230	5,090	5,000	4,930
Selenium	ug/L	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	5,350	8,930	9,390	9,600	8,750	9,130	8,390	8,630	10,300	10,100	6,960	6,970	6,420
Strontium	ug/L	1,550	925	770	773	694	735	589	605	637	606	1,140	1,110	1,240
Thallium	ug/L	<0.128	<0.128	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.253 U*	<0.148	<0.148	0.941 J
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.899	1.35	2.47 U*	2.45 U*	<0.991	<0.991	1.10 U*	1.29 U*	<0.991	1.15	1.14 U*	1.31 U*	<0.991
Zinc	ug/L	15.4	4.30 J	3.38 J	3.84 J	3.47 U*	4.68 U*	3.29 J	3.53 J	4.55 U*	<3.22	<3.22	<3.22	3.31 U*
Radiological Parameters														
Radium-226	pCi/L	0.0235 +/-(0.0465)U	-0.00990 +/-(0.0539)UJ	0.586 +/-(0.606)U	0.0328 +/-(0.340)U	0.519 +/-(0.426)U	0.394 +/-(0.465)U	0.023 +/-(0.452)UJ	0.321 +/-(0.400)UJ	0.108 +/-(0.487)U	0.418 +/-(0.579)U	0.277 +/-(0.435)U	0.365 +/-(0.475)U	0.239 +/-(0.332)U
Radium-228	pCi/L	0.478 +/-(0.300)	0.586 +/-(0.280)	0.182 +/-(0.523)U	0.514 +/-(0.539)U	-0.0363 +/-(0.363)U	-0.0982 +/-(0.386)U	-0.237 +/-(0.377)U	0.0704 +/-(0.238)U	-0.071 +/-(0.431)U	0.179 +/-(0.522)U	-0.148 +/-(0.345)U	-0.403 +/-(0.365)U	0.525 +/-(0.404)U
Radium-226+228	pCi/L	0.502 +/-(0.304)J	0.586 +/-(0.285)J	0.768 +/-(0.800)U	0.547 +/-(0.637)U	0.519 +/-(0.560)U	0.394 +/-(0.604)U	0.023 +/-(0.588)UJ	0.392 +/-(0.466)UJ	0.108 +/-(0.650)U	0.597 +/-(0.780)U	0.277 +/-(0.555)U	0.365 +/-(0.599)U	0.764 +/-(0.523)U
Anions														
Chloride	mg/L	<1.79	7.41	7.63	7.22	8.01	7.69	7.61	7.67	7.65	7.57	1.97 U*	1.85 U*	2.13
Fluoride	mg/L	0.146 J	0.0813 J	0.0821 U*	0.0799 U*	0.0716 J	0.0754 J	0.0723 U*	0.0686 U*	0.0768 J	0.0716 J	0.118 U*	0.112 U*	0.128
Sulfate	mg/L	745 J	926	910	913	940 J	872 J	931 J	916 J	927 J	864 J	783	781	745
General Chemistry														
Alkalinity, Bicarbonate	mg/L	302	-	327	326	324	329	339	339	354	351	308	309	325
Alkalinity, Carbonate	mg/L	<5.00	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.77	6.35	6.49	-	6.46	-	6.50	-	6.71	-	6.79	-	6.77
Total Dissolved Solids	mg/L	1,480	1,700	1,730	1,860	1,660	1,670	1,760	1,740	1,680	1,880	1,480	1,440	1,470

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3											
Sample Date		18-Dec-19	8-Jan-20	19-Feb-20	10-Jun-20	1-Sep-20	9-Dec-20	9-Dec-20	25-Jan-21	4-Mar-21	11-Jun-21	11-Jun-21	21-Jul-21
Sample ID		KIF-GW-AD3-121819	KIF-GW-008-01082020	KIF-GW-008-02192020	KIF-GW-008-06102020	KIF-GW-008-09012020	KIF-GW-AD3-120920	KIF-AW-AD3-120920	KIF-GW-AD-3-01252021	KIF-GW-AD-3-03042021	KIF-GW-AD-3-06112021	KIF-GW-FD02-06112021	KIF-GW-AD-3-07212021
Parent Sample ID								KIF-GW-AD3-120920				KIF-GW-AD-3-06112021	
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	-	<12.5	<12.5	<12.5	<12.5	-	-	<12.5	<12.5	-	-	<12.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.485 U*	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.323	0.954 U*	<0.313	0.360 U*	<0.313	<0.313	<0.313	<0.313	<0.313	<0.313	<0.313	<0.313
Barium	ug/L	20.4	21.8	15.8	19.5 U*	19.1	18.0	18.1	16.1	13.1	24.1	22.7	21.1
Beryllium	ug/L	<0.182	0.614 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	867	891	615	848	1,670	641	687	486	420	879	832	1,030
Cadmium	ug/L	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	385,000	393,000	302,000	364,000	386,000	379,000	372,000	343,000	282,000	378,000	386,000	382,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	8.47	6.69	5.34	6.92	6.75	6.46	6.51	5.10	4.52	8.52	8.27	6.50
Copper	ug/L	<0.627	0.852 U*	0.738 J	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	-	44.7 U*	<19.5	43.2 J	20.2 J	-	-	<19.5	41.1 U*	-	-	39.5 J
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	18.0 U*	22.1	13.2	12.7	6.01	13.9	14.1	12.2	12.0	10.3	9.93	7.86
Magnesium	ug/L	-	56,300	41,200	46,800	49,700	-	-	42,200	33,800	-	-	48,400
Manganese	ug/L	-	11,400	9,770	11,100	12,200	-	-	9,000	6,980	-	-	11,100
Mercury	ug/L	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	3.43	4.55 U*	2.01	2.83	3.04	2.52	2.42	2.04	1.78	2.85	2.94	2.89
Potassium	ug/L	-	5,360	4,360	5,020	4,450	-	-	4,930	4,390	-	-	4,560
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	-	5,680	4,780	5,920	7,610	-	-	3,960	3,320	-	-	7,040
Strontium	ug/L	-	1,640	1,160	1,410	1,040	-	-	1,470	1,210	-	-	1,260
Thallium	ug/L	<0.148	<0.148	0.382 U*	<0.148	<0.148	<0.148	0.218 J	<0.148	<0.148	<0.148	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	<3.22	<3.22	<3.22	3.39 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	0.307 +/-(0.490)U	0.430 +/-(0.433)U	0.442 +/-(0.573)U	0.218 +/-(0.329)U	-0.133 +/-(0.189)U	0.269 +/-(0.479)U	0.147 +/-(0.418)U	0.497 +/-(0.473)U	0.551 +/-(0.554)U	0.230 +/-(0.281)U	0.247 +/-(0.344)U	0.225 +/-(0.347)U
Radium-228	pCi/L	0.228 +/-(0.308)U	0.344 +/-(0.341)U	0.102 +/-(0.305)U	0.244 +/-(0.299)U	0.0733 +/-(0.463)U	0.368 +/-(0.412)U	0.0901 +/-(0.279)U	-0.359 +/-(0.318)U	0.293 +/-(0.385)U	0.345 +/-(0.276)U	0.201 +/-(0.272)U	0.178 +/-(0.262)U
Radium-226+228	pCi/L	0.535 +/-(0.579)U	0.774 +/-(0.551)U	0.544 +/-(0.649)U	0.462 +/-(0.445)U	0.0733 +/-(0.500)U	0.637 +/-(0.632)U	0.237 +/-(0.503)U	0.497 +/-(0.570)U	0.844 +/-(0.674)U	0.575 +/-(0.394)U	0.448 +/-(0.439)U	0.403 +/-(0.434)U
Anions													
Chloride	mg/L	3.30	3.79	2.80	4.75	7.67	3.14	3.17	3.99	2.53	7.07	6.68	8.65
Fluoride	mg/L	0.120	0.105	0.113	0.151	0.134 U*	0.136	0.141	0.167	0.127	0.127	0.119	0.110
Sulfate	mg/L	925	900	696 J	841	824	1,130 J	1,020 J	1,000	619	810	828	875
General Chemistry													
Alkalinity, Bicarbonate	mg/L	270	244	199	277	313	238	236	208	193	290	286	334
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.58	6.86	6.64	6.58	6.59	6.57	-	6.74	6.81	6.68	-	6.70
Total Dissolved Solids	mg/L	1,600	1,620	1,210	1,500	1,600	1,540	1,510	1,360	1,110	1,530	1,550	1,580

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		AD-3										
Sample Date		25-Aug-21	25-Aug-21	8-Nov-21	8-Nov-21	8-Feb-22	23-Mar-22	10-Jun-22	5-Aug-22	27-Sep-22	30-Nov-22	30-Nov-22
Sample ID		KIF-GW-AD-3-08252021	KIF-GW-FD02-08252021	KIF-GW-AD-3-11082021	KIF-GW-FD-11082021	KIF-GW-AD-3-02082022	KIF-GW-AD-3-03232022	KIF-GW-AD-3-06102022	KIF-GW-AD-3-08052022	KIF-GW-AD-3-09272022	KIF-GW-AD-3-11302022	KIF-GW-FD01-11302022
Parent Sample ID			KIF-GW-AD-3-08252021		KIF-GW-AD-3-11082021							KIF-GW-AD-3-11302022
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	CCR Program	CCR Program	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program			
Total Metals												
Aluminum	ug/L	<12.5	<12.5	-	-	<15.5	<15.5	-	<15.5	<15.5	-	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.506	<0.506	<0.506	<0.506	0.533 U*	<0.506	0.628 U*
Arsenic	ug/L	<0.313	<0.313	<0.313	<0.313	<0.282	0.371 U*	<0.282	<0.282	<0.282	<0.282	<0.282
Barium	ug/L	19.6	19.8	19.0	19.4	13.4	12.5	18.6	21.0	19.5 J	19.0	19.9
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.274	<0.274	<0.274	<0.274	<0.274	<0.274	<0.274
Boron	ug/L	1,430	1,380	639	750	361	379 U*	600	1,180	1,320	712	883
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	393,000	392,000	334,000	342,000	264,000	184,000	279,000	380,000	351,000	323,000	333,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6.42	6.62	5.32	5.48	3.55	2.74	4.78	5.87	5.20	4.80	5.04
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14
Iron	ug/L	20.9 J	38.7 J	-	-	<27.7	<27.7	-	<27.7	<27.7	-	-
Lead	ug/L	<0.128	<0.128	<0.128	0.133 U*	<0.167	0.183 J	<0.167	<0.167	<0.167	<0.167	<0.167
Lithium	ug/L	7.18	7.26	15.0	15.4	9.19	8.28	11.4	7.16	6.78	10.4	11.3
Magnesium	ug/L	54,700	54,000	-	-	31,400	23,400	-	53,000	50,100	-	-
Manganese	ug/L	11,200	11,000	-	-	5,680	4,080	-	10,200	9,360	-	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	2.69	2.65	2.36	2.47	1.61 U*	1.14	2.17 U*	2.71	2.43	2.27	2.41
Potassium	ug/L	4,500	4,520	-	-	4,400	3,960	-	4,920	4,490	-	-
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<0.739	<0.739	<0.739	<0.739	<0.739	<0.739	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.223	<0.223	<0.223	<0.223	<0.223	<0.223	<0.223
Sodium	ug/L	7,950	7,730	-	-	3,100	2,720	-	7,600	7,530	-	-
Strontium	ug/L	1,180	1,180	-	-	1,140	919	-	1,240	987	-	-
Thallium	ug/L	0.179 J	<0.148	<0.148	0.411 U*	<0.472	<0.472	<0.472	<0.472	<0.472	<0.472	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.776	<0.776	<0.776	<0.776	<0.776	<0.776	<0.776
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<2.88	<2.88	3.71 U*	<2.88	4.06 J	3.53 J	<2.88
Radiological Parameters												
Radium-226	pCi/L	0.324 +/-(0.522)U	0.482 +/-(0.562)U	-0.0965 +/-(0.225)U	0.286 +/-(0.389)U	-0.137 +/-(0.208)U	0.0578 +/-(0.189)U	0.139 +/-(0.352)U	0.0839 +/-(0.317)U	0.112 +/-(0.486)U	-0.165 +/-(0.185)UJ	0.749 +/-(0.529)J
Radium-228	pCi/L	0.738 +/-(0.654)U	0.417 +/-(0.356)U	-0.188 +/-(0.356)U	0.270 +/-(0.298)U	0.285 +/-(0.359)UJ	0.248 +/-(0.315)U	0.223 +/-(0.466)U	-0.0608 +/-(0.468)U	-0.127 +/-(0.412)U	0.0660 +/-(0.490)U	0.214 +/-(0.352)U
Radium-226+228	pCi/L	1.06 +/-(0.837)U	0.898 +/-(0.665)U	0.000 +/-(0.421)U	0.557 +/-(0.490)U	0.285 +/-(0.415)UJ	0.306 +/-(0.367)U	0.362 +/-(0.584)U	0.0839 +/-(0.565)U	0.112 +/-(0.637)U	0.0660 +/-(0.524)UJ	0.963 +/-(0.636)J
Anions												
Chloride	mg/L	8.66	8.42 J	1.76	1.59 J	2.09	2.02	2.60	8.24	8.16	2.35	2.30
Fluoride	mg/L	0.142 U*	0.154	0.286	0.192	0.145	0.214 U*	0.171	0.0515 J	0.120 U*	0.145	0.142
Sulfate	mg/L	878	854	819 J	714 J	553	411	657 J	795	807	674	676
General Chemistry												
Alkalinity, Bicarbonate	mg/L	325	323	273	276	213	181	270	320	303	274	268
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<2.60	<5.00	<5.00
pH (field)	SU	6.59	-	6.60	-	7.20	7.08	6.68	6.68	6.75	6.74	-
Total Dissolved Solids	mg/L	1,630	1,670	1,360	1,340	1,090	787	1,300	1,590	1,570	1,350	1,340

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		GW-2							KIF-103				
Sample Date		21-Jun-19	21-Aug-19	23-Oct-19	18-Dec-19	19-Feb-20	21-Apr-20	21-Apr-20	23-Jan-19	23-Jan-19	31-Jan-19	6-Feb-19	13-Feb-19
Sample ID		KIF-GW-027-06212019	KIF-GW-027-20190821	KIF-GW-027-20191023	KIF-GW-027-20191218	KIF-GW-027-02192020	KIF-GW-027-20200421	KIF-GW-DUP01-20200421	KIF-GW-031-01232019	KIF-GW-903-01232019	KIF-GW-031-01312019	KIF-GW-031-02062019	KIF-GW-031-02132019
Parent Sample ID								KIF-GW-027-20200421		KIF-GW-031-01232019			
Sample Depth		21.8 ft	21.8 ft	21.8 ft	21.8 ft	21.8 ft	21.8 ft	21.8 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	EIP	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	-	-	-	-	-	-	-	<11.8	<11.8	<12.5	<12.5	<12.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	1.07 U*	1.11 U*	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	ug/L	0.338 J	0.574 U*	0.377 J	<0.323	<0.313	<0.313	0.336 J	1.85	2.02	2.25	2.19	2.33
Barium	ug/L	31.9	45.3	49.3	33.7	19.9	20.6	20.3	36.8	40.2	39.6	44.8	46.9
Beryllium	ug/L	0.267 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.155	<0.155	<0.155
Boron	ug/L	147 U*	273 U*	367	167	77.3 J	70.6 U*	105 U*	886	935	1,050	1,010	907
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	10,000	14,300	15,900	10,600	5,160	5,370	4,960	33,100	36,100	28,700	34,400	35,200
Chromium	ug/L	2.55 U*	4.19 U*	4.09 U*	<1.53	<1.53	<1.53	<1.53	1.32 U*	1.57 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	0.0820 J	0.0760 J	<0.0750	<0.0750	<0.134	<0.134	<0.134	58.3	63.8	65.3	67.8	69
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	0.775 U*	1.27 U*	<1.3	<1.3	<0.627	<0.627	<0.627
Iron	ug/L	-	-	-	-	-	-	-	38,400	39,500	36,000	40,000	41,900
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	0.151 U*	<0.128	<0.128
Lithium	ug/L	3.65 J	<3.39	<3.39	<3.39	<3.39	<3.39	4.96 J	<2.56	<2.56	<3.14	<3.14	<3.14
Magnesium	ug/L	3,320	4,720	5,420	3,480	1,750	1,690	1,620	11,400	12,500	10,100	12,100	13,100
Manganese	ug/L	-	-	-	-	-	-	-	13,700	15,200	15,200	15,800	16,300
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.61	<0.61	<0.61
Nickel	ug/L	<0.312	0.377 J	0.885 J	<0.336	<0.336	<0.336	<0.336	2.87	3.01	2.81	3.03	3.15
Potassium	ug/L	2,200	2,280	2,570	2,320	1,630	1,660	1,630	1,060	1,150	947	1,070	1,270
Selenium	ug/L	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<2.62	<2.62	<2.62
Silver	ug/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	0.284 J
Sodium	ug/L	1,910	1,840	11,400 J	2,070	1,440	1,400	1,400	4,880	5,210	4,400	4,970	5,730
Strontium	ug/L	-	-	-	-	-	-	-	78.6	85.5	79.3	87.3	89.7
Thallium	ug/L	<0.128	<0.148	<0.148	<0.148	0.410 U*	<0.148	<0.148	<0.063	<0.063	<0.128	<0.128	<0.128
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.41 U*	2.34 U*	1.66	<0.991	<0.991	<0.991	<0.991	<0.899	<0.899	<0.899	<0.899	<0.899
Zinc	ug/L	<3.22	3.24 J	<56.7	<3.22	<3.22	<3.22	<3.22	5.9	3.79 J	7.54	3.78 J	3.79 J
Radiological Parameters													
Radium-226	pCi/L	0.00721 +/-(0.0480)U	0.121 +/-(0.476)U	0.591 +/-(0.472)U	0.335 +/-(0.502)U	0.0798 +/-(0.530)U	0.634 +/-(0.579)U	0.301 +/-(0.459)U	0.0256 +/-(0.0385)UJ	0.110 +/-(0.0616)J	0.0896 +/-(0.0680)U	0.128 +/-(0.0705)	0.151 +/-(0.0871)
Radium-228	pCi/L	-0.0302 +/-(0.266)U	0.242 +/-(0.492)U	0.00831 +/-(0.233)U	0.200 +/-(0.273)U	-0.258 +/-(0.214)U	0.102 +/-(0.276)U	-0.0308 +/-(0.342)U	0.529 +/-(0.267)J	0.446 +/-(0.252)J	0.289 +/-(0.207)U	0.168 +/-(0.213)UJ	0.0899 +/-(0.225)U
Radium-226+228	pCi/L	0.00721 +/-(0.270)U	0.362 +/-(0.684)U	0.600 +/-(0.527)U	0.536 +/-(0.572)U	0.0798 +/-(0.571)U	0.736 +/-(0.641)U	0.301 +/-(0.572)U	0.555 +/-(0.270)J	0.557 +/-(0.259)J	0.378 +/-(0.218)U	0.295 +/-(0.224)J	0.241 +/-(0.241)J
Anions													
Chloride	mg/L	1.44	1.61	1.84 U*	1.41	1.57	1.24	1.23	6.48	6.34	6.16	6.18	6.00
Fluoride	mg/L	0.0416 U*	0.0539 U*	0.0680 J	0.0512 J	0.0364 J	0.0715 U*	0.0763 U*	0.0553 J	0.0553 J	<0.0263	<0.0263	0.0284 J
Sulfate	mg/L	21.9	30.0	35.2	18.8	14.1 J	12.3	12.2	102	100	90.6	90.5	89.3
General Chemistry													
Alkalinity, Bicarbonate	mg/L	34.6	25.1	33.8	37.6	7.77	7.85	7.64	115	113	125	124	166
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.89	5.97	6.07	6.11	5.28	5.72	-	5.97	-	5.55	5.80	5.90
Total Dissolved Solids	mg/L	64.0	<10.0	70.0	4,950	60.0	38.0	38.0	228	235	277	198	248

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-103											
Sample Date		21-Feb-19	27-Feb-19	20-Mar-19	26-Mar-19	3-Apr-19	20-Jun-19	20-Aug-19	18-Sep-19	22-Oct-19	20-Nov-19	18-Dec-19	9-Jan-20
Sample ID		KIF-GW-031-02212019	KIF-GW-031-02272019	KIF-GW-031-03202019	KIF-GW-031-03262019	KIF-GW-031-04032019	KIF-GW-031-06202019	KIF-GW-031-20190820	KIF-GW-031-09182019	KIF-GW-031-20191022	KIF-GW-031-11202019	KIF-GW-031-20191218	KIF-GW-031-01092020
Parent Sample ID													
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	EIP	CCR Program	EIP	CCR Program	EIP	CCR Program
Total Metals													
Aluminum	ug/L	14.3 J	<12.5	<12.5	<12.5	<12.5	<12.5	-	<12.5	-	<12.5	-	<12.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	2.01	0.441 J	1.16 U*	1.09	0.773 J	1.07	3.12 U*	2.93	3.31	3.41	3.37	4.08
Barium	ug/L	46.9	45	38.2	32.9	35.4	44.1	47.6	40.3	43.9	39.6	43.1	47.2
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	886	829	742	775	948	906	903	896	991	1,010	1,140	962
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217
Calcium	ug/L	40,800	41,200	30,200	29,800	34,700	53,600	56,900	44,400	44,700	33,800	30,900	38,900
Chromium	ug/L	<1.53	<1.53	1.62 U*	<1.53	<1.53	1.53 U*	3.16 U*	<1.53	2.15 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	64.3	60.1	62.5	52.9	65.3	64.6	48.8	59.0	56.0	70.2	71.4	66.7
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	11.1 U*	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	41,200	26,200	30,100	22,900	27,000	24,500	-	40,700	-	42,400	-	48,500
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	1.12	0.617 J	<0.128	<0.128	<0.128
Lithium	ug/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	13,300	12,100	11,800	9,340	11,600	13,700	14,300	12,700	13,000	11,900	12,200	13,200
Manganese	ug/L	15,900	14,800	14,200	15,900	16,000	14,300	-	14,200	-	14,700	-	13,500
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.101 UJ
Molybdenum	ug/L	<0.61	<0.61	<0.61	2.7 U*	<0.61	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	3.24	2.98	2.59	2.45	2.22	3.13	1.88	2.56	2.74	2.77 U*	2.39	4.10 U*
Potassium	ug/L	1,320	1,340	1,050	915	1,150	1,410	1,400	1,360	1,260	1,140	1,090	1,180
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	0.128 J	0.221 J	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	5,980	5,810	5,050	4,180	4,690	6,000	6,170	5,210	5,510 J	4,690	5,200	4,930
Strontium	ug/L	106	88.7	83.8	87.9	87.9	131	-	105	-	87.2	-	103
Thallium	ug/L	<0.128	<0.128	<0.128	0.224 J	<0.128	<0.128	<0.148	<0.148	<0.148	0.160 J	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	1.30 U*	1.11 U*	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	3.63 J	9.29 U*	4.01 J	4.22 J	3.76 J	4.69 J	3.85 J	9.13	4.43 J	5.67 U*	3.86 J	3.28 J
Radiological Parameters													
Radium-226	pCi/L	0.108 +/-(0.0652)U*	0.0754 +/-(0.0589)U	0.0916 +/-(0.0754)U	0.156 +/-(0.0816)	0.105 +/-(0.0716)	0.0128 +/-(0.0382)U	0.647 +/-(0.582)U	0.277 +/-(0.341)UJ	0.0359 +/-(0.269)U	0.121 +/-(0.217)U	0.676 +/-(0.601)U	0.192 +/-(0.399)U
Radium-228	pCi/L	0.327 +/-(0.288)U	0.272 +/-(0.232)U	0.220 +/-(0.258)U	0.345 +/-(0.304)U	0.270 +/-(0.299)U	0.106 +/-(0.302)U	0.644 +/-(0.401)	-0.481 +/-(0.316)U	0.337 +/-(0.251)U	0.176 +/-(0.253)U	-0.0332 +/-(0.312)U	0.131 +/-(0.304)U
Radium-226+228	pCi/L	0.435 +/-(0.295)U*	0.347 +/-(0.239)U	0.312 +/-(0.269)U	0.500 +/-(0.315)J	0.375 +/-(0.307)J	0.119 +/-(0.304)U	1.29 +/-(0.707)J	0.277 +/-(0.465)UJ	0.372 +/-(0.368)U	0.297 +/-(0.334)U	0.676 +/-(0.677)U	0.324 +/-(0.502)U
Anions													
Chloride	mg/L	6.58	6.91	5.08	5.10	4.93	5.25	4.95	6.01	5.27	6.02	6.40	6.49
Fluoride	mg/L	0.0461 J	<0.0263	0.0376 J	0.0426 J	0.0381 J	0.0329 U*	0.0434 U*	0.0538 U*	0.0716 J	0.0348 J	0.0395 J	0.0464 J
Sulfate	mg/L	99.2	96.7	86.2	82.6	92.2 J	93.0	91.7	85.9 J	90.0	76.3	77.7	86.5
General Chemistry													
Alkalinity, Bicarbonate	mg/L	120	114	102	146	106	125	181	156	130	88.7	140	141
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.94	5.93	5.86	5.89	5.81	6.03	6.02	5.98	5.96	6.08	5.96	6.15
Total Dissolved Solids	mg/L	281	254	229	224	249	323	340	301	323	238	246	286

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-103										
Sample Date		19-Feb-20	12-Jun-20	1-Sep-20	20-Jan-21	4-Mar-21	21-Jul-21	24-Aug-21	8-Feb-22	31-Mar-22	3-Aug-22	28-Sep-22
Sample ID		KIF-GW-031-02192020	KIF-GW-031-06122020	KIF-GW-031-09012020	KIF-GW-KIF-103-01202021	KIF-GW-KIF-103-03042021	KIF-GW-KIF-103-07212021	KIF-GW-KIF-103-08242021	KIF-GW-KIF-103-02082022	KIF-GW-KIF-103-03312022	KIF-GW-KIF-103-08032022	KIF-GW-KIF-103-09282022
Parent Sample ID												
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	<15.5	<15.5	<15.5	17.9 U*
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.506	<0.506	<0.506	0.524 J
Arsenic	ug/L	3.51	2.47	4.02	3.39	3.36	4.59	4.68	3.90	1.95	0.664 J	8.33
Barium	ug/L	40.5	41.7	44.3	38.3	38.8	55.0	50.7	40.0	47.3	52.3	62.3
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.274	<0.274	<0.274	<0.274
Boron	ug/L	933	937	995	1,030	1,080	914	1,020	871	1,040	843	920
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	30,700	42,500	38,000	26,300	26,500	40,400	36,600	25,000	26,900	35,600	32,400
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	60.7	56.6	65.4	70.1	63.5	50.5	54.6	65.7	52.0	50.1	29.9
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<1.14	<1.14	<1.14	<1.14
Iron	ug/L	53,000	47,900	50,500	47,600	44,600	45,500	50,000	45,100	39,200	30,300	57,300
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.167	<0.167	<0.167	<0.167
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<0.831	<0.831	<0.831	0.864 J
Magnesium	ug/L	11,100	11,800	10,800	10,400	10,400	11,400	12,200	10,400	10,600	11,600	11,400
Manganese	ug/L	14,800	12,300	13,900	14,900	15,100	12,500	12,900	13,900	13,300	12,200	13,500
Mercury	ug/L	<0.101	0.130 UJ	<0.130	<0.130	<0.130	<0.130	0.130 UJ	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	2.66	3.29	2.86	2.44	2.72	2.14	2.00	2.06 U*	2.17	2.61	0.860 J
Potassium	ug/L	1,080	1,360	1,240	1,020	943	1,210	1,130	931	1,140	1,090	11,700
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.739	<0.739	<0.739	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.223	<0.223	<0.223	<0.223
Sodium	ug/L	4,760	4,610	4,330	4,390	4,380	4,760	4,760	4,420	8,330	6,320	6,600
Strontium	ug/L	74.1	118	115	79.6	77.5	123	106	76.4	86.5	104	108
Thallium	ug/L	0.176 U*	0.227 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.472	<0.472	<0.472	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.776	<0.776	<0.776	<0.776
Zinc	ug/L	3.42 J	<3.22	4.37 U*	3.78 J	<3.22	<3.22	3.52 J	<2.88	<2.88	6.55	4.54 U*
Radiological Parameters												
Radium-226	pCi/L	0.536 +/-(0.595)U	-0.108 +/-(0.174)U	-0.275 +/-(0.214)U	0.356 +/-(0.565)U	0.530 +/-(0.596)U	-0.150 +/-(0.282)U	0.112 +/-(0.308)U	-0.0251 +/-(0.382)U	0.0485 +/-(0.195)U	0.178 +/-(0.448)U	0.454 +/-(0.564)U
Radium-228	pCi/L	0.399 +/-(0.494)U	0.248 +/-(0.434)U	0.163 +/-(0.286)U	-0.0584 +/-(0.410)U	0.552 +/-(0.417)U	-0.150 +/-(0.236)U	-0.0500 +/-(0.479)U	-0.0611 +/-(0.319)UJ	0.158 +/-(0.372)U	0.560 +/-(0.565)U	0.0529 +/-(0.395)U
Radium-226+228	pCi/L	0.935 +/-(0.774)U	0.248 +/-(0.467)U	0.163 +/-(0.357)U	0.356 +/-(0.698)U	1.08 +/-(0.728)U	0.000 +/-(0.368)U	0.112 +/-(0.569)U	0.000 +/-(0.498)UJ	0.206 +/-(0.420)U	0.738 +/-(0.721)U	0.507 +/-(0.689)U
Anions												
Chloride	mg/L	6.16	6.94	6.12	7.22	6.59	7.47	7.01	6.81	6.93	7.02	9.35
Fluoride	mg/L	0.0345 J	0.0457 J	0.0540 U*	0.0507 J	0.0277 J	0.0541 J	0.0612 U*	0.0623 J	0.0372 U*	0.154 U*	0.102 U*
Sulfate	mg/L	77.0	81.6	76.7	79.0	73.1	71.7	66.8	77.1	74.5	66.1	56.6
General Chemistry												
Alkalinity, Bicarbonate	mg/L	98.0	168	159	134	77.3	118	125	59.2	85.0	104 J	150
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	5.00 UJ	<2.60
pH (field)	SU	5.95	6.04	5.98	5.69	5.76	6.11	-	6.17	6.12	6.06	6.31
Total Dissolved Solids	mg/L	258	296	277	238	190	260	285	237	201	277	248

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-104										
Sample Date		22-Jan-19	31-Jan-19	6-Feb-19	14-Feb-19	21-Feb-19	28-Feb-19	21-Mar-19	26-Mar-19	4-Apr-19	18-Jun-19	21-Aug-19
Sample ID		KIF-GW-032-01222019	KIF-GW-032-01312019	KIF-GW-032-02062019	KIF-GW-032-02142019	KIF-GW-032-02212019	KIF-GW-032-02282019	KIF-GW-032-03212019	KIF-GW-032-03262019	KIF-GW-032-04042019	KIF-GW-032-06182019	KIF-GW-032-20190821
Parent Sample ID												
Sample Depth		33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	EIP
Total Metals												
Aluminum	ug/L	<11.8	<12.5	15.4 J	66	<12.5	33.1	<12.5	<12.5	14.7 U*	17.3 J	-
Antimony	ug/L	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	1.36 J
Arsenic	ug/L	11.3	11.1	11.7	10.4	10.1	9.03	9.8	9.69	10.1	7.00	8.57
Barium	ug/L	81.9	89.6	111	119	113	84.8	97.7	74.5	96.3	60.2	95.8
Beryllium	ug/L	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.267 J	<0.182
Boron	ug/L	1,660	1,790	1,840	1,660	1,820	1,990	1,690	1,530	1,740	1,520	1,500
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	170,000	168,000	182,000	176,000	164,000	175,000	164,000	154,000	167,000	171,000	171,000
Chromium	ug/L	0.754 U*	<1.53	<1.53	2.01	<1.53	1.74 J	2.23 U*	<1.53	3.25 U*	3.24 U*	3.17 U*
Cobalt	ug/L	9.2	9.19	10.3	9.21	9.51	8.61	9.92	7.66	9.79	10.1	13.0
Copper	ug/L	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.808 J	1.02 J	<0.627
Iron	ug/L	138,000	126,000	158,000	167,000	181,000	177,000	171,000	132,000	187,000	168,000	-
Lead	ug/L	<0.094	<0.128	<0.128	0.22 J	<0.128	0.27 J	<0.128	<0.128	<0.128	0.128 J	<0.128
Lithium	ug/L	8.3	8.14	7.64	6.9	7.03	5.17	4.22 J	<3.14	9.35 U*	6.07	5.25 U*
Magnesium	ug/L	30,600	26,600	31,100	31,100	33,100	32,400	33,800	25,900	33,700	33,700	32,000
Manganese	ug/L	14,400	14,400	15,500	15,500	16,100	15,600	16,100	17,200	16,100	16,200	-
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	3.94 U*	3.81 J	3.83 J	3.45 J	3.16 J	3.29 J	2.67 J	2.53 U*	1.98 J	2.18 J	1.70 J
Nickel	ug/L	4.16 U*	2.2	2.77	2.51	2.34	2.72	2.4	1.32	2.23 U*	1.67	1.56
Potassium	ug/L	7,060	6,340	7,370	7,390	7,690	8,320	7,670	6,170	7,570	6,970	6,620
Selenium	ug/L	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	2.13 J
Silver	ug/L	<0.121	<0.121	<0.121	0.441 J	<0.121	0.49 U*	<0.121	<0.121	<0.121	<0.121	<0.177
Sodium	ug/L	68,000	59,400	60,500	51,400	50,900	45,400	46,500	35,700	44,000	39,600	31,000
Strontium	ug/L	858	839	937	869	1,000	907	864	891	972	874	-
Thallium	ug/L	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.08	0.927 J	<0.899	<0.899	<0.899	0.909 J	1.39 U*	<0.899	1.19	1.13 U*	1.47 U*
Zinc	ug/L	5.87 U*	4.4 J	4.32 J	10.5	4.34 J	5.21	3.88 J	<3.22	3.61 J	6.80	5.04
Radiological Parameters												
Radium-226	pCi/L	0.131 +/-(0.0712)	0.159 +/-(0.0905)	0.411 +/-(0.123)	0.151 +/-(0.0856)	0.311 +/-(0.106)J	0.0899 +/-(0.0660)	0.139 +/-(0.0913)	0.336 +/-(0.111)	0.151 +/-(0.0875)J	0.131 +/-(0.0740)J	0.627 +/-(0.603)U
Radium-228	pCi/L	0.206 +/-(0.248)UJ	0.191 +/-(0.256)U	0.803 +/-(0.304)J	0.515 +/-(0.275)	0.571 +/-(0.346)	0.248 +/-(0.255)U	0.613 +/-(0.343)U*	0.326 +/-(0.284)U	0.472 +/-(0.237)	0.315 +/-(0.268)U	-0.169 +/-(0.415)U
Radium-226+228	pCi/L	0.338 +/-(0.258)J	0.349 +/-(0.272)J	1.21 +/-(0.328)J	0.666 +/-(0.288)	0.881 +/-(0.362)J	0.338 +/-(0.263)J	0.752 +/-(0.355)J	0.661 +/-(0.305)J	0.624 +/-(0.253)J	0.446 +/-(0.278)J	0.627 +/-(0.733)U
Anions												
Chloride	mg/L	11.8	12.4	11.3	12.0	10.5	9.91	19.8	8.62	9.98	9.54	8.57
Fluoride	mg/L	0.153	0.170	0.165	0.112	0.131	0.0923 J	0.218	0.112	0.0591 J	0.0983 U*	0.0992 U*
Sulfate	mg/L	527	586	532	552	555	555	812	611	579	546	592
General Chemistry												
Alkalinity, Bicarbonate	mg/L	248	250	262	274	226	216	223	187	272	190	163
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.25	6.90	6.25	-	6.23	6.22	6.19	6.23	6.24	6.32	6.10
Total Dissolved Solids	mg/L	1,080	1,100	1,100	1,040	936	1,000	1,020	1,020	1,030	1,080	1,070

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-104											
Sample Date		25-Sep-19	25-Sep-19	23-Oct-19	22-Nov-19	17-Dec-19	9-Jan-20	20-Feb-20	11-Jun-20	31-Aug-20	25-Jan-21	5-Mar-21	20-Jul-21
Sample ID		KIF-GW-032-09252019	KIF-GW-903-09252019	KIF-GW-032-20191023	KIF-GW-032-11222019	KIF-GW-032-20191217	KIF-GW-032-01092020	KIF-GW-032-02202020	KIF-GW-032-06112020	KIF-GW-032-08312020	KIF-GW-KIF-104-01252021	KIF-GW-KIF-104-03052021	KIF-GW-KIF-104-07202021
Parent Sample ID			KIF-GW-032-09252019										
Sample Depth		33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	EIP	CCR Program	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	12.6 U*	14.1 U*	-	14.0 J	-	14.7 J	<12.5	17.8 J	28.6 J	16.3 J	19.4 J	<12.5
Antimony	ug/L	0.509 J	0.604 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	1.13 U*	0.955 J	0.573 J
Arsenic	ug/L	8.07	8.07	8.13	9.53	9.63	13.8	8.38	3.61	6.76	7.67	8.72	4.45
Barium	ug/L	112	113	137	110	155	130	179	105	143	120	185	131
Beryllium	ug/L	<0.182	<0.182	<0.182	0.427 J	<0.182	0.205 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	1,860	1,890	1,890	1,230	1,840	867	1,740	1,420	1,820	780	1,330	1,260
Cadmium	ug/L	<0.125	<0.125	<0.125	0.138 U*	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	162,000	162,000	157,000	152,000	197,000	148,000	185,000	182,000	176,000	184,000	197,000	161,000
Chromium	ug/L	1.92 U*	2.43 U*	2.43 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	10.4	10.4	10.8	15.6	14.9	26.3	11.5	16.5	13.6	25.4	15.1	13.8
Copper	ug/L	0.864 U*	1.55 U*	<0.627	0.760 J	<0.627	<0.627	<0.627	1.14 J	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	187,000	190,000	-	145,000	-	129,000	251,000	169,000	200,000	167,000	222,000	173,000
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	3.80 J	5.94	3.70 J	23.9	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	34,100	33,400	34,800	30,300	39,900	29,000	38,600	35,900	32,600	35,400	37,500	31,500
Manganese	ug/L	17,000	17,000	-	18,400	-	18,600	22,800	21,800	20,800	28,400	25,900	21,400
Mercury	ug/L	0.101 UJ	0.101 UJ	<0.101	<0.101	<0.101	0.101 UJ	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	1.34 J	1.36 J	0.945 J	0.955 J	<0.610	0.943 J	0.916 J	1.03 J	1.23 J	<0.610	<0.610	0.936 J
Nickel	ug/L	1.29	1.37	1.05	1.52	1.20 U*	2.51 U*	0.849 J	1.17	0.991 J	0.778 J	0.446 J	0.764 J
Potassium	ug/L	7,070	7,050	6,480	5,840	6,630	4,370	6,630	6,060	5,920	4,690	5,470	4,870
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	26,200	26,400	25,500 J	38,000	34,900	46,300	21,000	33,800	19,200	54,400	32,300	31,900
Strontium	ug/L	949	942	-	847	-	689	871	901	920	716	858	784
Thallium	ug/L	<0.148	<0.148	<0.148	0.323 U*	<0.148	0.754 U*	0.379 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	1.09	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	9.43 U*	9.44 U*	5.17 J	<3.22	6.99	3.37 J	3.58 J	4.87 J	3.54 J	3.92 J	3.32 J	3.27 J
Radiological Parameters													
Radium-226	pCi/L	0.810 +/-(0.672)U	0.592 +/-(0.536)U	0.880 +/-(0.564)	0.584 +/-(0.344)	0.771 +/-(0.459)	0.367 +/-(0.444)U	0.938 +/-(0.686)U*	0.0216 +/-(0.286)U	0.188 +/-(0.293)U	0.925 +/-(0.612)	0.362 +/-(0.416)U	0.383 +/-(0.357)U
Radium-228	pCi/L	0.0444 +/-(0.322)U	0.0718 +/-(0.261)U	0.736 +/-(0.406)	0.406 +/-(0.396)UJ	0.619 +/-(0.452)U	0.391 +/-(0.402)U	0.0809 +/-(0.471)U	0.102 +/-(0.269)U	0.179 +/-(0.403)U	0.188 +/-(0.383)U	0.891 +/-(0.483)U*	0.414 +/-(0.348)U
Radium-226+228	pCi/L	0.855 +/-(0.745)U	0.664 +/-(0.596)U	1.62 +/-(0.695)	0.991 +/-(0.525)J	1.39 +/-(0.644)J	0.758 +/-(0.599)U	1.02 +/-(0.832)U*	0.124 +/-(0.392)U	0.368 +/-(0.498)U	1.11 +/-(0.721)J	1.25 +/-(0.638)U*	0.796 +/-(0.498)U
Anions													
Chloride	mg/L	8.44	8.65	6.42	10.1	10.6	11.4	7.34	10.7	7.71	16.2	10.7	11.0
Fluoride	mg/L	0.0711 U*	0.0569 U*	0.0928 J	0.0388 J	0.0949 J	0.0820 J	0.0305 J	0.0587 J	0.0645 U*	0.0779 J	0.0664 J	0.127
Sulfate	mg/L	543	551	563	497	439	424	722	613	644	397	666	524
General Chemistry													
Alkalinity, Bicarbonate	mg/L	244	227	79.5	244	346	326	168	225	253	388	59.9	93.2
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.09	-	6.09	6.21	6.13	6.09	6.13	6.11	5.97	5.88	6.03	6.19
Total Dissolved Solids	mg/L	1,120	1,120	1,030	913	991	971	1,280	1,080	1,190	883	1,230	1,030

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-104					KIF-105						
Sample Date		24-Aug-21	7-Feb-22	22-Mar-22	2-Aug-22	29-Sep-22	24-Jan-19	30-Jan-19	5-Feb-19	13-Feb-19	19-Feb-19	19-Feb-19	27-Feb-19
Sample ID		KIF-GW-KIF-104-08242021	KIF-GW-KIF-104-02072022	KIF-GW-KIF-104-03222022	KIF-GW-KIF-104-08022022	KIF-GW-KIF-104-09292022	KIF-GW-033-01242019	KIF-GW-033-01302019	KIF-GW-033-02052019	KIF-GW-033-02132019	KIF-GW-033-02192019	KIF-GW-903-02192019	KIF-GW-033-02272019
Parent Sample ID												KIF-GW-033-02192019	
Sample Depth		33 ft	33 ft	33 ft	33 ft	33 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program		CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	<12.5	16.5 J	<15.5	<15.5	23.8 U*	56.4	44.3	31.6 U*	41.8	45.4	48.4	35.2
Antimony	ug/L	0.481 J	<0.506	<0.506	<0.506	<0.506	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	6.06	4.80	3.59	4.93	4.23	1.05	1.21	0.728 J	0.85 J	0.74 J	1.03	0.843 J
Barium	ug/L	149	164	129	171	192	18.4	21.9	18.5	20.4	19.4	20.3	20.6
Beryllium	ug/L	<0.182	<0.274	<0.274	<0.274	<0.274	0.057 J	0.092 J	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	1,410	1,160	1,300	1,590	1,230	1,960	1,970	1,930	1,700	2,000	2,070	1,810
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	0.411 J	0.467 J	0.387 J	0.501 J	0.667 J	0.639 J	0.561 J
Calcium	ug/L	158,000	161,000	137,000	133,000	135,000	165,000	174,000	169,000	170,000	180,000	187,000	183,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	1.17 U*	1.45 U*	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	13.2	18.0	16.3	8.58	1.08	18.9	19.4	16.9	19.7	20	20.6	18.5
Copper	ug/L	<0.627	<1.14	<1.14	<1.14	<1.14	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	186,000	168,000	158,000	182,000	154,000	3,590	3,570	2,560	3,120	2,870	2,940	3,110
Lead	ug/L	<0.128	<0.167	<0.167	<0.167	<0.167	0.139 U*	0.225 U*	0.173 J	<0.128	<0.128	0.13 J	0.144 J
Lithium	ug/L	<3.39	1.71 J	<0.831	1.07 J	2.08 J	<2.56	2.66 J	<3.14	<3.14	<3.14	<3.14	3.19 J
Magnesium	ug/L	32,800	30,000	27,400	29,700	30,000	33,000	32,000	28,900	32,900	32,000	33,700	31,500
Manganese	ug/L	20,100	18,500	17,600	15,000	16,700	7,000	6,920	6,620	6,810	7,100	7,240	6,390
Mercury	ug/L	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.770 J	0.704 J	0.679 J	1.04 J	<0.610	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	0.658 J	2.21 U*	1.67	1.54	<0.517	18.8	19.4	17.4	19.2	20.1	20.6	17.9
Potassium	ug/L	5,110	5,490	5,210	6,100	53,400	13,200	13,500	12,000	13,700	12,800	13,300	13,400
Selenium	ug/L	<1.51	<0.739	<0.739	<0.739	<0.739	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	<0.177	<0.223	<0.223	<0.223	<0.223	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Sodium	ug/L	26,800	51,500	42,600	15,100	35,800	10,800	10,900	9,720	11,000	10,800	11,200	10,400
Strontium	ug/L	793	787	721	741	732	3,250	3,420	3,320	3,370	3,070	3,220	3,290
Thallium	ug/L	<0.148	<0.472	<0.472	<0.472	<0.472	0.159 J	0.173 J	0.162 J	0.193 J	0.191 J	0.205 J	0.213 J
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.776	<0.776	<0.776	<0.776	<0.899	2.43 U*	<0.899	<0.899	<0.899	<0.899	<0.899
Zinc	ug/L	<3.22	7.76	8.48 U*	10.1 U*	3.51 U*	14.8	13.4	14.5	14	15.2	15.6	13.5 U*
Radiological Parameters													
Radium-226	pCi/L	0.386 +/-(0.326)U	0.453 +/-(0.395)U	0.175 +/-(0.492)U	0.391 +/-(0.504)U	1.06 +/-(0.789)	0.0752 +/-(0.0502)	0.0696 +/-(0.0742)U	0.103 +/-(0.0615)	0.0716 +/-(0.0789)U	0.0545 +/-(0.0591)U	0.0919 +/-(0.0692)U	0.0971 +/-(0.0697)
Radium-228	pCi/L	0.271 +/-(0.503)U	0.855 +/-(0.467)J	0.570 +/-(0.329)	1.54 +/-(0.734)U*	0.513 +/-(0.318)	0.674 +/-(0.285)U*	0.240 +/-(0.211)U	0.448 +/-(0.260)	0.342 +/-(0.254)U	0.665 +/-(0.261)J	0.127 +/-(0.241)UJ	0.332 +/-(0.209)
Radium-226+228	pCi/L	0.657 +/-(0.599)U	1.31 +/-(0.611)J	0.745 +/-(0.592)J	1.93 +/-(0.890)U*	1.57 +/-(0.851)	0.749 +/-(0.289)J	0.310 +/-(0.224)U	0.551 +/-(0.267)	0.414 +/-(0.266)U	0.719 +/-(0.268)J	0.219 +/-(0.251)UJ	0.429 +/-(0.220)
Anions													
Chloride	mg/L	9.74	11.0	11.9	7.56	20.1	8.72	8.19	8.60	8.65	8.22	8.52	8.32
Fluoride	mg/L	0.0711 U*	0.0787 J	0.134 U*	0.117 U*	0.0663 U*	0.0736 U*	0.0583 J	<0.132	0.0441 J	0.0540 J	0.0547 J	<0.0263
Sulfate	mg/L	558	513	532	441	403	572	535	517	534	534	540	545
General Chemistry													
Alkalinity, Bicarbonate	mg/L	249	162	138	162 J	299	44.4	36.4	<5.00	48.0	42.0 J	32.0 J	40.0
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	5.00 UJ	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	-	6.42	5.97	6.19	6.21	5.64	5.71	5.67	5.62	5.65	-	5.61
Total Dissolved Solids	mg/L	1,090	1,020	1,070	870	922	836	868	868	806	863	883	806 J

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-105											
Sample Date		19-Mar-19	25-Mar-19	3-Apr-19	18-Jun-19	20-Aug-19	20-Aug-19	18-Sep-19	22-Oct-19	22-Oct-19	21-Nov-19	17-Dec-19	17-Dec-19
Sample ID		KIF-GW-033-03192019	KIF-GW-033-03252019	KIF-GW-033-04032019	KIF-GW-033-06182019	KIF-GW-033-20190820	KIF-GW-DUP01-20190820	KIF-GW-033-09182019	KIF-GW-033-20191022	KIF-GW-DUP01-20191022	KIF-GW-033-11212019	KIF-GW-033-20191217	KIF-GW-DUP01-20191217
Parent Sample ID							KIF-GW-033-20190820			KIF-GW-033-20191022			KIF-GW-033-20191217
Sample Depth		43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	CCR Program	CCR Program	CCR Program	State Compliance	EIP	EIP	CCR Program	EIP	EIP	CCR Program	EIP	EIP
Total Metals													
Aluminum	ug/L	37.9	32.4	27.4 J	35.6	-	-	40.3	-	-	35.9	-	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.822 U*	0.748 J	0.463 J	0.693 J	0.902 U*	1.28 U*	0.421 J	0.623 J	0.530 J	0.419 J	0.488 J	0.438 J
Barium	ug/L	18	19.2	18.4	19.1	19.9	21.9	18.1	18.2	19.5	20.1	22.5	23.7
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.182	0.485 J	0.257 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	1,790	1,700	1,800	1,760	1,770	2,040	1,830	1,910	2,020	1,750	2,150	2,090
Cadmium	ug/L	0.677 J	0.564 J	0.505 J	0.734 J	0.917 J	1.18	0.730 J	0.739 J	0.740 J	0.751 J	0.731 J	0.824 J
Calcium	ug/L	187,000	163,000	172,000	176,000	172,000	188,000	162,000	155,000	165,000	179,000	203,000	197,000
Chromium	ug/L	2.43 U*	1.82 U*	<1.53	2.73 U*	3.77 U*	4.59 U*	<1.53	1.80 U*	1.82 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	19.1	17.9	16.6	17.5	17.1	18.8	17.1	16.5	17.7	17.5	18.5	17.4
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	0.677 J	4.33 U*	<0.627	<0.627	<0.627	<0.627	1.77 J
Iron	ug/L	2,670	2,590	2,410	2,580	-	-	2,250	-	-	2,450	-	-
Lead	ug/L	0.134 J	0.132 J	<0.128	0.155 J	0.168 J	0.393 J	0.139 J	0.170 J	0.163 J	0.152 J	<0.128	0.285 J
Lithium	ug/L	<3.14	<3.14	3.28 U*	<3.14	<3.39	4.19 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	33,300	31,600	29,300	32,500	30,300	33,600	31,100	29,600	31,500	33,500	36,100	35,200
Manganese	ug/L	6,560	5,900	6,270	5,680	-	-	5,690	-	-	5,540	-	-
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	19.1	17.7	16.1	16.7	17.0	18.2	16.4	16.6	17.7	17.4	17.5	17.6
Potassium	ug/L	13,200	12,900	12,500	13,000	12,000	13,400	12,300	11,500	12,200	13,400	14,100	13,600
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<1.51	1.74 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	10,900	9,850	9,520	10,900	10,100	11,200	9,910	10,100 J	10,800 J	11,500	12,000	11,600
Strontium	ug/L	3,140	3,300	3,150	3,220	-	-	3,150	-	-	3,360	-	-
Thallium	ug/L	0.207 J	0.191 J	<0.128	0.223 J	0.282 U*	0.705 U*	0.250 J	0.197 J	0.194 J	0.232 J	0.174 J	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.69 U*	1.53 U*	<0.899	1.61 U*	2.28 U*	2.51 U*	1.36 U*	1.09	1.01	1.15 U*	<0.991	<0.991
Zinc	ug/L	14.6	13.9	12.5	16.2	14.4	16.7	15.0	14.7 J	15.7 J	17.5 U*	14.9 J	20.4 J
Radiological Parameters													
Radium-226	pCi/L	0.0766 +/-(0.0682)U	0.128 +/-(0.0746)J	0.0686 +/-(0.0581)U	0.0621 +/-(0.0654)UJ	0.0344 +/-(0.502)U	0.283 +/-(0.543)U	0.155 +/-(0.368)UJ	0.502 +/-(0.447)U	-0.0787 +/-(0.289)U	0.274 +/-(0.276)U	0.223 +/-(0.239)U	0.480 +/-(0.489)U
Radium-228	pCi/L	0.280 +/-(0.224)U	0.571 +/-(0.289)	0.146 +/-(0.265)U	0.702 +/-(0.302)U*	0.340 +/-(0.447)U	0.544 +/-(0.527)U	0.576 +/-(0.336)	0.248 +/-(0.258)U	0.107 +/-(0.241)U	0.284 +/-(0.277)U	0.337 +/-(0.369)U	0.250 +/-(0.274)U
Radium-226+228	pCi/L	0.357 +/-(0.234)U	0.700 +/-(0.298)J	0.215 +/-(0.271)U	0.764 +/-(0.309)U*	0.374 +/-(0.672)U	0.827 +/-(0.757)U	0.730 +/-(0.498)J	0.750 +/-(0.516)U	0.107 +/-(0.376)U	0.558 +/-(0.391)U	0.560 +/-(0.440)U	0.730 +/-(0.560)U
Anions													
Chloride	mg/L	7.52	7.58	6.87	8.55	6.95	7.10	8.72	7.38	7.39	6.76	8.25	8.32
Fluoride	mg/L	0.0611 J	0.0414 J	0.0484 J	0.0806 U*	0.0449 U*	0.0466 U*	0.0587 U*	0.0724 J	0.0712 J	0.0478 J	0.0483 J	0.0513 J
Sulfate	mg/L	566	570	503 J	554	564	574	546 J	577	574	513	506 J	499 J
General Chemistry													
Alkalinity, Bicarbonate	mg/L	40.6	97.4	40.6	36.9	40.7	39.1	37.4	34.6	34.7	41.3	40.6	48.6
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.59	5.63	5.60	5.54	5.53	-	5.50	5.64	-	5.77	5.75	-
Total Dissolved Solids	mg/L	829	840	832	862	863	862	908	817	840	836	802	838

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-105								
Sample Date		8-Jan-20	19-Feb-20	10-Jun-20	2-Sep-20	21-Jan-21	3-Mar-21	22-Jul-21	26-Aug-21	9-Feb-22
Sample ID		KIF-GW-033-01082020	KIF-GW-033-02192020	KIF-GW-033-06102020	KIF-GW-033-09022020	KIF-GW-KIF-105-01212021	KIF-GW-KIF-105-03032021	KIF-GW-KIF-105-07222021	KIF-GW-KIF-105-08262021	KIF-GW-KIF-105-02092022
Parent Sample ID										
Sample Depth		43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals										
Aluminum	ug/L	44.0 U*	41.6	44.2	34.3	53.8	79.2	86.3	69.3	107
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.506
Arsenic	ug/L	1.17 U*	0.366 J	0.641 U*	0.496 J	0.433 J	0.633 J	0.475 J	0.350 J	0.558 J
Barium	ug/L	23.0	19.4	18.1 U*	20.3 J	18.8	20.3	19.1	18.6 U*	18.3
Beryllium	ug/L	1.15 U*	<0.182	<0.182	0.223 J	<0.182	<0.182	0.185 J	<0.182	0.277 J
Boron	ug/L	2,250	1,850	1,690	1,680	1,660	1,970	1,820	1,980	1,870
Cadmium	ug/L	1.00	1.07	1.33	1.38 J	0.950 J	1.74	2.38	1.66	1.70
Calcium	ug/L	169,000	176,000	185,000	184,000	182,000	175,000	174,000	175,000	183,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	18.2	17.3	19.8	17.5 J	18.4	23.1	29.1	29.6	31.5
Copper	ug/L	0.770 U*	<0.627	0.801 U*	<0.627	<0.627	<0.627	<0.627	<0.627	<1.14
Iron	ug/L	2,310	2,590	2,320	2,400	2,520	3,470	3,920	4,200	4,190
Lead	ug/L	0.325 J	0.196 J	0.198 U*	0.261 J	<0.128	0.279 J	0.254 J	0.296 J	0.275 J
Lithium	ug/L	7.44	3.54 J	<3.39	3.39 UJ	<3.39	<3.39	<3.39	<3.39	3.08 J
Magnesium	ug/L	34,300	31,000	28,800	30,400	30,000	29,100	31,200	32,900	31,700
Manganese	ug/L	5,450	6,260	6,050	6,160	6,150	6,230	6,820	6,870	7,360
Mercury	ug/L	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	1.05 U*	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	20.4	17.2	18.8	16.9 J	18.1	20.9	27.0	27.3	32.9
Potassium	ug/L	12,300	11,900	11,700	11,900	12,200	11,500	11,200	10,500	10,600
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.223
Sodium	ug/L	10,900	10,600	9,360	10,500	10,100	9,350	9,700	10,100	10,100
Strontium	ug/L	3,290	3,030	3,590	3,970	3,430	3,210	3,230	3,160	3,170
Thallium	ug/L	0.975 J	0.315 U*	0.278 U*	0.430 J	0.229 J	0.499 J	0.358 U*	0.292 J	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.776
Zinc	ug/L	12.8	14.8	17.4	14.1	16.5 U*	21.7	30.1	28.0	34.0
Radiological Parameters										
Radium-226	pCi/L	0.353 +/-(0.500)U	0.814 +/-(0.641)U	-0.0711 +/-(0.156)U	0.606 +/-(0.598)U	1.41 +/-(0.889)	0.0128 +/-(0.261)U	0.434 +/-(0.390)U	0.391 +/-(0.491)U	0.856 +/-(0.621)
Radium-228	pCi/L	0.523 +/-(0.392)U	0.584 +/-(0.475)U	0.327 +/-(0.381)U	0.352 +/-(0.422)U	0.338 +/-(0.507)U	0.643 +/-(0.439)U*	0.454 +/-(0.351)U	0.134 +/-(0.382)U	0.447 +/-(0.304)
Radium-226+228	pCi/L	0.876 +/-(0.635)U	1.40 +/-(0.797)U	0.327 +/-(0.411)U	0.958 +/-(0.732)U	1.75 +/-(1.02)J	0.655 +/-(0.511)U*	0.889 +/-(0.524)U	0.525 +/-(0.623)U	1.30 +/-(0.691)
Anions										
Chloride	mg/L	9.43	9.23	9.70	9.10	11.6	11.7	16.5	15.1	18.7
Fluoride	mg/L	0.0591 J	0.0507 J	0.0470 J	0.0910 U*	0.0615 J	0.0550 J	0.0532 J	0.0923 J	0.123
Sulfate	mg/L	531	549 J	518	521	565	513	528	550	562
General Chemistry										
Alkalinity, Bicarbonate	mg/L	35.7	34.6	35.7	39.3	37.5	24.9	20.3	22.4	13.3
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.78	5.59	5.36	5.64	5.52	5.62	5.32	-	5.77
Total Dissolved Solids	mg/L	825	827	882	781	837	826	860	889	842

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-105				KIF-106							
Sample Date		30-Mar-22	4-Aug-22	4-Aug-22	28-Sep-22	24-Jan-19	29-Jan-19	5-Feb-19	12-Feb-19	12-Feb-19	19-Feb-19	26-Feb-19	26-Feb-19
Sample ID		KIF-GW-KIF-105-03302022	KIF-GW-KIF-105-08042022	KIF-GW-FD02-08042022	KIF-GW-KIF-105-09282022	KIF-GW-034-01242019	KIF-GW-034-01292019	KIF-GW-034-02052019	KIF-GW-034-02122019	KIF-GW-903-02122019	KIF-GW-034-02192019	KIF-GW-034-02262019	KIF-GW-903-02262019
Parent Sample ID				KIF-GW-KIF-105-08042022						KIF-GW-034-02122019			KIF-GW-034-02262019
Sample Depth		43 ft	43 ft	43 ft	43 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals													
Aluminum	ug/L	124	120	120	124 U*	40.9	15.5 J	<12.5	17.1 J	17.3 J	<12.5	<12.5	<12.5
Antimony	ug/L	<0.506	<0.506	<0.506	0.830 J	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.466 U*	0.419 J	0.349 J	0.548 J	0.794 J	0.76 J	0.668 J	0.845 J	0.782 J	0.747 J	0.845 J	0.789 J
Barium	ug/L	18.2	18.3	17.2	17.5	46.3	49.2	46.4	55.5	53.1	51.3	57.7	57.7
Beryllium	ug/L	0.473 J	<0.274	<0.274	0.277 J	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	1,650	1,850	1,780	1,790	314	286	306	287	273	304	300	294
Cadmium	ug/L	2.02	1.57	1.40	1.57	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	179,000	188,000	183,000	185,000	83,300	76,100	82,800	86,800	81,900	86,200	86,900	84,900
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	1.17 U*	2.24 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	33.9	30.9	29.9	31.0	3.25	3.24	3.34	3.68	3.47	3.29	3.33	3.23
Copper	ug/L	<1.14	<1.14	<1.14	<1.14	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	4,050	4,620	4,300	4,330	688	704	573	791	759	733	761	752
Lead	ug/L	0.269 J	0.226 J	0.201 J	0.322 J	<0.094	0.13 U*	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	3.19 J	2.60 J	2.72 J	3.68 J	3.82 J	3.44 J	5.24	5.05	5.15	4.99 J	4.85 J	4.68 J
Magnesium	ug/L	32,800	34,700	34,200	33,300	5,980	5,980	5,240	6,440	6,170	5,860	6,270	6,140
Manganese	ug/L	7,810	7,310	7,070	7,690	3,760	3,820	3,840	4,030	3,850	3,780	4,020	3,940
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	33.6	31.1	30.5	31.2	1.74	1.73	1.85	1.73	1.79	1.57	1.55	1.48
Potassium	ug/L	10,900	11,100	10,700	11,000	1,430	1,450	1,340	1,590	1,520	1,390	1,510	1,470
Selenium	ug/L	<0.739	<0.739	<0.739	0.883 J	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	<0.223	<0.223	<0.223	<0.223	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Sodium	ug/L	9,950	10,500	10,200	10,200	12,000	12,400	12,000	13,900	13,400	12,600	13,600	13,500
Strontium	ug/L	3,130	3,120	3,020	3,120	216	216	233	242	227	210	263	256
Thallium	ug/L	<0.472	<0.472	<0.472	0.478 J	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.776	<0.776	<0.776	<0.776	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899	<0.899
Zinc	ug/L	37.5	35.6	34.1	38.0	2.48 J	<2.42	<3.22	<3.22	3.31 J	5.05	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	0.0427 +/-(0.187)U	0.0857 +/-(0.259)U	0.337 +/-(0.307)U	0.169 +/-(0.437)U	0.0244 +/-(0.0357)U	0.0430 +/-(0.0464)UJ	-0.00893 +/-(0.0385)U	0.0143 +/-(0.0608)U	0.0228 +/-(0.0533)U	0.0539 +/-(0.0507)UJ	0.0684 +/-(0.0573)U	-0.0122 +/-(0.0363)U
Radium-228	pCi/L	0.172 +/-(0.279)U	0.362 +/-(0.472)U	0.860 +/-(0.532)	0.159 +/-(0.411)U	0.183 +/-(0.202)UJ	-0.00204 +/-(0.219)U	0.148 +/-(0.232)U	-0.00701 +/-(0.230)U	0.291 +/-(0.244)U	0.373 +/-(0.232)	0.162 +/-(0.207)U	0.144 +/-(0.244)U
Radium-226+228	pCi/L	0.214 +/-(0.336)U	0.448 +/-(0.538)U	1.20 +/-(0.614)J	0.327 +/-(0.600)U	0.208 +/-(0.205)UJ	0.0430 +/-(0.224)UJ	0.148 +/-(0.235)U	0.0143 +/-(0.238)U	0.314 +/-(0.250)U	0.427 +/-(0.237)J	0.231 +/-(0.215)U	0.144 +/-(0.247)U
Anions													
Chloride	mg/L	23.8	22.5	22.4	25.5	8.80	8.67	8.72	8.75	8.71	9.24	9.20	8.51
Fluoride	mg/L	0.0695 U*	0.0388 J	0.0420 J	0.109 U*	0.192	0.163	0.180	0.168	0.165	0.193	0.202	0.178
Sulfate	mg/L	597	557	551	601	101	102	101	97.5	98.0	106	109	99.0
General Chemistry													
Alkalinity, Bicarbonate	mg/L	12.0	14.8 J	15.0 J	13.4	170	220	143	180	176	156	162	164
Alkalinity, Carbonate	mg/L	<5.00	5.00 UJ	5.00 UJ	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	5.16	5.19	-	5.24	6.67	6.63	6.78	6.67	-	6.75	6.69	-
Total Dissolved Solids	mg/L	860	919	938	890	317	311	305	318	315	309	319	328

See notes on last page.

Stantec

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location							KIF-106					
Sample Date		19-Mar-19	25-Mar-19	2-Apr-19	2-Apr-19	19-Jun-19	20-Aug-19	17-Sep-19	24-Oct-19	21-Nov-19	21-Nov-19	17-Dec-19
Sample ID		KIF-GW-034-03192019	KIF-GW-034-03252019	KIF-GW-034-04022019	KIF-GW-903-04022019	KIF-GW-034-06192019	KIF-GW-034-20190820	KIF-GW-034-09172019	KIF-GW-034-20191024	KIF-GW-034-11212019	KIF-GW-903-11212019	KIF-GW-034-20191217
Parent Sample ID					KIF-GW-034-04022019						KIF-GW-034-11212019	
Sample Depth		38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	EIP	CCR Program	EIP	CCR Program	CCR Program	EIP
Total Metals												
Aluminum	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	-	14.1 J	-	<12.5	13.5 J	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.904 U*	0.777 J	0.89 J	0.991 J	0.768 J	1.36 U*	0.992 J	1.05	0.852 J	0.895 J	0.818 J
Barium	ug/L	47.1	43.9	45.6	46.5	44.3	52.3	49.7	52.8	46.0	47.9	54.9
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	276	248	293	298	272	366	263	307	368 J	270 J	378
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	0.159 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	82,300	71,200	75,700	76,700	81,000	83,400	80,500	75,200	78,600	78,100	89,600
Chromium	ug/L	2.55 U*	1.84 U*	2.32 U*	2.61 U*	<1.53	4.48 U*	1.99 J	1.67 U*	1.64 J	1.55 J	<1.53
Cobalt	ug/L	3.39	2.99	3.45	3.5	3.06	2.87	2.68	2.84	2.97	2.84	3.01
Copper	ug/L	0.699 J	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	714	698	741 U*	742 U*	832	-	1,060	-	1,110	1,270	-
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	0.187 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	5.64	3.54 J	3.33 U*	3.75 U*	4.20 J	5.86 U*	5.61	5.25	5.67	5.33	4.37 J
Magnesium	ug/L	5,830	5,070	5,420	5,520	5,680	5,610	5,540	5,230	5,580	5,560	6,000
Manganese	ug/L	3,690	3,200	3,430	3,490	3,410	-	3,440	-	3,420	3,620	-
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.61	1.5	1.53	1.57	1.40	1.58	1.31	1.31	1.40	1.29	1.52 U*
Potassium	ug/L	1,540	1,330	1,400	1,440	1,410	1,290	1,390	1,330	1,520	1,480	1,590
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	13,300	11,100	13,100	13,300	14,200	13,900	13,900	20,600	14,800	14,600	15,900
Strontium	ug/L	213	207	228	233	225	-	254	-	226	222	-
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	0.239 U*	<0.148	<0.148	0.161 J	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.84 U*	1.63 U*	1.23 U*	1.45 U*	0.907 U*	2.54 U*	1.08 U*	<0.991	1.08 U*	1.02 U*	<0.991
Zinc	ug/L	<3.22	3.24 J	<3.22	<3.22	<3.22	3.64 J	3.37 J	48.1	3.53 U*	3.77 U*	<3.22
Radiological Parameters												
Radium-226	pCi/L	0.0706 +/-(0.0624)U	0.0721 +/-(0.0658)UJ	0.00252 +/-(0.0392)U	0.0471 +/-(0.0500)U	-0.0674 +/-(0.0501)UJ	0.0232 +/-(0.466)U	0.121 +/-(0.430)UJ	0.293 +/-(0.511)U	0.559 +/-(0.420)U	0.390 +/-(0.295)	0.473 +/-(0.304)
Radium-228	pCi/L	-0.00678 +/-(0.220)U	-0.120 +/-(0.293)U	0.279 +/-(0.244)U	0.232 +/-(0.213)U	0.727 +/-(0.330)U*	0.480 +/-(0.397)U	-0.21 +/-(0.228)U	0.440 +/-(0.396)U	0.172 +/-(0.243)U	0.052 +/-(0.185)U	0.134 +/-(0.286)U
Radium-226+228	pCi/L	0.0706 +/-(0.229)U	0.0721 +/-(0.300)UJ	0.282 +/-(0.247)U	0.279 +/-(0.219)U	0.727 +/-(0.334)U*	0.503 +/-(0.612)U	0.121 +/-(0.487)UJ	0.733 +/-(0.647)U	0.732 +/-(0.485)U	0.442 +/-(0.348)J	0.607 +/-(0.418)J
Anions												
Chloride	mg/L	7.45	7.59	7.61	7.58	9.19	7.48	8.98	8.27	7.16	7.29	8.89
Fluoride	mg/L	0.157	0.157	0.125	0.130	0.125 U*	0.149 U*	0.103	0.183	0.161	0.160	0.152
Sulfate	mg/L	89.2	93.0	85.0	85.2	103	92.9	98.2 J	96.7	87.0	87.1	91.8 J
General Chemistry												
Alkalinity, Bicarbonate	mg/L	148	164	148	148	144	149	145	155	146	144	141
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.61	6.63	6.72	-	6.54	6.54	6.48	6.58	6.74	-	6.70
Total Dissolved Solids	mg/L	283	304	320	321	328	329	289	334	302 J	223 J	310

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-106											
Sample Date		7-Jan-20	18-Feb-20	18-Feb-20	8-Jun-20	3-Sep-20	22-Jan-21	2-Mar-21	22-Jul-21	27-Aug-21	2-Sep-21	9-Feb-22
Sample ID		KIF-GW-034-01072020	KIF-GW-034-02182020	KIF-GW-903-02182020	KIF-GW-034-06082020	KIF-GW-034-09032020	KIF-GW-KIF-106-01222021	KIF-GW-KIF-106-03022021	KIF-GW-KIF-106-07222021	KIF-GW-KIF-106-08272021	KIF-GW-KIF-106-09022021	KIF-GW-KIF-106-02092022
Parent Sample ID				KIF-GW-034-02182020								
Sample Depth		38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	33.7	34.9	<12.5	<12.5	<12.5	24.3 J	14.7 J	-	<12.5	36.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	-	<0.378	<0.506
Arsenic	ug/L	1.51 U*	1.07	1.05	2.66 U*	2.77	3.24	2.73	4.28	-	4.22	3.19
Barium	ug/L	65.8	59.4	63.2	55.7	56.7	51.7	48.1	37.2	-	34.2	43.8
Beryllium	ug/L	<0.182	<0.182	<0.182	0.206 J	<0.182	<0.182	<0.182	<0.182	-	<0.182	<0.274
Boron	ug/L	302	414	409	368	384	328	354	370	-	341	348
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	-	<0.217	<0.217
Calcium	ug/L	99,100	78,900	87,900	164,000	193,000	202,000	197,000	150,000	-	147,000	182,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	-	<1.53	<1.53
Cobalt	ug/L	3.38	2.60	2.65	3.27	3.17	2.98	3.07	3.10	-	3.21	3.33
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	-	1.13 U*	<1.14
Iron	ug/L	1,560	1,500	1,480	1,300	2,200	2,540	2,250	3,620	-	3,950	4,550
Lead	ug/L	<0.128	0.234 U*	0.206 U*	0.309 U*	<0.128	0.180 J	<0.128	<0.128	-	0.132 J	<0.167
Lithium	ug/L	4.63 J	6.97 U*	7.32 U*	13.1	11.5	14.9	14.6	10.4	-	9.32	10.8
Magnesium	ug/L	7,360	8,550	8,690	15,300	17,000	22,100	19,900	15,400	-	14,400	19,100
Manganese	ug/L	4,290	5,160	5,220	4,630	5,780	5,750	5,350	5,030	-	5,240	6,290
Mercury	ug/L	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	-	<0.130	<0.130
Molybdenum	ug/L	<0.610	2.35 J	2.39 J	4.59 J	5.11	5.27	4.48 J	3.15 J	-	3.10 J	3.62 J
Nickel	ug/L	1.93 U*	1.01	1.02	1.54	1.36 U*	1.36	1.41	1.60	-	1.71	2.00
Potassium	ug/L	1,520	1,560	1,620	2,180	2,320	2,610	2,470	2,100	-	2,140	2,280
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	-	<1.51	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	-	<0.177	<0.223
Sodium	ug/L	17,900	14,800	15,000	17,900	17,900	23,400	21,100	19,500	-	18,200	21,900
Strontium	ug/L	304	300	316	525	657	714 J	682	553	-	532	695
Thallium	ug/L	0.199 J	<0.148	<0.148	0.382 U*	<0.148	0.356 U*	<0.148	<0.148	-	<0.148	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<4.96	<4.96	<0.991	<0.991	<0.991	<0.991	<0.991	-	<0.991	<0.776
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	-	12.5	<2.88
Radiological Parameters												
Radium-226	pCi/L	0.451 +/-(0.534)U	0.697 +/-(0.621)U	0.243 +/-(0.530)U	0.450 +/-(0.524)U	0.0692 +/-(0.406)U	-0.0265 +/-(0.315)U	0.491 +/-(0.480)U	0.361 +/-(0.555)U	0.230 +/-(0.469)U	-	0.344 +/-(0.502)U
Radium-228	pCi/L	-0.244 +/-(0.502)U	0.161 +/-(0.321)U	0.526 +/-(0.424)U	0.112 +/-(0.284)U	0.172 +/-(0.296)U	0.366 +/-(0.456)U	0.866 +/-(0.541)U*	1.18 +/-(0.493)	0.177 +/-(0.439)U	-	-0.181 +/-(0.219)U
Radium-226+228	pCi/L	0.451 +/-(0.733)U	0.858 +/-(0.699)U	0.769 +/-(0.679)U	0.562 +/-(0.596)U	0.241 +/-(0.502)U	0.366 +/-(0.554)U	1.36 +/-(0.723)U*	1.54 +/-(0.742)J	0.407 +/-(0.642)U	-	0.344 +/-(0.548)U
Anions												
Chloride	mg/L	15.2	24.6	22.4	31.6	36.0	35.4	30.0	23.9	-	22.9	24.3
Fluoride	mg/L	0.182	0.174	0.138	0.144	0.120 U*	0.185	0.126	0.0731 J	-	0.137	0.149
Sulfate	mg/L	152	241 J	234 J	323	387	446	419	312	-	277	416
General Chemistry												
Alkalinity, Bicarbonate	mg/L	135	127 J	122	144	141	168	151	154	-	163	155
Alkalinity, Carbonate	mg/L	<5.00	5.00 UJ	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-	<5.00	<5.00
pH (field)	SU	6.62	6.83	-	6.81	6.58	6.58	6.76	6.68	6.56	6.72	6.94
Total Dissolved Solids	mg/L	423	540	501	658	766	851	883	689 J	-	660	807

See notes on last page.

Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-106			KIF-109								
Sample Date		30-Mar-22	5-Aug-22	26-Sep-22	29-Jan-21	4-Mar-21	7-Apr-21	7-Apr-21	11-May-21	11-May-21	9-Jun-21	9-Jun-21
Sample ID		KIF-GW-KIF-106-03302022	KIF-GW-KIF-106-08052022	KIF-GW-KIF-106-09262022	KIF-GW-KIF-109-01292021	KIF-GW-KIF-109-03042021	KIF-GW-KIF-109-04072021	KIF-GW-FD02-04072021	KIF-GW-KIF-109-05112021	KIF-GW-FD02-05112021	KIF-GW-KIF-109-06092021	KIF-GW-FD02-06092021
Parent Sample ID								KIF-GW-KIF-109-04072021		KIF-GW-KIF-109-05112021		KIF-GW-KIF-109-06092021
Sample Depth		38 ft	38 ft	38 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample
Program	Units	CCR Program	CCR Program		CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<15.5	<15.5	<15.5	<12.5	12.7 U*	15.9 J	20.0 J	43.7	31.0	<12.5	<12.5
Antimony	ug/L	<0.506	<0.506	0.665 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	4.00	3.11	2.98	2.73	2.40	1.47	1.52	2.54	2.69	2.71	2.26
Barium	ug/L	40.8	34.6	34.4	138	154	127	124	151	153	152	153
Beryllium	ug/L	<0.274	<0.274	<0.274	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	345 U*	315	374	<38.6	50.5 J	939	971	339	358	45.3 J	547 J
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	185,000	160,000	162,000	71,800	58,000	120,000	122,000	81,300	83,300	57,500 J	90,200 J
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	3.21	2.37	2.30	6.10	4.34	13.9	14.2	5.95	6.26	2.92 J	6.74 J
Copper	ug/L	<1.14	<1.14	<1.14	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	5,740	6,350	6,800	86,700	92,700	42,500	44,400	85,500	85,300	99,100 J	80,100 J
Lead	ug/L	<0.167	<0.167	<0.167	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	11.0	8.35	7.27	<3.39	<3.39	5.20	5.09	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	19,300	16,200	16,300	17,100	16,200	31,600	31,700	20,800	21,200	16,000 J	23,400 J
Manganese	ug/L	6,420	5,770	6,200	1,900	1,650	4,280	4,290	2,230	2,300	1,600 J	2,700 J
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	3.46 J	2.08 J	2.24 J	<0.610	0.670 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	2.11	1.77	1.91	2.84	2.09	13.1	14.1	4.22	4.48	1.61 J	5.74 J
Potassium	ug/L	2,350	1,980	1,990	3,820	3,450	2,880	2,960	3,150	3,160	3,010	3,010
Selenium	ug/L	<0.739	<0.739	<0.739	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.223	<0.223	<0.223	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	21,600	19,000	20,000	32,200	27,300	20,200	20,100	31,500	31,500	25,700	26,300
Strontium	ug/L	690	569	542	576	461	591	588	579	591	465 J	578 J
Thallium	ug/L	<0.472	<0.472	<0.472	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Uranium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.776	<0.776	<0.776	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	<2.88	<2.88	11.5	6.01	4.08 J	8.60	8.71	5.44	5.49	4.15 J	4.60 J
Radiological Parameters												
Radium-226	pCi/L	0.0518 +/-(0.199)U	0.241 +/-(0.409)U	-0.153 +/-(0.314)U	1.16 +/-(0.796)	1.36 +/-(0.789)U*	0.612 +/-(0.493)J	0.0450 +/-(0.290)UJ	0.907 +/-(0.607)	0.383 +/-(0.493)U	0.828 +/-(0.623)	0.0995 +/-(0.487)U
Radium-228	pCi/L	0.431 +/-(0.357)U	0.708 +/-(0.595)U	0.259 +/-(0.434)U	0.147 +/-(0.302)U	0.327 +/-(0.457)U	1.04 +/-(0.566)U*	0.356 +/-(0.414)U	0.720 +/-(0.462)	0.817 +/-(0.479)	-0.0560 +/-(0.288)U	0.568 +/-(0.416)U
Radium-226+228	pCi/L	0.483 +/-(0.409)U	0.949 +/-(0.722)U	0.259 +/-(0.535)U	1.30 +/-(0.852)J	1.69 +/-(0.912)U*	1.65 +/-(0.750)J	0.401 +/-(0.505)UJ	1.63 +/-(0.762)	1.20 +/-(0.688)J	0.828 +/-(0.686)J	0.668 +/-(0.641)U
Anions												
Chloride	mg/L	25.0	22.6	23.9	8.81	6.90	5.99	6.03	6.20	6.43	5.96	6.06
Fluoride	mg/L	0.139 U*	0.0682 J	0.163	0.0569 J	0.0293 J	0.0268 J	<0.0260	0.0280 J	0.0325 J	0.0353 J	0.0341 J
Sulfate	mg/L	418	339	346	136	120	395	389	379	381	244	271
General Chemistry												
Alkalinity, Bicarbonate	mg/L	152	165 J	169	194	159	82.2	78.5	78.1	77.9	184	205
Alkalinity, Carbonate	mg/L	<5.00	5.00 UJ	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (field)	SU	6.61	6.63	6.63	-	6.00	5.93	-	6.06	-	5.98	-
Total Dissolved Solids	mg/L	801	722	742	454	350	721	720	701	701	562	580

See notes on last page.

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Table H.1-8 - Groundwater Analytical Results
Kingston Fossil Plant

Sample Location		KIF-109								
Sample Date		6-Jul-21	21-Jul-21	25-Aug-21	13-Sep-21	13-Sep-21	8-Feb-22	30-Mar-22	3-Aug-22	28-Sep-22
Sample ID		KIF-GW-KIF-109-07062021	KIF-GW-KIF-109-07212021	KIF-GW-109-08252021	KIF-GW-KIF-109-09132021	KIF-GW-FD02-09132021	KIF-GW-KIF-109-02082022	KIF-GW-KIF-109-03302022	KIF-GW-KIF-109-08032022	KIF-GW-KIF-109-09282022
Parent Sample ID						KIF-GW-KIF-109-09132021				
Sample Depth		48 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals										
Aluminum	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<15.5	16.0 J	<15.5	<15.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.506	<0.506	<0.506	<0.506
Arsenic	ug/L	2.58	2.43	2.21	2.47	2.51	2.09	2.82	2.24	2.36
Barium	ug/L	158	162	159	153	156	160	161	156	158
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.274	<0.274	<0.274	<0.274
Boron	ug/L	61.8 J	<38.6	<38.6	48.1 U*	54.6 U*	70.7 J	116 U*	<60.1	66.7 U*
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	53,300	50,300	52,000	52,700	52,300	50,500	55,800	53,500	49,100
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	3.25	2.94	2.90	2.51	2.49	2.36	2.62	2.00	1.80
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<1.14	<1.14	<1.14	10.1
Iron	ug/L	96,100	102,000	96,000 J	93,300	93,400	101,000	101,000	98,800	98,300
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.167	<0.167	<0.167	<0.167
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	1.29 J	1.39 J	0.934 J	1.36 J
Magnesium	ug/L	15,600	14,900	16,900	15,400	15,700	16,000	16,300	16,100	15,100
Manganese	ug/L	1,520	1,440	1,410	1,380	1,360	1,350	1,530	1,350	1,340
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.49	1.48	1.44	1.18	1.03	1.63 U*	1.48	0.959 J	1.09
Potassium	ug/L	2,980	2,910	2,960	2,770	2,770	2,850	2,850	2,710	2,730
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<0.739	<0.739	<0.739	<0.739
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.223	<0.223	<0.223	<0.223
Sodium	ug/L	24,200	24,300	25,800	24,400	24,800	22,800	22,800	21,200	20,300
Strontium	ug/L	449	440	446	454	451	381	466	420	379
Thallium	ug/L	0.341 J	<0.148	<0.148	<0.148	<0.148	<0.472	<0.472	<0.472	<0.472
Uranium	ug/L	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.776	<0.776	<0.776	<0.776
Zinc	ug/L	3.31 J	<3.22	6.27	<3.22	<3.22	<2.88	<2.88	<2.88	5.30 U*
Radiological Parameters										
Radium-226	pCi/L	0.246 +/-(0.395)U	0.880 +/-(0.533)	0.492 +/-(0.569)U	0.701 +/-(0.650)U	0.195 +/-(0.462)U	0.561 +/-(0.542)U	0.0875 +/-(0.266)U	1.38 +/-(0.820)	0.408 +/-(0.554)U
Radium-228	pCi/L	-0.0139 +/-(0.303)U	0.322 +/-(0.302)U	-0.337 +/-(0.367)U	0.145 +/-(0.276)UJ	0.837 +/-(0.402)J	0.271 +/-(0.428)UJ	0.193 +/-(0.408)U	-0.0597 +/-(0.493)U	0.642 +/-(0.526)U
Radium-226+228	pCi/L	0.246 +/-(0.498)U	1.20 +/-(0.612)J	0.492 +/-(0.676)U	0.846 +/-(0.706)UJ	1.03 +/-(0.613)J	0.832 +/-(0.690)UJ	0.280 +/-(0.487)U	1.38 +/-(0.957)J	1.05 +/-(0.764)U
Anions										
Chloride	mg/L	6.05	6.15	6.04	5.61	5.86	4.57	4.73	4.90	4.74
Fluoride	mg/L	0.0535 J	0.0467 J	0.0631 U*	0.0675 J	0.0607 J	0.0403 J	<0.0260	0.0648 U*	0.0535 U*
Sulfate	mg/L	119	124	120	208	199	112	169	181	124
General Chemistry										
Alkalinity, Bicarbonate	mg/L	122	207	230	111 J	143 J	122	133	129 J	191
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	5.00 UJ	<2.60
pH (field)	SU	5.81	5.97	5.89	5.95	-	6.33	6.02	6.03	6.07
Total Dissolved Solids	mg/L	422	430	388	550	563	411	444	498	373

Notes:

Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

15.2	measured concentration did not exceed the indicated standard
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
-	Parameter not analyzed / not available.
ft	feet
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
R	Unreliable positive result; compound may or may not be present in sample.
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
UR	Unreliable reporting or detection limit; compound may or may not be present in sample.
mg/L	milligrams per Liter
pCi/L	picocuries per Liter
ug/L	micrograms per Liter
++	Uncertainty values and/or data is unavailable

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Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		6AR								
Sample Date		23-Mar-16	15-Jun-16	22-Sep-16	1-Dec-16	2-Mar-17	7-Jun-17	12-Sep-17	12-Dec-17	27-Mar-18
Sample ID		KIF-6AR-GW-032316-A	KIF-6AR-GW-061516-A	KIF-6AR-GW-092216-A	KIF-6AR-GW-120116-A	KIF-6AR-GW-030217-A	KIF-6AR-GW-060717-A	KIF-6AR-GW-091217-A	KIF-6AR-GW-121217-A	KIF-6AR-GW-032718-A
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters										
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	0.2	0.1	0.1	0.1	0.1	0.1	0.52	0.5	
ORP	mV	517	442	440	427	165	139	72	110	140
pH (field)	SU	4.6	4.7	4.7	4.6	5.7	5.27	4.66	4.82	4.52
Specific Cond. (Field)	mS/cm	0.622	0.636	0.617	0.606	0.65	0.65	0.609	0.607	0.618
Temperature, Water (C)	DEG C	-	-	-	-	-	-	-	-	-
Turbidity, field	NTU	2.89	1.83	3.71	2.59	0.95	1.94	4.04	0.94	0.52

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		6AR									
Sample Date		10-Sep-18	11-Dec-18	23-Jan-19	31-Jan-19	6-Feb-19	14-Feb-19	21-Feb-19	27-Feb-19	12-Mar-19	20-Mar-19
Sample ID		KIF-6AR-GW-091018-A	KIF-6AR-GW-121118	KIF-GW-005-01232019	KIF-GW-005-01312019	KIF-GW-005-02062019	KIF-GW-005-02142019	KIF-GW-005-02212019	KIF-GW-005-02272019	KIF-6AR-GW-031219	KIF-GW-005-03202019
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	-	3.7	2.3	4.1	2.0	2.5	1.2	-	3.7
Dissolved Oxygen	mg/L	0.8	0.1	0.37	0.23	0.40	0.26	0.24	0.12	0.04	0.38
ORP	mV	232	244	127.3	116.2	161.9	228.6	150.7	223.1	429	187.0
pH (field)	SU	5.05	4.67	5.12	4.63	4.92	4.77	4.94	4.89	4.72	5.00
Specific Cond. (Field)	mS/cm	0.584	0.569	0.571	0.585	0.563	0.62	0.601	0.56	0.603	0.522
Temperature, Water (C)	DEG C	18.61	15.38	12.2	16.0	16.3	15.7	15.7	16.7	16.3	16.4
Turbidity, field	NTU	0.92	0.59	0.48	0.29	0.59	2.42	2.34	3.07	0.87	1.09

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		6AR									
Sample Date		26-Mar-19	4-Apr-19	18-Jun-19	18-Sep-19	20-Nov-19	18-Dec-19	9-Jan-20	20-Feb-20	12-Jun-20	1-Sep-20
Sample ID		KIF-GW-005-03262019	KIF-GW-005-04042019	KIF-6AR-GW-061819	KIF-GW-005-09182019	KIF-GW-005-11202019	KIF-GW-6AR-121819	KIF-GW-005-01092020	KIF-GW-005-02202020	KIF-GW-005-06122020	KIF-GW-005-09012020
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	2.6	4.1	-	10.7	5.0	-	2.7	3.3	5.7	7.0
Dissolved Oxygen	mg/L	0.26	0.41	0.86	1.03	0.49	0.14	0.29	0.30	0.57	0.66
ORP	mV	141.2	157.8	429	124.7	209.9	453	192.6	148.5	196.8	177.3
pH (field)	SU	5.17	5.09	4.78	5.20	5.19	4.82	5.18	5.09	4.96	5.07
Specific Cond. (Field)	mS/cm	0.506	0.56	0.614	0.60	0.503	0.625	0.604	0.559	0.600	0.57
Temperature, Water (C)	DEG C	15.6	15.5	18.94	19.1	16.9	12.2	16.0	14.3	19.9	18.6
Turbidity, field	NTU	1.25	1.23	1.95	3.54	1.72	0.38	4.15	2.25	2.27	0.71

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location						6AR				
Sample Date		14-Dec-20	19-Jan-21	5-Mar-21	11-Jun-21	20-Jul-21	8-Nov-21	7-Feb-22	23-Mar-22	9-Jun-22
Sample ID		KIF-GW-005-12142020	KIF-GW-6AR-01192021	KIF-GW-6AR-03052021	KIF-GW-6AR-06112021	KIF-GW-6AR-07202021	KIF-GW-6AR-11082021	KIF-GW-6AR-02072022	KIF-GW-6AR-03232022	KIF-GW-6AR-06092022
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters										
Dissolved Oxygen	%	9.5	11.1	4.4	11.2	3.8	42.3	9.0	12.6	3.7
Dissolved Oxygen	mg/L	0.97	1.05	0.44	1.08	0.36	3.95	0.90	1.23	0.32
ORP	mV	161.2	120.8	106.1	237.4	94.8	179	85.1	199.8	240.1
pH (field)	SU	5.50	4.99	5.42	5.02	5.38	5.11	5.84	5.13	4.99
Specific Cond. (Field)	mS/cm	0.566	0.603	0.544	0.57	0.58	0.578	0.528	0.595	0.57
Temperature, Water (C)	DEG C	14.7	14.7	15.2	18.9	19.1	17.73	14.9	16.2	21.8
Turbidity, field	NTU	0.56	0.41	0.93	4.96	0.49	0.90	0.54	0.59	3.45

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		6AR			AD-1						
Sample Date		3-Aug-22	27-Sep-22	29-Nov-22	21-Mar-16	13-Jun-16	20-Sep-16	28-Nov-16	28-Feb-17	5-Jun-17	13-Sep-17
Sample ID		KIF-GW-6AR-08032022	KIF-GW-6AR-09272022	KIF-GW-6AR-11292022	KIF-AD1-GW-032116-A	KIF-AD1-GW-061316-A	KIF-AD1-GW-092016-A	KIF-AD1-GW-112816-A	KIF-AD1-GW-022817-A	KIF-AD1-GW-060617-A	KIF-AD1-GW-091317-A
Sample Depth		34 ft	34 ft	34 ft	9.1 M	9.1 M	9.1 M	29.9 ft	29.9 ft	30 M	30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program			State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters											
Dissolved Oxygen	%	35.2	5.0	30.1	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	3.10	0.46	2.95	2.3	2.2	1.3	2.6	1.3	1.96	2.91
ORP	mV	158.4	57.0	7	368	238	256	195	229	203	121
pH (field)	SU	5.29	5.54	5.09	8.6	8.6	8.6	8.7	8.8	8.86	8.62
Specific Cond. (Field)	mS/cm	0.560	0.607	0.533	0.426	0.417	0.414	0.416	0.41	0.414	0.408
Temperature, Water (C)	DEG C	21.6	19.4	17.48	-	-	-	-	-	-	-
Turbidity, field	NTU	1.28	0.47	0.80	4.2	1.4	2.8	1.2	1.1	7.35	3.21

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-1									
Sample Date		6-Dec-17	19-Mar-18	10-Sep-18	12-Dec-18	22-Jan-19	31-Jan-19	5-Feb-19	12-Feb-19	19-Feb-19	26-Feb-19
Sample ID		KIF-AD1-GW-120617-A	KIF-AD1-GW-031918-A	KIF-AD-1-GW-091018-A	KIF-AD1-GW-121218	KIF-GW-006-01222019	KIF-GW-006-01312019	KIF-GW-006-02052019	KIF-GW-006-02122019	KIF-GW-006-02192019	KIF-GW-006-02262019
Sample Depth		30 ft	30 M	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	-	-	-	3.7	1.4	12.3	96.5	26.8	4.1
Dissolved Oxygen	mg/L	1.87	3.22	2.02	1.48	0.39	0.14	1.28	10.05	2.94	0.41
ORP	mV	195	307	362	228	44.1	56.3	118.4	234.5	128.0	146.6
pH (field)	SU	8.52	8.19	8.72	8.62	8.80	8.87	8.44	6.81	8.70	8.70
Specific Cond. (Field)	mS/cm	0.41	0.411	0.423	0.424	0.421	0.428	0.411	0.007	0.426	0.375
Temperature, Water (C)	DEG C	-	-	18.61	11.94	12.7	13.8	13.8	13.5	11.4	12.6
Turbidity, field	NTU	1.59	1.68	3.39	3.2	2.64	6.53	3.62	3.08	2.32	1.64

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-1									
Sample Date		12-Mar-19	21-Mar-19	26-Mar-19	2-Apr-19	19-Jun-19	19-Sep-19	19-Nov-19	18-Dec-19	7-Jan-20	18-Feb-20
Sample ID		KIF-AD1-GW-031219	KIF-GW-006-03212019	KIF-GW-006-03262019	KIF-GW-006-04022019	KIF-GW-006-06192019	KIF-GW-006-09192019	KIF-GW-006-11192019	KIF-GW-AD1-121819	KIF-GW-006-01072020	KIF-GW-006-02182020
Sample Depth		30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	4.6	1.5	16.3	3.5	5.0	5.3	-	6.8	4.2
Dissolved Oxygen	mg/L	2.53	0.46	0.15	1.68	0.35	0.49	0.53	2.00	0.70	0.43
ORP	mV	285	-126.0	-157.7	94.5	157.3	148.3	-17.9	344	10.6	29.2
pH (field)	SU	8.36	8.52	8.67	9.11	8.43	8.46	8.57	7.91	8.15	7.69
Specific Cond. (Field)	mS/cm	0.43	0.379	0.371	0.59	0.408	0.406	0.361	0.44	0.443	0.433
Temperature, Water (C)	DEG C	12.17	13.1	14.2	13.8	16.0	18.1	15.4	9.69	13.9	13.9
Turbidity, field	NTU	1.37	57.4	24.9	16.9	2.92	1.23	2.11	0.88	1.68	0.30

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-1									
Sample Date		8-Jun-20	2-Sep-20	8-Dec-20	20-Jan-21	8-Mar-21	14-Jun-21	20-Jul-21	27-Aug-21	2-Sep-21	9-Nov-21
Sample ID		KIF-GW-006-06082020	KIF-GW-006-09022020	KIF-GW-AD1-120820	KIF-GW-AD-1-01202021	KIF-GW-AD-1-03082021	KIF-GW-AD-1-06142021	KIF-GW-AD-1-07202021	KIF-GW-AD-1-08272021	KIF-GW-AD-1-09022021	KIF-GW-AD-1-11092021
Sample Depth		30 - 30 ft	30 - 30 ft	30 - 30 ft	30 ft	30 - 30 ft	30 - 30 ft	30 - 30 ft	30 ft	30 ft	34 - 34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance
Field Parameters											
Dissolved Oxygen	%	37.0	9.2	-	5.6	3.6	5.2	3.3	14.0	3.6	26.0
Dissolved Oxygen	mg/L	3.57	0.83	2.81	0.59	0.37	0.47	0.32	1.34	0.34	2.52
ORP	mV	9.1	-71.6	178	136	131.7	22.8	17.9	11.3	-41.3	117
pH (field)	SU	8.81	8.16	8.00	8.65	8.01	8.30	8.74	8.38	8.15	8.85
Specific Cond. (Field)	mS/cm	0.389	0.432	0.445	0.41	0.405	0.422	0.396	0.417	0.433	0.405
Temperature, Water (C)	DEG C	17.6	20.9	11.54	13.6	13.7	20.5	16.3	17.7	17.9	15.72
Turbidity, field	NTU	0.69	0.66	1.09	1.01	0.38	1.07	0.59	4.18	0.38	1.01

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-1						AD-2			
Sample Date		10-Feb-22	22-Mar-22	9-Jun-22	2-Aug-22	23-Sep-22	5-Dec-22	23-Mar-16	14-Jun-16	21-Sep-16	1-Dec-16
Sample ID		KIF-GW-AD-1-02102022	KIF-GW-AD-1-03222022	KIF-GW-AD-1-06092022	KIF-GW-AD-1-08022022	KIF-GW-AD-1-09232022	KIF-GW-AD-1-12052022	KIF-AD2-GW-032316-A	KIF-AD2-GW-061416-A	KIF-AD2-GW-092116-A	KIF-AD2-GW-120116-A
Sample Depth		30 - 30 ft	30 - 30 ft	30 - 30 ft	30 ft	30 ft	30 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program			State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters											
Dissolved Oxygen	%	19.7	3.0	12.9	15.1	7.9	29.6	-	-	-	-
Dissolved Oxygen	mg/L	2.18	0.32	1.23	1.31	0.70	3.21	0.2	0.1	0.1	0.7
ORP	mV	136.2	188.3	172.9	212.6	13.6	63	408	268	294	278
pH (field)	SU	8.41	8.34	8.74	8.73	9.15	8.80	5.9	5.8	5.7	5.9
Specific Cond. (Field)	mS/cm	0.395	0.433	0.393	0.4291	0.4043	0.431	0.326	0.338	0.335	0.319
Temperature, Water (C)	DEG C	11.0	14.8	17.4	21.7	21.5	11.62	-	-	-	-
Turbidity, field	NTU	0.28	0.22	0.39	0.17	0.62	1.18	4.6	2.74	3.06	0.89

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-2									
Sample Date		1-Mar-17	7-Jun-17	11-Sep-17	5-Dec-17	20-Mar-18	5-Sep-18	4-Dec-18	24-Jan-19	29-Jan-19	5-Feb-19
Sample ID		KIF-AD2-GW-030117-A	KIF-AD2-GW-060717-A	KIF-AD2-GW-091117-A	KIF-AD2-GW-120517-A	KIF-AD2-GW-032018-A	KIF-AD2-GW-090518-A	KIF-AD2-GW-120418	KIF-GW-007-01242019	KIF-GW-007-01292019	KIF-GW-007-02052019
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	-	-	-	-	-	-	1.5	1.20	2.2
Dissolved Oxygen	mg/L	0.4	0.1	0.72	0.63		0.82	0.44	0.13	0.11	0.23
ORP	mV	306	267	286	290	329	325	305	87.7	75.2	83.8
pH (field)	SU	5.9	6.04	5.61	5.69	5.42	5.78	5.75	5.84	5.81	5.86
Specific Cond. (Field)	mS/cm	0.341	0.465	0.54	0.615	0.691	0.813	0.869	0.89	0.90	0.89
Temperature, Water (C)	DEG C	-	-	-	-	-	21.8	18.73	17.6	17.1	19.5
Turbidity, field	NTU	8.9	5.37	4.47	0.78	5.1	5.11	2.96	3.82	2.51	4.83

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-2									
Sample Date		13-Feb-19	19-Feb-19	26-Feb-19	18-Mar-19	21-Mar-19	27-Mar-19	3-Apr-19	17-Jun-19	17-Sep-19	21-Nov-19
Sample ID		KIF-GW-007-02132019	KIF-GW-007-02192019	KIF-GW-007-02262019	KIF-AD2-GW-031819	KIF-GW-007-03212019	KIF-GW-007-03272019	KIF-GW-007-04032019	KIF-AD2-GW-061719	KIF-GW-007-09172019	KIF-GW-007-11212019
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	0.6	1.8	1.4	-	3.7	1.0	1.6	-	3.5	4.2
Dissolved Oxygen	mg/L	0.04	0.18	0.14	2.15	0.35	0.10	0.16	0.82	0.28	0.39
ORP	mV	93.7	100.3	100.1	323	86.7	0.78	75.7	330	71.8	81.6
pH (field)	SU	5.77	5.86	5.81	5.63	5.82	5.83	5.89	5.69	5.81	6.04
Specific Cond. (Field)	mS/cm	0.90	0.89	0.80	0.89	0.78	0.78	0.85	0.823	0.83	0.73
Temperature, Water (C)	DEG C	18.8	18.1	18.6	16.77	17.9	17.8	17.4	21.88	23.2	19.5
Turbidity, field	NTU	3.40	3.86	4.30	15.3	12.4	11.8	14.5	8.16	4.37	4.27

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-2									
Sample Date		18-Dec-19	7-Jan-20	18-Feb-20	9-Jun-20	3-Sep-20	9-Dec-20	22-Jan-21	2-Mar-21	22-Jul-21	15-Nov-21
Sample ID		KIF-GW-AD2-121819	KIF-GW-007-01072020	KIF-GW-007-02182020	KIF-GW-007-06092020	KIF-GW-007-09032020	KIF-GW-AD2-120920	KIF-GW-AD-2-01222021	KIF-GW-AD-2-03022021	KIF-GW-AD-2-07222021	KIF-GW-AD-2-11152021
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	23 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance
Field Parameters											
Dissolved Oxygen	%	-	2.2	0.7	2.9	1.8	-	1.9	1.5	1.4	37.1
Dissolved Oxygen	mg/L	1.09	0.20	0.06	0.26	0.16	3.16	0.18	0.16	0.12	3.52
ORP	mV	331	85.8	33.7	52.2	85.2	129	76.3	56.3	63.5	105
pH (field)	SU	5.85	5.88	5.78	5.83	5.74	5.84	5.77	5.85	5.92	5.91
Specific Cond. (Field)	mS/cm	0.853	0.87	0.86	0.85	0.91	0.966	1	0.92	0.98	1.055
Temperature, Water (C)	DEG C	15.85	19.3	18.8	21.0	21.7	15.52	15.4	16.9	21.9	16.41
Turbidity, field	NTU	2.61	4.76	4.61	7.07	4.33	3.75	4.62	4.89	4.04	4.62

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-2						AD-3			
Sample Date		9-Feb-22	24-Mar-22	10-Jun-22	4-Aug-22	26-Sep-22	30-Nov-22	22-Mar-16	13-Jun-16	21-Sep-16	30-Nov-16
Sample ID		KIF-GW-AD-2-02092022	KIF-GW-AD-2-03242022	KIF-GW-AD-2-06102022	KIF-GW-AD-2-08042022	KIF-GW-AD-2-09262022	KIF-GW-AD-2-11302022	KIF-AD3-GW-032216-A	KIF-AD3-GW-061316-A	KIF-AD3-GW-092116-A	KIF-AD3-GW-113016-A
Sample Depth		23 ft	23 ft	23 ft	23 ft	23 ft	23 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program			Recovery Project	Recovery Project	Recovery Project	Recovery Project
Field Parameters											
Dissolved Oxygen	%	4.4	4.3	2.9	2.5	4.9	32.6	-	-	-	-
Dissolved Oxygen	mg/L	0.41	0.41	0.25	0.21	0.43	3.13	2.6	0.1	0.1	1
ORP	mV	109.4	111.2	92.9	40.6	42.4	70	423	325	314	273
pH (field)	SU	6.27	5.89	5.84	6.03	6.03	5.96	6.9	6.3	6.3	6.8
Specific Cond. (Field)	mS/cm	0.98	1.085	1.03	1.059	1.096	1.11	0.774	2.044	1.818	0.903
Temperature, Water (C)	DEG C	17.4	17.4	22.3	24.3	22.4	16.95	-	-	-	-
Turbidity, field	NTU	3.66	16.3	60.8	3.28	2.91	1.98	0.5	0.8	0.6	0.7

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-3									
Sample Date		2-Mar-17	6-Jun-17	12-Sep-17	5-Dec-17	20-Mar-18	5-Sep-18	4-Dec-18	21-Feb-19	27-Feb-19	11-Mar-19
Sample ID		KIF-AD3-GW-030217-A	KIF-AD3-GW-060617-A	KIF-AD3-GW-091217-A	KIF-AD3-GW-120517-A	KIF-AD3-GW-032018-A	KIF-AD-3-GW-090518-A	KIF-AD3-GW-120418	KIF-GW-008-02212019	KIF-GW-008-02272019	KIF-AD3-GW-031119
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	Recovery Project	Recovery Project	Recovery Project	Recovery Project	Recovery Project	State Compliance	State Compliance	CCR Program	CCR Program	State Compliance
Field Parameters											
Dissolved Oxygen	%	-	-	-	-	-	-	-	2.0	38.6	-
Dissolved Oxygen	mg/L	1.2	0.75	0.58	0.86		0.83	0.23	0.22	3.86	0.77
ORP	mV	356	321	331	281	305	379	280	66.4	76.6	317
pH (field)	SU	7.3	6.46	6.27	6.54	6.39	6.41	6.67	6.78	6.71	6.54
Specific Cond. (Field)	mS/cm	0.779	1.989	2.101	1.37	1.259	2.028	2.028	1.63	1.59	1.673
Temperature, Water (C)	DEG C	-	-	-	-	-	20.97	16.06	12.1	13.4	11.86
Turbidity, field	NTU	0.8	4.21	3.13	0.59	0.63	3.15	1.23	0.89	0.44	0.6

See notes on last page.

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Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-3									
Sample Date		21-Mar-19	27-Mar-19	3-Apr-19	17-Jun-19	20-Aug-19	12-Sep-19	18-Sep-19	10-Oct-19	6-Nov-19	20-Nov-19
Sample ID		KIF-GW-008-03212019	KIF-GW-008-03272019	KIF-GW-008-04032019	KIF-AD3-GW-061719	KIF-GW-008-08202019	KIF-GW-008-09122019	KIF-GW-008-09182019	KIF-GW-008-10102019	KIF-GW-008-11062019	KIF-GW-008-11202019
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	2.2	2.7	2.1	-	6.3	8.0	11.6	7.5	22.8	3.3
Dissolved Oxygen	mg/L	0.21	0.27	0.22	0.06	0.56	0.71	1.07	0.69	2.03	0.31
ORP	mV	60.9	99.7	45.0	383	190.1	126.3	114.4	163.8	63.3	50.7
pH (field)	SU	6.72	6.61	6.77	6.35	6.49	6.46	6.50	6.71	6.79	6.77
Specific Cond. (Field)	mS/cm	1.51	1.47	1.66	1.946	1.70	1.92	1.96	1.84	1.49	1.51
Temperature, Water (C)	DEG C	12.7	13.1	13.4	18.89	19.9	21.3	19.8	19.7	20.5	19.1
Turbidity, field	NTU	1.45	0.63	0.96	0.66	0.56	0.55	0.64	0.74	1.49	1.64

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-3									
Sample Date		18-Dec-19	8-Jan-20	19-Feb-20	10-Jun-20	1-Sep-20	9-Dec-20	25-Jan-21	4-Mar-21	11-Jun-21	21-Jul-21
Sample ID		KIF-GW-AD3-121819	KIF-GW-008-01082020	KIF-GW-008-02192020	KIF-GW-008-06102020	KIF-GW-008-09012020	KIF-GW-AD3-120920	KIF-GW-AD-3-01252021	KIF-GW-AD-3-03042021	KIF-GW-AD-3-06112021	KIF-GW-AD-3-07212021
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	4.2	1.0	5.1	2.7	-	4	3.8	2.8	2.9
Dissolved Oxygen	mg/L	0.42	0.42	0.08	0.45	0.24	3.50	0.44	0.40	0.26	0.26
ORP	mV	429	163.7	38.8	81.1	84.2	305	20.7	-14.1	131.9	59.2
pH (field)	SU	6.58	6.86	6.64	6.58	6.59	6.57	6.74	6.81	6.68	6.70
Specific Cond. (Field)	mS/cm	1.892	1.85	1.49	1.74	1.88	1.821	1.66	1.28	1.77	1.78
Temperature, Water (C)	DEG C	13.35	14.8	12.9	17.7	21.7	14.43	11.4	12.9	18.4	19.7
Turbidity, field	NTU	0.21	2.01	0.26	2.50	0.72	0.75	0.87	0.65	3.38	1.01

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		AD-3							
Sample Date		25-Aug-21	8-Nov-21	8-Feb-22	23-Mar-22	10-Jun-22	5-Aug-22	27-Sep-22	30-Nov-22
Sample ID		KIF-GW-AD-3-08252021	KIF-GW-AD-3-11082021	KIF-GW-AD-3-02082022	KIF-GW-AD-3-03232022	KIF-GW-AD-3-06102022	KIF-GW-AD-3-08052022	KIF-GW-AD-3-09272022	KIF-GW-AD-3-11302022
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	17 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program		
Field Parameters									
Dissolved Oxygen	%	11.9	38.9	4.9	81.0	21.5	3.9	15.8	20.9
Dissolved Oxygen	mg/L	1.07	3.48	0.52	8.01	1.91	0.32	1.38	2.15
ORP	mV	31.4	211	22.9	126.6	271.1	124.4	92.3	195
pH (field)	SU	6.59	6.60	7.20	7.08	6.68	6.68	6.75	6.74
Specific Cond. (Field)	mS/cm	1.75	1.625	1.16	1.068	1.36	1.796	1.853	1.602
Temperature, Water (C)	DEG C	21.7	18.12	12.3	15.9	21.6	25.3	21.6	16.68
Turbidity, field	NTU	1.59	0.56	0.25	0.50	0.37	0.55	0.30	0.89

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		GW-2						KIF-103			
Sample Date		21-Jun-19	21-Aug-19	23-Oct-19	18-Dec-19	19-Feb-20	21-Apr-20	23-Jan-19	31-Jan-19	6-Feb-19	13-Feb-19
Sample ID		KIF-GW-027-06212019	KIF-GW-027-20190821	KIF-GW-027-20191023	KIF-GW-027-20191218	KIF-GW-027-02192020	KIF-GW-027-20200421	KIF-GW-031-01232019	KIF-GW-031-01312019	KIF-GW-031-02062019	KIF-GW-031-02132019
Sample Depth		21.8 ft	21.8 ft	21.8 ft	21.8 ft	21.8 ft	21.8 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	15.6	54.4	32.4	70.0	71.8	77.3	3.3	3.2	5.3	3.1
Dissolved Oxygen	mg/L	1.54	5.26	3.14	7.04	7.43	7.98	0.32	0.32	0.53	0.32
ORP	mV	168.6	207.5	179.0	116.9	49.5	133.9	23.3	-8.0	30.5	21.2
pH (field)	SU	5.89	5.97	6.07	6.11	5.28	5.72	5.97	5.55	5.80	5.90
Specific Cond. (Field)	mS/cm	0.099	0.1295	0.1409	0.0954	0.058	0.0611	0.449	0.438	0.431	0.452
Temperature, Water (C)	DEG C	16.0	16.7	16.8	15.9	13.5	13.5	16.1	15.7	16.4	16.2
Turbidity, field	NTU	1.80	2.46	2.91	2.52	1.05	1.94	3.10	1.20	0.53	1.82

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-103									
Sample Date		21-Feb-19	27-Feb-19	20-Mar-19	26-Mar-19	3-Apr-19	20-Jun-19	20-Aug-19	18-Sep-19	22-Oct-19	20-Nov-19
Sample ID		KIF-GW-031-02212019	KIF-GW-031-02272019	KIF-GW-031-03202019	KIF-GW-031-03262019	KIF-GW-031-04032019	KIF-GW-031-06202019	KIF-GW-031-20190820	KIF-GW-031-09182019	KIF-GW-031-20191022	KIF-GW-031-11202019
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	EIP	CCR Program	EIP	CCR Program
Field Parameters											
Dissolved Oxygen	%	3.0	3.9	1.4	1.3	2.1	2.6	7.3	25.0	2.7	7.1
Dissolved Oxygen	mg/L	0.30	0.39	0.14	0.13	0.20	0.25	0.65	2.22	0.26	0.70
ORP	mV	94.2	28.0	26.6	23.8	34.6	20.7	-68.7	-20.0	-73.6	-23.4
pH (field)	SU	5.94	5.93	5.86	5.89	5.81	6.03	6.02	5.98	5.96	6.08
Specific Cond. (Field)	mS/cm	0.468	0.381	0.367	0.382	0.417	0.50	0.537	0.535	0.4887	0.400
Temperature, Water (C)	DEG C	16.3	18.1	16.6	15.8	18.4	18.7	20.7	21.3	18.3	18.0
Turbidity, field	NTU	2.29	4.20	3.99	4.68	4.69	3.44	2.48	1.02	0.93	2.13

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-103								
Sample Date		18-Dec-19	9-Jan-20	19-Feb-20	12-Jun-20	1-Sep-20	20-Jan-21	4-Mar-21	21-Jul-21	8-Feb-22
Sample ID		KIF-GW-031-20191218	KIF-GW-031-01092020	KIF-GW-031-02192020	KIF-GW-031-06122020	KIF-GW-031-09012020	KIF-GW-KIF-103-01202021	KIF-GW-KIF-103-03042021	KIF-GW-KIF-103-07212021	KIF-GW-KIF-103-02082022
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters										
Dissolved Oxygen	%	6.7	4.2	4.2	3.2	3.1	3.1	23.0	1.5	3.6
Dissolved Oxygen	mg/L	0.68	0.40	0.40	0.29	0.29	0.3	2.24	0.14	0.38
ORP	mV	5.6	-14.8	26.8	-14.3	-0.3	9.6	21.7	-24.0	68.6
pH (field)	SU	5.96	6.15	5.95	6.04	5.98	5.69	5.76	6.11	6.17
Specific Cond. (Field)	mS/cm	0.431	0.490	0.452	0.514	0.502	0.429	0.388	0.461	0.376
Temperature, Water (C)	DEG C	15.3	15.9	16.4	21.5	19.3	16.1	17.3	18.8	14.0
Turbidity, field	NTU	4.04	4.31	2.29	3.94	2.88	4.41	4.14	4.91	1.65

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-103			KIF-104						
Sample Date		31-Mar-22	3-Aug-22	28-Sep-22	22-Jan-19	31-Jan-19	6-Feb-19	21-Feb-19	28-Feb-19	21-Mar-19	26-Mar-19
Sample ID		KIF-GW-KIF-103-03312022	KIF-GW-KIF-103-08032022	KIF-GW-KIF-103-09282022	KIF-GW-032-01222019	KIF-GW-032-01312019	KIF-GW-032-02062019	KIF-GW-032-02212019	KIF-GW-032-02282019	KIF-GW-032-03212019	KIF-GW-032-03262019
Sample Depth		34 ft	34 ft	34 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	4.9	4.5	2.9	0.6	2.1	9.9	2.2	2.3	2.0	1.1
Dissolved Oxygen	mg/L	0.46	0.38	0.26	0.06	0.22	0.85	0.21	0.23	0.12	0.10
ORP	mV	-25.8	8.8	-80.7	-128.8	-134.5	-96.5	-60.8	-115.6	-113.0	-118.4
pH (field)	SU	6.12	6.06	6.31	6.25	6.90	6.25	6.23	6.22	6.19	6.23
Specific Cond. (Field)	mS/cm	0.434	0.4167	0.521	1.58	1.57	1.52	1.57	1.37	1.39	1.38
Temperature, Water (C)	DEG C	17.8	23.9	21.1	16.4	16.0	17.8	15.9	16.4	16.4	16.7
Turbidity, field	NTU	2.67	4.86	4.18	7.36	7.20	3.21	2.95	12.9	4.17	6.18

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-104									
Sample Date		4-Apr-19	18-Jun-19	21-Aug-19	25-Sep-19	23-Oct-19	22-Nov-19	17-Dec-19	9-Jan-20	20-Feb-20	11-Jun-20
Sample ID		KIF-GW-032-04042019	KIF-GW-032-06182019	KIF-GW-032-20190821	KIF-GW-032-09252019	KIF-GW-032-20191023	KIF-GW-032-11222019	KIF-GW-032-20191217	KIF-GW-032-01092020	KIF-GW-032-02202020	KIF-GW-032-06112020
Sample Depth		33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	State Compliance	EIP	CCR Program	EIP	CCR Program	EIP	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	1.4	1.0	3.7	18.0	3.9	4.5	5.2	1.3	1.3	1.3
Dissolved Oxygen	mg/L	0.13	0.10	0.33	1.60	0.36	0.43	0.53	0.13	0.13	0.13
ORP	mV	-122.7	-100.4	-119.4	-97.9	-95.2	-110.8	-91.8	-95.1	-31.4	-81.3
pH (field)	SU	6.24	6.32	6.10	6.09	6.09	6.21	6.13	6.09	6.13	6.11
Specific Cond. (Field)	mS/cm	1.53	1.55	1.527	1.58	1.471	1.23	1.607	1.51	1.69	1.58
Temperature, Water (C)	DEG C	17.3	18.7	21.9	20.7	19.2	17.1	14.8	17.3	15.6	19.2
Turbidity, field	NTU	11.2	6.80	6.57	8.74	4.42	3.80	2.99	4.95	2.97	19.4

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-104							
Sample Date		31-Aug-20	25-Jan-21	5-Mar-21	20-Jul-21	7-Feb-22	22-Mar-22	2-Aug-22	29-Sep-22
Sample ID		KIF-GW-032-08312020	KIF-GW-KIF-104-01252021	KIF-GW-KIF-104-03052021	KIF-GW-KIF-104-07202021	KIF-GW-KIF-104-02072022	KIF-GW-KIF-104-03222022	KIF-GW-KIF-104-08022022	KIF-GW-KIF-104-09292022
Sample Depth		33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft	33 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	
Field Parameters									
Dissolved Oxygen	%	4.2	2.7	1.7	1.8	43.2	16.1	12.8	3.3
Dissolved Oxygen	mg/L	0.37	0.25	0.16	0.16	4.29	1.45	1.07	0.32
ORP	mV	-15.3	-81.1	-65.1	-64.4	-36.3	-47.2	-60.9	-98.6
pH (field)	SU	5.97	5.88	6.03	6.19	6.42	5.97	6.19	6.21
Specific Cond. (Field)	mS/cm	1.66	1.71	1.61	1.49	1.41	1.47	1.309	1.565
Temperature, Water (C)	DEG C	20.9	13.6	16.0	20.6	15.3	20.4	24.7	18.2
Turbidity, field	NTU	4.03	3.68	4.65	14.8	4.08	8.17	3.72	4.20

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-105									
Sample Date		24-Jan-19	30-Jan-19	5-Feb-19	13-Feb-19	19-Feb-19	27-Feb-19	19-Mar-19	25-Mar-19	3-Apr-19	18-Jun-19
Sample ID		KIF-GW-033-01242019	KIF-GW-033-01302019	KIF-GW-033-02052019	KIF-GW-033-02132019	KIF-GW-033-02192019	KIF-GW-033-02272019	KIF-GW-033-03192019	KIF-GW-033-03252019	KIF-GW-033-04032019	KIF-GW-033-06182019
Sample Depth		43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance
Field Parameters											
Dissolved Oxygen	%	3.6	5.6	3.5	1.1	4.2	4.1	2.4	2.7	1.9	2.6
Dissolved Oxygen	mg/L	0.34	0.55	0.33	0.13	0.45	0.40	0.21	0.26	0.19	0.26
ORP	mV	73.4	66.8	64.9	71.1	90.3	106.7	92.5	105.2	105.5	130.4
pH (field)	SU	5.64	5.71	5.67	5.62	5.65	5.61	5.59	5.63	5.60	5.54
Specific Cond. (Field)	mS/cm	1.11	1.12	1.09	1.11	1.09	0.99	0.99	0.99	1.09	1.10
Temperature, Water (C)	DEG C	16.6	17.3	18.7	18.3	18.2	18.3	18.6	17.6	18.9	20.7
Turbidity, field	NTU	4.98	2.23	0.40	0.68	1.51	0.28	1.67	0.30	0.22	4.05

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-105									
Sample Date		20-Aug-19	18-Sep-19	22-Oct-19	21-Nov-19	17-Dec-19	8-Jan-20	19-Feb-20	10-Jun-20	2-Sep-20	21-Jan-21
Sample ID		KIF-GW-033-20190820	KIF-GW-033-09182019	KIF-GW-033-20191022	KIF-GW-033-11212019	KIF-GW-033-20191217	KIF-GW-033-01082020	KIF-GW-033-02192020	KIF-GW-033-06102020	KIF-GW-033-09022020	KIF-GW-KIF-105-01212021
Sample Depth		43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	43 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	CCR Program	EIP	CCR Program	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	3.2	4.6	1.7	4.8	4.4	4.7	2.2	3.2	3.8	4.7
Dissolved Oxygen	mg/L	0.29	0.42	0.16	0.43	0.43	0.45	0.17	0.30	0.31	0.47
ORP	mV	80.4	84.5	81.4	100.9	85.7	58.5	41.2	83.8	110.8	103.5
pH (field)	SU	5.53	5.50	5.64	5.77	5.75	5.78	5.59	5.36	5.64	5.52
Specific Cond. (Field)	mS/cm	1.041	1.11	1.018	0.94	1.081	1.09	1.08	1.08	1.08	1.11
Temperature, Water (C)	DEG C	22.0	21.1	20.4	18.9	16.3	17.0	18.3	20.0	24.9	13.3
Turbidity, field	NTU	0.93	0.44	1.52	0.30	0.75	4.53	0.58	1.41	0.81	0.44

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-105						KIF-106			
Sample Date		3-Mar-21	22-Jul-21	9-Feb-22	30-Mar-22	4-Aug-22	28-Sep-22	24-Jan-19	29-Jan-19	5-Feb-19	12-Feb-19
Sample ID		KIF-GW-KIF-105-03032021	KIF-GW-KIF-105-07222021	KIF-GW-KIF-105-02092022	KIF-GW-KIF-105-03302022	KIF-GW-KIF-105-08042022	KIF-GW-KIF-105-09282022	KIF-GW-034-01242019	KIF-GW-034-01292019	KIF-GW-034-02052019	KIF-GW-034-02122019
Sample Depth		43 ft	43 ft	43 ft	43 ft	43 ft	43 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	3.0	33.3	10.2	5.3	1.9	4.6	4.9	4.90	3.1	1.0
Dissolved Oxygen	mg/L	0.28	3.07	1.03	0.49	0.16	0.41	0.51	0.48	0.31	0.09
ORP	mV	122.2	112.4	113.0	183.4	161.0	173.4	36.0	55.9	25.0	-19.4
pH (field)	SU	5.62	5.32	5.77	5.16	5.19	5.24	6.67	6.63	6.78	6.67
Specific Cond. (Field)	mS/cm	1.01	1.08	1.04	1.143	1.090	1.098	0.497	0.499	0.491	0.500
Temperature, Water (C)	DEG C	17.5	20.1	14.9	18.9	23.7	20.0	13.3	16.9	18.2	17.8
Turbidity, field	NTU	1.19	3.02	3.63	4.53	3.49	0.62	1.75	1.49	2.49	2.97

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-106									
Sample Date		19-Feb-19	26-Feb-19	19-Mar-19	25-Mar-19	2-Apr-19	19-Jun-19	20-Aug-19	17-Sep-19	24-Oct-19	21-Nov-19
Sample ID		KIF-GW-034-02192019	KIF-GW-034-02262019	KIF-GW-034-03192019	KIF-GW-034-03252019	KIF-GW-034-04022019	KIF-GW-034-06192019	KIF-GW-034-20190820	KIF-GW-034-09172019	KIF-GW-034-20191024	KIF-GW-034-11212019
Sample Depth		38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	EIP	CCR Program	EIP	CCR Program
Field Parameters											
Dissolved Oxygen	%	4.4	0.9	4.3	2.5	2.9	3.1	6.9	4.0	1.3	3.1
Dissolved Oxygen	mg/L	0.57	0.09	0.41	0.25	0.25	0.28	0.61	0.36	0.12	0.28
ORP	mV	33.9	17.7	43.7	85.0	13.8	33.0	-42.8	-16.2	-31.4	-6.9
pH (field)	SU	6.75	6.69	6.61	6.63	6.72	6.54	6.54	6.48	6.58	6.74
Specific Cond. (Field)	mS/cm	0.499	0.445	0.436	0.433	0.475	0.49	0.476	0.50	0.4623	0.419
Temperature, Water (C)	DEG C	16.9	17.7	17.5	16.4	17.0	20.0	22.8	21.7	19.3	18.6
Turbidity, field	NTU	2.55	2.88	3.29	3.58	3.76	1.29	1.91	1.34	2.38	0.67

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-106									
Sample Date		17-Dec-19	7-Jan-20	18-Feb-20	8-Jun-20	3-Sep-20	22-Jan-21	2-Mar-21	22-Jul-21	27-Aug-21	2-Sep-21
Sample ID		KIF-GW-034-20191217	KIF-GW-034-01072020	KIF-GW-034-02182020	KIF-GW-034-06082020	KIF-GW-034-09032020	KIF-GW-KIF-106-01222021	KIF-GW-KIF-106-03022021	KIF-GW-KIF-106-07222021	KIF-GW-KIF-106-08272021	KIF-GW-KIF-106-09022021
Sample Depth		38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	5.9	3.1	2.3	5.3	4.4	2.1	0.7	2.8	5.1	3.6
Dissolved Oxygen	mg/L	0.60	0.30	0.21	0.51	0.38	0.2	0.07	0.25	0.49	0.33
ORP	mV	21.4	-24.1	20.7	-45.2	-39.0	-36.3	-26.3	-34.9	-10.0	-35.5
pH (field)	SU	6.70	6.62	6.83	6.81	6.58	6.58	6.76	6.68	6.56	6.72
Specific Cond. (Field)	mS/cm	0.4872	0.62	0.75	0.88	1.05	1.17	1.04	0.91	0.85	0.84
Temperature, Water (C)	DEG C	15.0	17.1	17.3	20.1	22.5	13.5	15.5	21.5	21.3	20.5
Turbidity, field	NTU	1.36	2.98	3.52	0.87	0.65	4.48	5.40	2.93	2.66	0.62

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-106				KIF-109					
Sample Date		9-Feb-22	30-Mar-22	5-Aug-22	26-Sep-22	4-Mar-21	7-Apr-21	11-May-21	9-Jun-21	6-Jul-21	21-Jul-21
Sample ID		KIF-GW-KIF-106-02092022	KIF-GW-KIF-106-03302022	KIF-GW-KIF-106-08052022	KIF-GW-KIF-106-09262022	KIF-GW-KIF-109-03042021	KIF-GW-KIF-109-04072021	KIF-GW-KIF-109-05112021	KIF-GW-KIF-109-06092021	KIF-GW-KIF-109-07062021	KIF-GW-KIF-109-07212021
Sample Depth		38 ft	38 ft	38 ft	38 ft	48 ft	48 ft	48 ft	48 ft	48 ft	48 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program		CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	2.7	2.1	4.7	5.9	2.70	0.9	1.6	4.6	3.7	2.6
Dissolved Oxygen	mg/L	0.26	0.18	0.40	0.48	0.27	0.09	0.16	0.42	0.32	0.24
ORP	mV	42.8	-56.2	-69.5	-71.6	-32.6	-29.1	-62.5	-32.0	-41.9	-41.6
pH (field)	SU	6.94	6.61	6.63	6.63	6.00	5.93	6.06	5.98	5.81	5.97
Specific Cond. (Field)	mS/cm	1.01	1.106	0.972	1.005	0.71	1.02	0.85	0.74	0.71	0.70
Temperature, Water (C)	DEG C	16.6	22.7	24.2	24.1	15.8	16.7	16.0	20.1	20.8	21.3
Turbidity, field	NTU	4.92	21.1	0.55	0.67	2.70	4.83	4.65	3.77	0.50	1.96

See notes on last page.

Table H.1-9 - Groundwater Quality Parameters
Kingston Fossil Plant

Sample Location		KIF-109					
Sample Date		25-Aug-21	13-Sep-21	8-Feb-22	30-Mar-22	3-Aug-22	28-Sep-22
Sample ID		KIF-GW-109-08252021	KIF-GW-KIF-109-09132021	KIF-GW-KIF-109-02082022	KIF-GW-KIF-109-03302022	KIF-GW-KIF-109-08032022	KIF-GW-KIF-109-09282022
Sample Depth		48 ft	48 ft	48 ft	48 ft	48 ft	48 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters							
Dissolved Oxygen	%	4.7	35.0	3.7	20.3	4.6	3.1
Dissolved Oxygen	mg/L	0.42	3.14	0.38	1.97	0.40	0.28
ORP	mV	-18.3	-39.4	45.1	-60.5	-45.5	-44.5
pH (field)	SU	5.89	5.95	6.33	6.02	6.03	6.07
Specific Cond. (Field)	mS/cm	0.69	0.71	0.65	0.721	0.678	0.687
Temperature, Water (C)	DEG C	23.0	21.4	14.1	17.3	22.9	18.8
Turbidity, field	NTU	2.15	0.84	3.80	3.49	4.86	1.98

Notes:

Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

-	Parameter not analyzed / not available.
%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
M	meters
mg/L	milligrams per Liter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units
uS/cm	microSiemens per centimeter

Table H.1-10 - Screening Levels for Groundwater
Kingston Fossil Plant

CCR Parameters	Groundwater Screening Levels	
	(µg/L)	Source
CCR Rule Appendix III Constituents :		
Boron	4,000	RSL
Calcium		
Chloride	250,000	SMCL
Fluoride	4,000	MCL
pH	6.5 8.5 S.U.	SMCL
Sulfate	250,000	SMCL
Total Dissolved Solids	500,000	SMCL
CCR Rule Appendix IV Constituents :		
Antimony	6	MCL
Arsenic	10	MCL
Barium	2,000	MCL
Beryllium	4	MCL
Cadmium	5	MCL
Chromium (total)	100	MCL
Cobalt	6	CCR Rule GWPS
Fluoride	4,000	MCL
Lead	15	CCR Rule GWPS
Lithium	40	CCR Rule GWPS
Mercury	2	MCL
Molybdenum	100	CCR Rule GWPS
Radium-226 & 228	5 pCi/L	MCL
Selenium	50	MCL
Thallium	2	MCL
TDEC Appendix I Constituents :		
Copper	1,300	MCLG
Nickel	100	TN MCL
Silver	100	TN SMCL
Vanadium	86	RSL
Zinc	5,000	SMCL

Notes:

CCR Rule - Coal Combustion Residuals rule, USEPA Title 40, Code of Federal Regulations, Part 257

GWPS - groundwater protection standards

MCL - USEPA maximum contaminant level

MCLG - Maximum contaminant level goal

pCi/L - picocuries per liter

RSL - USEPA regional screening level

SMCL - USEPA secondary maximum contaminant level

S.U. - standard units

TN MCL - maximum contaminant level promulgated by State of Tennessee

TN SMCL - secondary maximum contaminant level promulgated by State of Tennessee

TDEC - Tennessee Department of

µg/L - micrograms per liter

USEPA - United States Environmental Protection Agency

Table H.1-11 - Summary of Statistically Significant Concentrations/Values
Kingston Fossil Plant

Parameter	Background		Stilling Pond			Sluice Trench and Area East of Sluice Trench, Interim Ash Staging Area				
	AD-1	GW-2	6AR	KIF-103	KIF-104	AD-2	AD-3	KIF-105	KIF-106	KIF-109
CCR Rule Appendix III Parameters										
Boron	Green	Green*	Green	Green	Green	Green	Green	Green	Green	Green
Chloride	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Fluoride[1] (also Appendix IV)	Green	Green*	Green	Green	Green	Green	Green	Green	Green	Green
pH (field)	Green	Red	Red	Red	Red	Red	Green	Red	Green	Red
Sulfate	Green	Green	Red	Green	Red	Red	Red	Red	Red	Green
TDS	Green	Green	Green	Green	Red	Red	Red	Red	Red	Green
CCR Rule Appendix IV Parameters										
Antimony	Green*	Green*	Green	Green*	Green	Green*	Green*	Green*	Green*	Green*
Arsenic	Green	Green*	Green	Green	Green	Green	Green	Green	Green	Green
Barium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Beryllium	Green*	Green*	Green	Green*	Green*	Green	Green*	Green	Green*	Green*
Cadmium	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green	Green*	Green*
Chromium	Green	Green*	Green	Green*	Green*	Green	Green	Green*	Green*	Green*
Cobalt	Green	Green*	Red	Red	Red	Red	Green	Red	Green	Green
Lead	Green*	Green*	Green	Green*	Green*	Green	Green*	Green	Green*	Green*
Lithium	Green	Green*	Green*	Green*	Green	Green	Green	Green	Green	Green
Mercury	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Molybdenum	Green	Green*	Green*	Green*	Green	Green	Green	Green*	Green	Green*
Radium-226+228	Green	Green*	Green	Green	Green	Green	Green	Green	Green*	Green
Selenium	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*
Thallium	Green	Green*	Green	Green*	Green*	Green	Green	Green	Green*	Green*
Additional TDEC Appendix I Parameters										
Copper	Green	Green*	Green*	Green*	Green	Green*	Green	Green*	Green*	Green*
Nickel	Green*	Green*	Green	Green	Green	Green	Green	Green	Green	Green
Silver	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Vanadium	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*
Zinc	Green*	Green*	Green	Green	Green	Green	Green	Green	Green	Green

Green	No statistically significant concentration greater than or equal to the GSL for constituents other than pH and no statistically significant difference outside the GSL range for pH.
Green*	Limited dataset (sample size <5 or <4 detected values), but none of the available results are greater than or equal to the GSL or outside the GSL range for pH.
Red	Statistically significant concentration greater than or equal to the GSL for constituents other than pH or a statistically significant difference outside the GSL range for pH.

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

GSL - Groundwater Screening Level established for the TDEC Order EI

TDEC - Tennessee Department of Environment and Conservation

Bold colors are used to represent CCR Rule Appendix IV Parameter and TDEC Appendix I Parameter results; subdued colors represent CCR Rule Appendix III Parameter results.

See Appendix E.3 for full description of statistical methods applied.

[1]Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV constituent. In this table, fluoride has been grouped with the Appendix III constituents to avoid duplication of results.

Table H.1-12 - Linear Regression Results
Kingston Fossil Plant

Well	Constituent Type	Constituent	p-value	Trend summary[1]
AD-1	CCR Rule Appendix III Parameters	pH	0.7739	No trend detected
GW-2	CCR Rule Appendix III Parameters	pH	0.3113	No trend detected
6AR	CCR Rule Appendix III Parameters	pH	0.0003	Increasing
		Sulfate	0.0063	Increasing
		Total Dissolved Solids	<0.0001	Increasing
	CCR Rule Appendix IV Parameters	Cadmium	0.2433	No trend detected
		Cobalt	<0.0001	Increasing
KIF-103	CCR Rule Appendix III Parameters	pH	0.0047	Increasing
	CCR Rule Appendix IV Parameters	Cobalt	0.0065	Decreasing
KIF-104	CCR Rule Appendix III Parameters	pH	0.1734	No trend detected
		Sulfate	0.0614	No trend detected
		Total Dissolved Solids	0.395	No trend detected
	CCR Rule Appendix IV Parameters	Arsenic	<0.0001	Decreasing
		Cobalt	0.3969	No trend detected
AD-2	CCR Rule Appendix III Parameters	pH	0.0086	Increasing
		Sulfate	<0.0001	Increasing
		Total Dissolved Solids	<0.0001	Increasing
	CCR Rule Appendix IV Parameters	Arsenic	0.1271	No trend detected
		Cobalt	<0.0001	Increasing
AD-3	CCR Rule Appendix III Parameters	pH	0.072	No trend detected
		Sulfate	<0.0001	Increasing
		Total Dissolved Solids	<0.0001	Increasing
	CCR Rule Appendix IV Parameters	Cobalt	<0.0001	Increasing
KIF-105	CCR Rule Appendix III Parameters	pH	0.0005	Decreasing
		Sulfate	0.08	No trend detected
		Total Dissolved Solids	0.0579	No trend detected
	CCR Rule Appendix IV Parameters	Cobalt	<0.0001	Increasing
KIF-106	CCR Rule Appendix III Parameters	pH	0.6825	No trend detected
		Sulfate	<0.0001	Increasing
		Total Dissolved Solids	<0.0001	Increasing
KIF-109	CCR Rule Appendix III Parameters	pH	0.1758	No trend detected
		Sulfate	0.3135	No trend detected
		Total Dissolved Solids	0.2954	No trend detected
	CCR Rule Appendix IV Parameters	Cobalt	0.0535	No trend detected

Notes:
CCR Rule - Title 40, Code of Federal Regulations, Part 257
1. Trend evaluated using linear regression. Regression considered significant when p<0.05.
2. Fluoride is both a CCR Rule Appendix III and CCR Rule Appendix IV constituent. In this table, fluoride has been grouped with the Appendix III constituents only to avoid duplication of results.

EXHIBITS

Exhibit No.
H.1-1

Title

Monitoring Well and Piezometer Network

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by DMB on 2023-10-12
Technical Review by MT on 2023-10-12

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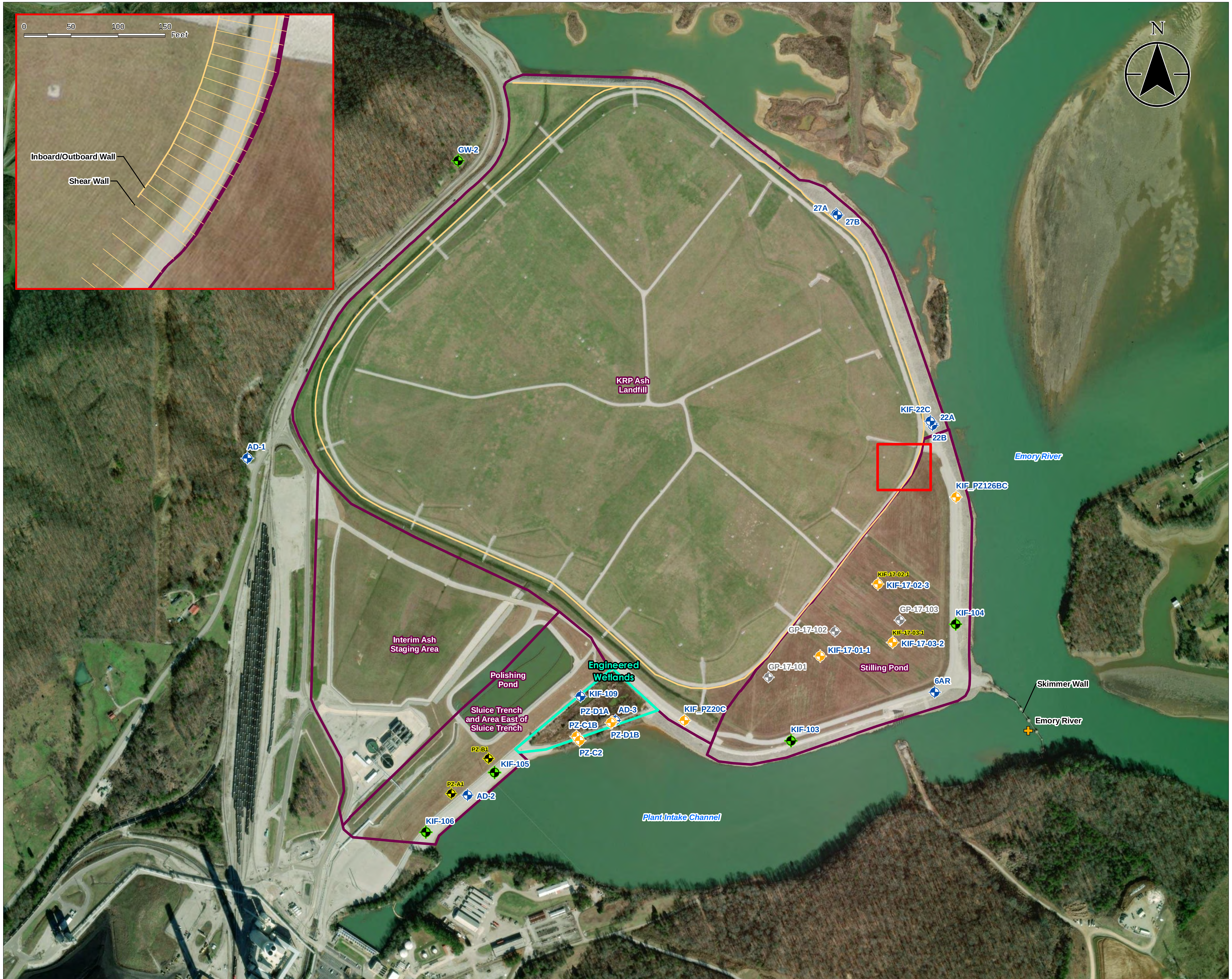
1:3,600 (At original document size of 22x34)



Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Abandoned Temporary Well in CCR Material
- Emory River Gauging Station
- Subsurface Wall (Approximate)
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

Perimeter Containment Wall (As Shown in Inset)

- Inboard/Outboard Wall
- Shear Wall

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery

Stantec TVA

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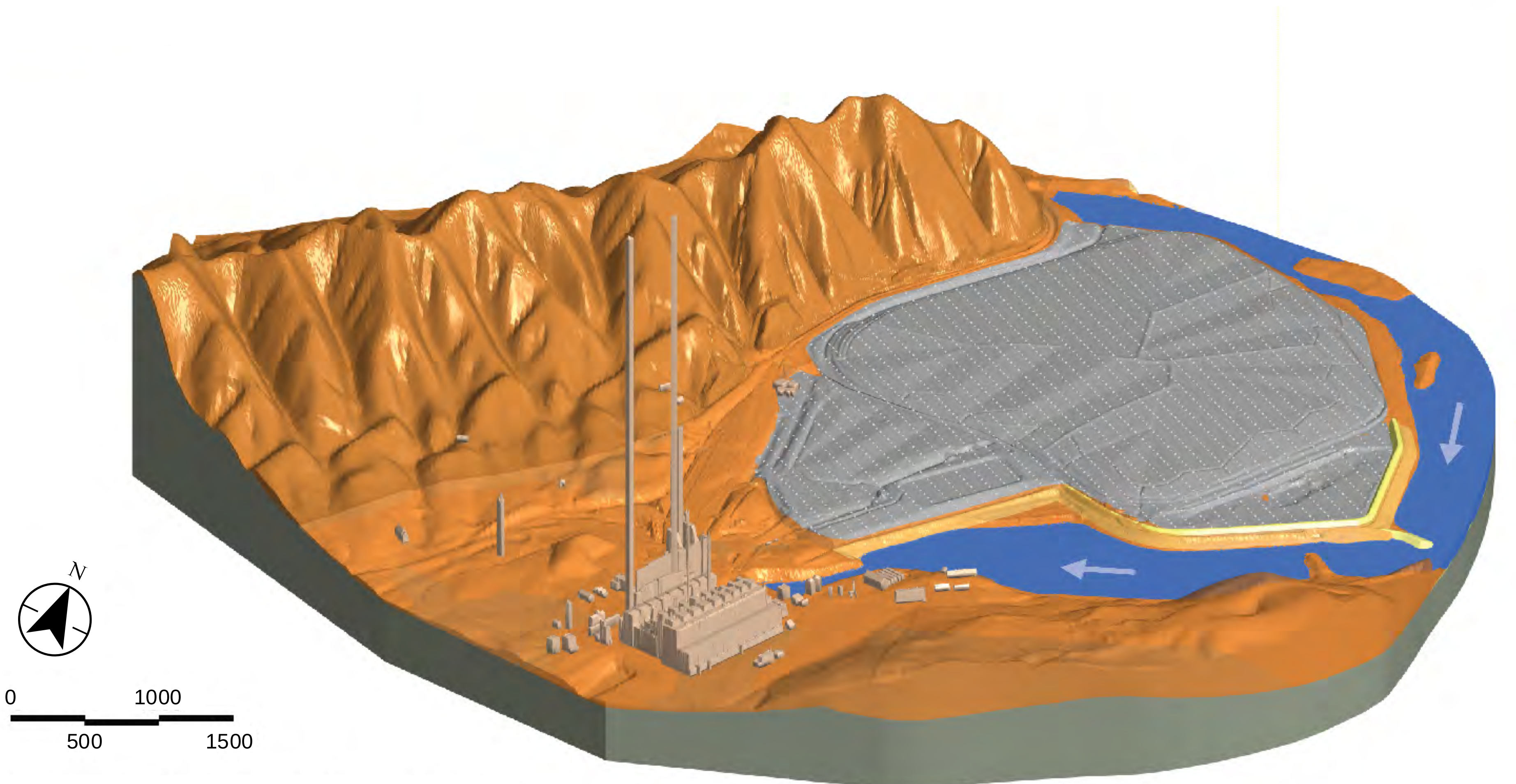


Image is an oblique view of a 3-dimensional model at 3X vertical exaggeration. The scale above is valid only in the horizontal direction.

Exhibit No.
H.1-2

Title
Lithologic Model (Oblique View Looking North)

Client/Project 175668043
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2023-09-21
TR by BL on 2023-09-21

Legend

- Building Structure
- CCR Material
- Clay Dike
- Unconsolidated Materials (Primarily Silt and Clay)
- Waterbody
- Bedrock
- Typical Surface Stream Flow Direction

Exhibit No.

H.1-3

Title

Lithologic Model - Primarily Silts and Clays (Oblique View Looking North)

Client/Project 175668043

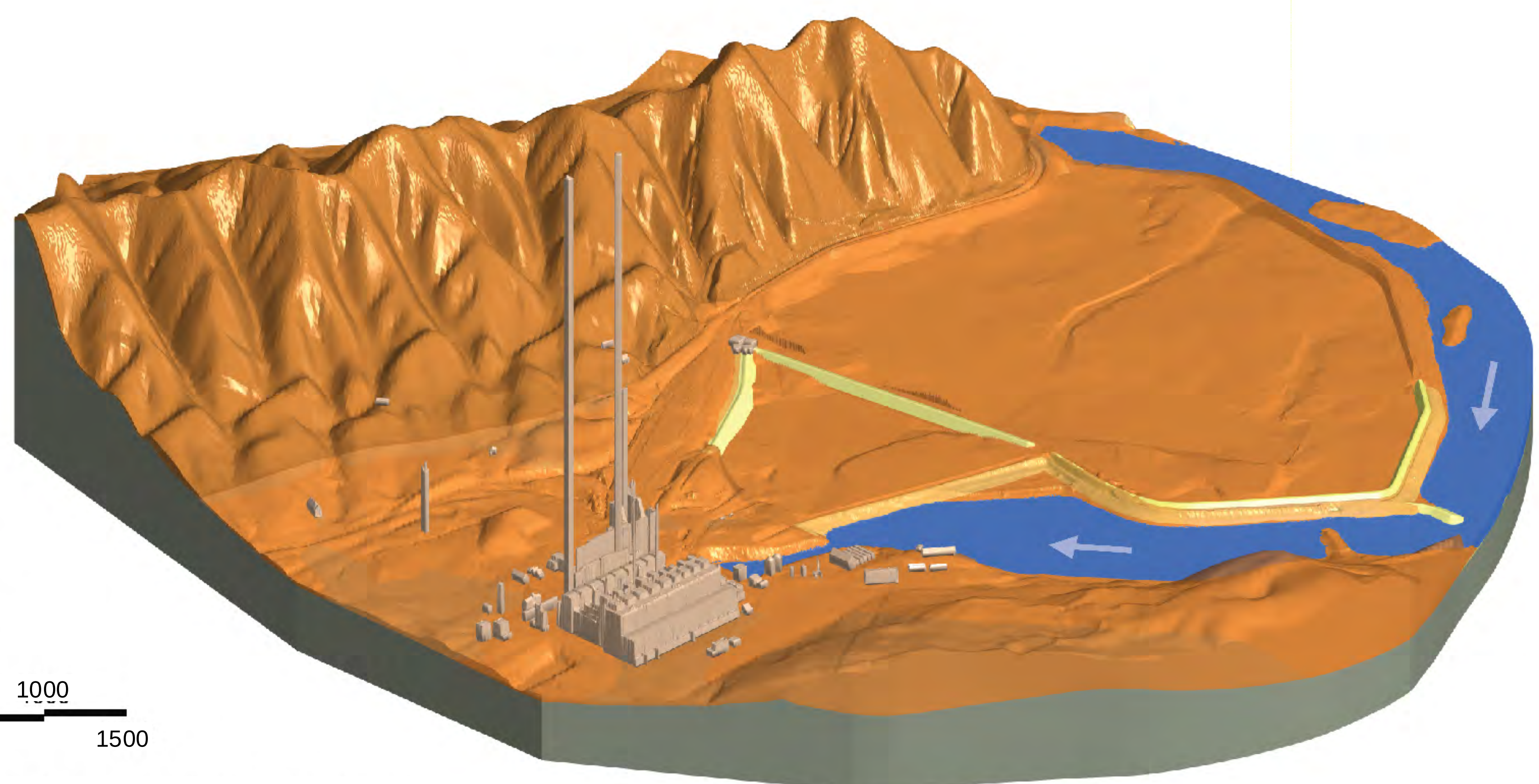
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2023-09-21
TR by BL on 2023-09-21

Legend

- Building Structure
- Clay Dike
- Unconsolidated Materials (Primarily Silt and Clay)
- Waterbody
- Bedrock
- Typical Surface Stream Flow Direction



N

0 1000
500 1500

Image is an oblique view of a 3-dimensional model at 3X vertical exaggeration. The scale above is valid only in the horizontal direction.

Stantec

TVA

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Exhibit No.

H.1-4

Title

Lithologic Model - Primarily Sand and Silty Sand (Oblique View Looking North)

Client/Project 175668043

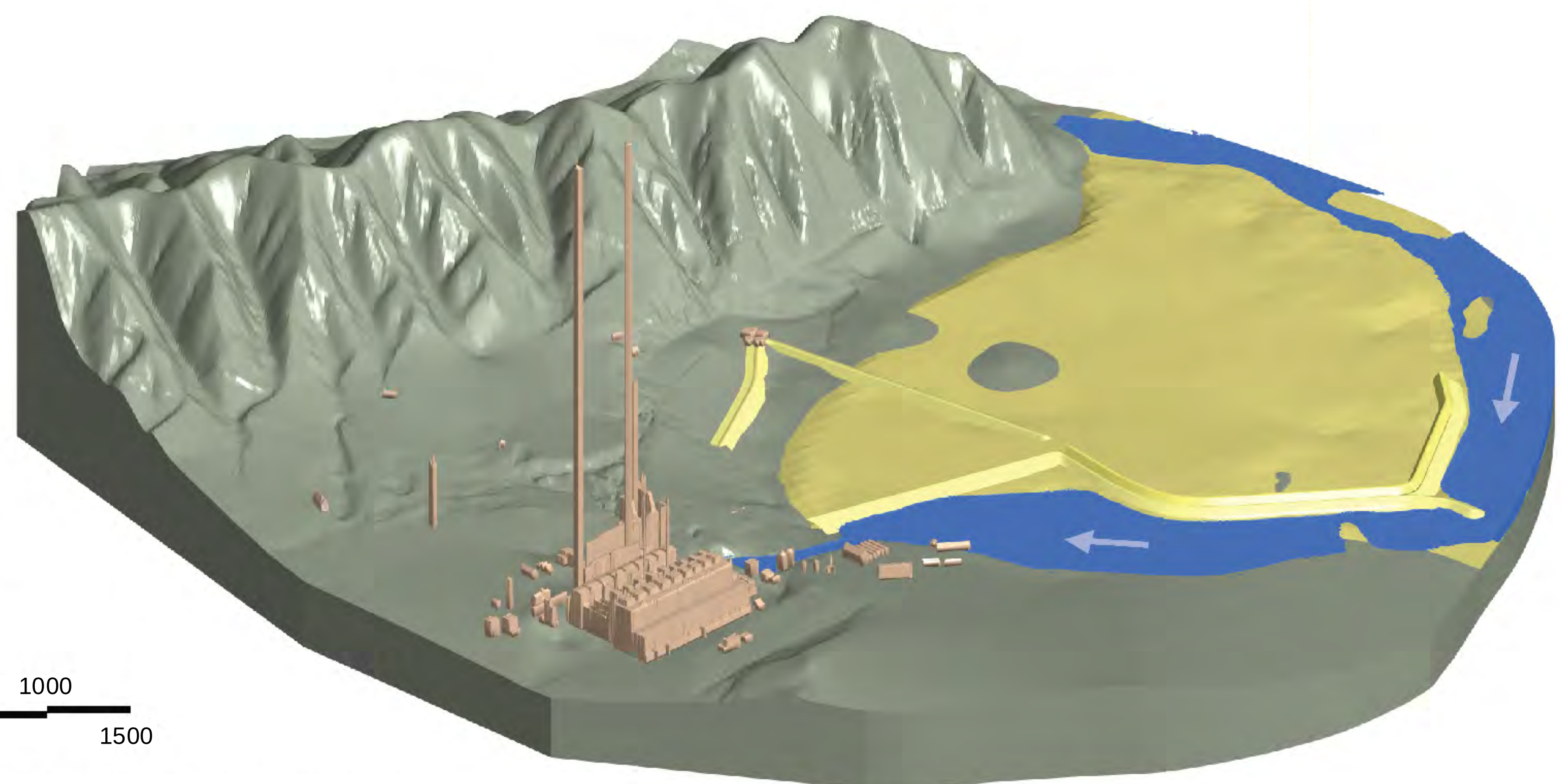
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2023-09-21
TR by BL on 2023-09-21

Legend

- Building Structure
- Clay Dike
- Unconsolidated Materials (Primarily Sand and Gravel)
- Waterbody
- Bedrock
- Typical Surface Stream Flow Direction



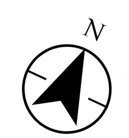


Image is an oblique view of a 3-dimensional model at 3X vertical exaggeration. The scale above is valid only in the horizontal direction.

Stantec

TVA

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Exhibit No.
H.1-5

Title

Geologic Map

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by TKR on 2023-03-16
Technical Review by SZ on 2023-03-16

0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Abandoned Temporary Well in CCR Material
- Emory River Gauging Station
- CCR Unit Area (Approximate)
- Engineered Wetlands (Approximate)
- Polishing Pond (Approximate)

Geologic Formations

- Ordovician/Cambrian Knox Group
- Cambrian Maynardville Limestone
- Cambrian Conasauga Shale
- Cambrian Rome Formation

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery
3. Geologic map corresponds to Moore, James L. et al (1993). "Geologic Map of The Harriman Quadrangle, Tennessee" and the Site Geologic Map, Figure 2-1 included in the TVA (November 2004) "Kingston Fossil Plant Hydrogeologic Evaluation of Coal-Combustion Byproduct Disposal Facility Expansion".

Stantec
TVA

Figure No.
H.1-6

Title
Regional Geologic Map

Client/Project
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by TKR on 2023-03-16
Technical Review by MB on 2023-03-16
Independent Review by ES on 2023-03-16

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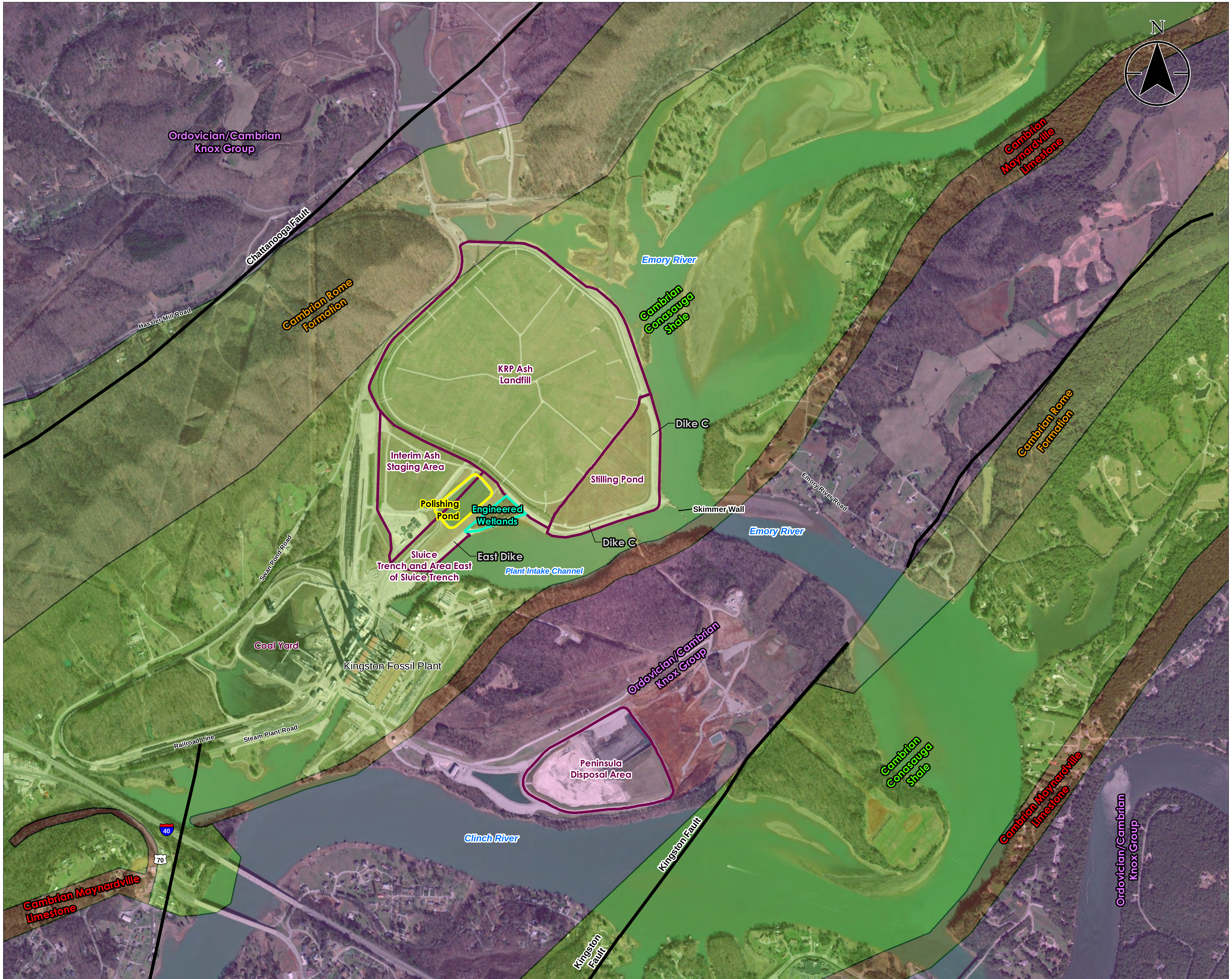


Legend

Fault

CCR Unit Area (Approximate)

Engineered Wetlands (Approximate)

Polishing Pond (Approximate)

Geologic Formations

Ordovician/Cambrian Knox Group

Cambrian Maynardville Limestone

Cambrian Conasauga Shale

Cambrian Rome Formation

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery courtesy of ESRI World Imagery basemap (Dated 2/22/2020)
3. Geologic map corresponds to the "East-Central Sheet Geologic Map of Tennessee" (1966); Moore, James L. et al (1993). "Geologic Map of The Harriman Quadrangle, Tennessee"; and the Site Geologic Map, Figure 2-1 included in the TVA (November 2004) "Kingston Fossil Plant Hydrogeologic Evaluation of Coal-Combustion Byproduct Disposal Facility Expansion".

Stantec
TVA

Exhibit No.

H.1-7

Title

Lithologic Model - Top of Bedrock (Oblique View Looking North)

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2023-09-21
TR by BL on 2023-09-21

Legend

- Building Structure
- Clay Dike
- Waterbody
- Bedrock
- Typical Surface Stream Flow Direction

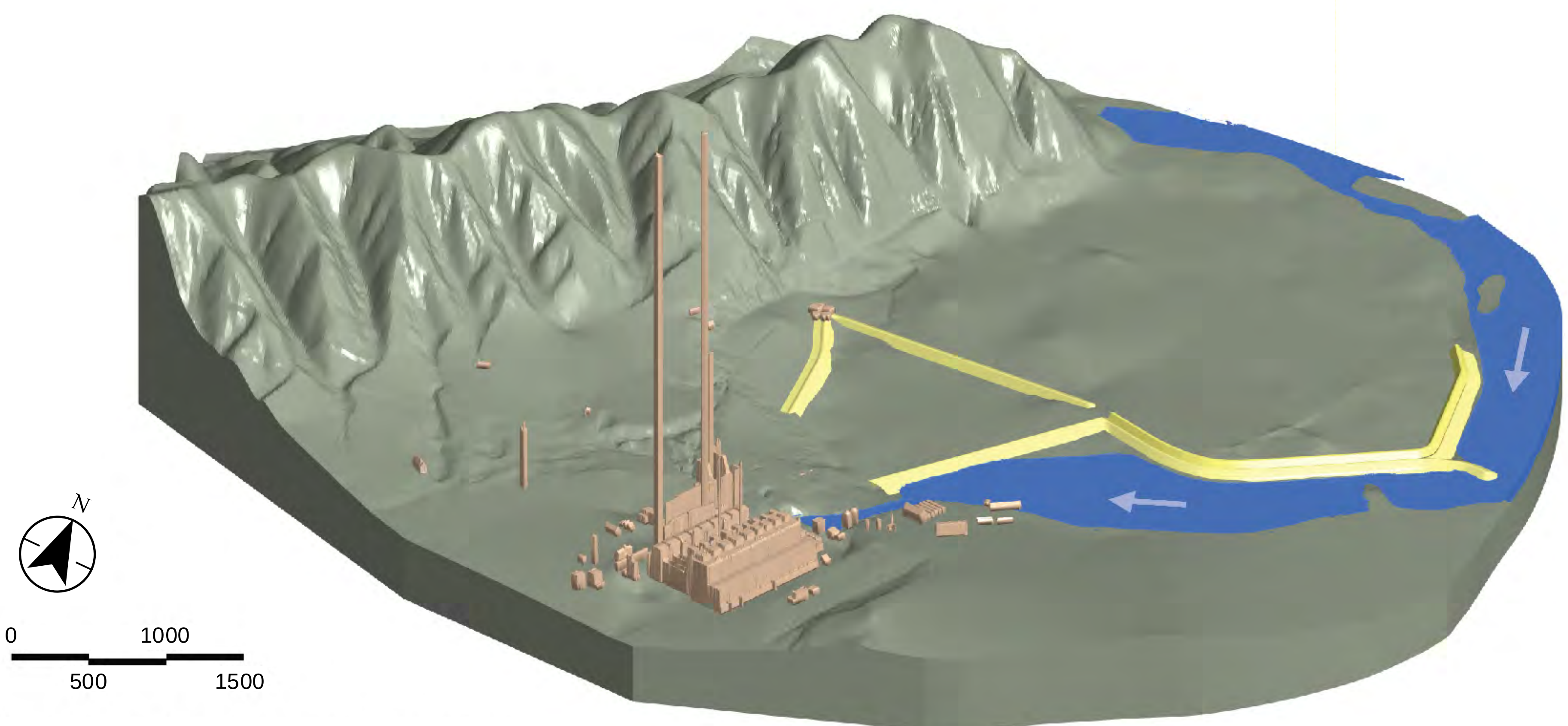


Image is an oblique view of a 3-dimensional model at 3X vertical exaggeration. The scale above is valid only in the horizontal direction.

Stantec

TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1-7_LithologicModel_TopofBedrock.mxd Revised: 2023-09-21 By: mbough

Exhibit No.

H.1-8

Title

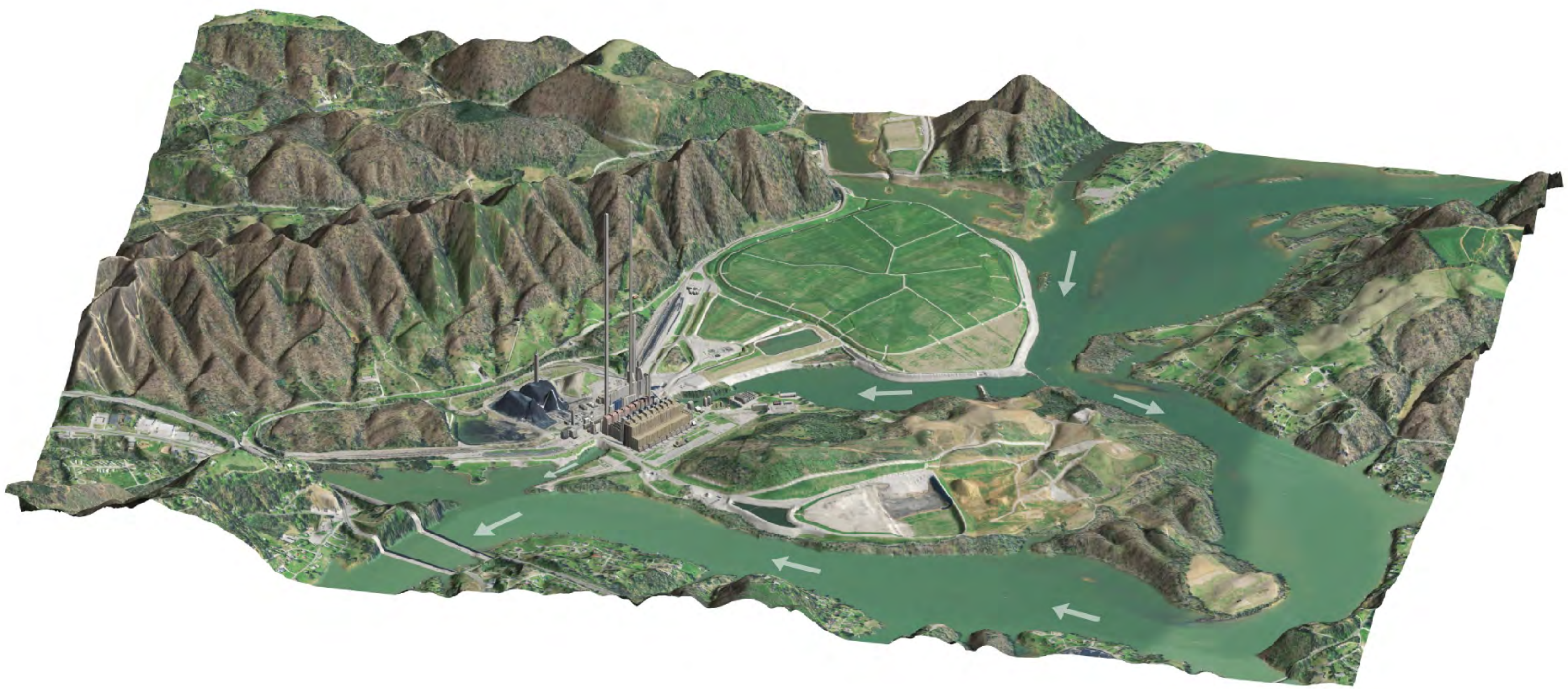
Lithologic Model - Physiographic Setting (Oblique View Looking North)

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2023-05-11
TR by BL on 2023-05-11



Legend

Typical Surface Stream Flow Direction

Stantec

TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1-8_PhysiographicSetting.mxd Revised: 2023-05-11 By: mbough

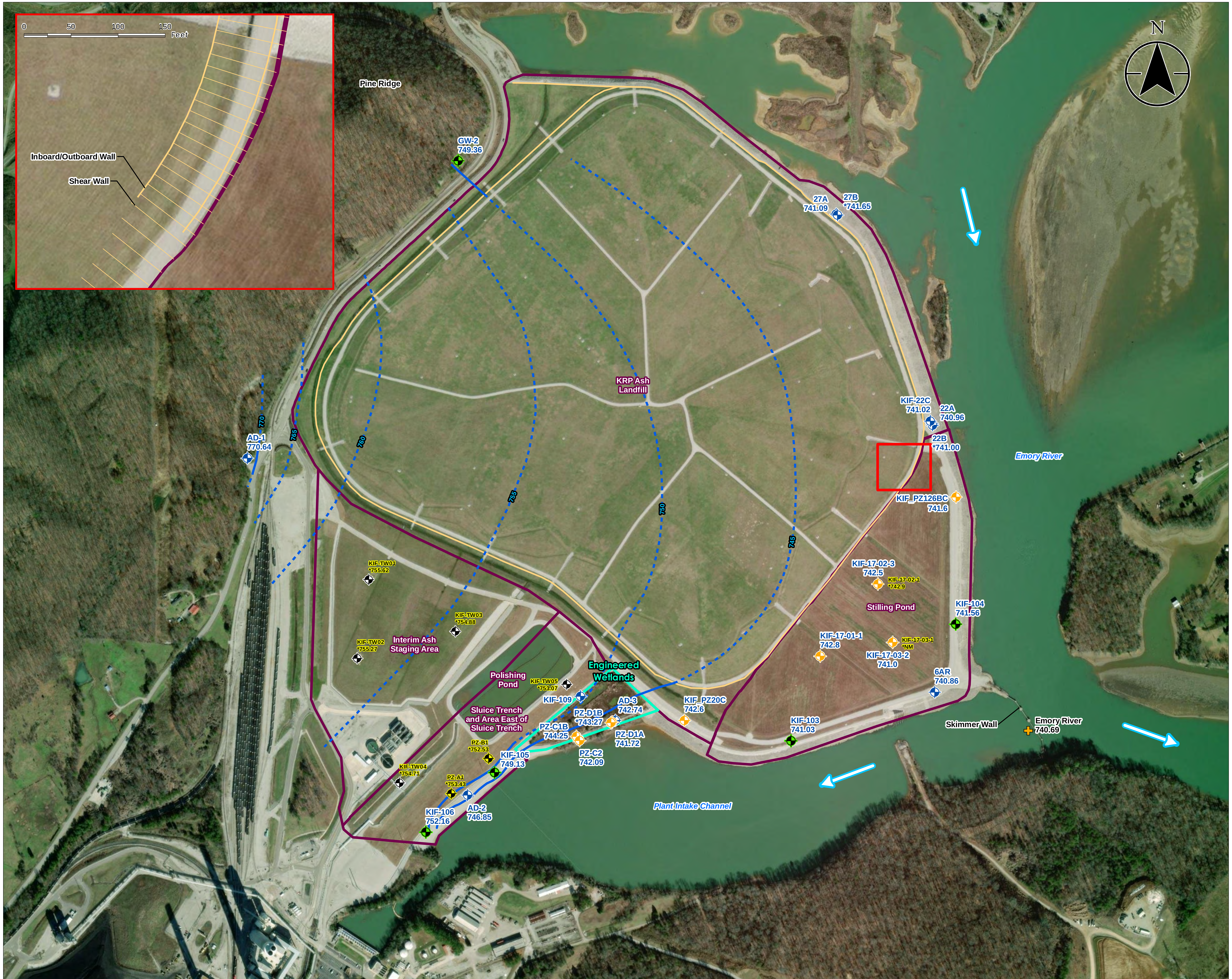


Exhibit No.

H.1-9

Title

Groundwater Elevation Contour Map, Event #3 (August 19, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043

Prepared by DMB on 2023-10-12
Technical Review by MT on 2023-10-12

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well — groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well — groundwater elevation in ft amsl
- Piezometer — groundwater elevation in ft amsl
- Piezometer in CCR — pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR — pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station — surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall (Approximate)
- Surface Stream Flow
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

Perimeter Containment Wall (As Shown in Inset)

- Inboard/Outboard Wall
- Shear Wall

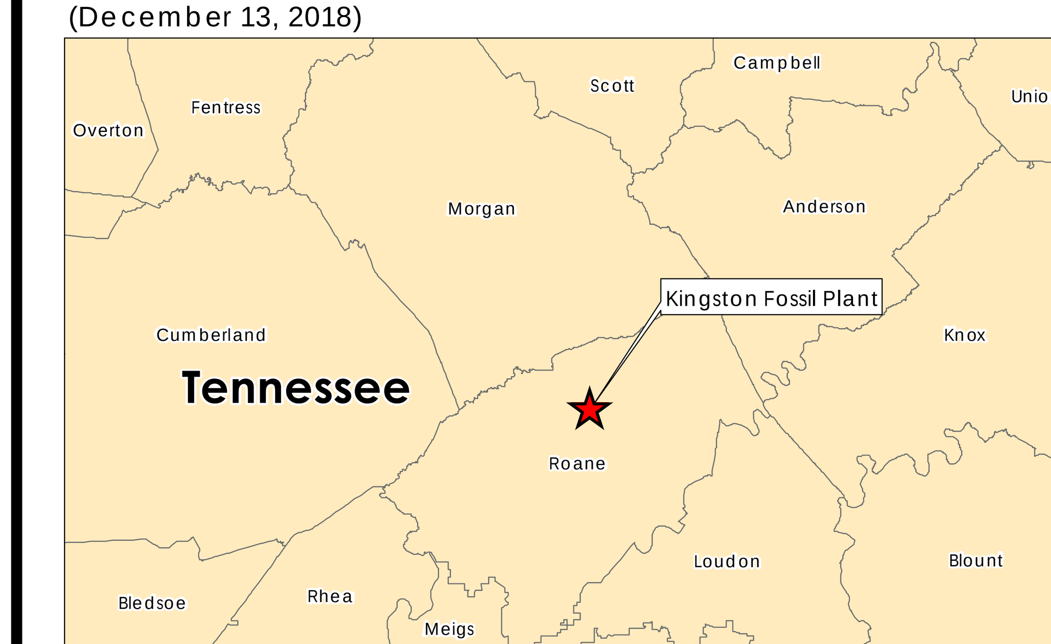
CCR: Coal combustion residuals

*Groundwater and pore water elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018)



Stantec TVA

Exhibit No.

H.1-10

Title

KIF Instrumentation Used for Surface Water / Pore Water / Groundwater Hydrograph Comparison

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by MB on 2023-03-16
Technical Review by MD on 2023-03-16

0 250 500 750 1,000 Feet

1:3,000 (At original document size of 22x34)

Legend

- Piezometer
- CCR Management Unit Area (Approximate)
- Engineered Wetlands (Approximate)
- Polishing Pond (Approximate)

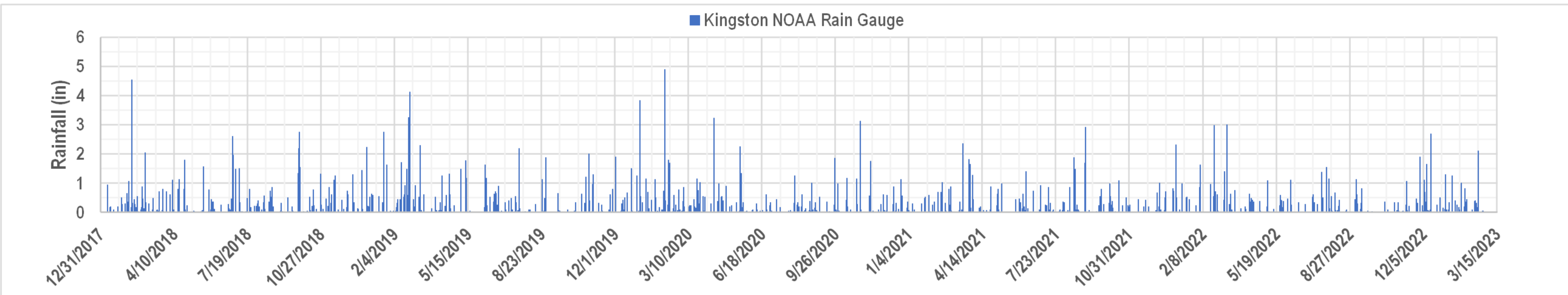
Instrument Name	Northing (TN STP NAD83)	Easting (TN STP NAD83)
KIF_PZ126AC	576,576.97	2,411,404.55
KIF_PZ126BC	576,576.97	2,411,404.55
KIF_RS41_SPT_17_1_1	575,562.74	2,410,537.60
KIF_RS42_SPT_17_2_1	576,021.59	2,410,907.02
KIF_RS42_SPT_17_2_3	576,021.59	2,410,907.02
KIF_RS43_SPT_17_3_2	575,650.15	2,411,000.11

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery

Stantec TVA

V:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1-10_graph_instrumentation.mxd Revised: 2023-03-16 By: mbough



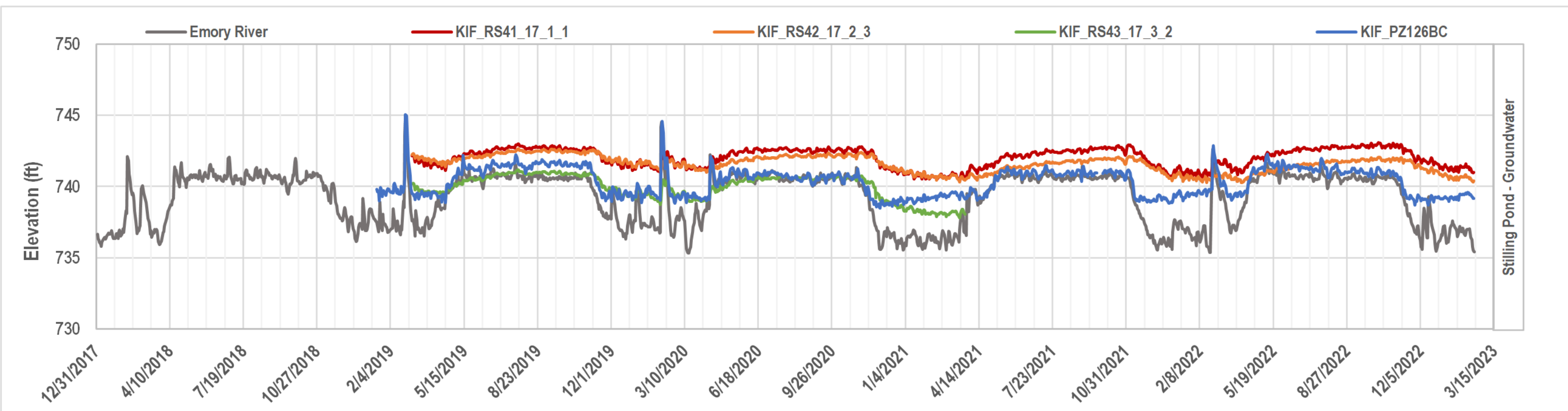


Exhibit No.

H.1-11

Title

Groundwater / Surface Water Elevation Comparison

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2022-05-16
TR by SZ on 2022-05-16
IR Review by TR on 2022-05-16

Legend

in - inches
ft - feet
NOAA - National Oceanic and Atmospheric Administration

Notes:
Daily Summaries Station Details: KINGSTON, TN US, GHCND:USC00404871, Climate Data Online (CDO), National Climatic Data Center (NCDC) (noaa.org)

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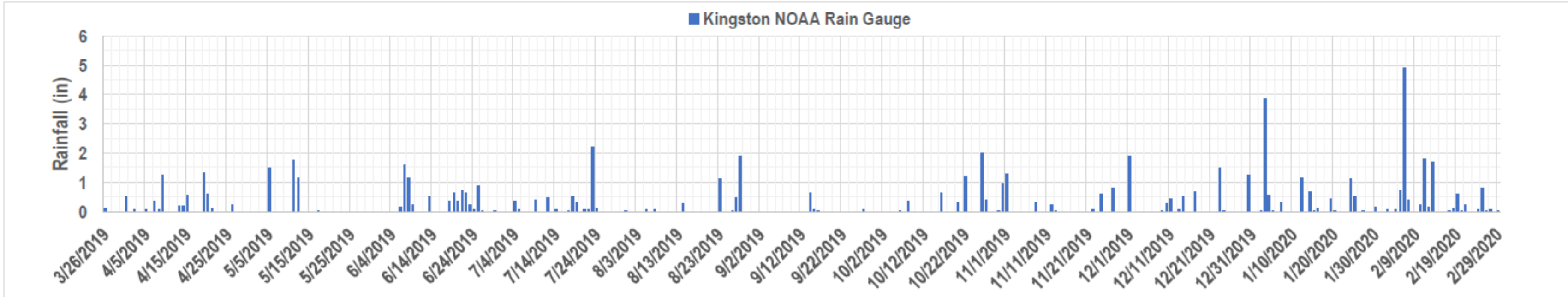
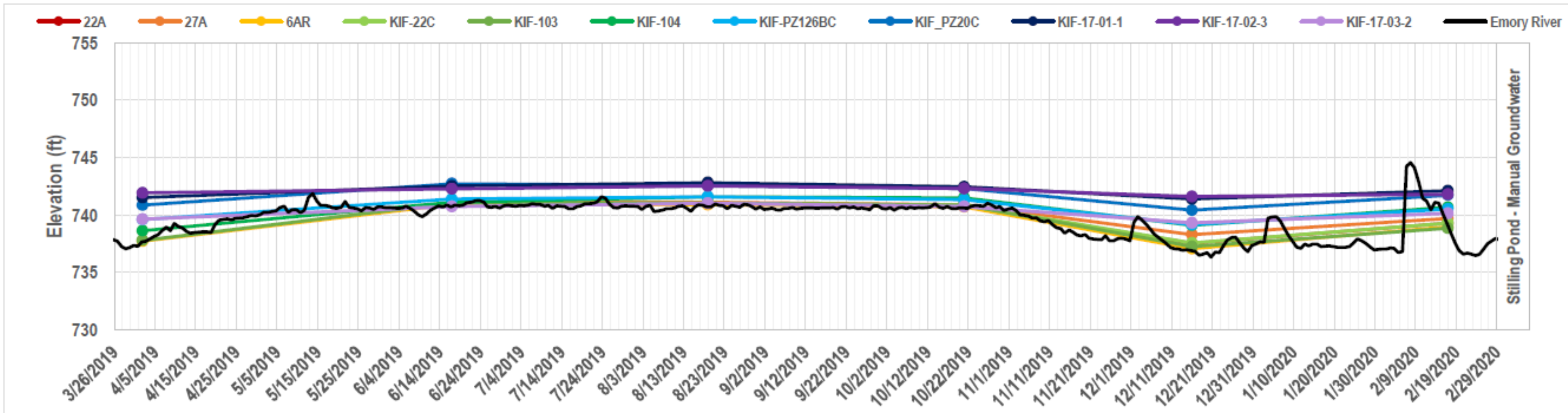
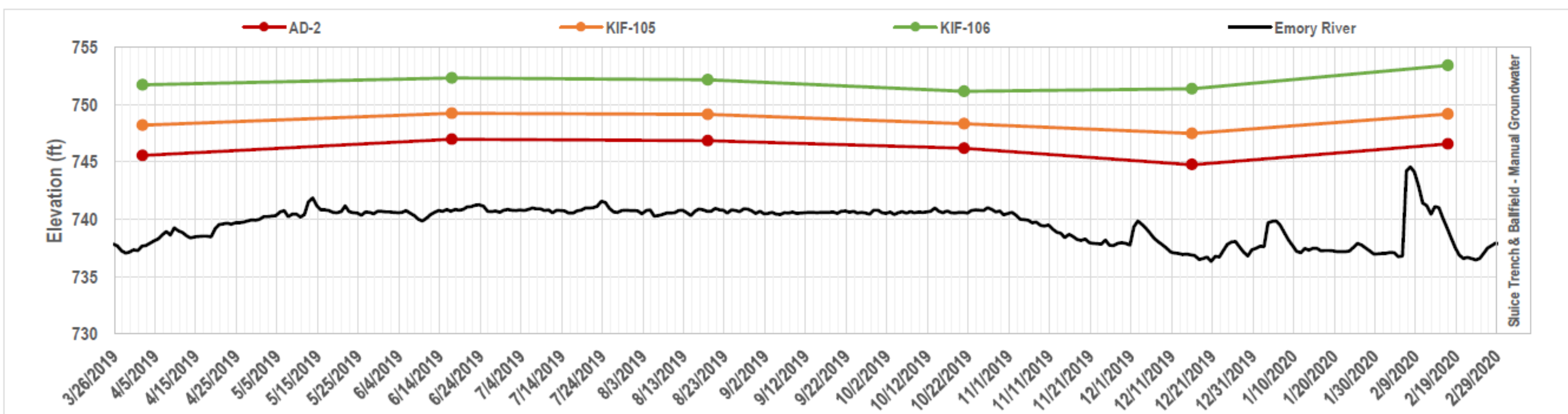
TVA







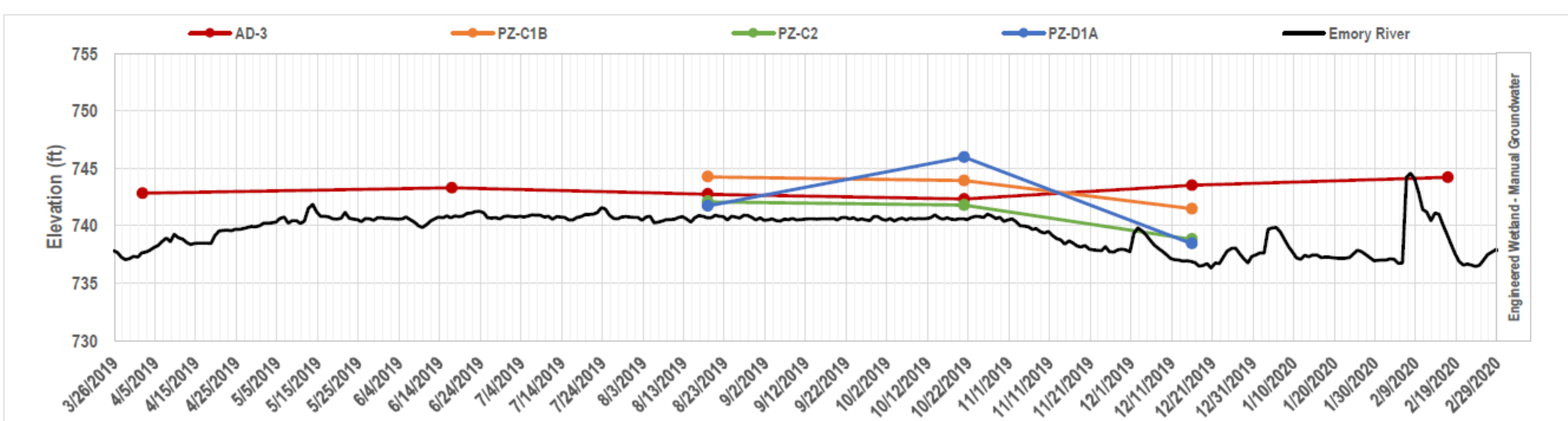


Exhibit No.

H.1-12

Title

Groundwater / Surface Water Elevation Comparison - Manual Instrumentation

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2022-05-16
TR by SZ on 2022-05-16
IR Review by TR on 2022-05-16

Legend

in - inches
ft - feet
NOAA - National Oceanic and Atmospheric Administration

Notes:

Daily Summaries Station Details: KINGSTON, TN US, GHCND:USC00404871, Climate Data Online (CDO), National Climatic Data Center (NCDC) (noaa.org)

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Exhibit No.
H.1-13

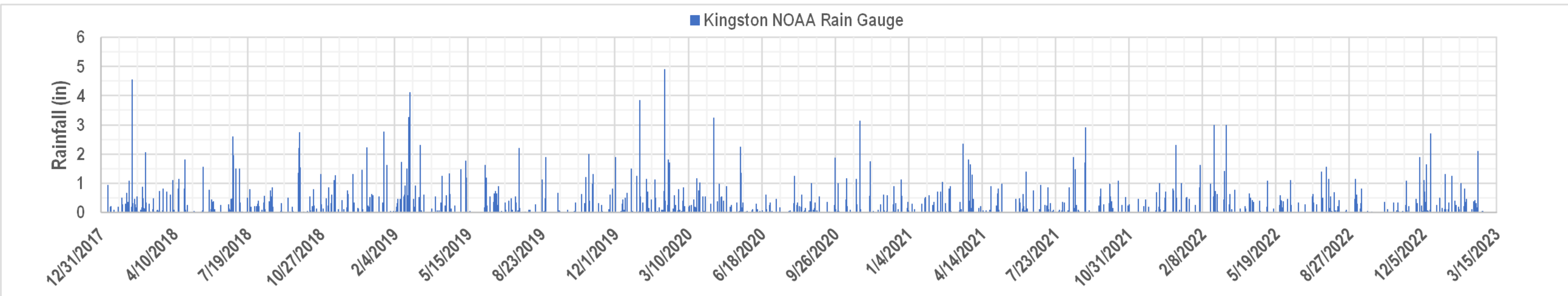
Title
Pore Water / Surface Water Elevation Comparison

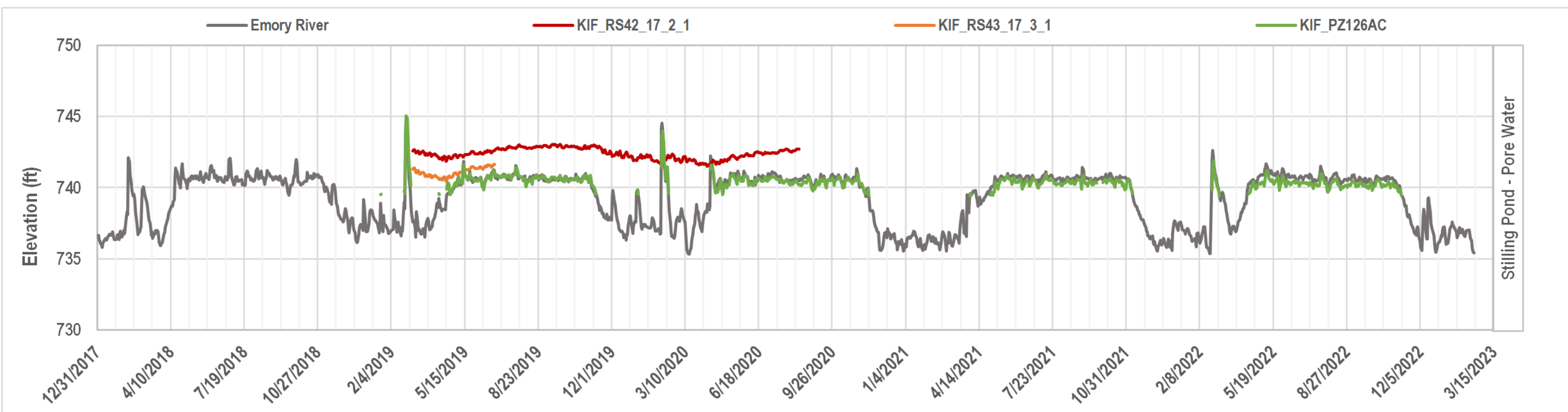
Client/Project 175668043
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2022-05-16
TR by SZ on 2022-05-16
IR Review by TR on 2022-05-16

Legend
in - inches
ft - feet
NOAA - National Oceanic and Atmospheric Administration

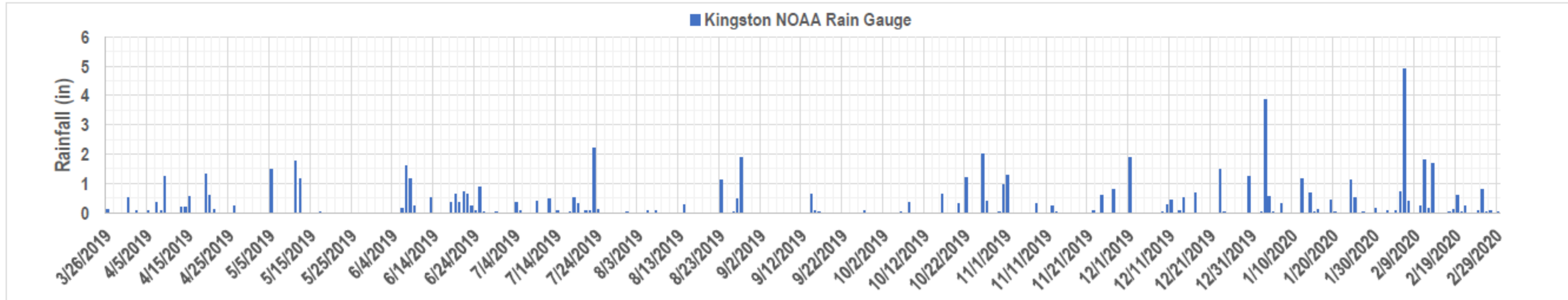


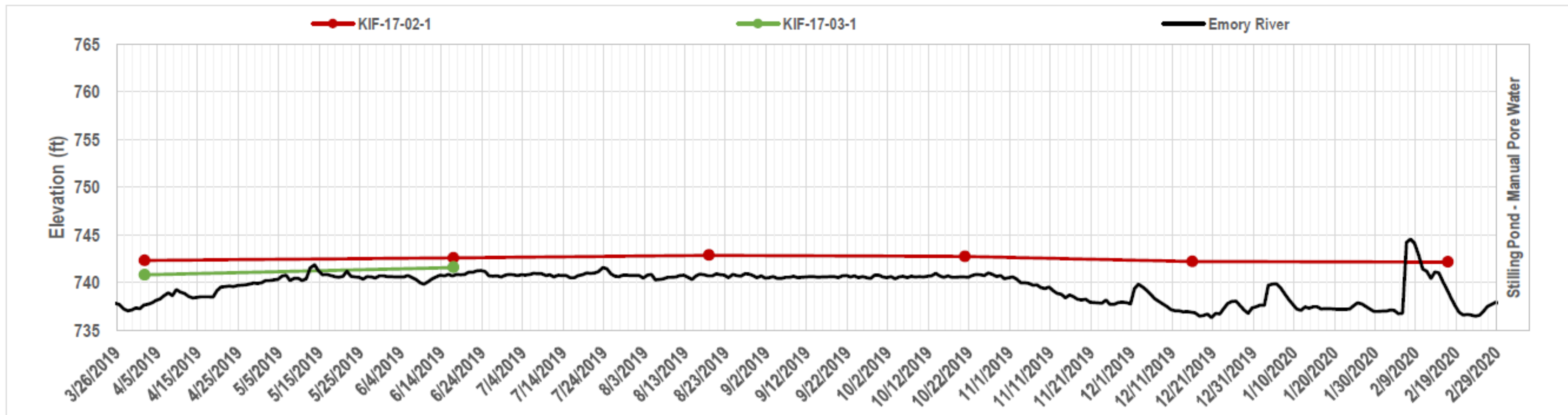


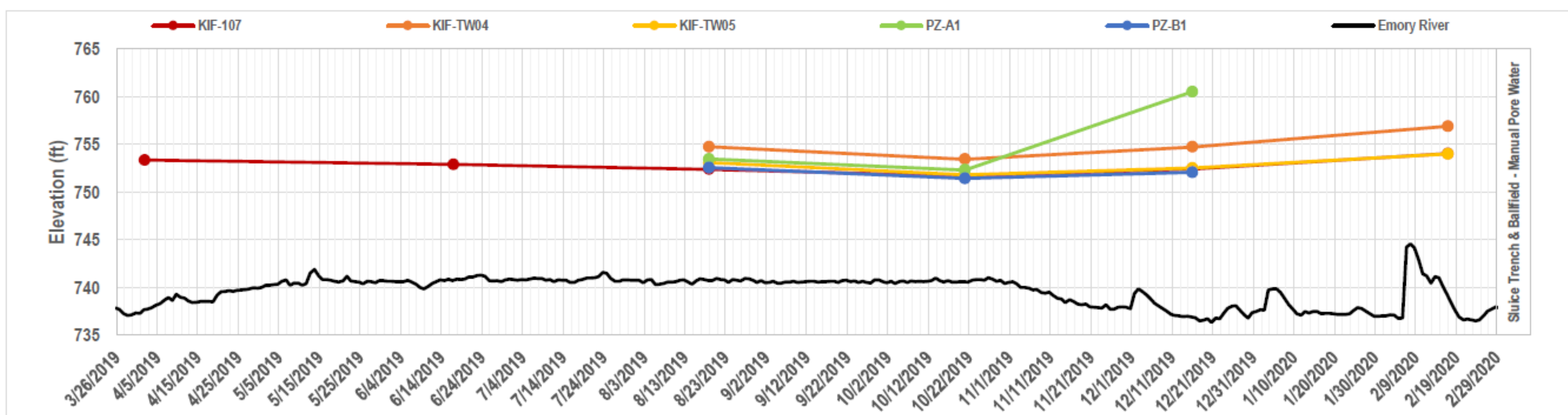
Notes:
Daily Summaries Station Details: KINGSTON, TN US, GHCND:USC00404871, Climate Data Online (CDO), National Climatic Data Center (NCDC) (noaa.org)

Stantec
TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1-10_Concentrations_BoronSulfateChlorideCobalt_in_GW_AD-3.mxd Revised: 2022-05-16 By: mbough







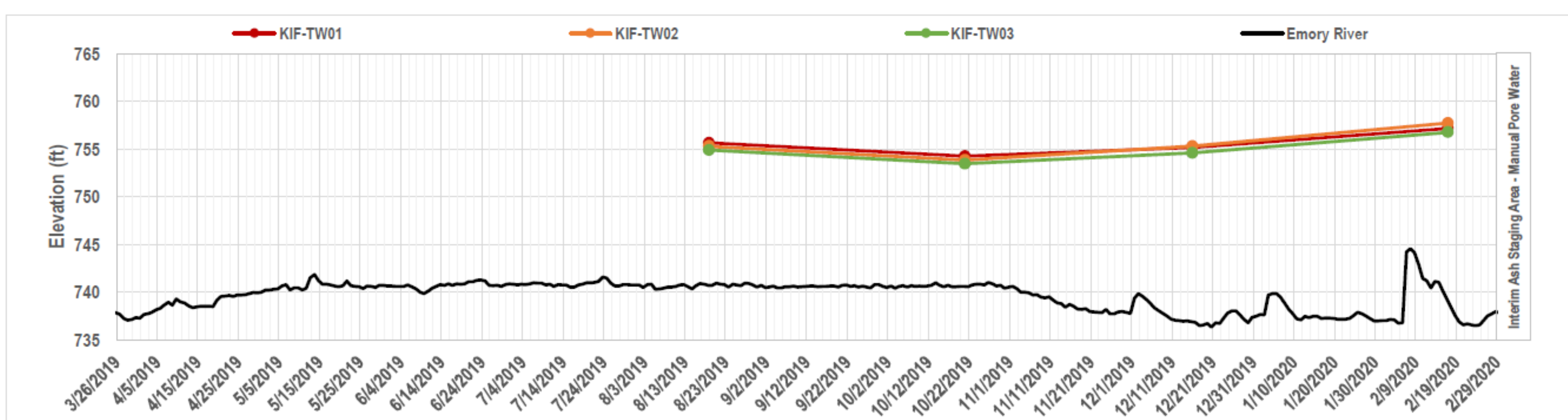


Exhibit No.

H.1-14

Title

Pore Water / Surface Water Elevation Comparison - Manual Instrumentation

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee
Roane County, Tennessee

Prepared by DMB on 2022-05-16
TR by SZ on 2022-05-16
IR Review by TR on 2022-05-16

Legend

in - inches
ft - feet
NOAA - National Oceanic and Atmospheric Administration

Notes:
Daily Summaries Station Details: KINGSTON, TN US, GHCND:USC00404871, Climate Data Online (CDO), National Climatic Data Center (NCDC) (noaa.org)

Stantec

TVA

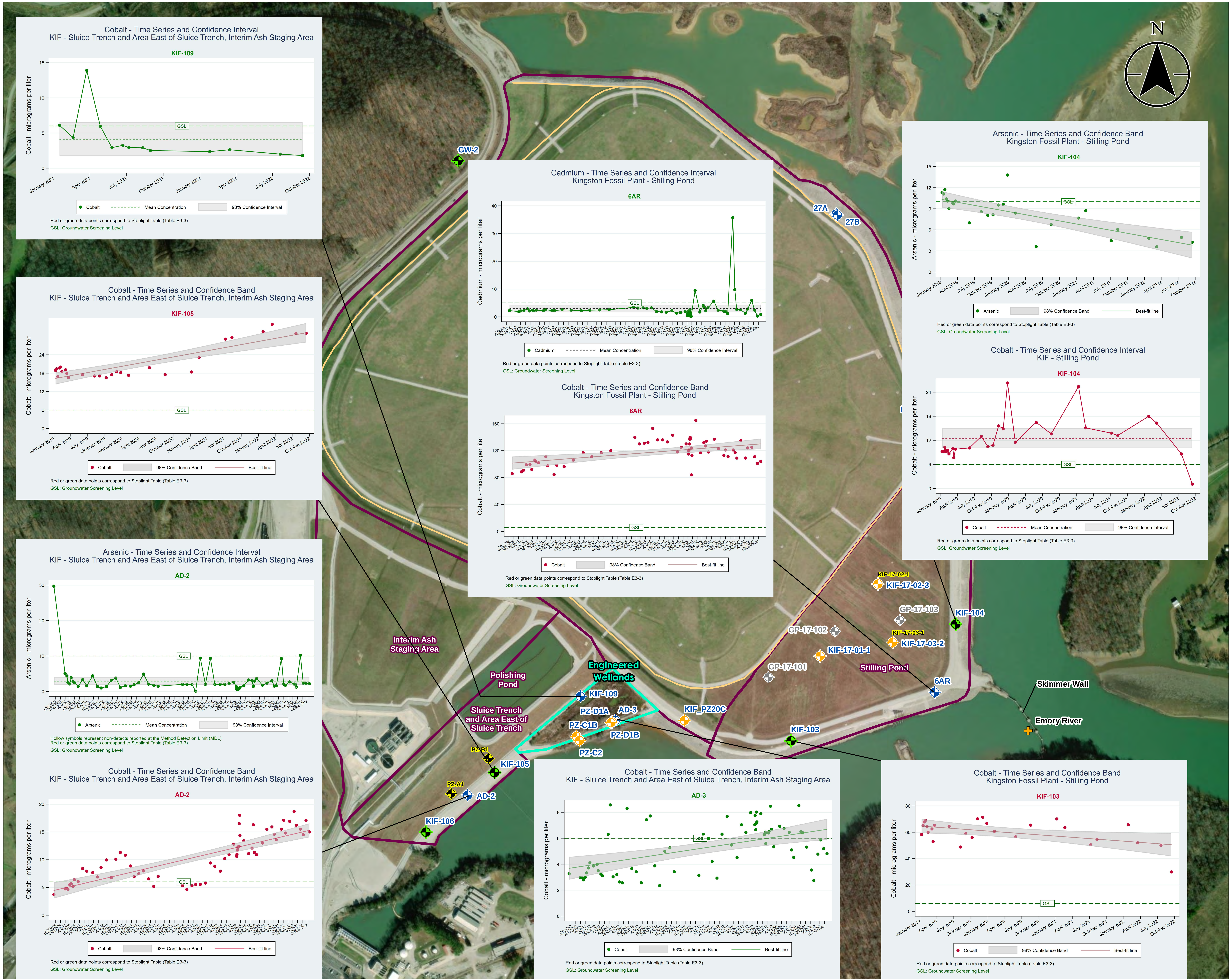


Exhibit No.

H.1-15

Title

Summary of Statistical Evaluation of Groundwater Analytical Results for CCR Rule Appendix IV and TDEC Appendix I Constituents

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location: Roane County, Tennessee

175668043

Prepared by DMB on 2023-03-16
Technical Review by MT on 2023-03-16

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Abandoned Temporary Well in CCR Material
- Emory River Gauging Station
- Subsurface Wall
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery

Stantec

TVA

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KIF February 2020

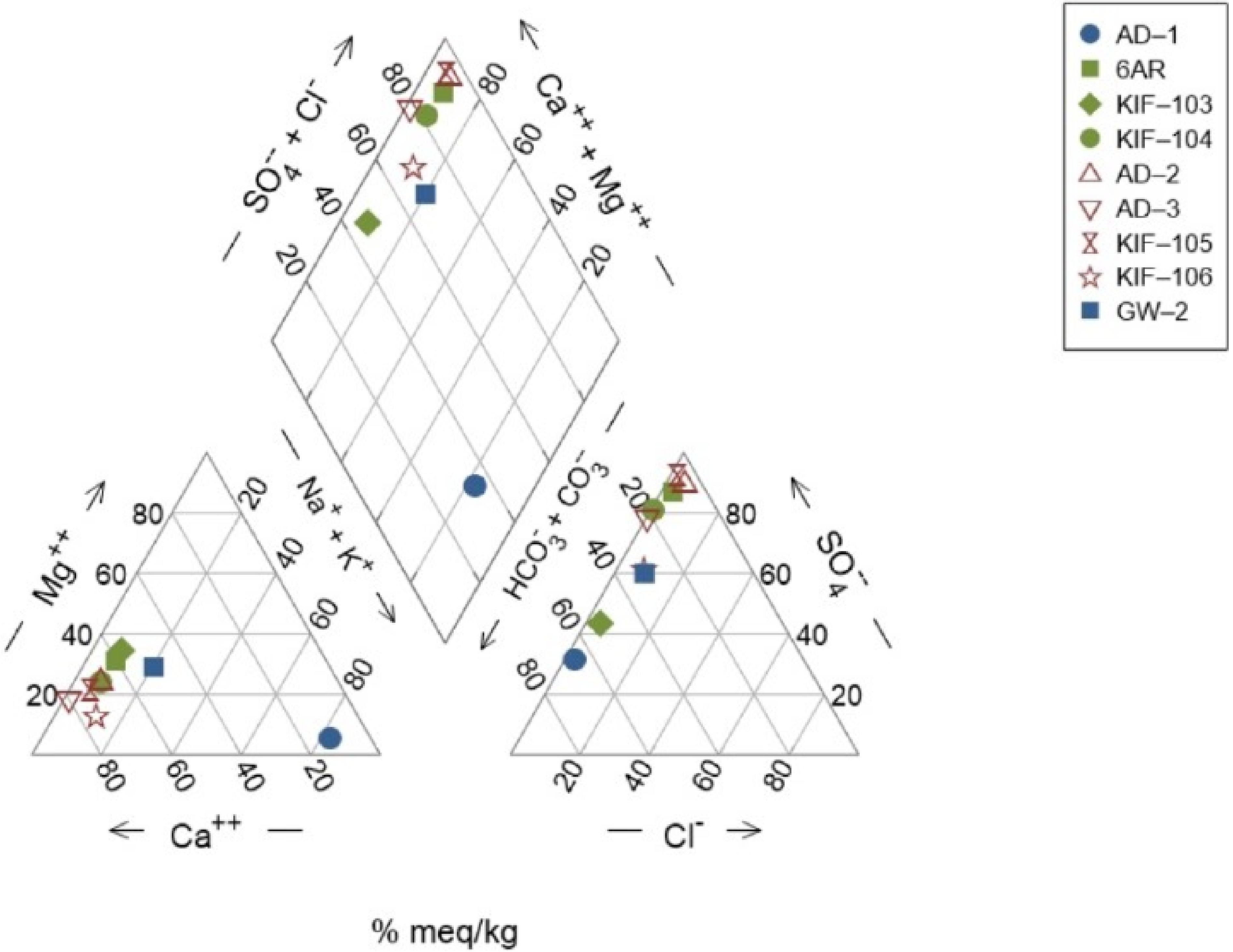

Exhibit No.

H.1-16

Title

Piper Diagram - February 2020

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Clinton, Tennessee

Roane County, Tennessee

Prepared by DMB on 2023-03-16
TR by SZ on 2023-03-16
IR Review by TR on 2023-03-16

Notes

1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^- - Chloride
4. CO_3 - Carbonate
5. HCO_3 - Bicarbonate
6. K^+ - Potassium
7. Mg^{++} - Magnesium
8. Na^+ - Sodium
9. SO_4 - Sulfate

Stantec

TVA

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ATTACHMENT H.1-A
POLARIZED LIGHT MICROSCOPY
ANALYTICAL DATA

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

March 19, 2020

Shannon Zahuranec
Stantec Consulting Services, Inc.
3052 Beaumont Centre Circle
Lexington, KY 40513

RE: TVA Kingston Fossil Plant Project/182603521 Task 400.B – Analytical Report
RJ Lee Group Project Number AOH1057333-0

Dear Ms. Zahuranec,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received nine samples on March 13, 2020 associated with Tennessee Valley Authority (TVA) Kingston Fossil Plant. The samples were logged into RJ Lee Group project number AOH1057333-0 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with all custody seals in place and intact. Attached in Appendix A is the signed sample receipt confirmation form, revised COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Monica McGrath-Koerner
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: AOH1057333-0
Project Name/Case #: 182603521 Task 400.8

Received From:	Relinquished To:
Rita Sartori Stantec Consulting Services, Inc. 3052 Beaumont Centre Circle Lexington, KY 40513 United States Main: 859-422-3000	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10503917	KIF-107 SPT-6 A	03/13/2020 7:40 AM EDT
10503918	KIF-107 SPT-7 A	03/13/2020 7:40 AM EDT
10503919	KIF-107 SPT-7 B	03/13/2020 7:40 AM EDT
10503920	KIF-107 SPT-7 C	03/13/2020 7:40 AM EDT
10503921	KIF-107 SPT-8A A	03/13/2020 7:40 AM EDT
10503922	KIF-107 SPT-8A B	03/13/2020 7:40 AM EDT
10503923	KIF-107 SPT-8B A	03/13/2020 7:40 AM EDT
10503924	KIF-107 SPT-10 A	03/13/2020 7:40 AM EDT
10503925	KIF-107 SPT-11 A	03/13/2020 7:40 AM EDT
10503926	QC_KIF-107 SPT-8A A	03/13/2020 7:40 AM EDT

	Received From: Rita Sartori	*Method of Shipment:* *Federal Express*	
	Company: Stantec Consulting Services, Inc.		**Date:** 03/13/2020
	Received By: Monica Carse	*Package Condition Upon Receipt:* *Sealed*	
	Company: RJ Lee Group, Inc.		**Date:** 03/13/2020

	Relinquished	*Method of Shipment:*	
	Company:		**Date:**
	Received By:	*Package Condition Upon Receipt:*	
	Company:		**Date:**

	Relinquished	*Method of Shipment:*	
	Company:		**Date:**
	Received By:	*Package Condition Upon Receipt:*	
	Company:		**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	Stantec	Date Received:	3/13/2020	Log in Date:	3/13/2020
Time Received:	7:40 AM	By:	Monica Carse	COC# :	GEOKIF03022020_1C
Project:	AOH1057333-0	# Coolers Received	1 BOX	Means of Shipment:	FedEX
Air Bill:	7700 0462 0319				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		Sample in Box
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	N/A		
Were all samples intact?	✓		
Were all samples accurately labeled?	✓		
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?	✓		
Were there any discrepancies among samples and COC?		✓	
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

N/A

Analyst Signature: M Carse 03-13-2020

Manager Signature: [signature] 03-~~0~~13-2020 mmk 03/13/2020

A0H1057333-0

Revised COC

TVA Environmental Investigations

TVA

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

~~COOLER No.~~:	1 of 1
COC No:	GEOKIF03022020_1C
1 of 1 Pages	
Task Desc:	KIF_Geochemical_2020_03

Required Ship to Lab:

Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road, Monroeville, PA 15146

Lab Manager Contact Information

Lab PM:	Monica Carse
Phone/Fax:	724.325.1776
Lab Email:	MCarse@rjleegroup.com

Required Project Information:

Site ID #:	Kingston Fossil Plant
Project #:	182603521 TASK 400.8
Site Address	714 Swan Pond Road
City	Harriman
State, Zip:	TN, 37748
Site PM Name:	Roy Quinn
Phone/Fax:	423-751-3753
Site PM Email:	rquinn@tva.gov

Required Sampler Information

Sampler:	Shannon Zahuranec
Sampling Company:	Stantec
Address	3052 Beaumont Centre Circle
City/State	Lexington, KY
Phone:	859-422-3112
Sampling Team Number:	1
Send EDD/Hard Copy to:	~~[illegible]~~ Shannon.Zahuranec@Stantec.com

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below ________

- ☐ 24 Hours
- ☐ 3 Business Days
- ☑ 5 Business Days
- ☐ 10 Business Days

Filtered: N — Preservative: None — Analysis: BACKGROUNDSOIL_PLM

SZ 3/12/20

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Depth Unit / Start Depth	Select Unit / End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	BACKGROUNDSOIL_PLM
1	KIF-107 SPT-6 A	KIF-107	7.5	9		G	SOIL	3/2/2020	1130	1			X
2	KIF-107 SPT-7 A	KIF-107	9	10.5		G	SOIL	3/2/2020	1130	1			X
3	KIF-107 SPT-7 B	KIF-107	9	10.5		G	SOIL	3/2/2020	1130	1			X
4	KIF-107 SPT-7 C	KIF-107	9	10.5		G	SOIL	3/2/2020	1130	1			X
5	KIF-107 SPT-8A A	KIF-107	10.5	12		G	SOIL	3/2/2020	1130	1			X
6	KIF-107 SPT-8A B	KIF-107	10.5	12		G	SOIL	3/2/2020	1130	1			X
7	KIF-107 SPT-8B A	KIF-107	10.5	12		G	SOIL	3/2/2020	1130	1			X
8	KIF-107 SPT-10 A	KIF-107	13.5	15		G	SOIL	3/2/2020	1130	1			X
9	KIF-107 SPT-11 A	KIF-107	13.5	15		G	SOIL	3/2/2020	1130	1			X
10													
11													
12													
13													

SZ 3/12/20

SZ 3/12/20

SZ 3/12/20

Additional Comments/Special Instructions:

Excess mass should be reserved.

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Shannon Zahuranec	3/12/20	2:00			
			M. Carse / RJ Lee Group	03-13-20	7:40am

SHIPPING METHOD	SAMPLER NAME AND SIGNATURE

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No ✓	Yes / No ✓	Yes ✓ / No	Yes / No ✓
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

Form TVA 30067A

Appendix B

Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

RJ LeeGroup, Inc.

Shannon Zahuranec
Stantec Consulting Services, Inc.
3052 Beaumont Centre Circle
Lexington, KY 40513 United States
Email: shannon.zahuranec@stantec.com
Main: 859-422-3112

Report Date: 03/19/2020
Sample Received Date: 03/13/2020
RJLG Project: AOH1057333-0
Customer COC: GEOKIF03022020_1C
Purchase Order: 182603521 Task 400.8
Analytical Method: Fly Ash Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
KIF-107 SPT-10 A	10503924	03/18/2020	03/02/2020	5%	Opaques Quartz	Tan Sediment.
KIF-107 SPT-11 A	10503925	03/18/2020	03/02/2020	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-107 SPT-6 A	10503917	03/18/2020	03/02/2020	7%	Clay Opaques Quartz	Tan Sediment.
KIF-107 SPT-7 A	10503918	03/18/2020	03/02/2020	38%	Opaques Quartz	Brown Sediment.
KIF-107 SPT-7 B	10503919	03/18/2020	03/02/2020	30%	Opaques Quartz	Brown Sediment.
KIF-107 SPT-7 C	10503920	03/18/2020	03/02/2020	37%	Opaques Quartz	Brown Sediment.
KIF-107 SPT-8A A	10503921	03/18/2020	03/02/2020	32%	Opaques Quartz	Brown Sediment.
KIF-107 SPT-8A B	10503922	03/18/2020	03/02/2020	37%	Opaques Quartz	Brown Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
KIF-107 SPT-8B A	10503923	03/18/2020	03/02/2020	1%	Carbonate Opaques Quartz	Tan Sediment.
QC_KIF-107 SPT-8A A	10503926	03/18/2020	03/02/2020	29%	NA	Brown Sediment.

Disclaimer Notes

* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Fly Ash is defined as any particle consistent with Coal Ash.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
Fly Ash – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% Fly Ash – Fly Ash observed, none counted.
ND – No Fly Ash detected.

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

January 24, 2021

Paul Thomas
TVA Bull Run Fossil Plant
1265 Edgemoor Road
Clinton, TN 37716

RE: KIF Supplemental PLM – Analytical Report RJ Lee Group Project Number COH1063570-0 Rev 1

Dear Mr. Thomas,

A revised report has been issued to correct changes to the Chain of Custody.

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 38 samples on September 21, 2021 associated with Tennessee Valley Authority (TVA) KIF Supplemental. The samples were logged into RJ Lee Group project number COH1063570-0 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with sample labels and custody seals intact. Attached in Appendix A is the sample receipt confirmation form, COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Elizabeth A Fischer

Elizabeth A. Fischer
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: COH1063570-0
Project Name/Case #: KIF Supplemental

Received From:	Relinquished To:
Paul Thomas Senior Program Manager, Civil Engineering Tennessee Valley Authority 1101 Market Street LP 5E-C Chattanooga, TN 37402 United States Email: prthomas0@tva.gov Main: 423-751-2926	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10548555	KIF-SS-AD3-SB10-0.0/1.5-20210917	09/21/2021 9:45 AM EDT
10548556	KIF-SS-AD3-SB10-1.5/3.0-20210917	09/21/2021 9:45 AM EDT
10548557	KIF-SS-AD3-SB10-3.0/4.5-20210917	09/21/2021 9:45 AM EDT
10548558	KIF-SS-AD3-SB10-4.5/6.0-20210917	09/21/2021 9:45 AM EDT
10548559	KIF-SS-AD3-SB10-6.0/7.5-20210917	09/21/2021 9:45 AM EDT
10548560	KIF-SS-AD3-SB10-7.5/9.0-20210917	09/21/2021 9:45 AM EDT
10548561	KIF-SS-AD3-SB10-9.0/10.5-20210917	09/21/2021 9:45 AM EDT
10548562	KIF-SS-AD3-SB10-10.5/12.0-20210917	09/21/2021 9:45 AM EDT
10548563	KIF-SS-AD3-SB10-12.0/13.5-20210917	09/21/2021 9:45 AM EDT
10548564	KIF-SS-AD3-SB10-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548565	QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548566	KIF-SS-AD3-SB09-0.0/1.5-20210917	09/21/2021 9:45 AM EDT
10548567	KIF-SS-AD3-SB09-1.5/3.0-20210917	09/21/2021 9:45 AM EDT
10548568	KIF-SS-AD3-SB09-3.0/4.5-20210917	09/21/2021 9:45 AM EDT
10548569	KIF-SS-AD3-SB09-4.5/6.0-20210917	09/21/2021 9:45 AM EDT
10548570	KIF-SS-AD3-SB09-6.0/7.5-20210917	09/21/2021 9:45 AM EDT
10548571	KIF-SS-AD3-SB09-7.5/9.0-20210917	09/21/2021 9:45 AM EDT
10548572	KIF-SS-AD3-SB09-9.0/10.5-20210917	09/21/2021 9:45 AM EDT
10548573	KIF-SS-AD3-SB09-10.5/12.0-20210917	09/21/2021 9:45 AM EDT
10548574	KIF-SS-AD3-SB09-12.0/13.5-20210917	09/21/2021 9:45 AM EDT
10548575	KIF-SS-AD3-SB09-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548576	QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548577	KIF-SS-DUP01-20210917	09/21/2021 9:45 AM EDT
10548578	KIF-SS-AD3-SB08-0.0/1.5-20210918	09/21/2021 9:45 AM EDT
10548579	KIF-SS-AD3-SB08-1.5/3.0-20210918	09/21/2021 9:45 AM EDT
10548580	KIF-SS-AD3-SB08-3.0/4.5-20210918	09/21/2021 9:45 AM EDT
10548581	KIF-SS-AD3-SB08-4.5/5.7-20210918	09/21/2021 9:45 AM EDT
10548582	KIF-SS-AD3-SB08A-0.0/1.5-20210918	09/21/2021 9:45 AM EDT
10548583	KIF-SS-AD3-SB08A-1.5/3.0-20210918	09/21/2021 9:45 AM EDT

Sample ID	Client Sample ID	Date Received
10548584	KIF-SS-AD3-SB08A-3.0/4.5-20210918	09/21/2021 9:45 AM EDT
10548585	KIF-SS-AD3-SB08A-4.5/6.0-20210918	09/21/2021 9:45 AM EDT
10548586	KIF-SS-AD3-SB08A-6.0/7.5-20210918	09/21/2021 9:45 AM EDT
10548587	QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	09/21/2021 9:45 AM EDT
10548588	KIF-SS-AD3-SB08A-7.5/9.0-20210918	09/21/2021 9:45 AM EDT
10548589	KIF-SS-AD3-SB08A-9.0/10.5-20210918	09/21/2021 9:45 AM EDT
10548590	KIF-SS-AD3-SB08A-10.5/12.0-20210918	09/21/2021 9:45 AM EDT
10548591	KIF-SS-AD3-SB08A-12.0/13.5-20210918	09/21/2021 9:45 AM EDT
10548592	KIF-SS-AD3-SB08A-13.5/15.0-20210918	09/21/2021 9:45 AM EDT
10548593	KIF-SS-AD3-SB08A-15.0/16.5-20210918	09/21/2021 9:45 AM EDT
10548594	KIF-SS-AD3-SB08A-16.5/18.0-20210918	09/21/2021 9:45 AM EDT
10548595	KIF-SS-AD3-SB08A-18.0/19.5-20210918	09/21/2021 9:45 AM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express
	Company: Tennessee Valley Authority	**Date:** 09/21/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed
	Company: RJ Lee Group, Inc.	**Date:** 09/21/2021

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	**Tennessee Valley Authority**	**Date Received:**	**9/21/2021**	**Log in Date:**	**9/22/2021**
Time Received:	**9:45PM**	**By:**	**Brianna Zidek**	**COC#:**	**KIF_SI_09172021-1C**
Project:	**COH1063570-0**	**# Coolers Received**	**1**	**Means of Shipment:**	**FedEx**
Air Bill:	**2839 2901 4193**				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	NA		
Were all samples intact?	✓		
Were all samples accurately labeled?	✓		
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?	✓		
Were there any discrepancies among samples and COC?		✓	
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

NA
BZ 9/22/21

Analyst Signature: [signature] 9/22/21

Manager Signature: [signature] 09/22/2021

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063570-0

Rev'
BB
1/21/22

COOLER No.:	1 of 1
COC No:	KIF_SI_09172021_1C
1 of 3 Pages	
Task Desc:	KIF_SI_2021_09

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:				Required Sampler Information			
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT			Sampler:	Michael Boatman, Kevin Nguyen		
Lab Address:	350 Hochberg Road	Project #:	175668043			Sampling Company:	Stantec		
	Monroeville, PA 15146	Site Address	714 Swan Pond Road			Address	3052 Beaumont Centre Cir		
		City	Harriman	State, Zip:	TN, 37748	City/State	Lexington, KY	Phone No:	859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas						
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926			Sampling Team Number:	1		
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov			Send EDD/Hard Copy to:	tva_deliverables@envstd.com		
Lab Email:	efischer@rjleegroup.com								

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

- ☐ 24 Hours
- ☐ 3 Business Days
- ☐ 5 Business Days
- ☑ 10 Business Days (Standard)

Filtered: N — Preservative: None — Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Depth Unit — Start Depth	Sample Depth: Select Unit — End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD3-SB10-0.0/1.5-20210917	KIF-ST-SB10	0.0	1.5	SS	G	N	9/17/2021	1000	1	NA	X
2	KIF-SS-AD3-SB10-1.5/3.0-20210917	KIF-ST-SB10	1.5	3.0	SS	G	N	9/17/2021	1010	1	NA	X
3	KIF-SS-AD3-SB10-3.0/4.5-20210917	KIF-ST-SB10	3.0	4.5	SS	G	N	9/17/2021	1020	1	NA	X
4	KIF-SS-AD3-SB10-4.5/6.0-20210917	KIF-ST-SB10	4.5	6.0	SS	G	N	9/17/2021	1110	1	NA	X
5	KIF-SS-AD3-SB10-6.0/7.5-20210917	KIF-ST-SB10	6.0	7.5	SS	G	N	9/17/2021	1125	1	NA	X
6	KIF-SS-AD3-SB10-7.5/9.0-20210917	KIF-ST-SB10	7.5	9.0	SS	G	N	9/17/2021	1135	1	NA	X
7	KIF-SS-AD3-SB10-9.0/10.5-20210917	KIF-ST-SB10	9.0	10.5	SS	G	N	9/17/2021	1155	1	NA	X
8	KIF-SS-AD3-SB10-10.5/12.0-20210917	KIF-ST-SB10	10.5	12.0	SS	G	N	9/17/2021	1205	1	NA	X
9	KIF-SS-AD3-SB10-12.0/13.5-20210917	KIF-ST-SB10	12.0	13.5	SS	G	N	9/17/2021	1215	1	NA	X
10	KIF-SS-AD3-SB10-13.5/15.0-20210917	KIF-ST-SB10	13.5	15.0	SS	G	N	9/17/2021	1225	1	NA	X
11	KIF-SS-AD3-SB09-0.0/1.5-20210917	KIF-ST-SB09	0.0	1.5	SS	G	N	9/17/2021	1400	1	NA	X
12	KIF-SS-AD3-SB09-1.5/3.0-20210917	KIF-ST-SB09	1.5	3.0	SS	G	N	9/17/2021	1405	1	NA	X
13	KIF-SS-AD3-SB09-3.0/4.5-20210917	KIF-ST-SB09	3.0	4.5	SS	G	N	9/17/2021	1415	1	NA	X

KN 9/18/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Kevin Nguyen / Stantec	9/20/21	17:00	BiBi	9/21/21	9:45	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Sample Receipt Conditions

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Kevin Nguyen
	Michael Boatman

Form TVA 30067A

Rev1
BB 1/21/22

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063570-0

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_09172021_1C
	2 of 3 Pages
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Michael Boatman, Kevin Nguyen
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	prthomas@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

Filtered: N — Preserve: None — Analysis: PLM

KA 9/21/21

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Sample Depth, Depth Unit)	End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD3-SB09-4.5/6.0-20210917	KIF-ST-SB09	4.5	6.0	SS	G	N	9/17/2021	1425	1	NA	X
2	KIF-SS-AD3-SB09-6.0/7.5-20210917	KIF-ST-SB09	6.0	7.5	SS	G	N	9/17/2021	1430	1	NA	X
3	KIF-SS-AD3-SB09-7.5/9.0-20210917	KIF-ST-SB09	7.5	9.0	SS	G	N	9/17/2021	1435	1	NA	X
4	KIF-SS-AD3-SB09-9.0/10.5-20210917	KIF-ST-SB09	9.0	10.5	SS	G	N	9/17/2021	1455	1	NA	X
5	KIF-SS-AD3-SB09-10.5/12.0-20210917	KIF-ST-SB09	10.5	12.0	SS	G	N	9/17/2021	1505	1	NA	X
6	KIF-SS-AD3-SB09-12.0/13.5-20210917	KIF-ST-SB09	12.0	13.5	SS	G	N	9/17/2021	1510	1	NA	X
7	KIF-SS-AD3-SB09-13.5/15.0-20210917	KIF-ST-SB09	13.5	15.0	SS	G	N	9/17/2021	1520	1	NA	X
8	KIF-SS-DUP01-20210917	NA	NA	NA	SS	G	FD	9/17/2021	NA	1	NA	X
9	KIF-SS-AD3-SB08-0.0/1.5-20210918	KIF-ST-SB08	0.0	1.5	SS	G	N	9/18/2021	0810	1	NA	X
10	KIF-SS-AD3-SB08-1.5/3.0-20210918	KIF-ST-SB08	1.5	3.0	SS	G	N	9/18/2021	0820	1	NA	X
11	KIF-SS-AD3-SB08-3.0/4.5-20210918	KIF-ST-SB08	3.0	4.5	SS	G	N	9/18/2021	0830	1	NA	X
12	KIF-SS-AD3-SB08-4.5/6.0-20210918	KIF-ST-SB08	4.5	6.0	SS	G	N	9/18/2021	0840	1	NA	X
13	KIF-SS-AD3-SB08A-0.0/1.5-20210918	KIF-ST-SB08A	0.0	1.5	SS	G	N	9/18/2021	0935	1	NA	X

Additional Comments/Special Instructions:

5.7

BB 1/21/22

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Kevin Nguyen / Stantec K	9/20/21	17:00	Bri Zm	9/21/21	945

Sample Receipt Conditions			
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Kevin Nguyen K
	Michael Boatman MBoatman

Form TVA 30067A

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH 1063570-0

Rec'd BB 1/21/22

COOLER No.:	1 of 1
COC No:	KIF_SI_09172021_1C
3 of 3 Pages	
Task Desc:	KIF_SI_2021_09

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

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Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman; State, Zip: TN, 37748	City/State	Lexington, KY; Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	pnthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

- ☐ 24 Hours
- ☐ 3 Business Days
- ☐ 5 Business Days
- ☑ 10 Business Days (Standard)

Filtered: N; Preserve: None; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD3-SB08A-1.5/3.0-20210918	KIF-ST-SB08A	1.5	3.0	SS	G	N	9/18/2021	0945	1	NA	X
2	KIF-SS-AD3-SB08A-3.0/4.5-20210918	KIF-ST-SB08A	3.0	4.5	SS	G	N	9/18/2021	0955	1	NA	X
3	KIF-SS-AD3-SB08A-4.5/6.0-20210918	KIF-ST-SB08A	4.5	6.0	SS	G	N	9/18/2021	1035	1	NA	X
4	KIF-SS-AD3-SB08A-6.0/7.5-20210918	KIF-ST-SB08A	6.0	7.5	SS	G	N	9/18/2021	1045	1	minimal recovery	X
5	KIF-SS-AD3-SB08A-7.5/9.0-20210918	KIF-ST-SB08A	7.5	9.0	SS	G	N	9/18/2021	1100	1	minimal recovery	X
6	KIF-SS-AD3-SB08A-9.0/10.5-20210918	KIF-ST-SB08A	9.0	10.5	SS	G	N	9/18/2021	1110	1	NA	X
7	KIF-SS-AD3-SB08A-10.5/12.0-20210918	KIF-ST-SB08A	10.5	12.0	SS	G	N	9/18/2021	1120	1	NA	X
8	KIF-SS-AD3-SB08A-12.0/13.5-20210918	KIF-ST-SB08A	12.0	13.5	SS	G	N	9/18/2021	1125	1	NA	X
9	KIF-SS-AD3-SB08A-13.5/15.0-20210918	KIF-ST-SB08A	13.5	15.0	SS	G	N	9/18/2021	1130	1	NA	X
10	KIF-SS-AD3-SB08A-15.0/16.5-20210918	KIF-ST-SB08A	15.0	16.5	SS	G	N	9/18/2021	1150	1	minimal recovery	X
11	KIF-SS-AD3-SB08A-16.5/18.0-20210918	KIF-ST-SB08A	16.5	18.0	SS	G	N	9/18/2021	1200	1	NA	X
12	KIF-SS-AD3-SB08A-18.0/19.5-20210918	KIF-ST-SB08A	18.0	19.5	SS	G	N	9/18/2021	1215	1	NA	X
13								KN 9/20/21				

KN 9/20/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Kevin Nguyen / Stantec	9/20/21	17:00	[signature]	9/21/21	9:20

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Kevin Nguyen
	Michael Boatman

Form TVA 30057A

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10548555	KIF-SS-AD3-SB10-0.0/1.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548556	KIF-SS-AD3-SB10-1.5/3.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548557	KIF-SS-AD3-SB10-3.0/4.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548558	KIF-SS-AD3-SB10-4.5/6.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548559	KIF-SS-AD3-SB10-6.0/7.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548560	KIF-SS-AD3-SB10-7.5/9.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548561	KIF-SS-AD3-SB10-9.0/10.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548562	KIF-SS-AD3-SB10-10.5/12.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548563	KIF-SS-AD3-SB10-12.0/13.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548564	KIF-SS-AD3-SB10-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548565	QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548566	KIF-SS-AD3-SB09-0.0/1.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548567	KIF-SS-AD3-SB09-1.5/3.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548568	KIF-SS-AD3-SB09-3.0/4.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548569	KIF-SS-AD3-SB09-4.5/6.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548570	KIF-SS-AD3-SB09-6.0/7.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548571	KIF-SS-AD3-SB09-7.5/9.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548572	KIF-SS-AD3-SB09-9.0/10.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548573	KIF-SS-AD3-SB09-10.5/12.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548574	KIF-SS-AD3-SB09-12.0/13.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548575	KIF-SS-AD3-SB09-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548576	QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548577	KIF-SS-DUP01-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548578	KIF-SS-AD3-SB08-0.0/1.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548579	KIF-SS-AD3-SB08-1.5/3.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548580	KIF-SS-AD3-SB08-3.0/4.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548581	KIF-SS-AD3-SB08-4.5/5.7-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548582	KIF-SS-AD3-SB08A-0.0/1.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548583	KIF-SS-AD3-SB08A-1.5/3.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548584	KIF-SS-AD3-SB08A-3.0/4.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548585	KIF-SS-AD3-SB08A-4.5/6.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548586	KIF-SS-AD3-SB08A-6.0/7.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548587	QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548588	KIF-SS-AD3-SB08A-7.5/9.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548589	KIF-SS-AD3-SB08A-9.0/10.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548590	KIF-SS-AD3-SB08A-10.5/12.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548591	KIF-SS-AD3-SB08A-12.0/13.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548592	KIF-SS-AD3-SB08A-13.5/15.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548593	KIF-SS-AD3-SB08A-15.0/16.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548594	KIF-SS-AD3-SB08A-16.5/18.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548595	KIF-SS-AD3-SB08A-18.0/19.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193

Appendix B

Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 10/15/2021
Sample Received Date: 09/21/2021
RJLG Project: COH1063570-0
Customer COC: KIF_SI_09172021_1C
Purchase Order:
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB08-0.0/1.5-20210918	10548578	10/14/2021	09/18/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB08-1.5/3.0-20210918	10548579	10/14/2021	09/18/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB08-3.0/4.5-20210918	10548580	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08-4.5/5.7-20210918	10548581	10/14/2021	09/18/2021	ND	Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-0.0/1.5-20210918	10548582	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-1.5/3.0-20210918	10548583	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB08A-10.5/12.0-20210918	10548590	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-12.0/13.5-20210918	10548591	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-13.5/15.0-20210918	10548592	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-15.0/16.5-20210918	10548593	10/14/2021	09/18/2021	1%	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-16.5/18.0-20210918	10548594	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-18.0/19.5-20210918	10548595	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-3.0/4.5-20210918	10548584	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-4.5/6.0-20210918	10548585	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-6.0/7.5-20210918	10548586	10/14/2021	09/18/2021	2%	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-7.5/9.0-20210918	10548588	10/14/2021	09/18/2021	1%	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-9.0/10.5-20210918	10548589	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB09-0.0/1.5-20210917	10548566	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB09-1.5/3.0-20210917	10548567	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB09-10.5/12.0-20210917	10548573	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB09-12.0/13.5-20210917	10548574	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB09-13.5/15.0-20210917	10548575	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Pale Brown Sediment
KIF-SS-AD3-SB09-3.0/4.5-20210917	10548568	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB09-4.5/6.0-20210917	10548569	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-6.0/7.5-20210917	10548570	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-7.5/9.0-20210917	10548571	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-9.0/10.5-20210917	10548572	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-0.0/1.5-20210917	10548555	10/13/2021	09/17/2021	ND	Carbonate Feldspar Misc. Silicates Opaques Quartz Coal	Red Sediment
KIF-SS-AD3-SB10-1.5/3.0-20210917	10548556	10/13/2021	09/17/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB10-10.5/12.0-20210917	10548562	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-12.0/13.5-20210917	10548563	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB10-13.5/15.0-20210917	10548564	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB10-3.0/4.5-20210917	10548557	10/13/2021	09/17/2021	ND	Feldspar Misc. Silicates Opaques Quartz Coal	Reddish Yellow Sediment
KIF-SS-AD3-SB10-4.5/6.0-20210917	10548558	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-6.0/7.5-20210917	10548559	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pale Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB10-7.5/9.0-20210917	10548560	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-9.0/10.5-20210917	10548561	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-DUP01-20210917	10548577	10/14/2021	09/17/2021	ND	NA	Pale Brown Sediment
QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	10548587	10/14/2021	09/18/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Organic Particulate Quartz	Yellowish Red Sediment
QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	10548576	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Pale Brown Sediment
QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	10548565	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light Brown Sediment

Disclaimer Notes
* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Coal Combustion Products (CCP) are defined as fly ash, bottom ash, and slag.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
CCP – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% CCP observed, none counted.
ND – No CCP detected.

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Revised COC appended to the data package via Environmental Standards, Inc (AEW-3/16/2022)

November 12, 2021

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402

RE: KIF Supplemental PLM – Analytical Report
RJ Lee Group Project Number COH1063570-3

Dear Mr. Thomas,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 51 samples on October 29, 2021 associated with Tennessee Valley Authority (TVA) KIF Supplemental. The samples were logged into RJ Lee Group project number COH1063570-3 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with sample labels and custody seals intact. Attached in Appendix A is the sample receipt confirmation form, COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Elizabeth A. Fischer

Elizabeth A. Fischer
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: COH1063570-3
Project Name/Case #: KIF Supplemental

Received From:	Relinquished To:
Paul Thomas Senior Program Manager, Civil Engineering Tennessee Valley Authority 1101 Market Street LP 5E-C Chattanooga, TN 37402 United States Email: prthomas0@tva.gov Main: 423-751-2926	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10551717	KIF-SS-AD2-SB11-1.3/1.5-20211012	10/29/2021 9:30 AM EDT
10551718	KIF-SS-AD2-SB11-2.8/3.0-20211012	10/29/2021 9:30 AM EDT
10551719	KIF-SS-AD2-SB11-4.3/4.5-20211012	10/29/2021 9:30 AM EDT
10551720	KIF-SS-AD2-SB11-5.6/5.8-20211012	10/29/2021 9:30 AM EDT
10551721	KIF-SS-AD2-SB11-6.2/6.4-20211012	10/29/2021 9:30 AM EDT
10551722	KIF-SS-AD2-SB11-8.8/9.0-20211012	10/29/2021 9:30 AM EDT
10551723	KIF-SS-AD2-SB11-10.3/10.5-20211012	10/29/2021 9:30 AM EDT
10551724	KIF-SS-AD2-SB11-11.8/12.0-20211013	10/29/2021 9:30 AM EDT
10551725	KIF-SS-AD2-SB11-13.3/13.5-20211013	10/29/2021 9:30 AM EDT
10551726	KIF-SS-AD2-SB11-14.8/15.0-20211013	10/29/2021 9:30 AM EDT
10551727	QC-KIF-SS-AD2-SB11-14.8/15.0-20211013	10/29/2021 9:30 AM EDT
10551728	KIF-SS-AD2-SB11-16.3/16.5-20211013	10/29/2021 9:30 AM EDT
10551729	KIF-SS-AD2-SB11-17.8/18.0-20211013	10/29/2021 9:30 AM EDT
10551730	KIF-SS-AD2-SB11-19.3/19.5-20211013	10/29/2021 9:30 AM EDT
10551731	KIF-SS-AD2-SB11-20.8/21.0-20211013	10/29/2021 9:30 AM EDT
10551732	KIF-SS-AD2-SB11-22.3./22.5-20211013	10/29/2021 9:30 AM EDT
10551733	KIF-SS-AD2-SB11-23.8/24.0-20211013	10/29/2021 9:30 AM EDT
10551734	KIF-SS-AD2-SB11-25.3/25.5-20211013	10/29/2021 9:30 AM EDT
10551735	KIF-SS-AD2-SB11-26.8/27.0-20211013	10/29/2021 9:30 AM EDT
10551736	KIF-SS-AD2-SB11-28.3/28.5-20211013	10/29/2021 9:30 AM EDT
10551737	KIF-SS-AD2-SB13-1.3/1.5-20211014	10/29/2021 9:30 AM EDT
10551738	QC-KIF-SS-AD2-SB13-1.3/1.5-20211014	10/29/2021 9:30 AM EDT
10551739	KIF-SS-AD2-SB13-2.5/2.7-20211014	10/29/2021 9:30 AM EDT
10551740	KIF-SS-AD2-SB13-4.3/4.5-20211014	10/29/2021 9:30 AM EDT
10551741	KIF-SS-AD2-SB13-6.0/6.2-20211014	10/29/2021 9:30 AM EDT
10551742	KIF-SS-AD2-SB13-9.3/9.5-20211014	10/29/2021 9:30 AM EDT
10551743	KIF-SS-AD2-SB13-10.8/11.0-20211014	10/29/2021 9:30 AM EDT
10551744	KIF-SS-AD2-SB13-12.3/12.5-20211014	10/29/2021 9:30 AM EDT
10551745	KIF-SS-AD2-SB13-13.8/14.0-20211014	10/29/2021 9:30 AM EDT

Sample ID	Client Sample ID	Date Received
10551746	KIF-SS-AD2-SB13-15.3/15.5-20211014	10/29/2021 9:30 AM EDT
10551747	KIF-SS-AD2-SB13-16.8/17.0-20211014	10/29/2021 9:30 AM EDT
10551748	KIF-SS-AD2-SB13-18.3/18.5-20211014	10/29/2021 9:30 AM EDT
10551749	KIF-SS-AD2-SB13-19.8/20.0-20211014	10/29/2021 9:30 AM EDT
10551750	QC-KIF-SS-AD2-SB13-19.8/20.0-20211014	10/29/2021 9:30 AM EDT
10551751	KIF-SS-AD2-SB13-21.3/21.5-20211014	10/29/2021 9:30 AM EDT
10551752	KIF-SS-AD2-SB13-22.8/23.0-20211014	10/29/2021 9:30 AM EDT
10551753	KIF-SS-AD2-SB13-24.3/24.5-20211014	10/29/2021 9:30 AM EDT
10551754	KIF-SS-AD2-SB13-25.8/26.0-20211014	10/29/2021 9:30 AM EDT
10551755	KIF-SS-AD2-SB13-27.3/27.5-20211014	10/29/2021 9:30 AM EDT
10551756	KIF-SS-AD2-SB13-28.8/29.0-20211014	10/29/2021 9:30 AM EDT
10551757	KIF-SS-AD2-SB13-30.3/30.5-20211015	10/29/2021 9:30 AM EDT
10551758	KIF-SS-AD2-SB13-31.8/32.0-20211015	10/29/2021 9:30 AM EDT
10551759	KIF-SS-AD2-SB13-33.8/34.0-20211015	10/29/2021 9:30 AM EDT
10551760	QC-KIF-SS-AD2-SB13-33.8/34.0-20211015	10/29/2021 9:30 AM EDT
10551761	KIF-SS-AD2-SB13-35.8/36.0-20211015	10/29/2021 9:30 AM EDT
10551762	KIF-SS-AD2-SB13-37.8/38.0-20211015	10/29/2021 9:30 AM EDT
10551763	KIF-SS-AD2-SB13-39.8/40.0-20211015	10/29/2021 9:30 AM EDT
10551764	KIF-SS-AD2-SB13-41.8/42.0-20211015	10/29/2021 9:30 AM EDT
10551765	KIF-SS-AD2-SB13-43.8/44.0-20211015	10/29/2021 9:30 AM EDT
10551766	KIF-SS-AD2-SB13-45.8/46.0-20211015	10/29/2021 9:30 AM EDT
10551767	KIF-SS-AD2-SB13-47.8/48.0-20211015	10/29/2021 9:30 AM EDT
10551768	KIF-SS-AD2-SB13-49.8/50.0-20211015	10/29/2021 9:30 AM EDT
10551769	KIF-SS-AD2-SB13-51.3/51.5-20211016	10/29/2021 9:30 AM EDT
10551770	KIF-SS-AD2-SB13-51.9/52.1-20211016	10/29/2021 9:30 AM EDT
10551771	QC-KIF-SS-AD2-SB13-51.9/52.1-20211016	10/29/2021 9:30 AM EDT
10551772	KIF-SS-DUP01-20211012	10/29/2021 9:30 AM EDT
10551773	KIF-SS-DUP01-20211014	10/29/2021 9:30 AM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express	
	Company: Tennessee Valley Authority		**Date:** 10/29/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed	
	Company: RJ Lee Group, Inc.		**Date:** 10/29/2021

	Relinquished	Method of Shipment:	
	Company:		**Date:**
	Received By:	Package Condition Upon Receipt:	
	Company:		**Date:**

	Relinquished	Method of Shipment:	
	Company:		**Date:**
	Received By:	Package Condition Upon Receipt:	
	Company:		**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	**Tennessee Valley Authority**	**Date Received:**	**10/29/2021**	**Log in Date:**	**10/29/2021**
Time Received:	**9:30AM**	**By:**	**Brianna Zidek**	**COC# :**	**KIF_SI_10122021-1C**
Project:	**COH1063570-3**	**# Coolers Received**	**1**	**Means of Shipment:**	**FedEx**
Air Bill:	**2854 8098 3644**				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	NA		
Were all samples intact?	✓		
Were all samples accurately labeled?		✓	see comments
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?		✓	see comments
Were there any discrepancies among samples and COC?	✓		
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

COC does not match samples received

Analyst Signature: BriZi 11/1/21

Manager Signature: Elizabeth A Fisher 11/01/21

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
__1__ of __4__ Pages			
Task Desc:	KIF_SI_2021_10		

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:			
Site ID #:	KINGSTON FOSSIL PLANT		
Project #:	175668043		
Site Address	714 Swan Pond Road		
City	Harriman	State, Zip:	TN, 37748
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:			

Required Sampler Information			
Sampler:	Trenton VanEgtern, Kenneth Nye		
Sampling Company:	Stantec		
Address	3052 Beaumont Centre Cir		
City/State	Lexington, KY	Phone No:	859-422-3000
Sampling Team Number:	1		
Send EDD/Hard Copy to:			

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A____

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N
Preserve: None
Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Start Depth (Depth Unit)	End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB11-1.3/1.5-20211012	AD2-SB11	1.3	1.5	SS	G	N	10/12/2021	1400	1	None	X
2	KIF-SS-AD2-SB11-2.8/3.0-20211012	AD2-SB11	2.8	3.0	SS	G	N	10/12/2021	1437	1	None	X
3	KIF-SS-AD2-SB11-4.3/4.5-20211012	AD2-SB11	4.3	4.5	SS	G	N	10/12/2021	1520	1	None	X
4	KIF-SS-AD2-SB11-5.6/5.8-20211012	AD2-SB11	5.6	5.8	SS	G	N	10/12/2021	1552	1	None	X
5	KIF-SS-AD2-SB11-6.2/6.4-20211012	AD2-SB11	6.2	6.4	SS	G	N	10/12/2021	1618	1	None	X
6	KIF-SS-AD2-SB11-8.8/9.0-20211012	AD2-SB11	8.8	9.0	SS	G	N	10/12/2021	1640	1	None	X
7	KIF-SS-AD2-SB11-10.3/10.5-20211012	AD2-SB11	10.3	10.5	SS	G	N	10/12/2021	1700	1	None	X
8	KIF-SS-AD2-SB11-11.8/12.0-20211013	AD2-SB11	11.8	12.0	SS	G	N	10/13/2021	0835	1	None	X
9	KIF-SS-AD2-SB11-13.3/13.5-20211013	AD2-SB11	13.3	13.5	SS	G	N	10/13/2021	0847	1	None	X
10	KIF-SS-AD2-SB11-14.8/15.0-20211013	AD2-SB11	14.8	15.0	SS	G	N	10/13/2021	0910	1	None	X
11	KIF-SS-AD2-SB11-16.3/16.5-20211013	AD2-SB11	16.3	16.5	SS	G	N	10/13/2021	0930	1	None	X
12	KIF-SS-AD2-SB11-17.8/18.0-20211013	AD2-SB11	17.8	18.0	SS	G	N	10/13/2021	0950	1	None	X
13	KIF-SS-AD2-SB11-19.3/19.5-20211013	AD2-SB11	19.3	19.5	SS	G	N	10/13/2021	1015	1	None	X

TV 10/19/21

Additional Comments/Special Instructions:

RELINQISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	[signature]	10/29/21	9:30

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
No (checked)	No (checked)	Yes (checked)	No (checked)
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern [signature]

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
2 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road, Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:	
Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman; State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	

Required Sampler Information	
Sampler:	Trenton VanEgtern, Kenneth Nye
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY; Phone No: 859-422-3000
Sampling Team Number:	1
Send EDD/Hard Copy to:	

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below N/A

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N; Preserve: None; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB11-20.8/21.0-2021013	AD2-SB11	20.8	21.0	SS	G	N	10/13/2021	1040	1	None	X
2	KIF-SS-AD2-SB11-22.3/22.5-20211013	AD2-SB11	22.3	22.5	SS	G	N	10/13/2021	1100	1	None	X
3	KIF-SS-AD2-SB11-23.8/24.0-20211013	AD2-SB11	23.8	24.0	SS	G	N	10/13/2021	1115	1	None	X
4	KIF-SS-AD2-SB11-25.3/25.5-20211013	AD2-SB11	25.3	25.5	SS	G	N	10/13/2021	1155	1	None	X
5	KIF-SS-AD2-SB11-26.8/27.0-20211013	AD2-SB11	26.8	27.0	SS	G	N	10/13/2021	1215	1	None	X
6	KIF-SS-AD2-SB11-28.3/28.5-20211013	AD2-SB11	28.3	28.5	SS	G	N	10/13/2021	1230	1	None	X
7	KIF-SS-AD2-SB13-1.3/1.5-20211014	AD2-SB13	1.3	1.5	SS	G	N	10/14/2021	0900	1	None	X
8	KIF-SS-AD2-SB13-2.5/2.7-20211014	AD2-SB13	2.5	2.7	SS	G	N	10/14/2021	0915	1	None	X
9	KIF-SS-AD2-SB13-4.3/4.5-20211014	AD2-SB13	4.3	4.5	SS	G	N	10/14/2021	0935	1	None	X
10	KIF-SS-AD2-SB13-7.3/7.5-20211014	AD2-SB13	7.3	7.5	SS	G	N	10/14/2021	1035	1	None	X
11	KIF-SS-AD2-SB13-9.3/9.5-20211014	AD2-SB13	9.3	9.5	SS	G	N	10/14/2021	1050	1	None	X
12	KIF-SS-AD2-SB13-10.8/11.0-20211014	AD2-SB13	10.8	11.0	SS	G	N	10/14/2021	1125	1	None	X
13	KIF-SS-AD2-SB13-12.3/12.5-20211014	AD2-SB13	12.3	12.5	SS	G	N	10/14/2021	1140	1	None	X

TV 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	BuBin	10/29/21	9:30

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
No	No	Yes	No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
3 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Trenton VanEgtern, Kenneth Nye
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A____

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N — Preserve: None — Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth (Depth Unit) Start Depth	Sample Depth (Select Unit) End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-13.8/14.0-20211014	AD2-SB13	13.8	14.0	SS	G	N	10/14/2021	1215	1	None	X
2	KIF-SS-AD2-SB13-15.3/15.5-20211014	AD2-SB13	15.3	15.5	SS	G	N	10/14/2021	1240	1	None	X
3	KIF-SS-AD2-SB13-16.8/17.0-20211014	AD2-SB13	16.8	17.0	SS	G	N	10/14/2021	1310	1	None	X
4	KIF-SS-AD2-SB13-18.3/18.5-20211014	AD2-SB13	18.3	18.5	SS	G	N	10/14/2021	1340	1	None	X
5	KIF-SS-AD2-SB13-19.8/20.0-20211014	AD2-SB13	19.8	20.0	SS	G	N	10/14/2021	1400	1	None	X
6	KIF-SS-AD2-SB13-21.3/21.5-20211014	AD2-SB13	21.3	21.5	SS	G	N	10/14/2021	1425	1	None	X
7	KIF-SS-AD2-SB13-22.8/23.0-20211014	AD2-SB13	22.8	23.0	SS	G	N	10/14/2021	1445	1	None	X
8	KIF-SS-AD2-SB13-24.3/24.5-20211014	AD2-SB13	24.3	24.5	SS	G	N	10/14/2021	1520	1	None	X
9	KIF-SS-AD2-SB13-25.8/26.0-20211014	AD2-SB13	25.8	26.0	SS	G	N	10/14/2021	1540	1	None	X
10	KIF-SS-AD2-SB13-27.3/27.5-20211014	AD2-SB13	27.3	27.5	SS	G	N	10/14/2021	1605	1	None	X
11	KIF-SS-AD2-SB13-28.8/29.0-20211014	AD2-SB13	28.8	29.0	SS	G	N	10/14/2021	1635	1	None	X
12	KIF-SS-AD2-SB13-30.3/30.5-20211015	AD2-SB13	30.3	30.5	SS	G	N	10/15/2021	0900	1	None	X
13	KIF-SS-AD2-SB13-33.8/40.0-20211015	AD2-SB13	33.8	40.0	SS	G	N	10/15/2021	1045	1	None	X

TV 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	[signature]	10/29/21	9:30

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / X No	Yes / ✓ No	✓ Yes / No	Yes / X No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern [signature]

Form TVA 30067A

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
__4__ of __4__ Pages			
Task Desc:	KIF_SI_2021_10		

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road
	Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:			
Site ID #:	KINGSTON FOSSIL PLANT		
Project #:	175668043		
Site Address	714 Swan Pond Road		
City	Harriman	State, Zip:	TN, 37748
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:			

Required Sampler Information			
Sampler:	Trenton VanEgtern, Kenneth Nye		
Sampling Company:	Stantec		
Address	3052 Beaumont Centre Cir		
City/State	Lexington, KY	Phone No:	859-422-3000
Sampling Team Number:	1		
Send EDD/Hard Copy to:			

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A____

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N — Preserve: None — Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth (Depth Unit) Start Depth	Sample Depth (Select Unit) End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-35.8/36.0-20211015	AD2-SB13	35.8	36.0	SS	G	N	10/15/2021	1150	1	None	X
2	KIF-SS-AD2-SB13-37.8/38.0-20211015	AD2-SB13	37.8	38.0	SS	G	N	10/15/2021	1225	1	None	X
3	KIF-SS-AD2-SB13-39.8/40.0-20211015	AD2-SB13	39.8	40.0	SS	G	N	10/15/2021	1255	1	None	X
4	KIF-SS-AD2-SB13-41.8/42.0-20211015	AD2-SB13	41.8	42.0	SS	G	N	10/15/2021	1330	1	None	X
5	KIF-SS-AD2-SB13-43.8/44.0-20211015	AD2-SB13	43.8	44.0	SS	G	N	10/15/2021	1355	1	None	X
6	KIF-SS-AD2-SB13-45.8/46.0-20211015	AD2-SB13	45.8	46.0	SS	G	N	10/15/2021	1450	1	None	X
7	KIF-SS-AD2-SB13-47.8/48.0-20211015	AD2-SB13	47.8	48.0	SS	G	N	10/15/2021	1535	1	None	X
8	KIF-SS-AD2-SB13-49.8/50.0-20211015	AD2-SB13	49.8	50.0	SS	G	N	10/15/2021	1610	1	None	X
9	KIF-SS-AD2-SB13-51.3/51.5-20211016	AD2-SB13	51.3	51.5	SS	G	N	10/16/2021	0850	1	None	X
10	KIF-SS-AD2-SB13-51.9/52.1-20211016	AD2-SB13	51.9	52.1	SS	G	N	10/16/2021	1110	1	None	X
11	KIF-SS-DUP01-20211012	AD2-SB13	NA	NA	SS	G	N	10/12/2021	NA	1	None	X
12	KIF-SS-DUP01-20211014	AD2-SB13	NA	NA	SS	G	N	10/14/2021	NA	1	None	X
13								10/19/21				

TV 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	[illegible signature]	10/29/21	9:30

Sample Receipt Conditions			
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / X No	Yes / X No	X Yes / No	Yes / X No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern [signature]

Form TVA 30067A

tva-deliverables@envstd.com 11/4/2021

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
1 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Rev1 BB 11/4/2021

Rev2 BB 11/9/2021

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road, Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:	
Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman; State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	

Required Sampler Information	
Sampler:	Trenton VanEgtem, Kenneth Nye
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY; Phone No: 859-422-3000
Sampling Team Number:	1
Send EDD/Hard Copy to:	

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below __N/A__

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N; Preserve: None; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB11-1.3/1.5-20211012	AD2-SB11	1.3	1.5	SS	G	N	10/12/2021	1400	1	None	X
2	KIF-SS-AD2-SB11-2.8/3.0-20211012	AD2-SB11	2.8	3.0	SS	G	N	10/12/2021	1437	1	None	X
3	KIF-SS-AD2-SB11-4.3/4.5-20211012	AD2-SB11	4.3	4.5	SS	G	N	10/12/2021	1520	1	None	X
4	KIF-SS-AD2-SB11-5.6/5.8-20211012	AD2-SB11	5.6	5.8	SS	G	N	10/12/2021	1552	1	None	X
5	KIF-SS-AD2-SB11-6.2/6.4-20211012	AD2-SB11	6.2	6.4	SS	G	N	10/12/2021	1618	1	None	X
6	KIF-SS-AD2-SB11-8.8/9.0-20211012	AD2-SB11	8.8	9.0	SS	G	N	10/12/2021	1640	1	None	X
7	KIF-SS-AD2-SB11-10.3/10.5-20211012	AD2-SB11	10.3	10.5	SS	G	N	10/12/2021	1700	1	None	X
8	KIF-SS-AD2-SB11-11.8/12.0-20211013	AD2-SB11	11.8	12.0	SS	G	N	10/13/2021	0835	1	None	X
9	KIF-SS-AD2-SB11-13.3/13.5-20211013	AD2-SB11	13.3	13.5	SS	G	N	10/13/2021	0847	1	None	X
10	KIF-SS-AD2-SB11-14.8/15.0-20211013	AD2-SB11	14.8	15.0	SS	G	N	10/13/2021	0910	1	None	X
11	KIF-SS-AD2-SB11-16.3/16.5-20211013	AD2-SB11	16.3	16.5	SS	G	N	10/13/2021	0930	1	None	X
12	KIF-SS-AD2-SB11-17.8/18.0-20211013	AD2-SB11	17.8	18.0	SS	G	N	10/13/2021	0950	1	None	X
13	KIF-SS-AD2-SB11-19.3/19.5-20211013	AD2-SB11	19.3	19.5	SS	G	N	10/13/2021	1015	1	None	X

TV 11/4/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtem / Stantec	10/19/2021	10:00	[signature]	10/24/21	9:30

Sample Receipt Conditions: Temperature in °C: No; Sample on Ice?: No; Sample Intact?: Yes; Trip Blank?: No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtem [signature]

BB 11/4/2021

Additional Sample

KIF-SS-AD2-SB13-31.8/32.0-20211015 / AD2-SB13 / 31.8 / 32.0 / SS / G / N / 10/15/2021 / 0920 / 1 / None / X

Form TVA 30067A

tva_deliverables@envstd.com BB 11/4/2021

Rev1 BB 11/4/2021

Rev2 BB 11/9/2021

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
2 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:	
Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman; State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	

Required Sampler Information	
Sampler:	Trenton VanEgtem, Kenneth Nye
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY; Phone No: 859-422-3000
Sampling Team Number:	1
Send EDD/Hard Copy to:	

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below __N/A__

24 Hours
3 Business Days
5 Business Days
10 Business Days (Standard)

Filtered: N
Preserve: None
Analysis: PLM

BB 11/4/2021 20211013

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Sample Depth)	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB11-20.8/21.0-~~2021013~~	AD2-SB11	20.8	21.0	SS	G	N	10/13/2021	1040	1	None	x
2	KIF-SS-AD2-SB11-22.3/22.5-20211013	AD2-SB11	22.3	22.5	SS	G	N	10/13/2021	1100	1	None	x
3	KIF-SS-AD2-SB11-23.8/24.0-20211013	AD2-SB11	23.8	24.0	SS	G	N	10/13/2021	1115	1	None	x
4	KIF-SS-AD2-SB11-25.3/25.5-20211013	AD2-SB11	25.3	25.5	SS	G	N	10/13/2021	1155	1	None	x
5	KIF-SS-AD2-SB11-26.8/27.0-20211013	AD2-SB11	26.8	27.0	SS	G	N	10/13/2021	1215	1	None	x
6	KIF-SS-AD2-SB11-28.3/28.5-20211013	AD2-SB11	28.3	28.5	SS	G	N	10/13/2021	1230	1	None	x
7	KIF-SS-AD2-SB13-1.3/1.5-20211014	AD2-SB13	1.3	1.5	SS	G	N	10/14/2021	0900	1	None	x
8	KIF-SS-AD2-SB13-2.5/2.7-20211014	AD2-SB13	2.5	2.7	SS	G	N	10/14/2021	0915	1	None	x
9	KIF-SS-AD2-SB13-4.3/4.5-20211014	AD2-SB13	4.3	4.5	SS	G	N	10/14/2021	0935	1	None	x
10	KIF-SS-AD2-SB13-~~7.3/7.5~~-20211014	AD2-SB13	~~7.3~~	~~7.5~~	SS	G	N	10/14/2021	1035	1	None	x
11	KIF-SS-AD2-SB13-9.3/9.5-20211014	AD2-SB13	9.3	9.5	SS	G	N	10/14/2021	1050	1	None	x
12	KIF-SS-AD2-SB13-10.8/11.0-20211014	AD2-SB13	10.8	11.0	SS	G	N	10/14/2021	1125	1	None	x
13	KIF-SS-AD2-SB13-12.3/12.5-20211014	AD2-SB13	12.3	12.5	SS	G	N	10/14/2021	1140	1	None	x

Additional Comments/Special Instructions:

6.0/6.2

BB 11/9/2021

6.0

6.2

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Trenton VanEgtem / Stantec	10/19/2021	10:00	[signature]	10/29/21	9:30	Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtem [signature]

Temperature in °C | Sample on Ice? | Sample Intact? | Trip Blank?

Form TVA 30087A

tva-deliverables@envstd.com BJ 11/4/2021

Rev1 BJ 11/4/2021

Rev2 BJ 11/9/2021

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_10122021_1C
3 of 4 Pages	
Task Desc:	KIF_SI_2021_10

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:	
Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	

Required Sampler Information	
Sampler:	Trenton VanEgtern, Kenneth Nye
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY Phone No: 859-422-3000
Sampling Team Number:	1
Send EDD/Hard Copy to:	

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below N/A

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N · Preserve: None · Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-13.8/14.0-20211014	AD2-SB13	13.8	14.0	SS	G	N	10/14/2021	1215	1	None	X
2	KIF-SS-AD2-SB13-15.3/15.5-20211014	AD2-SB13	15.3	15.5	SS	G	N	10/14/2021	1240	1	None	X
3	KIF-SS-AD2-SB13-16.8/17.0-20211014	AD2-SB13	16.8	17.0	SS	G	N	10/14/2021	1310	1	None	X
4	KIF-SS-AD2-SB13-18.3/18.5-20211014	AD2-SB13	18.3	18.5	SS	G	N	10/14/2021	1340	1	None	X
5	KIF-SS-AD2-SB13-19.8/20.0-20211014	AD2-SB13	19.8	20.0	SS	G	N	10/14/2021	1400	1	None	X
6	KIF-SS-AD2-SB13-21.3/21.5-20211014	AD2-SB13	21.3	21.5	SS	G	N	10/14/2021	1425	1	None	X
7	KIF-SS-AD2-SB13-22.8/23.0-20211014	AD2-SB13	22.8	23.0	SS	G	N	10/14/2021	1445	1	None	X
8	KIF-SS-AD2-SB13-24.3/24.5-20211014	AD2-SB13	24.3	24.5	SS	G	N	10/14/2021	1520	1	None	X
9	KIF-SS-AD2-SB13-25.8/26.0-20211014	AD2-SB13	25.8	26.0	SS	G	N	10/14/2021	1540	1	None	X
10	KIF-SS-AD2-SB13-27.3/27.5-20211014	AD2-SB13	27.3	27.5	SS	G	N	10/14/2021	1605	1	None	X
11	KIF-SS-AD2-SB13-28.8/29.0-20211014	AD2-SB13	28.8	29.0	SS	G	N	10/14/2021	1635	1	None	X
12	KIF-SS-AD2-SB13-30.3/30.5-20211015	AD2-SB13	30.3	30.5	SS	G	N	10/15/2021	0900	1	None	X
13	KIF-SS-AD2-SB13-33.8/40.0-20211015	AD2-SB13	33.8	40.0	SS	G	N	10/15/2021	1045	1	None	X

TW 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	BJBr	10/29/21	9:30

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No (No marked)	Yes / No (No marked)	Yes / No (Yes marked)	Yes / No (No marked)
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern

Form TVA 30057A

tva_deliverables@envstd.com BB 11/4/2021

Rev1 BB 11/4/2021

Rev2 BB 11/9/2021

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
4 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Trenton VanEgtem, Kenneth Nye
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A____

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: # ; Preserve: None ; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-35.8/36.0-20211015	AD2-SB13	35.8	36.0	SS	G	N	10/15/2021	1150	1	None	X
2	KIF-SS-AD2-SB13-37.8/38.0-20211015	AD2-SB13	37.8	38.0	SS	G	N	10/15/2021	1225	1	None	X
3	KIF-SS-AD2-SB13-39.8/40.0-20211015	AD2-SB13	39.8	40.0	SS	G	N	10/15/2021	1255	1	None	X
4	KIF-SS-AD2-SB13-41.8/42.0-20211015	AD2-SB13	41.8	42.0	SS	G	N	10/15/2021	1330	1	None	X
5	KIF-SS-AD2-SB13-43.8/44.0-20211015	AD2-SB13	43.8	44.0	SS	G	N	10/15/2021	1355	1	None	X
6	KIF-SS-AD2-SB13-45.8/46.0-20211015	AD2-SB13	45.8	46.0	SS	G	N	10/15/2021	1450	1	None	X
7	KIF-SS-AD2-SB13-47.8/48.0-20211015	AD2-SB13	47.8	48.0	SS	G	N	10/15/2021	1535	1	None	X
8	KIF-SS-AD2-SB13-49.8/50.0-20211015	AD2-SB13	49.8	50.0	SS	G	N	10/15/2021	1610	1	None	X
9	KIF-SS-AD2-SB13-51.3/51.5-20211016	AD2-SB13	51.3	51.5	SS	G	N	10/16/2021	0850	1	None	X
10	KIF-SS-AD2-SB13-51.9/52.1-20211016	AD2-SB13	51.9	52.1	SS	G	N	10/16/2021	1110	1	None	X
11	KIF-SS-DUP01-20211012	AD2-SB13	NA	NA	SS	G	~~N~~ FD	10/12/2021	NA	1	None	X
12	KIF-SS-DUP01-20211014	AD2-SB13	NA	NA	SS	G	~~N~~ FD	10/14/2021	NA	1	None	X
13								10/19/21				

TN 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/18/2021	10:00	Kei Zi	10/29/21	9:30
BB 11/4/2021					

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No (X No)	Yes / No (X No)	Yes (X) / No	Yes / No (X No)
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern TV

Form TVA 30057A

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10551717	KIF-SS-AD2-SB11-1.3/1.5-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551718	KIF-SS-AD2-SB11-2.8/3.0-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551719	KIF-SS-AD2-SB11-4.3/4.5-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551720	KIF-SS-AD2-SB11-5.6/5.8-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551721	KIF-SS-AD2-SB11-6.2/6.4-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551722	KIF-SS-AD2-SB11-8.8/9.0-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551723	KIF-SS-AD2-SB11-10.3/10.5-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551724	KIF-SS-AD2-SB11-11.8/12.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551725	KIF-SS-AD2-SB11-13.3/13.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551726	KIF-SS-AD2-SB11-14.8/15.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551727	QC-KIF-SS-AD2-SB11-14.8/15.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551728	KIF-SS-AD2-SB11-16.3/16.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551729	KIF-SS-AD2-SB11-17.8/18.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551730	KIF-SS-AD2-SB11-19.3/19.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551731	KIF-SS-AD2-SB11-20.8/21.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551732	KIF-SS-AD2-SB11-22.3./22.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551733	KIF-SS-AD2-SB11-23.8/24.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551734	KIF-SS-AD2-SB11-25.3/25.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551735	KIF-SS-AD2-SB11-26.8/27.0-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551736	KIF-SS-AD2-SB11-28.3/28.5-20211013	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551737	KIF-SS-AD2-SB13-1.3/1.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551738	QC-KIF-SS-AD2-SB13-1.3/1.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551739	KIF-SS-AD2-SB13-2.5/2.7-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551740	KIF-SS-AD2-SB13-4.3/4.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551741	KIF-SS-AD2-SB13-6.0/6.2-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551742	KIF-SS-AD2-SB13-9.3/9.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551743	KIF-SS-AD2-SB13-10.8/11.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551744	KIF-SS-AD2-SB13-12.3/12.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551745	KIF-SS-AD2-SB13-13.8/14.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551746	KIF-SS-AD2-SB13-15.3/15.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551747	KIF-SS-AD2-SB13-16.8/17.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551748	KIF-SS-AD2-SB13-18.3/18.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551749	KIF-SS-AD2-SB13-19.8/20.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551750	QC-KIF-SS-AD2-SB13-19.8/20.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551751	KIF-SS-AD2-SB13-21.3/21.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551752	KIF-SS-AD2-SB13-22.8/23.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551753	KIF-SS-AD2-SB13-24.3/24.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551754	KIF-SS-AD2-SB13-25.8/26.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551755	KIF-SS-AD2-SB13-27.3/27.5-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551756	KIF-SS-AD2-SB13-28.8/29.0-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551757	KIF-SS-AD2-SB13-30.3/30.5-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551758	KIF-SS-AD2-SB13-31.8/32.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644

10551759	KIF-SS-AD2-SB13-33.8/34.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551760	QC-KIF-SS-AD2-SB13-33.8/34.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551761	KIF-SS-AD2-SB13-35.8/36.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551762	KIF-SS-AD2-SB13-37.8/38.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551763	KIF-SS-AD2-SB13-39.8/40.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551764	KIF-SS-AD2-SB13-41.8/42.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551765	KIF-SS-AD2-SB13-43.8/44.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551766	KIF-SS-AD2-SB13-45.8/46.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551767	KIF-SS-AD2-SB13-47.8/48.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551768	KIF-SS-AD2-SB13-49.8/50.0-20211015	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551769	KIF-SS-AD2-SB13-51.3/51.5-20211016	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551770	KIF-SS-AD2-SB13-51.9/52.1-20211016	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551771	QC-KIF-SS-AD2-SB13-51.9/52.1-20211016	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551772	KIF-SS-DUP01-20211012	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644
10551773	KIF-SS-DUP01-20211014	COH1063570-3	10/29/2021 13:57	10/29/2021 09:30	Fly Ash Determination by PLM	11/12/2021 13:43	2854 8098 3644

Appendix B

Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 11/11/2021
Sample Received Date: 10/29/2021
RJLG Project: COH1063570-3
Customer COC: BRF_SI_10262021_1C & KIF_SI_10122021_1C
Purchase Order: 7037609
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD2-SB11-1.3/1.5-20211012	10551717	11/08/2021	10/12/2021	ND	Misc. Silicates Opaques	Light gray sediment
KIF-SS-AD2-SB11-10.3/10.5-20211012	10551723	11/08/2021	10/12/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB11-11.8/12.0-20211013	10551724	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB11-13.3/13.5-20211013	10551725	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB11-14.8/15.0-20211013	10551726	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Light gray sediment
KIF-SS-AD2-SB11-16.3/16.5-20211013	10551728	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB11-17.8/18.0-20211013	10551729	11/08/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB11-19.3/19.5-20211013	10551730	11/08/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB11-2.8/3.0-20211012	10551718	11/09/2021	10/12/2021	17%	Misc. Silicates Opaques	Dark gray sediment
KIF-SS-AD2-SB11-20.8/21.0-20211013	10551731	11/10/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD2-SB11-22.3./22.5-20211013	10551732	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB11-23.8/24.0-20211013	10551733	11/08/2021	10/13/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB11-25.3/25.5-20211013	10551734	11/09/2021	10/13/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB11-26.8/27.0-20211013	10551735	11/08/2021	10/13/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB11-28.3/28.5-20211013	10551736	11/08/2021	10/13/2021	1%		Light brownish gray sediment
KIF-SS-AD2-SB11-4.3/4.5-20211012	10551719	11/08/2021	10/12/2021	3%	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB11-5.6/5.8-20211012	10551720	11/08/2021	10/12/2021	3%	Misc. Silicates Opaques	Dark yellowish brown sediment
KIF-SS-AD2-SB11-6.2/6.4-20211012	10551721	11/08/2021	10/12/2021	1%	Misc. Silicates Opaques	Pale brown sediment
KIF-SS-AD2-SB11-8.8/9.0-20211012	10551722	11/09/2021	10/12/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB13-1.3/1.5-20211014	10551737	11/10/2021	10/14/2021	ND	Misc. Silicates Opaques	White sediment
KIF-SS-AD2-SB13-10.8/11.0-20211014	10551743	11/09/2021	10/14/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB13-12.3/12.5-20211014	10551744	11/09/2021	10/14/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB13-13.8/14.0-20211014	10551745	11/09/2021	10/14/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
KIF-SS-AD2-SB13-15.3/15.5-20211014	10551746	11/10/2021	10/14/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
KIF-SS-AD2-SB13-16.8/17.0-20211014	10551747	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Light yellowish brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD2-SB13-18.3/18.5-20211014	10551748	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
KIF-SS-AD2-SB13-19.8/20.0-20211014	10551749	11/10/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-2.5/2.7-20211014	10551739	11/08/2021	10/14/2021	5%	Misc. Silicates Opaques	Brown sediment
KIF-SS-AD2-SB13-21.3/21.5-20211014	10551751	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Yellowish brown sediment
KIF-SS-AD2-SB13-22.8/23.0-20211014	10551752	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
KIF-SS-AD2-SB13-24.3/24.5-20211014	10551753	11/10/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-25.8/26.0-20211014	10551754	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
KIF-SS-AD2-SB13-27.3/27.5-20211014	10551755	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Yellowish brown sediment
KIF-SS-AD2-SB13-28.8/29.0-20211014	10551756	11/08/2021	10/14/2021	ND	Misc. Silicates Opaques	Yellowish brown sediment
KIF-SS-AD2-SB13-30.3/30.5-20211015	10551757	11/09/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-31.8/32.0-20211015	10551758	11/10/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-33.8/34.0-20211015	10551759	11/10/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-35.8/36.0-20211015	10551761	11/09/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-37.8/38.0-20211015	10551762	11/08/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-39.8/40.0-20211015	10551763	11/09/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD2-SB13-4.3/4.5-20211014	10551740	11/09/2021	10/14/2021	1%	Misc. Silicates Opaques	Pale brown sediment
KIF-SS-AD2-SB13-41.8/42.0-20211015	10551764	11/09/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-43.8/44.0-20211015	10551765	11/10/2021	10/15/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB13-45.8/46.0-20211015	10551766	11/09/2021	10/15/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB13-47.8/48.0-20211015	10551767	11/09/2021	10/15/2021	1%	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB13-49.8/50.0-20211015	10551768	11/10/2021	10/15/2021	ND	Misc. Silicates Opaques	Gray sediment
KIF-SS-AD2-SB13-51.3/51.5-20211016	10551769	11/10/2021	10/16/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
KIF-SS-AD2-SB13-51.9/52.1-20211016	10551770	11/09/2021	10/16/2021	ND	Misc. Silicates Opaques	Pinkish gray sediment
KIF-SS-AD2-SB13-6.0/6.2-20211014	10551741	11/10/2021	10/14/2021	3%	Misc. Silicates Opaques	Yellowish brown sediment
KIF-SS-AD2-SB13-9.3/9.5-20211014	10551742	11/09/2021	10/14/2021	ND	Misc. Silicates Opaques	Light grayish brown sediment
KIF-SS-DUP01-20211012	10551772	11/08/2021	10/12/2021	ND	Misc. Silicates Opaques	Pale brown sediment
KIF-SS-DUP01-20211014	10551773	11/10/2021	10/14/2021	2%	Misc. Silicates Opaques	Light yellowish brown sediment
QC-KIF-SS-AD2-SB11-14.8/15.0-20211013	10551727	11/11/2021	10/13/2021	ND	Carbonate Clay Misc. Silicates Opaques Quartz	Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
QC-KIF-SS-AD2-SB13-1.3/1.5-20211014	10551738	11/11/2021	10/14/2021	ND	Carbonate Misc. Silicates Opaques Quartz	White Sediment
QC-KIF-SS-AD2-SB13-19.8/20.0-20211014	10551750	11/11/2021	10/14/2021	ND	Misc. Silicates Opaques Quartz	Light Brown Sediment
QC-KIF-SS-AD2-SB13-33.8/34.0-20211015	10551760	11/11/2021	10/15/2021	ND	Misc. Silicates Opaques Quartz	Light Brown Sediment
QC-KIF-SS-AD2-SB13-51.9/52.1-20211016	10551771	11/11/2021	10/16/2021	ND	Clay Misc. Silicates Opaques Quartz Coal	Grey Sediment

Disclaimer Notes

* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Coal Combustion Products (CCP) are defined as fly ash, bottom ash, and slag.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
CCP – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% CCP observed, none counted.
ND – No CCP detected.

tva.deliverables@envstd.com 11/4/2021

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
1 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Rev1 BB 11/4/2021

Rev2 BB 11/9/2021

Rev3 BB 3/15/2022

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:	
Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road Monroeville, PA 15146
Lab Manager Contact Information	
Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:			
Site ID #:	KINGSTON FOSSIL PLANT		
Project #:	175668043		
Site Address	714 Swan Pond Road		
City	Harriman	State, Zip:	TN, 37748
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:			

Required Sampler Information			
Sampler:	Trenton VanEgtem, Kenneth Nye		
Sampling Company:	Stantec		
Address	3052 Beaumont Centre Cir		
City/State	Lexington, KY	Phone No:	859-422-3000
Sampling Team Number:	1		
Send EDD/Hard Copy to:			

Analysis Turnaround Time

CALENDAR DAYS / WORKING DAYS

TAT if different from Below ___N/A___

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N

Preserve: None

Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Sample Depth, Depth Unit)	End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB11-1.3/1.5-20211012	AD2-SB11	1.3	1.5	SS	G	N	10/12/2021	1400	1	None	X
2	KIF-SS-AD2-SB11-2.8/3.0-20211012	AD2-SB11	2.8	3.0	SS	G	N	10/12/2021	1437	1	None	X
3	KIF-SS-AD2-SB11-4.3/4.5-20211012	AD2-SB11	4.3	4.5	SS	G	N	10/12/2021	1520	1	None	X
4	KIF-SS-AD2-SB11-5.6/5.8-20211012	AD2-SB11	5.6	5.8	SS	G	N	10/12/2021	1552	1	None	X
5	KIF-SS-AD2-SB11-6.2/6.4-20211012	AD2-SB11	6.2	6.4	SS	G	N	10/12/2021	1618	1	None	X
6	KIF-SS-AD2-SB11-8.8/9.0-20211012	AD2-SB11	8.8	9.0	SS	G	N	10/12/2021	1640	1	None	X
7	KIF-SS-AD2-SB11-10.3/10.5-20211012	AD2-SB11	10.3	10.5	SS	G	N	10/12/2021	1700	1	None	X
8	KIF-SS-AD2-SB11-11.8/12.0-20211013	AD2-SB11	11.8	12.0	SS	G	N	10/13/2021	0835	1	None	X
9	KIF-SS-AD2-SB11-13.3/13.5-20211013	AD2-SB11	13.3	13.5	SS	G	N	10/13/2021	0847	1	None	X
10	KIF-SS-AD2-SB11-14.8/15.0-20211013	AD2-SB11	14.8	15.0	SS	G	N	10/13/2021	0910	1	None	X
11	KIF-SS-AD2-SB11-16.3/16.5-20211013	AD2-SB11	16.3	16.5	SS	G	N	10/13/2021	0930	1	None	X
12	KIF-SS-AD2-SB11-17.8/18.0-20211013	AD2-SB11	17.8	18.0	SS	G	N	10/13/2021	0950	1	None	X
13	KIF-SS-AD2-SB11-19.3/19.5-20211013	AD2-SB11	19.3	19.5	SS	G	N	10/13/2021	1015	1	None	X

T-1 11/4/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtem / Stantec	10/19/2021	10:00	[signature]	10/29/21	9:30

Sample Receipt Conditions			
Yes / No (X)	Yes / No (X)	Yes (X) / No	Yes / No (X)
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtem [signature]

BB 11/4/2021

Additional Sample

KIF-SS-AD2-SB13-31.8/32.0-20211015 / AD2-SB13 / 31.8 / 32.0 / SS / G / N / 10/15/2021 / 0920 / 1 / None / X

Form TVA 20057A

tva_deliverables@envstd.com BB 11/4/2021

Rev1 BB 11/4/2021

Rev2 BB 11/9/2021

Rev3 BB 3/15/2022

Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
2 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Trenton VanEgtern, Kenneth Nye
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below N/A

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N

Preserve: None

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
	BB 11/4/2021											
1	KIF-SS-AD2-SB11-20.8/21.0-~~2021013~~ 20211013	AD2-SB11	20.8	21.0	SS	G	N	10/13/2021	1040	1	None	X
2	KIF-SS-AD2-SB11-22.3/22.5-20211013	AD2-SB11	22.3	22.5	SS	G	N	10/13/2021	1100	1	None	X
3	KIF-SS-AD2-SB11-23.8/24.0-20211013	AD2-SB11	23.8	24.0	SS	G	N	10/13/2021	1115	1	None	X
4	KIF-SS-AD2-SB11-25.3/25.5-20211013	AD2-SB11	25.3	25.5	SS	G	N	10/13/2021	1155	1	None	X
5	KIF-SS-AD2-SB11-26.8/27.0-20211013	AD2-SB11	26.8	27.0	SS	G	N	10/13/2021	1215	1	None	X
6	KIF-SS-AD2-SB11-28.3/28.5-20211013	AD2-SB11	28.3	28.5	SS	G	N	10/13/2021	1230	1	None	X
7	KIF-SS-AD2-SB13-1.3/1.5-20211014	AD2-SB13	1.3	1.5	SS	G	N	10/14/2021	0900	1	None	X
8	KIF-SS-AD2-SB13-2.5/2.7-20211014	AD2-SB13	2.5	2.7	SS	G	N	10/14/2021	0915	1	None	X
9	KIF-SS-AD2-SB13-4.3/4.5-20211014	AD2-SB13	4.3	4.5	SS	G	N	10/14/2021	0935	1	None	X
10	KIF-SS-AD2-SB13-~~7.3/7.5~~ 6.0/6.2-20211014	AD2-SB13	~~7.3~~ 6.0	~~7.5~~ 6.2	SS	G	N	10/14/2021	1035	1	None	X
11	KIF-SS-AD2-SB13-9.3/9.5-20211014	AD2-SB13	9.3	9.5	SS	G	N	10/14/2021	1050	1	None	X
12	KIF-SS-AD2-SB13-10.8/11.0-20211014	AD2-SB13	10.8	11.0	SS	G	N	10/14/2021	1125	1	None	X
13	KIF-SS-AD2-SB13-12.3/12.5-20211014	AD2-SB13	12.3	12.5	SS	G	N	10/14/2021	1140	1	None	X

Additional Comments/Special Instructions:

6.0/6.2

BB 11/9/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/19/2021	10:00	BuBin	10/29/21	9:30

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern

Form TVA 30067A

tva_deliverables@envstd.com BJ 11/4/2021

Rev 1 BJ 11/4/2021

Rev 2 BJ 11/9/2021

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	KIF_SI_10122021_1C		
3 of 4 Pages			
Task Desc:	KIF_SI_2021_10		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Trenton VanEgtern, Kenneth Nye
Lab Address:	350 Hochberg Road, Monroeville, PA 15146	Project #:	175688043	Sampling Company:	Stantec
		Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman; State, Zip: TN, 37748	City/State	Lexington, KY; Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:		Send EDD/Hard Copy to:	
Lab Email:					

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A__

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N; Preserve: None; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Sample Depth)	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-13.8/14.0-20211014	AD2-SB13	13.8	14.0	SS	G	N	10/14/2021	1215	1	None	X
2	KIF-SS-AD2-SB13-15.3/15.5-20211014	AD2-SB13	15.3	15.5	SS	G	N	10/14/2021	1240	1	None	X
3	KIF-SS-AD2-SB13-16.8/17.0-20211014	AD2-SB13	16.8	17.0	SS	G	N	10/14/2021	1310	1	None	X
4	KIF-SS-AD2-SB13-18.3/18.5-20211014	AD2-SB13	18.3	18.5	SS	G	N	10/14/2021	1340	1	None	X
5	KIF-SS-AD2-SB13-19.8/20.0-20211014	AD2-SB13	19.8	20.0	SS	G	N	10/14/2021	1400	1	None	X
6	KIF-SS-AD2-SB13-21.3/21.5-20211014	AD2-SB13	21.3	21.5	SS	G	N	10/14/2021	1425	1	None	X
7	KIF-SS-AD2-SB13-22.8/23.0-20211014	AD2-SB13	22.8	23.0	SS	G	N	10/14/2021	1445	1	None	X
8	KIF-SS-AD2-SB13-24.3/24.5-20211014	AD2-SB13	24.3	24.5	SS	G	N	10/14/2021	1520	1	None	X
9	KIF-SS-AD2-SB13-25.8/26.0-20211014	AD2-SB13	25.8	26.0	SS	G	N	10/14/2021	1540	1	None	X
10	KIF-SS-AD2-SB13-27.3/27.5-20211014	AD2-SB13	27.3	27.5	SS	G	N	10/14/2021	1605	1	None	X
11	KIF-SS-AD2-SB13-28.8/29.0-20211014	AD2-SB13	28.8	29.0	SS	G	N	10/14/2021	1635	1	None	X
12	KIF-SS-AD2-SB13-30.3/30.5-20211015	AD2-SB13	30.3	30.5	SS	G	N	10/15/2021	0900	1	None	X
13	KIF-SS-AD2-SB13-33.8/~~40.0~~-20211015	AD2-SB13	33.8	~~40.0~~	SS	G	N	10/15/2021	1045	1	None	X

TW 10/29/21

Additional Comments/Special Instructions:

34.0 BJ 3/15/2022

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Trenton VanEgtern / Stantec	10/19/2021	10:00	[signature]	10/29/21	9:30	Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No
						Yes/No; Yes/No; Yes/No; Yes/No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern [signature]

Temperature in °C; Sample on Ice?; Sample Intact?; Trip Blank?

Form TVA 30057A

tva_deliverables@enustd.com BJ 11/4/2021

Rev1 BJ 11/4/2021

Rev2 BJ 11/9/2021

Rev3 BJ 3/15/2022

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_10122021_1C
4 of 4 Pages	
Task Desc:	KIF_SI_2021_10

Required Ship to Lab:

Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road, Monroeville, PA 15146

Lab Manager Contact Information

Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	

Required Project Information:

Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	

Required Sampler Information

Sampler:	Trenton VanEgtem, Kenneth Nye
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY Phone No: 859-422-3000
Sampling Team Number:	1
Send EDD/Hard Copy to:	

Analysis Turnaround Time

CALENDAR DAYS WORKING DAYS

TAT if different from Below __N/A__

24 Hours

3 Business Days

5 Business Days

10 Business Days (Standard)

Filtered: N

Preserve: None

Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD2-SB13-35.8/36.0-20211015	AD2-SB13	35.8	36.0	SS	G	N	10/15/2021	1150	1	None	X
2	KIF-SS-AD2-SB13-37.8/38.0-20211015	AD2-SB13	37.8	38.0	SS	G	N	10/15/2021	1225	1	None	X
3	KIF-SS-AD2-SB13-39.8/40.0-20211015	AD2-SB13	39.8	40.0	SS	G	N	10/15/2021	1255	1	None	X
4	KIF-SS-AD2-SB13-41.8/42.0-20211015	AD2-SB13	41.8	42.0	SS	G	N	10/15/2021	1330	1	None	X
5	KIF-SS-AD2-SB13-43.8/44.0-20211015	AD2-SB13	43.8	44.0	SS	G	N	10/15/2021	1355	1	None	X
6	KIF-SS-AD2-SB13-45.8/46.0-20211015	AD2-SB13	45.8	46.0	SS	G	N	10/15/2021	1450	1	None	X
7	KIF-SS-AD2-SB13-47.8/48.0-20211015	AD2-SB13	47.8	48.0	SS	G	N	10/15/2021	1535	1	None	X
8	KIF-SS-AD2-SB13-49.8/50.0-20211015	AD2-SB13	49.8	50.0	SS	G	N	10/15/2021	1610	1	None	X
9	KIF-SS-AD2-SB13-51.3/51.5-20211016	AD2-SB13	51.3	51.5	SS	G	N	10/16/2021	0850	1	None	X
10	KIF-SS-AD2-SB13-51.9/52.1-20211016	AD2-SB13	51.9	52.1	SS	G	N	10/16/2021	1110	1	None	X
11	KIF-SS-DUP01-20211012	AD2-SB13	NA	NA	SS	G	~~N~~ FD	10/12/2021	NA	1	None	X
12	KIF-SS-DUP01-20211014	AD2-SB13	NA	NA	SS	G	~~N~~ FD	10/14/2021	NA	1	None	X
13								10/19/21				

TVN 10/19/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Trenton VanEgtern / Stantec	10/18/2021	10:00	Bei Zi	10/29/21	9:30
BJ 11/4/2021					

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Yes / No (X No)	Yes / No (X No)	Yes (X) / No	Yes / No (X No)
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No
Yes / No	Yes / No	Yes / No	Yes / No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Trenton VanEgtern TV

Form TVA 30057A

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

November 17, 2021

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402

RE: KIF Supplemental PLM – Analytical Report
RJ Lee Group Project Number COH1063570-2 REV01

Dear Mr. Thomas,

A revised report is being issued to correct the condition in which the samples were received.

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 33 samples on October 7, 2021 associated with Tennessee Valley Authority (TVA) KIF Supplemental. The samples were logged into RJ Lee Group project number COH1063570-2 and assigned RJLG sample numbers as indicated in Appendix A.

One sample, labeled as KIF-SS-6AR-SB05-28.8/29.0-20211001 (RJLG ID 1055050), arrived broken and could not be analyzed. Attached in Appendix A is the sample receipt confirmation form, COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Elizabeth A. Fischer
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: COH1063570-2

Project Name/Case #: KIF Supplemental

Received From:	Relinquished To:
Paul Thomas TVA Bull Run Fossil Plant 1265 Edgemoor Road Clinton, TN 37716 United States Email: prthomas0@tva.gov Main: 423-751-2926	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10550035	KIF-SS-6AR-SB05-1.3/1.5-20210930	10/07/2021 9:20 AM EDT
10550036	KIF-SS-6AR-SB05-2.8/3.0-20210930	10/07/2021 9:20 AM EDT
10550037	KIF-SS-6AR-SB05-4.3/4.5-20210930	10/07/2021 9:20 AM EDT
10550038	KIF-SS-6AR-SB05-5.8/6.0-20210930	10/07/2021 9:20 AM EDT
10550039	KIF-SS-6AR-SB05-7.3/7.5-20210930	10/07/2021 9:20 AM EDT
10550040	KIF-SS-6AR-SB05-8.8/9.0-20210930	10/07/2021 9:20 AM EDT
10550041	KIF-SS-6AR-SB05-10.3/10.5-20210930	10/07/2021 9:20 AM EDT
10550042	KIF-SS-6AR-SB05-11.8/12.0-20210930	10/07/2021 9:20 AM EDT
10550043	KIF-SS-6AR-SB05-13.3/13.5-20210930	10/07/2021 9:20 AM EDT
10550044	KIF-SS-6AR-SB05-14.8/15.0-20210930	10/07/2021 9:20 AM EDT
10550045	QC-KIF-SS-6AR-SB05-14.8/15.0-20210930	10/07/2021 9:20 AM EDT
10550046	KIF-SS-6AR-SB05-16.8/17.0-20210930	10/07/2021 9:20 AM EDT
10550047	KIF-SS-6AR-SB05-18.8/19.0-20210930	10/07/2021 9:20 AM EDT
10550048	KIF-SS-6AR-SB05-20.8/21.0-20210930	10/07/2021 9:20 AM EDT
10550049	KIF-SS-6AR-SB05-26.8/27.0-20211001	10/07/2021 9:20 AM EDT
10550051	KIF-SS-6AR-SB05-30.8/31.0-20211001	10/07/2021 9:20 AM EDT
10550052	KIF-SS-6AR-SB05-32.8/33.0-20211001	10/07/2021 9:20 AM EDT
10550053	KIF-SS-6AR-SB05-34.8/35.0-20211001	10/07/2021 9:20 AM EDT
10550054	KIF-SS-6AR-SB05-36.8/37.0-20211001	10/07/2021 9:20 AM EDT
10550055	KIF-SS-6AR-SB05-38.8/39.0-20211001	10/07/2021 9:20 AM EDT
10550056	QC-KIF-SS-6AR-SB05-38.8/39.0-20211001	10/07/2021 9:20 AM EDT
10550057	KIF-SS-6AR-SB05-40.8/41.0-20211001	10/07/2021 9:20 AM EDT
10550058	KIF-SS-DUP01-20211001	10/07/2021 9:20 AM EDT
10550059	KIF-SS-6AR-SB05-44.8/45.0-20211002	10/07/2021 9:20 AM EDT
10550060	KIF-SS-6AR-SB05-46.8/47.0-20211002	10/07/2021 9:20 AM EDT
10550061	KIF-SS-6AR-SB05-48.8/49.0-20211002	10/07/2021 9:20 AM EDT
10550062	KIF-SS-6AR-SB05-50.8/51.0-20211002	10/07/2021 9:20 AM EDT
10550063	KIF-SS-6AR-SB05-52.8/53.0-20211002	10/07/2021 9:20 AM EDT
10550064	KIF-SS-6AR-SB05-54.8/55.0-20211002	10/07/2021 9:20 AM EDT

Sample ID	Client Sample ID	Date Received
10550065	KIF-SS-6AR-SB05-56.8/57.0-20211002	10/07/2021 9:20 AM EDT
10550066	QC-KIF-SS-6AR-SB05-56.8/57.0-20211002	10/07/2021 9:20 AM EDT
10550067	KIF-SS-6AR-SB05-57.8/58.0-20211002	10/07/2021 9:20 AM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express
	Company: TVA Bull Run Fossil Plant	**Date:** 10/07/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed
	Company: RJ Lee Group, Inc.	**Date:** 10/07/2021

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	Tennessee Valley Authority	**Date Received:**	10/7/2021	**Log In Date:**	10/8/2021
Time Received:	9:20AM	**By:**	Brianna Zidek	**COC#:**	KIF_SI_09302021-1C
Project:	COH1063570-2	**# Coolers Received**	1	**Means of Shipment:**	FedEx
Air Bill:	2845 8158 4002				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	√		
Was there evidence of tampering?		√	
Are Custody Seals intact and in good condition?	√		
Were Coolers received between 2 and 4 degrees C?	NA		
Were all samples intact?		√	see comments
Were all samples accurately labeled?	√		
Was the COC received in good condition?	√		
Did the sample ID on COC match the ID on the sample jars?	√		
Were there any discrepancies among samples and COC?		√	
Is the COC completely filled out?	√		
Was the COC relinquished properly?	√		

List any anomalies associated with Sample Receipt

One sample jar arrived broken, Sample KIF-SS-6AR-SB05-28.8/29.0-20211001 (10550050)

Analyst Signature: [signature] 10/8/21

Manager Signature: [signature] 10/08/21

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH 1063570-2

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_09302021_1C
	1 of 3 Pages
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Michael Boatman, Jamie Snider
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		JS 10-5-21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				
	JS 10-5-21		JS 10-5-21		

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

Filtered: N — Preserve: None — Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-6AR-SB05-1.3/1.5-20210930	KIF-SP-SB05	1.3	1.5	SS	G	N	9/30/2021	1346	1	NA	X
2	KIF-SS-6AR-SB05-2.8/3.0-20210930	KIF-SP-SB05	2.8	3.0	SS	G	N	9/30/2021	1352	1	NA	X
3	KIF-SS-6AR-SB05-4.3/4.5-20210930	KIF-SP-SB05	4.3	4.5	SS	G	N	9/30/2021	1405	1	NA	X
4	KIF-SS-6AR-SB05-5.8/6.0-20210930	KIF-SP-SB05	5.8	6.0	SS	G	N	9/30/2021	1411	1	NA	X
5	KIF-SS-6AR-SB05-7.3/7.5-20210930	KIF-SP-SB05	7.3	7.5	SS	G	N	9/30/2021	1417	1	NA	X
6	KIF-SS-6AR-SB05-8.8/9.0-20210930	KIF-SP-SB05	8.8	9.0	SS	G	N	9/30/2021	1431	1	NA	X
7	KIF-SS-6AR-SB05-10.3/10.5-20210930	KIF-SP-SB05	10.3	10.5	SS	G	N	9/30/2021	1436	1	NA	X
8	KIF-SS-6AR-SB05-11.8/12.0-20210930	KIF-SP-SB05	11.8	12.0	SS	G	N	9/30/2021	1440	1	NA	X
9	KIF-SS-6AR-SB05-13.3/13.5-20210930	KIF-SP-SB05	13.3	13.5	SS	G	N	9/30/2021	1445	1	NA	X
10	KIF-SS-6AR-SB05-14.8/15.0-20210930	KIF-SP-SB05	14.8	15.0	SS	G	N	9/30/2021	1457	1	NA	X
11	KIF-SS-6AR-SB05-16.8/17.0-20210930	KIF-SP-SB05	16.8	17.0	SS	G	N	9/30/2021	1520	1	NA	X
12	KIF-SS-6AR-SB05-18.8/19.0-20210930	KIF-SP-SB05	18.9	19.0	SS	G	N	9/30/2021	1545	1	NA	X
13	KIF-SS-6AR-SB05-20.8/21.0-20210930	KIF-SP-SB05	20.8	21.0	SS	G	N	9/30/2021	1612	1	NA	X

JS 10-5-21

Additional Comments/Special Instructions:

NA

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Jamie Snider / Stantec	10.5.21	1050	[signature]	10/7/21	9:20

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☐ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Jamie Snider [signature]
	Michael Boatman [signature]
JS 10-5-21	JS 10-5-21

Form TVA 30067A

TVA

Tennessee Valley Authority

TVA Environmental Investigations

C0H1063570-2

JS 10.5.21

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	~~KIF-SI-09272021-1C~~ KIF_SI_09302021-1C
	2 of 3 Pages
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:

Lab Name:	RJ Lee Group, Inc.
Lab Address:	350 Hochberg Road Monroeville, PA 15146

Lab Manager Contact Information

Lab PM:	Elizabeth Fischer
Phone/Fax:	724-325-1776
Lab Email:	efischer@rjleegroup.com
	JS 10-5-21

Required Project Information:

Site ID #:	KINGSTON FOSSIL PLANT
Project #:	175668043
Site Address	714 Swan Pond Road
City	Harriman — State, Zip: TN, 37748
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	prthomas0@tva.gov
	JS 10.5.21

Required Sampler Information

Sampler:	Michael Boatman, Jamie Snider
Sampling Company:	Stantec
Address	3052 Beaumont Centre Cir
City/State	Lexington, KY — Phone No: 859-422-3000
	JS 10-5-21
Sampling Team Number:	1
Send EDD/Hard Copy to:	tva_deliverables@envstd.com

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

Filtered: N — Preserve: None — Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Start Depth (Depth Unit)	End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-6AR-SB05-26.8/27.0-20211001	KIF-SP-SB05	26.8	27.0	SS	G	N	10/1/2021	0857	1	NA	X
2	KIF-SS-6AR-SB05-28.8/29.0-20211001	KIF-SP-SB05	28.8	29.0	SS	G	N	10/1/2021	0927	1	NA	X
3	KIF-SS-6AR-SB05-30.8/31.0-20211001	KIF-SP-SB05	30.8	31.0	SS	G	N	10/1/2021	0958	1	NA	X
4	KIF-SS-6AR-SB05-32.8/33.0-20211001	KIF-SP-SB05	32.8	33.0	SS	G	N	10/1/2021	1040	1	NA	X
5	KIF-SS-6AR-SB05-34.8/35.0-20211001	KIF-SP-SB05	34.8	35.0	SS	G	N	10/1/2021	1110	1	NA	X
6	KIF-SS-6AR-SB05-36.8/37.0-20211001	KIF-SP-SB05	36.8	37.0	SS	G	N	10/1/2021	1230	1	NA	X
7	KIF-SS-6AR-SB05-38.8/39.0-20211001	KIF-SP-SB05	38.8	39.0	SS	G	N	10/1/2021	1313	1	NA	X
8	KIF-SS-6AR-SB05-40.8/41.0-20211001	KIF-SP-SB05	40.8	41.0	SS	G	N	10/1/2021	1340	1	NA	X
9	KIF-SS-DUP01-20211001	KIF-SP-SB05	NA	NA	SS	G	FD	10/1/2021	NA	1	NA	X
10	KIF-SS-6AR-SB05-44.8/45.0-20211002	KIF-SP-SB05	44.8	45.0	SS	G	N	10/2/2021	0810	1	NA	X
11	KIF-SS-6AR-SB05-46.8/47.0-20211002	KIF-SP-SB05	46.8	47.0	SS	G	N	10/2/2021	0848	1	NA	X
12	KIF-SS-6AR-SB05-48.8/49.0-20211002	KIF-SP-SB05	48.8	49.0	SS	G	N	10/2/2021	0917	1	NA	X
13	KIF-SS-6AR-SB05-50.8/51.0-20211002	KIF-SP-SB05	50.8	51.0	SS	G	N	10/2/2021	0955	1	NA	X

JS 10.5.21

Additional Comments/Special Instructions:

NA

RELINQISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
[signature] /Stantec	10.5.21	1050	[signature]	10/7/21	9:20

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Jamie Snider [signature]
JS 10.5.21	Michael Boatman [signature]
	JS 10-5-21

KIF_SI-09302021-1C

COH1063570-2

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	~~KIF-SI-09272021-1C~~ JS 10.5.21
3 of 3 Pages	
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Michael Boatman, Jamie Snider
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman, State, Zip: TN, 37748	City/State	Lexington, KY; Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		JS 10.5.21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				
	JS 10-5-21		JS 10.5.21		

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

Filtered: N | Preserve: None | Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Depth Unit)	End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-6AR-SB05-52.8/53.0-20211002	KIF-SP-SB05	52.8	53.0	SS	G	N	10/2/2021	1027	1	NA	X
2	KIF-SS-6AR-SB05-54.8/55.0-20211002	KIF-SP-SB05	54.8	55.0	SS	G	N	10/2/2021	1100	1	NA	X
3	KIF-SS-6AR-SB05-56.8/57.0-20211002	KIF-SP-SB05	56.8	57.0	SS	G	N	10/2/2021	1150	1	NA	X
4	KIF-SS-6AR-SB05-57.8/58.0-20211002	KIF-SP-SB05	57.8	58.0	SS	G	N	10/2/2021	1240	1	NA	X
5												
6												
7												
8												
9			JS 10-5-21									
10												
11												
12												
13												

JS 10-5-21

Additional Comments/Special Instructions:

NA

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Jamie Snider / Stantec	10.5.21	1050	[signature]	10/7/21	9:20

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Jamie Snider [signature]
JS 10.5.21	Michael Boatman [signature]
	JS 10-5-21

Form TVA 30067A

Sample #	Customer Sample #	Work Order	Login Date	ate And Time Receive	Protocol Assigned	Due Date	Delivery Tracking #
10550035	KIF-SS-6AR-SB05-1.3/1.5-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550036	KIF-SS-6AR-SB05-2.8/3.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550037	KIF-SS-6AR-SB05-4.3/4.5-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550038	KIF-SS-6AR-SB05-5.8/6.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550039	KIF-SS-6AR-SB05-7.3/7.5-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550040	KIF-SS-6AR-SB05-8.8/9.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550041	KIF-SS-6AR-SB05-10.3/10.5-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550042	KIF-SS-6AR-SB05-11.8/12.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550043	KIF-SS-6AR-SB05-13.3/13.5-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550044	KIF-SS-6AR-SB05-14.8/15.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550045	QC-KIF-SS-6AR-SB05-14.8/15.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550046	KIF-SS-6AR-SB05-16.8/17.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550047	KIF-SS-6AR-SB05-18.8/19.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550048	KIF-SS-6AR-SB05-20.8/21.0-20210930	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550049	KIF-SS-6AR-SB05-26.8/27.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550051	KIF-SS-6AR-SB05-30.8/31.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550052	KIF-SS-6AR-SB05-32.8/33.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550053	KIF-SS-6AR-SB05-34.8/35.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550054	KIF-SS-6AR-SB05-36.8/37.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550055	KIF-SS-6AR-SB05-38.8/39.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550056	QC-KIF-SS-6AR-SB05-38.8/39.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550057	KIF-SS-6AR-SB05-40.8/41.0-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550058	KIF-SS-DUP01-20211001	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550059	KIF-SS-6AR-SB05-44.8/45.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550060	KIF-SS-6AR-SB05-46.8/47.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550061	KIF-SS-6AR-SB05-48.8/49.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550062	KIF-SS-6AR-SB05-50.8/51.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550063	KIF-SS-6AR-SB05-52.8/53.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550064	KIF-SS-6AR-SB05-54.8/55.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550065	KIF-SS-6AR-SB05-56.8/57.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550066	QC-KIF-SS-6AR-SB05-56.8/57.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002
10550067	KIF-SS-6AR-SB05-57.8/58.0-20211002	COH1063570-2	10/08/2021 09:32	10/07/2021 09:20	Fly Ash Determination by PLM	10/15/2021 09:26	2845 8158 4002

Appendix B

Mineral Identification Report

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 11/03/2021
Sample Received Date: 10/07/2021
RJLG Project: COH1063570-2
Customer COC: KIF_SI_09302021_1C
Purchase Order: 7037609
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-6AR-SB05-1.3/1.5-20210930	10550035	10/27/2021	09/30/2021	ND	Carbonate Misc. Silicates Opaques	White Sediment
KIF-SS-6AR-SB05-10.3/10.5-20210930	10550041	10/28/2021	09/30/2021	ND	Carbonate Feldspar Mica	Very pale brown sediment
KIF-SS-6AR-SB05-11.8/12.0-20210930	10550042	10/28/2021	09/30/2021	ND	Carbonate Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-13.3/13.5-20210930	10550043	10/28/2021	09/30/2021	ND	Clay Feldspar Mica Misc. Silicates Opaques Quartz	Reddish Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-6AR-SB05-14.8/15.0-20210930	10550044	10/28/2021	09/30/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-16.8/17.0-20210930	10550046	10/28/2021	09/30/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-18.8/19.0-20210930	10550047	10/28/2021	09/30/2021	ND	Misc. Silicates Opaques	Light reddish brown sediment
KIF-SS-6AR-SB05-2.8/3.0-20210930	10550036	10/27/2021	09/30/2021	ND	Carbonate Feldspar Misc. Silicates Opaques Quartz	White Sediment
KIF-SS-6AR-SB05-20.8/21.0-20210930	10550048	10/28/2021	09/30/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-26.8/27.0-20211001	10550049	10/28/2021	10/01/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-6AR-SB05-30.8/31.0-20211001	10550051	10/28/2021	10/01/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-6AR-SB05-32.8/33.0-20211001	10550052	10/28/2021	10/01/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-34.8/35.0-20211001	10550053	10/28/2021	10/01/2021	ND	Clay Feldspar Mica Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-36.8/37.0-20211001	10550054	10/28/2021	10/01/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-6AR-SB05-38.8/39.0-20211001	10550055	10/28/2021	10/01/2021	ND	Mica Misc. Silicates Opaques	Light reddish brown sediment
KIF-SS-6AR-SB05-4.3/4.5-20210930	10550037	10/27/2021	09/30/2021	ND	Carbonate Misc. Silicates Opaques	White Sediment
KIF-SS-6AR-SB05-40.8/41.0-20211001	10550057	10/29/2021	10/01/2021	ND	Misc. Silicates Opaques	Light brown sediment
KIF-SS-6AR-SB05-44.8/45.0-20211002	10550059	10/29/2021	10/02/2021	ND	Misc. Silicates Opaques	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-6AR-SB05-46.8/47.0-20211002	10550060	10/29/2021	10/02/2021	ND	Feldspar Misc. Silicates Opaques	Very light brown sediment
KIF-SS-6AR-SB05-48.8/49.0-20211002	10550061	10/29/2021	10/02/2021	ND	Misc. Silicates Opaques Coal	Medium gray sediment
KIF-SS-6AR-SB05-5.8/6.0-20210930	10550038	10/27/2021	09/30/2021	ND	Carbonate Feldspar Misc. Silicates Opaques Quartz	White Sediment
KIF-SS-6AR-SB05-50.8/51.0-20211002	10550062	10/29/2021	10/02/2021	2%	Misc. Silicates Opaques Organic Particulate	Dark gray sediment
KIF-SS-6AR-SB05-52.8/53.0-20211002	10550063	10/29/2021	10/02/2021	2%	Misc. Silicates Opaques	Dark gray sediment
KIF-SS-6AR-SB05-54.8/55.0-20211002	10550064	10/29/2021	10/02/2021	5%	Misc. Silicates Opaques	Dark gray sediment
KIF-SS-6AR-SB05-56.8/57.0-20211002	10550065	10/28/2021	10/02/2021	2%	Mica Misc. Silicates Opaques Coal	Dark gray sediment
KIF-SS-6AR-SB05-57.8/58.0-20211002	10550067	10/29/2021	10/02/2021	ND	Misc. Silicates Opaques	Light gray sediment
KIF-SS-6AR-SB05-7.3/7.5-20210930	10550039	10/27/2021	09/30/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-6AR-SB05-8.8/9.0-20210930	10550040	10/28/2021	09/30/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Brown Sediment
KIF-SS-DUP01-20211001	10550058	10/28/2021	10/01/2021	ND	Misc. Silicates Opaques	Pale reddish brown sediment
QC-KIF-SS-6AR-SB05-14.8/15.0-20210930	10550045	11/02/2021	09/30/2021	1%	Clay Misc. Silicates Opaques Quartz Coal	Brown Sediment
QC-KIF-SS-6AR-SB05-38.8/39.0-20211001	10550056	11/02/2021	10/01/2021	ND	Mica Misc. Silicates Opaques Quartz	Light Brown Sediment
QC-KIF-SS-6AR-SB05-56.8/57.0-20211002	10550066	11/01/2021	10/02/2021	6%	Carbonate Clay Misc. Silicates Opaques Quartz Coal	Grey Sediment

Disclaimer Notes
* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Coal Combustion Products (CCP) are defined as fly ash, bottom ash, and slag.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
CCP – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% CCP observed, none counted.
ND – No CCP detected.

January 24, 2021

Paul Thomas
TVA Bull Run Fossil Plant
1265 Edgemoor Road
Clinton, TN 37716

RE: KIF Supplemental PLM – Analytical Report RJ Lee Group Project Number COH1063570-0 Rev 1

Dear Mr. Thomas,

A revised report has been issued to correct changes to the Chain of Custody.

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 38 samples on September 21, 2021 associated with Tennessee Valley Authority (TVA) KIF Supplemental. The samples were logged into RJ Lee Group project number COH1063570-0 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with sample labels and custody seals intact. Attached in Appendix A is the sample receipt confirmation form, COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,

Elizabeth A. Fischer
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A
Chain of Custody Forms

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Chain of Custody

RJ Lee Group Work Order #: COH1063570-0
Project Name/Case #: KIF Supplemental

Received From:	Relinquished To:
Paul Thomas Senior Program Manager, Civil Engineering Tennessee Valley Authority 1101 Market Street LP 5E-C Chattanooga, TN 37402 United States Email: prthomas0@tva.gov Main: 423-751-2926	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10548555	KIF-SS-AD3-SB10-0.0/1.5-20210917	09/21/2021 9:45 AM EDT
10548556	KIF-SS-AD3-SB10-1.5/3.0-20210917	09/21/2021 9:45 AM EDT
10548557	KIF-SS-AD3-SB10-3.0/4.5-20210917	09/21/2021 9:45 AM EDT
10548558	KIF-SS-AD3-SB10-4.5/6.0-20210917	09/21/2021 9:45 AM EDT
10548559	KIF-SS-AD3-SB10-6.0/7.5-20210917	09/21/2021 9:45 AM EDT
10548560	KIF-SS-AD3-SB10-7.5/9.0-20210917	09/21/2021 9:45 AM EDT
10548561	KIF-SS-AD3-SB10-9.0/10.5-20210917	09/21/2021 9:45 AM EDT
10548562	KIF-SS-AD3-SB10-10.5/12.0-20210917	09/21/2021 9:45 AM EDT
10548563	KIF-SS-AD3-SB10-12.0/13.5-20210917	09/21/2021 9:45 AM EDT
10548564	KIF-SS-AD3-SB10-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548565	QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548566	KIF-SS-AD3-SB09-0.0/1.5-20210917	09/21/2021 9:45 AM EDT
10548567	KIF-SS-AD3-SB09-1.5/3.0-20210917	09/21/2021 9:45 AM EDT
10548568	KIF-SS-AD3-SB09-3.0/4.5-20210917	09/21/2021 9:45 AM EDT
10548569	KIF-SS-AD3-SB09-4.5/6.0-20210917	09/21/2021 9:45 AM EDT
10548570	KIF-SS-AD3-SB09-6.0/7.5-20210917	09/21/2021 9:45 AM EDT
10548571	KIF-SS-AD3-SB09-7.5/9.0-20210917	09/21/2021 9:45 AM EDT
10548572	KIF-SS-AD3-SB09-9.0/10.5-20210917	09/21/2021 9:45 AM EDT
10548573	KIF-SS-AD3-SB09-10.5/12.0-20210917	09/21/2021 9:45 AM EDT
10548574	KIF-SS-AD3-SB09-12.0/13.5-20210917	09/21/2021 9:45 AM EDT
10548575	KIF-SS-AD3-SB09-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548576	QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	09/21/2021 9:45 AM EDT
10548577	KIF-SS-DUP01-20210917	09/21/2021 9:45 AM EDT
10548578	KIF-SS-AD3-SB08-0.0/1.5-20210918	09/21/2021 9:45 AM EDT
10548579	KIF-SS-AD3-SB08-1.5/3.0-20210918	09/21/2021 9:45 AM EDT
10548580	KIF-SS-AD3-SB08-3.0/4.5-20210918	09/21/2021 9:45 AM EDT
10548581	KIF-SS-AD3-SB08-4.5/5.7-20210918	09/21/2021 9:45 AM EDT
10548582	KIF-SS-AD3-SB08A-0.0/1.5-20210918	09/21/2021 9:45 AM EDT
10548583	KIF-SS-AD3-SB08A-1.5/3.0-20210918	09/21/2021 9:45 AM EDT

Sample ID	Client Sample ID	Date Received
10548584	KIF-SS-AD3-SB08A-3.0/4.5-20210918	09/21/2021 9:45 AM EDT
10548585	KIF-SS-AD3-SB08A-4.5/6.0-20210918	09/21/2021 9:45 AM EDT
10548586	KIF-SS-AD3-SB08A-6.0/7.5-20210918	09/21/2021 9:45 AM EDT
10548587	QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	09/21/2021 9:45 AM EDT
10548588	KIF-SS-AD3-SB08A-7.5/9.0-20210918	09/21/2021 9:45 AM EDT
10548589	KIF-SS-AD3-SB08A-9.0/10.5-20210918	09/21/2021 9:45 AM EDT
10548590	KIF-SS-AD3-SB08A-10.5/12.0-20210918	09/21/2021 9:45 AM EDT
10548591	KIF-SS-AD3-SB08A-12.0/13.5-20210918	09/21/2021 9:45 AM EDT
10548592	KIF-SS-AD3-SB08A-13.5/15.0-20210918	09/21/2021 9:45 AM EDT
10548593	KIF-SS-AD3-SB08A-15.0/16.5-20210918	09/21/2021 9:45 AM EDT
10548594	KIF-SS-AD3-SB08A-16.5/18.0-20210918	09/21/2021 9:45 AM EDT
10548595	KIF-SS-AD3-SB08A-18.0/19.5-20210918	09/21/2021 9:45 AM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express
	Company: Tennessee Valley Authority	**Date:** 09/21/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed
	Company: RJ Lee Group, Inc.	**Date:** 09/21/2021

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

	Relinquished	Method of Shipment:
	Company:	**Date:**
	Received By:	Package Condition Upon Receipt:
	Company:	**Date:**

350 Hochberg Road, Monroeville, PA 15146
Phone: (724) 325-1776 | Fax: (724) 733-1799

RJ Lee Group
Sample Receipt and Log in Check List

Client:	Tennessee Valley Authority	Date Received:	9/21/2021	Log in Date:	9/22/2021
Time Received:	9:45PM	By:	Brianna Zidek	COC#:	KIF_SI_09172021-1C
Project:	COH1063570-0	# Coolers Received	1	Means of Shipment:	FedEx
Air Bill:	2839 2901 4193				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	NA		
Were all samples intact?	✓		
Were all samples accurately labeled?	✓		
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?	✓		
Were there any discrepancies among samples and COC?		✓	
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

NA
BZ 9/22/21

Analyst Signature: Bri Zi 9/22/21

Manager Signature: Elizabeth Afton 09/22/2021

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063570-0

Rev'
BB
1/21/22

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_09172021_1C
1 of 3 Pages	
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Michael Boatman, Kevin Nguyen
Lab Address:	350 Hochberg Road, Monroeville, PA 15146	Project #:	175668043	Sampling Company:	Stantec
		Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman; State, Zip: TN, 37748	City/State	Lexington, KY; Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __NA____

- ☐ 24 Hours
- ☐ 3 Business Days
- ☐ 5 Business Days
- ☑ 10 Business Days (Standard)

Filtered: N; Preserve: None; Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD3-SB10-0.0/1.5-20210917	KIF-ST-SB10	0.0	1.5	SS	G	N	9/17/2021	1000	1	NA	X
2	KIF-SS-AD3-SB10-1.5/3.0-20210917	KIF-ST-SB10	1.5	3.0	SS	G	N	9/17/2021	1010	1	NA	X
3	KIF-SS-AD3-SB10-3.0/4.5-20210917	KIF-ST-SB10	3.0	4.5	SS	G	N	9/17/2021	1020	1	NA	X
4	KIF-SS-AD3-SB10-4.5/6.0-20210917	KIF-ST-SB10	4.5	6.0	SS	G	N	9/17/2021	1110	1	NA	X
5	KIF-SS-AD3-SB10-6.0/7.5-20210917	KIF-ST-SB10	6.0	7.5	SS	G	N	9/17/2021	1125	1	NA	X
6	KIF-SS-AD3-SB10-7.5/9.0-20210917	KIF-ST-SB10	7.5	9.0	SS	G	N	9/17/2021	1135	1	NA	X
7	KIF-SS-AD3-SB10-9.0/10.5-20210917	KIF-ST-SB10	9.0	10.5	SS	G	N	9/17/2021	1155	1	NA	X
8	KIF-SS-AD3-SB10-10.5/12.0-20210917	KIF-ST-SB10	10.5	12.0	SS	G	N	9/17/2021	1205	1	NA	X
9	KIF-SS-AD3-SB10-12.0/13.5-20210917	KIF-ST-SB10	12.0	13.5	SS	G	N	9/17/2021	1215	1	NA	X
10	KIF-SS-AD3-SB10-13.5/15.0-20210917	KIF-ST-SB10	13.5	15.0	SS	G	N	9/17/2021	1225	1	NA	X
11	KIF-SS-AD3-SB09-0.0/1.5-20210917	KIF-ST-SB09	0.0	1.5	SS	G	N	9/17/2021	1400	1	NA	X
12	KIF-SS-AD3-SB09-1.5/3.0-20210917	KIF-ST-SB09	1.5	3.0	SS	G	N	9/17/2021	1405	1	NA	X
13	KIF-SS-AD3-SB09-3.0/4.5-20210917	KIF-ST-SB09	3.0	4.5	SS	G	N	9/17/2021	1415	1	NA	X

KN 9/17/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Kevin Nguyen / Stantec	9/20/21	17:00	[signature]	9/21/21	9:45

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No

SHIPPING METHOD: (Select Appropriate)

Fedex

SAMPLER NAME AND SIGNATURE

Kevin Nguyen [signature]

Michael Boatman [signature]

Form TVA 30067A

Rev 1
BB 1/21/22

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063570-0

COOLER No.:	1	of	1
COC No:	KIF_SI_09172021_1C		
2 of 3 Pages			
Task Desc:	KIF_SI_2021_09		

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

Required Ship to Lab:		Required Project Information:				Required Sampler Information		
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT			Sampler:	Michael Boatman, Kevin Nguyen	
Lab Address:	350 Hochberg Road	Project #:	175668043			Sampling Company:	Stantec	
	Monroeville, PA 15146	Site Address	714 Swan Pond Road			Address	3052 Beaumont Centre Cir	
		City	Harriman	State, Zip:	TN, 37748	City/State	Lexington, KY	Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas					
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926			Sampling Team Number:	1	
Phone/Fax:	724-325-1776	Site PM Email:	prthomas@tva.gov			Send EDD/Hard Copy to:	tva_deliverables@enystd.com	
Lab Email:	efischer@rjleegroup.com							

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below __N/A____

- ☐ 24 Hours
- ☐ 3 Business Days
- ☐ 5 Business Days
- ☑ 10 Business Days (Standard)

Filtered: N
Preserve: None
Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Depth Unit: Start Depth	Sample Depth Select Unit: End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	KIF-SS-AD3-SB09-4.5/6.0-20210917	KIF-ST-SB09	4.5	6.0	SS	G	N	9/17/2021	1425	1	NA	X
2	KIF-SS-AD3-SB09-6.0/7.5-20210917	KIF-ST-SB09	6.0	7.5	SS	G	N	9/17/2021	1430	1	NA	X
3	KIF-SS-AD3-SB09-7.5/9.0-20210917	KIF-ST-SB09	7.5	9.0	SS	G	N	9/17/2021	1435	1	NA	X
4	KIF-SS-AD3-SB09-9.0/10.5-20210917	KIF-ST-SB09	9.0	10.5	SS	G	N	9/17/2021	1455	1	NA	X
5	KIF-SS-AD3-SB09-10.5/12.0-20210917	KIF-ST-SB09	10.5	12.0	SS	G	N	9/17/2021	1505	1	NA	X
6	KIF-SS-AD3-SB09-12.0/13.5-20210917	KIF-ST-SB09	12.0	13.5	SS	G	N	9/17/2021	1510	1	NA	X
7	KIF-SS-AD3-SB09-13.5/15.0-20210917	KIF-ST-SB09	13.5	15.0	SS	G	N	9/17/2021	1520	1	NA	X
8	KIF-SS-DUP01-20210917	NA	NA	NA	SS	G	FD	9/17/2021	NA	1	NA	X
9	KIF-SS-AD3-SB08-0.0/1.5-20210918	KIF-ST-SB08	0.0	1.5	SS	G	N	9/18/2021	0810	1	NA	X
10	KIF-SS-AD3-SB08-1.5/3.0-20210918	KIF-ST-SB08	1.5	3.0	SS	G	N	9/18/2021	0820	1	NA	X
11	KIF-SS-AD3-SB08-3.0/4.5-20210918	KIF-ST-SB08	3.0	4.5	SS	G	N	9/18/2021	0830	1	NA	X
12	KIF-SS-AD3-SB08-4.5/6.0-20210918	KIF-ST-SB08	4.5	6.0	SS	G	N	9/18/2021	0840	1	NA	X
13	KIF-SS-AD3-SB08A-0.0/1.5-20210918	KIF-ST-SB08A	0.0	1.5	SS	G	N	9/18/2021	0935	1	NA	X

KA 9/21/21

Additional Comments/Special Instructions:

5.7
BB 1/21/22

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Kevin Nguyen / Stantec K	9/20/21	17:00	Bri Bm	9/21/21	945

Sample Receipt Conditions			
Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Kevin Nguyen K
	Michael Boatman [signature]

Form TVA 30067A

COH 1063570-0

Revl BB 1/21/22

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate

COOLER No.:	1 of 1
COC No:	KIF_SI_09172021_1C
3 of 3 Pages	
Task Desc:	KIF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	KINGSTON FOSSIL PLANT	Sampler:	Michael Boatman, Kevin Nguyen
Lab Address:	350 Hochberg Road	Project #:	175668043	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	714 Swan Pond Road	Address	3052 Beaumont Centre Cir
		City	Harriman State, Zip: TN, 37748	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	1
Phone/Fax:	724-325-1776	Site PM Email:	pnthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				

Analysis Turnaround Time

☐ CALENDAR DAYS ☐ WORKING DAYS

TAT if different from Below NA

☐ 24 Hours
☐ 3 Business Days
☐ 5 Business Days
☑ 10 Business Days (Standard)

Filtered: N | Preserve: None | Analysis: PLM

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
			Depth Unit	Select Unit								
1	KIF-SS-AD3-SB08A-1.5/3.0-20210918	KIF-ST-SB08A	1.5	3.0	SS	G	N	9/18/2021	0945	1	NA	X
2	KIF-SS-AD3-SB08A-3.0/4.5-20210918	KIF-ST-SB08A	3.0	4.5	SS	G	N	9/18/2021	0955	1	NA	X
3	KIF-SS-AD3-SB08A-4.5/6.0-20210918	KIF-ST-SB08A	4.5	6.0	SS	G	N	9/18/2021	1035	1	NA	X
4	KIF-SS-AD3-SB08A-6.0/7.5-20210918	KIF-ST-SB08A	6.0	7.5	SS	G	N	9/18/2021	1045	1	minimal recovery	X
5	KIF-SS-AD3-SB08A-7.5/9.0-20210918	KIF-ST-SB08A	7.5	9.0	SS	G	N	9/18/2021	1100	1	minimal recovery	X
6	KIF-SS-AD3-SB08A-9.0/10.5-20210918	KIF-ST-SB08A	9.0	10.5	SS	G	N	9/18/2021	1110	1	NA	X
7	KIF-SS-AD3-SB08A-10.5/12.0-20210918	KIF-ST-SB08A	10.5	12.0	SS	G	N	9/18/2021	1120	1	NA	X
8	KIF-SS-AD3-SB08A-12.0/13.5-20210918	KIF-ST-SB08A	12.0	13.5	SS	G	N	9/18/2021	1125	1	NA	X
9	KIF-SS-AD3-SB08A-13.5/15.0-20210918	KIF-ST-SB08A	13.5	15.0	SS	G	N	9/18/2021	1130	1	NA	X
10	KIF-SS-AD3-SB08A-15.0/16.5-20210918	KIF-ST-SB08A	15.0	16.5	SS	G	N	9/18/2021	1150	1	minimal recovery	X
11	KIF-SS-AD3-SB08A-16.5/18.0-20210918	KIF-ST-SB08A	16.5	18.0	SS	G	N	9/18/2021	1200	1	NA	X
12	KIF-SS-AD3-SB08A-18.0/19.5-20210918	KIF-ST-SB08A	18.0	19.5	SS	G	N	9/18/2021	1215	1	NA	X
13												

KN 9/20/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Kevin Nguyen / Stantec	9/20/21	17:00	[signature]	9/21/21	9:20

Sample Receipt Conditions

Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Kevin Nguyen
	Michael Boatman

Form TVA 30057A

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10548555	KIF-SS-AD3-SB10-0.0/1.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548556	KIF-SS-AD3-SB10-1.5/3.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548557	KIF-SS-AD3-SB10-3.0/4.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548558	KIF-SS-AD3-SB10-4.5/6.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548559	KIF-SS-AD3-SB10-6.0/7.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548560	KIF-SS-AD3-SB10-7.5/9.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548561	KIF-SS-AD3-SB10-9.0/10.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548562	KIF-SS-AD3-SB10-10.5/12.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548563	KIF-SS-AD3-SB10-12.0/13.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548564	KIF-SS-AD3-SB10-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548565	QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548566	KIF-SS-AD3-SB09-0.0/1.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548567	KIF-SS-AD3-SB09-1.5/3.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548568	KIF-SS-AD3-SB09-3.0/4.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548569	KIF-SS-AD3-SB09-4.5/6.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548570	KIF-SS-AD3-SB09-6.0/7.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548571	KIF-SS-AD3-SB09-7.5/9.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548572	KIF-SS-AD3-SB09-9.0/10.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548573	KIF-SS-AD3-SB09-10.5/12.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548574	KIF-SS-AD3-SB09-12.0/13.5-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548575	KIF-SS-AD3-SB09-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548576	QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548577	KIF-SS-DUP01-20210917	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548578	KIF-SS-AD3-SB08-0.0/1.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548579	KIF-SS-AD3-SB08-1.5/3.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548580	KIF-SS-AD3-SB08-3.0/4.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548581	KIF-SS-AD3-SB08-4.5/5.7-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548582	KIF-SS-AD3-SB08A-0.0/1.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548583	KIF-SS-AD3-SB08A-1.5/3.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548584	KIF-SS-AD3-SB08A-3.0/4.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548585	KIF-SS-AD3-SB08A-4.5/6.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548586	KIF-SS-AD3-SB08A-6.0/7.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548587	QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548588	KIF-SS-AD3-SB08A-7.5/9.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548589	KIF-SS-AD3-SB08A-9.0/10.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548590	KIF-SS-AD3-SB08A-10.5/12.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548591	KIF-SS-AD3-SB08A-12.0/13.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548592	KIF-SS-AD3-SB08A-13.5/15.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548593	KIF-SS-AD3-SB08A-15.0/16.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548594	KIF-SS-AD3-SB08A-16.5/18.0-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193
10548595	KIF-SS-AD3-SB08A-18.0/19.5-20210918	COH1063570-0	09/22/2021 10:14	09/21/2021 09:45	Fly Ash Determination by PLM	09/29/2021 10:07	2839 2901 4193

Appendix B

Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
Tennessee Valley Authority
1101 Market Street
LP 5E-C
Chattanooga, TN 37402 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 10/15/2021
Sample Received Date: 09/21/2021
RJLG Project: COH1063570-0
Customer COC: KIF_SI_09172021_1C
Purchase Order:
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB08-0.0/1.5-20210918	10548578	10/14/2021	09/18/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB08-1.5/3.0-20210918	10548579	10/14/2021	09/18/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB08-3.0/4.5-20210918	10548580	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08-4.5/5.7-20210918	10548581	10/14/2021	09/18/2021	ND	Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-0.0/1.5-20210918	10548582	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-1.5/3.0-20210918	10548583	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB08A-10.5/12.0-20210918	10548590	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-12.0/13.5-20210918	10548591	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-13.5/15.0-20210918	10548592	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-15.0/16.5-20210918	10548593	10/14/2021	09/18/2021	1%	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-16.5/18.0-20210918	10548594	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-18.0/19.5-20210918	10548595	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-3.0/4.5-20210918	10548584	10/14/2021	09/18/2021	ND	Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-4.5/6.0-20210918	10548585	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.
KIF-SS-AD3-SB08A-6.0/7.5-20210918	10548586	10/14/2021	09/18/2021	2%	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-7.5/9.0-20210918	10548588	10/14/2021	09/18/2021	1%	Carbonate Opaques Quartz	Tan Sediment.
KIF-SS-AD3-SB08A-9.0/10.5-20210918	10548589	10/14/2021	09/18/2021	ND	Carbonate Opaques Quartz	Beige Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB09-0.0/1.5-20210917	10548566	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB09-1.5/3.0-20210917	10548567	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB09-10.5/12.0-20210917	10548573	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB09-12.0/13.5-20210917	10548574	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB09-13.5/15.0-20210917	10548575	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Pale Brown Sediment
KIF-SS-AD3-SB09-3.0/4.5-20210917	10548568	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB09-4.5/6.0-20210917	10548569	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-6.0/7.5-20210917	10548570	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-7.5/9.0-20210917	10548571	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB09-9.0/10.5-20210917	10548572	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-0.0/1.5-20210917	10548555	10/13/2021	09/17/2021	ND	Carbonate Feldspar Misc. Silicates Opaques Quartz Coal	Red Sediment
KIF-SS-AD3-SB10-1.5/3.0-20210917	10548556	10/13/2021	09/17/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB10-10.5/12.0-20210917	10548562	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-12.0/13.5-20210917	10548563	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
KIF-SS-AD3-SB10-13.5/15.0-20210917	10548564	10/14/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Yellow Sediment
KIF-SS-AD3-SB10-3.0/4.5-20210917	10548557	10/13/2021	09/17/2021	ND	Feldspar Misc. Silicates Opaques Quartz Coal	Reddish Yellow Sediment
KIF-SS-AD3-SB10-4.5/6.0-20210917	10548558	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-6.0/7.5-20210917	10548559	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pale Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
KIF-SS-AD3-SB10-7.5/9.0-20210917	10548560	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-AD3-SB10-9.0/10.5-20210917	10548561	10/13/2021	09/17/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Light Brown Sediment
KIF-SS-DUP01-20210917	10548577	10/14/2021	09/17/2021	ND	NA	Pale Brown Sediment
QC-KIF-SS-AD3-SB08A-6.0/7.5-20210918	10548587	10/14/2021	09/18/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Organic Particulate Quartz	Yellowish Red Sediment
QC-KIF-SS-AD3-SB09-13.5/15.0-20210917	10548576	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Pale Brown Sediment
QC-KIF-SS-AD3-SB10-13.5/15.0-20210917	10548565	10/14/2021	09/17/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light Brown Sediment

Disclaimer Notes

* Samples will be returned to client immediately upon the release of final report.
* These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
* This test report relates to the items tested.
* Any reproduction of this document must include the entire document in order for the report to be valid.
* This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
* Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
* If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
* For the purposes of this method, Coal Combustion Products (CCP) are defined as fly ash, bottom ash, and slag.
* The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.
Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.
Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.
Opaques – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.
CCP – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.
Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.
Carbonates – High birefringent, can be rhombohedral, with high relief.
Diatoms – Silica rich isotropic particles with various morphologies.
Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.
Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.
Amphibole – Elongated anisotropic particulate with moderate to high relief.
Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.
<1% CCP observed, none counted.
ND – No CCP detected.

ATTACHMENT H.1-B
RESULTS OF GEOPHYSICAL BOREHOLE LOGGING (AD-2-D)

December 9, 2018

Mr. Daniel Rogers
Stantec
3052 Beaumont Centre Circle
Lexington, KY 40513-1703

Subject: Results of Geophysical Borehole Logging
One Borehole (AD-2-D)
TVA Kingston Fossil Plant (KIF)
Harriman, TN
ARM Project: 180668

Dear Mr. Rogers,

ARM Geophysics (ARM) is pleased to present this letter report that summarizes the results of geophysical borehole logging performed at the above referenced site on November 7, 2018. The objective of the logging was to identify water-bearing zones and to measure the depth and orientation of fractures and bedding planes in the above mentioned boreholes. To achieve these objectives, ARM acquired standard borehole logs and images.

LOGGING METHODS

The logs that ARM completed for this investigation include:

- Natural Gamma
- Fluid Temperature
- Fluid Resistivity
- 3-Arm Caliper
- Optical Televiewer (OTV)
- Acoustic Televiewer (ATV)
- Heat Pulse Flowmeter – Ambient & Pumping

ARM has provided a summary of these logging methods in Attachment A. ARM acquired the image and standard logs using a Matrix acquisition system manufactured by Mount Sopris Instrument Company.

INTERPRETATION

BASIC LOG DESCRIPTIONS

The geophysical borehole logs acquired during this investigation are presented in Attachment B. All log depths are referenced to ground surface as indicated in the header of each log. The majority of the acquired data are presented as standard curves that represent the change in measured parameter with depth. The format of the heat pulse flowmeter and televiewer logs are discussed in the following paragraphs.

The Vertical Flow track in the Hydro Log provides a record of the rate of vertical fluid movement derived from the heat pulse flowmeter tool. The X-axis represents the magnitude of flow in gallons/min that was recorded at depths indicated by the posted value. It is calculated during acquisition by dividing the distance between the grid and thermistors by the travel time. Negative and positive values indicate downward and upward flow, respectively.

The televiewer logs contain borehole images and structural information obtained from the OTV tool. The *Optical View* track is an "unwrapped" photographic image of the borehole wall (Figure 1). In this case, the cylindrical borehole surface is unzipped along the north azimuth and unrolled to a flat strip. The compass orientation (with respect to true north) is presented at the top of the log. The unwrapped format is distorted like any projection of a curved surface on a flat one. Horizontal and vertical planes will be undistorted. However, dipping planes will be represented as a sine wave: the greater the dip, the greater the wave amplitude.

The Plane Projection track presents the fracture signatures that are digitized from the unwrapped *Optical View* track. The *Dip & Dip Direction* log is a presentation in which the vertical axis is depth and the horizontal is dip angle from 0° to 90°. As shown in Figure 2, the dip direction is indicated by the orientation of the tadpole tail, measured in a clockwise direction from north.

INTERPRETATION OF STRUCTURAL DIAGRAMS

The structural data are presented on polar and rose diagrams for statistical analysis and pattern visualization. Polar diagrams are used in this report to plot the dip and dip direction of planar features. Zero degree dip is represented at the center of the diagram and 90° at the circumference. The dip direction is indicated by the compass azimuth, measured clockwise from north (0°), as shown in Figure 3. This format is sometimes referred to as a dip vector plot but it is essentially the same as a stereonet with an upper hemisphere projection.

The rose diagram graphically illustrates the strike distribution of a set of planes. Radiating rays are drawn with lengths proportional to number of strike measurements within each 10° sector. It is important to recognize that in this report, the polar diagram represents dip and dip direction, whereas the rose diagram represents strike. Using the right-hand-rule convention, strike equals the dip direction minus 90°.

RESULTS AND DISCUSSION

SITE GEOLOGY

Osv: Sevier Shale (Ordovician): https://mrdata.usgs.gov/geology/state/state.php?state=TN

ORIENTATION ANALYSIS OF PLANAR FEATURES

An optical televiewer and acoustic image were used to measure the depth and orientations of bedding and fracture planes. The digitized planar features were corrected for borehole deviation and magnetic declination. The measured plane projections and orientations are shown in the plane projection log. A tabulated listing of the fracture and bedding orientations is presented in Attachment C. Stereographic analysis was performed on the planar orientation data acquired from the image log. A listing of the calculated mean orientations of all bedding and fracture planes are presented in Table 1. The results from the borehole is presented in the polar and rose diagrams, and charts shown in Figure 4 through 8. Predominant groups or "sets" are indicated by the clustering of data points in the polar diagrams.

Figure 4 present polar diagrams showing the dip and dip direction of all planes measured during this investigation. ARM has classified the planes by symbols corresponding to bedding and fracture plane sets.

ARM used statistical contouring to identify windows in which to calculate the mean orientation of all bedding and fracture planes. Figure 5 presents a polar diagram with statistical contouring of bedding plane orientations. The mean bedding dip/dip directions are shown to the right of the diagram. The rose diagram in Figure 7 shows a predominant NE/SW strike direction.

Figures 6 present polar diagrams with statistical contouring of all fracture plane orientations. The mean fracture plane dip/dip directions are shown to the right of the diagram. Similarity in the bedding set and fracture set 1 orientations suggest the latter may be bedding partings. The rose diagrams in Figures 8 show a predominant NE/SW strike direction.

The mean orientations for all bedding planes and fracture sets are shown in Table 1.

Table 1: Statistical mean of dip and dip direction of bedding and fracture planes.

Planes	Dip	Dip Direction	Strike/Dip
Bedding	41	142	N52E/41SE
Fracture Set 1	43	141	N51E/43SE
Fracture Set 2	68	306	N36E/68NW

INTERPRETATION OF WATER PRODUCING OR RECEIVING ZONES

Water producing or receiving zones are typically identified in the acquired logs by a combination of the following parameters:

A. Start or increase in upward or downward fluid flow identified by heat pulse flowmeter data suggests water-producing zone.
B. End or decrease in upward or downward fluid flow identified by heat pulse flowmeter data suggests water-receiving zone.
C. Open fractures observed in televiewer data.
D. Deflections in caliper curve (suggests fractures).
E. Deflections or change in slope in fluid temperature or fluid resistivity curve.

Table 2 presents the interpreted flow zones (under pumping conditions) based on the indicators above. The most convincing evidence of water producing or receiving zones are heat pulse flowmeter, fluid temperature, and fluid resistivity deflections since they can indicate flow in the borehole. Fractures observed in televiewer images or caliper curves can indicate water-bearing zones although the evidence is more indirect. A fracture may be observed in the borehole wall that may have been opened or enlarged during the drilling process but may be tight and contain little or no water a short distance into the formation. A combination of the above indicators provides the highest level of confidence for identifying water-bearing zones.

No flow was detected in the borehole under ambient conditions. Upward flow was detected in the borehole under pumping conditions. Flow direction and associated symbols in the Hydro Log represent heat pulse flowmeter under pumping conditions.

Table 2: Interpreted water producing or receiving zones and indicators under pumping conditions. Letters in Indicators column correspond to the selection parameters shown above.

Borehole	Depth (Feet)	Indicators	Type
AD-2-D	54-55	B, E	Receiving zone
AD-2-D	57-59	B, C, E	Receiving zone
AD-2-D	61-63	A, C, E	Producing zone
AD-2-D	73-74	B, C, D, E	Receiving zone
AD-2-D	75-77	A, C, D, E	Producing zone
AD-2-D	82-84	A, C	Producing zone
AD-2-D	86-88	A, C	Producing zone

CLOSING

The data collection and interpretation methodologies used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site.

Please contact us if you have any questions regarding this survey. We appreciate your business and look forward to working with you again.

Kind regards,
ARM Geophysics

Duro Rajkovic

Duro Rajkovic
Senior Geophysicist

FIGURES

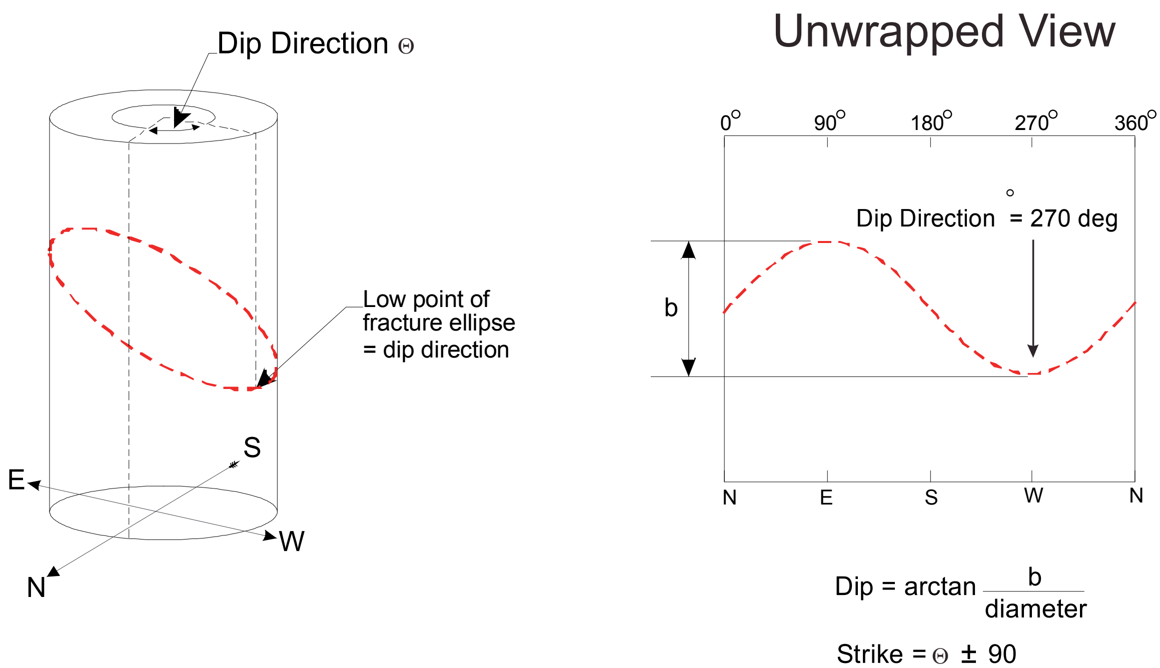


Figure 1: Diagram illustrating unwrapped view of fracture signature.

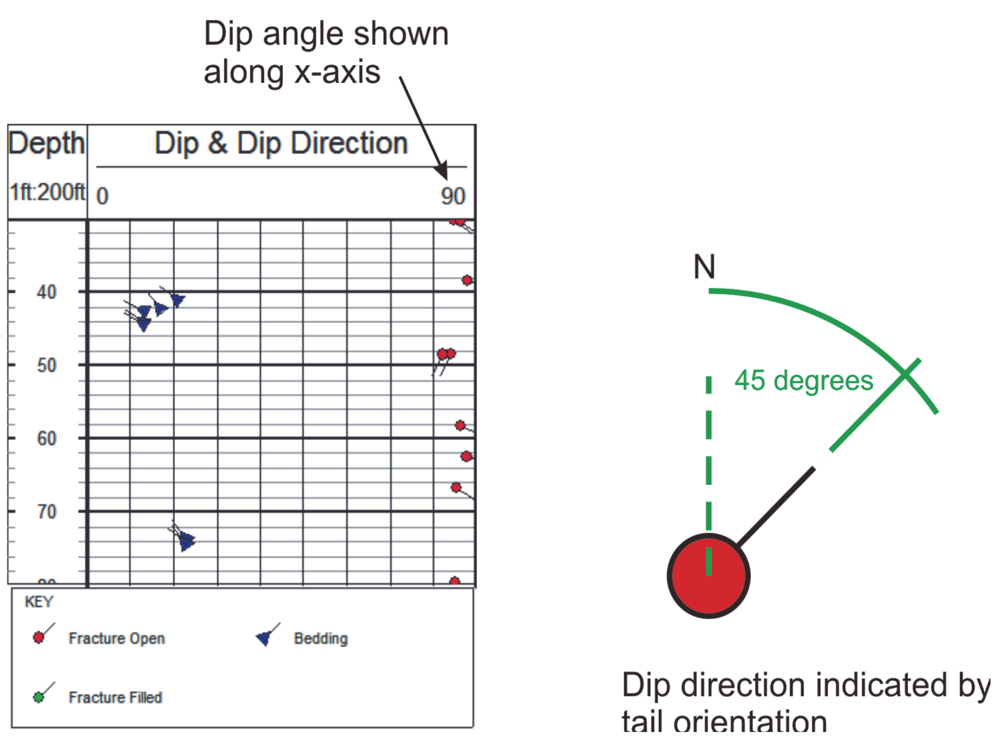
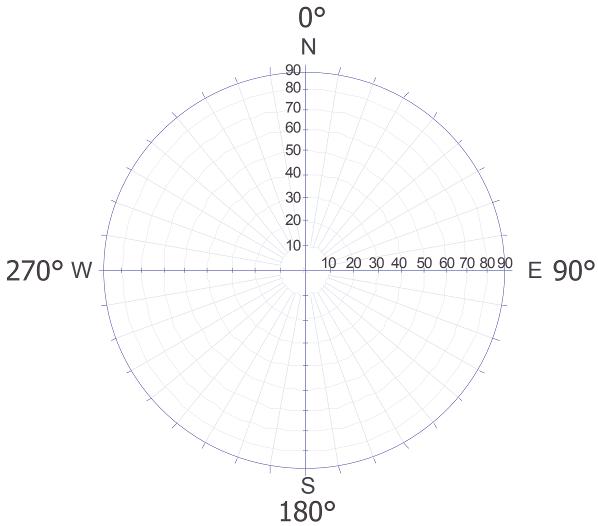
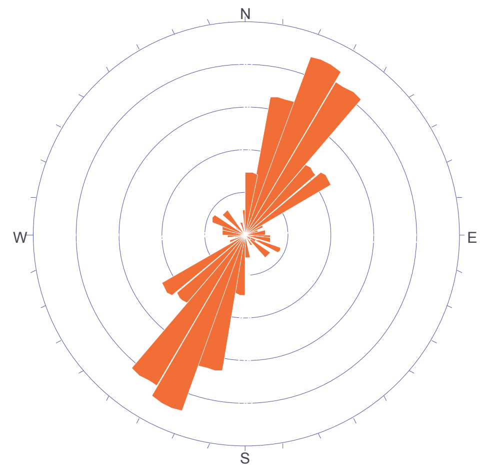


Figure 2: Dip & dip direction determination from the tadpole plot.



Polar Diagram



Rose Diagram

Figure 3: Example polar and rose diagrams. Polar diagram is used in this report for plotting dip and dip direction. Rose diagrams are used for plotting the frequency or number of strike measurements per sector.

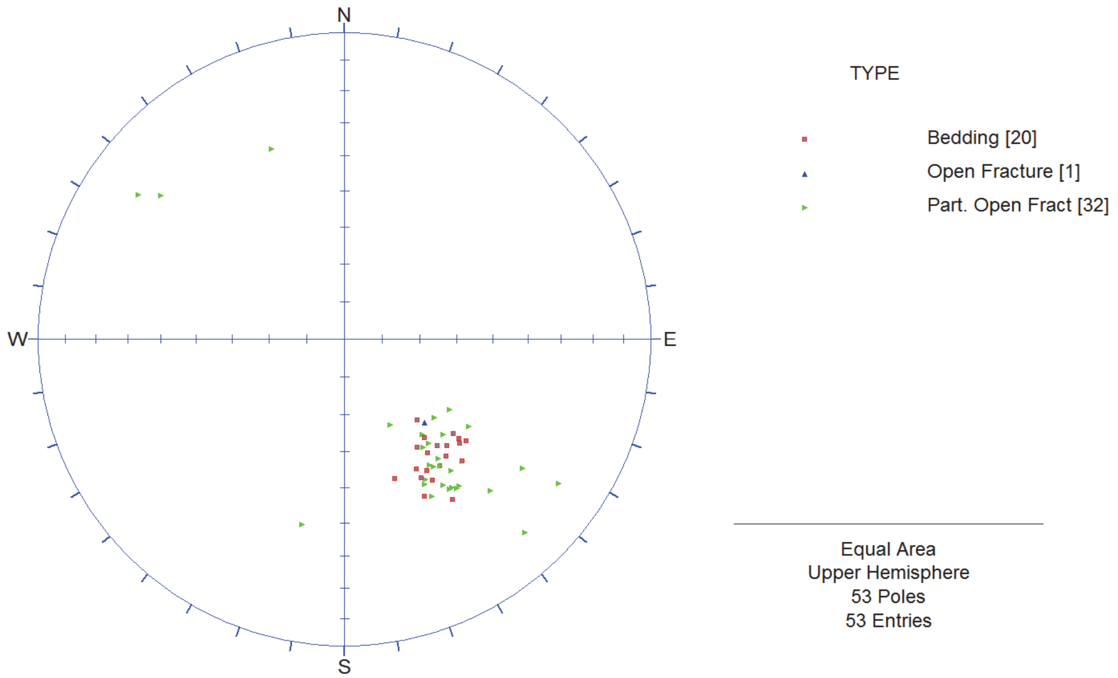


Figure 4: A polar diagram plotting dip and dip direction of all planes categorized by plane type.

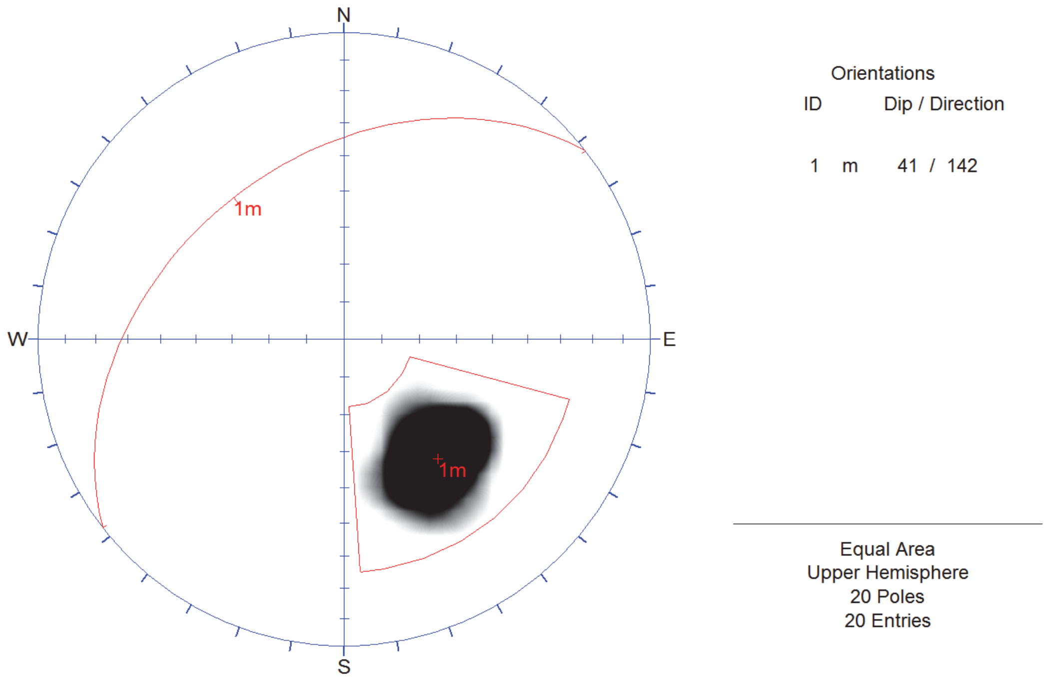


Figure 5: A polar diagram with statistical contouring of all bedding planes. The calculated mean dip angle and direction is shown at the right of the diagram.

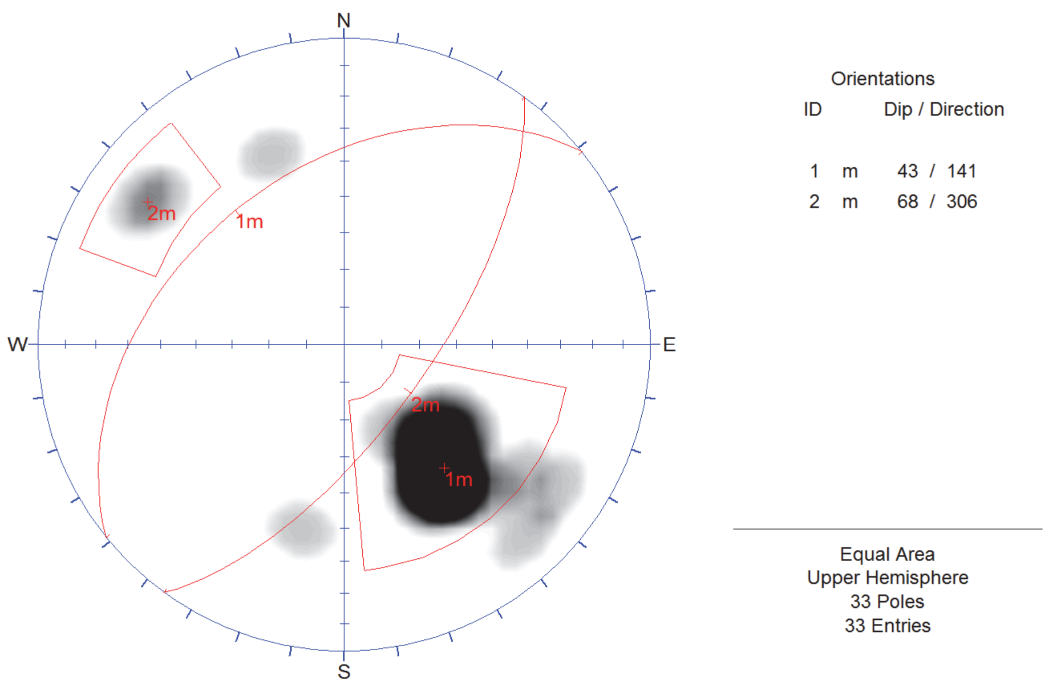


Figure 6: A polar diagram with statistical contouring of all fracture planes. The calculated mean dip angle and direction is shown at the right of the diagram.

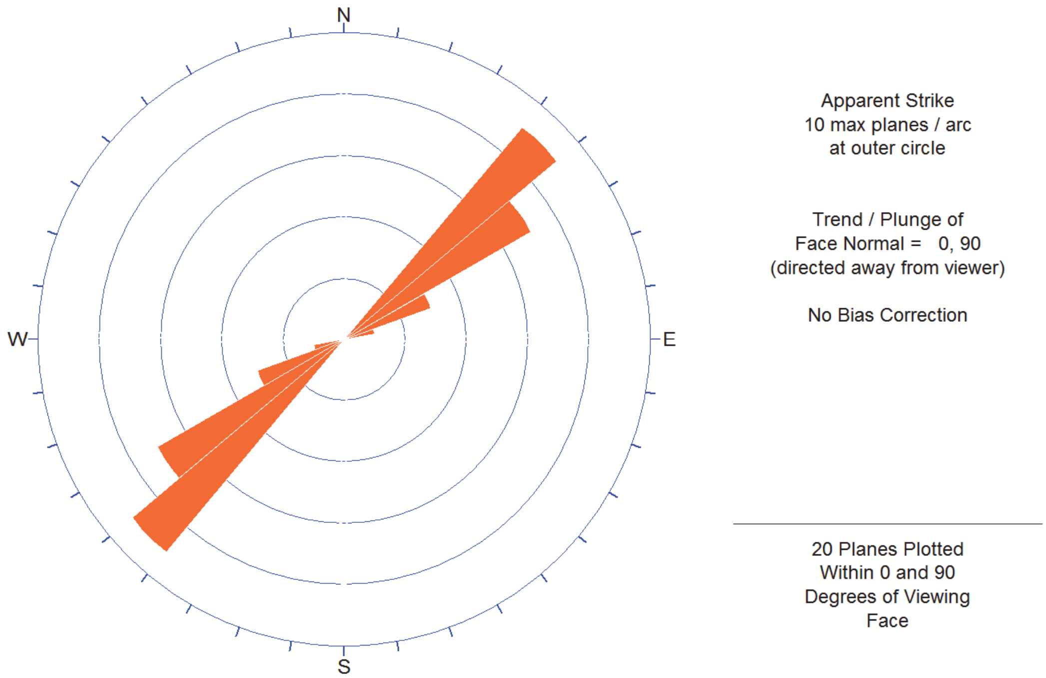


Figure 7: A rose diagram illustrating strike distribution of all bedding planes.

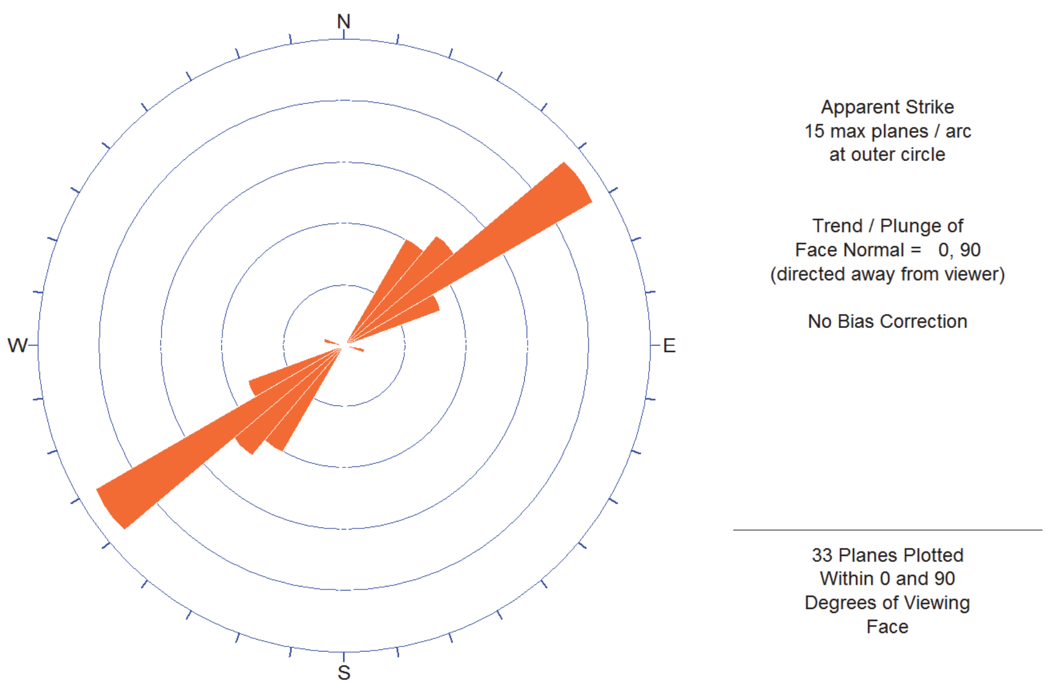


Figure 8: A rose diagram illustrating strike distribution of all fractures.

ATTACHMENT A
LOGGING METHODS

1129 West Governor Road, PO Box 797
Hershey, PA 17033-0797
Voice: (717) 533 - 8600
Fax: (717) 533 - 8605

APPENDIX A: OVERVIEW OF LOGGING METHODS

CALIPER LOGS

The caliper log measures variations in borehole size as a function of depth in a well. Some example responses of in a caliper log is shown in Figure A- 1 (Rider, 2002[1.]) The log data enables (a) the detection of competent or fractured geologic units, (b) the location of washouts or tight zones, (c) the optimal placement of well screen, sand, and bentonite, and (d) the establishment of appropriate borehole correction factors to be applied to other well log curves. Further, when run in combination with other logs, the caliper log may be an indicator of lithologic makeup and degree of consolidation. The typical caliper response in a fractured, weathered, or karstic unit is a relatively abrupt increase in borehole size.

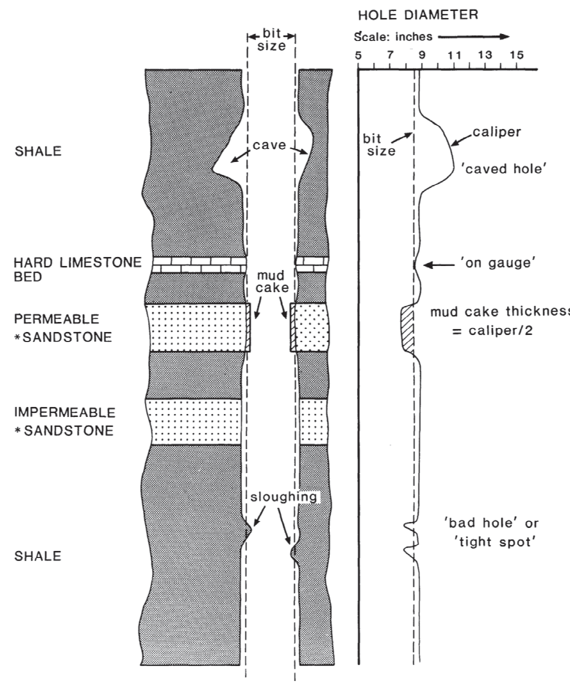


Figure A- 1: The caliper log showing some typical responses. (From Rider, 2002).

SPONTANEOUS POTENTIAL (SP) LOGS

The SP log measures the natural voltages that are created within the borehole due to the presence of borehole fluids, formation fluids, and formation matrix materials. It is recorded by measuring the difference in electrical potential in millivolts between an electrode in the borehole and a grounded electrode at the surface. The SP log is commonly used to 1) detect permeable beds, 2) detect boundaries of permeable beds, 3) determine formation water resistivity, and 4) determine the volume of shale in permeable beds. The constant SP readings observed in thicker shale units define the shale base line, a reference line from which further formation matrix and formation fluid property calculations may be completed. Although this log is consistently used in oil and gas applications, its effectiveness in water wells is limited since the method requires a contrast in salinity between borehole and formation fluids (Figure A- 2). This condition is often not met in ground water wells.

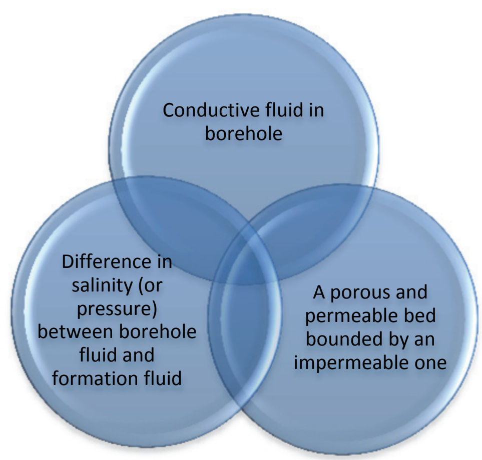


Figure A- 2: Conditions required to produce an SP response.

1 Rider, M. (2006) The Geological Interpretation of Well Logs, *Rider-French Consulting, Ltd.*, 280pp.

The SP log can be qualitatively used for permeability recognition. SP deflections from the shale base line commonly indicate the presence of a permeable bed. The magnitude and direction of the deflection is dependent upon the relative resistivity (or salinity) values of the borehole fluid and the formation fluid. If the formation fluid resistivity is less than the borehole fluid resistivity, then the relative SP values will decrease in a porous, coarse-grained unit. Alternately, if the formation fluid resistivity is greater than the borehole fluid resistivity, the relative SP values will increase in the same body, and the curve shape is referred to as a "reversed SP". If both fluid resistivities are equal, no SP deflection will occur.

GAMMA RAY LOGS

The gamma ray log is a passive instrument that measures the amount of naturally occurring radioactivity from geologic units within the borehole. Commonly occurring radioelements include potassium, thorium, and uranium; the two former elements are predominant within a common fine-grained rock sequence. The gamma ray log is also an excellent lithologic indicator because fine-grained clays and shales contain a higher radioelement concentration than limestones or sands. Gamma ray values are often used to assess the percentage of clay materials (indurated or non-indurated) that are present within a formation by utilizing empirically derived equations and sand-shale base line information.

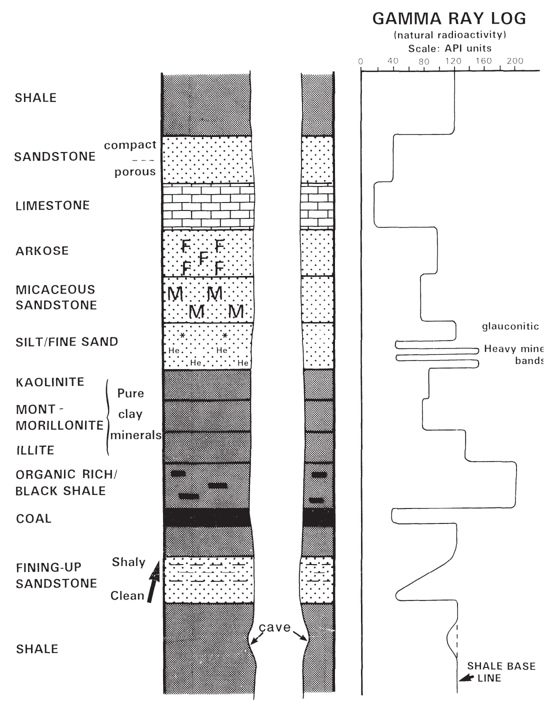


Figure A- 3: Characteristic gamma ray responses. (From Rider, 2002).

NORMAL RESISTIVITY LOGS

Resistivity is a measure of how well an electric current passes through a material. Formation resistivity is an intrinsic property of rocks and depends on the porosity and resistivity of the interstitial fluid and rock matrix. The spacing between the transmitter and receiver on the tool determines the depth of investigation into the surrounding formation; the greater the spacing, the deeper the penetration of electrical current into the formation.

In sedimentary rocks, the resistivity values of shales (5 - 30 ohm-m) is generally lower than the resistivity of sandstone (30 – 100 ohm-m), which is lower than the resistivity limestone (75 – 300 ohm-m). The resistivity log often shows a picture of the overall depositional sequence in sedimentary environment. Resistivity of igneous and metamorphic rocks is extremely high when compared to resistivity in sedimentary rocks, with values that are commonly thousands of ohm-meters. Example resistivity log responses are shown in Figure A- 4.

FLUID RESISTIVITY LOGS

Fluid resistivity, which is the reciprocal of fluid conductivity, provides data related to the concentration of dissolved solids in the fluid column. Although the quality of the fluid column may not reflect the quality of adjacent interstitial fluids, information can be quite useful when combined with other logs. For example, change in fluid resistivity associated with a water-producing zone that is corroborated by other logs may indicate the inflow of ground water.

SINGLE-POINT RESISTANCE LOGS

Single point resistance measurements are made by passing a constant current between two electrodes and recording the voltage fluctuations as the probe is moved up the borehole. The resistance variations measured in the borehole is primarily due to variations in the immediate vicinity of the downhole electrode.

The resistance log is strongly affected by the resistance of the drilling fluid and variations in borehole diameter. It is extremely useful for detecting fractures in boreholes with relatively constant diameter. In sedimentary environments, the resistance log generally follows the variations in resistivity of the formation. Shales in clay generally exhibit low values, sandstones have intermediate values, while coal and limestone beds have high resistance values.

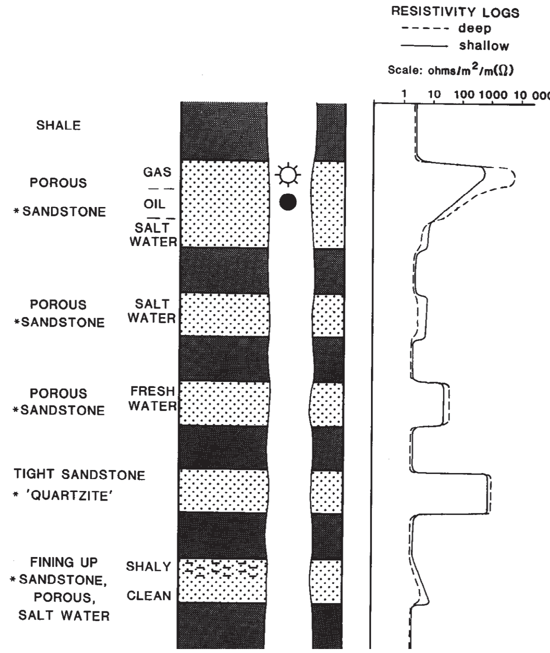


Figure A- 4: Characteristic resistivity responses. (From Rider, 2002)

TEMPERATURE LOGS

Temperature logs measure the change in fluid temperature within the borehole as a function of depth. This log can indicate the location of water- producing strata or fracture zones within the well. The inherent assumption of this technique is that the fluids entering the borehole from water producing zones are either cooler or warmer than the fluid in the borehole. In this case, it is possible to relate a temperature anomaly to a depth range in which waters of different temperature are emanating from a water-producing/receiving or fractured lithologic unit.

HEAT PULSE FLOWMETER (HPFM) LOGS

The heat pulse flowmeter measures the vertical flow rates within a borehole. The log may be used to identify contributing fracture zones under natural and pumping conditions. The system operates by heating a wire grid that is located between two thermistors. The heated body of water moves toward one of the thermistors under the effect of the vertical component of flow within the well. Positive and negative values on the log represent upward and downward flow, respectively. Measurements are recorded while the tool is stationary and the logs are presented as a bar graph (mud log) as shown in Figure A- 5.

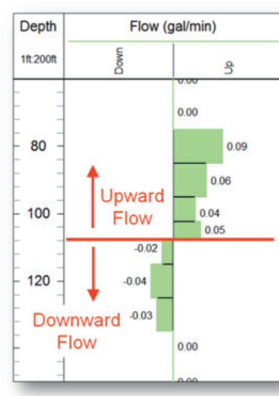


Figure A- 5: Example heat pulse flowmeter log.

A number of techniques have been attempted for measuring horizontal flow in wells without much success. The techniques may not represent the true hydrogeologic conditions due to variations in flow caused by the well.

OPTICAL TELEVIEWER (OTV) LOGS

The optical televiewer probe combines the axial view of a downward looking digital imaging system with a precision ground hyperbolic mirror to obtain an undistorted 360° view of the borehole wall. The probe records one 360° line of pixels at 0.003-ft depth intervals. The sample circle can be divided into 720 or 360 radial samples to give 0.5° or 1° radial resolution. For this investigation, the highest radial resolution (0.5°) was used. The line of pixels is aligned with respect to True North and digitally stacked to construct a complete, undistorted, and oriented image of the borehole walls. The data are 24 -bit true color and may be used for lithologic determination as part of the interpretation. Since the acquired image is digitized and properly oriented with respect to borehole deviation and tool rotation, it allows data processing to provide accurate strike and dip information of structural features. The borehole image is often shown as an “unwrapped” 360° image in which the cylindrical borehole image is sliced down the northern axis and flattened out as shown in Figure A- 6.

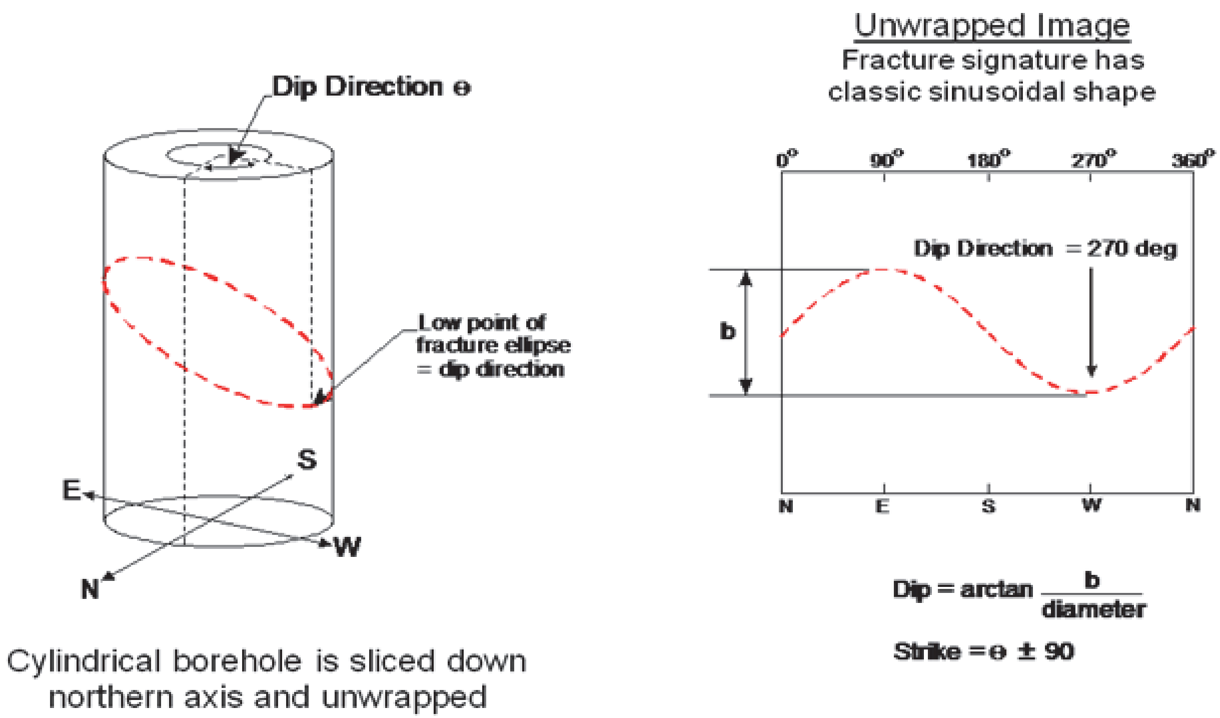


Figure A- 6: Schematic showing the sinusoidal fracture signature in the unwrapped borehole view.

ACOUSTIC TELEVIEWER (ATV) LOGS

Acoustic televiewer provides a 360° acoustic image of the borehole walls that can be used to identify and determine the orientation of planar features such as bedding and fractures. The data can also indicate the relative degree of hardness of formation materials. As shown in Figure A-7, Ultrasonic pulses are transmitted from a rotating transducer inside the tool. The transmitted pulses reflect off the borehole wall and return to the tool where the travel time and amplitude of the acoustic signal are measured. In order for the acoustic waves to travel to and from the borehole wall, the well must be fluid filled. Greater travel time can indicate openings in the rock. Strong amplitude suggests smooth, competent rock. Weaker amplitudes suggest rough or less competent rock.

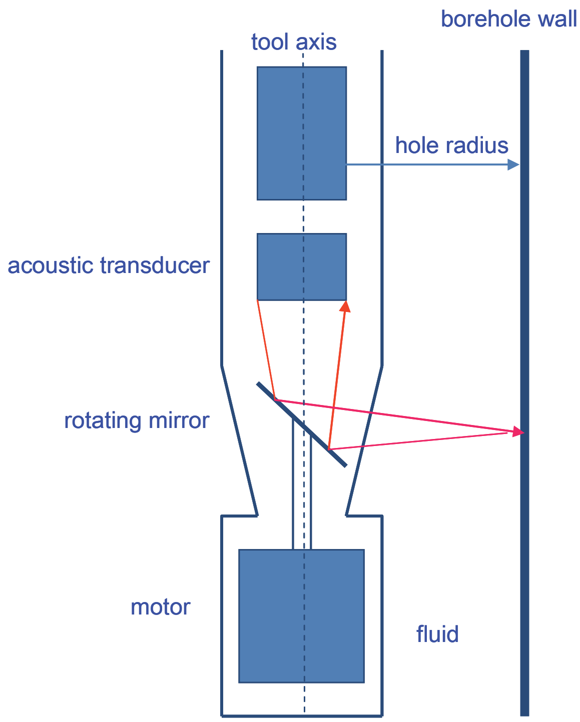


Figure A- 7: Schematic of the acoustic televiewer tool.

ATTACHMENT B
BOREHOLE LOGS

AD-2-D

Optical Televiewer
Acoustic Televiewer

ARM GEOPHYSICS
Surface & Borehole Services

COMP	Stantec
WELL	AD-2-D
SITE	TVA Kingston Fossil Pl.
CITY	Harriman
CNTY	Roane
STATE	TN
ARM	180668

COMPANY: Stantec
WELL ID: AD-2-D
SITE: TVA Kingston Fossil Pl.
CITY: Harriman
COUNTY: Roane
STATE: TN
ARM NO.: 180668
WEATHER:

LOCATION:
LATITUDE:
LONGITUDE:
NORTHING:
EASTING:

ACQUISITION SETUP
Ford F-250 Mount

PERMANENT DATUM: Ground Surface
ELEVATION:
LOG MEASURED FROM: Ground Surface
ABOVE PERM. DATUM: 0.00
DRILLING MEAS. FROM:
STICK UP: 2.30
BIT SIZE:
ROD SIZE:

LOGGING DATE	11.07.2018	11.07.2018			
RUN NO	2	4			
TYPE LOG	OTV	ATV			
DRILLER DEPTH (FT)	100.7	100.7			
ARM DEPTH (FT)	100.6	100.6			
BTM LOGGED INTERVAL (FT)	101.5	100.6			
TOP LOGGED INTERVAL (FT)	3.1	45.0			
CASING SIZE (IN)	4.0	4.0			
CASING DEPTH (FT)	52.8	52.8			
ARM CASING DEPTH (FT)	53.2	53.2			
FLUID LEVEL IN HOLE (FT)	4.4	4.4			
MAG. DECLINATION (DEG)	5.42 W	5.42 W			
RECORDED BY	R. Gecelosky	R. Gecelosky			
WITNESSED BY					

REMARKS:

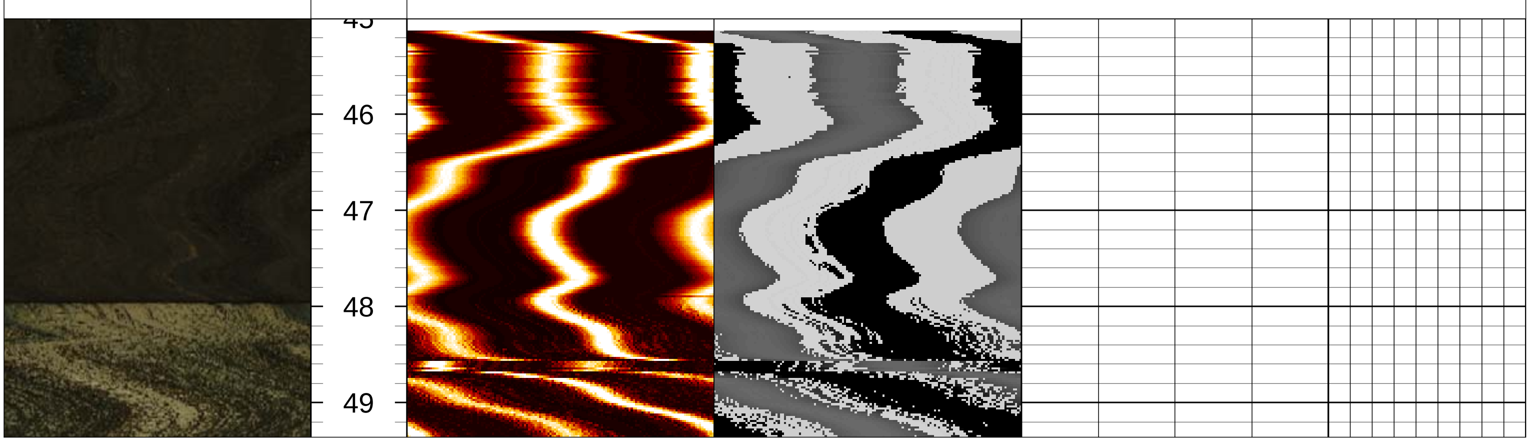
Symbols

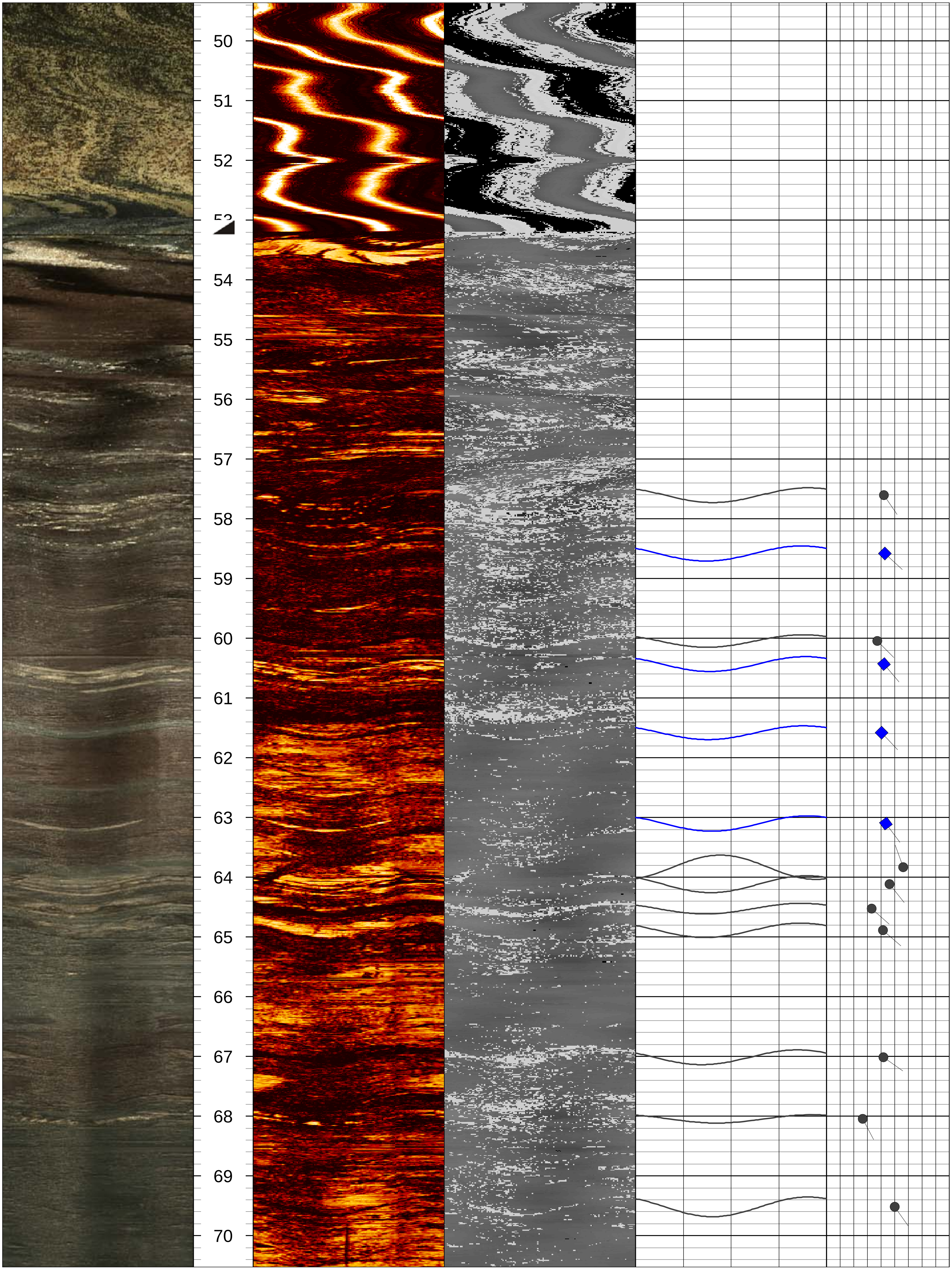
Bottom of Casing

Structure

Open Fracture
Bedding
Part. Open Fract

Optical Image	Depth	Acoustic Amplitude	Acoustic Travel Time	Plane Projection	Dip & Dip Direction
0° 90° 180° 270° 0°	1in:2ft	0° 90° 180° 270° 0°	0° 90° 180° 270° 0°	0° 90° 180° 270° 0°	0 90
	Symbols				

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67
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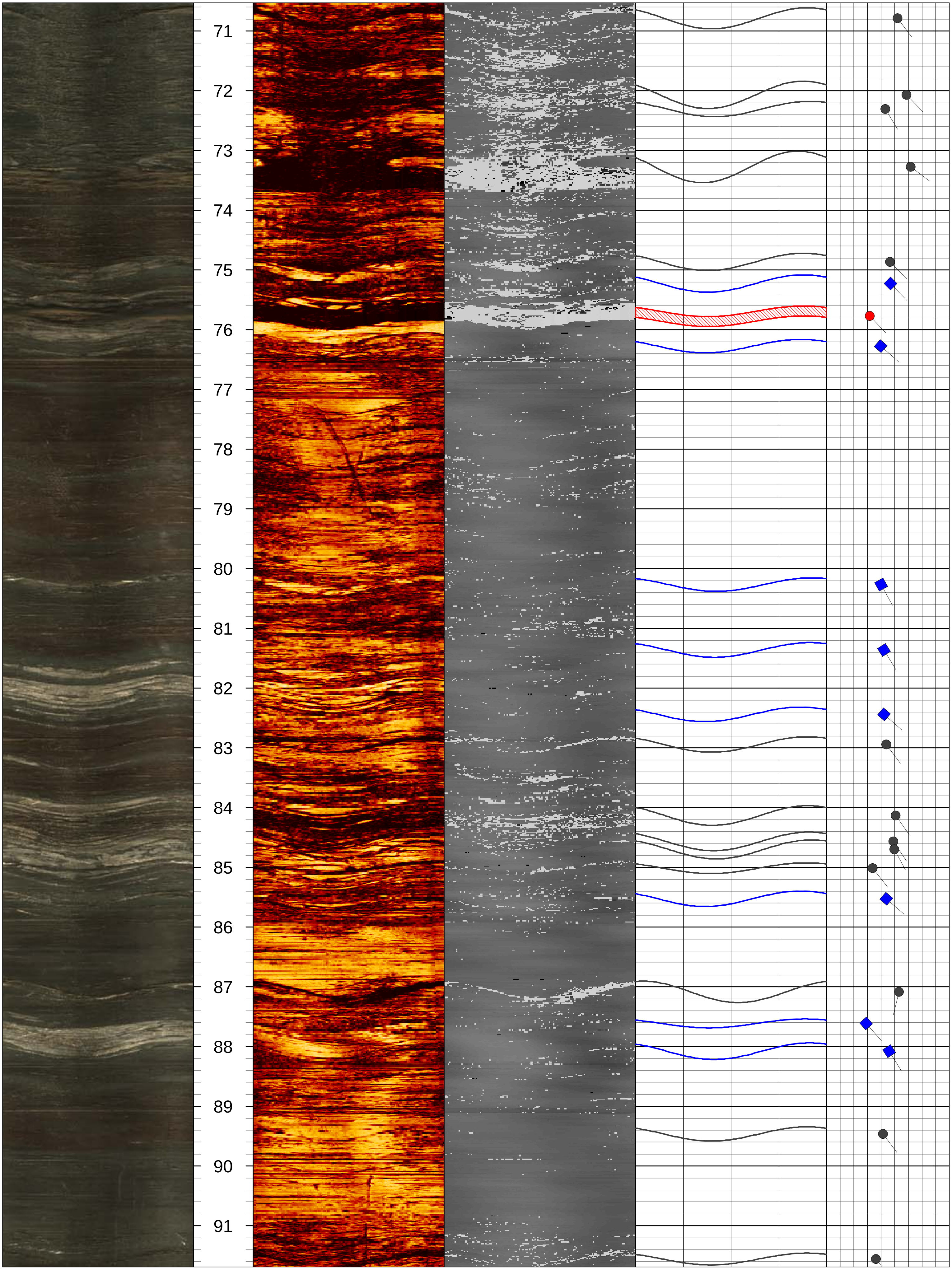
69
70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89
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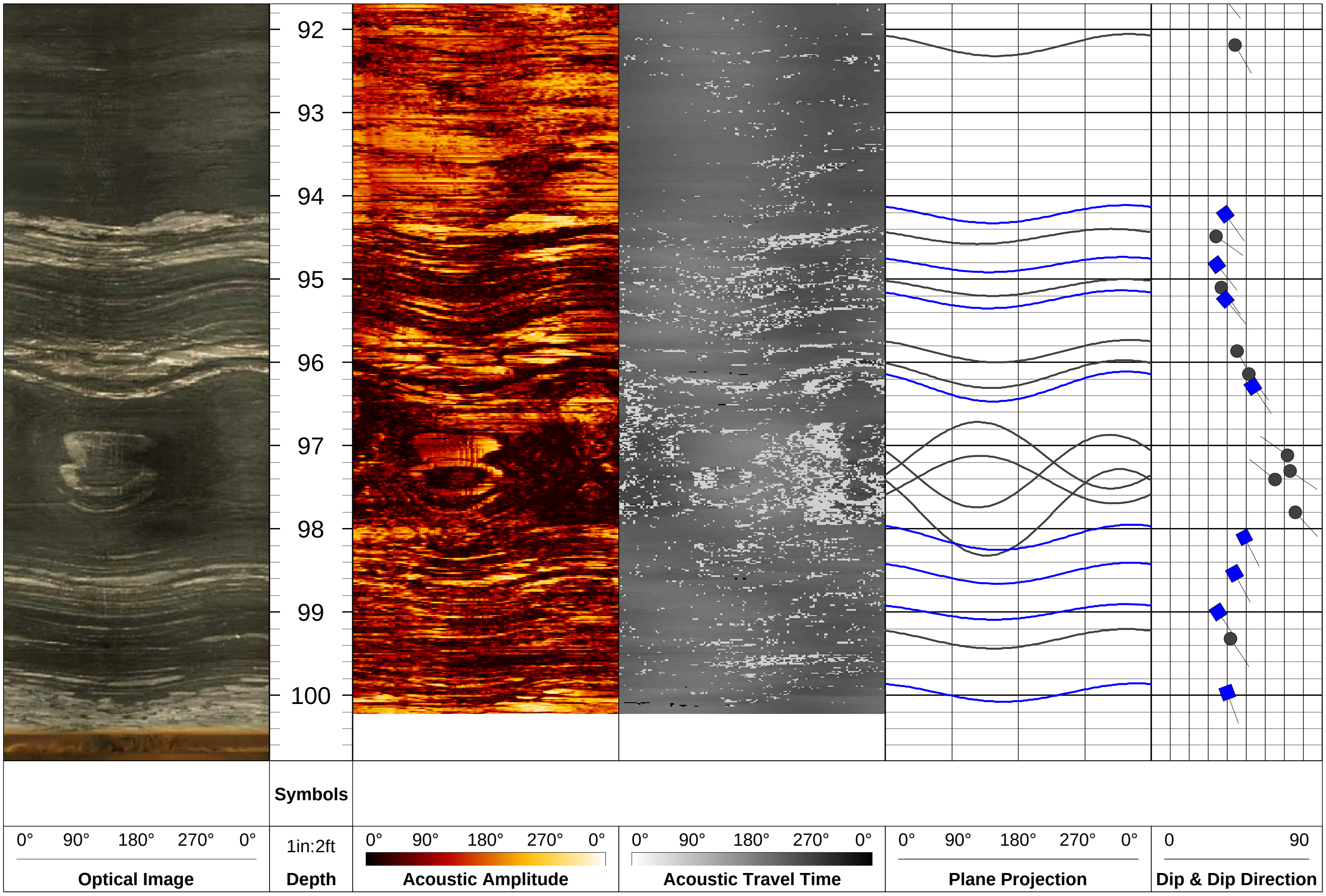
91



92
93
94
95
96
97
98
99
100
Symbols
0° 90° 180° 270° 0°
Optical Image
1in:2ft
Depth
0° 90° 180° 270° 0°
Acoustic Amplitude
0° 90° 180° 270° 0°
Acoustic Travel Time
0° 90° 180° 270° 0°
Plane Projection
0 90
Dip & Dip Direction

Natural Gamma
Fluid Temperature
Fluid Conductivity
3-Arm Caliper
Heat Pulse Flow Meter

ARM GEOPHYSICS
Surface & Borehole Services

COMP	**Stantec**
WELL	**AD-2-D**
SITE	**TVA Kingston Fossil Pl.**
CITY	**Harriman**
CNTY	**Roane**
STATE	**TN**
ARM	**180668**

COMPANY: Stantec COUNTY: Roane
WELL ID: AD-2-D STATE: TN
SITE: TVA Kingston Fossil Pl. ARM NO.: 180668
CITY: Harriman WEATHER:

LOCATION:
LATITUDE:
LONGITUDE:
NORTHING:
EASTING:

ACQUSITION SETUP
Ford F-250 Mount

PERMANENT DATUM: Ground Surface ELEVATION: BIT SIZE:
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: 0.00
DRILLING MEAS. FROM: STICK UP: 2.3 ROD SIZE:

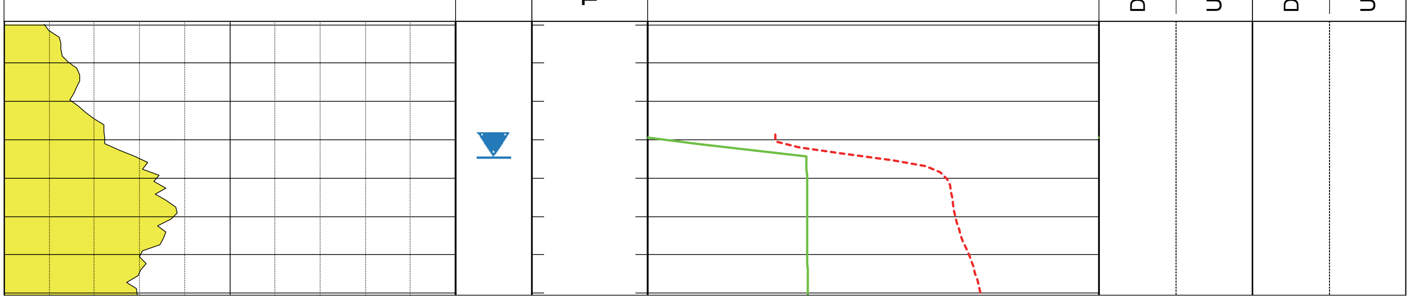
LOGGING DATE	11.07.2018	11.07.2018	11.07.2018	11.07.2018	
RUN NO	1	3	5	6	
TYPE LOG	FTC	CAL	A. HPFM	P. HPFM	
DRILLER DEPTH (FT)	100.7	100.7	100.7	100.7	
ARM DEPTH (FT)	100.9	100.6	N/A	N/A	
BTM LOGGED INTERVAL (FT)	101.3	100.0	94.8	98.4	
TOP LOGGED INTERVAL (FT)	6.1	40.0	50.1	50.1	
CASING SIZE (IN)	4.0	4.0	4.0	4.0	
CASING DEPTH (FT)	52.8	52.8	52.8	52.8	
ARM CASING DEPTH (FT)	53.2	53.2	53.2	53.2	
FLUID LEVEL IN HOLE (FT)	4.4	4.4	4.4	4.4	
MAG. DECLINATION (DEG)	5.42 W	5.42 W	5.42 W	5.42 W	
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	
WITNESSED BY					

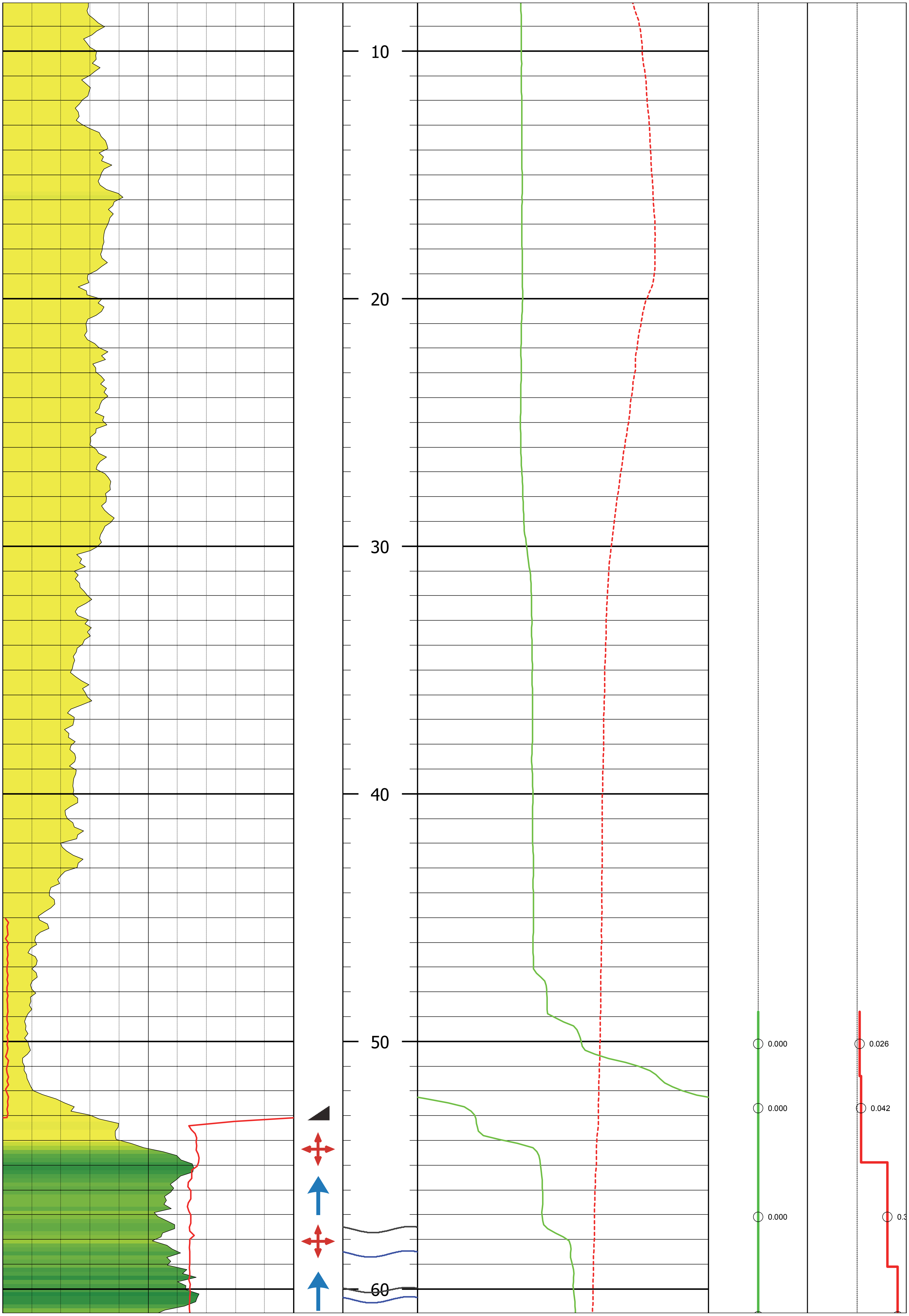
REMARKS:

Symbols

Bottom of Casing Receiving Zone Up Flow
Fluid Level Producing Zone

Natural Gamma: 0 – CPS – 200 / 3-Arm Caliper: 2 – in – 4	Symbols	Depth 1in:5ft / Televiewer Features	Temperature: 15 – 'C – 25 / Fluid Conductivity: 400 – uS/cm – 800	-Ambient Gal/Min (Down, Up)	-Pumping Gal/min (Down, Up)

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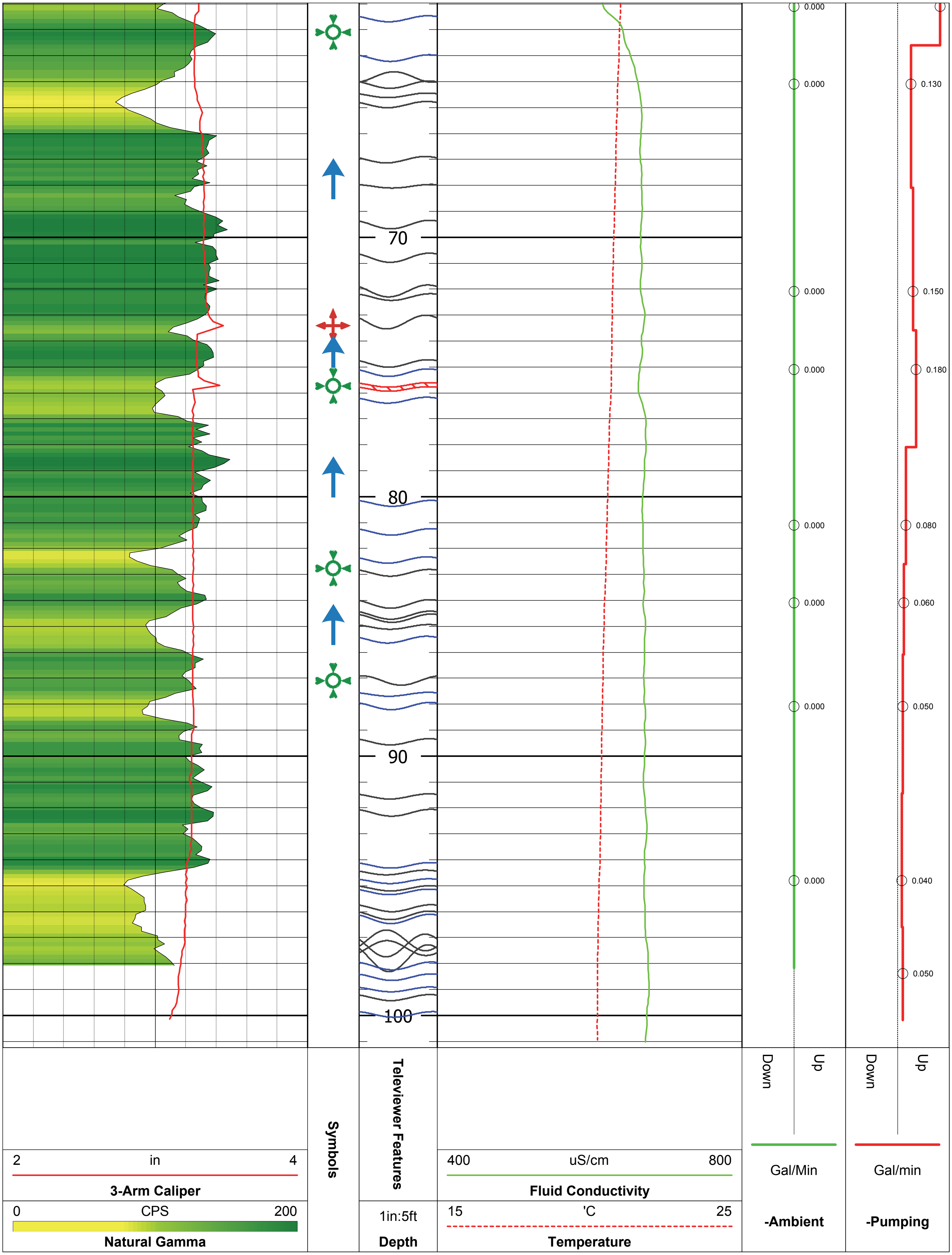
20
30
40
50
60
0.000
0.026
0.000
0.042
0.000


70
80
90
100
0.000
0.000
0.000
0.000
0.000
0.000
0.000
0.000
0.130
0.150
0.180
0.080
0.060
0.050
0.040
0.050
Down
Up
Down
Up
2
in
4
3-Arm Caliper
0
CPS
200
Natural Gamma
Symbols
Televiewer Features
1in:5ft
Depth
400
uS/cm
800
Fluid Conductivity
15
'C
25
Temperature
Gal/Min
-Ambient
Gal/min
-Pumping

ATTACHMENT C
TABULATED LISTING OF PLANE ORIENTATIONS

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
AD-2-D	57.6	145.57	42.15	0	Part. Open Fract	N56E/42SE
AD-2-D	58.58	132.97	42.8	0	Bedding	N43E/43SE
AD-2-D	60.05	134.89	37.15	0	Part. Open Fract	N45E/37SE
AD-2-D	60.43	139.83	42.19	0	Bedding	N50E/42SE
AD-2-D	61.58	136.54	40.37	0	Bedding	N47E/40SE
AD-2-D	63.1	143.56	43.38	0	Bedding	N54E/43SE
AD-2-D	63.83	339.93	56.22	0	Part. Open Fract	N70E/56NW
AD-2-D	64.12	141.65	46.05	0	Part. Open Fract	N52E/46SE
AD-2-D	64.53	131.76	32.96	0	Part. Open Fract	N42E/33SE
AD-2-D	64.89	131.2	41.22	0	Part. Open Fract	N41E/41SE
AD-2-D	67.01	125	41.73	0	Part. Open Fract	N35E/42SE
AD-2-D	68.04	152.61	26.67	0	Part. Open Fract	N63E/27SE
AD-2-D	69.52	145.09	50.01	0	Part. Open Fract	N55E/50SE
AD-2-D	70.79	143.21	51.91	0	Part. Open Fract	N53E/52SE
AD-2-D	72.07	136.03	58.73	0	Part. Open Fract	N46E/59SE
AD-2-D	72.31	148.69	42.98	0	Part. Open Fract	N59E/43SE
AD-2-D	73.28	126.26	61.88	0	Part. Open Fract	N36E/62SE
AD-2-D	74.87	136.17	46.61	0	Part. Open Fract	N46E/47SE
AD-2-D	75.23	136.27	46.74	0	Bedding	N46E/47SE
AD-2-D	75.77	136.53	31.8	41.03	Open Fracture	N47E/32SE
AD-2-D	76.28	131.16	39.74	0	Bedding	N41E/40SE
AD-2-D	80.27	151.96	40.05	0	Bedding	N62E/40SE
AD-2-D	81.36	148.49	42.23	0	Bedding	N58E/42SE
AD-2-D	82.44	131.03	41.98	0	Bedding	N41E/42SE
AD-2-D	82.95	143.11	43.82	0	Part. Open Fract	N53E/44SE
AD-2-D	84.14	144.87	50.54	0	Part. Open Fract	N55E/51SE
AD-2-D	84.57	146.62	48.87	0	Part. Open Fract	N57E/49SE
AD-2-D	84.7	151.77	49.68	0	Part. Open Fract	N62E/50SE
AD-2-D	85.02	141.59	33.73	0	Part. Open Fract	N52E/34SE
AD-2-D	85.53	130.95	43.83	0	Bedding	N41E/44SE
AD-2-D	87.09	193.64	52.94	0	Part. Open Fract	N76W/53SW
AD-2-D	87.62	138.45	29.02	0	Bedding	N48E/29SE
AD-2-D	88.08	148.14	45.75	0	Bedding	N58E/46SE
AD-2-D	89.46	142.93	41.5	0	Part. Open Fract	N53E/42SE
AD-2-D	91.56	141.5	36.21	0	Part. Open Fract	N52E/36SE
AD-2-D	92.19	150.02	44.29	0	Part. Open Fract	N60E/44SE
AD-2-D	94.22	144.78	38.91	0	Bedding	N55E/39SE
AD-2-D	94.49	124.98	34.18	0	Part. Open Fract	N35E/34SE
AD-2-D	94.83	141.28	34.41	0	Bedding	N51E/34SE
AD-2-D	95.1	144.69	36.73	0	Part. Open Fract	N55E/37SE
AD-2-D	95.24	139.53	38.87	0	Bedding	N50E/39SE
AD-2-D	95.87	151.33	45.06	0	Part. Open Fract	N61E/45SE
AD-2-D	96.14	142.73	51.24	0	Part. Open Fract	N53E/51SE
AD-2-D	96.29	146.09	53.36	0	Bedding	N56E/53SE
AD-2-D	97.12	305.67	71.55	0	Part. Open Fract	N36E/72NW
AD-2-D	97.3	124.17	73.04	0	Part. Open Fract	N34E/73SE
AD-2-D	97.41	308.26	65.15	0	Part. Open Fract	N38E/65NW
AD-2-D	97.8	137.41	75.73	0	Part. Open Fract	N47E/76SE
AD-2-D	98.1	153.24	48.97	0	Bedding	N63E/49SE
AD-2-D	98.54	151.74	43.64	0	Bedding	N62E/44SE
AD-2-D	99	146.24	35.09	0	Bedding	N56E/35SE
AD-2-D	99.32	146.27	41.61	0	Part. Open Fract	N56E/42SE
AD-2-D	99.97	160	40.05	0	Bedding	N70E/40SE

ATTACHMENT H.1-C
PIPER DIAGRAMS

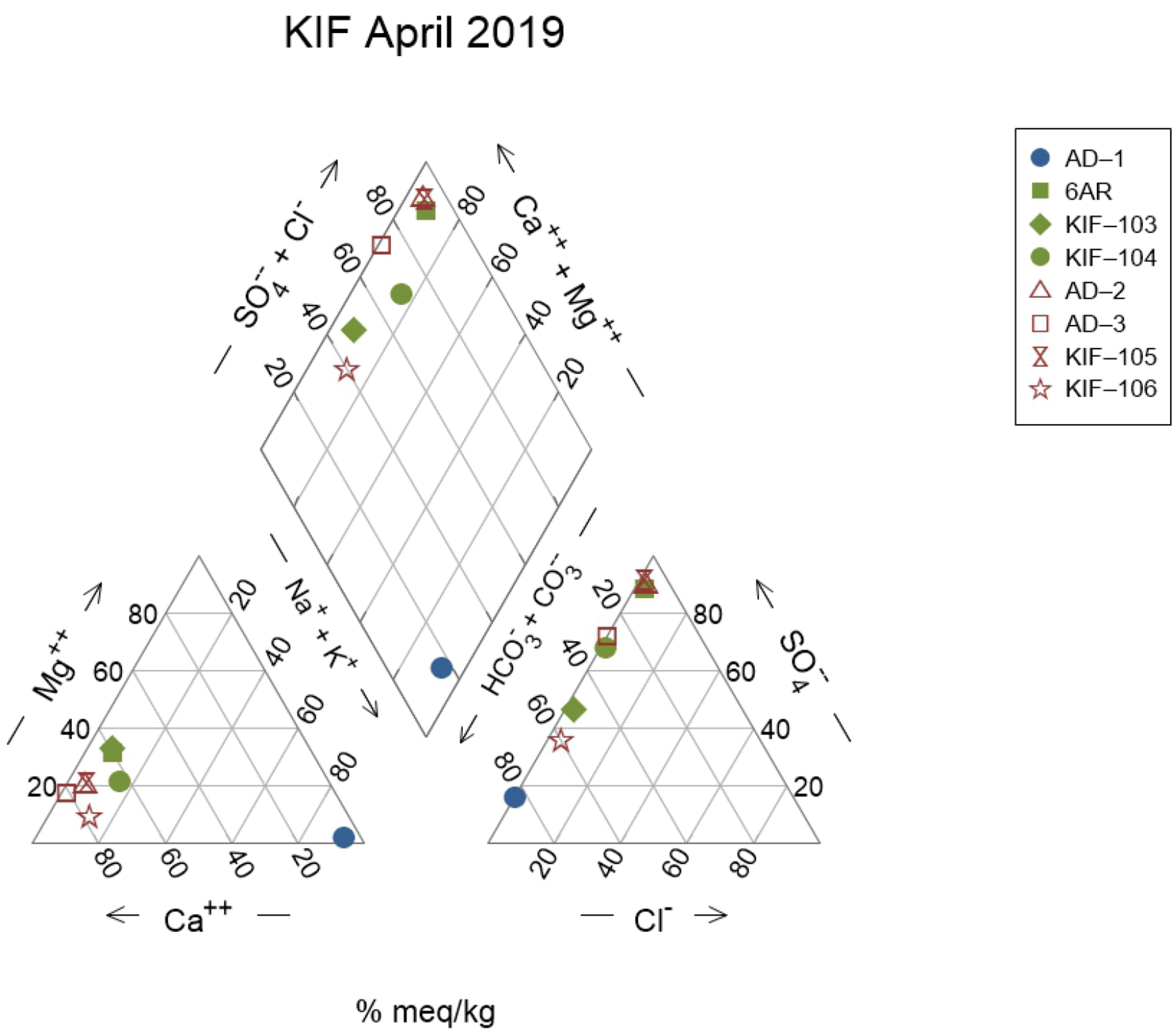


Figure No.

Title
Piper Diagram - April 2019

Client/Project 175668043
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Harriman, Tennessee

Prepared by DMB on 2021-10-14
TR by SZ on 2021-10-14
IR Review by TR on 2021-10-14

Legend

Notes
1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^{-} - Chloride
4. CO_3^{--} - Carbonate
5. HCO_3^{-} - Bicarbonate
6. K^{+} - Potassium
7. Mg^{++} - Magnesium
8. Na^{+} - Sodium
9. SO_4^{--} - Sulfate

Stantec TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1.1-10_Feb2020_PiperDiagram.mxd Revised: 2022-01-13 By: mbough

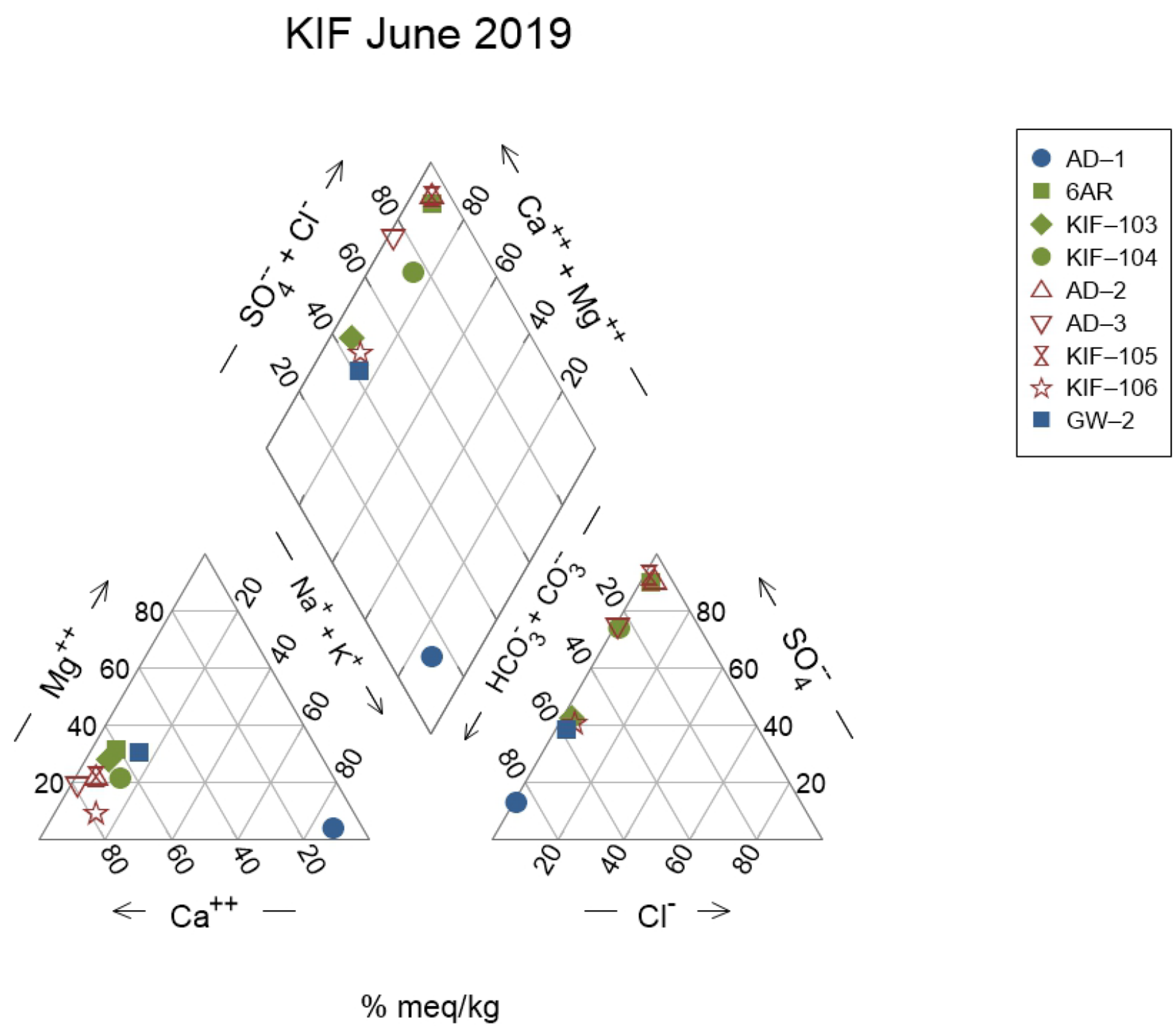


Figure No.

Title

Piper Diagram - June 2019

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Harriman, Tennessee

Prepared by DMB on 2021-10-14
TR by SZ on 2021-10-14
IR Review by TR on 2021-10-14

Legend

Notes

1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^- - Chloride
4. CO_3^{--} - Carbonate
5. HCO_3^- - Bicarbonate
6. K^+ - Potassium
7. Mg^{++} - Magnesium
8. Na^+ - Sodium
9. SO_4^{--} - Sulfate

Stantec

TVA

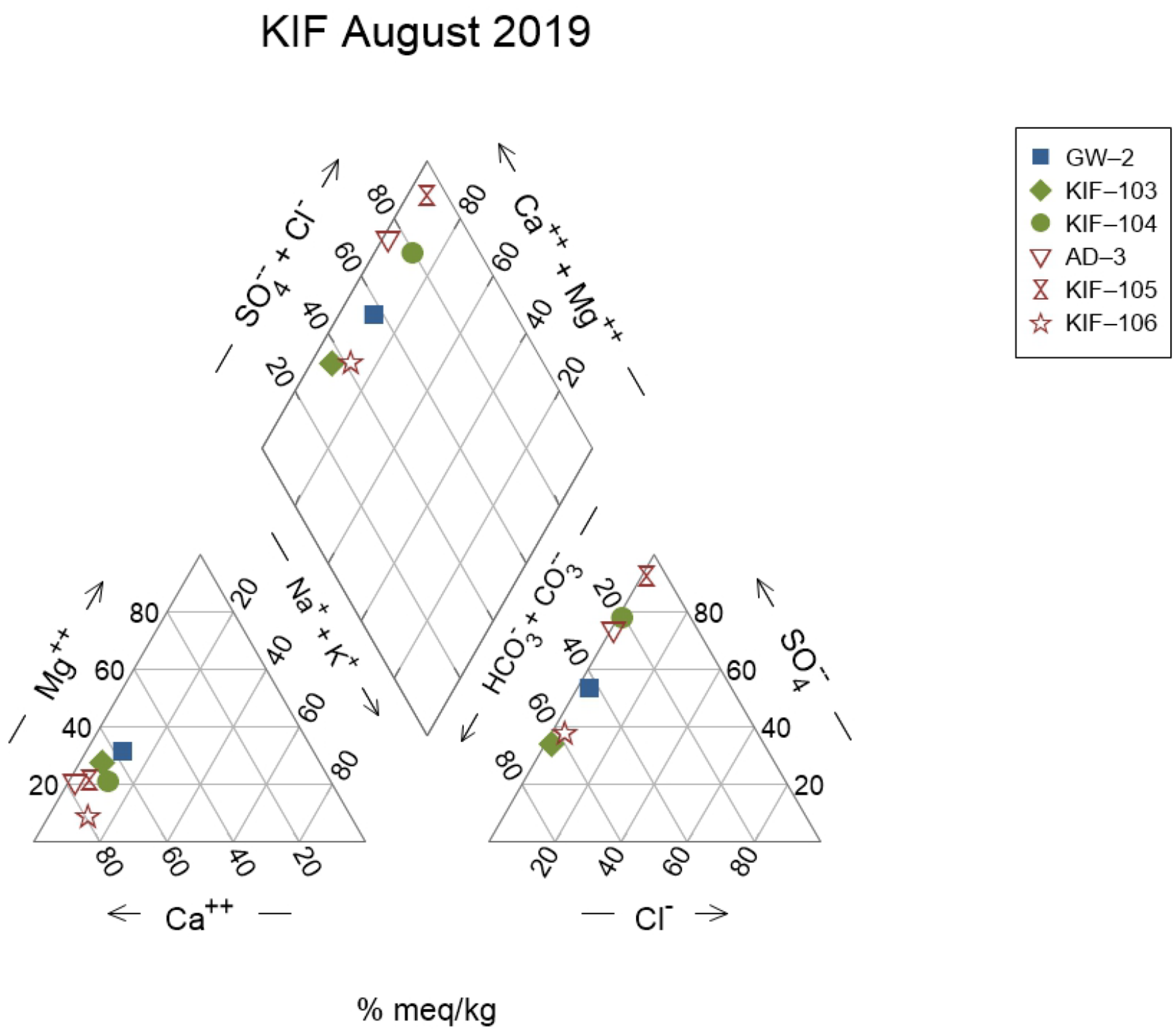


Figure No.

Title
Piper Diagram - August 2019

Client/Project 175668043
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Harriman, Tennessee

Prepared by DMB on 2021-10-14
TR by SZ on 2021-10-14
IR Review by TR on 2021-10-14

Legend

Notes
1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^{-} - Chloride
4. CO_3^{--} - Carbonate
5. HCO_3^{-} - Bicarbonate
6. K^{+} - Potassium
7. Mg^{++} - Magnesium
8. Na^{+} - Sodium
9. SO_4^{--} - Sulfate

Stantec

TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1.1-10_Feb2020_PiperDiagram.mxd Revised: 2022-01-13 By: mbough

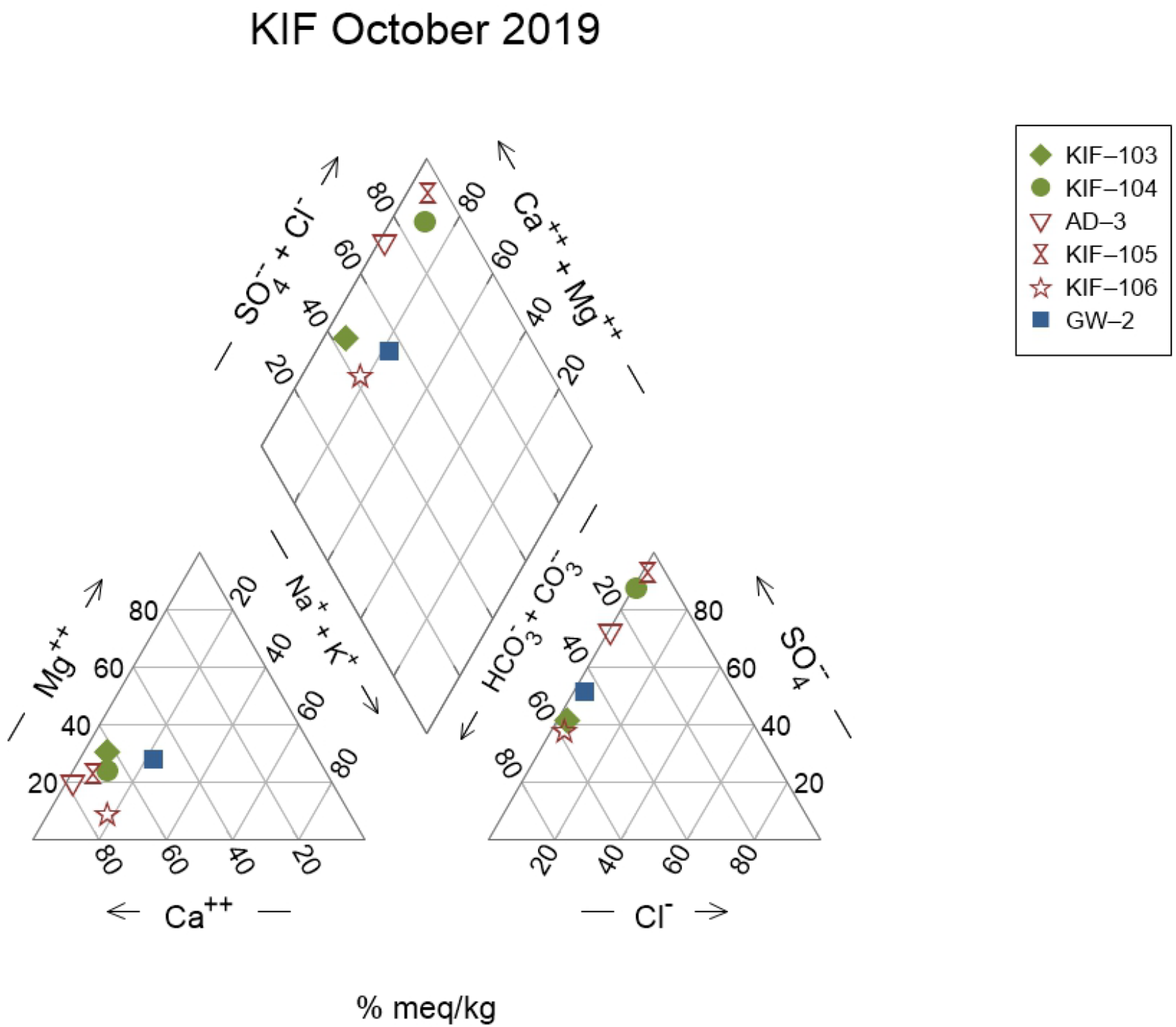


Figure No.

Title

Piper Diagram - October 2019

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Harriman, Tennessee

Prepared by DMB on 2021-10-14
TR by SZ on 2021-10-14
IR Review by TR on 2021-10-14

Legend

Notes

1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^- - Chloride
4. CO_3^{--} - Carbonate
5. HCO_3^- - Bicarbonate
6. K^+ - Potassium
7. Mg^{++} - Magnesium
8. Na^+ - Sodium
9. SO_4^{--} - Sulfate

Stantec TVA

KIF December 2019

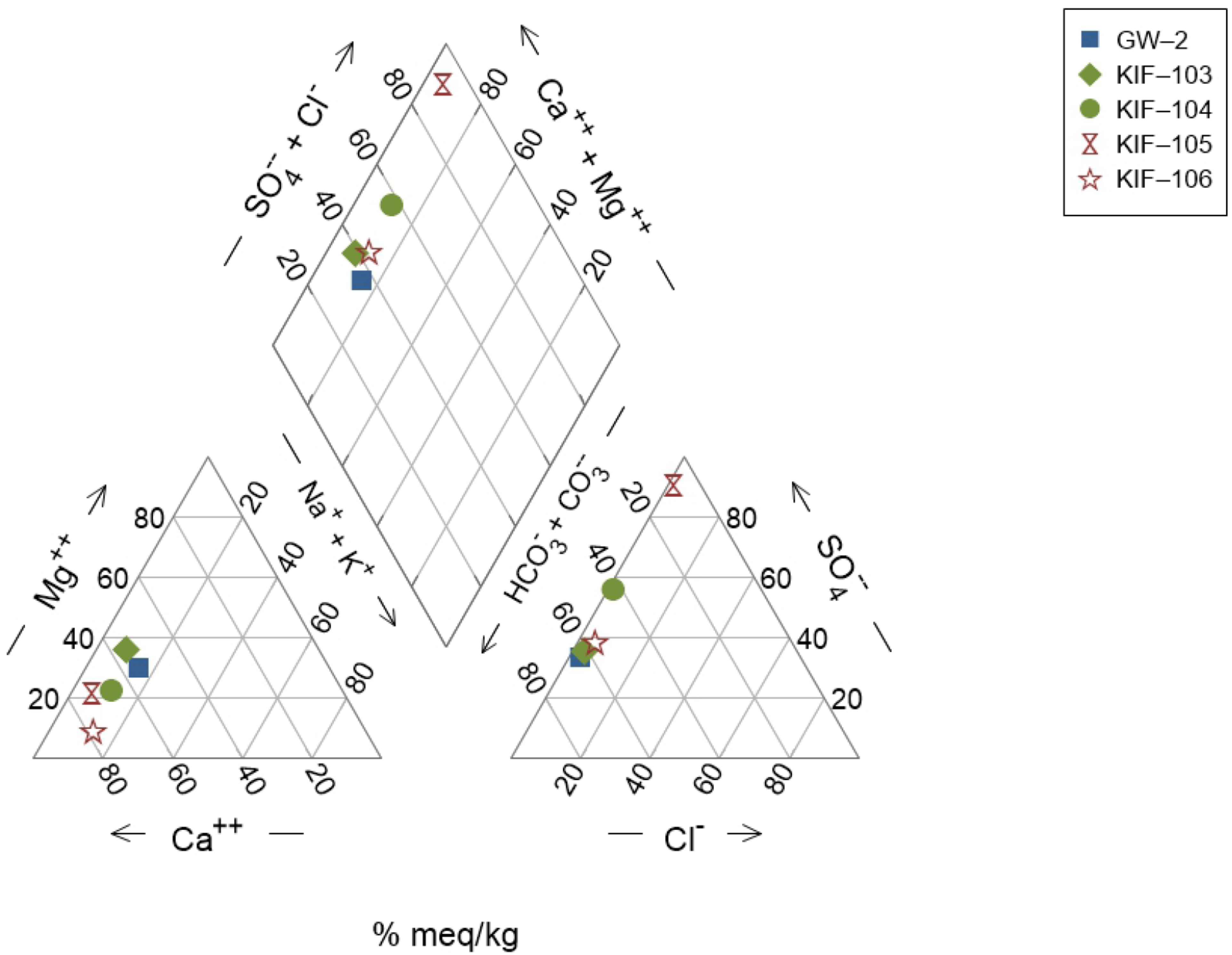


Figure No.

Title

Piper Diagram - December 2019

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Harriman, Tennessee

Prepared by DMB on 2021-10-14
TR by SZ on 2021-10-14
IR Review by TR on 2021-10-14

Legend

Notes

1. % meq/kg - Percent milliequivalent per kilogram
2. Ca^{++} - Calcium
3. Cl^- - Chloride
4. CO_3^{--} - Carbonate
5. HCO_3^- - Bicarbonate
6. K^+ - Potassium
7. Mg^{++} - Magnesium
8. Na^+ - Sodium
9. SO_4^{--} - Sulfate

Stantec

TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.1.1-10_Feb2020_PiperDiagram.mxd Revised: 2022-01-13 By: mbough

ATTACHMENT H.1-D
HYDROGRAPHS

Exhibit No.
H.1-D

Title
KIF Instrumentation Stilling Pond

Client/Project
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by MB on 2023-02-28
Technical Review by MD on 2023-02-28

0 250 500 750 1,000 Feet
1:3,000 (At original document size of 22x34)

Legend

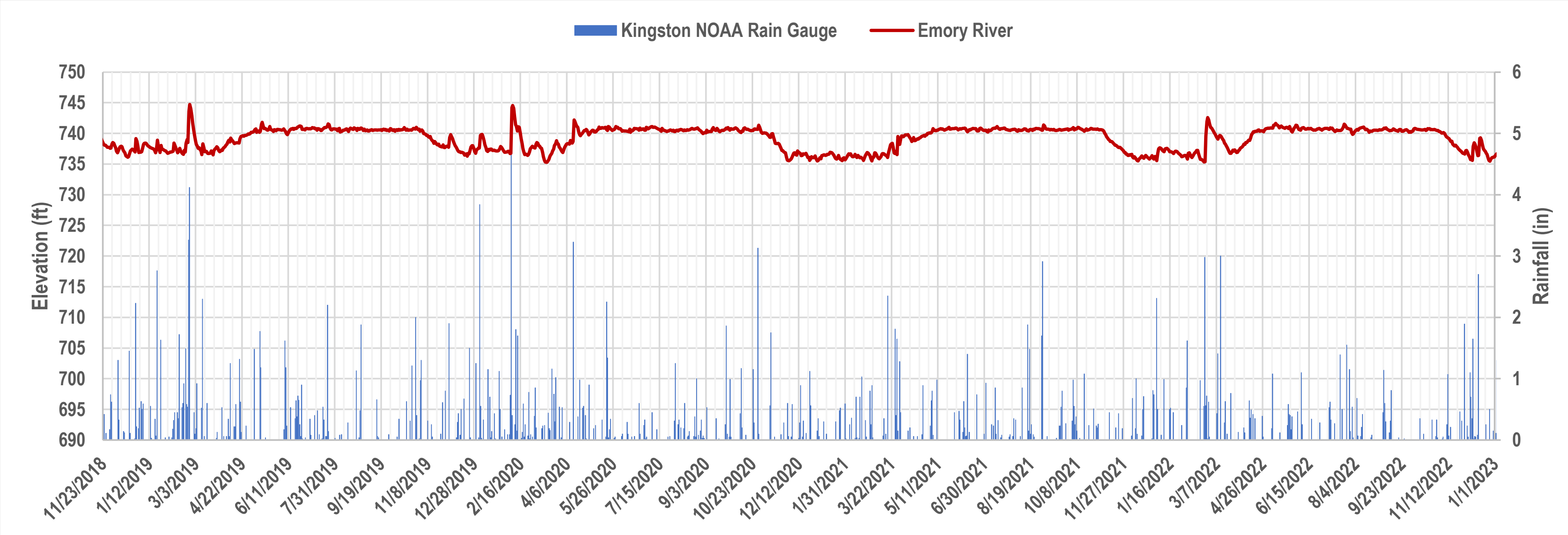
- Piezometer
- CCR Management Unit Area (Approximate)
- Engineered Wetlands (Approximate)
- Polishing Pond (Approximate)

Instrument Name	Northing (TN STP NAD83)	Easting (TN STP NAD83)
KIF_PZ126AC	576,576.97	2,411,404.55
KIF_PZ126BC	576,576.97	2,411,404.55
KIF_RS41_SPT_17_1_1	575,562.74	2,410,537.60
KIF_RS42_SPT_17_2_1	576,021.59	2,410,907.02
KIF_RS42_SPT_17_2_3	576,021.59	2,410,907.02
KIF_RS43_SPT_17_3_1	575,650.15	2,411,000.11
KIF_RS43_SPT_17_3_2	575,650.15	2,411,000.11
KIF_PZ17_10_1	576,004.94	2,411,401.18
KIF_PZ17_10_2	576,004.94	2,411,401.18
KIF_PZ17_06_1	575,129.23	2,410,700.58
KIF_PZ17_06_2	575,129.23	2,410,700.58
KIF_RS35_PZ17C	575,115.57	2,409,649.89
KIF_RS34_PZ18C	575,153.69	2,409,667.72
KIF_RS34_PZ19C	575,153.69	2,409,667.72
KIF_RS34_PZ20C	575,151.34	2,409,672.01
KIF_PZ9C	575,986.66	2,411,412.90

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by Esri World Imagery

Stantec TVA


Kingston NOAA Rain Gauge
Emory River
Elevation (ft)
Rainfall (in)
750
745
740
735
730
725
720
715
710
705
700
695
690
6
5
4
3
2
1
0
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
6/30/2021
8/19/2021
10/8/2021
11/27/2021
1/16/2022
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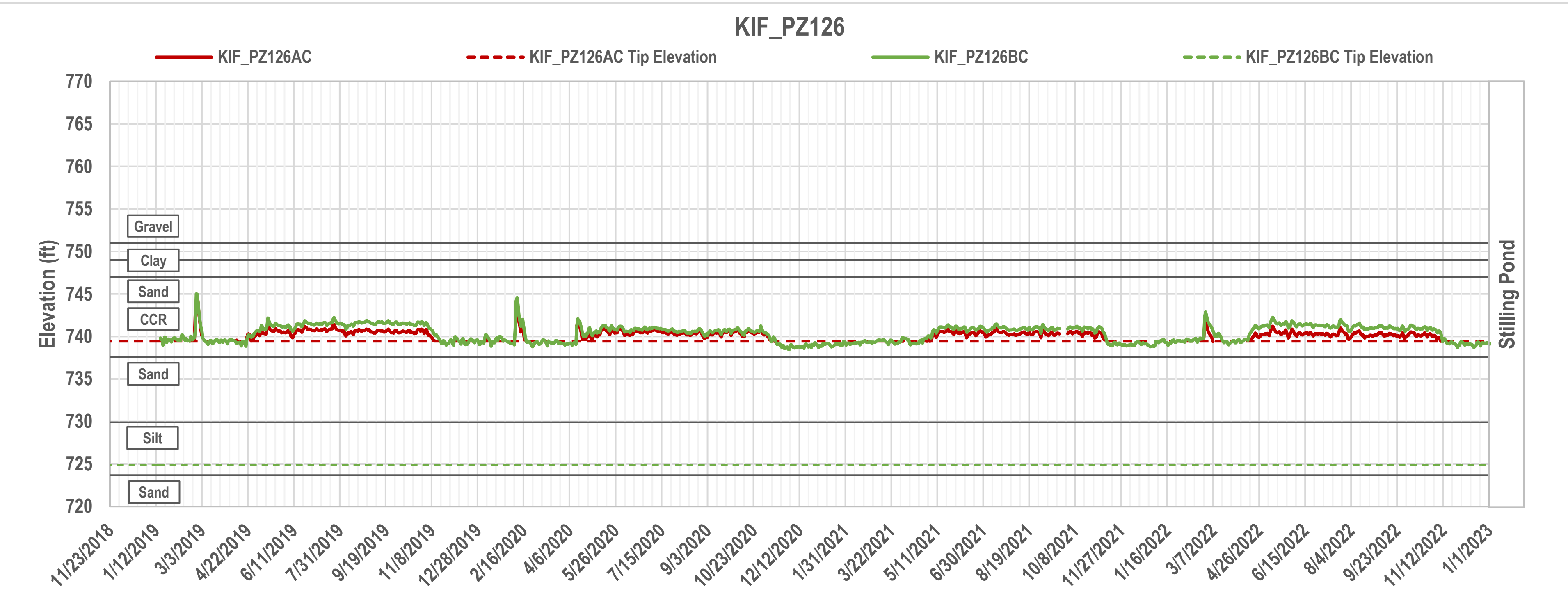
4/26/2022
6/15/2022
8/4/2022
9/23/2022
11/12/2022
1/1/2023


KIF_PZ126
KIF_PZ126AC
KIF_PZ126AC Tip Elevation
KIF_PZ126BC
KIF_PZ126BC Tip Elevation
Elevation (ft)
770
765
760
755
750
745
740
735
730
725
720
Gravel
Clay
Sand
CCR
Sand
Silt
Sand
Stilling Pond
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
6/30/2021
8/19/2021
10/8/2021
11/27/2021
1/16/2022
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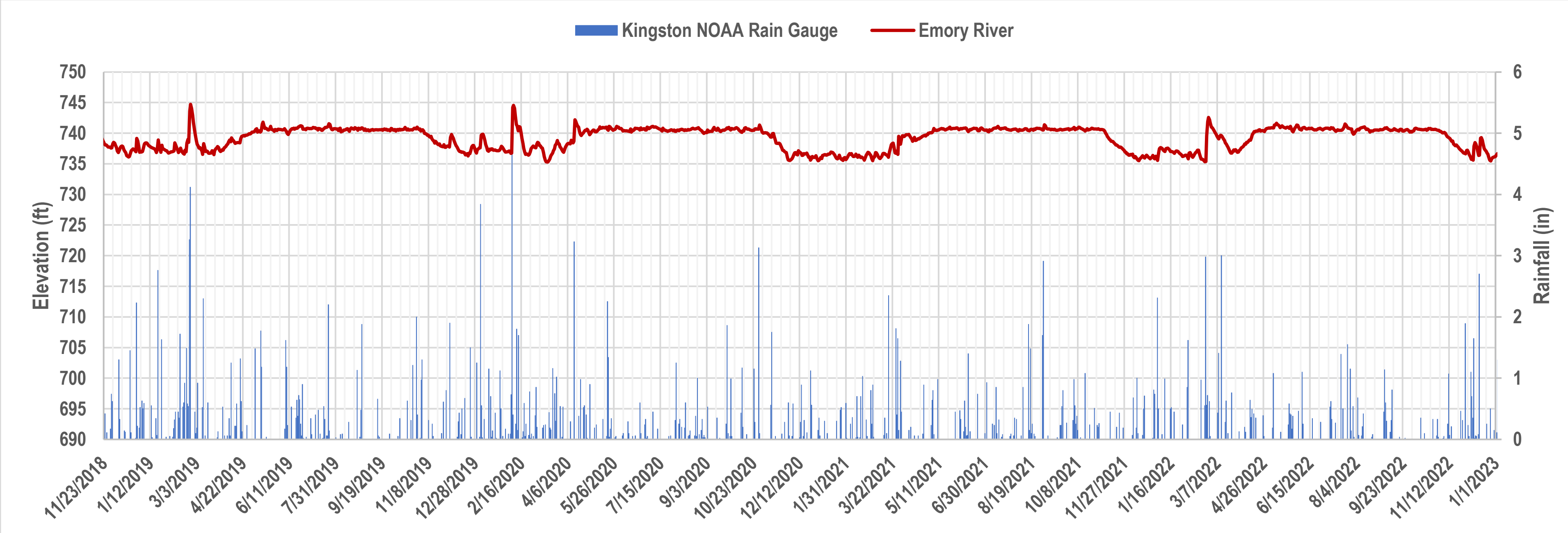
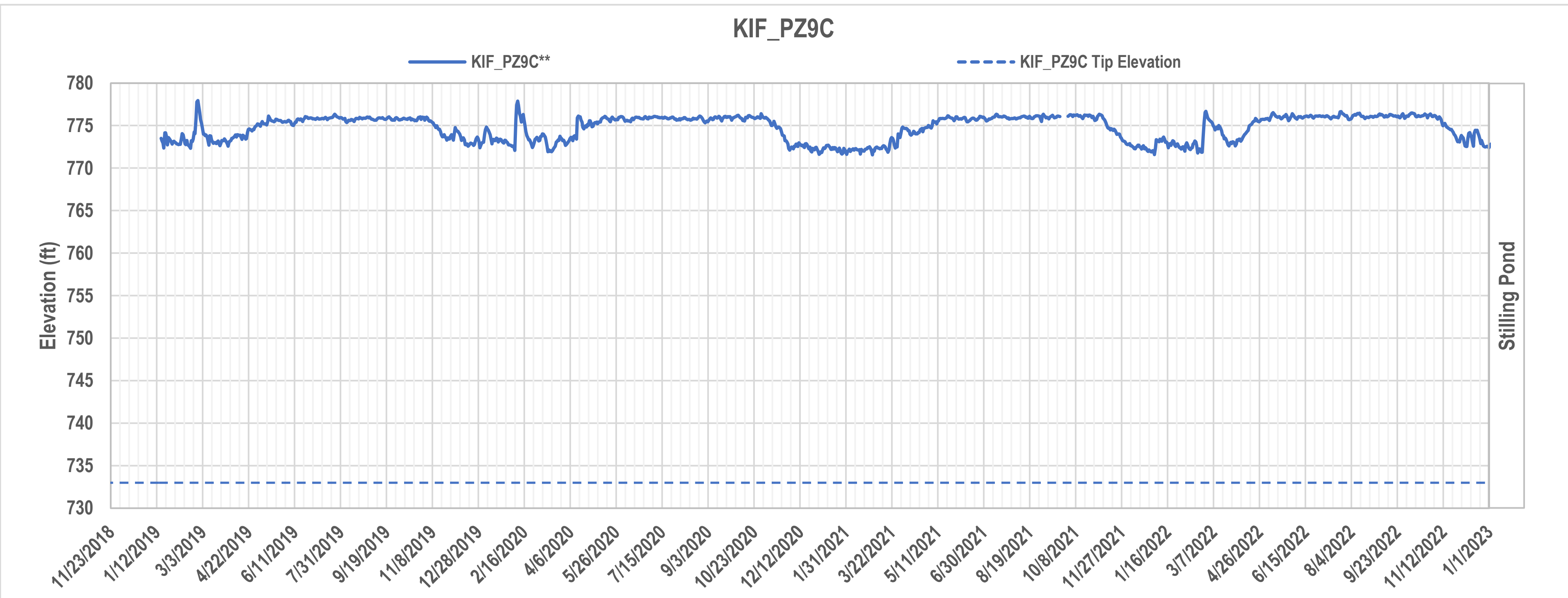
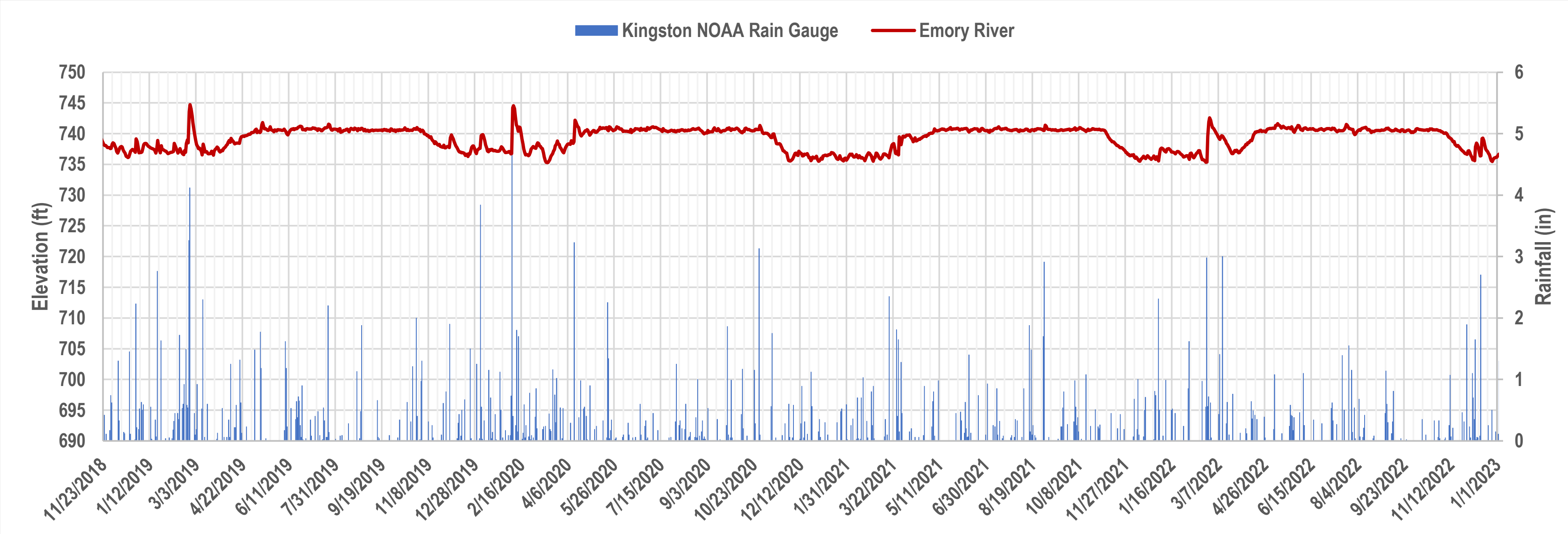
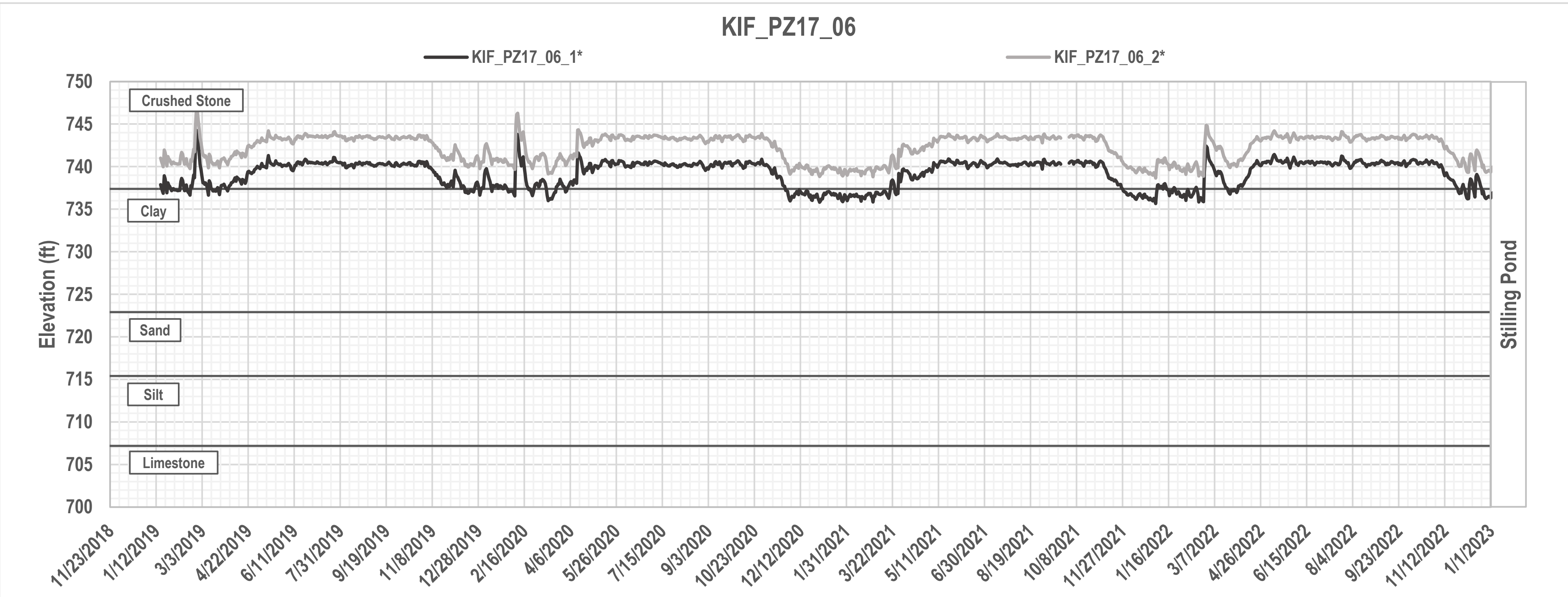
11/12/2022
1/1/2023



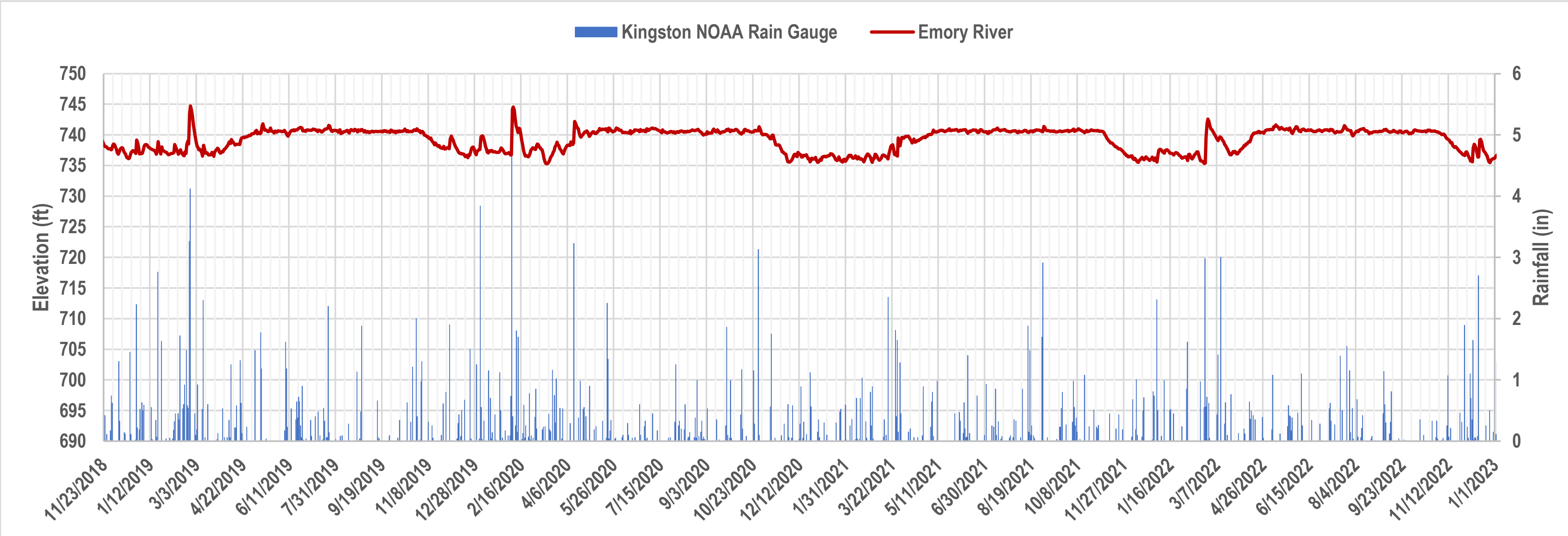


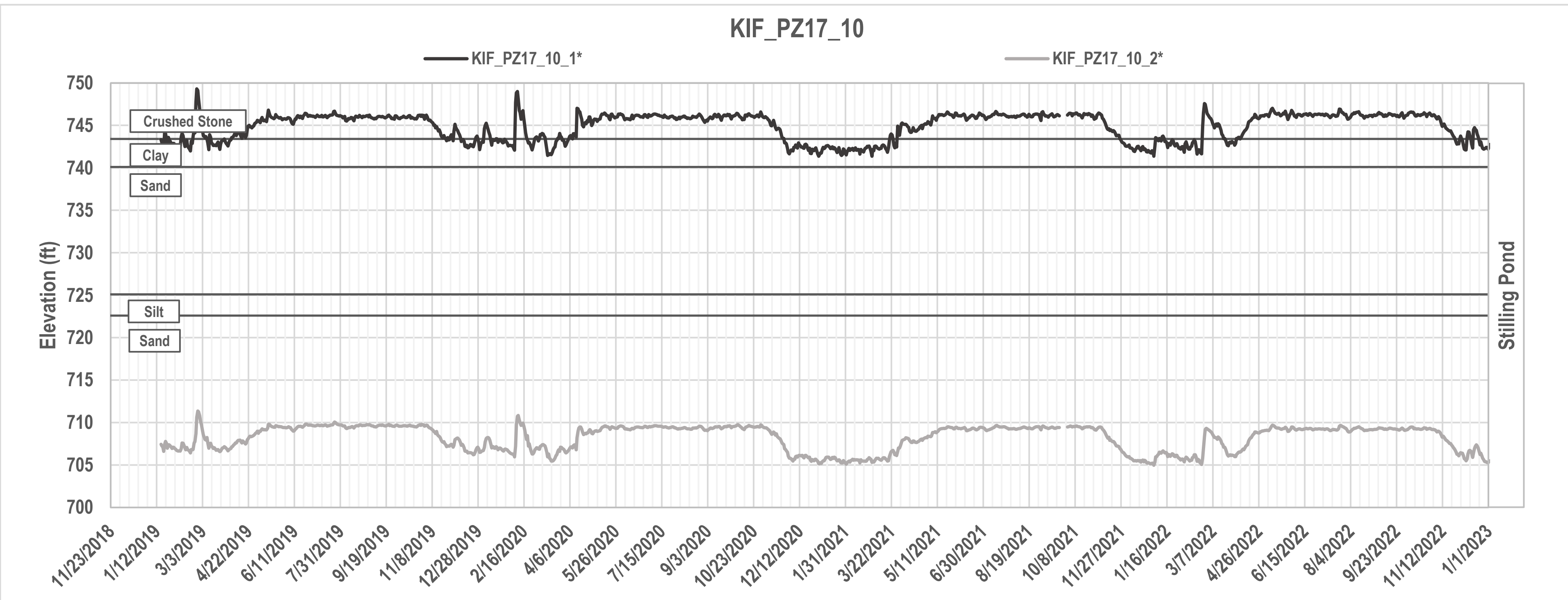
** Soil horizon is not available for this instrument. Where possible, a nearby boring log was substituted.



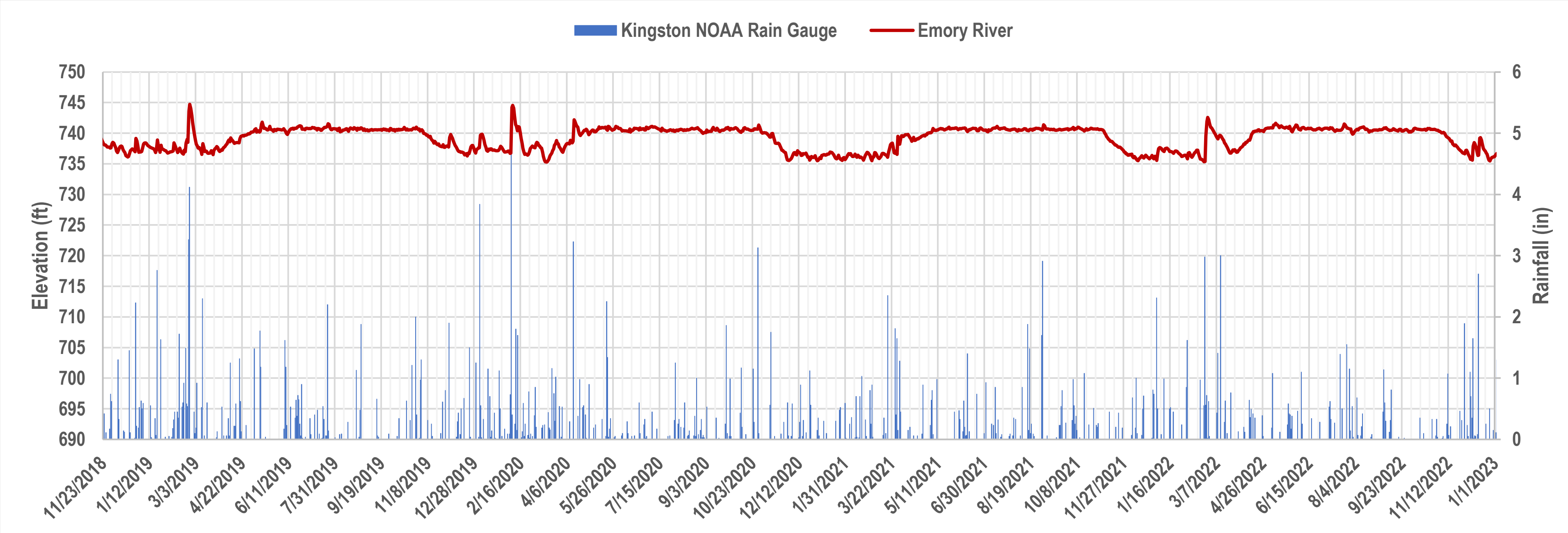


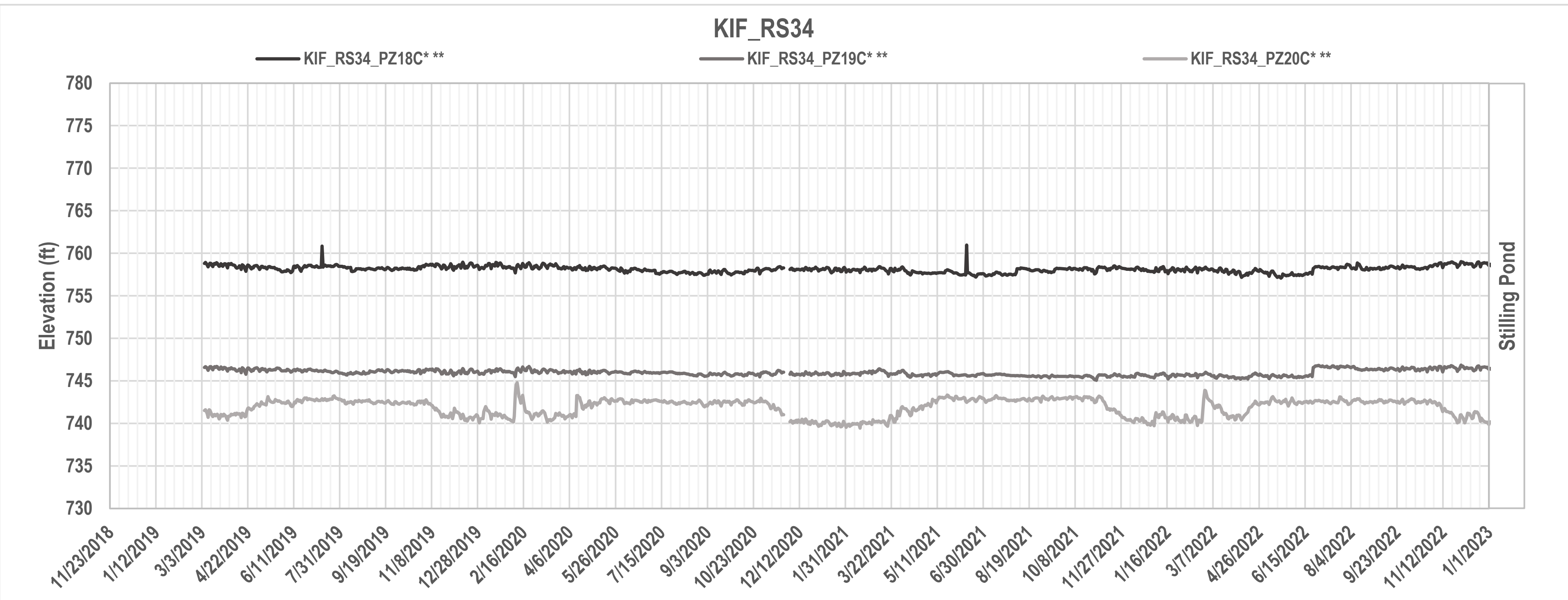
* Tip elevation is not available for this instrument.



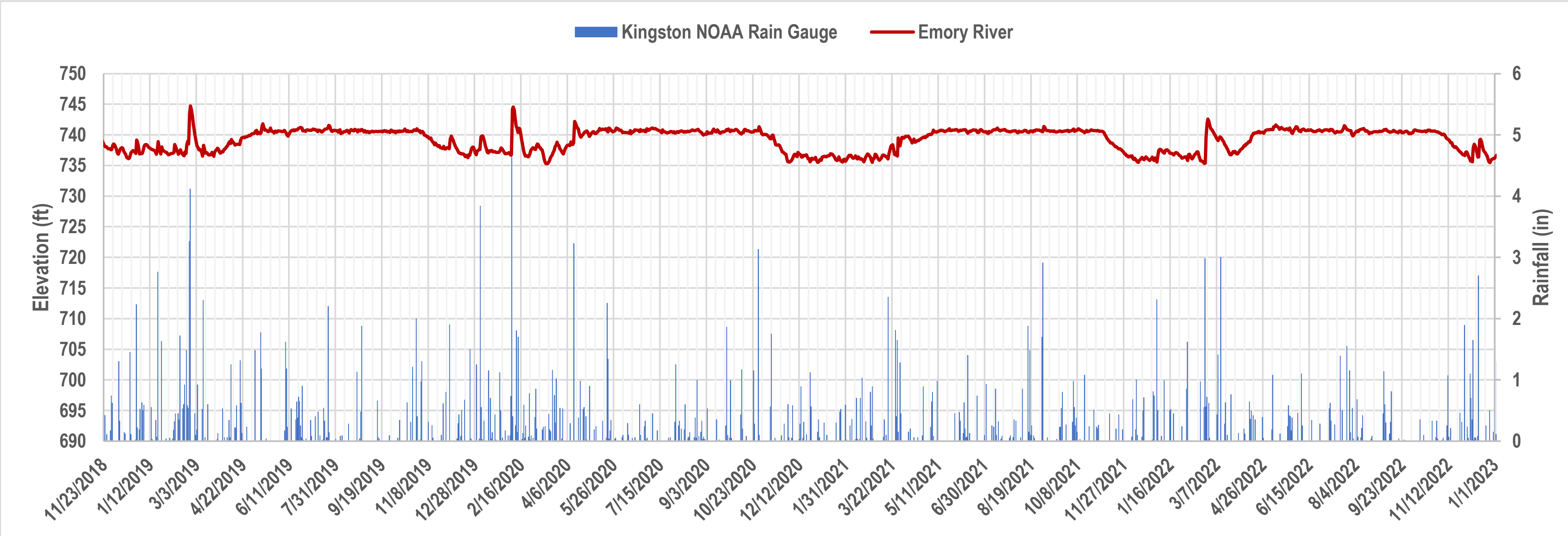


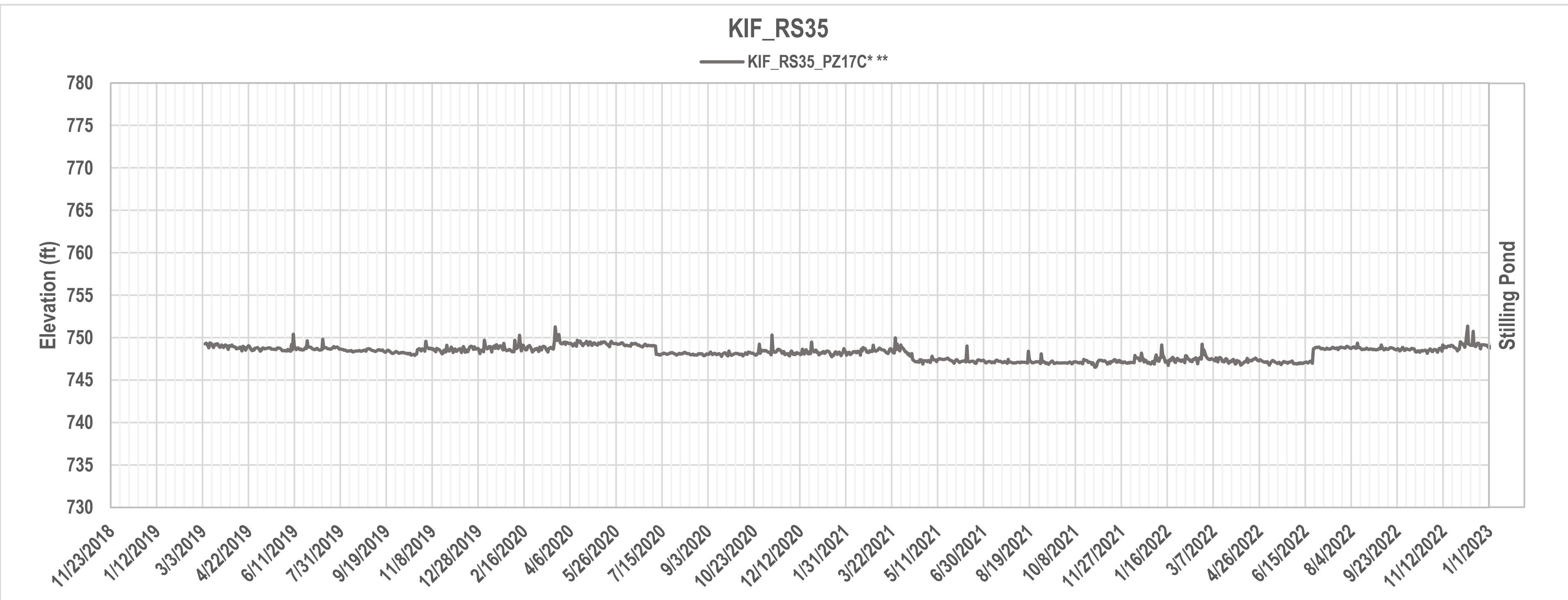
* Tip elevation is not available for this instrument.



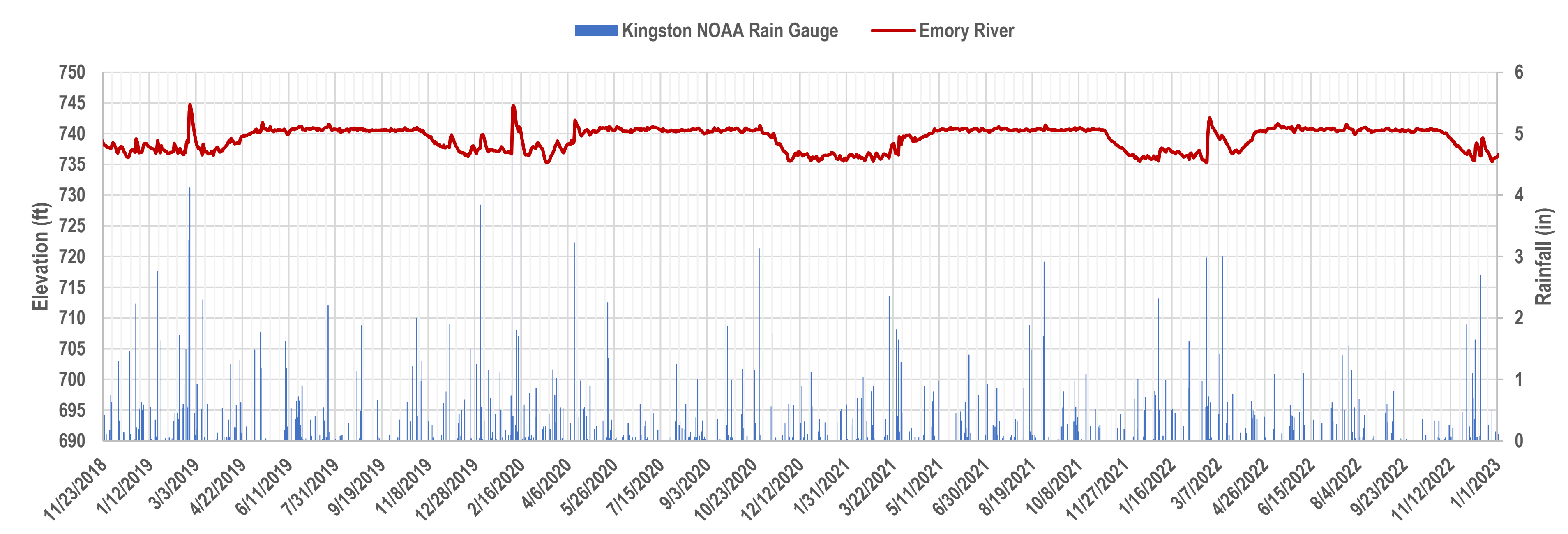


* Tip elevation is not available for this instrument.
** Soil horizon is not available for this instrument. Where possible, a nearby boring log was substituted.





* Tip elevation is not available for this instrument.
** Soil horizon is not available for this instrument. Where possible, a nearby boring log was substituted.


Kingston NOAA Rain Gauge
Emory River
Elevation (ft)
Rainfall (in)
750
745
740
735
730
725
720
715
710
705
700
695
690
6
5
4
3
2
1
0
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
6/30/2021
8/19/2021
10/8/2021
11/27/2021
1/16/2022
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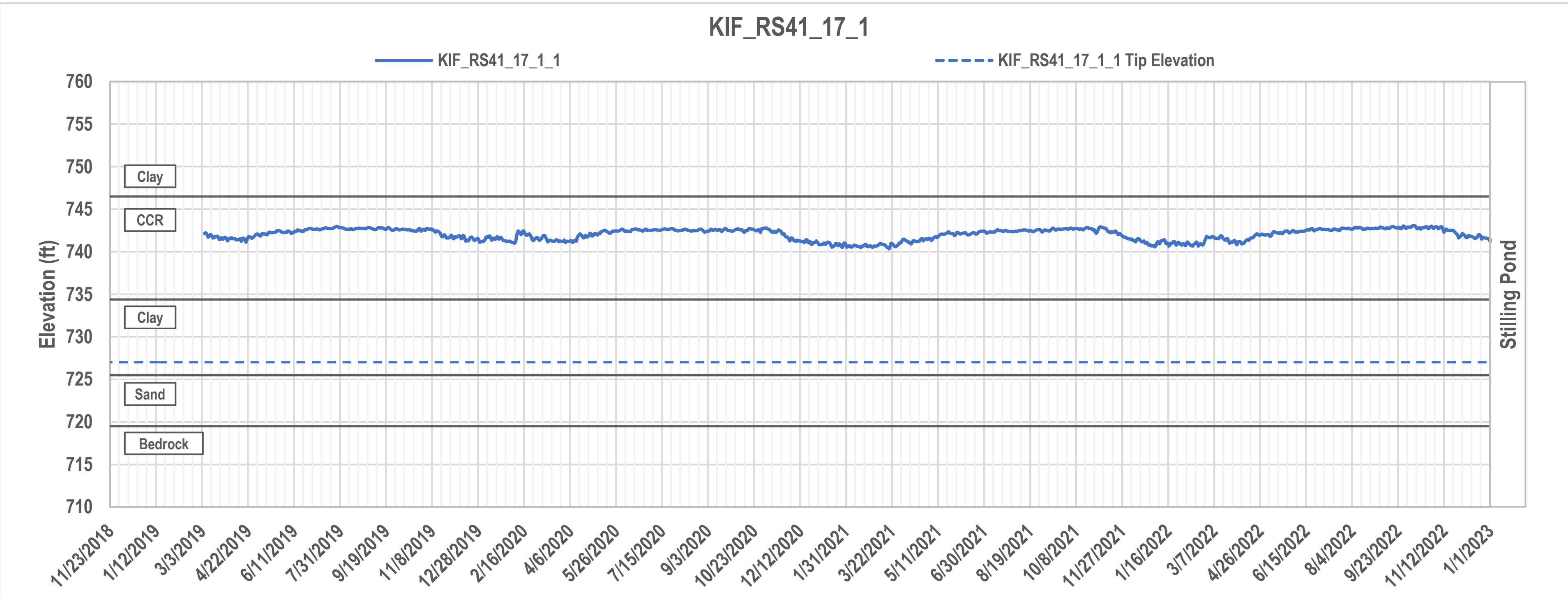
9/23/2022
11/12/2022
1/1/2023


KIF_RS41_17_1
KIF_RS41_17_1_1
KIF_RS41_17_1_1 Tip Elevation
Elevation (ft)
760
755
750
745
740
735
730
725
720
715
710
Clay
CCR
Clay
Sand
Bedrock
Stilling Pond
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
6/30/2021
8/19/2021
10/8/2021
11/27/2021
1/16/2022
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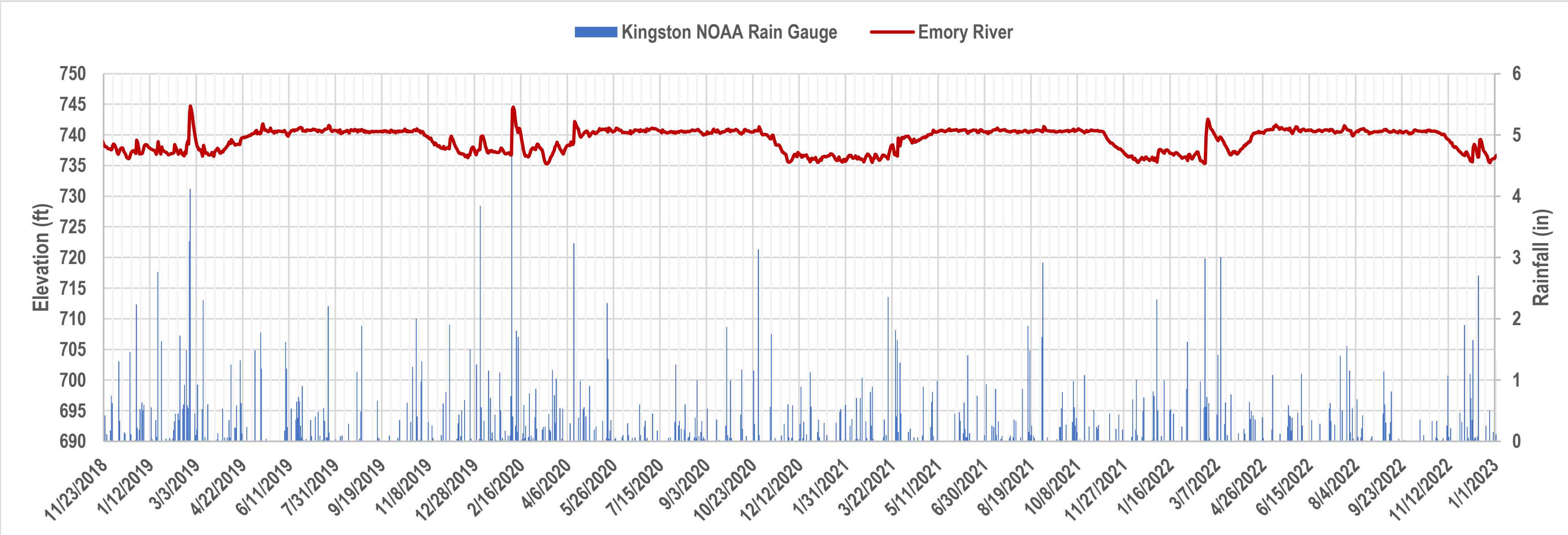
9/23/2022
11/12/2022
1/1/2023


Kingston NOAA Rain Gauge
Emory River
Elevation (ft)
Rainfall (in)
750
745
740
735
730
725
720
715
710
705
700
695
690
6
5
4
3
2
1
0
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
6/30/2021
8/19/2021
10/8/2021
11/27/2021
1/16/2022
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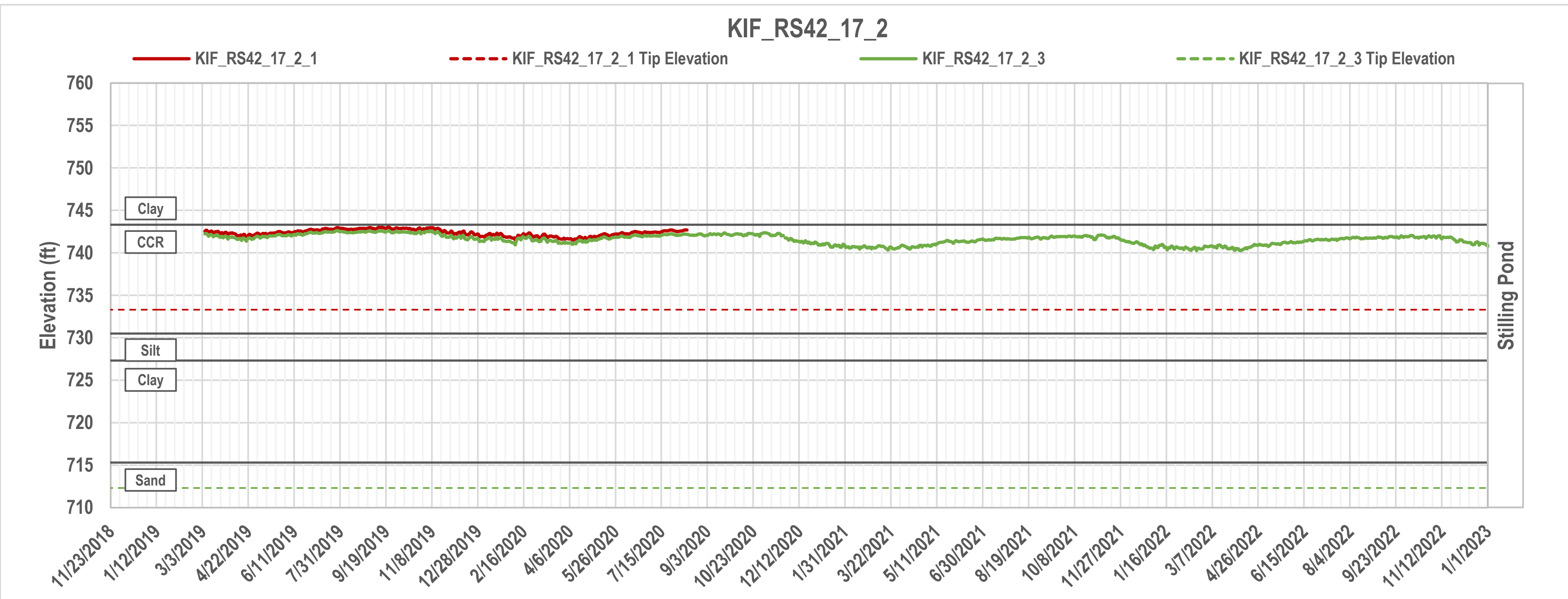
11/12/2022
1/1/2023


KIF_RS42_17_2
KIF_RS42_17_2_1
KIF_RS42_17_2_1 Tip Elevation
KIF_RS42_17_2_3
KIF_RS42_17_2_3 Tip Elevation
Elevation (ft)
760
755
750
745
740
735
730
725
720
715
710
Clay
CCR
Silt
Clay
Sand
Stilling Pond
11/23/2018
1/12/2019
3/3/2019
4/22/2019
6/11/2019
7/31/2019
9/19/2019
11/8/2019
12/28/2019
2/16/2020
4/6/2020
5/26/2020
7/15/2020
9/3/2020
10/23/2020
12/12/2020
1/31/2021
3/22/2021
5/11/2021
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8/19/2021
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11/27/2021
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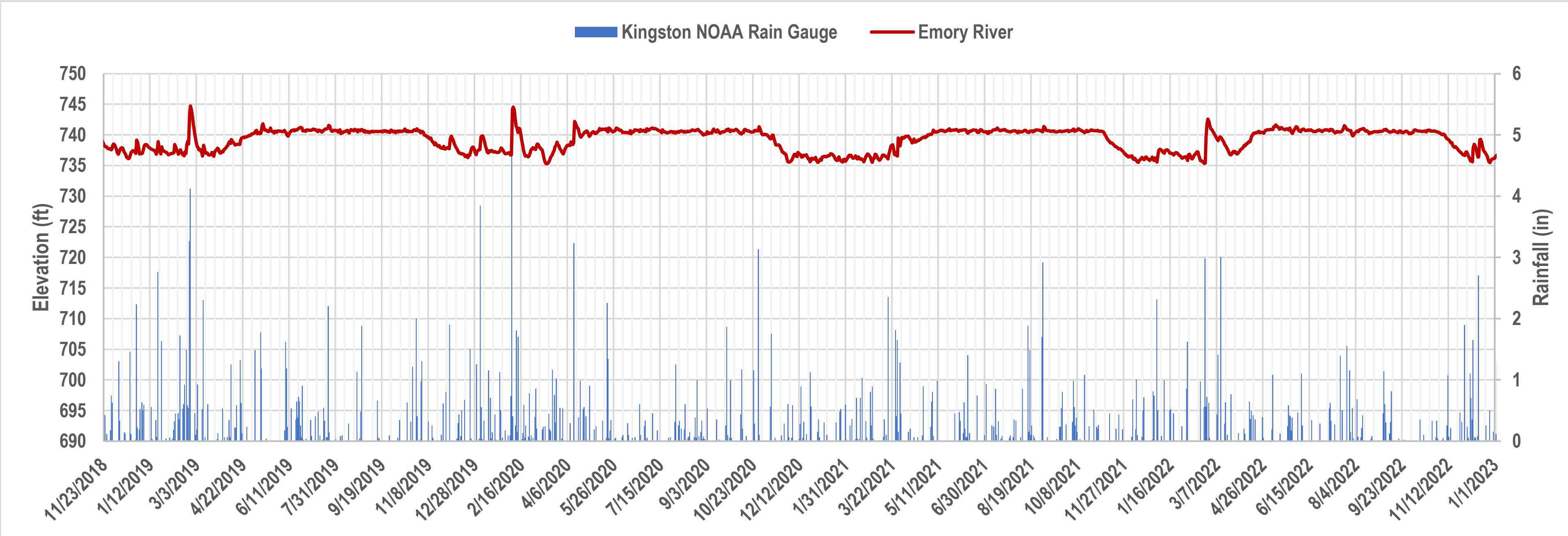
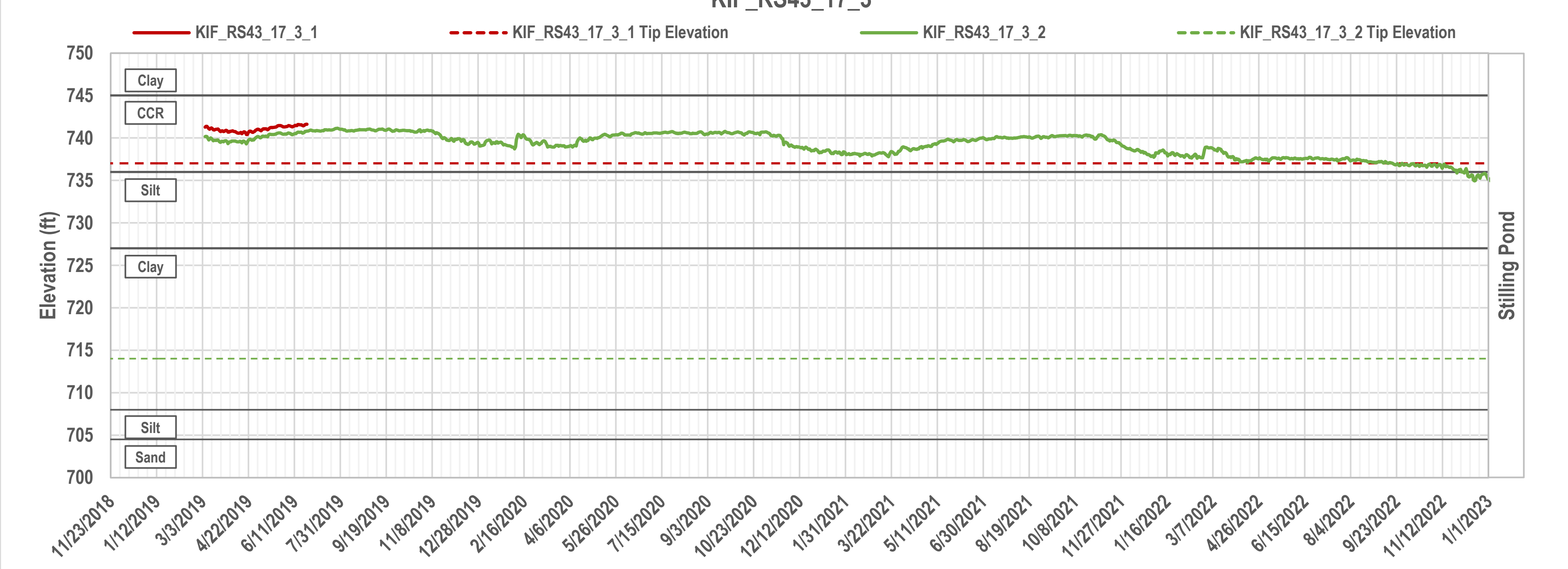
11/12/2022
1/1/2023



Kingston NOAA Rain Gauge
Emory River
Elevation (ft)
Rainfall (in)

KIF_RS43_17_3



KIF_RS43_17_3_1
KIF_RS43_17_3_1 Tip Elevation
KIF_RS43_17_3_2
KIF_RS43_17_3_2 Tip Elevation
Clay
CCR
Silt
Clay
Silt
Sand
Elevation (ft)
Stilling Pond

APPENDIX H.2

HYDROGEOLOGY INVESTIGATION SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant Hydrogeological Investigation Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

April 16, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Record

Revision	Description	Date
0	Submittal to TDEC	August 24, 2020
1	Addresses September 22, 2020 TDEC Review Comments and Issued for TDEC	October 20, 2020
2	Addresses November 3, 2020 TDEC Review Comments and Issued for TDEC	April 16, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Hydrogeological Investigation Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by J. M. Kerr, Jr.

James M. Kerr, Jr., Senior Principal Geologist

Approved by Rebekah Brooks

Rebekah Brooks, Principal Hydrogeologist

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Abbreviations

ASTM	American Society for Testing and Materials
CCR	Coal Combustion Residuals
COC	Chain-of-Custody
CFR	Code of Federal Regulations
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
FSP	Field Sampling Personnel
ft bgs	Feet Below Ground Surface
GPS	Global Positioning System
HGI	Hydrogeological Investigation
HSA	Hollow-Stem Auger
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
PG	Professional Geologist
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR), on behalf of the Tennessee Valley Authority (TVA), to document activities related to a hydrogeological investigation (HGI) at TVA's Kingston Fossil (KIF) Plant located in Harriman, Tennessee.

The purpose of the HGI was to install permanent monitoring wells to evaluate hydrogeological conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to summarize activities completed to meet the objectives of the HGI Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the HGI represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The results from this HGI will be evaluated in the context of these other activities, as well as data collected under other State and/or coal combustion residuals (CCR) programs, and will be presented in the Environmental Assessment Report (EAR).

The HGI activities were performed at the KIF Plant in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order:

- *Hydrogeological Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The hydrogeological investigation was implemented in accordance with TVA- and TDEC-approved Programmatic- and Project-specific changes. As approved by TDEC and described herein, a background well was not installed during this HGI. As such, soil samples were not collected for analysis of CCR-related constituents from a background well boring as specified in the Hydrogeological and Background Soil Investigation SAPs (Stantec 2018a and 2018c, respectively). This and minor variations in scope and procedures from those outlined in the KIF Plant HGI SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

HGI field work consisted of two primary activities – drilling and sampling, and permanent monitoring well installation. Quality Assurance oversight of field data acquisition protocols, sampling practices, and data review were performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objective of the HGI conducted pursuant to the HGI SAP was to install permanent monitoring wells to evaluate hydrogeological conditions at the KIF Plant in response to the TDEC Order. The work performed for this investigation also provides information in support of the United States Environmental Protection Agency CCR Rule codified in Title 40 of the Code of Federal Regulations Part 257 (40 CFR 257) at the KIF Plant.

The HGI included activities to assess groundwater conditions at three CCR units: the Stilling Pond, the Sluice Trench and Ballfield East of Sluice Trench, and the Interim Ash Staging Area (herein called the ”Study Area”). The activities conducted during the HGI support data collection for the groundwater investigation at the KIF Plant, including groundwater level measurements and groundwater sample collection for analysis of CCR-related constituents.

The approach for the HGI was to:

- Identify permanent downgradient monitoring well and background well locations targeting the shallow aquifer at the KIF Plant
- Use hollow-stem auger (HSA), roto-sonic, and direct push technology drilling techniques to collect soil samples at staked monitoring locations approved by TDEC and considered suitable for the drilling rigs to safely drill
- Complete monitoring well installation, well development, hydraulic conductivity (slug) testing, pump installation, and survey activities.

The scope of work of the HGI consisted of the following tasks:

- Confirming drilling locations for planned permanent downgradient monitoring well and background monitoring well locations using global positioning system (GPS) survey
- Drilling and logging soil borings for geotechnical and lithologic information
- Collecting soil samples for analysis of geotechnical parameters (if deemed warranted)
- Installing permanent monitoring wells in the borings and constructing surface completions
- Developing each permanent monitoring well and conducting slug tests to estimate hydraulic conductivity for evaluation of hydrogeologic conditions for the EAR
- Surveying each permanent monitoring well.

Details on each activity are presented in the sections below. Groundwater level measurements and sampling are being conducted as part of six groundwater monitoring events being performed pursuant to the Groundwater Investigation SAP, and reported in a series of Groundwater Investigation SARs for the KIF Plant.

3.0 FIELD ACTIVITIES

HGI field activities were conducted between October 1, 2018 and January 30, 2020 and consisted of boring advancement using HSA drilling, roto-sonic drilling and direct push technology; monitoring well installation; well development; slug tests; pump installation; and well surveys. Prior to initiating field activities, TVA conducted environmental reviews, obtained necessary permits, and performed utility clearances as necessary to complete the field work.

Stantec performed HGI field activities based on guidance and specifications listed in TVA's Environmental (ENV) Technical Instructions (TIs), the SAPs, and the QAPP prepared by EnvStds, except as noted in the Variations section of this report. As part of TVA's commitment to generate representative and reliable data, oversight of select field activities, field documentation, and centralized data management were performed by EnvStds under direct contract with TVA. EnvStds also conducted audits of field activities and provided quality reviews of field documentation.

During the HGI, Stantec conducted the following field activities:

- Confirmed drilling locations for planned monitoring well and background monitoring well locations
- Drilled seven soil borings for installation of four permanent monitoring wells and drilled 11 soil borings to find a location for one background monitoring well under the direction of a Stantec Professional Geologist (PG) licensed in the State of Tennessee
- Collected soil samples to develop a continuous boring log/soil profile for each well boring, and for potential analysis of geotechnical parameters (if deemed warranted)
- Installed permanent monitoring wells in four of the borings
- Developed each well and conducted slug tests in four wells to estimate hydraulic conductivity.

Following monitoring well installation, TVA constructed surface completions and surveyed each new permanent well.

3.1 WORK LOCATIONS

The HGI field activities were conducted at 18 soil boring/monitoring well locations at the KIF Plant under the HGI scope of work. The HGI boring/monitoring well locations are shown on Exhibit A.1 in Appendix A and are described in Table 1 following Section 3.1.2. As shown in Table 1, several locations required multiple borings to complete the HGI. Soil samples were not collected for analysis of CCR-related constituents from the background well boring (KIF-102) as a background well was not installed as part of this HGI.

Additionally, Tables B.1 through B.5 in Appendix B provide data and information obtained at the HGI boring/monitoring well locations as described in Section 3.4.

3.1.1 Background Locations

The proposed background well KIF-102 could not be installed as groundwater was not encountered in the overburden at and near the proposed location. Following the two initial attempts (borings KIF-102 and KIF-102a), nine additional test borings were advanced in an attempt to find a location with groundwater for well KIF-102. Groundwater was not encountered in any of the eleven borings drilled.

3.1.2 Coal Combustion Residuals Unit Locations

Four proposed permanent monitoring wells (KIF-103, KIF-104, KIF-105, and KIF-106) were installed within the Study Area to provide locations to evaluate groundwater flow and quality in these areas as summarized below. Boring locations for monitoring wells KIF-105 and KIF-106 were adjusted to achieve adequate utility clearance.

Table 1 - Summary of Boring and Monitoring Well Locations

Boring ID	Well ID	Location	Rationale
KIF-102	NC	West of Study Area	Proposed to assess background conditions upgradient from Study Area. Background well not installed since two initial borings and nine additional test borings hit shallow refusal and did not encounter groundwater.
KIF-102a	NC		
KIF-TB01	NC		
KIF-TB02	NC		
KIF-TB03	NC		
KIF-TB04	NC		
KIF-TB05	NC		
KIF-TB05A	NC		
KIF-TB06	NC		
KIF-TB07	NC		
KIF-TB08	NC		
KIF-103	KIF-103	Southwest portion of Stilling Pond	To assess local groundwater flow and quality downgradient of the CCR units
KIF-104	NC	East portion of Stilling Pond	To assess local groundwater flow and quality downgradient of the CCR units
KIF-104b	KIF-104		
KIF-105	NC	East of Sluice Trench	To assess local groundwater flow and quality downgradient of the CCR units
KIF-105b	KIF-105		
KIF-106	NC	Southeast of Sluice Trench	To assess local groundwater flow and quality downgradient of the CCR units
KIF-106b	KIF-106		

Notes:
ID Identification
NC Not completed as a monitoring well

3.2 DOCUMENTATION

Stantec maintained HGI field documentation in general accordance with ENV-TI-05.80.03, *Field Record Keeping*, the HGI SAP, and the QAPP. Health and safety forms were completed in accordance with TVA and Stantec health and safety requirements. Field activities and data were primarily recorded on program-specific field forms. Additional information regarding HGI field documentation is provided below.

3.2.1 Field Forms

Stantec used program-specific field forms to record field observations and data for specific activities. Field forms used during the HGI included:

- *Daily Field Activity Log*
- *Subsurface Boring Log*
- *Chain-of-Custody (COC)*
- *Monitoring Well Installation Field Log*
- *Well Development Form*
- *Slug Test Data Form*
- *QED Well Wizard Dedicated Sampling Pump Installation Checklist*
- *Well Pump Calibration Form.*

3.2.1.1 Daily Field Activity Log

Stantec field sampling personnel (FSP) recorded field activities, observations, and data on a *Daily Field Activity Log* to chronologically document the field program. Deviations from the SAP or QAPP were also documented on the *Daily Field Activity Log*.

3.2.1.2 Subsurface Boring Log

A Stantec PG licensed in the State of Tennessee prepared a *Subsurface Log* for each boring. The log documented time, boring location, drilling personnel, tooling/equipment used, depth to water, sample number, sample recovery, blow counts, soil lithology, and other relevant observations. Soil color was logged per the appropriate Munsell Soil Color Chart (Munsell Color 2009). Information from these logs was used to construct the subsurface logs provided in Attachment C.1 in Appendix C.

3.2.1.3 Chain of Custody

Stantec FSP completed *COC* documentation for each geotechnical soil sample collected during the HGI. Information on the geotechnical sample *COC* included the sample ID, sample location, sample depth, type of sample, sampling date, and sample custody record. *COCs* were completed in general accordance with *ENV-TI-05.80.02: Sample Labeling and Custody* and reviewed by the geotechnical laboratory manager.

3.2.1.4 Monitoring Well Installation Field Log

A Stantec PG licensed in the State of Tennessee prepared a *Monitoring Well installation Field Log* for each monitoring well. The log documented the well location, well installation date(s), well installation materials, well depth, screened interval, depth interval for each backfill material, and surface completion details (protective casing, concrete pad, bollards, etc.). Information from these logs was used to construct the well installation details provided in Attachment C.2 in Appendix C.

3.2.1.5 Well Development Form

Stantec FSP completed a *Well Development Form* for each monitoring well. The form documented well location, well development date(s), elapsed time since development started, depth to water, purge rate, cumulative purge volume, and water quality parameter measurements throughout and at completion of the development process.

3.2.1.6 Slug Test Data Form

Stantec FSP completed a *Slug Test Data Form* for the hydraulic conductivity tests performed at each monitoring well. The form primarily documented well location, slug test date(s), and initial and final water level measurements before and after each slug test attempt. The water level measurements during the tests were recorded by an automated pressure transducer and data recorder and subsequently downloaded.

3.2.1.7 QED Well Wizard Dedicated Sampling Pump Installation Checklist

Stantec FSP installed a dedicated bladder pump system in each monitoring well to facilitate subsequent groundwater sampling events. A *QED Well Wizard Dedicated Sampling Pump Installation Checklist* was prepared for each monitoring well to document the well information, pump information, initial testing results, and any relevant comments.

3.2.1.8 Well Pump Calibration Form

Stantec FSP performed a calibration procedure on the dedicated pump in each monitoring well and recorded the results on a *Well Pump Calibration Form*. Each form documented the well location, date, time, depth to water, flow rate, flow volume, and water quality stabilization measurements during and at completion of the calibration.

3.2.2 Photographs

In addition to documentation of field activities described above, photographs were taken to document the field investigation. A photographic log of soil cores recovered from the borings and the surface completion of each installed monitoring well are provided in Attachments D.1 and D.2, respectively, in Appendix D.

3.3 DRILLING AND SAMPLING

The following sections present drilling and soil sampling procedures used in the HGI. Drilling and sampling activities were performed under the direction of a Stantec PG licensed in the State of Tennessee.

3.3.1 Drilling

The HGI borings were advanced by Stantec drillers licensed in Tennessee using HSA drilling techniques following procedures provided in American Society for Testing and Materials (ASTM) D6151: *Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling*. Borings were generally advanced in ten-foot runs using a 4.25-inch inside diameter auger to advance the pilot boring (resulting in approximately an eight-inch borehole diameter). Standard penetration test sampling was conducted continuously in accordance with ASTM D1586 *Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils* and consisted of dropping a 140-pound hammer from a height of 30 inches, to drive a standard size 2-inch diameter split-spoon sampler to a depth of 18-inches. Blow-counts were recorded for each six inches of penetration. Soil samples were recovered for lithologic description, photographic documentation, and sample collection. Each run was then overdrilled using an 8.25-inch inside diameter auger where permanent monitoring wells were planned (resulting in approximately a 13-inch borehole diameter).

After reaching the targeted depth for the bottom of a borehole not completed as a permanent well, the augers were withdrawn and the borehole tremie-backfilled using a 30% solids bentonite grout. Well installation procedures for the boreholes completed as permanent wells are described in Section 3.4 below. Following removal, the augers were decontaminated using a high-pressure steam cleaner and potable water after use at each boring.

Three borings, KIF-104, KIF-105, and KIF-106, encountered CCR material in soils recovered from depths of 7.3 to 12.5 feet below ground surface (ft bgs), 4.3 to 4.6 ft bgs and 8.9 to 9.7 ft bgs, respectively. Due to the presence of CCR material in the shallow soil layers, and with TVA approval, these three borings were tremie-backfilled with a 30% solids bentonite grout. The offset borings were advanced as follows:

- The offset boring at KIF-104 (KIF104b) was advanced to 20 ft bgs using 4.25-inch and 8.25-inch diameter core barrels as described above. Then, 10-inch polyvinyl chloride (PVC) casing was set to 20 ft bgs and backfilled with grout, thereby isolating the CCR material from the interior of the PVC casing. The boring was then advanced to a depth of 35.0 ft bgs through the casing using 6-inch x 8-inch roto-sonic drilling methods

- The offset boring at KIF-105 (KIF-105b) was advanced to 12 ft bgs using 4.25-inch and 8.25-inch diameter core barrels as described above. Then, 10-inch PVC casing was set to 12 ft bgs and backfilled with grout, thereby isolating the CCR material from the interior of the PVC casing. The boring was then advanced to a depth of 45 ft bgs through the casing using 6-inch x 8-inch roto-sonic drilling methods

- The offset boring at KIF-106 (KIF-106b) was advanced to 15 ft bgs using 4.25-inch and 8.25-inch diameter core barrels as described above. Then, 10-inch PVC casing was set to 15 ft bgs and backfilled with grout, thereby isolating the CCR material from the interior of the PVC casing. The boring was then advanced to a depth of 40 ft bgs through the casing using 6-inch x 8-inch roto-sonic drilling methods.

A total of 11 borings were advanced in the attempt to install well KIF-102. The initial two borings were drilled using HSA drilling techniques as described above. An additional nine test borings were advanced in the exploration area and were completed using direct push technology. Static load and/or percussion were used to advance the tube and rods until encountering refusal. Refusal was encountered at depths between three and 10 ft bgs in the nine soil borings. Groundwater was not encountered in the soil borings from the exploration area for KIF-102. Completed boreholes were tremie-backfilled using a 30% solids bentonite grout.

3.3.2 Soil Sampling

During advancement of each boring, the Stantec PG prepared field subsurface logs. Inputs included a description of subsurface lithology, sample recovery, color using the Munsell Soil Color Chart, and other relevant parameters as required by the SAPs and TIs. Subsurface logs for the KIF Plant HGI are presented in Attachment C.1 in Appendix C.

Soil samples were collected from each boring to provide geotechnical and lithologic information for a continuous boring log/soil profile for the proposed monitoring wells, and for analysis as described below.

3.3.2.1 Geotechnical Sampling

Following preparation of the subsurface logs, soil samples were placed in laboratory-provided glass containers and labeled in general accordance with the SAP. FSP secured the caps on each bottle, and confirmed it was labeled legibly and externally clean before placing the sample container in a box for storage prior to transport to the laboratory. Geotechnical sample information was recorded on a *COC* as described above in Section 3.2.1.3. The samples were temporarily placed in a secure storage unit onsite under custody protocols until transport and submittal to the geotechnical laboratory.

Stantec personnel transported and submitted the geotechnical samples to the Stantec Geotechnical Laboratory in Lexington, Kentucky. No geotechnical samples were tested since they were not needed for additional lithologic and geotechnical information, and they remain stored at the Stantec laboratory.

3.4 MONITORING WELL INSTALLATION

3.4.1 Well Installation

Monitoring wells were installed in the borings by qualified drill crews working under the direction of a Stantec PG and a licensed Tennessee driller. Well installation was carried out in general accordance with ENV-TI-05.80.25, *Monitoring Well and Piezometer Installation and Development*. Well construction details are documented on the Well Installation Details provided in Attachment C.2 in Appendix C.

The lowest portions of the borings were backfilled with a layer of sand filter pack (20/40 mesh). The monitoring well was installed above the backfilled portion. Monitoring wells consisted of a four-inch-diameter Schedule 40 PVC pre-packed well screen (0.010-inch slots) and riser. The screen and riser consisted of flush-joint, threaded PVC pipe. The screen length was selected based on the results of the boring log and the target stratum and varied from 9.6 to 10 feet. A four-inch diameter Schedule 40 PVC bottom well plug measuring approximately 0.4 feet in length was threaded onto the bottom of the screen. The PVC riser extended a minimum of 2.5 feet above the ground surface and was capped with a temporary plug or slip cap. The annular space was backfilled with a sand filter pack extending approximately two feet above and six inches below the screen. A bentonite pellet seal approximately two feet thick was placed on top of the sand filter pack. The sand filter pack and bentonite pellets were either placed by tremie method or poured slowly into the annular space of the drill tooling to prevent bridging.

After the bentonite pellet seal had sufficiently hydrated for a duration equal to or greater than the minimum recommended by the manufacturer (a minimum of four hours), the remaining annular space was backfilled with a 30% solids bentonite grout. The grout was placed by tremie method through one-inch diameter PVC pipe using pumps gauged to allow the installation crew to monitor pressures during the grouting process.

Subsequent monitoring well surface completions consisted of an above-grade steel locking protective cover anchored to a concrete surface pad. The protective cover extended above the concrete pad and the annular space was filled with sand or pea gravel to about six inches below the top of PVC casing. Steel protective bollards were installed near each corner of the concrete pad and filled with concrete.

A summary of monitoring well construction specifications is presented in Table B.1 in Appendix B. Full construction details are presented in the Well Installation Details provided in Attachment C.2 in Appendix C.

3.4.2 Well Development

Each new monitoring well was developed in accordance with ENV-TI-05.80.25, *Monitoring Well and Piezometer Installation and Development* by a combination of bailing, surging, and pumping after a minimum of 24 hours following well installation. First, a three-inch diameter PVC bailer was lowered and raised within the screened intervals to create a slight surging action to dislodge particles within the wells and sand filter packs. Then the bailer was used to remove turbid water from the well. Baseline readings of turbidity, pH, temperature, and specific conductance were measured using a calibrated YSI Pro Plus water quality meter and a calibrated Hach 2100Q turbidity meter. This process of alternately surging and bailing was repeated several times to decrease the water turbidity within the wells. Lastly, a submersible pump was employed to further develop the wells until stabilization criteria for turbidity (≤10 Nephelometric Turbidity Units), pH (±0.1 Standard Unit), temperature (±10%), and specific conductance (±10%) were achieved. The target turbidity value was based on well purging criteria specified in ENV-TI-05.80.42, *Groundwater Sampling* at the time of development. Well development details were recorded on the *Well Development Form.* A summary of initial and final water quality measurements is presented in Table B.2 in Appendix B.

3.4.3 Hydraulic Conductivity (Slug) Testing

After development, Stantec performed slug tests in the four monitoring wells to estimate hydraulic conductivity. The slug tests were performed in accordance with ASTM D4044: *Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers*. A pressure transducer with a data recorder was used to collect water level information from the wells.

One to three rising-head and one to three falling-head slug tests were performed at each well, as shown on Table B.3 in Appendix B. Each well was tested by taking an initial measurement of the static water level followed by the insertion of the pressure transducer into the well. After the transducer had been installed, a falling-head slug test was conducted by introducing a solid slug (e.g., PVC pipe filled with sand) into the well to cause a nearly instantaneous rise in the water level. The water levels were then recorded at regular intervals until reaching near initial static levels. After the first test concluded, a rising-head slug test was conducted by removing the slug to cause a nearly instantaneous drop in the water level. Water levels were recorded until initial static water levels were reached again. The procedure of alternating a falling-head and a rising-head slug test was conducted one to three times at the wells. The data were recorded electronically by the transducer and downloaded into a data collector. Raw data were checked in the field for discrepancies prior to demobilizing from the KIF Plant.

The field data were analyzed using AQTESOLV™ Version 4.50 Professional software to estimate the hydraulic conductivity of the saturated soils in the screened interval. Calculated hydraulic conductivities are summarized in Table B.3 in Appendix B, and the software output package is provided in Appendix E. The following assumptions and methods were utilized for the calculations:

- The clay intervals in each well were not included when estimating the saturated thickness
- Well KIF-105 was assumed to be installed in confined aquifer conditions based on the boring logs. The term “confined” is included on the output chart.

3.4.4 Pump Installation

A new, decontaminated, dedicated QED Environmental Systems, Inc. brand model P1101M bladder pump was installed in each new monitoring well after well development was completed. The pump model installed in each well was either a P1150 if the water column height above the pump intake was less than 10 feet, or a model P1101M if it was more than 10 feet. Each pump intake was placed at approximately the mid-point of the well screened interval or the mid-point of the saturated portion of the well screened interval for future groundwater sampling. Following pump installation, the pumps were calibrated in general accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Well pump placement depths, installation calculations, and calibration details were recorded on the *QED Well Wizard Dedicated Sampling Pump Installation Checklist* and the *Dedicated Pump Calibration Form*. Pump installation information is provided in Table B.4 in Appendix B.

3.4.5 Well Surveys

After the surface completions for each monitoring well were installed, the well was professionally surveyed using a survey-grade GPS for horizontal and vertical control. Measurements were calculated relative to the coordinate systems used by the KIF Plant. Well survey information is provided in Table B.5 in Appendix B.

3.5 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during the HGI included:

- Soil cuttings
- Well development water
- Decontamination fluids
- Personal protective equipment (PPE)
- General trash.

IDW was handled in general accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.25, *Monitoring Well and Piezometer Installation and Development*; the HGI SAP; the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW were coordinated with the KIF Plant facility management. Soil cuttings, decontamination fluids, and well development water were managed as authorized by KIF Plant facility management and in accordance with the HGI SAP. Used disposable PPE (e.g., nitrile gloves) and general trash were placed in garbage bags and disposed of in a municipal waste dumpster onsite.

3.6 VARIATIONS

The proposed scope and procedures for the HGI were outlined in the SAP, QAPP, applicable TVA TIs, and ASTM standards, as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for the HGI at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Proposed background monitoring well KIF-102 was not installed because 11 borings in the exploration area for this location did not encounter groundwater. This change was approved by TDEC.
- Monitoring wells KIF-105 and KIF-106 were relocated as approved by TDEC because of access restrictions.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Borings KIF-104, KIF-105 and KIF-106 encountered CCR material in the shallow soils. As described in Section 3.3.1, drilling and well installation methods were modified as approved by TVA to prevent CCR material from migrating deeper into the borehole.
- During well installation, grout densities were measured but not recorded in field documentation. The Well Installation Field Log template was modified to include a location for recording grout density for future well installations.

4.0 SUMMARY

The data presented in this report are from the HGI at the KIF Plant. Four permanent monitoring wells were installed during the HGI to support data collection for the groundwater investigation at the KIF Plant, including groundwater level measurements and groundwater sample collection for analysis of CCR-related constituents. As described above and approved by TDEC, a background well was not installed as part of this HGI. The scope of work for the HGI included:

- Drilling seven soil borings for installation of four permanent monitoring wells and drilling an additional 11 soil borings in an attempt to find a location for one background monitoring well
- Collecting soil samples to develop a continuous boring log/soil profile for each well boring
- Installing permanent monitoring wells in four of the borings and constructing surface completions
- Developing each well and conducting slug testing in four wells to estimate hydraulic conductivity
- Surveying each new permanent well.

A summary of boring and monitoring well locations is presented in Table 1. Monitoring well construction specifications, well development, hydraulic testing results, pump installation details, and survey information are presented in Tables B.1 through B.5, respectively (Appendix B). Groundwater level measurement and sampling analytical results are reported in a series of Groundwater Investigation SARs for the KIF Plant.

Stantec has completed an HGI at the KIF Plant in Harriman, Tennessee, in accordance with the HGI SAP as documented herein. The data collected during the HGI are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. HGI drilling and well installation data will be evaluated along with data collected under other TDEC Order SAPs including but not limited to the six sampling events of the groundwater investigation, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR.

5.0 REFERENCES

American Society for Testing and Materials (ASTM). D6151: *Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling.*

ASTM. D1586: *Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils*.

ASTM. D4044: *Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers*.

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Revision 3. Prepared for Tennessee Valley Authority. November 2018.

Munsell Color. 2009. Munsell Soil Color Book.

Stantec Consulting Services Inc. (Stantec). 2018a. *Hydrogeological Investigation Sampling and Analysis Plan (SAP), Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018c. *Background Soil Sampling and Analysis Plan, Kingston Fossil Plant*. Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. Commissioner's Order No. OGC15-0177.

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA. ENV-TI-05.80.03, *Field Record Keeping.*

TVA. ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

TVA. ENV-TI-05.80.25, *Monitoring Well and Piezometer Installation and Development*.

TVA. ENV-TI-05.80.42, *Groundwater Sampling.*

APPENDIX A - EXHIBITS

Exhibit No.

A.1

Title

Site Map and Monitoring Well Locations

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2020-06-25
Technical Review by MT on 2020-06-25

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Monitoring Well (Survey 1/22/2019) — Well Name / Boring Name
- Drilled and Abandoned Borehole — Boring Name
- 2018 Imagery Boundary
- Exploration Areas for KIF-102
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)
- Polishing Pond (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Exploration Borings were drilled to refusal/bedrock.

Stantec TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\Hydro_Geo_Tech_Memos\KIF_TM_HGI_ExhA1_SiteMap.mxd Revised: 2020-06-25 By: mbough

APPENDIX B - TABLES

Table B.1 - Summary of Monitoring Well Construction Specifications
Kingston Fossil Plant
October - November 2018

Well ID	Top of Casing		Bottom of Well			Screened Interval					
	Stickup	Elevation	Depth	Depth	Elevation	Depth Top	Depth Bottom	Depth Top	Depth Bottom	Elevation Top	Elevation Bottom
	ft ags	ft NGVD29	ft bgs	ft btoc	ft NGVD29	ft bgs	ft bgs	ft btoc	ft btoc	ft NGVD29	ft NGVD29
KIF-103	3.6	760.33	35.5	39.1	721.2	25.5	35.1	29.1	38.7	731.2	721.6
KIF-104	3.5	758.60	35.1	38.6	720.0	24.6	34.6	28.1	38.1	730.5	720.5
KIF-105	3.5	756.56	45.5	49.0	707.6	35.1	45.1	38.6	48.6	718.0	708.0
KIF-106	3.6	761.27	39.5	43.1	718.2	29.1	39.1	32.7	42.7	728.6	718.6

Notes:

ags	above ground surface
bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
NGVD29	National Geodetic Vertical Datum of 1929

1. Measurement data are from Well Installation Details (Appendix C.2).
2. Wells were surveyed on January 22, 2019.

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Table B.2 - Summary of Well Development Data
Kingston Fossil Plant
December 2018 - January 2019

Well ID	pH		Turbidity		Specific Conductance		Temperature	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
			NTU	NTU	uS/cm	uS/cm	DEG C	DEG C
KIF-103	6.35	6.00	>1,000	2.44	537	385	16.48	16.15
KIF-104	8.42	5.03	35.9	1.97	332	1,606	18.76	17.12
KIF-105	6.00	5.79	5.46	2.04	1,092	1,141	16.52	18.88
KIF-106	6.62	7.00	888	3.55	541	496	17.09	12.78

Notes:

>	result greater than
DEG C	degrees Celsius
ID	identification
NTU	Nephelometric Turbidity Unit
uS/cm	microSiemens per centimeter

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Table B.3 - Summary of Hydraulic Conductivity Testing Results
Kingston Fossil Plant
May - June 2019 and January 2020

Well ID	Saturated Thickness	Number of Tests: Falling Head	Number of Tests: Rising Head	Average Hydraulic Conductivity	Average Hydraulic Conductivity
	ft			ft/day	cm/s
KIF-103	16.0 and 19.0	3	2	0.2574	9.10E-05
KIF-104	18.6	1	1	0.0093	3.30E-06
KIF-105	14.0	3	3	4.5793	1.60E-03
KIF-106	34.1	3	3	1.4430	5.10E-04

Notes:

cm/s — centimeters per second
ft — feet
ID — identification

Stantec

Table B.4 - Summary of Pump Installation Details
Kingston Fossil Plant
December 2018 - January 2019

Well ID	Top of Casing Elevation	Bottom of Well		Groundwater Level		Pump Intake		Water Column Above Intake
		Depth	Elevation	Depth	Elevation	Depth	Elevation	
	ft NGVD29	ft btoc	ft NGVD29	ft btoc	ft NGVD29	ft btoc	ft NGVD29	ft
KIF-103	760.33	39.1	721.2	23.6	736.73	34.0	726.3	10.4
KIF-104	758.60	38.6	720.0	19.5	739.1	33.0	725.6	13.5
KIF-105	756.56	49.0	707.6	9.1	747.46	43.0	713.6	33.9
KIF-106	761.27	43.1	718.2	10.2	751.07	38.0	723.3	27.8

Notes:

btoc	below top of casing
ft	feet
NGVD29	National Geodetic Vertical Datum of 1929

1. Wells were surveyed on January 22, 2019.

2. Depth data are from *QED Well Wizard Dedicated Sampling Pump Installation Checklists* dated December 20, 2018 - January 16, 2019. Depth to groundwater level was measured prior to pump insertion. Pump intake and water column above intake rounded to nearest 0.1 foot.

Table B.5 - Summary of Monitoring Well Survey Data
Kingston Fossil Plant
January 2019

Well ID	TN State Plane Northing	TN State Plane Easting	Latitude	Longitude	Ground Surface Elevation
	ft NAD83	ft NAD83	DMS NAD83	DMS NAD83	ft NGVD29
KIF-103	575,021.43	2,410,351.42	N35°54'13.63"	W84°30'28.75"	756.7
KIF-104	575,765.61	2,411,402.90	N35°54'20.83"	W84°30'15.83"	755.1
KIF-105	574,819.38	2,408,462.83	N35°54'11.92"	W84°30'51.74"	753.0
KIF-106	574,439.09	2,408,024.18	N35°54'8.22"	W84°30'57.15"	757.6

Notes:

DMS	Degrees, Minutes, Seconds
ft	feet
ID	identification
NAD83	North American Datum of 1983
NGVD29	National Geodetic Vertical Datum of 1929
TN	Tennessee

1. Wells were surveyed on January 22, 2019. Coordinates are for the top of well casing, except ground surface elevation which is adjacent to the concrete well pad. State Plane coordinates rounded to the nearest 0.01 feet. Latitude and Longitude rounded to the nearest 0.01 degree. Ground surface elevations rounded to the nearest 0.1 feet.

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APPENDIX C – SUBSURFACE LOGS AND WELL INSTALLATION DETAILS

ATTACHMENT C.1

Subsurface Logs

Subsurface Boring Legend

Lithology Graphics

Symbol	Lithology
	Fill
	Top Soil
	Gravel
	Well Graded Gravel (GW)
	Poorly Graded Gravel (GP)
	Silty Gravel (GM)
	Silty, Clayey Gravel (GC-GM)
	Clayey Gravel (GC)
	Well Graded Gravel with Silt (GW-GM)
	Well Graded Gravel with Clay (GW-GC)
	Poorly Graded Gravel with Silt (GP-GM)
	Poorly Graded Gravel with Clay (GP-GC)
	Well Graded Sand (SW)
	Poorly Graded Sand (SP)
	Silty Sand (SM)
	Silty, Clayey Sand (SC-SM)
	Clayey Sand (SC)
	Well Graded Sand with Silt (SW-SM)
	Well Graded Sand with Clay (SW-SC)
	Poorly Graded Sand with Silt (SP-SM)
	Poorly Graded Sand with Clay (SP-SC)
	Silt (ML)
	Silty Clay (CL-ML)
	Lean Clay (CL)
	Organic Silt (OL)
	Elastic Silt (MH)
	Fat Clay (CH)
	Organic Clay (OH)
	Shale
	Siltstone
	Coal
	Limestone
	Sandstone

Lithology Graphics are based on TVA drafting standards.

Other Graphics

Symbol	Description
	Denotes environmental analytical sample interval
	Denotes SS sample interval
	Denotes ST sample interval
	Denotes DP sample interval
	Denotes RS sample interval
	Denotes RC sample interval
∇	First water level reading
▼	Second water level reading

Common Abbreviations

Abbreviation	Definition
DP	Direct Push
HA	Hand Auger
HSA	Hollow Stem Auger
N/A	Not Applicable
NR	Not Recorded
RC	Rock Core
RQD	Rock Quality Designation
RS	Rotary Sonic
SS	Split Spoon
ST	Shelby Tube
WH	Weight of Hammer
WR	Weight of Rod

General Notes

The boring logs include sample numbering used during drilling. For assigned Environmental Analytical Sample ID numbers, see relevant Environmental Chain-of- Custody forms from the drilling date range listed on each log.

For pH readings and additional field data, see applicable field documentation (e.g., Soil pH Data Form) from the drilling date range listed on each log.

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-102**
Client	Tennessee Valley Authority	Boring Location	576,056.37 N; 2,406,617.47 E NAD83
Project Number	175668043	Surface Elevation	790.6 ft; Elevation Datum: NGVD29
Project Name	KIF TDEC Order	Date Started	11/5/18; Completed: 11/5/18
Project Location	Harriman, Tennessee	Depth to Water	N/A; Date/Time: N/A
Inspector	G. Budd; Logger: G. Budd	Depth to Water	N/A; Date/Time: N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 850XR, #953

Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" HSA, 3" SS w/o liners

Rock Drilling and Sampling Tools (Type and Size): N/A

Overdrill Tooling (Type and Size): N/A; Overdrill Depth: N/A

Sampler Hammer Type: Automatic; Weight: 140; Drop: 30; Efficiency: N/A

Borehole Azimuth: N/A (Vertical); Borehole Inclination (from Vertical): N/A

Reviewed By: C. Kocka; Approved By: L. Price

Lithology Depth Ft[3]	Elevation	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	790.6	Top of Hole				
0.3	790.3	Grass and Topsoil with gravel, trace asphalt				
		LEAN CLAY, CL, 7.5YR 4/4 (brown), low plasticity, firm, moist, with fragments of siltstone	SS01G	0.0 - 1.5	1.3	7-4-5
		Color change to 7.5YR 4/6 (strong brown) at 1.5'	SS02G	1.5 - 3.0	1.4	3-6-7
			SS03G	3.0 - 4.5	1.5	5-10-15
		Color change to 10YR 4/6 (dark yellowish brown), dry, with abundent weathered interbedded siltstone, shale, sandstone at 4.5'	SS04G	4.5 - 6.0	1.5	10-30-28
7.5	783.1	Color change to 10YR 5/6 (yellowish brown), hard, weathered siltstone at 6.0'	SS05G	6.0 - 7.5	1.5	24-36-45
		Siltstone, brown and gray, hard, weathered	SS06G	7.5 - 8.3	0.8	31-50+/4"
9.8	780.8		SS07G	9.0 - 9.8	0.8	43-50+/4"

Refusal /
Bottom of Hole at 9.8 Ft.

Top of Rock = 7.5 Ft.
Top of Rock Elevation = 783.1 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No.: **KIF-102a**
Client: Tennessee Valley Authority
Boring Location: 576,046.37 N; 2,406,617.47 E NAD83
Project Number: 175668043
Surface Elevation: 789.8 ft
Elevation Datum: NGVD29
Project Name: KIF TDEC Order
Date Started: 11/6/18
Completed: 11/6/18
Project Location: Harriman, Tennessee
Depth to Water: N/A
Date/Time: N/A
Inspector: G. Budd
Logger: G. Budd
Depth to Water: N/A
Date/Time: N/A
Drilling Contractor: Stantec Consulting Services Inc.
Drill Rig Type and ID: CME 850XR, #953
Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" HSA, 3" SS w/o liners
Rock Drilling and Sampling Tools (Type and Size): N/A
Overdrill Tooling (Type and Size): N/A
Overdrill Depth: N/A
Sampler Hammer Type: Automatic
Weight: 140
Drop: 30
Efficiency: N/A
Borehole Azimuth: N/A (Vertical)
Borehole Inclination (from Vertical): N/A
Reviewed By: C. Kocka
Approved By: L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	789.8		Top of Hole				
0.3	789.5		Grass and Topsoil with gravel, trace asphalt				
			LEAN CLAY, CL, 7.5YR 4/4 (brown), low plasticity, soft, moist, with fragments of siltstone, organics. Color change to 7.5YR 4/6 (strong brown) at 1.5'	SS01G	0.0 - 1.5	1.5	2-1-2
				SS02G	1.5 - 3.0	1.1	3-3-6
				SS03G	3.0 - 4.5	1.5	6-9-12
			Color change to 10YR 4/6 (dark yellowish brown) with interbedded fragments of siltstone and shale at 4.5'	SS04G	4.5 - 6.0	1.5	8-9-18
7.3	782.5			SS05G	6.0 - 7.5	1.5	11-15-27
			Siltstone, brown and gray, very stiff to hard, dry, weathered with some clay	SS06G	7.5 - 9.0	1.5	20-32-27
10.2	779.6			SS07G	9.0 - 10.2	1.2	20-41-50+/2"

No Refusal /
Bottom of Hole at 10.2 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID: N/A | Stantec Boring No. **KIF-103**

Client: Tennessee Valley Authority | Boring Location: 575,021.43 N; 2,410,351.42 E NAD83

Project Number: 175668043 | Surface Elevation: 756.7 ft | Elevation Datum: NGVD29

Project Name: KIF TDEC Order | Date Started: 10/2/18 | Completed: 10/3/18

Project Location: Harriman, Tennessee | Depth to Water: 28.0 ft | Date/Time: 10/3/18

Inspector: G. Budd | Logger: G. Budd | Depth to Water: N/A | Date/Time: N/A

Drilling Contractor: Stantec Consulting Services Inc. | Drill Rig Type and ID: CME 850 Track

Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" HSA, 2" SS w/o liners

Rock Drilling and Sampling Tools (Type and Size): N/A

Overdrill Tooling (Type and Size): 8-1/4" HSA overdrill of boring | Overdrill Depth: 35.5 ft

Sampler Hammer Type: Automatic | Weight: 140 | Drop: 30 | Efficiency: N/A

Borehole Azimuth: N/A (Vertical) | Borehole Inclination (from Vertical): N/A

Reviewed By: C. Kocka | Approved By: L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	756.7		Top of Hole				
3.2	753.5		LEAN CLAY, CL, 5YR 5/6 (yellowish red), soft, dry, with grass sod, [FILL] Fragments of tan chert from 0.0' to 1.5' Limestone gravel fragments and chert from 1.5' to 3.2'	SS01	0.0 - 1.5	0.9	4-3-2
				SS02	1.5 - 3.0	0.4	2-2-4
7.2	749.5		POORLY GRADED GRAVEL, GP, loose, dry, limestone, [FILL]	SS03	3.0 - 4.5	1.3	6-10-14
				SS04	4.5 - 6.0	1.0	11-8-11
				SS05	6.0 - 7.5	0.8	7-5-3
7.7	749.0		WELL GRADED SAND, SW, loose, dry, [FILL]				
9.4	747.3		LEAN CLAY, CL, 5YR 4/6 (yellowish red), soft, moist, with coal fragments	SS06	7.5 - 9.0	1.0	2-1-2
9.6	747.1		SAND, SM, 10YR 5/1 (gray), fine, loose, dry	SS07	9.0 - 10.5	0.9	1-1-2
11.0	745.7		LEAN CLAY, CL, 7.5YR 6/1 (gray) and 7.5YR 5/8 (strong brown), soft, moist, mottled				
13.5	743.2		LEAN CLAY, CL, 10YR 5/4 (yellowish brown), firm to stiff, moist, with weathered siltstone fragments	SS08	10.5 - 12.0	1.2	2-6-5
				SS09	12.0 - 13.5	0.9	4-6-7
15.9	740.8		LEAN CLAY, CL, 10YR 4/1 (dark gray), firm to stiff, moist, with interbedded fragments of limestone and siltstone	SS10	13.5 - 15.0	0.9	13-13-15
				SS11	15.0 - 16.5	1.4	10-5-3
18.0	738.7		FAT CLAY, CH, 7.5YR 5/6 (strong brown), soft to stiff, moist, with trace very fine sand	SS12	16.5 - 18.0	1.4	3-4-7
			FAT CLAY, CH, 7.5YR 5/6 (strong brown), soft, moist, with trace very fine sand	SS13	18.0 - 19.5	1.4	1-3-3

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

Client Borehole ID	N/A	Stantec Boring No.	**KIF-103**
Client	Tennessee Valley Authority	Boring Location	575,021.43 N; 2,410,351.42 E NAD83
Project Number	175668043	Surface Elevation	756.7 ft
		Elevation Datum	NGVD29

Lithology: Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
			FAT CLAY, CH, 7.5YR 5/6 (strong brown), soft, moist, with trace very fine sand *(Continued)*	SS14	19.5 - 21.0	0.6	2-3-4
				SS15	21.0 - 22.5	0.6	6-7-7
23.1	733.6						
			LEAN CLAY, CL, 10YR 4/1 (dark gray), soft, moist, with interbedded fragments of limestone and siltstone	SS16	22.5 - 24.0	1.5	3-4-5
				SS17	24.0 - 25.5	0.9	3-3-4
				SS18	25.5 - 27.0	1.5	2-3-4
				SS19	27.0 - 28.5	1.5	4-5-5
▽28.0	728.7						
28.5	728.2						
			LEAN CLAY, CL, 10YR 4/1 (dark gray), soft to stiff, moist to wet, with interbedded fragments of limestone and siltstone, with very fine sand	SS20	28.5 - 30.0	1.5	WH-WH-WH
			LEAN CLAY, CL, 10YR 4/6 (dark yellowish brown) and 10YR 5/2 (grayish brown), soft, moist, mottled, with fine sand	SS21	30.0 - 31.5	1.5	WH-3-4
			Soft to medium stiff from 31.5' to 33.0'	SS22	31.5 - 33.0	1.5	WH-2-7
33.0	723.7						
			SANDY LEAN CLAY, CL, 10YR 4/6 (dark yellowish brown) and 10YR 5/2 (grayish brown), soft to stiff, mottled, with trace fine subrounded gravel	SS23	33.0 - 34.5	1.5	3-4-7
34.5	722.2						
			CLAYEY SAND, SC, 10YR 5/1 (gray) and 10YR 5/6 (yellowish brown), very loose to loose, moist, mottled	SS24	34.5 - 36.0	1.5	3-5-7
36.0	720.7						

No Refusal /
Bottom of Hole at 36.0 Ft.

Boring converted to 4-inch monitoring well. See well installation notes.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

Client Borehole ID	N/A	Stantec Boring No.	**KIF-104**
Client	Tennessee Valley Authority	Boring Location	575,781.72 N; 2,411,399.23 E NAD83
Project Number	175668043	Surface Elevation	754.5 ft
		Elevation Datum	NGVD29
Project Name	KIF TDEC Order	Date Started	10/1/18
		Completed	10/1/18
Project Location	Harriman, Tennessee	Depth to Water	28.5 ft
		Date/Time	10/1/18
Inspector	G. Budd	Depth to Water	N/A
Logger	G. Budd	Date/Time	N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 850 Track
Overburden Drilling and Sampling Tools (Type and Size)	4-1/4" HSA, 2" SS w/o liners		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	N/A	Overdrill Depth	N/A
Sampler Hammer Type	Automatic	Weight	140
Drop	30	Efficiency	N/A
Borehole Azimuth	N/A (Vertical)	Borehole Inclination (from Vertical)	N/A
Reviewed By	E. Smith	Approved By	C. Kocka

Lithology Depth Ft[3]	Elevation	Description
0.0	754.5	Top of Hole
6.9	747.6	POORLY GRADED GRAVEL, GP, loose, dry, limestone, [FILL] Brown sand from 6.0' to 6.9'
7.3	747.2	LEAN CLAY, CL, 7.5YR 3/3 (dark brown), firm to stiff, dry
10.0	744.5	SILTY SAND, SM, 7.5YR 2.5/1 (black), loose, dry, [CCR] Medium dense from 7.5' to 10.0' Moist from 9.0' to 10.0'
10.5	744.0	POORLY GRADED SAND WITH SILT, SP-SM, 10YR 6/4 (light yellowish brown) to 10YR 3/4 (dark yellowish brown), fine to medium, moist, [CCR]
12.5	742.0	POORLY GRADED SAND, SP, 10YR 2/1 (black), medium dense, moist, fine to coarse, [CCR] Wet from 12.0' to 12.5'
14.6	739.9	LEAN CLAY, CL, 10YR 5/4 (yellowish brown), soft to stiff, moist, with weathered siltstones, fragments Soft from 13.5' to 14.6'
15.0	739.5	FAT CLAY, CH, 5YR 4/6 (yellowish red), soft, with fine sand
16.5	738.0	No recovery from 15.0' to 16.5'
		SANDY FAT CLAY, CH, 5YR 4/6 (yellowish red), low plasticity, soft, moist

Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
SS01G	0.0 - 1.5	1.0	5-5-6
SS02G	1.5 - 3.0	0.8	8-6-6
SS03G	3.0 - 4.5	0.9	6-2-3
SS04G	4.5 - 6.0	0.2	6-5-7
SS05aG	6.0 - 6.9	1.3	5-8-9
SS05bG	6.9 - 7.5		
SS06G	7.5 - 9.0	1.3	18-17-23
SS07G	9.0 - 10.5	1.5	23-12-11
SS08G	10.5 - 12.0	1.5	10-14-12
SS09aG	12.0 - 12.5	1.1	11-4-6
SS09bG	12.5 - 13.5		
SS10G	13.5 - 15.0	1.4	3-4-5
SS11G	15.0 - 16.5	0.0	2-4-4
SS12G	16.5 - 18.0	1.5	3-7-7
SS13G	18.0 - 19.5	1.5	2-2-4

SUBSURFACE LOG

Client Borehole ID N/A | Stantec Boring No. **KIF-104**
Client Tennessee Valley Authority | Boring Location 575,781.72 N; 2,411,399.23 E NAD83
Project Number 175668043 | Surface Elevation 754.5 ft | Elevation Datum NGVD29

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] / RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
21.0	733.5		SANDY FAT CLAY, CH, 5YR 4/6 (yellowish red), low plasticity, soft, moist *(Continued)*	SS14G	19.5 - 21.0	1.3	2-2-3
22.5	732.0		CLAYEY SAND, SC, 5YR 4/6 (yellowish red), very fine to fine, loose, moist	SS15G	21.0 - 22.5	1.5	2-3-4
24.0	730.5		SANDY FAT CLAY, CH, 5YR 4/6 (yellowish red), very fine, very soft, moist	SS16G	22.5 - 24.0	1.4	WH-WH-WH
28.5	726.0		CLAYEY SAND, SC, 5YR 5/8 (yellowish red), very fine to fine, very loose, moist	SS17G	24.0 - 25.5	1.5	WH-WH-WH
				SS18G	25.5 - 27.0	1.5	WH-WH-WH
				SS19G	27.0 - 28.5	1.5	WH-WH-WH
33.7	720.8		SILTY SAND, SM, 7.5YR 4/1 (dark gray), very fine to fine, very loose, wet	SS20G	28.5 - 30.0	1.5	WH-WH-1
				SS21G	30.0 - 31.5	1.5	WH-WH-WH
				SS22G	31.5 - 33.0	1.5	WH-WH-WH
				SS23aG	33.0 - 33.7	1.5	WH-2-2
36.0	718.5		SANDY LEAN CLAY, CL, 10YR 5/1 (gray) and 10YR 3/4 (dark yellowish brown), very soft to soft, mottled, with trace manganese	SS23bG	33.7 - 34.5		
				SS24G	34.5 - 36.0	1.5	WH-2-3

No Refusal /
Bottom of Hole at 36.0 Ft.

Boring abandoned and backfilled with grout due to presence of CCR material. An off-set boring was advanced using 4-1/4 HSA and 8-1/4 HSA to 20'. 10-inch PVC casing is set to 20' bgs and backfilled with grout. The boring was then advanced to depth through the casing using 6"x8" roto-sonic drilling methods. The boring was advanced to a final depth of 36' bgs to facilitate the installation of monitoring well KIF-104.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No. **KIF-104b**
Client: Tennessee Valley Authority
Boring Location: 575,765.61 N; 2,411,402.90 E NAD83
Project Number: 175668043
Surface Elevation: 755.1 ft
Elevation Datum: NGVD29
Project Name: KIF TDEC Order
Date Started: 10/29/18
Completed: 10/30/18
Project Location: Harriman, Tennessee
Depth to Water: N/A
Date/Time: N/A
Inspector: B. Evans
Logger: B. Evans
Depth to Water: N/A
Date/Time: N/A
Drilling Contractor: Stantec / M&W Drilling
Drill Rig Type and ID: CME 850XR #853/Geoprobe 8150LS Sonic
Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" & 8-1/4" HSA to 20'; 6"x8" Sonic to depth
Rock Drilling and Sampling Tools (Type and Size): N/A
Overdrill Tooling (Type and Size): N/A
Overdrill Depth: N/A
Sampler Hammer Type: N/A
Weight: N/A
Drop: N/A
Efficiency: N/A
Borehole Azimuth: N/A (Vertical)
Borehole Inclination (from Vertical): N/A
Reviewed By: E. Smith
Approved By: C. Kocka

Lithology			Description	Overburden:	Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core:	RQD %	Run Ft	Rec. Ft	Rec. %
0.0	755.1		Top of Hole					
			Boring offset due to CCR encountered in KIF-104. Overburden not sampled. See KIF-104 boring log for overburden sampling.					

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/8/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-104b**
Client	Tennessee Valley Authority	Boring Location	575,765.61 N; 2,411,402.90 E NAD83
Project Number	175668043	Surface Elevation	755.1 ft
		Elevation Datum	NGVD29

Lithology			Description	Overburden:	Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core:	RQD %	Run Ft	Rec. Ft	Rec. %
35.0	720.1		Boring offset due to CCR encountered in KIF-104. Overburden not sampled. See KIF-104 boring log for overburden sampling. *(Continued)*					

30
31
32
33
34
35

No Refusal /
Bottom of Hole at 35.0 Ft.

Monitoring Well KIF-104 installed in boring. Refer to KIF-104 Well Installation Detail dated 10/30/18.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-105**
Client	Tennessee Valley Authority	Boring Location	574,807.16 N; 2,408,437.15 E NAD83
Project Number	175668043	Surface Elevation	751.5 ft — Elevation Datum: NGVD29
Project Name	KIF TDEC Order	Date Started	10/23/18 — Completed: 10/23/18
Project Location	Harriman, Tennessee	Depth to Water	19.3 ft — Date/Time: 10/23/18 12:38
Inspector	G. Budd — Logger: G. Budd	Depth to Water	N/A — Date/Time: N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 850XR, #953

Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" HSA, 2" SS w/o liners, 3" Shelby Tubes

Rock Drilling and Sampling Tools (Type and Size): N/A

Overdrill Tooling (Type and Size): N/A — Overdrill Depth: N/A

Sampler Hammer Type: Automatic — Weight: 140 — Drop: 30 — Efficiency: N/A

Borehole Azimuth: N/A (Vertical) — Borehole Inclination (from Vertical): N/A

Reviewed By: C. Kocka — Approved By: L. Price

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] / RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	751.5		Top of Hole				
3.0	748.5		Placed crushed run and rip rap stone, no sample collected, [FILL]	SS01	0.0 - 1.5		N/A
				SS02	1.5 - 3.0		N/A
4.3	747.2		SP, Placed sand fill, fine to coarse grained, [FILL]	SS03	3.0 - 4.5	1.0	12-4-6
6.0	745.5		LEAN CLAY, CL, 10YR 4/4 (dark yellowish brown), firm to stiff, moist, [CCR] With bottom ash from 4.3' to 4.6' Soft, with organics, fragmented shale and siltstone from 4.5' to 4.6'	SS04	4.5 - 6.0	1.2	2-1-4
7.5	744.0		LEAN CLAY, CL, 10YR 4/6 (dark yellowish brown), firm to stiff, moist Fragments of weathered siltstone and shale from 6.0' to 7.5'	SS05	6.0 - 7.5	0.8	5-5-8
12.0	739.5		LEAN CLAY, CL, 10YR 4/1 (dark gray), firm to stiff, moist Fragments of limestone from 7.5' to 9.0'	SS06	7.5 - 9.0	0.6	5-3-6
			Stiff with fragments of limestone and siltstone from 9.0' to 10.5'	SS07	9.0 - 10.5	1.0	3-10-13
			Very stiff to hard with highly weathered shale from 10.5' to 12.0'	SS08	10.5 - 12.0	1.1	9-11-39
13.5	738.0		WELL GRADED SAND, SW, 10YR 4/1 (dark gray), medium dense, wet, angular to subangular, with fragments of wood, shale, and limestone	SS09	12.0 - 13.5	0.6	15-11-13

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/6/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-105**
Client	Tennessee Valley Authority	Boring Location	574,807.16 N; 2,408,437.15 E NAD83
Project Number	175668043	Surface Elevation	751.5 ft
		Elevation Datum	NGVD29

Depth Ft[3]	Elevation	Description	Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
		LEAN CLAY, CL, 10YR 4/2 (dark grayish brown), stiff to very stiff, wet, interbedded weathered limestone, shale, and siltstone *(Continued)* Fragments of wood from 13.5' to 13.8' Stiff to medium stiff from 15.0' to 16.5'	SS10	13.5 - 15.0	1.3	16-11-19
16.5	735.0		SS11	15.0 - 16.5	1.2	13-7-5
18.0	733.5	Limestone Shale, moderately hard, highly weathered, wet, interbedded, clayey	SS12	16.5 - 18.0	0.5	6-7-7
		LEAN CLAY, CL, 10YR 4/2 (dark grayish brown), soft, wet, with highly weathered shale fragments and wood pieces from 18.0' to 19.5'	SS13	18.0 - 19.5	0.7	3-3-4
21.0	730.5	Soft to medium stiff with highly weathered shale fragments from 19.5' to 21.0'	SS14	19.5 - 21.0	0.5	3-8-6
		Limestone Shale, moderately hard, weathered, wet, interbedded	SS15	21.0 - 22.5	0.4	3-5-8
		Soft with some clay from 22.5' to 24.0'	SS16	22.5 - 24.0	0.8	2-4-4
		Highly weathered and soft from 24.0' to 26.7'	SS17	24.0 - 25.5	0.7	3-1-2
26.7	724.8		SS18	25.5 - 27.0	1.3	1-1-1
27.0	724.5	SILTY FAT CLAY, CH, 10YR 4/2 (dark grayish brown), soft, wet, trace very fine sand				
28.5	723.0	FAT CLAY, CH, 10YR 4/2 (dark grayish brown), very soft, wet, with trace organics	SS19	27.0 - 28.5	1.2	WH-WH-3
		FAT CLAY, CH, 10YR 5/4 (yellowish brown), very soft, wet With some very fine sand from 28.5' to 30.0'	SS20	28.5 - 30.0	1.4	WH-WH-2
31.0	720.5	Soft from 30.0' to 31.5'	SS21	30.0 - 31.5	1.5	2-2-1
31.5	720.0	CLAYEY SAND, SC, 10YR 5/4 (yellowish brown) and 10YR 5/1 (gray), fine, very loose, wet				
		POORLY GRADED SAND, SP, 10YR 5/4 (yellowish brown), fine to medium, very loose to loose, wet	SS22	31.5 - 33.0	1.4	WH-3-5

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/6/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-105**
Client	Tennessee Valley Authority	Boring Location	574,807.16 N; 2,408,437.15 E NAD83
Project Number	175668043	Surface Elevation	751.5 ft
		Elevation Datum	NGVD29

Lithology				Overburden:	Sample[1,2]	Depth Ft[3]		Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic	Description	Rock Core:	RQD %	Run Ft		Rec. Ft	Rec. %
33 – 36.0	715.5		POORLY GRADED SAND, SP, 10YR 5/4 (yellowish brown), fine to medium, very loose to loose, wet *(Continued)* Shale fragments from 33.4' to 33.9' Trace manganese from 34.6' to 34.8'		SS23	33.0 - 34.5	33.0 - 34.5	1.5	1-3-4
					SS24	34.5 - 36.0	34.5 - 36.0	1.4	7-5-4

No Refusal /
Bottom of Hole at 36.0 Ft.

Boring abandoned backfilled with grout due to presence of CCR material, relocate boring ~5' south and advance 4-1/4 HSA and 8-1/4 HSA to 12' and set 10-inch PVC casing backfilled with grout. The boring was then advanced to depth through the casing using 6"x8" roto-sonic drilling methods. The boring was advance to a final depth of 45' bgs to facilitate the installation of monitoring well KIF-105.

As-drilled location not surveyed. Horizontal coordinates based on proposed boring location and vertical coordinates based on 2017 LIDAR surfaces.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-105b**
Client	Tennessee Valley Authority	Boring Location	574,819.38 N; 2,408,462.83 E NAD83
Project Number	175668043	Surface Elevation	753.0 ft
		Elevation Datum	NGVD29
Project Name	KIF TDEC Order	Date Started	10/23/18
		Completed	10/31/18
Project Location	Harriman, Tennessee	Depth to Water	N/A
		Date/Time	N/A
Inspector	B. Evans	Depth to Water	N/A
Logger	B. Evans	Date/Time	N/A
Drilling Contractor	Stantec / M&W Drilling	Drill Rig Type and ID	CME 850XR #853/Geoprobe 8150LS Sonic
Overburden Drilling and Sampling Tools (Type and Size)	4-1/4" & 8-1/4" HSA to 12'; 6"x8" Sonic to depth		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	N/A	Overdrill Depth	N/A
Sampler Hammer Type	N/A	Weight	N/A
Drop	N/A	Efficiency	N/A
Borehole Azimuth	N/A (Vertical)	Borehole Inclination (from Vertical)	N/A
Reviewed By	E. Smith	Approved By	C. Kocka

Lithology			Description	Overburden: Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core: RQD %	Run Ft	Rec. Ft	Rec. %
0.0	753.0		Top of Hole				
			Boring offset due to CCR encountered in KIF-105. Overburden not sampled. See KIF-105 boring log for overburden sampling to 36.0' bgs.				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

SUBSURFACE LOG

Client Borehole ID N/A
Client Tennessee Valley Authority
Project Number 175668043

Stantec Boring No. **KIF-105b**
Boring Location 574,819.38 N; 2,408,462.83 E NAD83
Surface Elevation 753.0 ft
Elevation Datum NGVD29

Lithology			Description	Overburden:	Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core:	RQD %	Run Ft	Rec. Ft	Rec. %
45.0	708.0		Boring offset due to CCR encountered in KIF-105. Overburden not sampled. See KIF-105 boring log for overburden sampling to 36.0' bgs. *(Continued)*					

No Refusal /
Bottom of Hole at 45.0 Ft.

Monitoring Well KIF-105 installed in boring. Refer to KIF-105b Well Installation Detail dated 10/30/18.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/8/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-106**
Client	Tennessee Valley Authority	Boring Location	574,427.76 N; 2,408,031.06 E NAD83
Project Number	175668043	Surface Elevation	748.6 ft — Elevation Datum: NGVD29
Project Name	KIF TDEC Order	Date Started	10/18/18 — Completed: 10/22/18
Project Location	Harriman, Tennessee	Depth to Water	25.3 ft — Date/Time: 10/18/18 15:00
Inspector	G. Budd — Logger: G. Budd	Depth to Water	N/A — Date/Time: N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 850XR, #953

Overburden Drilling and Sampling Tools (Type and Size): 4-1/4" HSA, 2" SS w/o liners, 3" Shelby Tubes

Rock Drilling and Sampling Tools (Type and Size): N/A

Overdrill Tooling (Type and Size): N/A — Overdrill Depth: N/A

Sampler Hammer Type: Automatic — Weight: 140 — Drop: 30 — Efficiency: N/A

Borehole Azimuth: N/A (Vertical) — Borehole Inclination (from Vertical): N/A

Reviewed By: C. Kocka — Approved By: L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	748.6		Top of Hole				
3.0	745.6		Placed crush and run and riprap stone, no sample collected, [FILL]	SS01	0.0 - 1.5		N/A
				SS02	1.5 - 3.0		N/A
4.5	744.1		Placed sand auger cuttings, no sample collected, [FILL]	SS03	3.0 - 4.5	0.0	5-5-2
9.0	739.6		LEAN CLAY, CL, 5YR 4/6 (yellowish red), soft, moist, with fragments of siltstone	SS04	4.5 - 6.0	0.8	1-1-2
			Color change to 10YR 5/6 (yellowish brown) at 6.0'	SS05	6.0 - 7.5	0.6	1-1-1
			Color change to 5YR 4/6 (yellowish red) at 7.5'	SS06	7.5 - 9.0	0.3	1-WH-WH
			Bottom ash at 8.9', [CCR]				
9.7	738.9		SANDY LEAN CLAY, CL, 10YR 5/6 (yellowish brown) and 10YR 4/2 (dark grayish brown), soft, wet, with fragments of shale and trace bottom ash, [CCR]	SS07	9.0 - 10.5	1.5	1-1-1
			LEAN CLAY, CL, 5YR 4/6 (yellowish red), soft, moist, with abundant chert fragments Color change to 10YR 4/2 (dark grayish brown), stiff, wet, with fragments of limestone and chert at 10.5'	SS08	10.5 - 12.0	1.0	2-10-14
			Color change to 5YR 4/2 (dark reddish gray), firm to stiff, with fragments of shale at 12.0'	SS09	12.0 - 13.5	1.1	5-5-5
			Color change to 10YR 3/1 (very dark gray), hard, with weathered interbedded shale and siltstone at 13.5'				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/6/20

SUBSURFACE LOG

Client Borehole ID N/A
Client Tennessee Valley Authority
Project Number 175668043
Stantec Boring No. **KIF-106**
Boring Location 574,427.76 N; 2,408,031.06 E NAD83
Surface Elevation 748.6 ft
Elevation Datum NGVD29

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] / RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
			LEAN CLAY, CL, 5YR 4/6 (yellowish red), soft, moist, with abundant chert fragments *(Continued)*	SS10	13.5 - 15.0	0.7	22-49-27
16.5	732.1		Stiff, moist, with highly weathered shale at 15.0'	SS11	15.0 - 16.5	0.6	11-11-12
			No recovery	SS12	16.5 - 18.0	0.0	11-12-15
19.5	729.1			SS13	18.0 - 19.5	0.0	12-11-9
			LEAN CLAY, CL, 10YR 3/1 (very dark gray), soft, moist Weathered shale from 19.5' to 19.9' Soft, red brown weathered siltstone from 19.9' to 21.0'	SS14	19.5 - 21.0	1.0	2-4-4
			Color change to 10YR 4/3 (brown), with fragments of limestone and shale at 21.0'	SS15	21.0 - 22.5	0.8	3-5-3
			Firm to stiff, wet, with fragments of siltstone, shale, and limestone from 22.5' to 25.5'	SS16	22.5 - 24.0	0.6	6-13-5
			Soft at 24.0'	SS17	24.0 - 25.5	0.3	3-2-3
			Fragments of siltstone and shale from 25.5' to 28.5'	SS18	25.5 - 27.0	0.2	1-1-WH
28.5	720.1			SS19	27.0 - 28.5	0.7	WH-2-2
30.0	718.6		No recovery	SS20	28.5 - 30.0	0.0	1-3-4
			LEAN CLAY, CL, 10YR 4/3 (brown), soft, wet Fragments of siltstone, shale, and limestone from 30.0' to 31.5'	SS21	30.0 - 31.5	0.6	1-3-1
			Fragments of siltstone and shale from 31.5' to 36.0'	SS22	31.5 - 33.0	1.1	1-3-3

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/6/20

Client Borehole ID	N/A	Stantec Boring No.	**KIF-106**
Client	Tennessee Valley Authority	Boring Location	574,427.76 N; 2,408,031.06 E NAD83
Project Number	175668043	Surface Elevation	748.6 ft
		Elevation Datum	NGVD29

Lithology: Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
33–36			LEAN CLAY, CL, 10YR 4/3 (brown), soft, wet *(Continued)*	SS23	33.0 - 34.5	0.4	WH-WH-WH
				SS24	34.5 - 36.0	0.7	WH-1-1
36.0	712.6						

No Refusal /
Bottom of Hole at 36.0 Ft.

Boring abandoned backfilled with grout due to presence of CCR material, relocate boring ~5' north and advance 4-1/4 HSA, and 8-1/4 HSA to 15' and set 10-inch PVC casing backfilled with grout. The boring was then advanced to depth using 6"x8" roto-sonic drilling methods. The boring was advanced to 40' bgs to facilitate the installation of the monitoring well.

As-drilled location not surveyed. Horizontal coordinates based on proposed boring location and vertical coordinates based on 2017 LIDAR surfaces.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-106b**
Client	Tennessee Valley Authority	Boring Location	574,439.09 N; 2,408,024.18 E NAD83
Project Number	175668043	Surface Elevation	757.6 ft
		Elevation Datum	NGVD29
Project Name	KIF TDEC Order	Date Started	10/22/18
		Completed	11/1/18
Project Location	Harriman, Tennessee	Depth to Water	N/A
		Date/Time	N/A
Inspector	B. Evans	Depth to Water	N/A
Logger	B. Evans	Date/Time	N/A
Drilling Contractor	Stantec / M&W Drilling	Drill Rig Type and ID	CME 850XR #853/Geoprobe 8150LS Sonic
Overburden Drilling and Sampling Tools (Type and Size)	4-1/4" & 8-1/4" HSA to 15'; 6"x8" Sonic to depth		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	N/A	Overdrill Depth	N/A
Sampler Hammer Type	N/A	Weight	N/A
Drop	N/A	Efficiency	N/A
Borehole Azimuth	N/A (Vertical)	Borehole Inclination (from Vertical)	N/A
Reviewed By	E. Smith	Approved By	C. Kocka

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	757.6		Top of Hole				
			Boring offset due to CCR encountered in KIF-106. Overburden not sampled. See KIF-106 boring log for overburden sampling to 36.0' bgs.				

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-106b**
Client	Tennessee Valley Authority	Boring Location	574,439.09 N; 2,408,024.18 E NAD83
Project Number	175668043	Surface Elevation	757.6 ft — Elevation Datum NGVD29

Lithology			Description	Overburden:	Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core:	RQD %	Run Ft	Rec. Ft	Rec. %
35 36 37 38 39 40.0	717.6		Boring offset due to CCR encountered in KIF-106. Overburden not sampled. See KIF-106 boring log for overburden sampling to 36.0' bgs. *(Continued)*					

No Refusal /
Bottom of Hole at 40.0 Ft.

Monitoring Well KIF-106 installed in boring. Refer to KIF-106 Well Installation Detail dated 10/31/18.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 10/8/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB01**
Client	Tennessee Valley Authority	Boring Location	575,777.94 N; 2,406,720.24 E NAD83
Project Number	175668043	Surface Elevation	776.0 ft — Elevation Datum NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19 — Completed 7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A — Date/Time N/A
Inspector	C. Sexton — Logger C. Sexton	Depth to Water	N/A — Date/Time N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT

Overburden Drilling and Sampling Tools (Type and Size) DT37 Dual Tube Soil Sampling System w/ 60" PVC liners

Rock Drilling and Sampling Tools (Type and Size) N/A

Overdrill Tooling (Type and Size) N/A — Overdrill Depth N/A

Sampler Hammer Type GH70 Direct Push — Weight N/A — Drop N/A — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By C. Kocka — Approved By L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	776.0		Top of Hole				
0.0 – 4.0	776.0 – 772.0		CLAYEY SILT WITH GRAVEL, ML, 10YR 5/3 (brown) and 10GY 6/1 (greenish gray), low to medium plasticity, loose, dry, iron oxide staining	DP01	0.0 - 5.0	4.6	N/A
4.0 – 6.4	772.0 – 769.6		SILTY FAT CLAY SOME GRAVEL, CL, 5Y 5/2 (olive gray), medium to high plasticity, soft, moist, iron oxide staining				
6.4 – 8.6	769.6 – 767.4		SILTY FAT CLAY WITH GRAVEL, CH, 10GY 5/1 (greenish gray), very soft to very firm, moist to wet, iron oxide staining Wet from 6.8' to 7.1' Organic material from 8.2' to 8.5'	DP02	5.0 - 10.0	4.7	N/A
8.6 – 10.0	767.4 – 766.0		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, Weathered shale Bright green mineralization at 8.8', very fine				

Bedrock Refusal /
Bottom of Hole at 10.0 Ft.

Top of Rock = 10.0 Ft.
Top of Rock Elevation = 766.0 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No.: **KIF-TB02**
Client: Tennessee Valley Authority
Boring Location: 575,751.95 N; 2,406,699.77 E NAD83
Project Number: 175668043
Surface Elevation: 778.2 ft
Elevation Datum: NGVD29
Project Name: KIF TDEC Order
Date Started: 7/10/19
Completed: 7/10/19
Project Location: Harriman, Tennessee
Depth to Water: N/A
Date/Time: N/A
Inspector: C. Sexton
Logger: C. Sexton
Depth to Water: N/A
Date/Time: N/A
Drilling Contractor: Hawkston (Subcontractor)
Drill Rig Type and ID: Geoprobe 3230DT
Overburden Drilling and Sampling Tools (Type and Size): DT37 Dual Tube Soil Sampling System w/ 60" PVC liners
Rock Drilling and Sampling Tools (Type and Size): N/A
Overdrill Tooling (Type and Size): N/A
Overdrill Depth: N/A
Sampler Hammer Type: GH70 Direct Push
Weight: N/A
Drop: N/A
Efficiency: N/A
Borehole Azimuth: N/A
Borehole Inclination (from Vertical): N/A
Reviewed By: C. Kocka
Approved By: L. Price

Lithology Depth Ft[3]	Lithology Elevation	Lithology Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	778.2		Top of Hole				
0.0 - 2.6	778.2 - 775.6		CLAYEY SILT WITH GRAVEL, ML, 10YR 5/3 (brown) and 10GY 6/1 (greenish gray), low to medium plasticity, loose, dry, iron oxide staining	DP01	0.0 - 5.0	4.7	N/A
2.6 - 4.8	775.6 - 773.4		SILTY FAT CLAY SOME GRAVEL, CL, 5Y 5/2 (olive gray), medium to high plasticity, soft, moist, iron oxide staining				
4.8 - 8.8	773.4 - 769.4		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale	DP02	5.0 - 8.8	3.8	N/A

Bedrock Refusal /
Bottom of Hole at 8.8 Ft.

Top of Rock = 8.8 Ft.
Top of Rock Elevation = 769.4 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB03**
Client	Tennessee Valley Authority	Boring Location	575,905.47 N; 2,406,816.38 E NAD83
Project Number	175668043	Surface Elevation	769.5 ft
		Elevation Datum	NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19
		Completed	7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A
		Date/Time	N/A
Inspector	C. Sexton	Depth to Water	N/A
Logger	C. Sexton	Date/Time	N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT
Overburden Drilling and Sampling Tools (Type and Size)	DT37 Dual Tube Soil Sampling System w/ 60" PVC liners		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	N/A	Overdrill Depth	N/A
Sampler Hammer Type	GH70 Direct Push	Weight	N/A
Drop	N/A	Efficiency	N/A
Borehole Azimuth	N/A	Borehole Inclination (from Vertical)	N/A
Reviewed By	C. Kocka	Approved By	L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	769.5		Top of Hole				
0.3	769.2		Rock fill				
3.5	766.0		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale	DP01	0.0 - 3.5	2.6	N/A

Bedrock Refusal /
Bottom of Hole at 3.5 Ft.

Top of Rock = 3.5 Ft.
Top of Rock Elevation = 766.0 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No.: **KIF-TB04**
Client: Tennessee Valley Authority
Boring Location: 575,682.22 N; 2,406,649.55 E NAD83
Project Number: 175668043
Surface Elevation: 781.3 ft
Elevation Datum: NGVD29
Project Name: KIF TDEC Order
Date Started: 7/10/19
Completed: 7/10/19
Project Location: Harriman, Tennessee
Depth to Water: N/A
Date/Time: N/A
Inspector: C. Sexton
Logger: C. Sexton
Depth to Water: N/A
Date/Time: N/A
Drilling Contractor: Hawkston (Subcontractor)
Drill Rig Type and ID: Geoprobe 3230DT
Overburden Drilling and Sampling Tools (Type and Size): DT37 Dual Tube Soil Sampling System w/ 60" PVC liners
Rock Drilling and Sampling Tools (Type and Size): N/A
Overdrill Tooling (Type and Size): N/A
Overdrill Depth: N/A
Sampler Hammer Type: GH70 Direct Push
Weight: N/A
Drop: N/A
Efficiency: N/A
Borehole Azimuth: N/A
Borehole Inclination (from Vertical): N/A
Reviewed By: C. Kocka
Approved By: L. Price

Lithology: Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	781.3		Top of Hole				
1.4	779.9		CLAYEY SILT WITH GRAVEL, ML, 10YR 5/3 (brown) and 10GY 6/1 (greenish gray), low to medium plasticity, loose, dry, iron oxide staining	DP01	0.0 - 4.0	3.7	N/A
4.0	777.3		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale				

Bedrock Refusal /
Bottom of Hole at 4.0 Ft.

Top of Rock = 4.0 Ft.
Top of Rock Elevation = 777.3 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB05**
Client	Tennessee Valley Authority	Boring Location	575,663.31 N; 2,406,722.56 E NAD83
Project Number	175668043	Surface Elevation	773.6 ft — Elevation Datum NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19 — Completed 7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A — Date/Time N/A
Inspector	C. Sexton — Logger C. Sexton	Depth to Water	N/A — Date/Time N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT

Overburden Drilling and Sampling Tools (Type and Size) DT37 Dual Tube Soil Sampling System w/ 60" PVC liners

Rock Drilling and Sampling Tools (Type and Size) N/A

Overdrill Tooling (Type and Size) N/A — Overdrill Depth N/A

Sampler Hammer Type GH70 Direct Push — Weight N/A — Drop N/A — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By C. Kocka — Approved By L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	773.6		Top of Hole				
0.0 – 3.0	773.6 – 770.6		CLAYEY SILT WITH GRAVEL, ML, 10YR 5/3 (brown) and 10GY 6/1 (greenish gray), low to medium plasticity, loose to dense, dry to moist, iron oxide staining	DP01	0.0 - 5.0	4.5	N/A
3.0 – 5.0	770.6 – 768.6		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale				

Bedrock Refusal /
Bottom of Hole at 5.0 Ft.

Top of Rock = 5.0 Ft.
Top of Rock Elevation = 768.6 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB05a**
Client	Tennessee Valley Authority	Boring Location	575,645.11 N; 2,406,721.76 E NAD83
Project Number	175668043	Surface Elevation	774.1 ft; Elevation Datum: NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19; Completed: 7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A; Date/Time: N/A
Inspector	C. Sexton; Logger: C. Sexton	Depth to Water	N/A; Date/Time: N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT

Overburden Drilling and Sampling Tools (Type and Size): DT37 Dual Tube Soil Sampling System w/ 60" PVC liners

Rock Drilling and Sampling Tools (Type and Size): N/A

Overdrill Tooling (Type and Size): N/A; Overdrill Depth: N/A

Sampler Hammer Type: GH70 Direct Push; Weight: N/A; Drop: N/A; Efficiency: N/A

Borehole Azimuth: N/A; Borehole Inclination (from Vertical): N/A

Reviewed By: C. Kocka; Approved By: L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	774.1		Top of Hole				
2.7	771.4		CLAYEY SILT WITH GRAVEL, ML, 10YR 5/3 (brown) and 10GY 6/1 (greenish gray), low to medium plasticity, loose, dry, iron oxide staining	DP01	0.0 - 5.0	4.5	N/A
3.8	770.3		SILTY FAT CLAY SOME GRAVEL, CL, 5Y 5/2 (olive gray), medium to high plasticity, soft, moist, iron oxide staining				
5.0	769.1		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale				

Bedrock Refusal /
Bottom of Hole at 5.0 Ft.

Top of Rock = 5.0 Ft.
Top of Rock Elevation = 769.1 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

SUBSURFACE LOG

Stantec TVA

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB06**
Client	Tennessee Valley Authority	Boring Location	576,039.98 N; 2,406,841.56 E NAD83
Project Number	175668043	Surface Elevation	769.2 ft; Elevation Datum NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19; Completed 7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A; Date/Time N/A
Inspector	C. Sexton; Logger C. Sexton	Depth to Water	N/A; Date/Time N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT

Overburden Drilling and Sampling Tools (Type and Size) DT37 Dual Tube Soil Sampling System w/ 60" PVC liners

Rock Drilling and Sampling Tools (Type and Size) N/A

Overdrill Tooling (Type and Size) N/A Overdrill Depth N/A

Sampler Hammer Type GH70 Direct Push Weight N/A Drop N/A Efficiency N/A

Borehole Azimuth N/A Borehole Inclination (from Vertical) N/A

Reviewed By C. Kocka Approved By L. Price

Lithology Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	769.2		Top of Hole				
0.3	768.9		Rock fill and soil				
3.5	765.7		SILT, ML, 2.5Y 6/1 (gray) to N 8/ (white), coarse, loose to very dense, dry, fissured, Weathered shale	DP01	0.0 - 3.5	2.5	N/A

Bedrock Refusal /
Bottom of Hole at 3.5 Ft.

Top of Rock = 3.5 Ft.
Top of Rock Elevation = 765.7 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

TVA EIP BORING LOG 175668043_TVA_KIF_TDEC.GPJ TDEC SUBSURF DT 20190530.GDT 2/9/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB07**
Client	Tennessee Valley Authority	Boring Location	576,191.33 N; 2,406,888.79 E NAD83
Project Number	175668043	Surface Elevation	768.6 ft
		Elevation Datum	NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19
		Completed	7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A
		Date/Time	N/A
Inspector	C. Sexton	Depth to Water	N/A
Logger	C. Sexton	Date/Time	N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT
Overburden Drilling and Sampling Tools (Type and Size)	DT37 Dual Tube Soil Sampling System w/ 60" PVC liners		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	N/A	Overdrill Depth	N/A
Sampler Hammer Type	GH70 Direct Push	Weight	N/A
Drop	N/A	Efficiency	N/A
Borehole Azimuth	N/A	Borehole Inclination (from Vertical)	N/A
Reviewed By	C. Kocka	Approved By	L. Price

Lithology: Depth Ft[3]	Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
0.0	768.6		Top of Hole				
1.2	767.4		Asphalt and soil	DP01	0.0 - 3.0	2.4	N/A
3.0	765.6		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale				

Bedrock Refusal /
Bottom of Hole at 3.0 Ft.

Top of Rock = 3.0 Ft.
Top of Rock Elevation = 765.6 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**KIF-TB08**
Client	Tennessee Valley Authority	Boring Location	576,336.38 N; 2,406,930.54 E NAD83
Project Number	175668043	Surface Elevation	767.9 ft; Elevation Datum NGVD29
Project Name	KIF TDEC Order	Date Started	7/10/19; Completed 7/10/19
Project Location	Harriman, Tennessee	Depth to Water	N/A; Date/Time N/A
Inspector	C. Sexton; Logger C. Sexton	Depth to Water	N/A; Date/Time N/A
Drilling Contractor	Hawkston (Subcontractor)	Drill Rig Type and ID	Geoprobe 3230DT

Overburden Drilling and Sampling Tools (Type and Size) DT37 Dual Tube Soil Sampling System w/ 60" PVC liners

Rock Drilling and Sampling Tools (Type and Size) N/A

Overdrill Tooling (Type and Size) N/A Overdrill Depth N/A

Sampler Hammer Type GH70 Direct Push Weight N/A Drop N/A Efficiency N/A

Borehole Azimuth N/A Borehole Inclination (from Vertical) N/A

Reviewed By C. Kocka Approved By L. Price

Lithology			Description	Overburden: Sample[1,2]	Depth Ft[3]	Rec. Ft	Blows/PSI
Depth Ft[3]	Elevation	Graphic		Rock Core: RQD %	Run Ft	Rec. Ft	Rec. %
0.0	767.9		Top of Hole				
1.2	766.7		Rock fill and asphalt	DP01	0.0 - 4.0	3.0	N/A
4.0	763.9		SILT, ML, 2.5Y 6/1 (gray), coarse, loose to very dense, dry, fissured, weathered shale				

Bedrock Refusal /
Bottom of Hole at 4.0 Ft.

Top of Rock = 4.0 Ft.
Top of Rock Elevation = 763.9 Ft.

1: E = Environmental Sample Custody (two Split Spoons may be required to obtain sufficient sample)
G = Geotechnical Sample Custody
2: a,b,c denote Split Spoon divided between Environmental and Geotechnical Samples
3: Depths are reported in feet below ground surface

ATTACHMENT C.2

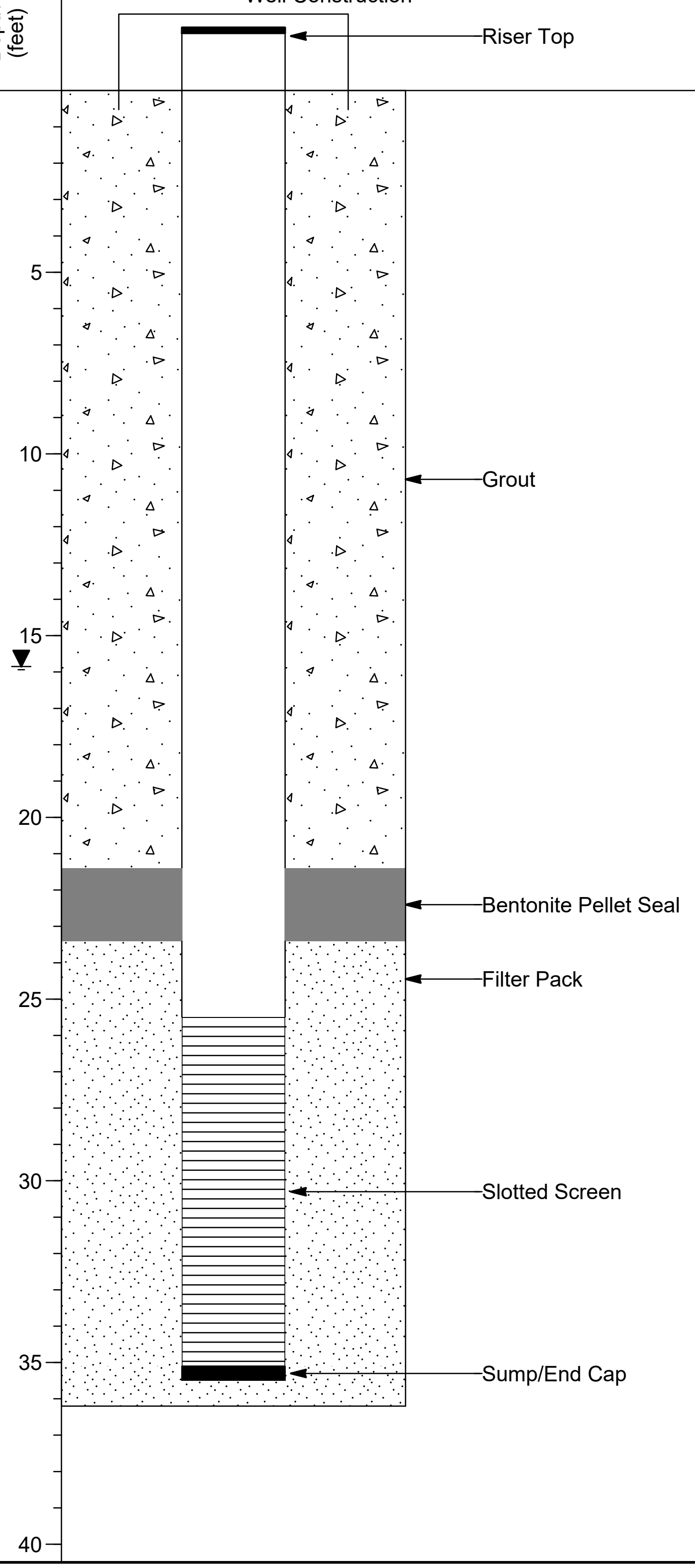
Well Installation Details

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **KIF-103** (Boring KIF-103)

PROJECT: **KIF TDEC Order**	INSTALLATION: STARTED: **10/2/18** COMPLETED: **10/3/18**
PROJECT NUMBER: **175668043**	LOCATION: **575,021.43 N; 2,410,351.42 E** DATUM: **NAD83**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP:
DRILLING EQUIPMENT: **CME 850 Track**	LATITUDE: **35° 54' 13.63"** LONGITUDE: **-84° 30' 28.75"**
DRILLING METHOD: **8-1/4" HSA overdrill of boring**	GROUND ELEV (ft): **756.7** TOC ELEV (ft): **760.33**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **G. Budd**	WELL DEPTH (ft, bgs): **35.5**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **15.9**
APPROVED BY: **L. Price**	BOREHOLE DIA. (in): **13.0** WELL DIA. (in): **4.0**

Depth (feet) | Well Construction



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**	
RISER: TOP (AGS): **3.6 ft**	BOTTOM (BGS): **25.5 ft**
SCREEN TYPE: **5"ID x 4"ID U-Pack**	
SCREEN SLOT SIZE (in): **0.010**	
SCREEN: TOP (BGS): **25.5 ft**	BOTTOM (BGS): **35.1 ft**
END CAP: TOP (BGS): **35.1 ft**	BOTTOM (BGS): **35.5 ft**
GROUT QUANTITY: **130 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.5 ft**	BOTTOM (BGS): **21.4 ft**
GROUT DENSITY: INITIAL (lbs/gal): **NR**	RETURN (lbs/gal): **NR**
BENTONITE TYPE: **3/8" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **21.4 ft**	BOTTOM (BGS): **23.4 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **23.4 ft**	BOTTOM (BGS): **36.2 ft**

NOTES:

1) 4-1/4" HSA exploratory boring advanced to 36.0 ft bgs (36.2 ft bgs corrected). Boring subsequently overdrilled with 8-1/4" HSA to same depth. Corrected values represent the boring depth from the surveyed ground surface elevation adjacent to the pad and consider grade modifications made during pad installation.

2) Final as-built depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For KIF-103, the finished grade surveyed elevation was approximately 0.7' higher than the original grade reference used when the well was installed. The position of each well component, however, has not changed relative to original elevation of the bottom of the well.

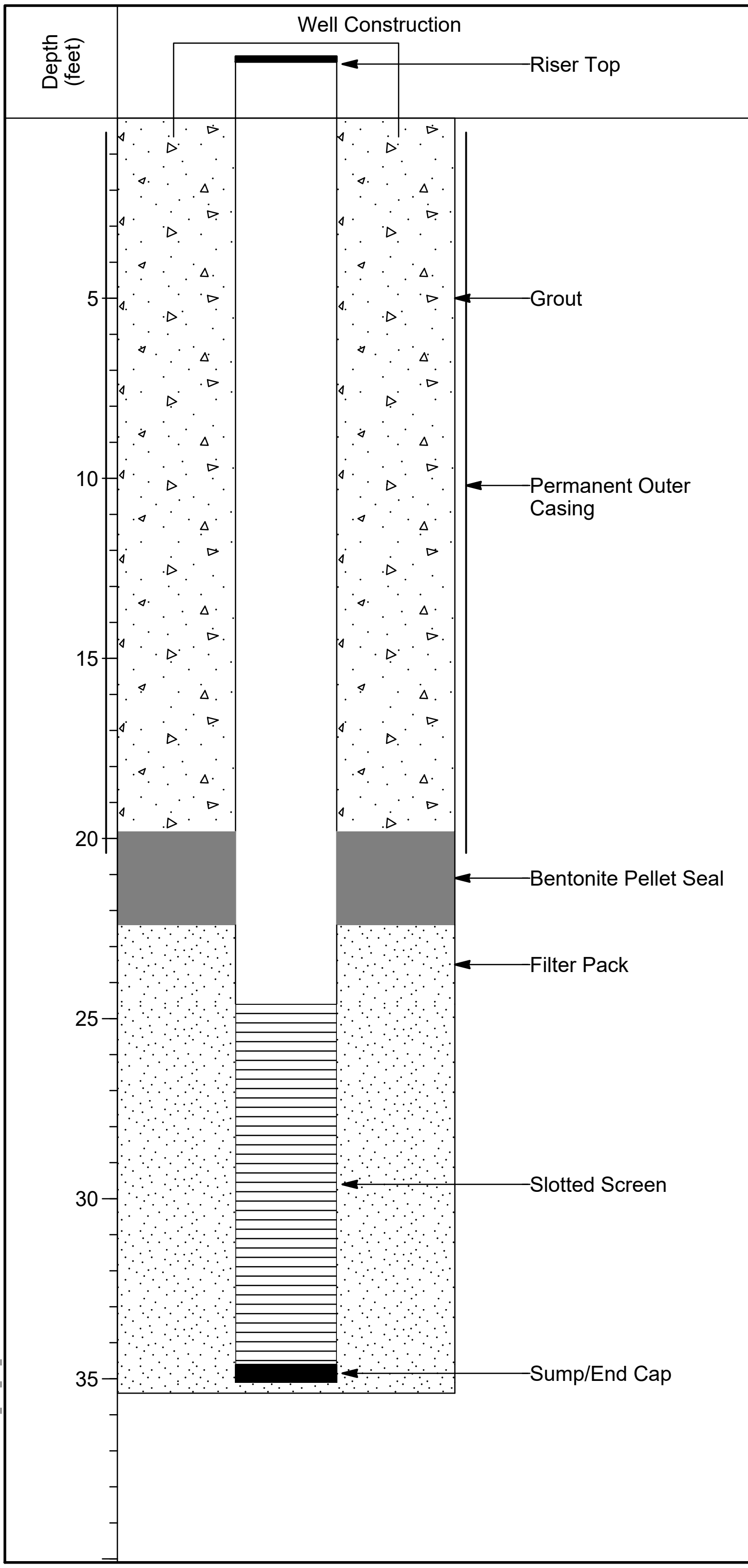
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **KIF-104** (Boring KIF-104b)

PROJECT: **KIF TDEC Order**	INSTALLATION: STARTED: **10/30/18** COMPLETED: **10/30/18**
PROJECT NUMBER: **175668043**	LOCATION: **575,765.61 N; 2,411,402.90 E** DATUM: **NAD83**
DRILLING COMPANY: **Stantec / M&W Drilling**	LOC. DESCRIP: **Stilling Pond**
DRILLING EQUIPMENT: **CME 850XR #853/Geoprobe 8150LS Sonic**	LATITUDE: **35° 54' 20.83"** LONGITUDE: **-84° 30' 15.83"**
DRILLING METHOD: **4-1/4" & 8-1/4" HSA to 20'; 6"x8" Sonic to depth**	GROUND ELEV (ft): **755.1** TOC ELEV (ft): **758.60**
SAMPLING METHOD: **4-1/4" & 8-1/4" HSA to 20'; 6"x8" Sonic to depth**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **B. Evans**	WELL DEPTH (ft, bgs): **35.1**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **N/A**
APPROVED BY: **L. Price**	BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**

Well Construction



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**	
RISER: TOP (AGS): **3.5 ft**	BOTTOM (BGS): **24.6 ft**
SCREEN TYPE: **5"ID x 4"ID U-Pack**	
SCREEN SLOT SIZE (in): **0.010**	
SCREEN: TOP (BGS): **24.6 ft**	BOTTOM (BGS): **34.6 ft**
END CAP: TOP (BGS): **34.6 ft**	BOTTOM (BGS): **35.1 ft**
GROUT QUANTITY: **40 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.5 ft**	BOTTOM (BGS): **19.8 ft**
GROUT DENSITY: INITIAL (lbs/gal): **NR**	RETURN (lbs/gal): **NR**
BENTONITE TYPE: **1/4" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **19.8 ft**	BOTTOM (BGS): **22.4 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **22.4 ft**	BOTTOM (BGS): **35.4 ft**

NOTES:

1) Offset boring KIF-104b advanced to install KIF-104 well with a permanent surface casing. 4 1/4" & 8 1/4" HSA used to install 10" casing to 20 ft bgs (20.4' corrected). Well boring advanced through permanent casing using 6"x 8" sonic drilling to a total depth of 35.0 ft bgs (35.4' corrected). Corrected values represent the boring depth from the surveyed ground surface elevation adjacent to the pad and consider grade modifications made during pad installation. Refer to KIF-104 boring for lithology and boring offset details.

2) Final as-built depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For KIF-104, the finished grade surveyed elevation was approximately 0.5' higher than the original grade reference used when the well was installed. The position of each well component, however, has not changed relative to original elevation of the bottom of the well.

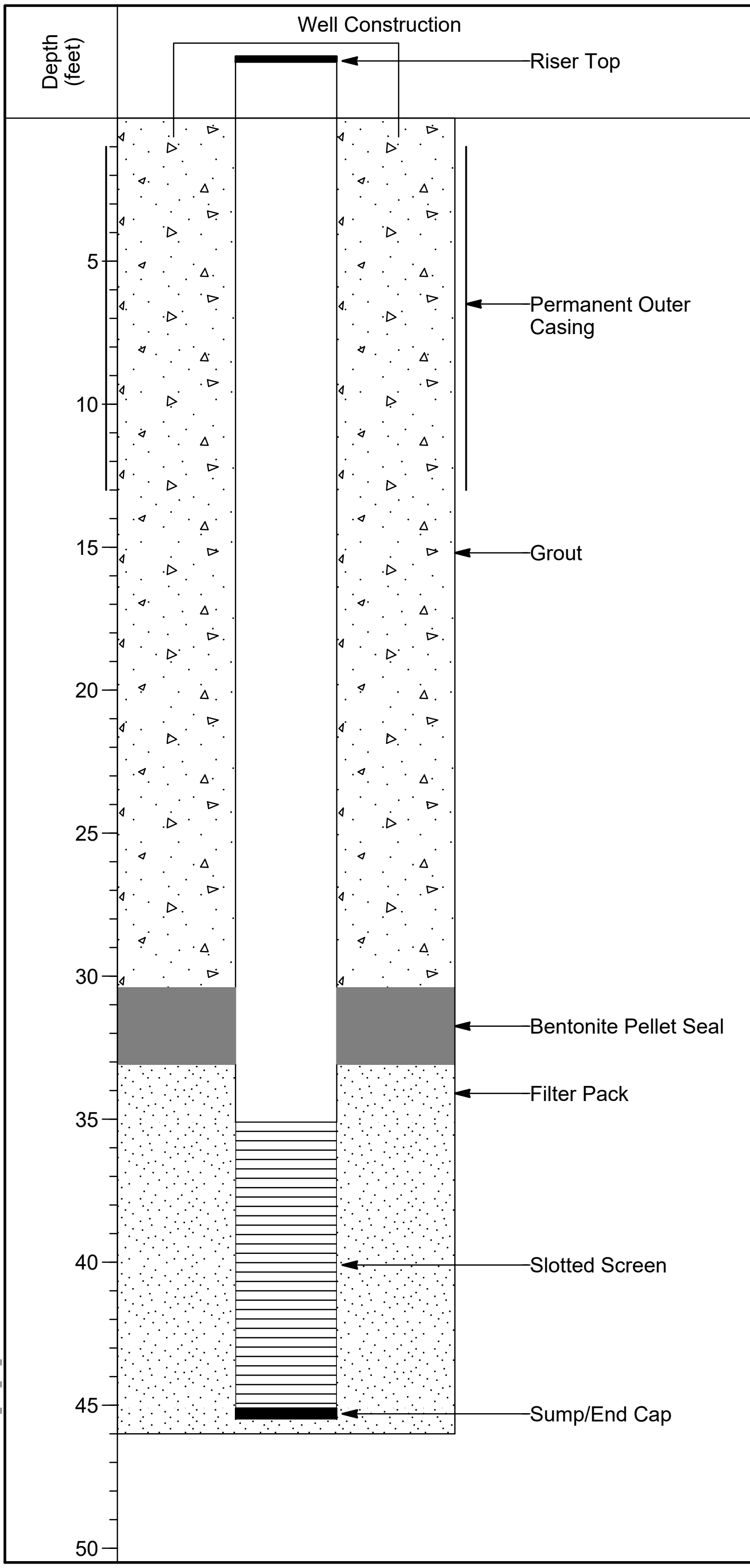
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **KIF-105** (Boring KIF-105b)

PROJECT: **KIF TDEC Order**
PROJECT NUMBER: **175668043**
DRILLING COMPANY: **Stantec / M&W Drilling**
DRILLING EQUIPMENT: **CME 850XR #853/Geoprobe 8150LS Sonic**
DRILLING METHOD: **4-1/4" & 8-1/4" HSA to 12'; 6"x8" Sonic to depth**
SAMPLING METHOD: **4-1/4" & 8-1/4" HSA to 12'; 6"x8" Sonic to depth**
OBSERVED BY: **B. Evans**
REVIEWED BY: **C. Kocka**
APPROVED BY: **P. Dunne**

INSTALLATION: STARTED: **10/30/18** COMPLETED: **10/31/18**
LOCATION: **574,819.38 N; 2,408,462.83 E** DATUM: **NAD83**
LOC. DESCRIP: **Sluice Trench**
LATITUDE: **35° 54' 11.92"** LONGITUDE: **-84° 30' 51.74"**
GROUND ELEV (ft): **753.0** TOC ELEV (ft): **756.56**
ELEVATION DATUM: **NGVD29**
WELL DEPTH (ft, bgs): **45.5**
DTW AT COMPLETION (ft, bgs): **N/A**
BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.5 ft** BOTTOM (BGS): **35.1 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **35.1 ft** BOTTOM (BGS): **45.1 ft**

END CAP: TOP (BGS): **45.1 ft** BOTTOM (BGS): **45.5 ft**

GROUT QUANTITY: **60 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.5 ft** BOTTOM (BGS): **30.4 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **NR** RETURN (lbs/gal): **NR**

BENTONITE TYPE: **1/4" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **30.4 ft** BOTTOM (BGS): **33.1 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **33.1 ft** BOTTOM (BGS): **46.0 ft**

NOTES:
1) Offset boring KIF-105b advanced to install KIF-105 well with a permanent surface casing. 4 1/4" & 8 1/4" HSA used to install 10" casing to 12 ft bgs (13' corrected). Well boring advanced through permanent casing using 6"x 8" sonic drilling to a total depth of 45.0 ft bgs (46' corrected). Corrected values represent the boring depth from the surveyed ground surface elevation adjacent to the pad and consider grade modifications made during pad installation. Refer to KIF-105 boring log for lithology and boring offset details.

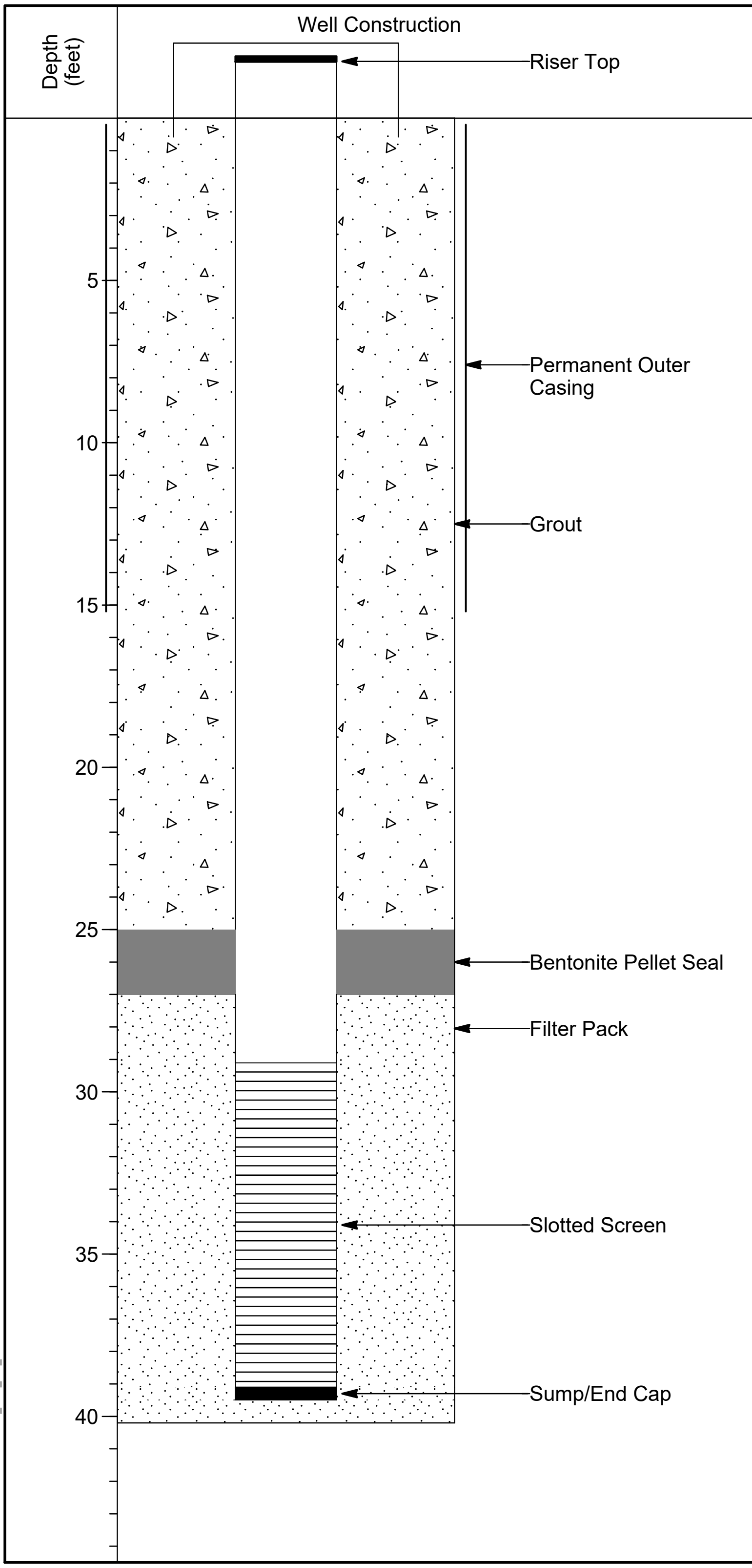
2) Final as-built depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For KIF-105, the finished grade surveyed elevation was approximately 1.0' higher than the original grade reference used when the well was installed. The position of each well component, however, has not changed relative to original elevation of the bottom of the well.

VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **KIF-106** (Boring KIF-106b)

PROJECT: **KIF TDEC Order**	INSTALLATION: STARTED: **10/31/18** COMPLETED: **11/1/18**
PROJECT NUMBER: **175668043**	LOCATION: **574,439.09 N; 2,408,024.18 E** DATUM: **NAD83**
DRILLING COMPANY: **Stantec / M&W Drilling**	LOC. DESCRIP: **Sluice Trench**
DRILLING EQUIPMENT: **CME 850XR #853/Geoprobe 8150LS Sonic**	LATITUDE: **35° 54' 8.22"** LONGITUDE: **-84° 30' 57.15"**
DRILLING METHOD: **4-1/4" & 8-1/4" HSA to 15'; 6"x8" Sonic to depth**	GROUND ELEV (ft): **757.6** TOC ELEV (ft): **761.27**
SAMPLING METHOD: **4-1/4" & 8-1/4" HSA to 15'; 6"x8" Sonic to depth**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **B. Evans**	WELL DEPTH (ft, bgs): **39.5**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **N/A**
APPROVED BY: **L. Price**	BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.6 ft** BOTTOM (BGS): **29.1 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **29.1 ft** BOTTOM (BGS): **39.1 ft**

END CAP: TOP (BGS): **39.1 ft** BOTTOM (BGS): **39.5 ft**

GROUT QUANTITY: **50 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.5 ft** BOTTOM (BGS): **25.0 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **NR** RETURN (lbs/gal): **NR**

BENTONITE TYPE: **3/8" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **25.0 ft** BOTTOM (BGS): **27.0 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **27.0 ft** BOTTOM (BGS): **40.2 ft**

NOTES:

1) Offset boring KIF-106b advanced to install KIF-106 well with a permanent surface casing. 4 1/4" & 8 1/4" HSA used to install 10" casing to 15 ft bgs (15.2' corrected). Well boring advanced through permanent casing using 6"x 8" sonic drilling to a total depth of 40.0 ft bgs (40.2' corrected). Corrected values represent the boring depth from the surveyed ground surface elevation adjacent to the pad and consider grade modifications made during pad installation.Refer to KIF-106 boring for lithology and boring offset details.

2) Final as-built depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For KIF-106, the finished grade surveyed elevation was approximately 0.2' higher than the original grade reference used when the well was installed. The position of each well component, however, has not changed relative to original elevation of the bottom of the well.

VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

APPENDIX D – PHOTOGRAPHS OF SOIL BORINGS AND MONITORING WELLS

ATTACHMENT D.1

Photographic Log of Soil Lithology

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 1

Photo Location:
KIF-102

Photo Date:
11/5/2018

Comments:
Photo of first boring location interval (0.0 - 1.5 feet).

Photograph ID: 2

Photo Location:
KIF-102

Photo Date:
11/5/2018

Comments:
Photo of first boring location interval (1.5 - 3.0 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 3 **Photo Location:** KIF-102 **Photo Date:** 11/5/2018 **Comments:** Photo of first boring location interval (3.0 - 4.5 feet).	
Photograph ID: 4 **Photo Location:** KIF-102 **Photo Date:** 11/5/2018 **Comments:** Photo of first boring location interval (4.5 - 6.0 feet).	

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 5 **Photo Location:** KIF-102 **Photo Date:** 11/5/2018 **Comments:** Photo of first boring location interval (6.0 - 7.5 feet).	
Photograph ID: 6 **Photo Location:** KIF-102 **Photo Date:** 11/5/2018 **Comments:** Photo of first boring location interval (7.5 - 8.3 feet). Sampler refusal at 8.3 feet. Blow count on white board should be 31-50+/4".	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 7

Photo Location:
KIF-102

Photo Date:
11/5/2018

Comments:
Photo of first boring location interval (9.0 - 9.8 feet). Boring refusal at 9.8 feet. Blow count on white board should be 43-50+/4".

Photograph ID: 8

Photo Location:
KIF-102a

Photo Date:
11/6/2018

Comments:
Photo of second boring location interval (0.0 - 1.5 feet). Offset 10 feet to the south of the first boring.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 9

Photo Location: KIF-102a

Photo Date: 11/6/2018

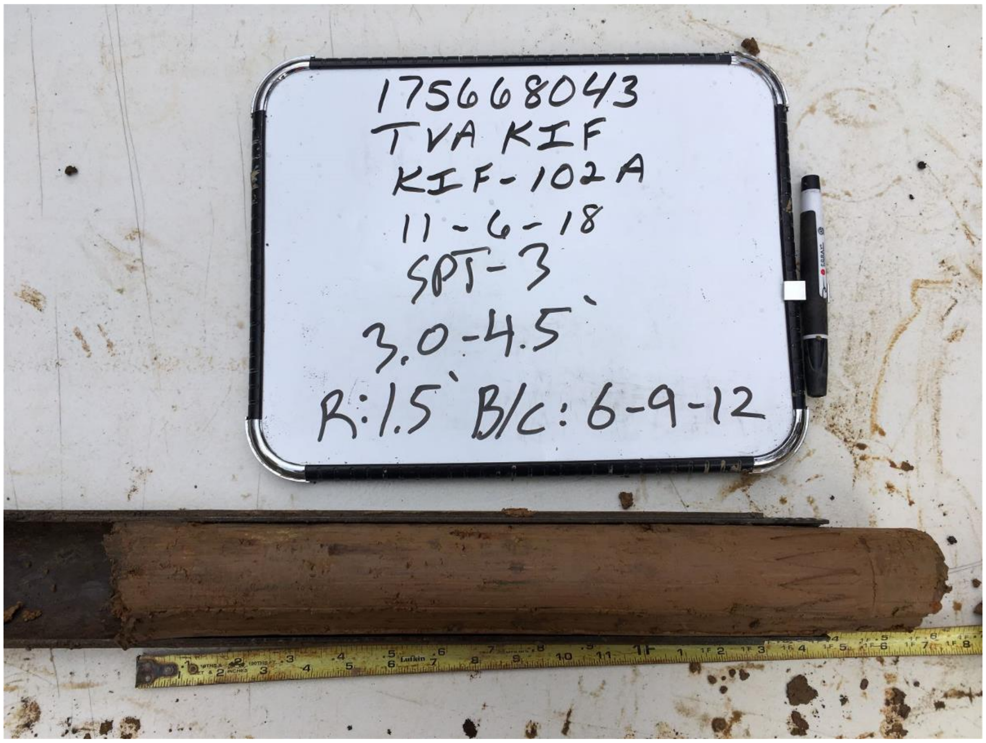
Comments: Photo of second boring location interval (1.5 - 3.0 feet).

Photograph ID: 10

Photo Location: KIF-102a

Photo Date: 11/6/2018

Comments: Photo of second boring location interval (3.0 - 4.5 feet).



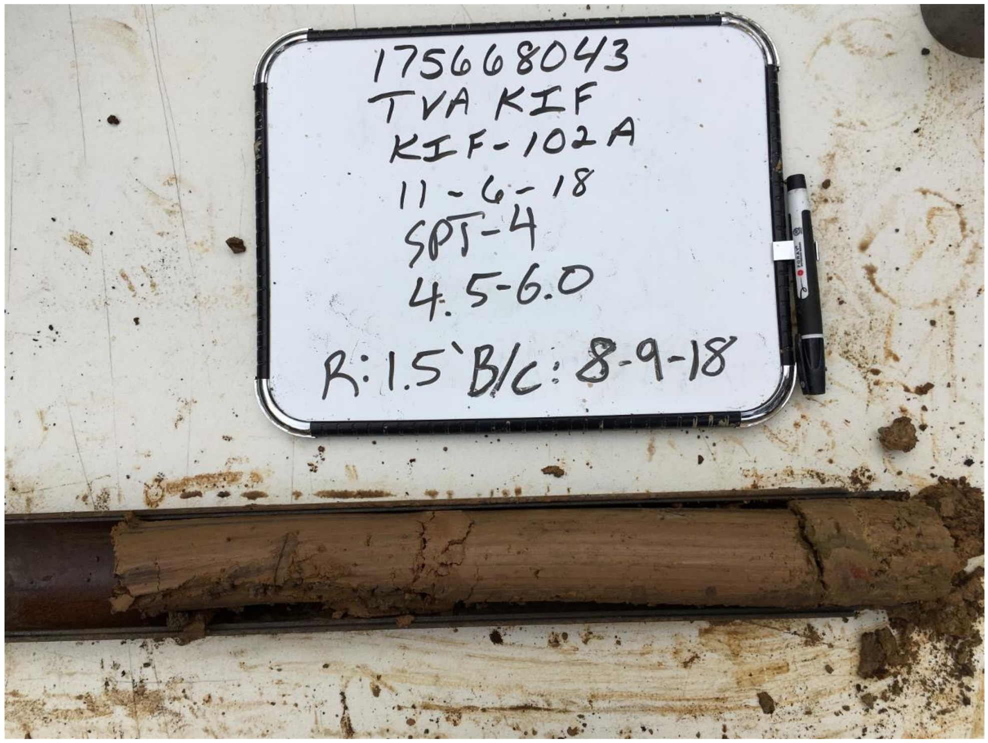
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 11

Photo Location:
KIF-102a

Photo Date:
11/6/2018

Comments:
Photo of second boring location interval (4.5 - 6.0 feet).



Photograph ID: 12

Photo Location:
KIF-102a

Photo Date:
11/6/2018

Comments:
Photo of second boring location interval (6.0 - 7.5 feet).

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 13

Photo Location: KIF-102a

Photo Date: 11/6/2018

Comments: Photo of second boring location interval (7.5 - 9.0 feet).

Photograph ID: 14

Photo Location: KIF-102a

Photo Date: 11/6/2018

Comments: Photo of second boring location interval (9.0 - 10.2 feet). Boring refusal at 10.2 feet. End depth on white board should be 10.2 feet. Blow count on white board should be 20-41-50+/2".

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 15

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (0.0 - 1.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 16

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (1.5 - 3.0 feet). Project number shown on white board should be 175668043.

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 17

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (3.0 - 4.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 18

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (4.5 - 6.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 19

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (6.0 - 7.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 20

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (7.5 - 9.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 21

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (9.0 - 10.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 22

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (10.5 - 12.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 23

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (12.0 - 13.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 24

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (13.5 - 15.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 25

Photo Location:
KIF-103

Photo Date:
10/2/2018

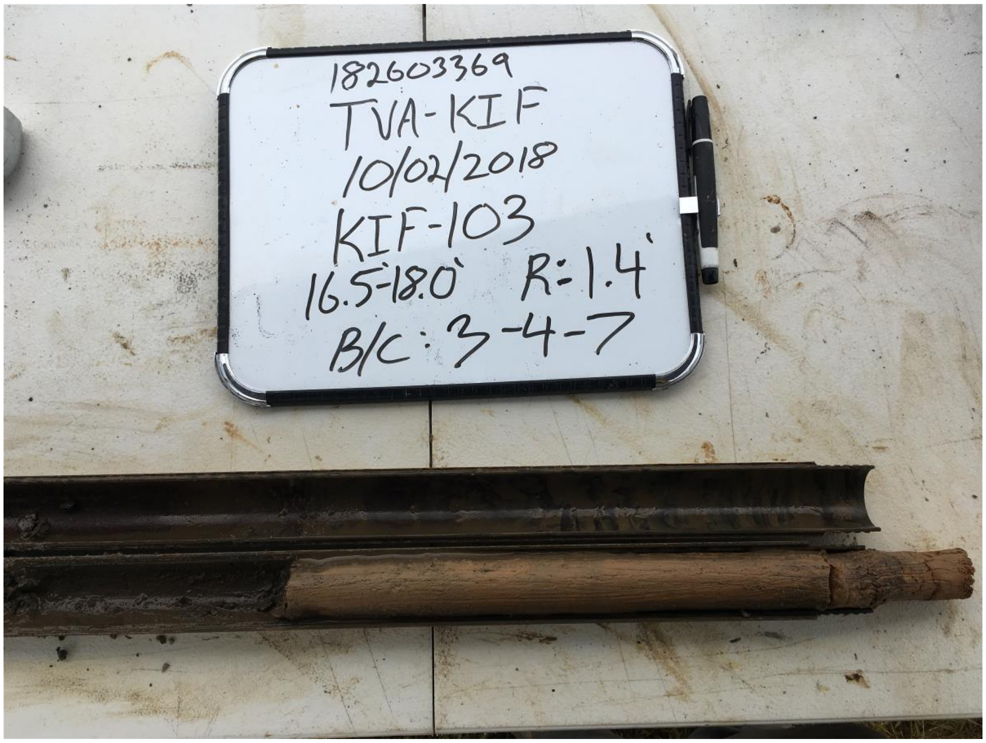
Comments:
Interval (15.0 - 16.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 26

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (16.5 - 18.0 feet). Project number shown on white board should be 175668043.



Stantec

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 27

Photo Location:
KIF-103

Photo Date:
10/2/2018

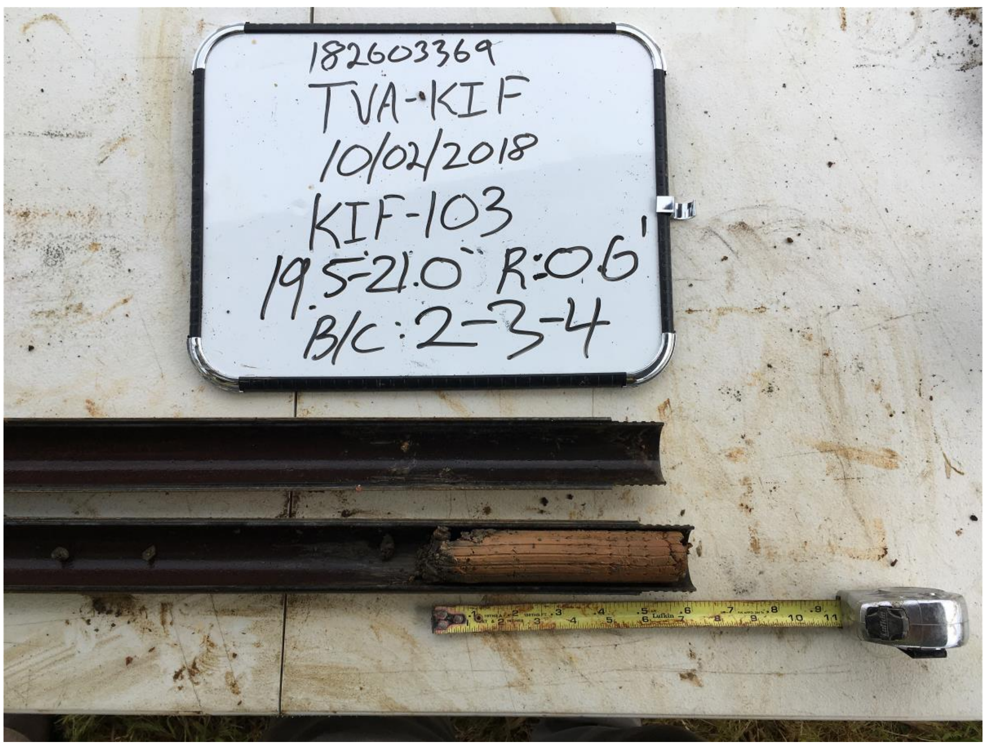
Comments:
Interval (18.0 - 19.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 28

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (19.5 - 21.0 feet). Project number shown on white board should be 175668043.



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 29

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (21.0 - 22.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 30

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (22.5 - 24.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 31

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (24.0 - 25.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 32

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (25.5 - 27.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 33

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (27.0 - 28.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 34

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (28.5 - 30.0 feet). Project number shown on white board should be 175668043.

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 35

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (30.0 - 31.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 36

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (31.5 - 33.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 37

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (33.0 - 34.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 38

Photo Location:
KIF-103

Photo Date:
10/2/2018

Comments:
Interval (34.5 - 36.0 feet). Project number shown on white board should be 175668043.

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 39

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (0.0 - 1.5 feet). Project number shown on white board should be 175668043. Blow counts should be listed on white board as 5-5-6.

Photograph ID: 40

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (1.5 - 3.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 41 **Photo Location:** KIF-104 **Photo Date:** 10/1/2018 **Comments:** Interval (3.0 - 4.5 feet). Project number shown on white board should be 175668043.	
Photograph ID: 42 **Photo Location:** KIF-104 **Photo Date:** 10/1/2018 **Comments:** Interval (4.5 - 6.0 feet). Project number shown on white board should be 175668043.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 43

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (6.0 - 7.5 feet). Boring encountered CCR at 7.3 feet. Project number shown on white board should be 175668043.

Photograph ID: 44

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (7.5 - 9.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 45

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (9.0 - 10.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 46

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (10.5 - 12.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 47

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (12.0 - 13.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 48

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (13.5 - 15.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 49

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (15.0 - 16.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 50

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (16.5 - 18.0 feet). Project number shown on white board should be 175668043.

Stantec

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 51

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (18.0 - 19.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 52

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (19.5 - 21.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 53

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (21.0 - 22.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 54

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (22.5 - 24.0 feet). Recovery shown on white board should be 1.4 feet. Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 55

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (24.0 - 25.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 56

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (25.5 - 27.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 57

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (27.0 - 28.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 58

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (28.5 - 30.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 59

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (30.0 - 31.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 60

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (31.5 - 33.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 61

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (33.0 - 34.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 62

Photo Location:
KIF-104

Photo Date:
10/1/2018

Comments:
Interval (34.5 - 36.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 63	No Photo Applicable
Photo Location: KIF-104b	
Photo Date: 10/1/2018	
Comments: Refer to photos for KIF-104.	

Photograph ID: 64	No Photo Applicable
Photo Location: KIF-105	
Photo Date: 10/23/2018	
Comments: Photo of interval (0.0 - 1.5 feet) unavailable.	

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 65

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Photo of interval (1.5 - 3.0 feet) unavailable.

No Photo Applicable

Photograph ID: 66

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (3.0 - 4.5 feet). Boring encountered CCR at 4.3 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 67 **Photo Location:** KIF-105 **Photo Date:** 10/23/2018 **Comments:** Interval (4.5 - 6.0 feet).	
Photograph ID: 68 **Photo Location:** KIF-105 **Photo Date:** 10/23/2018 **Comments:** Interval (6.0 - 7.5 feet).	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 69

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (7.5 - 9.0 feet).

Photograph ID: 70

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (9.0 - 10.5 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 71

Photo Location:
KIF-105

Photo Date:
10/23/2018

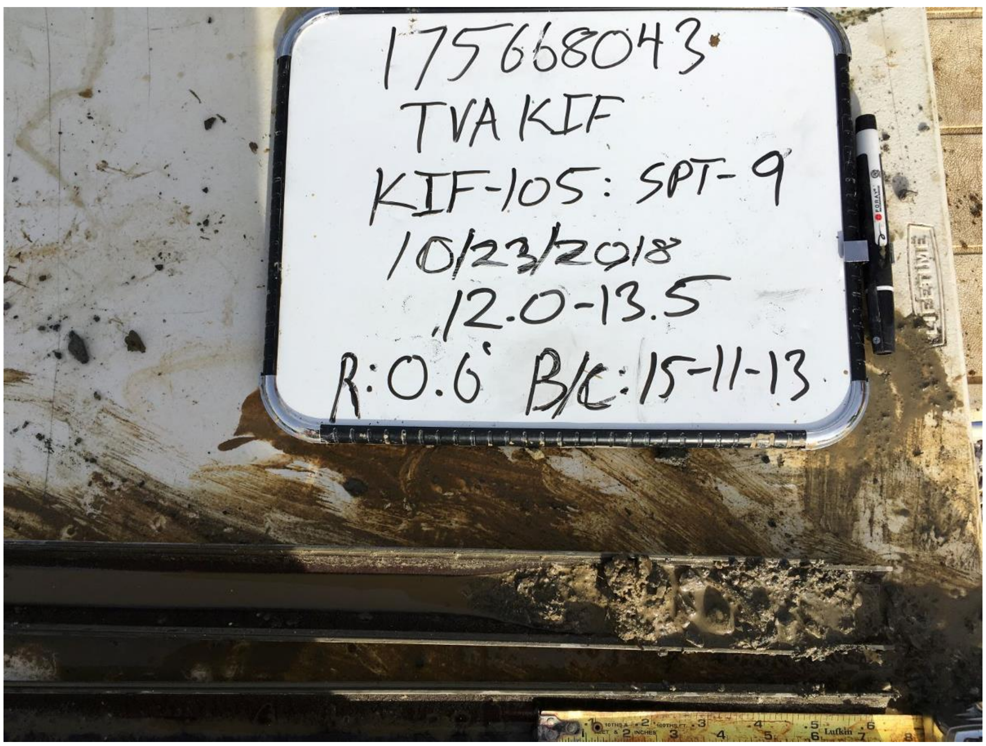
Comments:
Interval (10.5 - 12.0 feet).

Photograph ID: 72

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (12.0 - 13.5 feet). Recovery shown on white board should be 0.6 feet.



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 73

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (13.5 - 15.0 feet).

Photograph ID: 74

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (15.0 - 16.5 feet).

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 75

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (16.5 - 18.0 feet).

Photograph ID: 76

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (18.0 - 19.5 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 77

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (19.5 - 21.0 feet).

Photograph ID: 78

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (21.0 - 22.5 feet).

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 79

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (22.5 - 24.0 feet).

Photograph ID: 80

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (24.0 - 25.5 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 81

Photo Location:
KIF-105

Photo Date:
10/23/2018

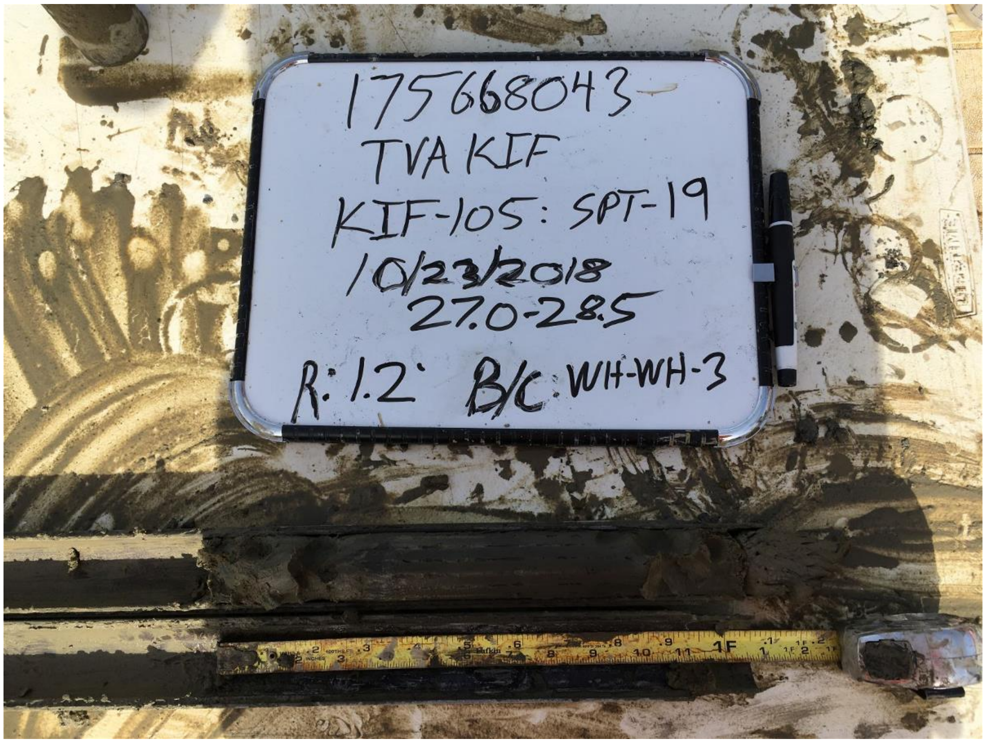
Comments:
Interval (25.5 - 27.0 feet).

Photograph ID: 82

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (27.0 - 28.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 83

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (28.5 - 30.0 feet).

Photograph ID: 84

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (30.0 - 31.5 feet).

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 85

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (31.5 - 33.0 feet).

Photograph ID: 86

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (33.0 - 34.5 feet).

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 87

Photo Location:
KIF-105

Photo Date:
10/23/2018

Comments:
Interval (34.5 - 36.0 feet).

Photograph ID: 88

Photo Location:
KIF-105b

Photo Date:
10/31/2018

Comments:
Refer to photos for KIF-105. Offset 5 feet from KIF-105.

No Photo Applicable

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 89	No Photo Applicable
Photo Location: KIF-106	
Photo Date: 10/18/2018	
Comments: Photo of interval (0.0 - 1.5 feet) unavailable.	

Photograph ID: 90	No Photo Applicable
Photo Location: KIF-106	
Photo Date: 10/18/2018	
Comments: Photo of interval (1.5 - 3.0 feet) unavailable.	

Stantec

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 91

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (3.0 - 4.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 92

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (4.5 - 6.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 93

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (6.0 - 7.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 94

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (7.5 - 9.0 feet). Boring encountered CCR at 8.9 feet. Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 95

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (9.0 - 10.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 96

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (10.5 - 12.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 97

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (12.0 - 13.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 98

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (13.5 - 15.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 99

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (15.0 - 16.5 feet). Project number shown on white board should be 175668043. Recovery shown on white board should be 0.6 feet.

Photograph ID: 100

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (16.5 - 18.0 feet). Project number shown on white board should be 175668043.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 101

Photo Location:
KIF-106

Photo Date:
10/18/2018

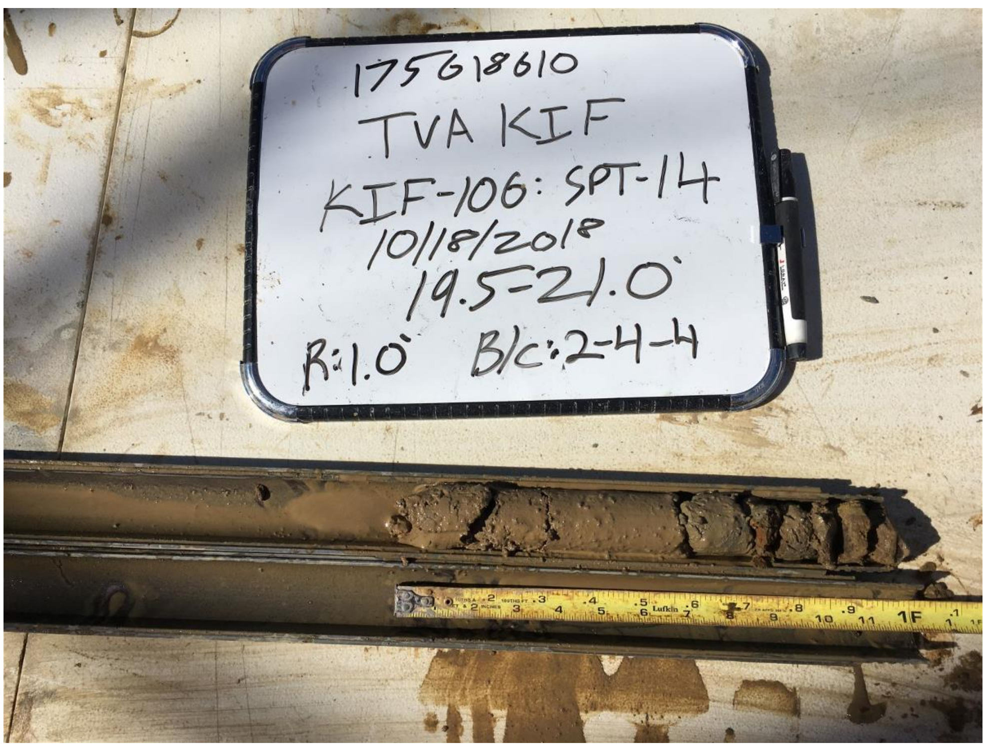
Comments:
Interval (18.0 - 19.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 102

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (19.5 - 21.0 feet). Project number shown on white board should be 175668043.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 103

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (21.0 - 22.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 104

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Photo of interval (22.5 - 24.0 feet) unavailable.

No Photo Applicable

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 105

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (24.0 - 25.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 106

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (25.5 - 27.0 feet). Project number shown on white board should be 175668043.

Stantec

Photographic Log

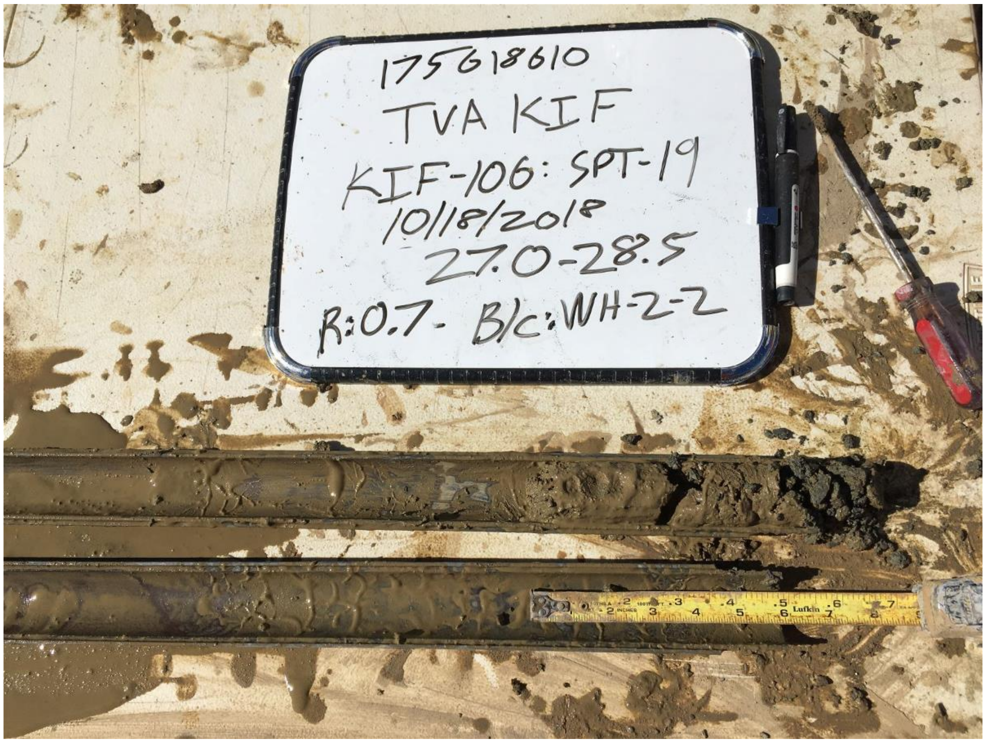
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 107

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (27.0 - 28.5 feet). Project number shown on white board should be 175668043.



Photograph ID: 108

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (28.5 - 30.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 109

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (30.0 - 31.5 feet). Project number shown on white board should be 175668043.

Photograph ID: 110

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (31.5 - 33.0 feet). Project number shown on white board should be 175668043.

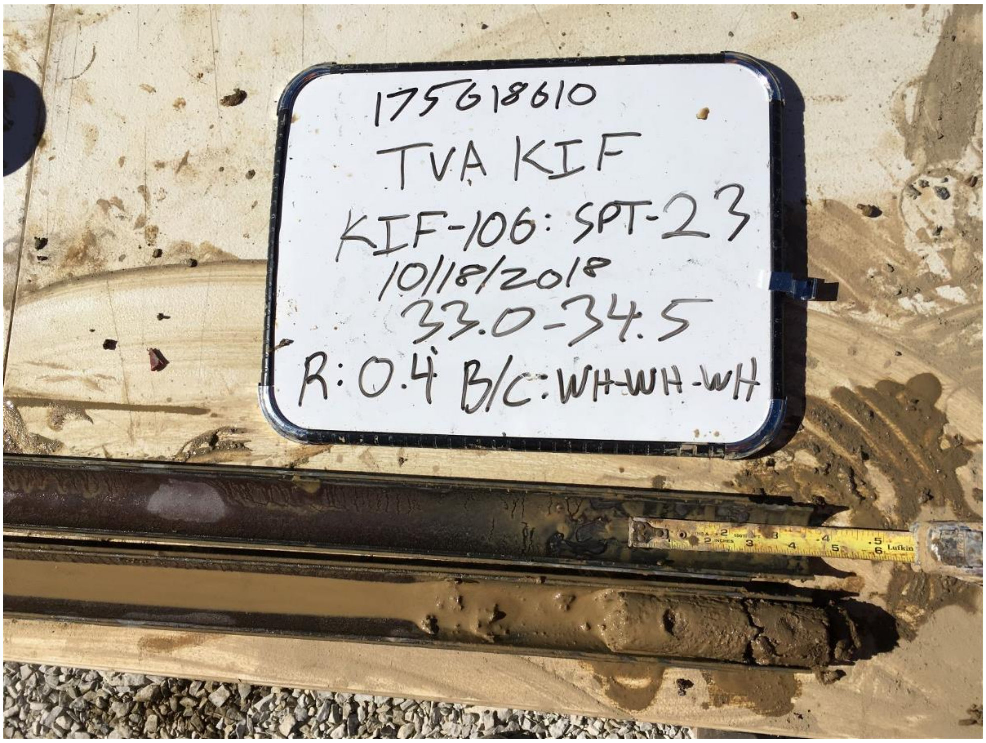
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 111

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (33.0 - 34.5 feet). Project number shown on white board should be 175668043.



Photograph ID: 112

Photo Location:
KIF-106

Photo Date:
10/18/2018

Comments:
Interval (34.5 - 36.0 feet). Project number shown on white board should be 175668043.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Kingston Fossil Plant (KIF)	Site Location:	Harriman, TN

Photograph ID: 113

Photo Location:
KIF-106b

Photo Date:
10/22/2018

Comments:
Refer to photos for KIF-106. Offset 5 feet to the north of KIF-106.

No Photo Applicable

Photograph ID: 114

Photo Location:
KIF-TB01

Photo Date:
7/10/2019

Comments:
Interval (0.0 - 5.0 feet). Boring ID shown on white board should be KIF-TB01.

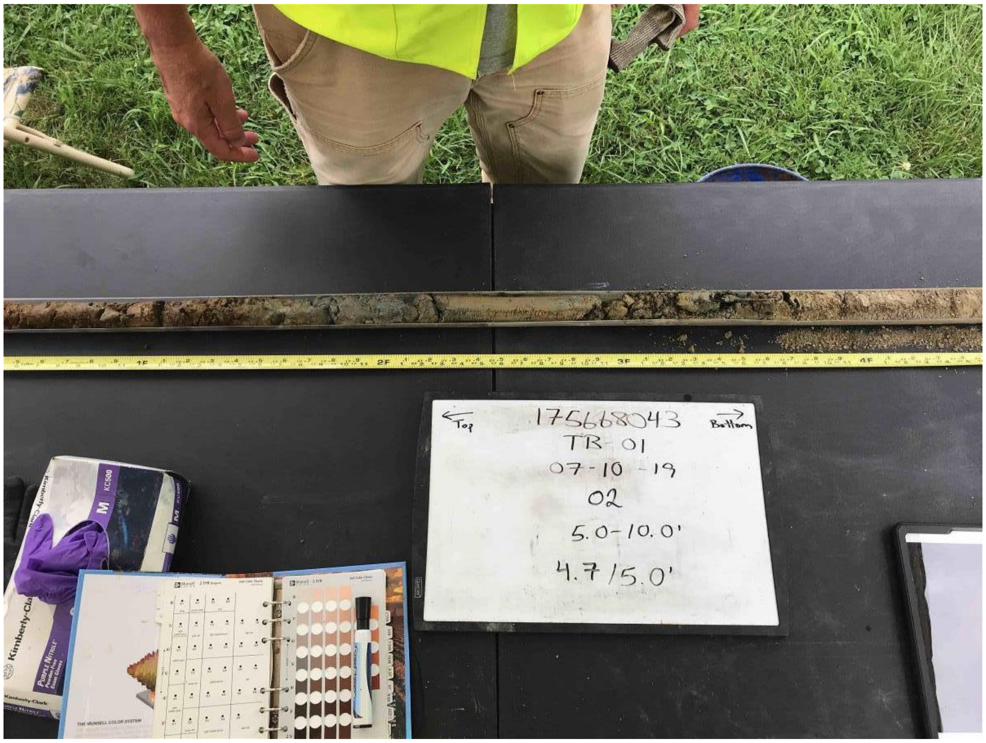
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 115

Photo Location:
KIF-TB01

Photo Date:
7/10/2019

Comments:
Interval (5.0 - 10.0 feet). Boring ID shown on white board should be KIF-TB01. Boring refusal at 10.0 feet.

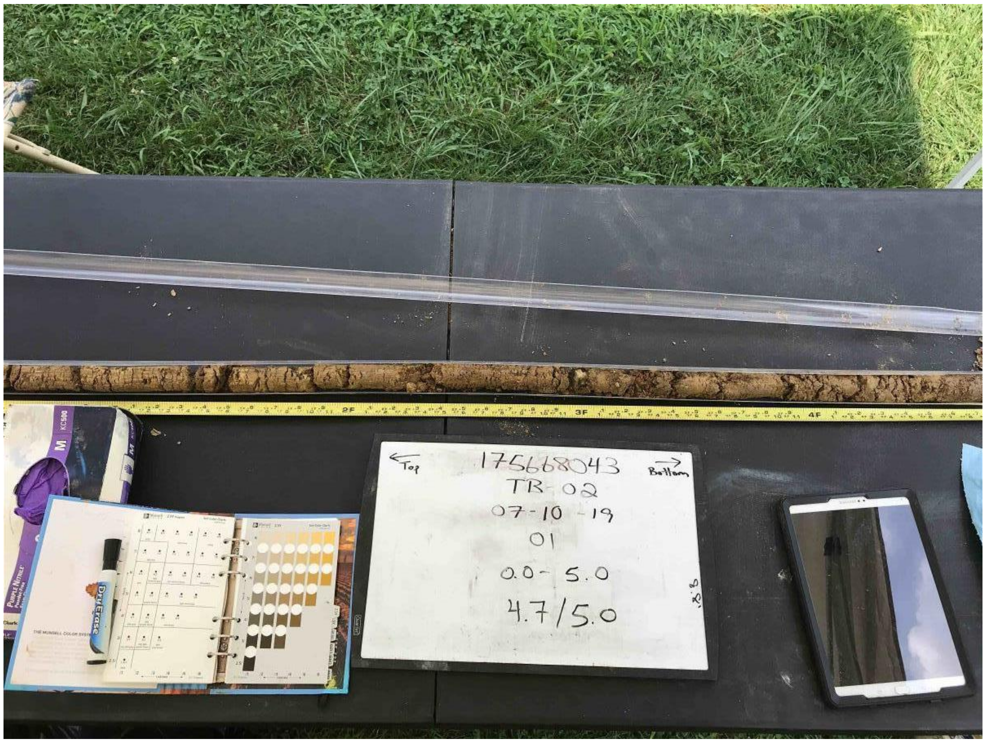


Photograph ID: 116

Photo Location:
KIF-TB02

Photo Date:
7/10/2019

Comments:
Interval (0.0 - 5.0 feet). Boring ID shown on white board should be KIF-TB02.



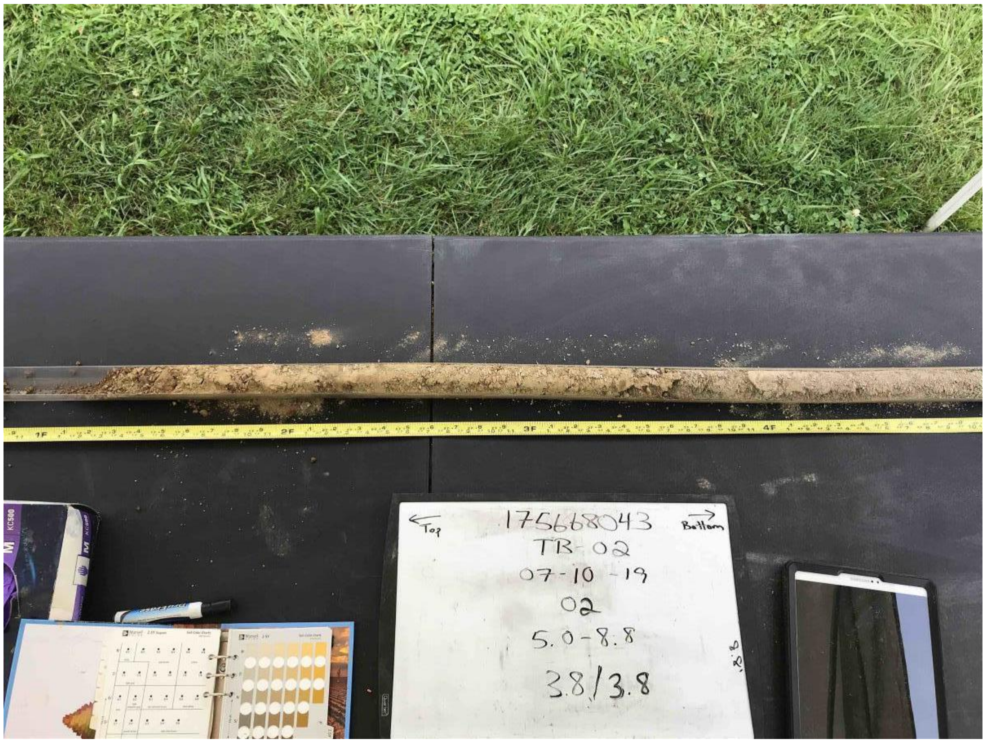
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 117

Photo Location:
KIF-TB02

Photo Date:
7/10/2019

Comments:
Interval (5.0 - 8.8 feet). Boring ID shown on white board should be KIF-TB02. Boring refusal at 8.8 feet.

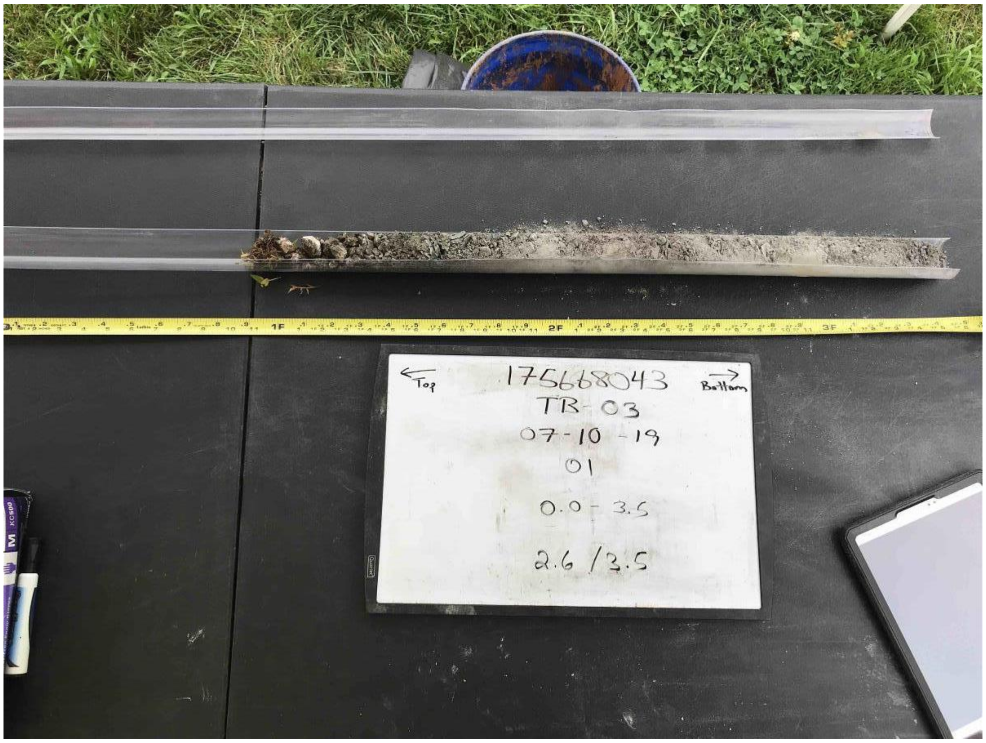


Photograph ID: 118

Photo Location:
KIF-TB03

Photo Date:
7/10/2019

Comments:
Interval (0.0 - 3.5 feet). Boring ID shown on white board should be KIF-TB03. Boring refusal at 3.5 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 119

Photo Location:
KIF-TB04

Photo Date:
7/10/2019

Comments:
Interval (0.0 - 4.0 feet). Boring ID shown on white board should be KIF-TB04. Boring refusal at 4.0 feet.

Photograph ID: 120

Photo Location:
KIF-TB05

Photo Date:
7/10/2019

Comments:
First boring location interval (0.0 - 5.0 feet). Boring ID shown on white board should be KIF-TB05. Boring refusal at 5.0 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 121

Photo Location:
KIF-TB05a

Photo Date:
7/10/2019

Comments:
Second boring location interval (0.0 - 5.0 feet). Boring ID shown on white board should be KIF-TB05a. Offset 20 feet to the north of the first boring. Boring refusal at 5.0 feet.

Photograph ID: 122

Photo Location:
KIF-TB06

Photo Date:
7/10/2019

Comments:
Photo of interval (0.0 - 3.5 feet) unavailable. Boring refusal at 3.5 feet.

No Photo Applicable

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil Plant (KIF)**	**Site Location:**	**Harriman, TN**

Photograph ID: 123

Photo Location: KIF-TB07

Photo Date: 7/10/2019

Comments: Photo of interval (0.0 - 3.0 feet) unavailable. Boring refusal at 3.0 feet.

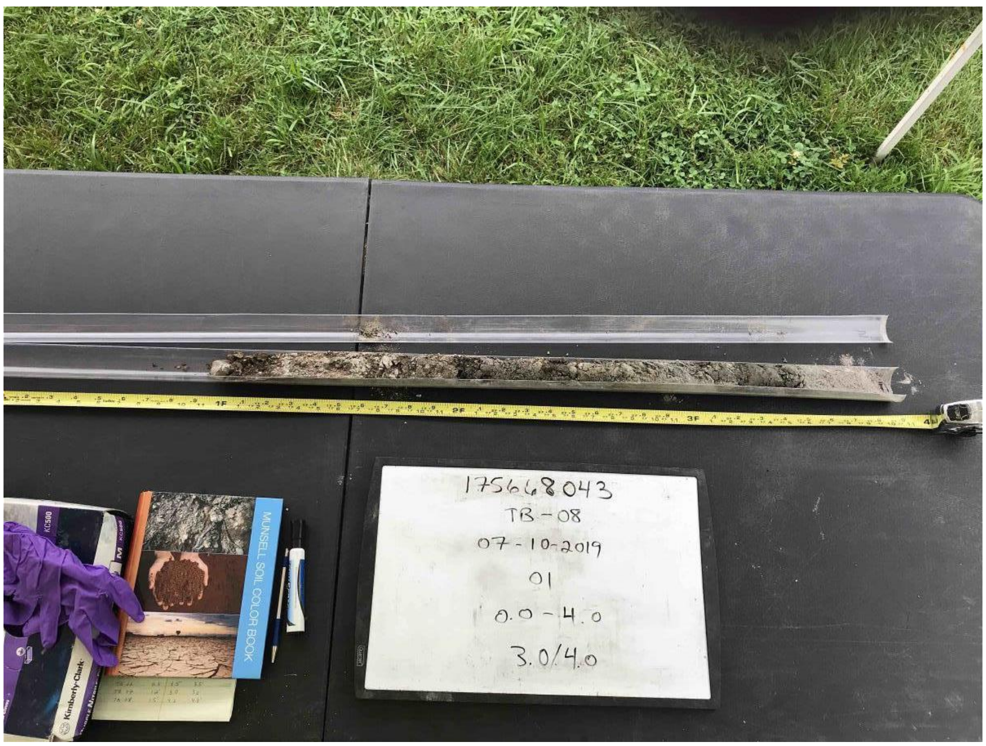
No Photo Applicable

Photograph ID: 124

Photo Location: KIF-TB08

Photo Date: 7/10/2019

Comments: Interval (0.0 - 4.0 feet). Boring ID shown on white board should be KIF-TB08. Boring refusal at 4.0 feet.



ATTACHMENT D.2

Photographic Log of Monitoring Wells

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil (KIF) Plant**	**Site Location:**	**Harriman, TN**

Photograph ID: 1

Photo Location:
KIF-103

Photo Date:
12/11/2018

Comments:
Completion of monitoring well KIF-103. Well was installed in Boring KIF-103.

Photograph ID: 2

Photo Location:
KIF-104

Photo Date:
12/11/2018

Comments:
Completion of monitoring well KIF-104. Well was installed in Boring KIF-104b.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Kingston Fossil (KIF) Plant**	**Site Location:**	**Harriman, TN**

Photograph ID: 3

Photo Location:
KIF-105

Photo Date:
7/7/2020

Comments:
Completion of monitoring well KIF-105. Well was installed in Boring KIF-105b.

Photograph ID: 4

Photo Location:
KIF-106

Photo Date:
7/7/2020

Comments:
Completion of monitoring well KIF-106. Well was installed in Boring KIF-106b.

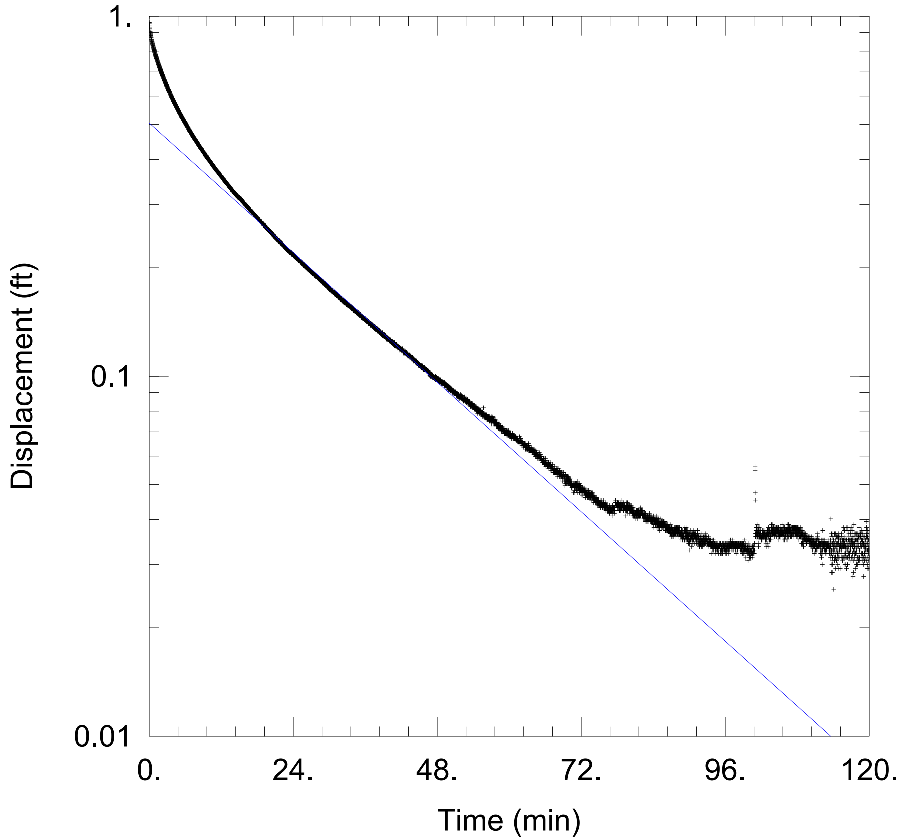
APPENDIX E – SLUG TEST RESULTS

Stantec

Slug Test Results
KIF Plan Hydrogeological Investigation
Kingston, Tennessee

Well ID	Test	Test Date	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)
KIF-103	Falling Head 1	6/20/2019	0.2415	8.5E-05
	Rising Head 1	6/20/2019	0.2185	7.7E-05
	Falling Head 2	6/21/2019	0.2762	9.7E-05
	Falling Head 3	1/27/2020	0.2715	9.6E-05
	Rising Head 2	1/27/2020	0.2792	9.8E-05
KIF-104	Falling Head 1	1/27/2020	0.0072	2.5E-06
	Rising Head 1	1/28/2020	0.0115	4.0E-06
KIF-105	Falling Head 1	5/28/2019	4.7710	1.7E-03
	Rising Head 1	5/28/2019	4.3510	1.5E-03
	Falling Head 2	5/28/2019	4.8420	1.7E-03
	Rising Head 2	5/28/2019	4.4610	1.6E-03
	Falling Head 3	5/29/2019	4.5860	1.6E-03
	Rising Head 3	5/29/2019	4.4650	1.6E-03
KIF-106	Falling Head 1	5/28/2019	1.6650	5.9E-04
	Rising Head 1	5/28/2019	1.2000	4.2E-04
	Falling Head 2	5/29/2019	1.5090	5.3E-04
	Rising Head 2	5/29/2019	1.3500	4.8E-04
	Falling Head 3	5/29/2019	1.4660	5.2E-04
	Rising Head 3	5/29/2019	1.4680	5.2E-04

Notes
ft/day - feet per day
cm/sec - centimeters per second
Slug tests were conducted on May 28, 2019 through January 28, 2020
Data analysis was completed using AQTESOLV™, Version 4.50 Professional
Analysis was completed using the Bouwer-Rice (1976) solution



KIF-103 FH TEST 1

Data Set: Z:\...\KIF-103_FH-T1_20190620.aqt
Date: 02/24/20 Time: 11:25:18

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-103
Test Date: 06/20/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

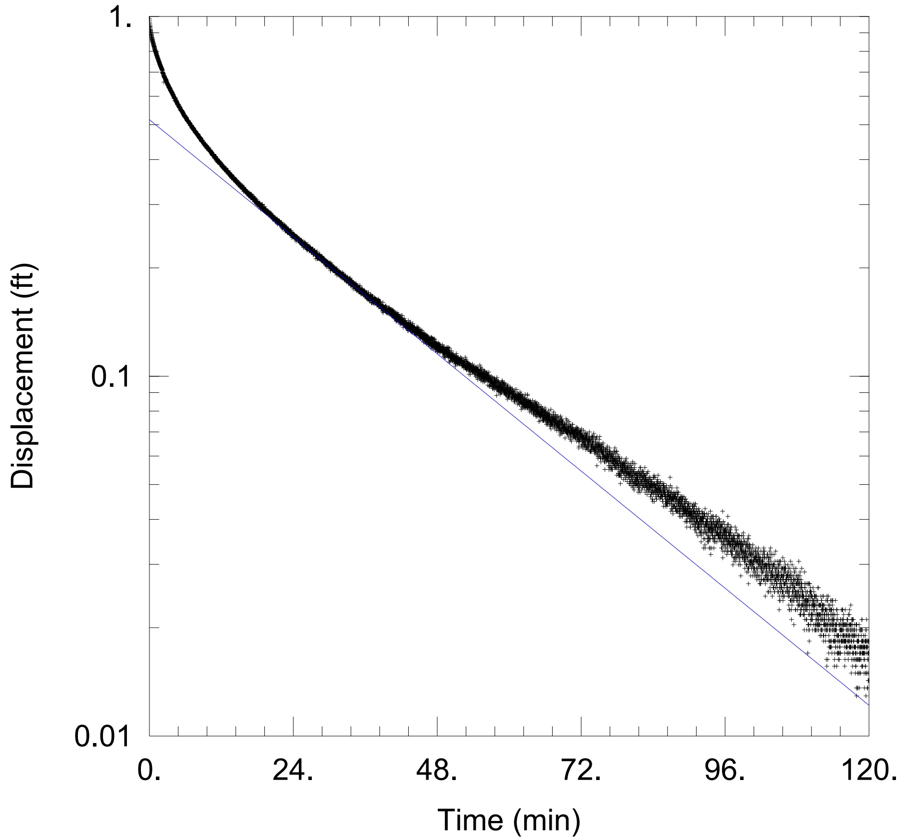
K = 0.2415 ft/day
y0 = 0.5046 ft

AQUIFER DATA

Saturated Thickness: 19. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-103)

Initial Displacement: 1. ft
Total Well Penetration Depth: 18.9 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 19. ft
Screen Length: 10. ft
Well Radius: 0.542 ft



KIF-103 RH TEST 1

Data Set: Z:\...\KIF-103_RH-T1_20190620.aqt
Date: 02/24/20 Time: 11:25:36

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-103
Test Date: 06/20/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.2185 ft/day
y0 = 0.5163 ft

AQUIFER DATA

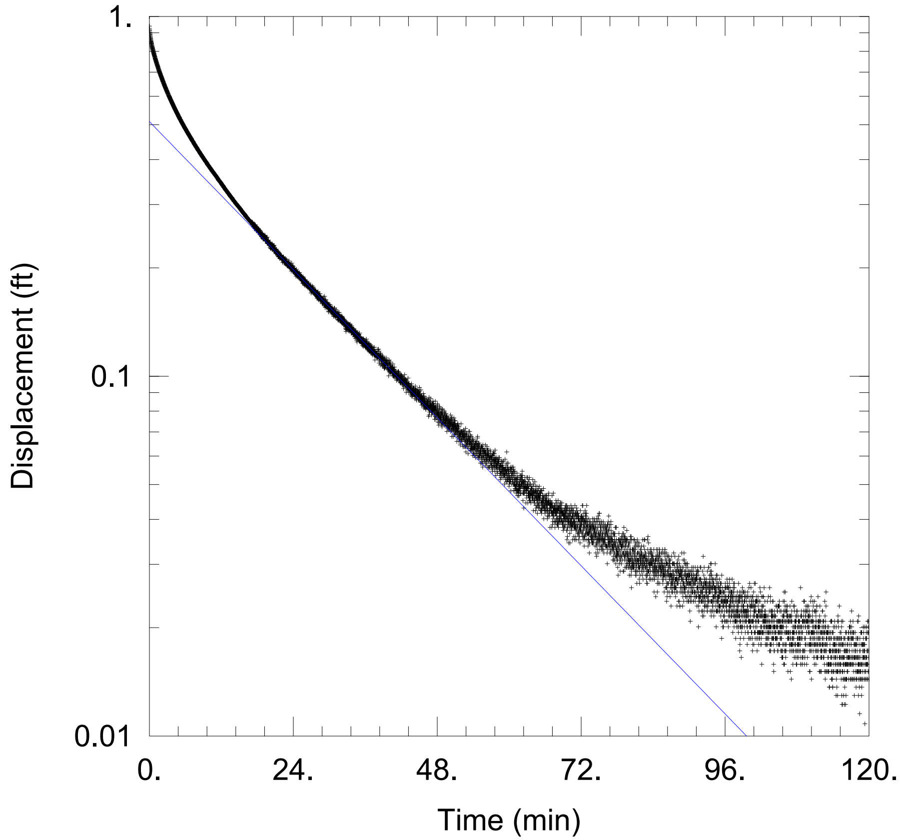
Saturated Thickness: 19. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-103)

Initial Displacement: 1. ft
Total Well Penetration Depth: 18.9 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 19. ft
Screen Length: 10. ft
Well Radius: 0.542 ft



KIF-103 FH TEST 2

Data Set: Z:\...\KIF-103_FH-T2_20190621.aqt
Date: 02/24/20 Time: 11:25:09

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-103
Test Date: 06/21/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

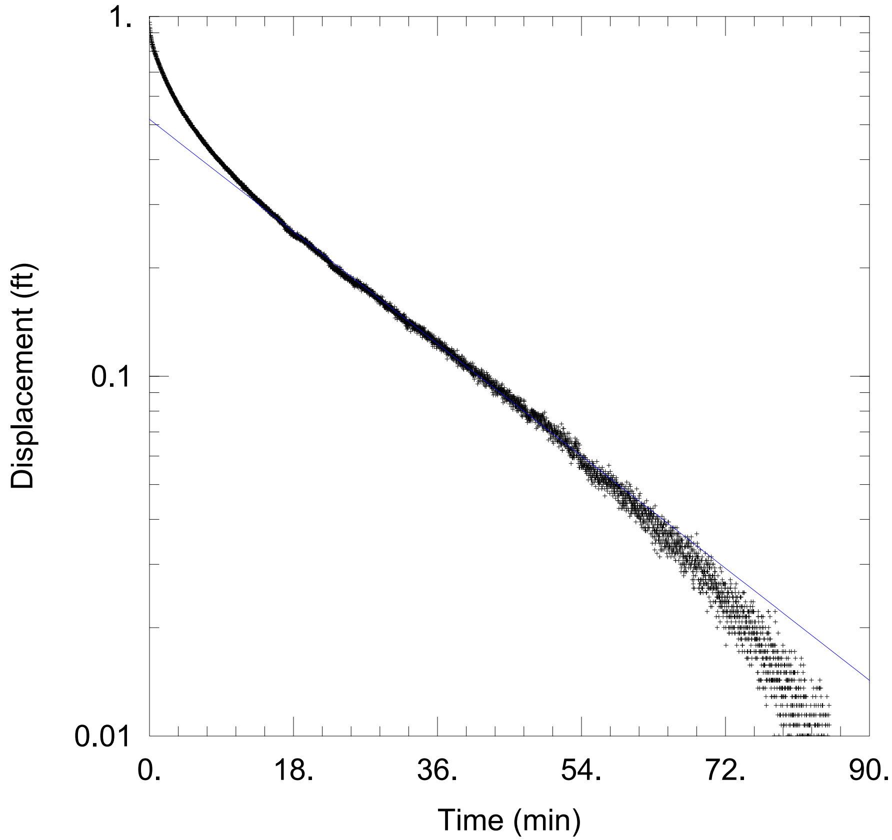
K = 0.2762 ft/day
y0 = 0.51 ft

AQUIFER DATA

Saturated Thickness: 19. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-103)

Initial Displacement: 1. ft
Total Well Penetration Depth: 18.9 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 19. ft
Screen Length: 10. ft
Well Radius: 0.542 ft



KIF-103 FH TEST 3

Data Set: Z:\...\KIF-103_FH-T3_20200127.aqt
Date: 02/24/20 Time: 10:25:36

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-103
Test Date: 01/27/20

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

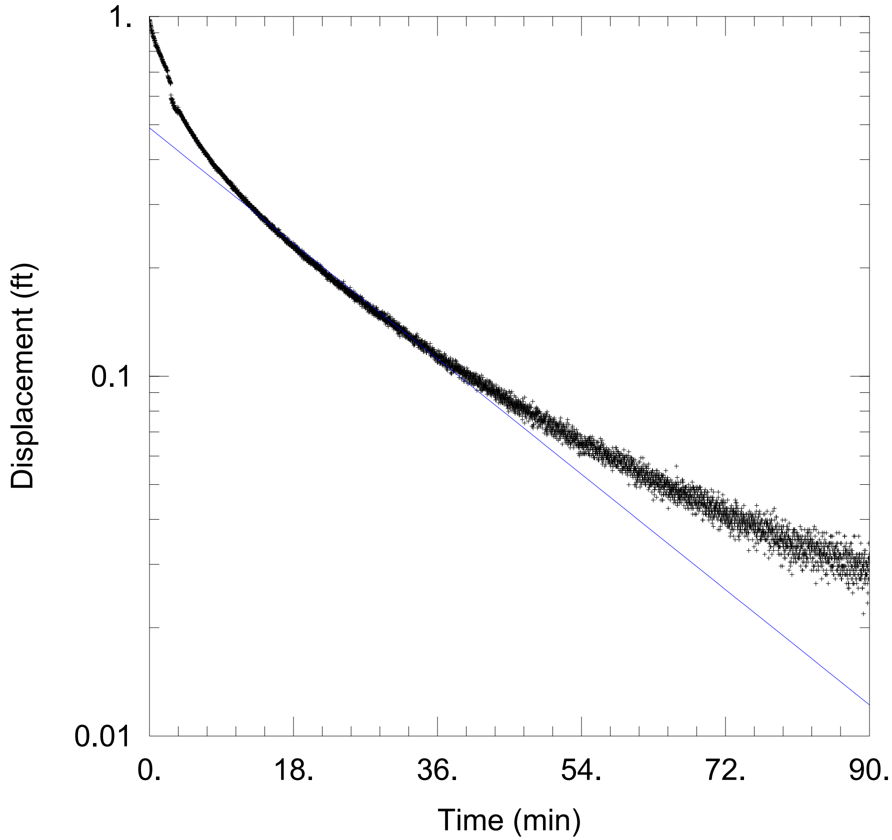
K = 0.2715 ft/day
y0 = 0.5175 ft

AQUIFER DATA

Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-103)

Initial Displacement: 1. ft
Total Well Penetration Depth: 15.91 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 16.01 ft
Screen Length: 10. ft
Well Radius: 0.542 ft



KIF-103 RH TEST 2

Data Set: Z:\...\KIF-103_RH-T2_20200127.aqt
Date: 02/24/20 Time: 10:25:32

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-103
Test Date: 01/27/20

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

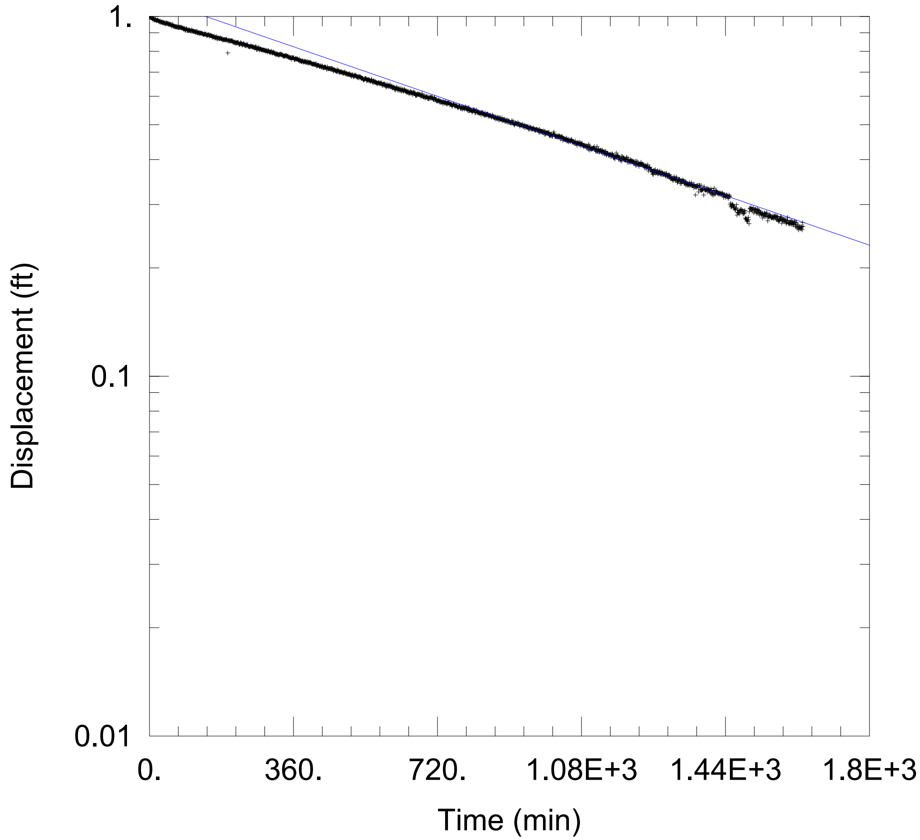
K = 0.2792 ft/day
y0 = 0.4897 ft

AQUIFER DATA

Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-103)

Initial Displacement: 1. ft
Total Well Penetration Depth: 15.91 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 16.01 ft
Screen Length: 10. ft
Well Radius: 0.542 ft



KIF-104 FH TEST 1

Data Set: Z:\...\KIF-104_FH-T1_20200127.aqt
Date: 02/24/20 Time: 10:25:27

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-104
Test Date: 01/27/20

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00718 ft/day
y0 = 1.131 ft

AQUIFER DATA

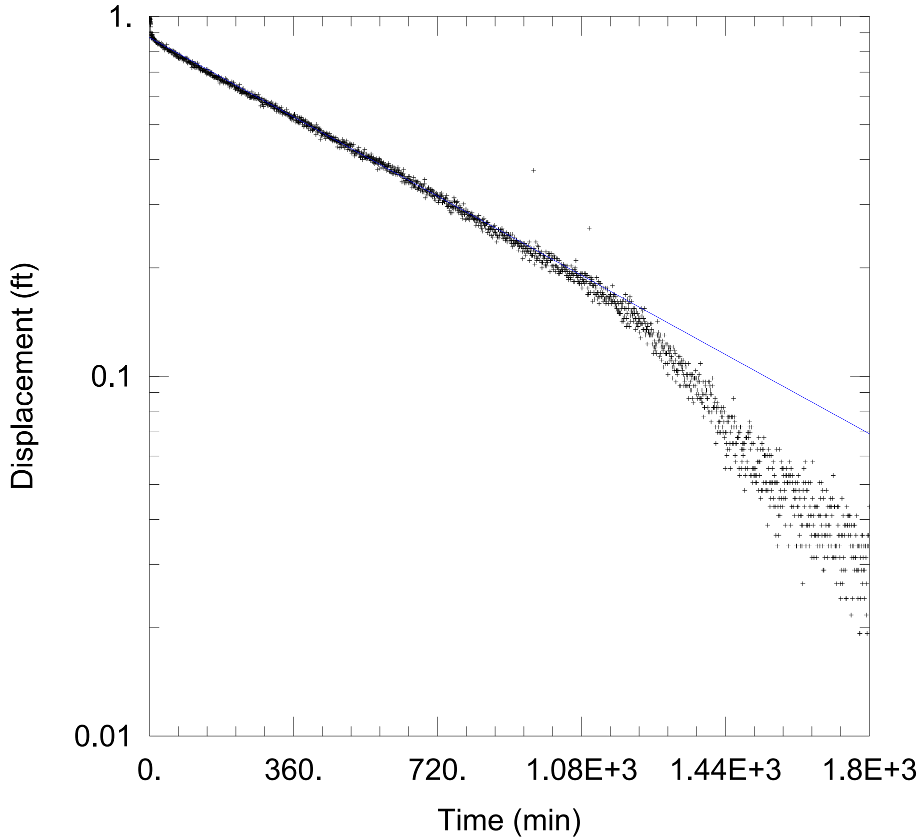
Saturated Thickness: 18.6 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-104)

Initial Displacement: 1. ft
Total Well Penetration Depth: 18.58 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 18.58 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-104 RH TEST 1

Data Set: Z:\...\KIF-104_RH-T1_20200127.aqt
Date: 02/24/20 Time: 10:25:40

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-104
Test Date: 01/28/20

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

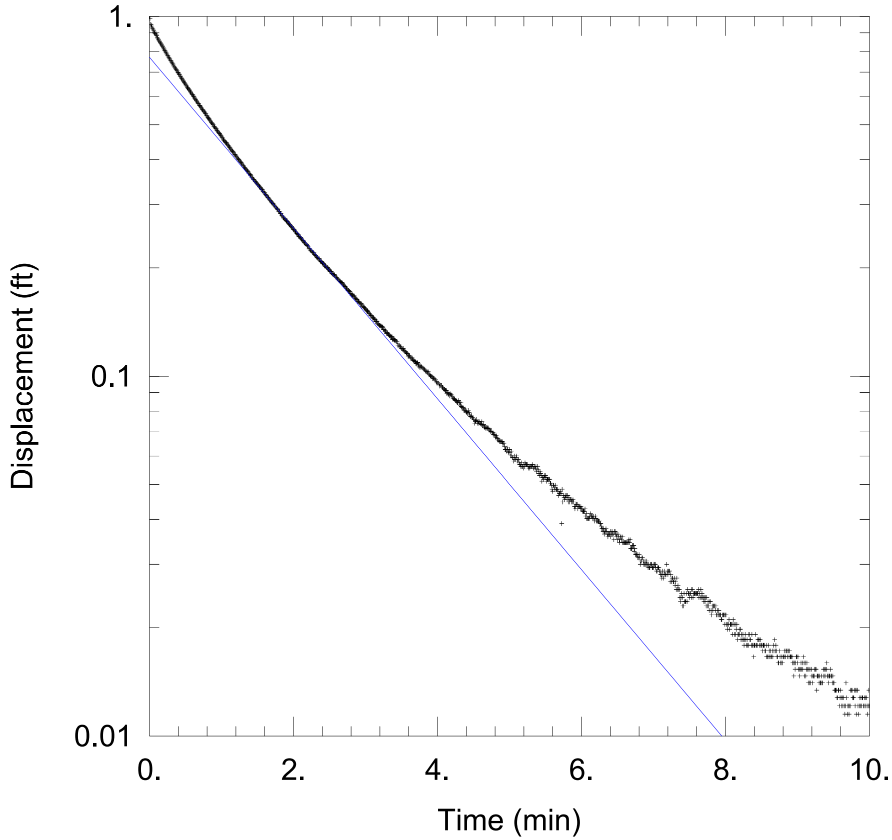
K = 0.01146 ft/day
y0 = 0.8729 ft

AQUIFER DATA

Saturated Thickness: 18.6 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-104)

Initial Displacement: 1. ft
Total Well Penetration Depth: 18.58 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 18.58 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 FH TEST 1

Data Set: Z:\...\KIF-105_FH-T1.aqt
Date: 06/13/19 Time: 11:53:37

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/28/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

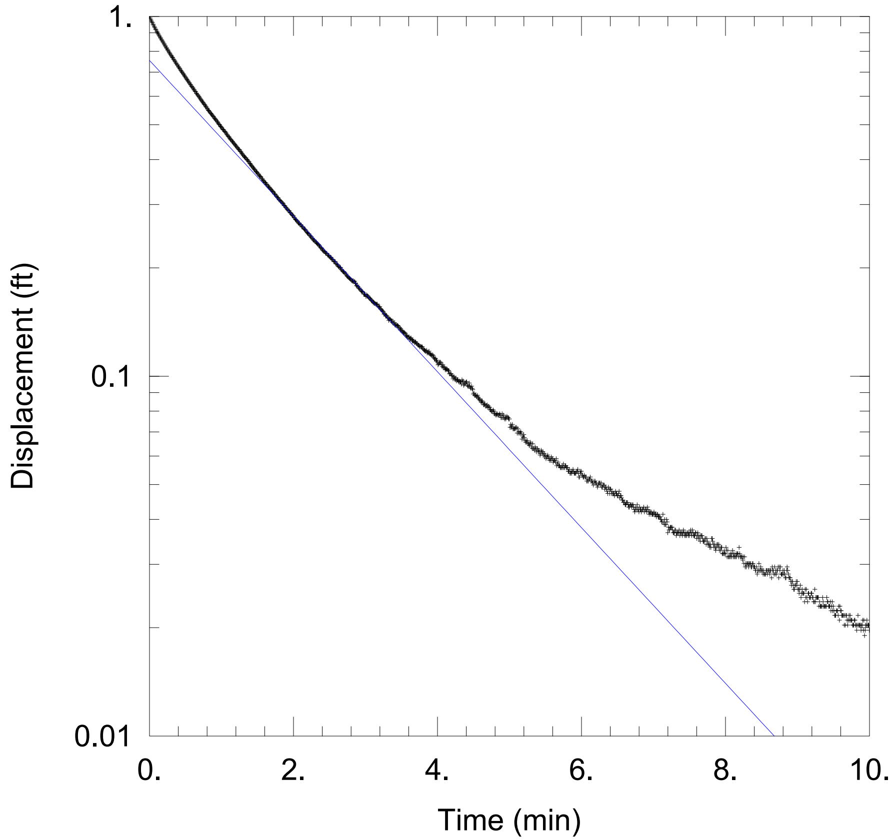
K = 4.771 ft/day
y0 = 0.7697 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 RH TEST 1

Data Set: Z:\...\KIF-105_RH-T1.aqt
Date: 06/13/19 Time: 11:53:26

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/28/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

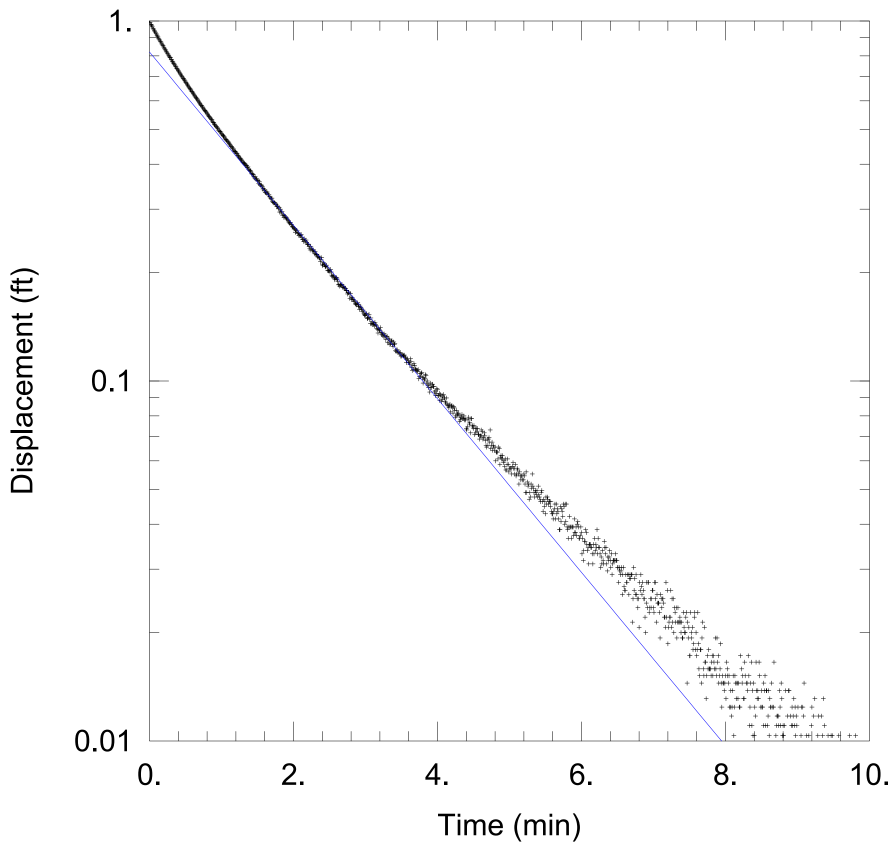
K = 4.351 ft/day
y0 = 0.7547 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 FH TEST 2

Data Set: Z:\...\KIF-105_FH-T2.aqt
Date: 06/13/19 Time: 11:53:34

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/28/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

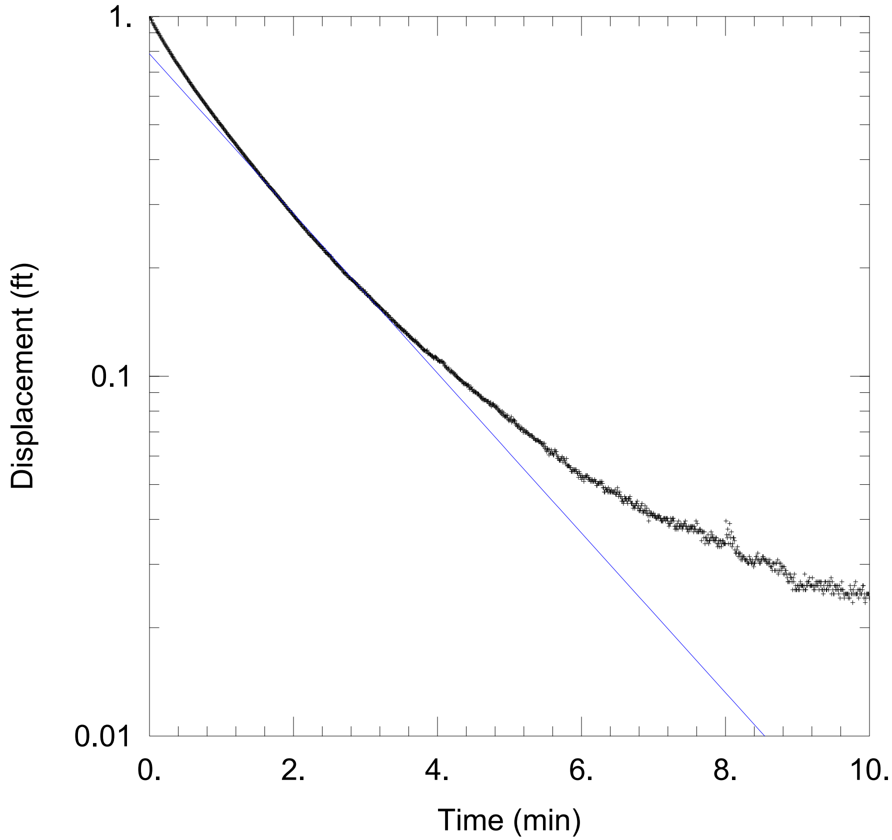
K = 4.842 ft/day
y0 = 0.8196 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 RH TEST 2

Data Set: Z:\...\KIF-105_RH-T2.aqt
Date: 06/13/19 Time: 11:53:22

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/28/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

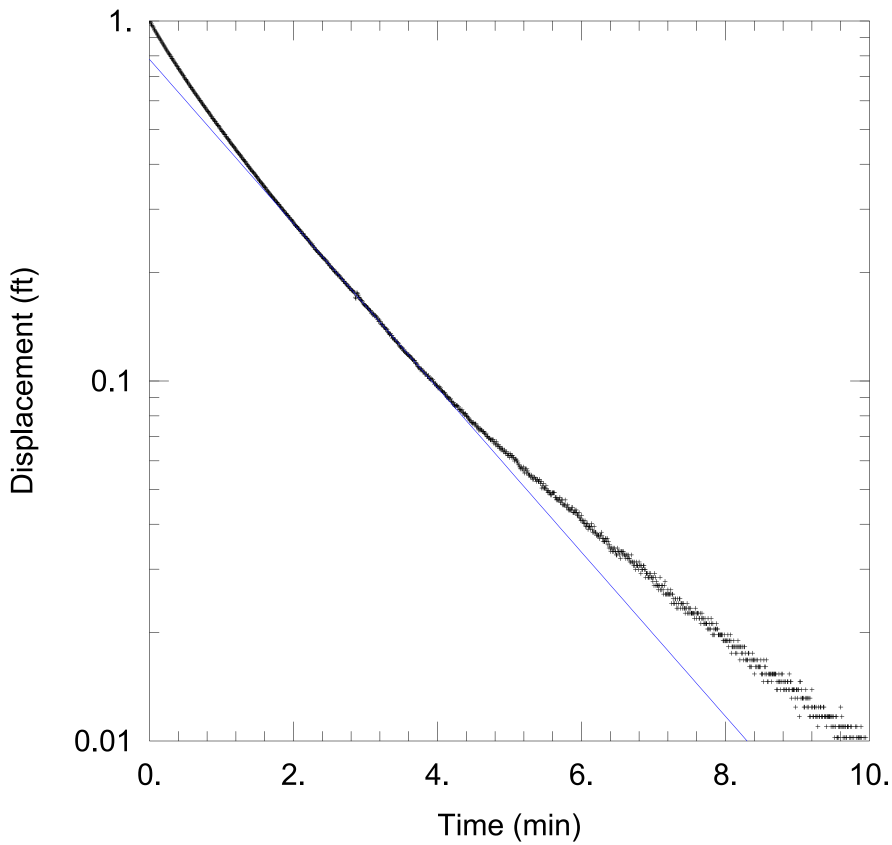
K = 4.461 ft/day
y0 = 0.7866 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 FH TEST 3

Data Set: Z:\...\KIF-105_FH-T3.aqt
Date: 06/13/19 Time: 11:53:30

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/29/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

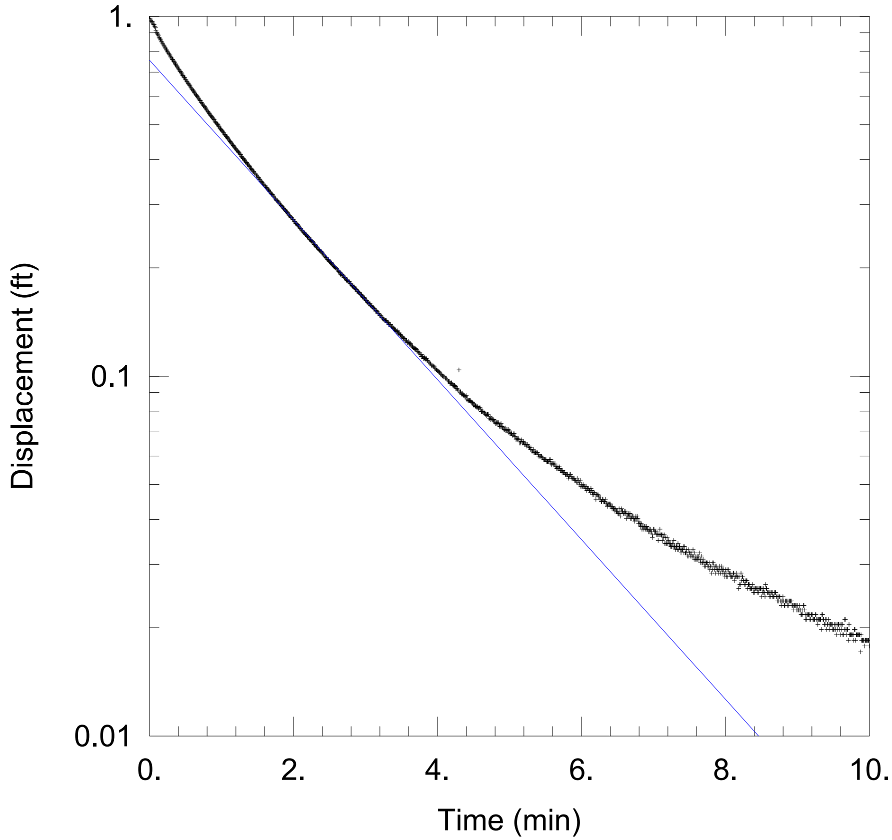
K = 4.586 ft/day
y0 = 0.7821 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-105 RH TEST 3

Data Set: Z:\...\KIF-105_RH-T3.aqt
Date: 06/13/19 Time: 11:53:18

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-105
Test Date: 05/29/19

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

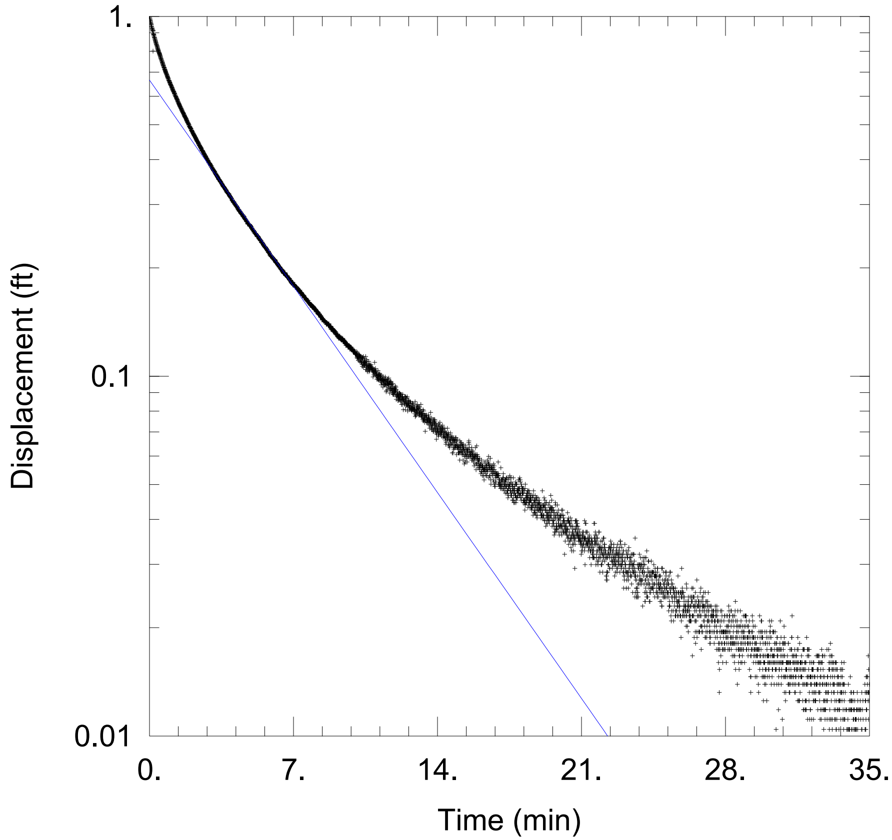
K = 4.465 ft/day
y0 = 0.7559 ft

AQUIFER DATA

Saturated Thickness: 14. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-105)

Initial Displacement: 1. ft
Total Well Penetration Depth: 39.99 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 39.99 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 FH TEST 1

Data Set: Z:\...\KIF-106_FH-T1.aqt
Date: 06/13/19 Time: 11:53:14

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/28/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

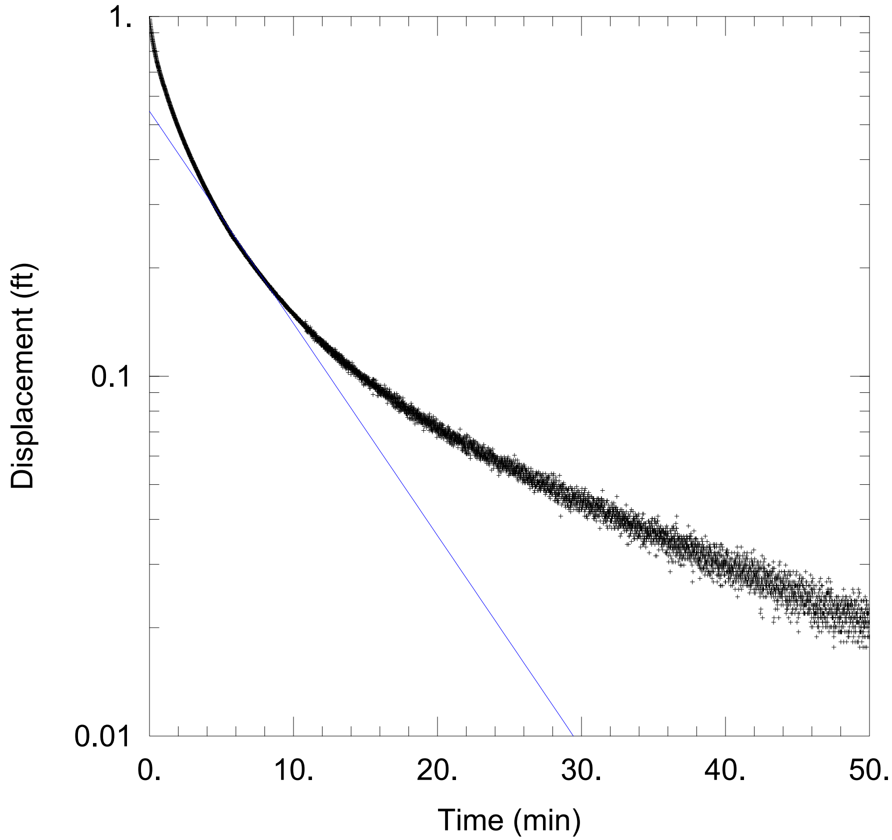
K = 1.665 ft/day
y0 = 0.6652 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 RH TEST 1

Data Set: Z:\...\KIF-106_RH-T1.aqt
Date: 06/13/19 Time: 11:53:03

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/28/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

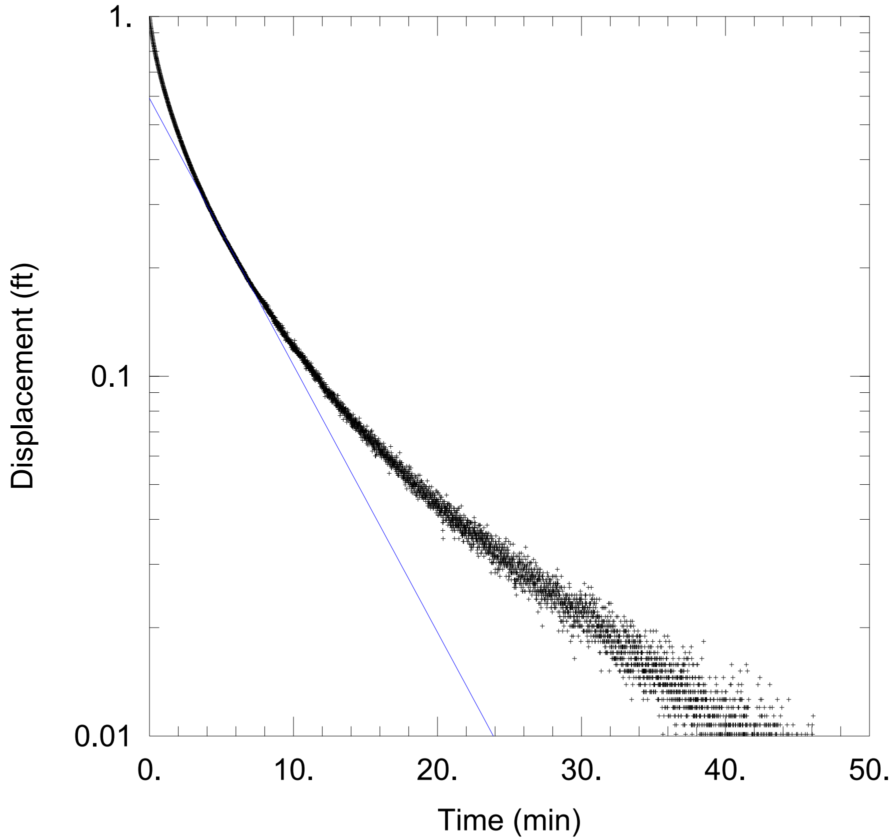
K = 1.2 ft/day
y0 = 0.5451 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 FH TEST 2

Data Set: Z:\...\KIF-106_FH-T2.aqt
Date: 06/13/19 Time: 11:53:10

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/29/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

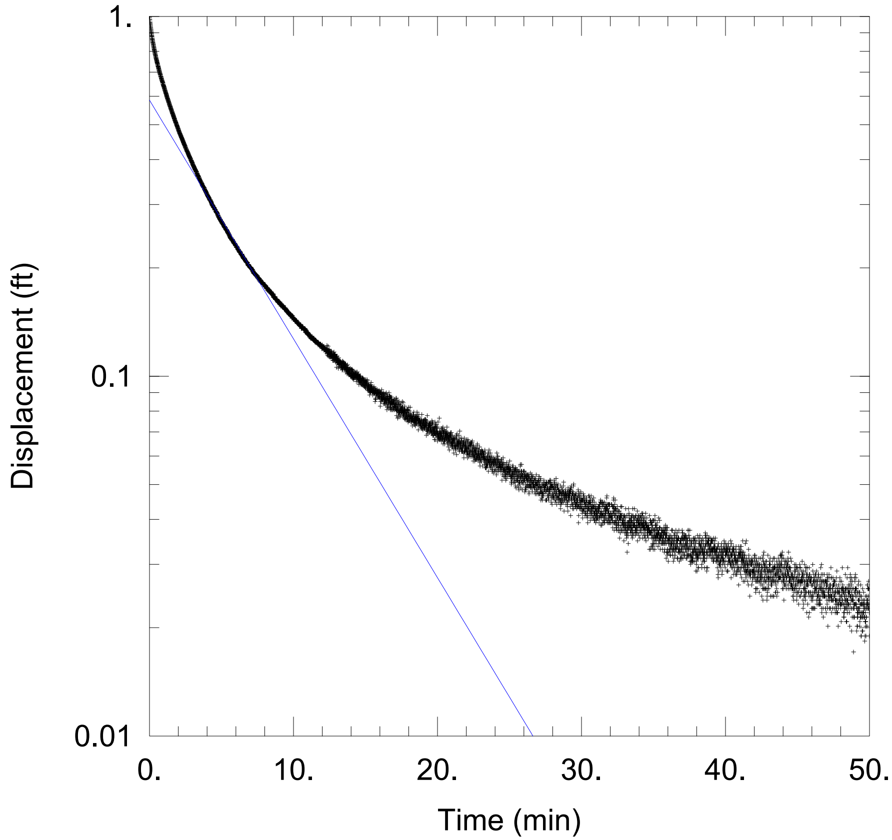
K = 1.509 ft/day
y0 = 0.5917 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 RH TEST 2

Data Set: Z:\...\KIF-106_RH-T2.aqt
Date: 06/13/19 Time: 11:52:58

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/29/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

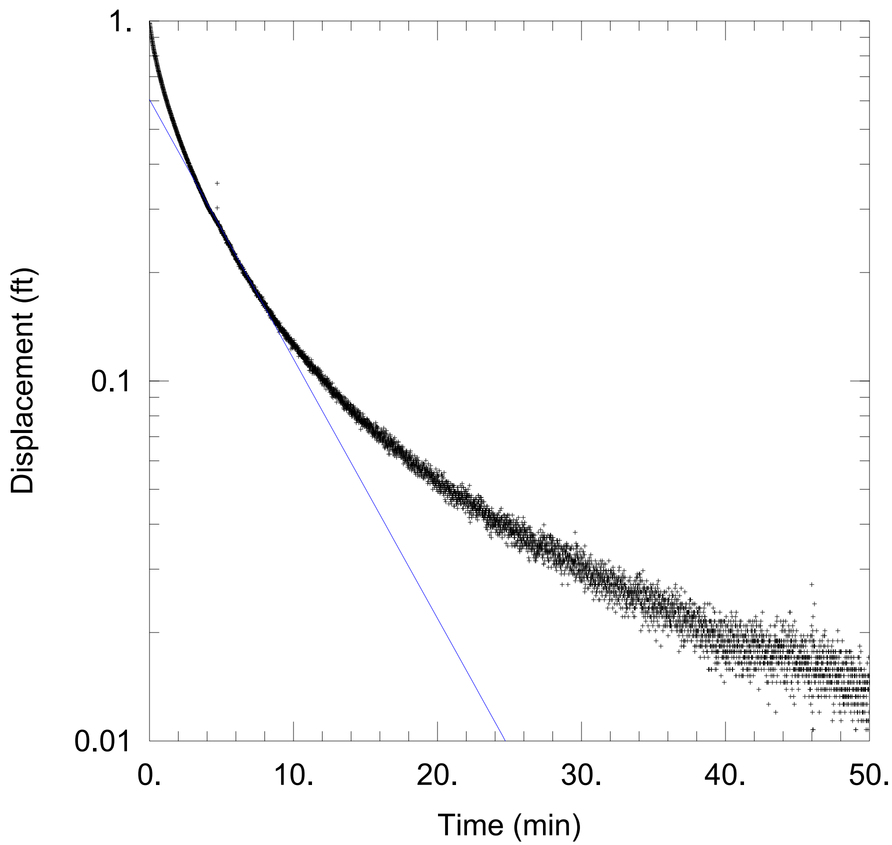
K = 1.35 ft/day
y0 = 0.5851 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 FH TEST 3

Data Set: Z:\...\KIF-106_FH-T3.aqt
Date: 06/13/19 Time: 11:53:07

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/29/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

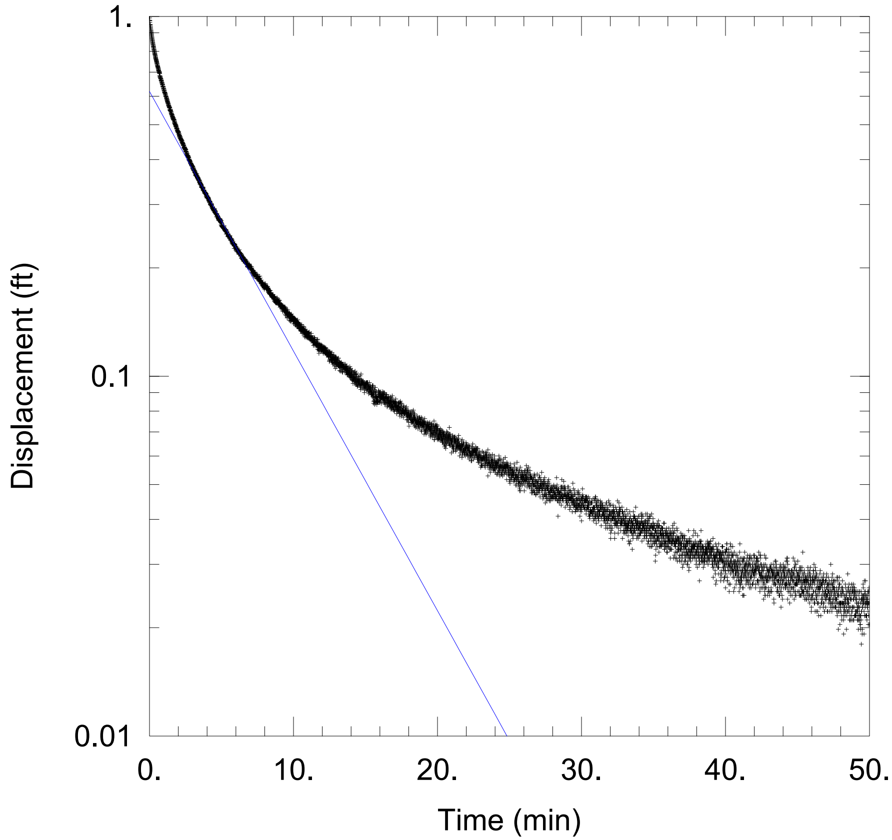
K = 1.466 ft/day
y0 = 0.605 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft



KIF-106 RH TEST 3

Data Set: Z:\...\KIF-106_RH-T3.aqt
Date: 06/13/19 Time: 11:53:42

PROJECT INFORMATION

Company: Stantec
Client: TVA-KIF
Project: 175668043
Location: Kingston Fossil Plant
Test Well: KIF-106
Test Date: 05/29/19

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.468 ft/day
y0 = 0.6183 ft

AQUIFER DATA

Saturated Thickness: 34.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (KIF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 34.07 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.1 ft
Screen Length: 10. ft
Well Radius: 0.333 ft

APPENDIX H.3

GROUNDWATER INVESTIGATION EVENT #1 SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant
Groundwater Investigation Event #1
Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #1 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Jamie Snider

Jamie Snider, Geologic Staff

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by Dreyer Hawbecker for

James M. Kerr, Jr., Senior Principal Geologist

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LIST OF APPENDICES

APPENDIX A - EXHIBITS

APPENDIX B – TABLES

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #1	Groundwater investigation sampling event performed April 2-4, 2019
FSP	Field Sampling Personnel
ft	Feet
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
Terracon	Terracon Consultants, Inc.
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to a groundwater investigation sampling event performed April 2-4, 2019 (Event #1) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #1 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #1 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant.

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #1 is the first in a series of six planned sampling events for the groundwater investigation. Terracon Consultants, Inc. (Terracon) performed the field work activities for this event in conjunction with groundwater sampling under the CCR Rule program pursuant to Title 40 Code of Federal Regulations (CFR) Part 257 at the KIF Plant. The TDEC Order data from this sampling event are included in this SAR. Laboratory analysis of constituents was performed by Eurofins TestAmerica, Inc. (TestAmerica) in

Pittsburgh, Pennsylvania and St. Louis, Missouri (radium samples only). Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification of the data presented in this SAR was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA and determined to meet the objectives of the TDEC Order SAP and QAPP.

This report summarizes the groundwater investigation activities for Event #1. The remaining five sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the KIF Plant are made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #1, performed in April 2019, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeologic Investigation SAR.

In addition, pore water measurements from a monitoring well and piezometers installed in the CCR unit at the KIF Plant are presented in this SAR for comparison with groundwater data. Monitoring well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #1 were conducted April 2-4, 2019. During this event, Terracon performed groundwater level measurements and sample collection activities based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. The sampling collection activities were conducted as part of another TVA groundwater monitoring program; the quality assurance requirements of that program are functionally equivalent to the quality assurance requirements established for the TDEC Order environmental investigation. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also provided quality reviews of field documentation.

During Event #1, the following field activities were conducted:

- Measured groundwater levels at four monitoring wells installed for the TDEC order, and four monitoring wells and five piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well and two piezometers installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from four monitoring wells installed for the TDEC Order
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, one field duplicate, three field blanks, one filter blank, one tubing blank, and one equipment blank
- Shipped the collected samples to TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench and the Ballfield East of Sluice Trench) as well as the monitoring wells and piezometers sampled and/or gauged during Event #1 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the CFR Part 257 (40 CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in the monitoring well and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibit A.2 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2.

Groundwater analytical and field duplicate samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for the TDEC Order and other environmental programs will be provided in the EAR.

3.2 DOCUMENTATION

Terracon maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded on *Field Log Books* and program-specific field forms. Health and safety forms were completed in accordance with TVA and Terracon health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Terracon used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- *Field Log Books*
- *Equipment Calibration Form*
- *Groundwater Level Measurement Form*
- *Groundwater Sampling Form*
- *Chain-of-Custody (COC).*

3.2.1.1 Field Log Book

Terracon field sampling personnel (FSP) recorded field activities, observations, and data in a *Field Log Book* to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented in the *Field Log Book.*

3.2.1.2 Equipment Calibration Form

Terracon FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.3 Groundwater Level Measurement Form

Terracon FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* The form includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.4 Groundwater Sampling Form

Terracon FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.5 Chain-of-Custody

Terracon FSP completed *COC* documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the *COC*. The Field Team Leader reviewed the *COC* for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding *COC*. *COCs* were completed in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure environmental data were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer and National Weather Service (via mesowest.utah.edu) barometric pressure readings for the KIF Plant in Harriman, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in Section 3.2.1.2.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used during Event #1. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

Terracon FSP measured static groundwater levels at eight monitoring wells and a pore water level at one monitoring well in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On April 2, 2019, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with water level measurements made for other groundwater investigation programs at the KIF Plant. Field documentation from this gauging event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs.

Monitoring wells 22A, 22B, 27A, 27B, and GW-2 were inadvertently not included in this gauging event.

Groundwater and pore water measurements were also obtained by Stantec from transducers installed within five and two piezometers, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the reading recorded closest to noon by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Tables B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map based on groundwater measurements in wells and piezometers, along with pore water elevations, is included as Exhibit A.2 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from four monitoring wells as shown in Table B.2 in Appendix B. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with groundwater sample collection for the CCR Rule groundwater program at the KIF Plant. Field documentation from this sampling event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs. Monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Solinst 101) and calibrated turbidimeters (Hach 2100Q), respectively. Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the applicable SAP. Sampling for Event #1 was performed in conjunction with the CCR Rule groundwater program, which had more stringent stabilization criteria. As such, well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 5% microSiemens per centimeter
- Turbidity – Less than 5 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 5 NTUs
- DO – Less than 0.5 milligrams per liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the final field parameter measurements were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Due to a final turbidity reading higher than 5 NTUs at well KIF-104, an additional sample was collected and submitted to the laboratory for dissolved metals analysis.

Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line with the exception of the dissolved metals sample, which was collected via a 0.45-micron disposable inline filter attached to the end of the discharge line to field filter the sample. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final turbidity measurements were made.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with ENV-TI-05.80.04, *Field Sampling Quality Control.*

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as “CCR Parameters.” For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were discarded onto the ground surface, downgradient from the monitoring wells, as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped to TestAmerica in Pittsburgh, Pennsylvania for official sample login. Once samples were logged in, the radium samples were shipped under internal lab protocols to the TestAmerica St. Louis, Missouri, laboratory. TestAmerica submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #1 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater sampling was not performed at well GW-2 during this Event as specified in the SAP. Groundwater sampling activities were performed at well GW-2 during Events #2-6, and an additional groundwater sample was collected following Event #6 for evaluation in the EAR.
- Groundwater level gauging was not performed at wells 22A, 22B, 27A, 27B, and GW-2, as specified in the SAP. Groundwater contour maps were prepared based on available static groundwater level measurements from this event. Water level measurements were made in these wells during Events #3-6 for evaluation in the EAR.
- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.

3.6.2 Variations in Procedures

Variations in procedures are provided below:

- Sampling for Event #1 was performed in conjunction with the CCR Rule groundwater program and SAP, which had more stringent stabilization criteria than were defined in the TDEC Order SAP (for this sampling event). As a result, a dissolved metals sample was collected from KIF-104. This variation does not impact data quality for this event.

4.0 SUMMARY

The data presented in this report are only for groundwater investigation sampling Event #1 at the KIF Plant. The scope of work for Event #1 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from the monitoring well and piezometers installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #1 included collecting groundwater level measurements at eight monitoring wells and five piezometers; pore water measurements at one monitoring well and two piezometers in the CCR units; and a surface water measurement at one gauge located in the Emory River. Groundwater and surface water measurements and elevations are provided in Table B.1a, and pore water measurements and elevations are provided in Table B.1b, and depicted on Exhibit A.2.

Groundwater quality measurements and groundwater analytical samples were collected at four monitoring wells as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity, and DO were achieved at each sampling location. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by TestAmerica, and then validated or verified by EnvStds.

Terracon has completed Event #1 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #1 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete dataset from this event will be evaluated along with data collected during the remaining groundwater sampling events and under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This full evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Revision 3. Prepared for Tennessee Valley Authority. November 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Groundwater Investigation Sampling and Analysis Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA. ENV-TI-05.80.03. *Field Record Keeping*.

TVA. ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA. ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA. ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA. ENV-TI-05.80.42. *Groundwater Sampling*.

TVA. ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA. ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.
A.1

Title
Monitoring Well Network

Client/Project
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec

TVA

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #1 (April 2, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-09
Technical Review by MD on 2021-09-09

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well groundwater elevation in ft amsl
- Piezometer groundwater elevation in ft amsl
- Piezometer in CCR pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured, refer to Tables B.1a and B.1b for details.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
April 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	n/a	NM	759.12	NM	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B	n/a	NM	759.18	NM	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	n/a	NM	757.97	NM	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B	n/a	NM	758.15	NM	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	2-Apr-19	20.33	758.01	737.68	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	2-Apr-19	5.91	781.13	775.22	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	2-Apr-19	11.54	757.10	745.56	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	2-Apr-19	9.47	752.30	742.83	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	n/a	NM	769.98	NM	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	n/a	NM	761.23	NM	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	2-Apr-19	22.56	760.33	737.77	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	2-Apr-19	19.99	758.60	738.61	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	2-Apr-19	9.06	757.26	748.20	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	2-Apr-19	9.55	761.27	751.72	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	2-Apr-19	n/a	n/a	739.6	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	2-Apr-19	n/a	n/a	740.8	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	2-Apr-19	n/a	n/a	741.5	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	2-Apr-19	n/a	n/a	741.9	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	2-Apr-19	n/a	n/a	739.6	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B	n/a	NM	751.92	NM	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2	n/a	NM	746.88	NM	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A	n/a	NM	752.05	NM	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B	n/a	NM	748.70	NM	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River Gauge	n/a	2-Apr-19	n/a	n/a	737.63	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification

1. Top of casing elevations, screen intervals, and screened formations for monitoring wells were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.
6. Monitoring wells 22A, 22B, 27A, 27B, GW-2, and KIF-22C were inadvertently not included in this gauging event.
7. In select piezometers, as noted by "NM" above, groundwater elevation data were not available for this event.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
April 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	2-Apr-19	9.54	762.86	753.32	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	n/a	NM	775.36	NM	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	n/a	NM	774.73	NM	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	n/a	NM	778.90	NM	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	n/a	NM	769.60	NM	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	n/a	NM	773.59	NM	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	2-Apr-19	n/a	n/a	742.3	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	2-Apr-19	n/a	n/a	740.8	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1	n/a	NM	764.43	NM	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1	n/a	NM	766.69	NM	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.
6. Temporary wells were not gauged during this event. Gauging and sampling of temporary wells did not commence until all temporary wells associated with the Exploratory Drilling scope were installed and developed.

TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
April 2019

			Analysis Type										
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Dissolved Metals	Total Mercury	Dissolved Mercury	Anions	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
KIF-103	KIF-GW-031-04032019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
KIF-104	KIF-GW-032-04042019	Normal Environmental Sample	x	x	x	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-04032019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
KIF-106	KIF-GW-034-04022019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
	KIF-GW-903-04022019	Field Duplicate Sample		x		x		x	x	x	x	x	x

Notes:

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Anions	SW-846 9056A
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
April 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	KIF-103 3-Apr-19 KIF-GW-031-04032019 21.8 ft Normal Environmental Sample Final QC Review	KIF-104 4-Apr-19 KIF-GW-032-04042019 33 ft Normal Environmental Sample Final QC Review	KIF-105 3-Apr-19 KIF-GW-033-04032019 43 ft Normal Environmental Sample Final QC Review	KIF-106 2-Apr-19 KIF-GW-034-04022019 37.5 ft Normal Environmental Sample Final QC Review
Field Parameters					
Dissolved Oxygen	%	2.1	1.4	1.9	2.9
Dissolved Oxygen	mg/L	0.20	0.13	0.19	0.25
ORP	mV	34.6	-122.7	105.5	13.8
pH (field)	SU	5.81	6.24	5.60	6.72
Specific Cond. (Field)	mS/cm	0.417	1.53	1.09	0.475
Temperature, Water (C)	DEG C	18.4	17.3	18.9	17.0
Turbidity, field	NTU	4.69	11.2	0.22	3.76

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mS/cm	millisiemens per centimeter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
April 2019

Sample Location				KIF-103	KIF-104	KIF-105	KIF-106	
Sample Date				3-Apr-19	4-Apr-19	3-Apr-19	2-Apr-19	2-Apr-19
Sample ID				KIF-GW-031-04032019	KIF-GW-032-04042019	KIF-GW-033-04032019	KIF-GW-034-04022019	KIF-GW-903-04022019
Sample Depth				21.8 ft	33 ft	43 ft	37.5 ft	37.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals								
Antimony	mg/L	0.0060^A	n/v	<0.000378	<0.000378	<0.000378	<0.000378	<0.000378
Arsenic	mg/L	0.010^A	n/v	0.000773 J	**0.0101^A**	0.000463 J	0.000890 J	0.000991 J
Barium	mg/L	2.0^A	n/v	0.0354	0.0963	0.0184	0.0456	0.0465
Beryllium	mg/L	0.0040^A	n/v	<0.000155	<0.000155	<0.000155	<0.000155	<0.000155
Boron	mg/L	n/v	n/v	0.948	1.74	1.80	0.293	0.298
Cadmium	mg/L	0.0050^A	n/v	<0.000125	<0.000125	0.000505 J	<0.000125	<0.000125
Calcium	mg/L	n/v	n/v	34.7	167	172	75.7	76.7
Chromium	mg/L	0.10^A	n/v	<0.00153	0.00325 U*	<0.00153	0.00232 U*	0.00261 U*
Cobalt	mg/L	n/v	0.0060^B	**0.0653^B**	**0.00979^B**	**0.0166^B**	0.00345	0.00350
Copper	mg/L	n/v	n/v	<0.000627	0.000808 J	<0.000627	<0.000627	<0.000627
Lead	mg/L	n/v	0.015^B	<0.000128	<0.000128	<0.000128	<0.000128	<0.000128
Lithium	mg/L	n/v	0.040^B	<0.00314	0.00935 U*	0.00328 U*	0.00333 U*	0.00375 U*
Magnesium	mg/L	n/v	n/v	11.6	33.7	29.3	5.42	5.52
Mercury	mg/L	0.0020^A	n/v	<0.000101	<0.000101	<0.000101	<0.000101	<0.000101
Molybdenum	mg/L	n/v	0.10^B	<0.000610	0.00198 J	<0.000610	<0.000610	<0.000610
Nickel	mg/L	100 (TN MCL)^A	n/v	0.00222	0.00223 U*	0.0161	0.00153	0.00157
Potassium	mg/L	n/v	n/v	1.15	7.57	12.5	1.40	1.44
Selenium	mg/L	0.050^A	n/v	<0.00262	<0.00262	<0.00262	<0.00262	<0.00262
Silver	mg/L	100 (TN MCL)^A	n/v	<0.000121	<0.000121	<0.000121	<0.000121	<0.000121
Sodium	mg/L	n/v	n/v	4.69	44.0	9.52	13.1	13.3
Thallium	mg/L	0.0020^A	n/v	<0.000128	<0.000128	<0.000128	<0.000128	<0.000128
Vanadium	mg/L	n/v	n/v	<0.000899	0.00119	<0.000899	0.00123 U*	0.00145 U*
Zinc	mg/L	n/v	n/v	0.00376 J	0.00361 J	0.0125	<0.00322	<0.00322
Dissolved Metals								
Antimony	mg/L	0.0060^A	n/v	-	<0.000378	-	-	-
Arsenic	mg/L	0.010^A	n/v	-	0.00972	-	-	-
Barium	mg/L	2.0^A	n/v	-	0.0838	-	-	-
Beryllium	mg/L	0.0040^A	n/v	-	<0.000155	-	-	-
Boron	mg/L	n/v	n/v	-	1.67	-	-	-
Cadmium	mg/L	0.0050^A	n/v	-	<0.000125	-	-	-
Calcium	mg/L	n/v	n/v	-	164	-	-	-
Chromium	mg/L	0.10^A	n/v	-	0.00255 U*	-	-	-
Cobalt	mg/L	n/v	0.0060^B	-	**0.00955^B**	-	-	-
Copper	mg/L	n/v	n/v	-	<0.000627	-	-	-
Lead	mg/L	n/v	0.015^B	-	<0.000128	-	-	-
Lithium	mg/L	n/v	0.040^B	-	0.00809	-	-	-
Magnesium	mg/L	n/v	n/v	-	33.4	-	-	-
Mercury	mg/L	0.0020^A	n/v	-	<0.000101	-	-	-
Molybdenum	mg/L	n/v	0.10^B	-	0.00172 J	-	-	-
Nickel	mg/L	100 (TN MCL)^A	n/v	-	0.00197	-	-	-
Potassium	mg/L	n/v	n/v	-	7.69	-	-	-
Selenium	mg/L	0.050^A	n/v	-	<0.00262	-	-	-
Silver	mg/L	100 (TN MCL)^A	n/v	-	<0.000121	-	-	-
Sodium	mg/L	n/v	n/v	-	43.9	-	-	-
Thallium	mg/L	0.0020^A	n/v	-	<0.000128	-	-	-
Vanadium	mg/L	n/v	n/v	-	0.000911 U*	-	-	-
Zinc	mg/L	n/v	n/v	-	<0.00322	-	-	-
Anions								
Chloride	mg/L	n/v	n/v	4.93	9.98	6.87	7.61	7.58
Fluoride	mg/L	4^A	n/v	0.0381 J	0.0591 J	0.0484 J	0.125	0.130
Sulfate	mg/L	n/v	n/v	92.2 J	579	503 J	85.0	85.2
General Chemistry								
Alkalinity, Bicarbonate	mg/L	n/v	n/v	106	272	40.6	148	148
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	106	272	40.6	148	148
Total Dissolved Solids	mg/L	n/v	n/v	249	1,030	832	320	321

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5^A	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
-	parameter not analyzed / not available
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

Stantec

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
April 2019

Sample Location				KIF-103	KIF-104	KIF-105	KIF-106	
Sample Date				3-Apr-19	4-Apr-19	3-Apr-19	2-Apr-19	2-Apr-19
Sample ID				KIF-GW-031-04032019	KIF-GW-032-04042019	KIF-GW-033-04032019	KIF-GW-034-04022019	KIF-GW-903-04022019
Sample Depth				21.8 ft	33 ft	43 ft	37.5 ft	37.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units	EPA MCLs	CCR Rule GWPS					
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	0.105 +/-(0.0716)	0.151 +/-(0.0875)J	0.0686 +/-(0.0581)U	0.00252 +/-(0.0392)U	0.0471 +/-(0.0500)U
Radium-226+228	pCi/L	5[A]	n/v	0.375 +/-(0.307)J	0.624 +/-(0.253)J	0.215 +/-(0.271)U	0.282 +/-(0.247)U	0.279 +/-(0.219)U
Radium-228	pCi/L	n/v	n/v	0.270 +/-(0.299)U	0.472 +/-(0.237)	0.146 +/-(0.265)U	0.279 +/-(0.244)U	0.232 +/-(0.213)U

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picoCurie per Liter
U	not detected

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.4

GROUNDWATER INVESTIGATION EVENT #2 SAMPLING AND ANALYSIS REPORT

Stantec

Kingston Fossil Plant
Groundwater Investigation Event #2
Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

TVA

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #2 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Jamie Snider

Jamie Snider, Geologic Staff

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by [signature] for,

James M. Kerr, Jr., Senior Principal Geologist

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LIST OF APPENDICES

APPENDIX A - EXHIBITS

APPENDIX B – TABLES

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #2	Groundwater investigation sampling event performed June 17-21, 2019
FSP	Field Sampling Personnel
ft	Feet
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
Terracon	Terracon Consultants, Inc.
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to a groundwater investigation sampling event performed June 17-21, 2019 (Event #2) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #2 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #2 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant.

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #2 is the second in a series of six planned sampling events for the groundwater investigation. Terracon Consultants, Inc. (Terracon) performed the field work activities for this event in conjunction with groundwater sampling for under the CCR Rule program pursuant to Title 40 Code of Federal Regulations (CFR) Part 257 at the KIF Plant. The TDEC Order data from this sampling event are included in this SAR. Laboratory analysis of constituents was performed by Eurofins TestAmerica, Inc. (TestAmerica) in

Pittsburgh, Pennsylvania and St. Louis, Missouri (radium samples only). Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification of the data presented in this SAR was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA and determined to meet the objectives of the TDEC Order SAP and QAPP.

This report summarizes the groundwater investigation activities for Event #2. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the KIF Plant are made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #2, performed in June 2019, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeologic Investigation SAR.

In addition, pore water measurements from a monitoring well and piezometers installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data. Monitoring well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #2 were conducted June 17-21, 2019. During this event, Terracon and Stantec performed groundwater level measurements, and sample collection activities were performed by Terracon based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. A subset of the sampling collection activities were conducted as part of another TVA groundwater monitoring program; the quality assurance requirements of that program are functionally equivalent to the quality assurance requirements established for the TDEC Order environmental investigation. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also provided quality reviews of field documentation.

During Event #2, the following field activities were conducted:

- Measured groundwater levels at five monitoring wells for the TDEC Order, and eight monitoring wells and five piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well and two piezometers installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from four monitoring wells installed for the TDEC Order and one monitoring well installed for other purposes
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, one field duplicate, four field blanks, one filter blank, one tubing blank, and one equipment blank
- Shipped the collected samples to TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench and the Ballfield East of Sluice Trench) as well as the monitoring wells and piezometers sampled and/or gauged during Event #2 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the CFR Part 257 (40 CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in the monitoring well and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibit A.2 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2.

Groundwater analytical samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for the TDEC Order and other environmental programs will be provided in the EAR.

3.2 DOCUMENTATION

Terracon maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded on *Field Log Books* and program-specific field forms. Health and safety forms were completed in accordance with TVA and Terracon health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Terracon used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- *Field Log Books*
- *Equipment Calibration Form*
- *Groundwater Level Measurement Form*
- *Groundwater Sampling Form*
- *Chain-of-Custody (COC).*

3.2.1.1 Field Log Book

Terracon field sampling personnel (FSP) recorded field activities, observations, and data in a *Field Log Book* to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented in the *Field Log Book.*

3.2.1.2 Equipment Calibration Form

Terracon FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.3 Groundwater Level Measurement Form

Terracon FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* The form includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.4 Groundwater Sampling Form

Terracon FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.5 Chain-of-Custody

Terracon FSP completed *COC* documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the *COC*. The Field Team Leader reviewed the *COC* for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding *COC*. *COCs* were completed in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure environmental data were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer and National Weather Service (via mesowest.utah.edu) barometric pressure readings for the KIF Plant in Harriman, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in Section 3.2.1.2.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used during Event #2. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

Terracon FSP measured static groundwater levels at 13 monitoring wells and a pore water level at one monitoring well in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On June 17, 2019, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with water level measurements made for other groundwater investigation programs at the KIF Plant. Field documentation from this gauging event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs.

Groundwater and pore water measurements were also obtained by Stantec from transducers installed within five and two piezometers, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the the reading recorded closest to noon by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Tables B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map based on groundwater measurements in wells and piezometers, along with pore water elevations, is included as Exhibit A.2 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical samples as specified in the SAP) were collected from five monitoring wells as shown in Table B.2 in Appendix B. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with groundwater sample collection for the CCR Rule groundwater program at the KIF Plant. Field documentation from this sampling event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs.With the exception of GW-2, monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*. Dedicated tubing was missing from GW-2 and replacement tubing was installed for the sampling event.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Solinst 101) and calibrated turbidimeters (Hach 2100Q), respectively. Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the applicable SAP and/or applicable TI. Sampling for Event #2 was performed in conjunction with the CCR Rule groundwater program, which had more stringent stabilization criteria. As such, well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 5% microSiemens per centimeter
- Turbidity – Less than 5 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 5 NTUs
- DO – Less than 0.5 milligrams per liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the final field parameter measurements were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Due to a final turbidity reading higher than 5 NTUs at well KIF-104, an additional sample was collected and submitted to the laboratory for dissolved metals analysis.

Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line with the exception of the dissolved metals sample, which was collected via a 0.45-micron disposable inline filter attached to the end of the discharge line to field filter the sample. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final turbidity measurements were made.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with ENV-TI-05.80.04, *Field Sampling Quality Control.* A field duplicate sample, along with other QC samples, were collected from a monitoring well installed for another environmental program, which was sampled in conjunction with the TDEC Order monitoring wells during Event #2.

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as “CCR Parameters.” For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were discarded onto the ground surface, downgradient from the monitoring wells, as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped to TestAmerica in Pittsburgh, Pennsylvania for official sample login. Once samples were logged in, the radium samples were shipped under internal lab protocols to the TestAmerica St. Louis, Missouri, laboratory. TestAmerica submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #2 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.

3.6.2 Variations in Procedures

Variations in procedures are provided below:

- Although new tubing was installed at monitoring well GW-2, a tubing blank was not collected.
- Sampling for Event #1 was performed in conjunction with the CCR Rule groundwater program and SAP, which had more stringent stabilization criteria than were defined in the TDEC Order SAP (for this sampling event). As a result, a dissolved metals sample was collected from KIF-104. This variation does not impact data quality for this event.

4.0 SUMMARY

The data presented in this report are only for groundwater investigation sampling Event #2 at the KIF Plant. The scope of work for Event #2 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from a monitoring well and piezometers installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #2 included collecting groundwater level measurements at 13 monitoring wells and five piezometers; pore water measurements at one monitoring well and two piezometers in the CCR units; and a surface water measurement at one gauge located in the Emory River. Groundwater and surface water measurements and elevations are provided in Table B.1a, and pore water measurements and elevations are provided in Table B.1b, and depicted on Exhibit A.2.

Groundwater quality measurements and groundwater analytical samples were collected at five monitoring wells as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity, and DO were achieved at each sampling location. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by TestAmerica, and then validated or verified by EnvStds.

Terracon has completed Event #2 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #2 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete datasets from the six groundwater sampling events will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This full evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Revision 3. Prepared for Tennessee Valley Authority. November 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Groundwater Investigation Sampling and Analysis Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA. ENV-TI-05.80.03. *Field Record Keeping*.

TVA. ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA. ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA. ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA. ENV-TI-05.80.42. *Groundwater Sampling*.

TVA. ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA. ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.
A.1

Title
Monitoring Well Network

Client/Project
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
Roane County, Tennessee

175668043
Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec TVA

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #2 (June 17, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-09
Technical Review by MD on 2021-09-09

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well groundwater elevation in ft amsl
- Piezometer groundwater elevation in ft amsl
- Piezometer in CCR pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured, refer to Tables B.1a and B.1b for details.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
June 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	17-Jun-19	18.11	759.12	741.01	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	17-Jun-19	18.06	759.18	741.12	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	17-Jun-19	16.74	757.97	741.23	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	17-Jun-19	16.41	758.15	741.74	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	17-Jun-19	17.11	758.01	740.90	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	17-Jun-19	8.43	781.13	772.70	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	17-Jun-19	10.12	757.10	746.98	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	17-Jun-19	9.02	752.30	743.28	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	17-Jun-19	19.20	769.98	750.78	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	n/a	NM	761.23	NM	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	17-Jun-19	19.30	760.33	741.03	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	17-Jun-19	17.50	758.60	741.10	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	17-Jun-19	8.03	757.26	749.23	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	17-Jun-19	8.97	761.27	752.30	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	17-Jun-19	n/a	n/a	741.4	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	17-Jun-19	n/a	n/a	742.7	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	17-Jun-19	n/a	n/a	742.5	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	17-Jun-19	n/a	n/a	742.2	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	17-Jun-19	n/a	n/a	740.7	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B	n/a	NM	751.92	NM	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2	n/a	NM	746.88	NM	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A	n/a	NM	752.05	NM	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B	n/a	NM	748.70	NM	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River Gauge	n/a	17-Jun-19	n/a	n/a	740.98	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.

1. Top of casing elevations, screen intervals, and screened formations for monitoring wells were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.
6. In select piezometers, as noted by "NM" above, groundwater elevation data were not available for this event.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
June 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	17-Jun-19	9.98	762.86	752.88	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	n/a	NM	775.36	NM	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	n/a	NM	774.73	NM	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	n/a	NM	778.90	NM	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	n/a	NM	769.60	NM	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	n/a	NM	773.59	NM	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	17-Jun-19	n/a	n/a	742.6	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	17-Jun-19	n/a	n/a	741.6	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1	n/a	NM	764.43	NM	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1	n/a	NM	766.69	NM	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.
6. Temporary wells were not gauged during this event. Gauging and sampling of temporary wells did not commence until all temporary wells associated with the Exploratory Drilling scope were installed and developed.

TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
June 2019

			Analysis Type										
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Dissolved Metals	Total Mercury	Dissolved Mercury	Anions	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
GW-2	KIF-GW-027-06212019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
KIF-103	KIF-GW-031-06202019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
KIF-104	KIF-GW-032-06182019	Normal Environmental Sample	x	x	x	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-06182019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
KIF-106	KIF-GW-034-06192019	Normal Environmental Sample	x	x		x		x	x	x	x	x	x

Notes:

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Anions	SW-846 9056A
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results are not included in report tables but were used for data validation.
2. TDEC Order Event #2 was performed in conjunction with sampling under other environmental programs. A duplicate sample was collected from a monitoring well sampled for another program and therefore is not included in Event #2 data.

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
June 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	GW-2 21-Jun-19 KIF-GW-027-06212019 21.8 ft Normal Environmental Sample Final QC Review	KIF-103 20-Jun-19 KIF-GW-031-06202019 34 ft Normal Environmental Sample Final QC Review	KIF-104 18-Jun-19 KIF-GW-032-06182019 33 ft Normal Environmental Sample Final QC Review	KIF-105 18-Jun-19 KIF-GW-033-06182019 43 ft Normal Environmental Sample Final QC Review	KIF-106 19-Jun-19 KIF-GW-034-06192019 37.5 ft Normal Environmental Sample Final QC Review
Field Parameters						
Dissolved Oxygen	%	15.6	2.6	1.0	2.6	3.1
Dissolved Oxygen	mg/L	1.54	0.25	0.10	0.26	0.28
ORP	mV	168.6	20.7	-100.4	130.4	33.0
pH (field)	SU	5.89	6.03	6.32	5.54	6.54
Specific Cond. (Field)	mS/cm	0.099	0.50	1.55	1.10	0.49
Temperature, Water (C)	DEG C	16.0	18.7	18.7	20.7	20.0
Turbidity, field	NTU	1.80	3.44	6.80	4.05	1.29

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mS/cm	millisiemens per centimeter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
June 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	GW-2 21-Jun-19 KIF-GW-027-06212019 21.8 ft Normal Environmental Sample Final-Verified	KIF-103 20-Jun-19 KIF-GW-031-06202019 34 ft Normal Environmental Sample Final-Verified	KIF-104 18-Jun-19 KIF-GW-032-06182019 33 ft Normal Environmental Sample Final-Verified	KIF-105 18-Jun-19 KIF-GW-033-06182019 43 ft Normal Environmental Sample Final-Verified	KIF-106 19-Jun-19 KIF-GW-034-06192019 37.5 ft Normal Environmental Sample Final-Verified
Total Metals								
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.338 J	1.07	7.00	0.693 J	0.768 J
Barium	ug/L	2,000[A]	n/v	31.9	44.1	60.2	19.1	44.3
Beryllium	ug/L	4[A]	n/v	0.267 J	<0.155	0.267 J	<0.155	<0.155
Boron	ug/L	n/v	n/v	147 U*	906	1,520	1,760	272
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	0.734 J	<0.125
Calcium	ug/L	n/v	n/v	10,000	53,600	171,000	176,000	81,000
Chromium	ug/L	100[A]	n/v	2.55 U*	1.53 U*	3.24 U*	2.73 U*	<1.53
Cobalt	ug/L	n/v	6[B]	0.0820 J	**64.6[B]**	**10.1[B]**	**17.5[B]**	3.06
Copper	ug/L	n/v	n/v	<0.627	<0.627	1.02 J	<0.627	<0.627
Lead	ug/L	n/v	15[B]	<0.128	<0.128	0.128 J	0.155 J	<0.128
Lithium	ug/L	n/v	40[B]	3.65 J	<3.14	6.07	<3.14	4.20 J
Magnesium	ug/L	n/v	n/v	3,320	13,700	33,700	32,500	5,680
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	2.18 J	<0.610	<0.610
Nickel	ug/L	100 (TN MCL)[A]	n/v	<0.312	3.13	1.67	16.7	1.40
Potassium	ug/L	n/v	n/v	2,200	1,410	6,970	13,000	1,410
Selenium	ug/L	50[A]	n/v	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100 (TN MCL)[A]	n/v	<0.121	<0.121	<0.121	<0.121	<0.121
Sodium	ug/L	n/v	n/v	1,910	6,000	39,600	10,900	14,200
Thallium	ug/L	2[A]	n/v	<0.128	<0.128	<0.128	0.223 J	<0.128
Vanadium	ug/L	n/v	n/v	1.41 U*	<0.899	1.13 U*	1.61 U*	0.907 U*
Zinc	ug/L	n/v	n/v	<3.22	4.69 J	6.80	16.2	<3.22
Dissolved Metals								
Antimony	ug/L	6[A]	n/v	-	-	<0.378	-	-
Arsenic	ug/L	10[A]	n/v	-	-	6.92	-	-
Barium	ug/L	2,000[A]	n/v	-	-	60.0	-	-
Beryllium	ug/L	4[A]	n/v	-	-	0.168 U*	-	-
Boron	ug/L	n/v	n/v	-	-	1,540	-	-
Cadmium	ug/L	5[A]	n/v	-	-	<0.125	-	-
Calcium	ug/L	n/v	n/v	-	-	177,000	-	-
Chromium	ug/L	100[A]	n/v	-	-	2.19 U*	-	-
Cobalt	ug/L	n/v	6[B]	-	-	**10.6[B]**	-	-
Copper	ug/L	n/v	n/v	-	-	<0.627	-	-
Lead	ug/L	n/v	15[B]	-	-	<0.128	-	-
Lithium	ug/L	n/v	40[B]	-	-	5.07	-	-
Magnesium	ug/L	n/v	n/v	-	-	34,600	-	-
Mercury	ug/L	2[A]	n/v	-	-	<0.101	-	-
Molybdenum	ug/L	n/v	100[B]	-	-	2.18 J	-	-
Nickel	ug/L	100 (TN MCL)[A]	n/v	-	-	1.72	-	-
Potassium	ug/L	n/v	n/v	-	-	7,350	-	-
Selenium	ug/L	50[A]	n/v	-	-	<2.62	-	-
Silver	ug/L	100 (TN MCL)[A]	n/v	-	-	<0.121	-	-
Sodium	ug/L	n/v	n/v	-	-	40,500	-	-
Thallium	ug/L	2[A]	n/v	-	-	<0.128	-	-
Vanadium	ug/L	n/v	n/v	-	-	<0.899	-	-
Zinc	ug/L	n/v	n/v	-	-	8.63 U*	-	-
Anions								
Chloride	mg/L	n/v	n/v	1.44	5.25	9.54	8.55	9.19
Fluoride	mg/L	4[A]	n/v	0.0416 U*	0.0329 U*	0.0983 U*	0.0806 U*	0.125 U*
Sulfate	mg/L	n/v	n/v	21.9	93.0	546	554	103
General Chemistry								
Alkalinity, Bicarbonate	mg/L	n/v	n/v	34.6	125	190	36.9	144
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	34.6	125	190	36.9	144
Total Dissolved Solids	mg/L	n/v	n/v	64.0	323	1,080	862	328

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5[A]	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
-	parameter not analyzed / not available
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
ug/L	micrograms per Liter
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
June 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	GW-2 21-Jun-19 KIF-GW-027-06212019 21.8 ft Normal Environmental Sample Final-Verified	KIF-103 20-Jun-19 KIF-GW-031-06202019 34 ft Normal Environmental Sample Final-Verified	KIF-104 18-Jun-19 KIF-GW-032-06182019 33 ft Normal Environmental Sample Final-Verified	KIF-105 18-Jun-19 KIF-GW-033-06182019 43 ft Normal Environmental Sample Final-Verified	KIF-106 19-Jun-19 KIF-GW-034-06192019 37.5 ft Normal Environmental Sample Final-Verified
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	0.00721 +/-(0.0480)U	0.0128 +/-(0.0382)U	0.131 +/-(0.0740)J	0.0621 +/-(0.0654)UJ	-0.0674 +/-(0.0501)UJ
Radium-226+228	pCi/L	5[A]	n/v	0.00721 +/-(0.270)U	0.119 +/-(0.304)U	0.446 +/-(0.278)J	0.764 +/-(0.309)U*	0.727 +/-(0.334)U*
Radium-228	pCi/L	n/v	n/v	-0.0302 +/-(0.266)U	0.106 +/-(0.302)U	0.315 +/-(0.268)U	0.702 +/-(0.302)U*	0.727 +/-(0.330)U*

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picoCurie per Liter
U	not detected
UJ	compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.5

GROUNDWATER INVESTIGATION EVENT #3 SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant Groundwater Investigation Event #3 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses June 23, 2021 TDEC Review Comments and Issued for TDEC	July 9, 2021
2	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #3 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by Dyan Haubrich for

James M. Kerr, Jr., Senior Principal Geologist

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LIST OF APPENDICES

APPENDIX A – EXHIBITS

APPENDIX B – TABLES

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #3	Groundwater investigation sampling event performed August 19-21, 2019
ft	Feet
FSP	Field Sampling Personnel
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica, Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to a groundwater investigation sampling event performed August 19-21, 2019 (Event #3) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation upon completion of six groundwater sampling events is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #3 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #3 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant:

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #3 is the third in a series of six planned sampling events for the groundwater investigation. Stantec performed the field work activities for this event. Laboratory analysis of constituents was performed by GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and Eurofins TestAmerica, Inc. (TestAmerica) in Pittsburgh, Pennsylvania (other analytes). Quality Assurance

oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

This report summarizes the groundwater investigation activities for Event #3. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the KIF Plant are made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #3, performed in August 2019, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the KIF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #3 were conducted between August 19-21, 2019. Stantec performed groundwater level measurements and sample collection activities based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also conducted audits of field activities and provided quality reviews of field documentation.

During Event #3, the following field activities were performed:

- Measured groundwater levels at five monitoring wells for the TDEC Order and nine monitoring wells and nine piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well, five temporary wells and three piezometers installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from four monitoring wells installed for the TDEC Order and one (GW-2) which was installed as an observation well to collect water levels for site evaluations not associated with a specific program
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, one field duplicate, two field blanks, two equipment blanks, and one tubing blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench, and the Ballfield East of Sluice Trench), as well as the monitoring wells, temporary wells, and piezometers sampled and/or gauged during Event #3 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the Code of Federal Regulations (CFR) Part 257 (40

CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B, to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in a monitoring well, temporary wells and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibits A.2 and A.3 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2 and pore water elevation contours are depicted on Exhibit A.3.

Groundwater analytical and field duplicate samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for TDEC Order and other programs will be provided in the EAR.

3.2 DOCUMENTATION

Stantec maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded on program-specific field forms. Health and safety forms were completed in accordance with TVA and Stantec health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Stantec used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- Daily Field Activity Log
- Monitoring Well Inspection Checklist
- Equipment Calibration Form
- Groundwater Level Measurement Form
- Vibrating Wire Piezometer Measurement Form
- Groundwater Sampling Form
- Chain-of-Custody (COC).

3.2.1.1 Daily Field Activity Log

Stantec field sampling personnel (FSP) recorded field activities, observations, and data on a *Daily Field Activity Log* to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented on the *Daily Field Activity Log*.

3.2.1.2 Monitoring Well Inspection Checklist

Prior to measuring water levels, Stantec FSP inspected each monitoring well for damage or indications that the well integrity had been compromised in accordance with ENV-TI-05.80.21, *Monitoring Well Inspection and Maintenance.* Inspection results were documented on a *Monitoring Well Inspection Checklist*. No signs of damage or necessary repairs were noted during Event #3 although dedicated tubing was missing from well GW-2.

3.2.1.3 Equipment Calibration Form

Stantec FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.4 Groundwater Level Measurement Form

Stantec FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. The form also includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.5 Vibrating Wire Piezometer Measurement Form

Stantec FSP recorded field measurement data on a *Vibrating Wire Piezometer Measurement Form*. The form includes the vibrating wire piezometer ID, serial number, time, digits, temperature, and length of the wire in feet. The readings were used to calculate the pressure head (ft of water) above the vibrating wire sensor to obtain the groundwater or pore water elevation.

3.2.1.6 Groundwater Sampling Form

Stantec FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms also document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.7 Chain-of-Custody

Stantec FSP completed COC documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the COC. The Field Team Leader reviewed the COC for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding COC. COCs were completed in accordance with TVA TI ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure water quality parameters were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if these instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer, and National Weather Service (via mesowest.utah.edu) barometric pressure readings from Oak Ridge National Laboratory (KOQT), Oak Ridge, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in 3.2.1.3.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used in the groundwater investigation Event #3. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 14 monitoring wells and four piezometers and pore water levels were measured at one monitoring well, five temporary wells and two piezometers in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On August 19, 2019, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*. The pump was removed from well GW-2 prior to measuring the water level as the water level was below the top of the pump.

Groundwater and pore water measurements were also obtained from transducers installed within five and one piezometer, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the reading closest to noon recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Table B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map, based on groundwater measurements in wells and piezometers, along with pore water elevations, is displayed on Exhibit A.2 in Appendix A. Similarly, a pore water elevation contour map based on pore water measurements in wells and piezometers, along with groundwater elevations, is included as Exhibit A.3 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples were collected from five monitoring wells as shown in Table B.2 in Appendix B. Monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*. One exception occurred at well GW-2 where the depth to water was below the dedicated pump intake. Therefore, a decontaminated, non-dedicated pump and length of disposable tubing were used to obtain that groundwater sample.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Heron Dipper-T) and calibrated turbidimeters (Hach 2100Q). Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the SAP. Well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 5% microSiemens per centimeter
- Turbidity – Less than 10 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 10 NTUs
- DO – Less than 0.5 milligrams per Liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the final field parameter results were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. Turbidity readings at the wells stabilized below 10 NTUs, therefore samples were not collected for dissolved metals analysis. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final turbidity measurements were made.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as “CCR Parameters.” For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were placed in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped by FedEx to GEL in Charleston, South Carolina (radium samples only), and to TestAmerica in Pittsburgh, Pennsylvania (other analytes). The laboratories submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #3 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.

3.6.2 Variations in Procedures

Variations in procedures are provided below:

- Although a non-dedicated pump and tubing were used to sample monitoring well GW-2, a tubing blank was not collected. An equipment blank was collected from the decontaminated pump.

4.0 SUMMARY

The data presented in this report are only for sampling Event #3 at the KIF Plant. The scope of work for Event #3 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #3 included collecting groundwater level measurements at 14 monitoring wells and nine piezometers; pore water measurements at one monitoring well, five temporary wells and three piezometers in the CCR units; and a surface water measurement at one gauge located in the Emory River. Groundwater and surface water measurements and elevations are provided in Table B.1a and pore water measurements and elevations are provided in Table B.1b and depicted on Exhibits A.2 and A.3.

Groundwater quality measurements and groundwater analytical samples were collected at five monitoring wells as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity and DO were achieved at each sampling location. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by TestAmerica and GEL and then validated or verified by EnvStds.

Stantec has completed Event #3 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #3 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete datasets from the six groundwater sampling events will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Cumberland Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. November2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03. *Field Record Keeping*.

TVA, ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.21. *Monitoring Well Inspection and Maintenance*.

TVA, ENV-TI-05.80.42. *Groundwater Sampling*.

TVA, ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA, ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.

A.1

Title

Monitoring Well Network

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec TVA

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #3 (August 19, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043

Prepared by DMB on 2021-09-09
Technical Review by MT on 2021-09-09

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
  groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well
  groundwater elevation in ft amsl
- Piezometer
  groundwater elevation in ft amsl
- Piezometer in CCR
  pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR
  pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station
  surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater and pore water elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

Exhibit No.

A.3

Title

Pore Water Elevation Contour Map, Event #3 (August 19, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200
Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well: groundwater elevation in feet above mean sea level (ft amsl); value not used for contouring
- Other Monitoring Well: groundwater elevation in ft amsl; value not used for contouring
- Piezometer: groundwater elevation in ft amsl;value not used for contouring
- Piezometer in CCR: pore water elevation in ft amsl
- Temporary well in CCR: pore water elevation in ft amsl
- Emory River Gauging Station: surface water elevation in ft amsl
- Pore water Contour (1 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Pore water contours were created with manual adjustment using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

U:\TVA-EP\175668043_KIF_Phase2\gis\mxd\GW_Tech_Memo\KIF_GWTechMemo_ExhA3_PoreWaterContour_wPZ_porewaterEvent3.mxd Revised: 2021-09-10 By: lblackman

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
August 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	19-Aug-19	18.16	759.12	740.96	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	19-Aug-19	18.18	759.18	741.00	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	19-Aug-19	16.88	757.97	741.09	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	19-Aug-19	16.50	758.15	741.65	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	19-Aug-19	17.15	758.01	740.86	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	19-Aug-19	10.49	781.13	770.64	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	19-Aug-19	10.25	757.10	746.85	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	19-Aug-19	9.56	752.30	742.74	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	19-Aug-19	20.62	769.98	749.36	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	19-Aug-19	20.21	761.23	741.02	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	19-Aug-19	19.30	760.33	741.03	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	19-Aug-19	17.04	758.60	741.56	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	19-Aug-19	8.13	757.26	749.13	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	19-Aug-19	9.11	761.27	752.16	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	19-Aug-19	n/a	n/a	741.6	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	19-Aug-19	n/a	n/a	742.6	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	19-Aug-19	n/a	n/a	742.8	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	19-Aug-19	n/a	n/a	742.5	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	19-Aug-19	n/a	n/a	741.0	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B**	19-Aug-19	7.67	751.92	744.25	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2**	19-Aug-19	4.79	746.88	742.09	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A**	19-Aug-19	10.33	752.05	741.72	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B**	19-Aug-19	5.43	748.70	743.27	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River gauge	n/a	19-Aug-19	n/a	n/a	740.69	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec, 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
August 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	19-Aug-19	10.50	762.86	752.36	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	19-Aug-19	19.74	775.36	755.62	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	19-Aug-19	19.46	774.73	755.27	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	19-Aug-19	24.02	778.90	754.88	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	19-Aug-19	14.89	769.60	754.71	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	19-Aug-19	20.52	773.59	753.07	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	19-Aug-19	n/a	n/a	742.9	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	19-Aug-19	n/a	n/a	NM	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1**	19-Aug-19	11.00	764.43	753.43	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1**	19-Aug-19	14.16	766.69	752.53	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations and piezometer data obtained from geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data used were based on average of readings on the measurement date.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.

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TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
August 2019

			Analysis Type								
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Total Mercury	Anions	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
GW-2	KIF-GW-027-20190821	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-103	KIF-GW-031-20190820	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-104	KIF-GW-032-20190821	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-20190820	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	KIF-GW-DUP01-20190820	Field Duplicate Sample		x	x	x	x	x	x	x	x
KIF-106	KIF-GW-034-20190820	Normal Environmental Sample	x	x	x	x	x	x	x	x	x

Notes:

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Anions	SW-846 9056A
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
August 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	GW-2 21-Aug-19 KIF-GW-027-20190821 21.8 ft Normal Environmental Sample Final QC Review	KIF-103 20-Aug-19 KIF-GW-031-20190820 34 ft Normal Environmental Sample Final QC Review	KIF-104 21-Aug-19 KIF-GW-032-20190821 33 ft Normal Environmental Sample Final QC Review	KIF-105 20-Aug-19 KIF-GW-033-20190820 43 ft Normal Environmental Sample Final QC Review	KIF-106 20-Aug-19 KIF-GW-034-20190820 38 ft Normal Environmental Sample Final QC Review
Field Parameters						
Dissolved Oxygen	%	54.4	7.3	3.7	3.2	6.9
Dissolved Oxygen	mg/L	5.26	0.65	0.33	0.29	0.61
ORP	mV	207.5	-68.7	-119.4	80.4	-42.8
pH (field)	SU	5.97	6.02	6.10	5.53	6.54
Specific Cond. (Field)	uS/cm	129.5	537	1,527	1,041	476
Temperature, Water (C)	DEG C	16.7	20.7	21.9	22.0	22.8
Turbidity, field	NTU	2.46	2.48	6.57	0.93	1.91

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units
uS/cm	microSiemens per centimeter

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TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
August 2019

Sample Location				GW-2	KIF-103	KIF-104	KIF-105		KIF-106
Sample Date				21-Aug-19	20-Aug-19	21-Aug-19	20-Aug-19	20-Aug-19	20-Aug-19
Sample ID				KIF-GW-027-20190821	KIF-GW-031-20190820	KIF-GW-032-20190821	KIF-GW-033-20190820	KIF-GW-DUP01-20190820	KIF-GW-034-20190820
Sample Depth				21.8 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals									
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	1.36 J	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.574 U*	3.12 U*	8.57	0.902 U*	1.28 U*	1.36 U*
Barium	ug/L	2,000[A]	n/v	45.3	47.6	95.8	19.9	21.9	52.3
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	0.485 J	<0.182
Boron	ug/L	n/v	n/v	273 U*	903	1,500	1,770	2,040	366
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	0.917 J	1.18	0.159 J
Calcium	ug/L	n/v	n/v	14,300	56,900	171,000	172,000	188,000	83,400
Chromium	ug/L	100[A]	n/v	4.19 U*	3.16 U*	3.17 U*	3.77 U*	4.59 U*	4.48 U*
Cobalt	ug/L	n/v	6[B]	0.0760 J	**48.8[B]**	**13.0[B]**	**17.1[B]**	**18.8[B]**	2.87
Copper	ug/L	n/v	n/v	<0.627	<0.627	<0.627	<0.627	0.677 J	<0.627
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128	0.168 J	0.393 J	0.187 J
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	5.25 U*	<3.39	4.19 U*	5.86 U*
Magnesium	ug/L	n/v	n/v	4,720	14,300	32,000	30,300	33,600	5,610
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	1.70 J	<0.610	<0.610	<0.610
Nickel	ug/L	100(TN MCL)[A]	n/v	0.377 J	1.88	1.56	17.0	18.2	1.58
Potassium	ug/L	n/v	n/v	2,280	1,400	6,620	12,000	13,400	1,290
Selenium	ug/L	50[A]	n/v	<1.51	<1.51	2.13 J	<1.51	1.74 J	<1.51
Silver	ug/L	100(TN MCL)[A]	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	n/v	n/v	1,840	6,170	31,000	10,100	11,200	13,900
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	0.282 U*	0.705 U*	0.239 U*
Vanadium	ug/L	n/v	n/v	2.34 U*	1.30 U*	1.47 U*	2.28 U*	2.51 U*	2.54 U*
Zinc	ug/L	n/v	n/v	3.24 J	3.85 J	5.04	14.4	16.7	3.64 J
Anions									
Chloride	mg/L	n/v	n/v	1.61	4.95	8.57	6.95	7.10	7.48
Fluoride	mg/L	4[A]	n/v	0.0539 U*	0.0434 U*	0.0992 U*	0.0449 U*	0.0466 U*	0.149 U*
Sulfate	mg/L	n/v	n/v	30.0	91.7	592	564	574	92.9
General Chemistry									
Alkalinity, Bicarbonate	mg/L	n/v	n/v	25.1	181	163	40.7	39.1	149
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	25.1	181	163	40.7	39.1	149
Total Dissolved Solids	mg/L	n/v	n/v	<10.0	340	1,070	863	862	329

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5[A]	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

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TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
August 2019

Sample Location				GW-2	KIF-103	KIF-104	KIF-105		KIF-106
Sample Date				21-Aug-19	20-Aug-19	21-Aug-19	20-Aug-19	20-Aug-19	20-Aug-19
Sample ID				KIF-GW-027-20190821	KIF-GW-031-20190820	KIF-GW-032-20190821	KIF-GW-033-20190820	KIF-GW-DUP01-20190820	KIF-GW-034-20190820
Sample Depth				21.8 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units	EPA MCLs	CCR Rule GWPS						
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.121 +/-(0.476)U	0.647 +/-(0.582)U	0.627 +/-(0.603)U	0.0344 +/-(0.502)U	0.283 +/-(0.543)U	0.0232 +/-(0.466)U
Radium-226+228	pCi/L	5[A]	n/v	0.362 +/-(0.684)U	1.29 +/-(0.707)J	0.627 +/-(0.733)U	0.374 +/-(0.672)U	0.827 +/-(0.757)U	0.503 +/-(0.612)U
Radium-228	pCi/L	n/v	n/v	0.242 +/-(0.492)U	0.644 +/-(0.401)	-0.169 +/-(0.415)U	0.340 +/-(0.447)U	0.544 +/-(0.527)U	0.480 +/-(0.397)U

Notes:
[A] EPA Maximum Contaminant Level
[B] CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v No standard/guideline value
ft feet below top of casing
ID identification
J quantitation is approximate due to limitations identified during data validation
pCi/L picoCurie per Liter
U not detected

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.6

GROUNDWATER INVESTIGATION EVENT #4 SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant
Groundwater Investigation Event #4
Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses June 24, 2021 TDEC Review Comments and Issued for TDEC	July 9, 2021
2	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #4 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by

James M. Kerr, Jr., Senior Principal Geologist

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Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #4	Groundwater investigation sampling event performed October 21-24, 2019
ft	Feet
FSP	Field Sampling Personnel
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica, Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to a groundwater investigation sampling event performed October 21-24, 2019 (Event #4) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #4 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #4 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant:

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #4 is the fourth in a series of six planned sampling events for the groundwater investigation. Stantec performed the field work activities for this event. Laboratory analysis of constituents was performed by GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and Eurofins TestAmerica, Inc. (TestAmerica) in Pittsburgh, Pennsylvania (other analytes). Quality Assurance

oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

This report summarizes the groundwater investigation activities for Event #4. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the KIF Plant are made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #4, performed in October 2019, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the KIF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #4 were conducted between October 21-24, 2019. Stantec performed groundwater level measurements and sample collection activities based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. As part of TVA's commitment to generate representative and reliable data, data validation, and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also conducted audits of field activities and provided quality reviews of field documentation.

During Event #4, Stantec conducted the following field activities:

- Measured groundwater levels at five monitoring wells for the TDEC Order and nine monitoring wells and nine piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well, five temporary wells and three piezometers installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from four monitoring wells installed for the TDEC Order and one monitoring well (GW-2) which was installed as an observation well to collect water levels for site evaluations not associated with a specific program
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, one field duplicate, three field blanks, two equipment blanks, and one tubing blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench and, the Ballfield East of Sluice Trench), as well as the monitoring wells, temporary wells, and piezometers sampled and/or gauged during Event #4 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the Code of Federal Regulations (CFR) Part 257 (40

CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B, to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in a monitoring well, temporary wells and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibits A.2 and A.3 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2 and pore water elevation contours are depicted on Exhibit A.3.

Groundwater analytical and field duplicate samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for TDEC Order and other programs will be provided in the EAR.

3.2 DOCUMENTATION

Stantec maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded on program-specific field forms. Health and safety forms were completed in accordance with TVA and Stantec health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Stantec used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- *Daily Field Activity Log*
- *Monitoring Well Inspection Checklist*
- *Equipment Calibration Form*
- *Groundwater Level Measurement Form*
- *Vibrating Wire Piezometer Measurement Form*
- *Groundwater Sampling Form*
- *Chain-of-Custody (COC)*.

3.2.1.1 Daily Field Activity Log

Stantec field sampling personnel (FSP) recorded field activities, observations, and data on a *Daily Field Activity Log* to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented on the *Daily Field Activity Log*.

3.2.1.2 Monitoring Well Inspection Checklist

Prior to measuring water levels, Stantec FSP inspected each monitoring well for damage or indications that the well integrity had been compromised in accordance with ENV-TI-05.80.21, *Monitoring Well Inspection and Maintenance.* Inspection results were documented on a *Monitoring Well Inspection Checklist*. No signs of damage or necessary repairs were noted during Event #4.

3.2.1.3 Equipment Calibration Form

Stantec FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.4 Groundwater Level Measurement Form

Stantec FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. The form includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.5 Vibrating Wire Piezometer Measurement Form

Stantec FSP recorded field measurement data on a *Vibrating Wire Piezometer Measurement Form*. The form includes the vibrating wire piezometer ID, serial number, time, digits, temperature, and length of the wire in feet. The readings were used to calculate the pressure head (ft of water) above the vibrating wire sensor to obtain the groundwater or pore water elevation.

3.2.1.6 Groundwater Sampling Form

Stantec FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms also document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.7 Chain-of-Custody

Stantec FSP completed *COC* documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the *COC*. The Field Team Leader reviewed the *COC* for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding *COC*. *COCs* were completed in accordance with TVA TI ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure water quality parameters were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if these instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer, and National Weather Service (via mesowest.utah.edu) barometric pressure readings from Oak Ridge National Laboratory (KOQT), Oak Ridge, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in Section 3.2.1.3.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used in the groundwater investigation Event #4. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 14 monitoring wells and four piezometers and pore water levels at one monitoring well, five temporary wells and two piezometers in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On October 21, 2019, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*. Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*.

Groundwater and pore water measurements were also obtained from transducers installed within five and one piezometer, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the reading closest to noon recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Table B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map, based on groundwater measurements in wells and piezometers, along with pore water elevations is displayed on Exhibit A.2 in Appendix A. Similarly, a pore water elevation contour map based on pore water measurements in wells and piezometers, along with groundwater elevations, is included as Exhibit A.3 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples were collected from five monitoring wells as shown in Table B.2 in Appendix B. Monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*. One exception occurred at well GW-2 where the depth to water was below the dedicated pump intake. Therefore, a decontaminated, non-dedicated pump and length of disposable tubing were used to obtain that groundwater sample.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Heron Dipper-T) and calibrated turbidimeters (Hach 2100Q). Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the SAP and applicable TI. As approved by TDEC, the specific conductance and turbidity stabilization limits were revised to the values below to meet overall programmatic objectives for groundwater investigations at the KIF Plant. Well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 3% microSiemens per centimeter
- Turbidity – Less than 5 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 5 NTUs
- DO – Less than 0.5 milligrams per Liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the final field parameter results were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. Turbidity readings at wells stabilized below 5 NTUs, therefore samples were not collected for dissolved metals analysis. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final water quality parameter measurements were made.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as “CCR Parameters.” For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were placed in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped by FedEx to GEL in Charleston, South Carolina (radium samples only), and to TestAmerica in Pittsburgh, Pennsylvania (other analytes). The laboratories submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #4 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- As approved by TDEC, the specific conductance and turbidity stabilization limits were revised to the values below to meet overall programmatic objectives for groundwater investigations at the KIF Plant.

- Although a decontaminated, nondedicated pump and disposable tubing were used to purge and sample monitoring well GW-2, an equipment blank and tubing blank were not collected during Event #4.

4.0 SUMMARY

The data presented in this report are only for sampling Event #4 at the KIF Plant. The scope of work for Event #4 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #4 included collecting groundwater level measurements at 14 monitoring wells and nine piezometers; pore water measurements at one monitoring well, five temporary wells, and three piezometers in the CCR units; and a surface water measurement at one gauge located in the Emory River. Groundwater and surface water measurements and elevations are provided in Table B.1a and pore water measurements and elevations are provided in Table B.1b and depicted on Exhibits A.2 and A.3.

Groundwater quality measurements and groundwater analytical samples were collected at five monitoring wells as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity, and DO were achieved at each sampling location. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by TestAmerica and GEL and then validated or verified by EnvStds.

Stantec has completed Event #4 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #4 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete datasets from the six groundwater sampling events will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR Programs. This evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. November 2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03. *Field Record Keeping*.

TVA, ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.21. *Monitoring Well Inspection and Maintenance*.

TVA, ENV-TI-05.80.42. *Groundwater Sampling*.

TVA, ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA, ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.

A.1

Title

Monitoring Well Network

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043

Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec TVA

Exhibit No.
A.2

Title
Groundwater Elevation Contour Map, Event #4 (October 21, 2019)

Client/Project
Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location
175668043
Roane County, Tennessee
Prepared by DMB on 2021-09-09
Technical Review by CK on 2021-09-09

0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well groundwater elevation in ft amsl
- Piezometer groundwater elevation in ft amsl
- Piezometer in CCR pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater and pore water elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

**Groundwater elevation is anomalous, data point not used in groundwater contours.

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment

Stantec TVA

Exhibit No.

A.3

Title

Pore Water Elevation Contour Map, Event #4 (October 21, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

175668043

Roane County, Tennessee

Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl); value not used for contouring
- Other Monitoring Well groundwater elevation in ft amsl; value not used for contouring
- Piezometer groundwater elevation in ft amsl; value not used for contouring
- Piezometer in CCR pore water elevation in ft amsl
- Temporary well in CCR pore water elevation in ft amsl
- Emory River Gauging Station surface water elevation in ft amsl
- Pore water Contour (1 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Pore water contours were created with manual adjustment using Surfer Version 16.1.350 (December 13, 2018)

Stantec

TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\GW_Tech_Memo\KIF_GWTechMemo_ExhA3_PorewaterContour_wPZ_porewaterEvent4.mxd Revised: 2021-09-10 By: lblackman

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
October 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	21-Oct-19	18.37	759.12	740.75	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	21-Oct-19	18.34	759.18	740.84	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	21-Oct-19	17.09	757.97	740.88	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	21-Oct-19	16.67	758.15	741.48	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	21-Oct-19	17.33	758.01	740.68	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	21-Oct-19	12.12	781.13	769.01	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	21-Oct-19	10.91	757.10	746.19	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	21-Oct-19	9.98	752.30	742.32	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	21-Oct-19	21.08	769.98	748.90	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	21-Oct-19	20.38	761.23	740.85	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	21-Oct-19	19.48	760.33	740.85	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	21-Oct-19	17.12	758.60	741.48	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	21-Oct-19	8.95	757.26	748.31	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	21-Oct-19	10.11	761.27	751.16	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	21-Oct-19	n/a	n/a	741.3	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	21-Oct-19	n/a	n/a	742.3	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	21-Oct-19	n/a	n/a	742.4	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	21-Oct-19	n/a	n/a	742.3	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	21-Oct-19	n/a	n/a	740.7	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B**	21-Oct-19	8.00	751.92	743.92	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2**	21-Oct-19	5.11	746.88	741.77	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A**	21-Oct-19	6.08	752.05	745.97	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B**	21-Oct-19	10.52	748.70	738.18	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River gauge	n/a	21-Oct-19	n/a	n/a	740.54	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec, 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
October 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	21-Oct-19	11.18	762.86	751.68	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	21-Oct-19	21.13	775.36	754.23	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	21-Oct-19	20.91	774.73	753.82	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	21-Oct-19	25.45	778.90	753.45	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	21-Oct-19	16.18	769.60	753.42	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	21-Oct-19	21.78	773.59	751.81	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	21-Oct-19	n/a	n/a	742.7	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	21-Oct-19	n/a	n/a	NM	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1**	21-Oct-19	12.14	764.43	752.29	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1**	21-Oct-19	15.29	766.69	751.40	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations and piezometer data obtained from geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data used were based on average of readings on the measurement date.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.

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TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
October 2019

			Analysis Type								
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Total Mercury	Anions	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
GW-2	KIF-GW-027-20191023	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-103	KIF-GW-031-20191022	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-104	KIF-GW-032-20191023	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-20191022	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	KIF-GW-DUP01-20191022	Field Duplicate Sample		x	x	x	x	x	x	x	x
KIF-106	KIF-GW-034-20191024	Normal Environmental Sample	x	x	x	x	x	x	x	x	x

Notes:

Total Metals	SW-846 6020A
Total Mercury	SW-846 7470A
Anions	EPA 300.0/SW 9056
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
October 2019

Sample Location		GW-2	KIF-103	KIF-104	KIF-105	KIF-106
Sample Date		23-Oct-19	22-Oct-19	23-Oct-19	22-Oct-19	24-Oct-19
Sample ID		KIF-GW-027-20191023	KIF-GW-031-20191022	KIF-GW-032-20191023	KIF-GW-033-20191022	KIF-GW-034-20191024
Sample Depth		21.8 ft	34 ft	33 ft	43 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters						
Dissolved Oxygen	%	32.4	2.7	3.9	1.7	1.3
Dissolved Oxygen	mg/L	3.14	0.26	0.36	0.16	0.12
ORP	mV	179.0	-73.6	-95.2	81.4	-31.4
pH (field)	SU	6.07	5.96	6.09	5.64	6.58
Specific Cond. (Field)	uS/cm	140.9	488.7	1,471	1,018	462.3
Temperature, Water (C)	DEG C	16.8	18.3	19.2	20.4	19.3
Turbidity, field	NTU	2.91	0.93	4.42	1.52	2.38

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units
uS/cm	microSiemens per centimeter

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
October 2019

Sample Location				GW-2	KIF-103	KIF-104	KIF-105		KIF-106
Sample Date				23-Oct-19	22-Oct-19	23-Oct-19	22-Oct-19	22-Oct-19	24-Oct-19
Sample ID				KIF-GW-027-20191023	KIF-GW-031-20191022	KIF-GW-032-20191023	KIF-GW-033-20191022	KIF-GW-DUP01-20191022	KIF-GW-034-20191024
Sample Depth				21.8 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Validated	Validated	Validated	Validated	Validated	Final-Verified
Total Metals									
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.377 J	3.31	8.13	0.623 J	0.530 J	1.05
Barium	ug/L	2,000[A]	n/v	49.3	43.9	137	18.2	19.5	52.8
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	367	991	1,890	1,910	2,020	307
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	0.739 J	0.740 J	<0.125
Calcium	ug/L	n/v	n/v	15,900	44,700	157,000	155,000	165,000	75,200
Chromium	ug/L	100[A]	n/v	4.09 U*	2.15 U*	2.43 U*	1.80 U*	1.82 U*	1.67 U*
Cobalt	ug/L	n/v	6[B]	<0.0750	**56.0[B]**	**10.8[B]**	**16.5[B]**	**17.7[B]**	2.84
Copper	ug/L	n/v	n/v	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Lead	ug/L	n/v	15[B]	<0.128	0.617 J	<0.128	0.170 J	0.163 J	<0.128
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	3.70 J	<3.39	<3.39	5.25
Magnesium	ug/L	n/v	n/v	5,420	13,000	34,800	29,600	31,500	5,230
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	0.945 J	<0.610	<0.610	<0.610
Nickel	ug/L	100 (TN MCL)[A]	n/v	0.885 J	2.74	1.05	16.6	17.7	1.31
Potassium	ug/L	n/v	n/v	2,570	1,260	6,480	11,500	12,200	1,330
Selenium	ug/L	50[A]	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100 (TN MCL)[A]	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	n/v	n/v	11,400 J	5,510 J	25,500 J	10,100 J	10,800 J	20,600
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	0.197 J	0.194 J	<0.148
Vanadium	ug/L	n/v	n/v	1.66	<0.991	1.09	1.09	1.01	<0.991
Zinc	ug/L	n/v	n/v	<56.7	4.43 J	5.17 J	14.7 J	15.7 J	48.1
Anions									
Chloride	mg/L	n/v	n/v	1.84 U*	5.27	6.42	7.38	7.39	8.27
Fluoride	mg/L	4[A]	n/v	0.0680 J	0.0716 J	0.0928 J	0.0724 J	0.0712 J	0.183
Sulfate	mg/L	n/v	n/v	35.2	90.0	563	577	574	96.7
General Chemistry									
Alkalinity, Bicarbonate	mg/L	n/v	n/v	33.8	130	79.5	34.6	34.7	155
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	33.8	130	79.5	34.6	34.7	155
Total Dissolved Solids	mg/L	n/v	n/v	70.0	323	1,030	817	840	334

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5[A]	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
-	parameter not analyzed / not available
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
ug/L	micrograms per Liter
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

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TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
October 2019

Sample Location				GW-2	KIF-103	KIF-104	KIF-105		KIF-106
Sample Date				23-Oct-19	22-Oct-19	23-Oct-19	22-Oct-19	22-Oct-19	24-Oct-19
Sample ID				KIF-GW-027-20191023	KIF-GW-031-20191022	KIF-GW-032-20191023	KIF-GW-033-20191022	KIF-GW-DUP01-20191022	KIF-GW-034-20191024
Sample Depth				21.8 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review				Validated	Validated	Validated	Validated	Validated	Final-Verified
	Units	EPA MCLs	CCR Rule GWPS						
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.591 +/-(0.472)U	0.0359 +/-(0.269)U	0.880 +/-(0.564)	0.502 +/-(0.447)U	-0.0787 +/-(0.289)U	0.293 +/-(0.511)U
Radium-226+228	pCi/L	5[A]	n/v	0.600 +/-(0.527)U	0.372 +/-(0.368)U	1.62 +/-(0.695)	0.750 +/-(0.516)U	0.107 +/-(0.376)U	0.733 +/-(0.647)U
Radium-228	pCi/L	n/v	n/v	0.00831 +/-(0.233)U	0.337 +/-(0.251)U	0.736 +/-(0.406)	0.248 +/-(0.258)U	0.107 +/-(0.241)U	0.440 +/-(0.396)U

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
ft	feet below top of casing
ID	identification
pCi/L	picoCurie per Liter
U	not detected

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.7

GROUNDWATER INVESTIGATION EVENT #5 SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant
Groundwater Investigation Event #5
Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses June 25, 2021 TDEC Review Comments and Issued for TDEC	July 9, 2021
2	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #5 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by Dyer Hawbaker for,

James M. Kerr, Jr., Senior Principal Geologist

Table of Contents

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CEC	Civil and Environmental Consultants, Inc.
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #5	Groundwater investigation sampling event performed December 16-18, 2019
ft	Feet
FSP	Field Sampling Personnel
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica, Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to a groundwater investigation sampling event performed December 16-18, 2019 (Event #5) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #5 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #5 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant:

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #5 is the fifth in a series of six planned sampling events for the groundwater investigation. Stantec performed the field work activities for this event. Laboratory analysis of constituents was performed by GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and Eurofins TestAmerica, Inc. (TestAmerica) in Pittsburgh, Pennsylvania (other analytes). Quality Assurance

oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

This report summarizes the groundwater investigation activities for Event #5. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the KIF Plant are made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #5, performed in December 2019, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the KIF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #5 were conducted between December 16-18, 2019. Stantec performed groundwater level measurements and sample collection activities based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also provided quality reviews of field documentation. In addition, on behalf of TDEC, Civil and Environmental Consultants, Inc. (CEC) collected split groundwater samples during this sampling event. Additional information regarding CEC split sample collection is provided in Section 3.3.2.

During Event #5, Stantec conducted the following field activities:

- Measured groundwater levels at five monitoring wells for the TDEC Order and nine monitoring wells and nine piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well, five temporary wells and three piezometers installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from four monitoring wells installed for the TDEC Order and one well (GW-2) which was installed as an observation well to collect water levels for site evaluations not associated with a specific program
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, one field duplicate, two field blanks, one equipment blank, and one tubing blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench and the Ballfield East of Sluice Trench), as well as the monitoring wells, temporary wells, and piezometers sampled and/or gauged during Event #5 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B, to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in a monitoring well, temporary wells and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibits A.2 and A.3 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2 and pore water elevation contours are depicted on Exhibit A.3.

Groundwater analytical and field duplicate samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for TDEC Order and other programs will be provided in the EAR.

3.2 DOCUMENTATION

Stantec maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded on program-specific field forms. Health and safety forms were completed in accordance with TVA and Stantec health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Stantec used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- *Daily Field Activity Log*
- *Monitoring Well Inspection Checklist*
- *Equipment Calibration Form*
- *Groundwater Level Measurement Form*
- *Vibrating Wire Piezometer Measurement Form*
- *Groundwater Sampling Form*
- *Chain-of-Custody (COC)*.

3.2.1.1 Daily Field Activity Log

Stantec field sampling personnel (FSP) recorded field activities, observations, and data on a *Daily Field Activity Log* to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented on the *Daily Field Activity Log*.

3.2.1.2 Monitoring Well Inspection Checklist

Prior to measuring water levels, Stantec FSP inspected each monitoring well for damage or indications that the well integrity had been compromised in accordance with ENV-TI-05.80.21, *Monitoring Well Inspection and Maintenance.* Inspection results were documented on a *Monitoring Well Inspection Checklist*. No signs of damage or necessary repairs were noted during Event #5.

3.2.1.3 Equipment Calibration Form

Stantec FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.4 Groundwater Level Measurement Form

Stantec FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. The form includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.5 Vibrating Wire Piezometer Measurement Form

Stantec FSP recorded field measurement data on a *Vibrating Wire Piezometer Measurement Form*. The form includes the vibrating wire piezometer ID, serial number, time, digits, temperature, and length of the wire in feet. The readings were used to calculate the pressure head (ft of water) above the vibrating wire sensor to obtain the groundwater or pore water elevation.

3.2.1.6 Groundwater Sampling Form

Stantec FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms also document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.7 Chain-of-Custody

Stantec FSP completed *COC* documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the *COC*. The Field Team Leader reviewed the *COC* for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding *COC*. *COCs* were completed in accordance with TVA TI ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure water quality parameters were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if these instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer, and National Weather Service (via mesowest.utah.edu) barometric pressure readings from Oak Ridge National Laboratory (KOQT), Oak Ridge, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in Section 3.2.1.3.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used in the groundwater investigation Event #5. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 14 monitoring wells and four piezometers and pore water levels were measured at one monitoring well, five temporary wells and two piezometers in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On December 16, 2019, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*. Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*.

Groundwater and pore water measurements were also obtained from transducers installed within five and one piezometer, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the reading closest to noon recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Table B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map, based on groundwater measurements in wells and piezometers, along with pore water elevations is displayed on Exhibit A.2 in Appendix A. Similarly, a pore water elevation contour map based on pore water measurements in wells and piezometers, along with groundwater elevations, is included as Exhibit A.3 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples were collected from five monitoring wells as shown in Table B.2 in Appendix B. Split samples collected by CEC, on behalf of TDEC, during Event #5 are also identified in Table B.2. Monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*. One exception occurred at well GW-2 where dedicated tubing was missing from the installed pump. FSP measured the pump inlet depth of the dedicated pump and used new tubing and the dedicated pump to purge and sample well GW-2.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Heron Dipper-T) and calibrated turbidimeters (Hach 2100Q). Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the SAP and applicable TI. As approved by TDEC, the specific conductance and turbidity stabilization limits were revised to the values below to meet overall programmatic objectives for groundwater investigations at the KIF Plant. Well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 3% microSiemens per centimeter
- Turbidity – Less than 5 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 5 NTUs
- DO – Less than 0.5 milligrams per Liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the final field parameter results were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. Turbidity readings at wells stabilized below 5 NTUs, therefore samples were not collected for dissolved metals analysis. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final water quality measurements were made.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as "CCR Parameters." For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were placed in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped by FedEx to GEL in Charleston, South Carolina (radium samples only), and to TestAmerica in Pittsburgh, Pennsylvania (other analytes). The laboratories submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #5 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- As approved by TDEC, the specific conductance and turbidity stabilization limits were revised to meet overall programmatic objectives for groundwater investigations at the KIF Plant.

4.0 SUMMARY

The data presented in this report are only for sampling Event #5 at the KIF Plant. The scope of work for Event #5 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #5 included collecting groundwater level measurements at 14 monitoring wells and nine piezometers; pore water measurements at one monitoring well, five temporary wells and three piezometers in the CCR units; and a surface water measurement at one gauge located in the Emory River. Groundwater and surface water measurements and elevations are provided in Table B.1a and pore water measurements and elevations are provided in Table B.1b and depicted on Exhibits A.2 and A.3.

Groundwater quality measurements and groundwater analytical samples were collected at five monitoring wells as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity and DO were achieved at each sampling location. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by TestAmerica and GEL and then validated or verified by EnvStds.

Stantec has completed Event #5 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #5 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete datasets from the six groundwater sampling events will be evaluated along with data collected under other TDEC Order SAPs as well as data collected under other State and CCR Programs. This evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. November 2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4 Final. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03. *Field Record Keeping*.

TVA, ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.21. *Monitoring Well Inspection and Maintenance*.

TVA, ENV-TI-05.80.42. *Groundwater Sampling*.

TVA, ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA, ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.

A.1

Title

Monitoring Well Network

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043

Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec TVA

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #5 (December 16, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
  groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well
  groundwater elevation in ft amsl
- Piezometer
  groundwater elevation in ft amsl
- Piezometer in CCR
  pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR
  pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station
  surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater and pore water elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment

Stantec TVA

Exhibit No.

A.3

Title

Pore Water Elevation Contour Map, Event #5 (December 16, 2019)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well: groundwater elevation in feet above mean sea level (ft amsl); value not used for contouring
- Other Monitoring Well: groundwater elevation in ft amsl; value not used for contouring
- Piezometer: groundwater elevation in ft amsl; value not used for contouring
- Piezometer in CCR: pore water elevation in ft amsl
- Temporary well in CCR: pore water elevation in ft amsl
- Emory River Gauging Station: surface water elevation in ft amsl
- Pore water Contour (1 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring

**The pore water elevation for PZ-A1 during Event #5 was approximately 6-8 feet higher than the other nearby piezometer PZ-B1 and temporary well KIF-TW04. The cause of the rise in the pore water elevation is unknown. During prior monitoring events, the pore water elevation at PZ-A1 was within 1 or 2 feet of pore water elevations in nearby monitoring points. Pore water elevation appears to be anomalous, not used in contouring.

NM: Not measured; data not available

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Pore water contours were created with manual adjustment using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
December 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	16-Dec-19	21.61	759.12	737.51	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	16-Dec-19	21.62	759.18	737.56	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	16-Dec-19	19.69	757.97	738.28	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	16-Dec-19	19.12	758.15	739.03	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	16-Dec-19	20.98	758.01	737.03	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	16-Dec-19	5.49	781.13	775.64	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	16-Dec-19	12.35	757.10	744.75	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	16-Dec-19	8.79	752.30	743.51	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	16-Dec-19	18.43	769.98	751.55	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	16-Dec-19	23.69	761.23	737.54	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	16-Dec-19	23.10	760.33	737.23	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	16-Dec-19	19.53	758.60	739.07	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	16-Dec-19	9.79	757.26	747.47	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	16-Dec-19	9.90	761.27	751.37	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	16-Dec-19	n/a	n/a	739.2	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	16-Dec-19	n/a	n/a	740.4	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	16-Dec-19	n/a	n/a	741.4	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	16-Dec-19	n/a	n/a	741.6	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	16-Dec-19	n/a	n/a	739.3	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B**	16-Dec-19	10.45	751.92	741.47	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2**	16-Dec-19	8.06	746.88	738.82	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A**	16-Dec-19	13.62	752.05	738.43	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B**	16-Dec-19	6.69	748.70	742.01	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River gauge	n/a	16-Dec-19	n/a	n/a	736.80	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.
**	Piezometer is manually gauged. Groundwater elevation is calculated to nearest 0.01 from surveyed top of casing.

1. Top of casing elevations, screen intervals, and screened formations were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Depth to groundwater in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec, 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
December 2019

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	16-Dec-19	10.46	762.86	752.40	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	16-Dec-19	20.21	775.36	755.15	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	16-Dec-19	19.44	774.73	755.29	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	16-Dec-19	24.32	778.90	754.58	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	16-Dec-19	14.90	769.60	754.70	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	16-Dec-19	21.10	773.59	752.49	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	16-Dec-19	n/a	n/a	742.2	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	16-Dec-19	n/a	n/a	NM	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1**	16-Dec-19	3.94	764.43	760.49	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1**	16-Dec-19	14.65	766.69	752.04	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification
**	piezometer is manually gauged

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations and piezometer data obtained from geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data used were based on average of readings on the measurement date.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.

TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
December 2019

			Analysis Type								
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Total Mercury	Anions	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
GW-2	KIF-GW-027-20191218	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-103	KIF-GW-031-20191218	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-104	KIF-GW-032-20191217	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-20191217	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	KIF-GW-DUP01-20191217	Field Duplicate Sample		x	x	x	x	x	x	x	x
KIF-106	KIF-GW-034-20191217	Normal Environmental Sample	x	x	x	x	x	x	x	x	x

Notes:

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Anions	EPA 300.0/SW 9056
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.
2. CEC collected split samples from KIF-104, KIF-105, and KIF-106

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
December 2019

Sample Location		GW-2	KIF-103	KIF-104	KIF-105	KIF-106
Sample Date		18-Dec-19	18-Dec-19	17-Dec-19	17-Dec-19	17-Dec-19
Sample ID		KIF-GW-027-20191218	KIF-GW-031-20191218	KIF-GW-032-20191217	KIF-GW-033-20191217	KIF-GW-034-20191217
Sample Depth		21.3 ft	34 ft	33 ft	43 ft	38 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters						
Dissolved Oxygen	%	70.0	6.7	5.2	4.4	5.9
Dissolved Oxygen	mg/L	7.04	0.68	0.53	0.43	0.60
ORP	mV	116.9	5.6	-91.8	85.7	21.4
pH (field)	SU	6.11	5.96	6.13	5.75	6.70
Specific Cond. (Field)	uS/cm	95.4	431.0	1,607	1,081	487.2
Temperature, Water (C)	DEG C	15.9	15.3	14.8	16.3	15.0
Turbidity, field	NTU	2.52	4.04	2.99	0.75	1.36

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units
uS/cm	microSiemens per centimeter

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
December 2019

Sample Location	Units	EPA MCLs	CCR Rule GWPS	GW-2	KIF-103	KIF-104	KIF-105	KIF-105	KIF-106
Sample Date				18-Dec-19	18-Dec-19	17-Dec-19	17-Dec-19	17-Dec-19	17-Dec-19
Sample ID				KIF-GW-027-20191218	KIF-GW-031-20191218	KIF-GW-032-20191217	KIF-GW-033-20191217	KIF-GW-DUP01-20191217	KIF-GW-034-20191217
Sample Depth				21.3 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals									
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	<0.323	3.37	9.63	0.488 J	0.438 J	0.818 J
Barium	ug/L	2,000[A]	n/v	33.7	43.1	155	22.5	23.7	54.9
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	167	1,140	1,840	2,150	2,090	378
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	0.731 J	0.824 J	<0.125
Calcium	ug/L	n/v	n/v	10,600	30,900	197,000	203,000	197,000	89,600
Chromium	ug/L	100[A]	n/v	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	6[B]	<0.0750	**71.4[B]**	**14.9[B]**	**18.5[B]**	**17.4[B]**	3.01
Copper	ug/L	n/v	n/v	<0.627	<0.627	<0.627	<0.627	1.77 J	<0.627
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128	<0.128	0.285 J	<0.128
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	<3.39	<3.39	<3.39	4.37 J
Magnesium	ug/L	n/v	n/v	3,480	12,200	39,900	36,100	35,200	6,000
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100(TN MCL)[A]	n/v	<0.336	2.39	1.20 U*	17.5	17.6	1.52 U*
Potassium	ug/L	n/v	n/v	2,320	1,090	6,630	14,100	13,600	1,590
Selenium	ug/L	50[A]	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100(TN MCL)[A]	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	n/v	n/v	2,070	5,200	34,900	12,000	11,600	15,900
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	0.174 J	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	n/v	n/v	<3.22	3.86 J	6.99	14.9 J	20.4 J	<3.22
Anions									
Chloride	mg/L	n/v	n/v	1.41	6.40	10.6	8.25	8.32	8.89
Fluoride	mg/L	4[A]	n/v	0.0512 J	0.0395 J	0.0949 J	0.0483 J	0.0513 J	0.152
Sulfate	mg/L	n/v	n/v	18.8	77.7	439	506 J	499 J	91.8 J
General Chemistry									
Alkalinity, Bicarbonate	mg/L	n/v	n/v	37.6	140	346	40.6	48.6	141
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	37.6	140	346	40.6	48.6	141
Total Dissolved Solids	mg/L	n/v	n/v	4,950	246	991	802	838	310

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5[A]	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
ug/L	micrograms per Liter
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
December 2019

Sample Location				GW-2	KIF-103	KIF-104	KIF-105		KIF-106
Sample Date				18-Dec-19	18-Dec-19	17-Dec-19	17-Dec-19	17-Dec-19	17-Dec-19
Sample ID				KIF-GW-027-20191218	KIF-GW-031-20191218	KIF-GW-032-20191217	KIF-GW-033-20191217	KIF-GW-DUP01-20191217	KIF-GW-034-20191217
Sample Depth				21.3 ft	34 ft	33 ft	43 ft	43 ft	38 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units	EPA MCLs	CCR Rule GWPS						
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.335 +/-(0.502)U	0.676 +/-(0.601)U	0.771 +/-(0.459)	0.223 +/-(0.239)U	0.480 +/-(0.489)U	0.473 +/-(0.304)
Radium-226+228	pCi/L	5[A]	n/v	0.536 +/-(0.572)U	0.676 +/-(0.677)U	1.39 +/-(0.644)J	0.560 +/-(0.440)U	0.730 +/-(0.560)U	0.607 +/-(0.418)J
Radium-228	pCi/L	n/v	n/v	0.200 +/-(0.273)U	-0.0332 +/-(0.312)U	0.619 +/-(0.452)U	0.337 +/-(0.369)U	0.250 +/-(0.274)U	0.134 +/-(0.286)U

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picoCurie per Liter
U	not detected

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.8

GROUNDWATER INVESTIGATION EVENT #6 SAMPLING AND ANALYSIS REPORT

Kingston Fossil Plant
Groundwater Investigation Event #6
Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Kingston Fossil Plant
Harriman, Tennessee

September 17, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	May 7, 2021
1	Addresses August 10, 2021 TDEC Review Comments and Issued for TDEC	September 17, 2021

Sign-off Sheet

This document entitled Kingston Fossil Plant Groundwater Investigation Event #6 Sampling and Analysis Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Tennessee Valley Authority (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Jamie Snider

Jamie Snider, Geologic Staff

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by Dirgu Haubrich for,

James M. Kerr, Jr., Senior Principal Geologist

Table of Contents

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DO	Dissolved Oxygen
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
ENV	Environmental
EnvStds	Environmental Standards, Inc.
Event #6	Groundwater investigation sampling event performed February 17-20, 2020 and April 20-21, 2020
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
KIF Plant	Kingston Fossil Plant
mg/L	Milligrams per Liter
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
Terracon	Terracon Consultants, Inc.
TestAmerica	Eurofins TestAmerica, Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this sampling and analysis report (SAR) on behalf of the Tennessee Valley Authority (TVA) to document the completion of activities related to groundwater investigation sampling events performed February 17-20, 2020 and April 21, 2020 (Event #6) at TVA's Kingston Fossil Plant (KIF Plant) located in Harriman, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the KIF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work completed during groundwater sampling Event #6 of 6 total events and to present the information and data collected during the execution of the Groundwater Investigation Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluations of results. The scope of the groundwater investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the KIF Plant. The data provided in this SAR are not inclusive of other programmatic data that exist for the site. The evaluation of the results will include data from the six groundwater sampling events as well as consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

Event #6 activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the KIF Plant.

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The Groundwater Investigation SAP was updated based on TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and are referenced in Section 3.6.

Event #6 is the last in a series of six planned sampling events for the groundwater investigation. Terracon Consultants, Inc. (Terracon) performed the field work activities during February for this event in conjunction with groundwater sampling for other environmental programs at the KIF Plant. The TDEC Order data from this sampling event are included in this SAR. Stantec performed additional sampling activities during April for this event. Laboratory analysis of constituents was performed by GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and Eurofins TestAmerica, Inc. (TestAmerica) in Pittsburgh, Pennsylvania (other analytes). Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification of the data presented in this SAR was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA and determined to meet the objectives of the TDEC Order SAP and QAPP.

This report summarizes the groundwater investigation activities for Event #6. Overall conclusions and findings about the six groundwater investigation and groundwater conditions at the KIF Plant will be made and documented in the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the groundwater investigation conducted pursuant to the Groundwater Investigation SAP (which includes six sampling events) are to characterize existing groundwater quality and to evaluate groundwater flow conditions at the KIF Plant in response to the TDEC Order. The approach to characterizing the groundwater conditions is to:

- Collect groundwater samples for chemical analyses to evaluate the potential presence of constituents related to CCR in groundwater
- Measure groundwater and surface water elevations for subsequent evaluation of the direction and rate of groundwater flow.

The scope of work intended to achieve the objectives of the groundwater investigation consists of six sampling events at a frequency of one event every two months for one year to characterize seasonal groundwater quality and flow direction. This report describes the activities related to Event #6, performed in February and April 2020, the scope of which included:

- Collecting groundwater and surface water level measurements
- Collecting field measurements of groundwater quality parameters
- Collecting groundwater samples and associated quality control (QC) samples for laboratory analysis.

These activities were carried out after the installation of permanent monitoring wells specified in the Groundwater Investigation SAP. Details of the monitoring well installation activities are provided in the KIF Plant Hydrogeologic Investigation SAR.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the KIF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the KIF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #6 were conducted February 17-20, 2020 by Terracon and April 21, 2020 by Stantec. During the February event, Terracon performed groundwater level measurements and sample collection activities, and during the April event, Stantec performed additional groundwater level measurements and sample collection activities, based on guidance and specifications in TVA's Environmental (ENV) Technical Instructions (TIs), the SAP, the QAPP, and applicable United States Environmental Protection Agency (USEPA) documents except as noted in the Variations section of this report. A subset of the sampling collection activities were conducted as part of another TVA groundwater monitoring program; the quality assurance requirements of that program are functionally equivalent to the quality assurance requirements established for the TDEC Order environmental investigation. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also conducted audits of field activities and provided quality reviews of field documentation.

During Event #6, the following field activities were conducted:

- Measured groundwater levels at five monitoring wells for the TDEC order, and nine monitoring wells and five piezometers installed for other environmental programs
- Measured pore water levels at one monitoring well, one piezometer, and five temporary wells installed in the CCR units
- Measured the surface water level at one location in the Emory River
- Collected groundwater samples from five monitoring wells for the TDEC Order
- Collected an additional groundwater sample from one monitoring well (GW-2) to fulfill the requirement to obtain six samples from the TDEC Order wells as described in the SAP
- Recorded field measurements of groundwater quality parameters during purging and stabilization at the sampled monitoring wells
- Collected QC samples including one matrix spike/matrix spike duplicate, two field duplicates, three field blanks, and one equipment blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in Pittsburgh, Pennsylvania.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the KIF Plant (the Stilling Pond, the Interim Ash Staging Area, the Sluice Trench and Ballfield East of Sluice Trench) as well as the monitoring wells, temporary wells, and piezometers sampled and/or gauged during Event #6 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the KIF Plant for TDEC Solid Waste Management permit requirements and the USEPA CCR Rule codified in Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257). Monitoring wells that are sampled as part of other environmental programs are not sampled as part of the groundwater investigation for the TDEC Order.

Groundwater levels were measured in TDEC Order monitoring wells, as well as in select additional wells and piezometers from other environmental programs, as shown in Table B.1a in Appendix B to provide information to prepare groundwater contour maps for this SAR and the KIF Plant EAR. Pore water levels measured in a monitoring well, termporary wells, and piezometers installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibits A.2 and A.3 in Appendix A. Groundwater elevation contours are depicted on Exhibit A.2 and pore water elevations are depicted on Exhibit A.3.

Groundwater analytical and field duplicate samples were collected from the TDEC Order monitoring wells as shown in Table B.2 in Appendix B. Groundwater analytical data collected for the TDEC Order and these other environmental programs will be provided in the EAR.

3.2 DOCUMENTATION

Terracon and Stantec field sampling personnel (FSP) maintained field documentation in accordance with ENV-TI-05.80.03, *Field Record Keeping*, and the QAPP. Field activities and data were recorded in *Field Log Books* and program-specific field forms. Health and safety forms were completed in accordance with TVA, Terracon, and Stantec health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

FSP used program-specific field forms to record field observations and data for specific activities. Field forms used during the groundwater investigation included:

- *Field Log Books/Daily Field Activity Log*
- *Monitoring Well Inspection Checklist*
- *Equipment Calibration Form*
- *Groundwater Level Measurement Form*
- *Groundwater Sampling Form*
- *Chain-of-Custody (COC).*

3.2.1.1 Field Log Book/Daily Field Activity Log

Terracon and Stantec FSP recorded field activities, observations, and data in a *Field Log Book* and *Daily Field Activity Log*, respectively, to chronologically document the field program. Deviations from the SAP, TIs, or QAPP were documented in the *Field Log Book* and *Daily Field Activity Log.*

3.2.1.2 Monitoring Well Inspection Checklist

Prior to the April 2020 sampling activities, Stantec FSP inspected each monitoring well for damage or indications that the well integrity had been compromised in accordance with ENV-TI-05.80.21, *Monitoring Well Inspection and Maintenance.* Inspection results were documented on a *Monitoring Well Inspection Checklist*. No signs of damage or necessary repairs were noted during Event #6.

3.2.1.3 Equipment Calibration Form

FSP performed daily calibration of the water quality meter and turbidity meter and documented the results on an *Equipment Calibration Form*. The form documented the calibration results for temperature, turbidity, specific conductance, pH, dissolved oxygen (DO), and oxidation-reduction potential (ORP), and verified that the field instruments' sensors were operating within acceptance criteria. Refer to Section 3.2.2 for additional details on equipment calibration procedures.

3.2.1.4 Groundwater Level Measurement Form

FSP recorded groundwater level field measurement data on a *Groundwater Level Measurement Form* in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* The form includes the monitoring well identification (ID), time, and depth to water measured from a standardized reference point on the top of each well casing, recorded in feet (ft) below top of casing.

3.2.1.5 Groundwater Sampling Form

FSP recorded the depth to water, purge flow rate, volume of groundwater purged, temperature, pH, specific conductance, DO, ORP, turbidity, color of water, and other observations during groundwater purging and sampling activities at each monitoring well in accordance with ENV-TI-05.80.42, *Groundwater Sampling*. Field measurements were recorded on a *Groundwater Sampling Form*. The forms document the time intervals between measurement of field parameters, low-flow extraction rates, water level drawdown, and water quality parameter measurements until stabilization criteria were met.

3.2.1.6 Chain-of-Custody

FSP completed *COC* documentation for each groundwater sample collected. The sample ID, sample location, type of sample, sampling date and time, analyses requested, sample pH, and sample custody record were recorded on the *COC*. The Field Team Leader reviewed the *COC* for completeness, and the FSP conducted a QC check of samples in each cooler compared to sample IDs on the corresponding *COC*. *COCs* were completed in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to collect, generate, or measure environmental data were calibrated each day prior to use as specified in the SAP, QAPP, and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde.* Afternoon calibration verifications were performed to evaluate if instruments remained within acceptance criteria during sampling. Temperature and barometric pressure instrument readings were verified using a calibrated National Institute of Standards and Technology traceable thermometer and National Weather Service (via mesowest.utah.edu) barometric pressure readings for Oak Ridge National Laboratory (KOQT) in Oak Ridge, Tennessee, respectively. Additional details regarding equipment calibration were recorded on an *Equipment Calibration Form*, as described in Section 3.2.1.3.

3.3 SAMPLING METHODS

The following sections present monitoring well data collection and sampling procedures used during Event #6. As approved by TDEC, monitoring well KIF-102 was not gauged or sampled during this event because it was not installed as part of the hydrogeologic investigation.

3.3.1 Static Water Level Measurements

Terracon FSP measured static groundwater levels at 14 monitoring wells and pore water levels at one monitoring well and five temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On February 17, 2020, static groundwater and pore water level readings were measured and recorded to the nearest 0.01 ft from a reference point on the top of each well casing using an electronic water level indicator. As noted on Table B.1a in Appendix B, a static groundwater level was also measured on April 20, 2020 prior to sampling well GW-2. Water level indicator probes were decontaminated prior to the first use and between measurements, and the decontamination was documented as specified in ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* Depth to groundwater and pore water measurements were recorded on a *Groundwater Level Measurement Form*. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with water level measurements made for other groundwater investigation programs at the KIF Plant. Field documentation from this gauging event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs.

Groundwater and pore water measurements were also obtained by Stantec from transducers installed within five and one piezometers, respectively. Additionally, a surface water level measurement for the Emory River was provided by TVA using the reading recorded closest to noon by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater and pore water level data are shown in Tables B.1a and B.1b, respectively, in Appendix B. A groundwater elevation contour map, based on groundwater measurements made in wells and piezometers, along with pore water elevations, is included as Exhibit A.2 in Appendix A. Similarly, a pore water elevation contour map, based on pore water measurements in wells and piezometers, along with groundwater elevations, is included as Exhibit A.3 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from five monitoring wells as shown in Table B.2 in Appendix B. Terracon performed this field activity for TDEC Order monitoring wells in conjunction with groundwater sample collection for other groundwater investigation programs at the KIF Plant. Field documentation from this sampling event was reviewed by EnvStds for adherence with applicable guidance documents, including TIs, as part of TVA's quality assurance for other environmental programs. Stantec performed additional sample collection activities at one well (GW-2). Monitoring wells were purged using dedicated bladder pumps equipped with dedicated tubing using low-flow purging and sampling techniques as specified in ENV-TI-05.80.42, *Groundwater Sampling*.

During the purging process, water quality field parameters including pH, specific conductance, temperature, ORP, and DO were measured using water quality meters (YSI ProPlus with flow-through cell) and recorded on field forms. Depth to water and turbidity were measured and recorded using decontaminated electronic water-level indicators (Solinst 101) and calibrated turbidimeters (Hach 2100Q). Field parameters were measured and recorded on *Groundwater Sampling Forms* during purging until readings were stabilized as specified in the SAP and/or applicable TI. Well purging was considered complete when three consecutive readings were within the following stabilization limits:

- pH – ± 0.1 Standard Units
- Specific Conductance – ± 3% microSiemens per centimeter
- Turbidity – Less than 5 Nephelometric Turbidity Units (NTUs) or ± 10% for values above 5 NTUs
- DO – Less than 0.5 milligrams per liter (mg/L) or ± 10% for values above 0.5 mg/L.

After water quality stabilization criteria were achieved, the water quality parameter measurements were recorded, purging was discontinued, and a sample was collected as specified in the SAP. Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. FSP wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when handling each sample. When filling sample bottles, care was taken to minimize sample aeration (i.e., water was directed down the inner walls of the sample bottle) and to avoid overfilling and diluting preservatives. Each sample bottle was capped before filling the next bottle. Following completion of sampling, final water quality parameter measurements were recorded.

Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* FSP secured caps on each bottle, attached a custody seal across the cap, and placed the bottles in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with ENV-TI-05.80.04, *Field Sampling Quality Control.*

Groundwater samples were analyzed for the CCR-related constituents listed in Appendices III and IV of 40 CFR 257. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with

TDEC environmental programs. These additional TDEC Appendix I constituents included copper, nickel, silver, vanadium, and zinc. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents will hereafter be referred to collectively as "CCR Parameters." For geochemical evaluation, major cations/anions not included in the CCR Parameters were included in the analyses. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during groundwater investigation activities included:

- Used calibration solutions
- Purge water
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; ENV-TI-05.80.42, *Groundwater Sampling* (purge water); the KIF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with KIF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by the KIF Plant facility management. Purge water and decontamination fluids were discarded onto the ground surface, downgradient from the monitoring wells, as specified in the KIF Plant-specific waste management plan. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite at the end of each day.

3.5 SAMPLE SHIPMENT

Samples were packed and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The samples were shipped to GEL in Charleston, South Carolina (radium samples only), and to TestAmerica in Pittsburgh, Pennsylvania (other analytes). The laboratories submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the groundwater investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for groundwater investigation sampling Event #6 at the KIF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater level gauging and sampling was not performed at well KIF-102 as specified in the SAP because it was not installed. This change in scope was approved by TDEC.
- An additional sample was collected from well GW-2 following Event #6 in April 2020 to meet the objectives of the Groundwater Investigation SAP (which includes six samples from each designated monitoring well over the six events), because a sample was not collected from well GW-2 during Event #1. This change in scope was discussed with, and approved by, TDEC prior to sampling.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- As approved by TDEC, the specific conductance and turbidity stabilization limits were revised to meet overall programmatic objectives for groundwater investigations.

4.0 SUMMARY

The data presented in this report are only for groundwater investigation sampling Event #6 at the KIF Plant. The scope of work for Event #6 was to:

- Collect groundwater samples for chemical analyses to assist with subsequent evaluation of the potential presence of CCR-related constituents in groundwater
- Measure groundwater and surface water elevations to assist with subsequent evaluation of groundwater flow direction and rate after multiple data sets have been collected.

In addition, pore water measurements from a monitoring well, piezometers and temporary wells installed in the CCR units at the KIF Plant are presented in this SAR for comparison with groundwater data.

Event #6 included collecting groundwater level measurements at 14 monitoring wells and five piezometers; pore water measurements at one monitoring well, one piezometer, and five temporary wells in the CCR units; and a surface water measurement at one gauge located in the Emory River. An additional water level measurement and groundwater sample were also collected from well GW-2 so that six samples were obtained from the well under the TDEC Order SAP. Groundwater and surface water measurements and elevations are provided in Table B.1a, and depicted on Exhibit A.2 for the February 2020 event. Pore water measurements and elevations are provided in Table B.1b, and depicted on Exhibit A.3.

Groundwater quality measurements and groundwater analytical samples were collected at five monitoring wells, as well as an additional sample collected at one well, as summarized in Table B.2. Groundwater quality parameters were recorded during purging. Stabilization criteria for pH, specific conductance, turbidity, and DO were achieved at each of the sampling locations. The final measurements prior to initiating sample collection are presented in Table B.3.

Groundwater analytical data for CCR Parameters and geochemical parameters are presented in Table B.4. Analytical data for radium analyses are presented in Table B.5. Analytical data were reported by GEL and TestAmerica, and then validated or verified by EnvStds.

Terracon and Stantec have completed Event #6 of the groundwater investigation at the KIF Plant in Harriman, Tennessee, in accordance with the Groundwater Investigation SAP as documented herein. The data collected during Event #6 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete dataset from this event will be evaluated along with data collected during the other groundwater sampling events and under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This full evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Fossil Plant Environmental Investigation*. Revision 3. Prepared for Tennessee Valley Authority. November 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Groundwater Investigation Sampling and Analysis Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Kingston Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. November 9, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03. *Field Record Keeping*.

TVA, ENV-TI-05.80.04. *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05. *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06. *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.21. *Monitoring Well Inspection and Maintenance*.

TVA, ENV-TI-05.80.42. *Groundwater Sampling*.

TVA, ENV-TI-05.80.44. *Groundwater Level and Well Depth Measurement*.

TVA, ENV-TI-05.80.46. *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

Exhibit No.

A.1

Title

Monitoring Well Network

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043
Prepared by DMB on 2021-03-24
Technical Review by MT on 2021-03-24

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore water Piezometer in CCR Material
- Temporary Well within CCR Material
- Emory River Gauging Station
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018

Stantec

TVA

V:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\GW_Tech_Memo\KIF_GWTechMemo_ExhA1_MonitoringWellNetwork_wPZ_porewater.mxd Revised: 2021-03-24 By: mbough

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #6 (February 17, 2020)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location

Roane County, Tennessee

175668043

Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well: groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well: groundwater elevation in ft amsl
- Piezometer: groundwater elevation in ft amsl
- Piezometer in CCR: pore water elevation in ft amsl; value not used for contouring
- Temporary well in CCR: pore water elevation in ft amsl; value not used for contouring
- Emory River Gauging Station: surface water elevation in ft amsl
- Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Interpolated Groundwater Contour (5 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring due to factors such as well construction or being screened in a different hydrogeologic unit.

NM: Not measured, sensor not collecting data during this event.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment

Stantec TVA

Exhibit No.

A.3

Title

Pore Water Elevation Contour Map, Event #6 (February 17, 2020)

Client/Project

Tennessee Valley Authority
Kingston Fossil (KIF) Plant TDEC Order

Project Location: Roane County, Tennessee

175668043
Prepared by DMB on 2021-09-10
Technical Review by MD on 2021-09-10

0 300 600 900 1,200 Feet

1:3,600 (At original document size of 22x34)

Legend

- Groundwater Investigation Monitoring Well — groundwater elevation in feet above mean sea level (ft amsl); value not used for contouring
- Other Monitoring Well — groundwater elevation in ft amsl; value not used for contouring
- Piezometer — groundwater elevation in ft amsl; value not used for contouring
- Piezometer in CCR — pore water elevation in ft amsl
- Temporary well in CCR — pore water elevation in ft amsl
- Emory River Gauging Station — surface water elevation in ft amsl
- Pore water Contour (1 ft interval; elevations are in ft amsl)
- Subsurface Wall
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR: Coal combustion residuals

*Groundwater elevation displayed but not used as input for contouring

NM: Not measured, sensor not collecting data during this event.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery provided by TVA and flown by Tuck Mapping on March 16, 2017; 2018 Imagery provided by TVA and is dated September 12, 2018
3. Pore water contours were created with manual adjustment using Surfer Version 16.1.350 (December 13, 2018)

Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
Kingston Fossil Plant
February 2020

UNID	Well / Piezometer ID	Date Measured	Depth to Groundwater	Top of Casing Elevation	Groundwater Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft btoc	
Monitoring Wells										
KIF-00-GW-43-001	22A	17-Feb-20	19.86	759.12	739.26	n/a	n/a	n/a	20.2 - 50.2	Residuum
KIF-00-GW-43-002	22B*	17-Feb-20	19.85	759.18	739.33	n/a	n/a	n/a	59.9 - 81.4	Lower Conasauga Group
KIF-00-GW-43-003	27A	17-Feb-20	18.29	757.97	739.68	n/a	n/a	n/a	31.4 - 47.5	Weathered Shale
KIF-00-GW-43-004	27B*	17-Feb-20	17.70	758.15	740.45	n/a	n/a	n/a	50.4 - 71.9	Lower Conasauga Group
KIF-00-GW-43-005	6AR	17-Feb-20	19.06	758.01	738.95	n/a	n/a	n/a	34.5 - 44.2	Residuum
KIF-00-GW-43-006	AD-1	17-Feb-20	4.69	781.13	776.44	n/a	n/a	n/a	25.5 - 35.4	Residuum
KIF-00-GW-43-007	AD-2	17-Feb-20	10.53	757.10	746.57	n/a	n/a	n/a	18.5 - 28.4	Residuum
KIF-00-GW-43-008	AD-3	17-Feb-20	8.10	752.30	744.20	n/a	n/a	n/a	13.9 - 18.8	Residuum
KIF-00-GW-43-027	GW-2	17-Feb-20	17.01	769.98	752.97	n/a	n/a	n/a	13.5 - 22.8	Residuum
KIF-00-GW-43-027	GW-2	20-Apr-20	16.25	769.98	753.73	na	na	na	13.5 - 22.8	Residuum
KIF-00-GW-43-030	KIF-22C	17-Feb-20	21.95	761.23	739.28	n/a	n/a	n/a	39.7 - 50.2	Residuum
KIF-00-GW-43-031	KIF-103	17-Feb-20	21.50	760.33	738.83	n/a	n/a	n/a	29.1 - 38.7	Alluvium
KIF-00-GW-43-032	KIF-104	17-Feb-20	17.94	758.60	740.66	n/a	n/a	n/a	28.1 - 38.1	Alluvium
KIF-00-GW-43-033	KIF-105	17-Feb-20	8.10	757.26	749.16	n/a	n/a	n/a	38.7 - 48.7	Residuum
KIF-00-GW-43-034	KIF-106	17-Feb-20	7.85	761.27	753.42	n/a	n/a	n/a	32.7 - 42.7	Residuum
Piezometers										
n/a	KIF_PZ126BC	17-Feb-20	n/a	n/a	740.5	754.0	724.9	29.1	n/a	Alluvium
n/a	KIF_PZ20C	17-Feb-20	n/a	n/a	741.7	765.3	720.1	45.2	n/a	Alluvial Sand
n/a	KIF-17-01-1	17-Feb-20	n/a	n/a	742.1	755.0	727.0	28.0	n/a	Alluvium
n/a	KIF-17-02-3	17-Feb-20	n/a	n/a	741.8	754.3	712.3	42.0	n/a	Alluvial Sand
n/a	KIF-17-03-2	17-Feb-20	n/a	n/a	740.1	749.0	714.0	23.7	n/a	Alluvium
n/a	PZ-C1B	17-Feb-20	NM	751.92	NM	748.4	718.5	29.9	n/a	Alluvial Sand
n/a	PZ-C2	17-Feb-20	NM	746.88	NM	743.9	727.0	16.9	n/a	Alluvial Clay
n/a	PZ-D1A	17-Feb-20	NM	752.05	NM	748.7	728.8	19.9	n/a	Alluvial Clay
n/a	PZ-D1B	17-Feb-20	NM	748.70	NM	748.7	709.7	39.0	n/a	Alluvial Sand
Surface Water Gauge										
Emory River Gauge	n/a	17-Feb-20	n/a	n/a	738.10	n/a	n/a	n/a	n/a	n/a

Notes:

bgs	below ground surface
btoc	below top of casing
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification
*	Groundwater elevation from wells 22B and 27B were not used as input for contouring due to factors such as well contruction or being screened in a different hydrogeologic unit.

1. Top of casing elevations, screen intervals, and screened formations for monitoring wells were obtained from the TVA Well Inventory Log provided by TVA.
2. Emory River data point is the reading recorded closest to noon by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
4. Groundwater elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
5. Well 22A is identified as well 22 in the Groundwater Investigation SAP (Stantec 2018a). Since TVA's well inventory lists this well as 22A, that identification is used in this SAR.
6. In select piezometers, as noted by "NM" above, groundwater elevation data were not available for this event.
7. GW-2 was gauged on April 20, 2020 to fulfill the six events described in the Groundwater Investigation SAP. GW-2 was not included in the first of the six sampling events. The April 20, 2020 water level is not included in the groundwater contour map.

TABLE B.1b – Pore Water Level Measurements
Kingston Fossil Plant
February 2020

UNID	Well / Piezometer ID	Date Measured	Depth to Pore Water	Top of Casing Elevation	Pore Water Elevation	Piezometer Ground Surface Elevation	Piezometer Sensor Elevation	Piezometer Sensor Depth	Screened Interval	Screened / Piezometer Sensor Formation
			ft btoc	ft msl	ft msl	ft msl	ft msl	ft bgs	ft bgs	
Monitoring Well										
KIF-00-GW-43-035	KIF-107	17-Feb-20	8.86	762.86	754.00	n/a	n/a	n/a	10.7 - 20.3	Residuum
Temporary Wells										
n/a	KIF-TW01	17-Feb-20	18.21	775.36	757.15	n/a	n/a	n/a	26.5 - 36.5	CCR
n/a	KIF-TW02	17-Feb-20	17.02	774.73	757.71	n/a	n/a	n/a	30.0 - 40.0	CCR
n/a	KIF-TW03	17-Feb-20	22.15	778.90	756.75	n/a	n/a	n/a	33.5 - 43.5	CCR
n/a	KIF-TW04	17-Feb-20	12.72	769.60	756.88	n/a	n/a	n/a	26.0 - 36.0	CCR
n/a	KIF-TW05	17-Feb-20	19.61	773.59	753.98	n/a	n/a	n/a	26.5 - 36.1	CCR
Piezometers										
n/a	KIF-17-02-1	17-Feb-20	n/a	n/a	742.1	754.3	733.3	21.0	n/a	CCR
n/a	KIF-17-03-1	n/a	n/a	n/a	NM	749.0	737.0	12.0	n/a	CCR
n/a	PZ-A1	n/a	NM	764.43	NM	757.0	732.2	24.8	n/a	CCR
n/a	PZ-B1	n/a	NM	766.69	NM	759.3	734.1	25.2	n/a	CCR

Notes:

bgs	below ground surface
btoc	below top of casing
CCR	coal combustion residuals
ft	feet
ID	identification
msl	mean sea level
n/a	not applicable
NM	not measured
UNID	Unique Numerical Identification

1. Top of casing elevations, screen intervals, and screened formations were obtained from boring logs, well detail and well survey data.
2. For piezometers, ground surface elevation, pore water elevations, and piezometer data were obtained from the geotechnical instrumentation database. Vibrating wire sensor formation information were obtained from boring logs.
3. Pore water elevations in piezometers are calculated values. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. In select piezometers noted as "NM" above, pore water elevation data were not available for this event.

TABLE B.2 – Summary of Groundwater Samples
Kingston Fossil Plant
February-April 2020

			Analysis Type							
Location ID	**Sample ID**	**Sample Type**	Field Parameters	Total Metals	Total Mercury	Alkalinity	Total Dissolved Solids	Radium-226	Radium-228	Radium-226+228
GW-2	KIF-GW-027-02192020	Normal Environmental Sample	x	x	x	x	x	x	x	x
	KIF-GW-027-20200421	Normal Environmental Sample	x	x	x	x	x	x	x	x
	KIF-GW-DUP01-20200421	Field Duplicate Sample		x	x	x	x	x	x	x
KIF-103	KIF-GW-031-02192020	Normal Environmental Sample	x	x	x	x	x	x	x	x
KIF-104	KIF-GW-032-02202020	Normal Environmental Sample	x	x	x	x	x	x	x	x
KIF-105	KIF-GW-033-02192020	Normal Environmental Sample	x	x	x	x	x	x	x	x
KIF-106	KIF-GW-034-02182020	Normal Environmental Sample	x	x	x	x	x	x	x	x
	KIF-GW-903-02182020	Field Duplicate Sample		x	x	x	x	x	x	x

Notes:

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Alkalinity	SM2320B
Total Dissolved Solids	SM2540C
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
ID	identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.

TABLE B.3 – Summary of Groundwater Quality Parameters
Kingston Fossil Plant
February-April 2020

Sample Location		GW-2		KIF-103	KIF-104	KIF-105	KIF-106
Sample Date		19-Feb-20	21-Apr-20	19-Feb-20	20-Feb-20	19-Feb-20	18-Feb-20
Sample ID		KIF-GW-027-02192020	KIF-GW-027-20200421	KIF-GW-031-02192020	KIF-GW-032-02202020	KIF-GW-033-02192020	KIF-GW-034-02182020
Sample Depth		21.8 ft	21.8 ft	34 ft	33 ft	43 ft	37.5 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review		Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
	Units						
Field Parameters							
Dissolved Oxygen	%	71.8	77.3	4.2	1.3	2.2	2.3
Dissolved Oxygen	mg/L	7.43	7.98	0.40	0.13	0.17	0.21
ORP	mV	49.5	133.9	26.8	-31.4	41.2	20.7
pH (field)	SU	5.28	5.72	5.95	6.13	5.59	6.83
Specific Cond. (Field)	mS/cm	0.058	-	0.452	1.69	1.08	0.75
Specific Cond. (Field)	uS/cm	-	61.1	-	-	-	-
Temperature, Water (C)	DEG C	13.5	13.5	16.4	15.6	18.3	17.3
Turbidity, field	NTU	1.05	1.94	2.29	2.97	0.58	3.52

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
mg/L	milligrams per Liter
mS/cm	millisiemens per centimeter
mV	milliVolts
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential, measured using a silver reference electrode which has a standard potential of 200 mV
SU	Standard Units
uS/cm	microsiemens per centimeter

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
Kingston Fossil Plant
February - April 2020

Sample Location				GW-2			KIF-103	KIF-104	KIF-105	KIF-106	
Sample Date				19-Feb-20	21-Apr-20	21-Apr-20	19-Feb-20	20-Feb-20	19-Feb-20	18-Feb-20	18-Feb-20
Sample ID				KIF-GW-027-02192020	KIF-GW-027-20200421	KIF-GW-DUP01-20200421	KIF-GW-031-02192020	KIF-GW-032-02202020	KIF-GW-033-02192020	KIF-GW-034-02182020	KIF-GW-903-02182020
Sample Depth				21.8 ft	21.8 ft	21.8 ft	34 ft	33 ft	43 ft	37.5 ft	37.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals											
Antimony	ug/L	6[A]	n/v	<0.378	1.07 U*	1.11 U*	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	<0.313	<0.313	0.336 J	3.51	8.38	0.366 J	1.07	1.05
Barium	ug/L	2,000[A]	n/v	19.9	20.6	20.3	40.5	179	19.4	59.4	63.2
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	77.3 J	70.6 U*	105 U*	933	1,740	1,850	414	409
Cadmium	ug/L	5[A]	n/v	<0.217	<0.217	<0.217	<0.217	<0.217	1.07	<0.217	<0.217
Calcium	ug/L	n/v	n/v	5,160	5,370	4,960	30,700	185,000	176,000	78,900	87,900
Chromium	ug/L	100[A]	n/v	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	6[B]	<0.134	<0.134	<0.134	**60.7[B]**	**11.5[B]**	**17.3[B]**	2.60	2.65
Copper	ug/L	n/v	n/v	<0.627	0.775 U*	1.27 U*	<0.627	<0.627	<0.627	<0.627	<0.627
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128	<0.128	<0.128	0.196 J	0.234 U*	0.206 U*
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	4.96 J	<3.39	<3.39	3.54 J	6.97 U*	7.32 U*
Magnesium	ug/L	n/v	n/v	1,750	1,690	1,620	11,100	38,600	31,000	8,550	8,690
Mercury	ug/L	2[A]	n/v	<0.101	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	<0.610	<0.610	0.916 J	<0.610	2.35 J	2.39 J
Nickel	ug/L	100 (TN MCL)[A]	n/v	<0.336	<0.336	<0.336	2.66	0.849 J	17.2	1.01	1.02
Potassium	ug/L	n/v	n/v	1,630	1,660	1,630	1,080	6,630	11,900	1,560	1,620
Selenium	ug/L	50[A]	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100 (TN MCL)[A]	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	n/v	n/v	1,440	1,400	1,400	4,760	21,000	10,600	14,800	15,000
Thallium	ug/L	2[A]	n/v	0.410 U*	<0.148	<0.148	0.176 U*	0.379 U*	0.315 U*	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<4.96	<4.96
Zinc	ug/L	n/v	n/v	<3.22	<3.22	<3.22	3.42 J	3.58 J	14.8	<3.22	<3.22
Anions											
Chloride	mg/L	n/v	n/v	1.57	1.24	1.23	6.16	7.34	9.23	24.6	22.4
Fluoride	mg/L	400[A]	n/v	0.0364 J	0.0715 U*	0.0763 U*	0.0345 J	0.0305 J	0.0507 J	0.174	0.138
Sulfate	mg/L	n/v	n/v	14.1 J	12.3	12.2	77.0	722	549 J	241 J	234 J
General Chemistry											
Alkalinity, Bicarbonate	mg/L	n/v	n/v	7.77	7.85	7.64	98.0	168	34.6	127 J	122
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	5.00 UJ	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	7.77	7.85	7.64	98.0	168	34.6	127 J	122
Total Dissolved Solids	mg/L	n/v	n/v	60.0	38.0	38.0	258	1,280	827	540	501

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
6.5[A]	Concentration is greater than or equal to the indicated standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
mg/L	milligrams per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter
(TN MCL)	Tennessee Maximum Contaminant Level

1. Level of review is defined in the Quality Assurance Project Plan.

Stantec

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
Kingston Fossil Plant
February 2020

Sample Location				GW-2			KIF-103	KIF-104	KIF-105	KIF-106	
Sample Date				19-Feb-20	21-Apr-20	21-Apr-20	19-Feb-20	20-Feb-20	19-Feb-20	18-Feb-20	18-Feb-20
Sample ID				KIF-GW-027-02192020	KIF-GW-027-20200421	KIF-GW-DUP01-20200421	KIF-GW-031-02192020	KIF-GW-032-02202020	KIF-GW-033-02192020	KIF-GW-034-02182020	KIF-GW-903-02182020
Sample Depth				21.8 ft	21.8 ft	21.8 ft	34 ft	33 ft	43 ft	37.5 ft	37.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units	EPA MCLs	CCR Rule GWPS								
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.0798 +/-(0.530)U	0.634 +/-(0.579)U	0.301 +/-(0.459)U	0.536 +/-(0.595)U	0.938 +/-(0.686)U*	0.814 +/-(0.641)U	0.697 +/-(0.621)U	0.243 +/-(0.530)U
Radium-226+228	pCi/L	5[A]	n/v	0.0798 +/-(0.571)U	0.736 +/-(0.641)U	0.301 +/-(0.572)U	0.935 +/-(0.774)U	1.02 +/-(0.832)U*	1.40 +/-(0.797)U	0.858 +/-(0.699)U	0.769 +/-(0.679)U
Radium-228	pCi/L	n/v	n/v	-0.258 +/-(0.214)U	0.102 +/-(0.276)U	-0.0308 +/-(0.342)U	0.399 +/-(0.494)U	0.0809 +/-(0.471)U	0.584 +/-(0.475)U	0.161 +/-(0.321)U	0.526 +/-(0.424)U

Notes:

A	EPA Maximum Contaminant Level
B	CCR Rule GWPS (Federal Register / Vol. 83, No. 146 / Monday, July 30, 2018 / Rules and Regulations)
n/v	No standard/guideline value
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picoCurie per Liter
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
U	not detected

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.9

TECHNICAL EVALUATION OF WATER USE SURVEY

Appendix H.9 - Technical Evaluation of Water Use Survey

TDEC Commissioner's Order:
Environmental Assessment Report
Kingston Fossil Plant
Harriman, Tennessee

March 12, 2024

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

APPENDIX H.9 - TECHNICAL EVALUATION OF WATER USE SURVEY

REVISION LOG

Revision	Description	Date
0	EAR Submittal to TDEC	May 30, 2023
1	Addresses August 16, 2023 TDEC Review Comments and Issued for TDEC	November 14, 2023
2	Addresses January 12, 2024 TDEC Review Comments and Issued for TDEC	March 12, 2024

Sign-off Sheet

This document entitled Appendix H.9 - Technical Evaluation of Water Use Survey was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of Tennessee Valley Authority (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by Stuart Gross

Stu Gross, Senior Project Manager

Reviewed by J E Griggs

John Griggs, PG, Senior Principal

Approved by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

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Abbreviations

CCR	Coal Combustion Residuals
EAR	Environmental Assessment Report.
EIP	Environmental Investigation Plan
GIS	Geographic Information System
IP	Implementation Plan
KIF Plant	Kingston Fossil Plant
SAP	Sampling and Analysis Plan
Stantec	Stantec Consulting Services Inc.
Survey Area	KIF Plant ½-mile boundary
the Survey	Desktop Survey
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order OGC15-0177
TVA	Tennessee Valley Authority
USGS	United State Geological Survey

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec), on behalf of the Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize applicable historical and recent water use survey information at TVA's Kingston Fossil Plant (KIF Plant) in Harriman, Tennessee. This technical appendix provides a detailed evaluation of this information for the Environmental Assessment Report (EAR) in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order OGC15-0177 (TDEC Order) Program (TDEC 2015).

2.0 WATER USE SURVEY

As a part of the Environmental Investigation Plan (EIP) (TVA 2018), TVA developed a Water Use Survey (WUS) Sampling and Analysis Plan (SAP). The objectives of the WUS SAP were to identify and sample usable private water supply wells and surface water sources being used for domestic purposes within ½-mile of the boundary of the TDEC Order coal combustion residual (CCR) management units[1] at the KIF Plant, which include the Stilling Pond, Sluice Trench and Area East of Sluice Trench, and the Interim Ash Staging Area. This area is referred to herein as the Survey Area and is illustrated on Exhibit H.9-1.TVA defines a usable water well to be one that will house a pump (even if a pump is not currently present) and does not contain an obstruction or defective construction that would prevent the insertion or operation of a pump.

Initial tasks associated with the WUS included a desktop survey to identify potentially usable water wells and springs within the Survey Area and a review of hydrogeologic information obtained from investigation activities at the KIF Plant. Following this effort, owners of parcels within an area of interest (AOI) located downgradient of coal combustion residuals (CCR) management activities at the KIF Plant were contacted. The results of the desktop survey, usable well and spring identification, and parcel owner outreach are presented in this appendix.

2.1 DESKTOP SURVEY

The first step of the WUS was a desktop survey (the Survey) to identify usable private wells and springs within the Survey Area. The Survey included: reviewing well logs obtained from TDEC, historical hydrogeologic reports provided by TVA and aerial photographs, and contacting public water supply providers in the vicinity of the KIF Plant. Details of the Survey are provided in the following sections.

[1] The term "CCR management unit" is used in this document generally and is not intended to be a designation under federal or state regulations.

2.1.1 Data Sources and Evaluation

The following information and historical reports were obtained and reviewed:

- TVA Engineering Laboratory - Hydrogeological Evaluation of Ash Pond Area report (TVA 1995) (herein referred to as the “1995 TVA Report”)
- TVA River System Operations & Environment Research & Technology Applications Environmental Engineering Services – East - Kingston Fossil Plant – Hydrogeologic Evaluation of Coal-Combustion Byproduct Disposal Facility Expansion report (TVA 2004) (herein referred to as the “2004 TVA Report”)
- Tetra Tech, Inc. – Potable Water Sampling Results, Kingston Fossil Fly Ash Response, Harriman, Roane County, Tennessee (Tetra Tech 2009) (herein referred to as the “2009 Tetra Tech Report”)
- USGS Public Water-Supply Systems and Associated Water Use in Tennessee, 2005 (Robinson & Brooks 2010)
- November 2019 Aerial Photographs (Google Earth 2020).

The following documents, obtained from government agencies were reviewed:

- Parcel data received from Roane County
- Well construction information received from Luke Ewing, TDEC Division of Water Resources, Drinking Water Unit (Ewing 2019)
- United State Geological Survey (USGS) National Water Information System online mapping database (USGS 2019)
- Local Public Water Supply Information.
    - Telephone Interview – Jimmy Agee, Kingston Water Department (Agee 2019); Kevin Hamilton, Kingston Water Department (Hamilton, 2023)
    - Telephone Interview – Gale Howard, Roane Central Utility District (Howard 2019)
    - Cumberland Utility District – Water Service Information (Cumberland Utility District 2019)
    - Harriman Utility Board – Service Area Maps (Harriman Utility Board 2019).

2.1.1.1 Desktop Survey Results

The findings from the main data sources reviewed as part of the desktop survey are presented below.

Public Water Service Providers

Public water surrounding the KIF Plant is supplied by four separate public water districts that obtain their water from local surface water sources (Robinson & Brooks 2010 and USGS 2019). Table H.9-1 summarizes the identified public water suppliers, their associated service areas, and water sources. The following additional information was obtained from the public water service providers:

- Jimmy Agee, Kingston Water Department, provided a general description but did not provide a map of their service area. Mr. Agee stated that a very small percentage of people obtain potable water from private water wells near Kingston. Kevin Hamilton, Kingston Water Department, provided a general description of spring water sourced from Swan Pond Spring.
- A map showing electric/gas/water service areas of the Harriman Utility Board was obtained from their website. During Spring 2019, the Harriman Utility Board was contacted to obtain additional information regarding their water system. However, to date, Harriman Utility Board representatives have not returned our calls.
- Gail Howard with the Roane Central Utility District reported that they purchase their water from the Rockwood Water Department and distribute the water to their customers. A service area map was not provided by the Roane Central Utility District.
- Based on information available at the Cumberland Utility District website, they sell potable water to rural parts of Roane and Morgan Counties. A service area map was not available.

<u>Roane County Parcel Information</u>

Stantec obtained parcel information for Roane County in electronic format and assimilated the information into a GIS database for the KIF Plant. Stantec used these data to populate Table H.9-2 including only those parcels partially or fully within the Survey Area, which totaled 79 parcels. The parcel information included a “water/sewer” field that listed the following water supply classifications:

- Individual (40 parcels)
- Private (1 parcel)
- Public (37 parcels)
- None (1 parcel).

The 41 parcels listed as having an “individual” or “private” water supply have no identified connection to municipal water supply. The remaining 38 parcels identified as having a “public” water supply are served by a municipal water supply or have no known water supply.

<u>TDEC Water Well Logs</u>

TDEC provided an electronic list of the recorded well logs within and near the Survey Area (Ewing 2019). Some well logs included the well depth and other well construction details. Stantec geo-referenced the listed latitude/longitude of each well log using GIS to plot the well locations on a map. The provided coordinates were imported into GIS “as is” without modification. Following this effort, coordinate locations for four well logs were inside the Survey Area. An additional well log was identified on a parcel that extends into the Survey Area; however, the coordinates of this well positioned its location approximately 100 feet outside of the Survey Area. Table H.9-3 summarizes the TDEC-documented well logs located on parcels within the Survey Area, and the well locations are shown on Exhibit H.9-2.

Historical Reports

The 1995 and 2004 TVA reports summarized previous surveys of non-public water supply wells and springs near the KIF Plant. The 1995 TVA report identified the approximate locations of “residential wells” near the KIF Plant. The 2004 TVA report also identified the locations of “private water wells and springs” near the KIF Plant. The well locations and assigned well numbers identified in the 1995 and 2004 TVA reports appear to be identical. The 2004 TVA report appeared to build upon the conclusions of the 1995 TVA report and provided latitude/longitude coordinates for each identified private water well. These reports identified three non-public water supply wells in the Survey Area. An additional well was identified on a parcel that extends into the Survey Area; however, the mapped location of the actual well is approximately 100 feet outside of the Survey Area. An identified spring was located outside the Survey Area.

The 2009 Tetra Tech report also summarized potable water sampling activities conducted around the KIF Plant during December 2008. The 2009 Tetra Tech report identified one additional private well within the Survey Area. Wells identified in the historical reports within the Survey Area are shown on Exhibit H.9-2.

Recent Aerial Photograph Review

Stantec reviewed the November 2019 Google Earth© aerial imagery (most recent available) to identify buildings or structures (i.e., residences, businesses) in the Survey Area that are likely to require a potable water source. If a parcel was identified by Roane County as having an “individual” or “private” water listing and a building was present, then it was assumed that a private well used for domestic or business purposes was present at the parcel. Alternatively, if a parcel was identified with an “individual” or “private” listing but no evidence of recent or current buildings or structures was observed, then it was considered unlikely for a private well to be present or currently in use at the parcel. No additional potential wells were identified in the Survey Area in the aerial photography review.

2.1.1.2 Summary of Desktop Survey Findings

Based on the results of the Survey, 18 parcels (highlighted on Exhibit H.9-2) were identified in the Survey Area that may have up to 20 potential wells. No springs were identified in the Survey Area. The private well information obtained from the reviewed data sources, as it relates to the Survey Area, are summarized in Table H.9-4.

Table H.9-2 provides a complete list of parcels in the Survey Area. Exhibit H.9-2 illustrates potential water supply wells and springs identified during the Survey and highlights those parcels in the Survey Area where one or more potential well(s) or spring(s) were identified based on the data reviewed.

2.1.2 Hydrogeological Considerations

In addition to conducting the Survey, the current KIF Plant WUS SAP outlines a process to identify locations where groundwater or surface water has the potential to be affected by KIF Plant TDEC Order CCR management units using results of investigative activities required as part of the EIP. This process includes consideration of geologic and hydrogeologic conditions (i.e., surface streams that bound groundwater flow [rivers/streams], topography, groundwater flow direction, and watershed boundaries). Relevant hydrogeologic information presented in Appendix H.1 of the EAR is discussed below as it relates to identifying usable water wells and surface water sources being used for domestic purposes with the potential to be affected by KIF Plant TDEC Order CCR management units.

- The KIF Plant is situated within a valley with Pine Ridge to the west and a secondary parallel northeast to southwest trending ridge to the east of the Emory River. The KIF Plant and the TDEC Order CCR management units reside atop unconsolidated materials consisting primarily of residuum in the areas upgradient of the TDEC Order CCR management units and alluvium beneath and downgradient of the TDEC Order CCR management units. The upper fine-grained alluvium layer varies in thickness from 2.5 to 27.5 ft and is primarily comprised of clay and silty clay. Clay foundation soils of variable thickness are present under the TDEC Order CCR management units. The lower alluvial layer, ranging in thickness from 0.5 to 52.5 ft, is primarily sand and silty sand.
- Bedrock immediately underlying the TDEC Order CCR management units is the Conasauga Group Shale, which is comprised of sandstone, siltstone, shale, limestone, and dolomite. The KIF Plant is situated between the Chattanooga Fault to the north and the Kingston Fault to the south.
- Physiographic features that will affect groundwater flow within the KIF watershed (specific to the TDEC Order CCR management units included in this evaluation) include Swan Pond Creek to the north of the Kingston Recovery Project Ash Landfill and Emory River and the Plant Intake Channel to the east-southeast and downgradient of the KIF TDEC Order CCR management units. To the west and upgradient of the KIF Plant is Pine Ridge, which serves as a hydrogeological divide to groundwater flow.
- Generally, the horizontal groundwater flow for the unconsolidated materials is to the east/southeast towards the Emory River and Plant Intake Channel with the Emory River acting as a surface stream that bounds groundwater flow.

2.1.3 Usable Water Well Identification

Considering the geologic and hydrogeologic conditions present at and in the vicinity of the KIF Plant, parcels containing a well or spring located south (downgradient) and immediately adjacent to (west) the KIF Plant would have the greatest likelihood of being impacted by the KIF Plant TDEC Order CCR management units. This area was termed the AOI. Potable water wells screened in unconsolidated materials or bedrock located northwest of Pine Ridge or east of the Emory River would have a low likelihood of being impacted from groundwater associated with KIF Plant TDEC Order CCR management units based on hydrogeologic boundaries and current groundwater flow patterns.

Based on the results of the Survey, 1 parcel (highlighted on Exhibit H.9-3 and outlined in Table H.9-5) located within the AOI was identified during the Survey. No potential wells or springs were identified on the parcel. Using the results of the Survey, delivery of a letter and postcard to the owner of this parcel was initiated as described in the WUS Implementation Plan (IP) (Stantec 2021) and is described in further detail in the following sections.

3.0 PARCEL OWNER OUTREACH

Parcel owner outreach is described in Sections 2.0 and 3.0 of the IP. Using the process outlined in the IP, on February 1, 2024, a letter and stamped postcard containing basic inquiries into the presence of a well or spring was mailed to the parcel owner, TVA, within the AOI. On February 12, 2024, TVA's KIF Plant Manager returned a complete postcard and reported that there were no known water supply wells or springs within the AOI. Information obtained from the delivery and return of the letter and postcard is presented in Table H.9-6. The postcard response is included in Attachment H.9-A.

4.0 CONCLUSIONS

TVA owns the parcel encompassing the AOI and was contacted for information regarding the presence of wells or springs on its property. The TVA Plant Manager reported that there were no known water supply wells or springs within the AOI. Based on the overall results of the WUS, current and historical CCR management associated with the KIF Plant have not affected water supply wells or springs located in the vicinity of the KIF Plant.

5.0 REFERENCES

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TABLES

Table H.9-1 – KIF Plant Area Public Water Service Providers
Kingston Fossil Plant

Public Water Supply Provider	Service Area Direction in Relation to KIF Plant	Does Service Area Extend into Survey Area (Yes/No)	Water Source/Intake Location	Distance of Source/Intake from KIF Plant
Roane Central Water District	West and southwest	No	Water purchased water from Rockwood Water Utility. Rockwood obtains water from Watts Bar Lake near Postoak Creek inlet.	5 miles southwest (downstream of KIF Plant)
Harriman Utility Board	North and northwest	No	Emory River on the west side of the city	2.5 miles northwest
Kingston Water Department	South and southeast	Yes, supplies potable water directly to KIF Plant	Swan Pond Spring and Watts Bar Lake south of Kingston off Highway 58	Swan Pond Spring - approximately 1 mile northwest of KIF Plant Watts Bar Lake - 2 miles south (downstream of KIF Plant)
Cumberland Water Utility	East and northeast	Yes, east side of Emory River	Water obtained from Little Emory River	4 miles northeast (upstream of KIF Plant)

Table H.9-2 – KIF Plant Parcel Data Inside Survey Area
Kingston Fossil Plant

ASSIGNED WELL ID	PARCEL ID	OWNER	PARCEL ADDRESS	ROANE COUNTY GIS WATER SERVICE DESIGNATION	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA ENGINEERING REPORT WELL ID	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
KIFPV-001	037 018.00	HENDERSON TONY	HASSLER MILL RD 730	Individual	House	1	99001947	253	None	
KIFPV-002	037 029.00	MATHESON CLIFTON & OLLIE R	SWAN POND RD 1091	Individual	House	1	-	-	None	
KIFPV-003	037 029.01	MATHESON WILLIAM C	SWAN POND RD 1093	Individual	House/Building	1			None	
KIFPV-004	037 031.00	UNITED STATES OF AMERICA	SWAN POND RD 1049	Individual	Two Houses/Buildings	1	20122258	452	None	
KIFPV-005	037 034.00	UNITED STATES OF AMERICA	SWAN POND RD 999	Individual	Vacant parcel - no buildings visible (buildings historically present)	3	14501921	280	TVA Reports “Residential Well” ID 8, 21, and 22	
KIFPV-006	037 034.01	UNITED STATES OF AMERICA	SWAN POND RD 1015	Individual	Vacant parcel - no buildings visible	1			Tetra Tech Report “EPA Well Water” ID 1015	
KIFPV-007	037 035.00	RYAN THOMAS & DOROTHY	SWAN POND RD 1007	Individual	House	1	20122259	275	Tetra Tech Report “EPA Well Water” ID 1007	
KIFPV-008	037 036.05	UNITED STATES OF AMERICA	SWAN POND ROAD OFF	Public	Vacant parcel - no buildings visible; mapped well location is outside the Survey Area boundary.	1	20122256	305	None	
KIFPV-009	037 036.06	UNITED STATES OF AMERICA	SWAN POND ROAD OFF	Public	Vacant parcel - no buildings visible	1			TVA Reports “Residential Well” ID 9	
KIFPV-010	037 037.00	UNITED STATES OF AMERICA	SWAN POND RD 995	Individual	House	1			None	
KIFPV-011	037 038.00	CHURCH SWAN POND MISSIONAR	SWAN POND RD	Individual	Church	1			None	
KIFPV-012	037 070.00	DAVIDSON SCOTT ANTHONY &	EMORY RIVER RD 490	Individual	House	1			None	
KIFPV-013	037 072.01	STEPHENSON MELINDA K	EMORY RIVER RD 496	Individual	House	1			None	
KIFPV-014	037 072.04	DAUGHERTY GLENN & EVELYN	EMORY RIVER RD 510	Individual	House	1			None	
KIFPV-015	037C A 020.00	UNITED STATES OF AMERICA	LAKESHORE DR 199	Individual	Building on parcel but not inside Survey Area	1			None	
KIFPV-016	037L A 002.01	WEATHERLY RICHARD K & JANET	GUNTERS WAY 502	Individual	House	1			None	
KIFPV-017	037L A 002.02	ROSE ROGER W & JUDITH GAIL	GUNTERS WAY 504	Individual	House	1			None	
KIFPV-018	037L A 002.04	RANKIN KENNETH D & SANDRA	GUNTERS WAY 507	Individual	House	1			None	
	037 014.00	METCALF DARRELL S & JUDY	HASSLER MILL RD 1088	Private	House on parcel but located outside the Survey Area boundary	0			None	
	037 015.00	HENDERSON TONY	HASSLER MILL RD 1102	Individual	House	0			None	
	037 022.00	TENNESSEE VALLEY AUTHORITY	SWAN POND RD	Individual	House	0			None	

Table H.9-2 – KIF Plant Parcel Data Inside Survey Area
Kingston Fossil Plant

ASSIGNED WELL ID	PARCEL ID	OWNER	PARCEL ADDRESS	ROANE COUNTY GIS WATER SERVICE DESIGNATION	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA ENGINEERING REPORT WELL ID	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
	037 023.00	UNITED STATES OF AMERICA	SWAN POND RD	Individual	House	0			None	
	037 025.00	UNITED STATES OF AMERICA	SWAN POND RD	Individual	House	0			None	
	037 026.00	UNITED STATES OF AMERICA	SWAN POND RD 1133	Individual	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 027.00	UNITED STATES OF AMERICA	SWAN POND RD 1125	Individual	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 028.00	UNITED STATES OF AMERICA	SWAN POND RD 1100	Individual	House	0			None	
	037 028.01	UNITED STATES OF AMERICA	SWAN POND RD 1107	Individual	Vacant parcel - no buildings visible	0			None	
	037 030.00	UNITED STATES OF AMERICA	SWAN POND RD	Individual	Vacant parcel - no buildings visible	0			None	
	037 032.00	UNITED STATES OF AMERICA	SWAN POND RD 1025	Public	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 033.00	UNITED STATES OF AMERICA	SWAN POND RD	Individual	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 036.00	UNITED STATES OF AMERICA	SWAN POND RD 985	Individual	Vacant parcel - no buildings visible	0			None	
	037 036.03	UNITED STATES OF AMERICA	SWAN POND RD 993	Individual	Vacant parcel - no buildings visible	0			None	
	037 036.04	UNITED STATES OF AMERICA	SWAN POND ROAD OFF	Individual	Vacant parcel - no buildings visible	0			None	
	037 038.01	CHURCH SWAN POND MISSIONARY BAPTIST	SWAN POND RD 987	Individual	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 046.00	TENNESSEE VALLEY AUTHORITY	SWAN POND RD 714	Public	TVA KIF Facility	0			None	
	037 047.00	TENNESSEE VALLEY AUTHORITY	CIRCLE RD	Individual	Vacant parcel - no buildings visible	0			None	
	037 053.00	UNITED STATES OF AMERICA	SWAN POND CIR 188	Public	Vacant parcel - no buildings visible	0			None	
	037 054.01	UNITED STATES OF AMERICA	SWAN POND CIR 194	None	Vacant parcel - no buildings visible	0			None	
	037 072.02	FRANCO PAUL J & PATRICIA L	EMORY RIVER RD 500	Individual	Vacant parcel - no buildings visible	0			None	
	037 072.03	TENNESSEE VALLEY AUTHORITY	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037 073.00	MALENOVSKY STACY AND TISHA	EMORY RIVER RD 618	Individual	Vacant parcel - no buildings visible	0			None	
	037 074.00	MALENOVSKY STACY	EMORY RIVER RD 617	Public	House	0			None	

Table H.9-2 – KIF Plant Parcel Data Inside Survey Area
Kingston Fossil Plant

ASSIGNED WELL ID	PARCEL ID	OWNER	PARCEL ADDRESS	ROANE COUNTY GIS WATER SERVICE DESIGNATION	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA ENGINEERING REPORT WELL ID	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
	037 089.00	HAMBY RONALD DALE AND	EMORY RIVER RD 507	Public	House	0			None	
	037 090.00	ARMES SCOTT D AND ANGELA K	EMORY RIVER RD 515	Public	House	0			None	
	037 091.00	SNOW DUSTIN C AND MEGAN	EMORY RIVER RD 521	Public	House	0			None	
	037 092.00	DAVIS JERRY LYNN & TERESA	EMORY RIVER RD 525	Public	House	0			None	
	037 093.00	DAVIS WILLIAM DAN & KRISTINE MARIE	EMORY RIVER RD 529	Public	House	0			None	
	037 094.00	HAMBY HOMER R & DONNA P	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037 095.00	MULLICAN JEFFREY LYNN & PAULA	EMORY RIVER RD 555	Public	House	0			None	
	037 096.00	RABY TEDDY III & SARAH J	EMORY RIVER RD 581	Public	House	0			None	
	037 097.00	KYKER JULIA L	EMORY RIVER RD 609	Public	House	0			None	
	037 105.00	STRANDBERG GERALD W & CHARLOTTE N	EMORY RIVER RD 558	Public	House	0			None	
	037 106.00	LIVELY TRAVIS AND TERESA	EMORY RIVER RD 564	Public	House	0			None	
	037 107.00	TATUM BRIAN A AND SUSAN M	EMORY RIVER RD	Public	House	0			None	
	037 108.00	FORECLOSED ASSETS SALES AND	EMORY RIVER RD 570	Public	Vacant parcel - no buildings visible (buildings historically present)	0			None	
	037 109.00	SAFFLES ANTHONY M	EMORY RIVER RD 572	Public	House	0			None	
	037 110.00	NEU PHILLIP RAYMOND AND	EMORY RIVER RD 574	Public	House	0			None	
	037 112.00	ADKINS ROBERT R AND TRACY R	EMORY RIVER RD 576	Public	House	0			None	
	037 113.00	BAUGH JIM F TRUST	EMORY RIVER RD	Public	House	0			None	
	037C A 019.00	UNITED STATES OF AMERICA	LAKESHORE DR	Public	Vacant parcel - no buildings visible	0			None	
	037C B 001.01	UNITED STATES OF AMERICA	LAKESHORE DR 189	Public	Vacant parcel - no buildings visible	0			None	
	037C C 001.00	UNITED STATES OF AMERICA	SWAN POND CIR	Individual	Vacant parcel - no buildings visible	0			None	
	037C C 001.01	UNITED STATES OF AMERICA	SWAN POND CIRCLE RD 148	Public	Vacant parcel - no buildings visible	0			None	
	037C C 001.02	UNITED STATES OF AMERICA	SWAN POND CIRCLE RD	Public	Vacant parcel - no buildings visible	0			None	
	037C C 002.00	UNITED STATES OF AMERICA	SWAN POND CIR	Individual	Vacant parcel - no buildings visible	0			None	
	037C C 003.00	UNITED STATES OF AMERICA	SWAN POND CIR	Individual	Vacant parcel - no buildings visible	0			None	
	037C C 004.00	UNITED STATES OF AMERICA	SWAN POND CIR	Individual	Vacant parcel - no buildings visible	0			None	
	037C C 005.00	UNITED STATES OF AMERICA	SWAN POND CIR	Individual	Vacant parcel - no buildings visible	0			None	

Table H.9-2 – KIF Plant Parcel Data Inside Survey Area
Kingston Fossil Plant

ASSIGNED WELL ID	PARCEL ID	OWNER	PARCEL ADDRESS	ROANE COUNTY GIS WATER SERVICE DESIGNATION	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA ENGINEERING REPORT WELL ID	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
	037L A 001.00	FORECLOSED ASSETS SALES AND	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037L A 002.00	GURECK WILLIAM SCOTT &	EMORY RIVER RD 514	Public	House	0			None	
	037L A 002.03	STOUT LARRY ALEXANDER & CHERYL ANN	GUNTERS WAY 506	Individual	Vacant parcel - no buildings visible	0			None	
	037L A 003.01	MCCARROLL NICHOLAS CHAD &	EMORY RIVER RD	Individual	Vacant parcel - no buildings visible	0			None	
	037L A 004.00	KALA NISHA & ATISH	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037L A 005.00	LONG TIM & DONNA	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037L A 006.00	KOHLER SHARON C & THOMAS A	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037L A 007.00	MOORE KATHLEEN D TRUST & TUXBURY DANIEL	EMORY RIVER RD 540	Public	House	0			None	
	037L A 008.00	KING WILLIAM R & MCNAB HEATHER M	RIVER RD 544	Public	Vacant parcel - no buildings visible	0			None	
	037L A 009.00	AUSTIN BRIANNE & JEREMY	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	
	037L A 010.00	SMITH SHAWN CHRISTOPHER & LESLIE	EMORY RIVER RD	Public	Vacant parcel - no buildings visible	0			None	

Table H.9-3 – TDEC Well Logs Located Inside Survey Area
Kingston Fossil Plant

Parcel Identification Number	TDEC Well Log Number(s)	Comments
037 018.00	99001947	total well depth = 253 feet below ground surface
037 031.00	20122258	total well depth = 452 feet below ground surface
037 034.00	14501921	total well depth = 280 feet below ground surface
037 035.00	20122259	total well depth = 275 feet below ground surface
037 036.05	20122256	total well depth = 305 feet below ground surface

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Table H.9-4 – Parcels Inside KIF Plant Survey Area with Likely Private Water Source
Kingston Fossil Plant

Assigned Well ID	Parcel ID	Potential Private Wells/Springs on Parcel and Inside Study Area	TDEC Well Log Number	Well Identified in TVA or Law Engineering Report	Roane County Parcel Data – Water Source Listing	Recent Aerial Photograph Review Notes
KIFPV-001	037 018.00	1	99001947	None	Individual	House
KIFPV-002	037 029.00	1	-	None	Individual	House
KIFPV-003	037 029.01	1		None	Individual	House/Building
KIFPV-004	037 031.00	1	20122258	None	Individual	Two Houses/Buildings
KIFPV-005	037 034.00	3	14501921	TVA Reports "Residential Well" ID 8, 21, and 22	Individual	Vacant parcel - no buildings visible (buildings historically present)
KIFPV-006	037 034.01	1		Tetra Tech Report "EPA Well Water" ID 1015	Individual	Vacant parcel - no buildings visible
KIFPV-007	037 035.00	1	20122259	Tetra Tech Report "EPA Well Water" ID 1007	Individual	House
KIFPV-008	037 036.05	1	20122256	None	Public	Vacant parcel - no buildings visible; mapped well location is outside the Survey Area boundary.
KIFPV-009	037 036.06	1		TVA Reports "Residential Well" ID 9	Public	Vacant parcel - no buildings visible
KIFPV-010	037 037.00	1		None	Individual	House
KIFPV-011	037 038.00	1		None	Individual	Church
KIFPV-012	037 070.00	1		None	Individual	House
KIFPV-013	037 072.01	1		None	Individual	House
KIFPV-014	037 072.04	1		None	Individual	House
KIFPV-015	037C A 020.00	1		None	Individual	Building on parcel but not inside Survey Area
KIFPV-016	037L A 002.01	1		None	Individual	House
KIFPV-017	037L A 002.02	1		None	Individual	House
KIFPV-018	037L A 002.04	1		None	Individual	House

Table H.9-5 – Parcels Identified for Water Use Survey
Kingston Fossil Plant

Exhibit H.9-3 Map Label	Parcel ID	Owner	Parcel Address	Potential Private Wells/Springs Identified
1	04600 000 2019	TENNESSEE VALLEY AUTHORITY	SWAN POND RD 714	No

Table H.9-6 - Summary of Surveys Completed
Water Supply Well Survey
Kingston Fossil Plant

Exhibit H.9-3 Map Label	Parcel ID	Owner	Parcel Address	Owner Mailing Address				Dwelling Building (YES/NO)	Comments	Status
1	037 046.00	TENNESSEE VALLEY AUTHORITY	SWAN POND ROAD 714	714 Swan Pond Road	HARRIMAN	TN	37748	Yes	TVA owned property; no wells or springs reported as present	survey complete

EXHIBITS

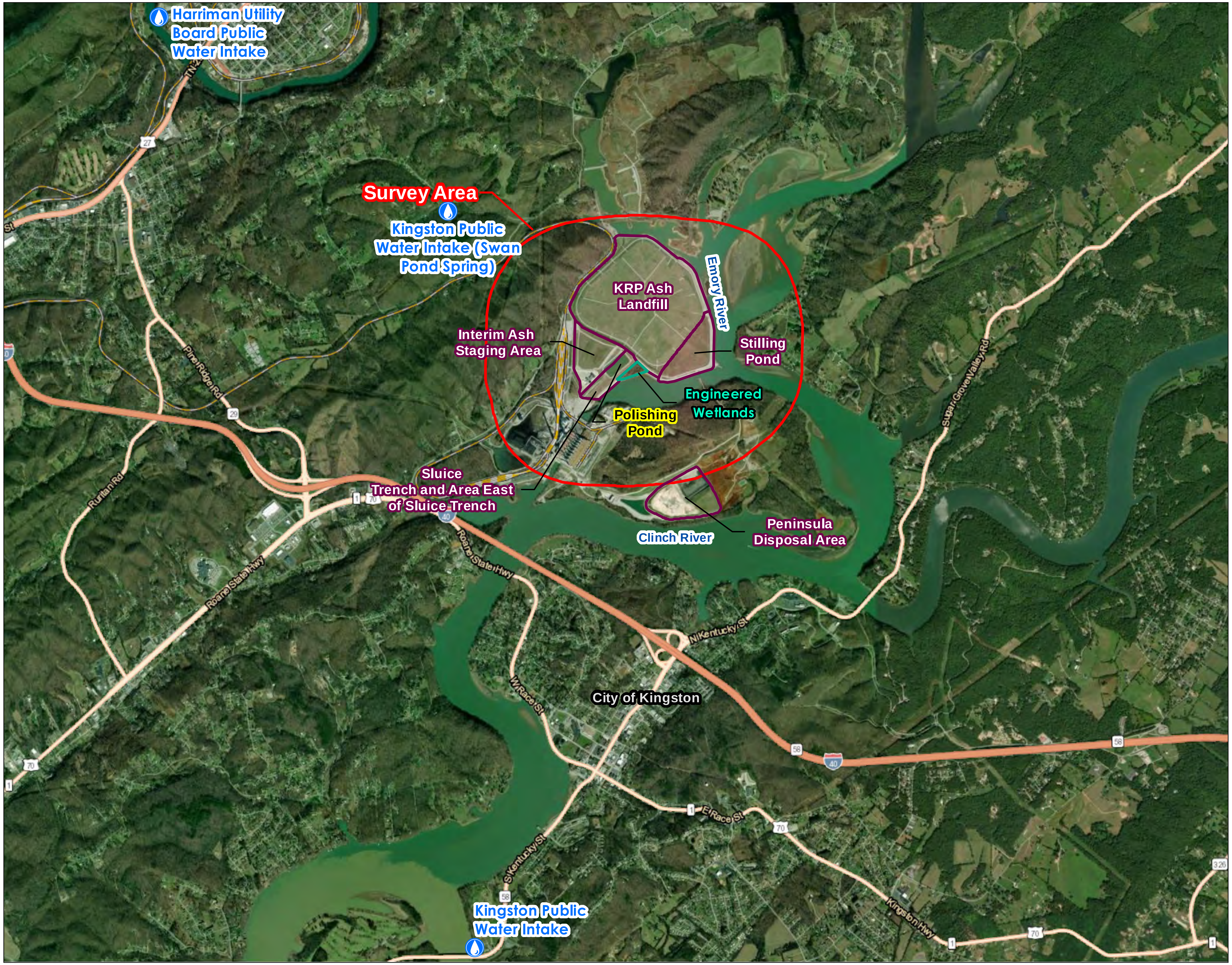


Exhibit No.

H.9-1

Title

Survey Area

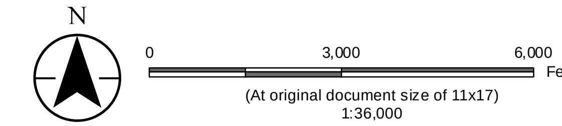
Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil Plant

Project Location

Roane County, Tennessee

Prepared by DMB on 2023-10-19
TR by CH on 2023-10-19
IR Review by SG on 2023-10-19



(At original document size of 11x17)
1:36,000

Legend

- Public Water Intake
- Major Highways
- Highways
- Major Roads
- Railroad
- Survey Area (1/2 Mile)
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

CCR = Coal Combustion Residuals

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Background: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec TVA

U:\TVA-EIP\175668043_KIF_Phase2\gis\mxd\EAR\KIF_EAR_H.9_1_KIF_Wateruse_Survey.mxd Revised: 2023-10-19 By: mbough

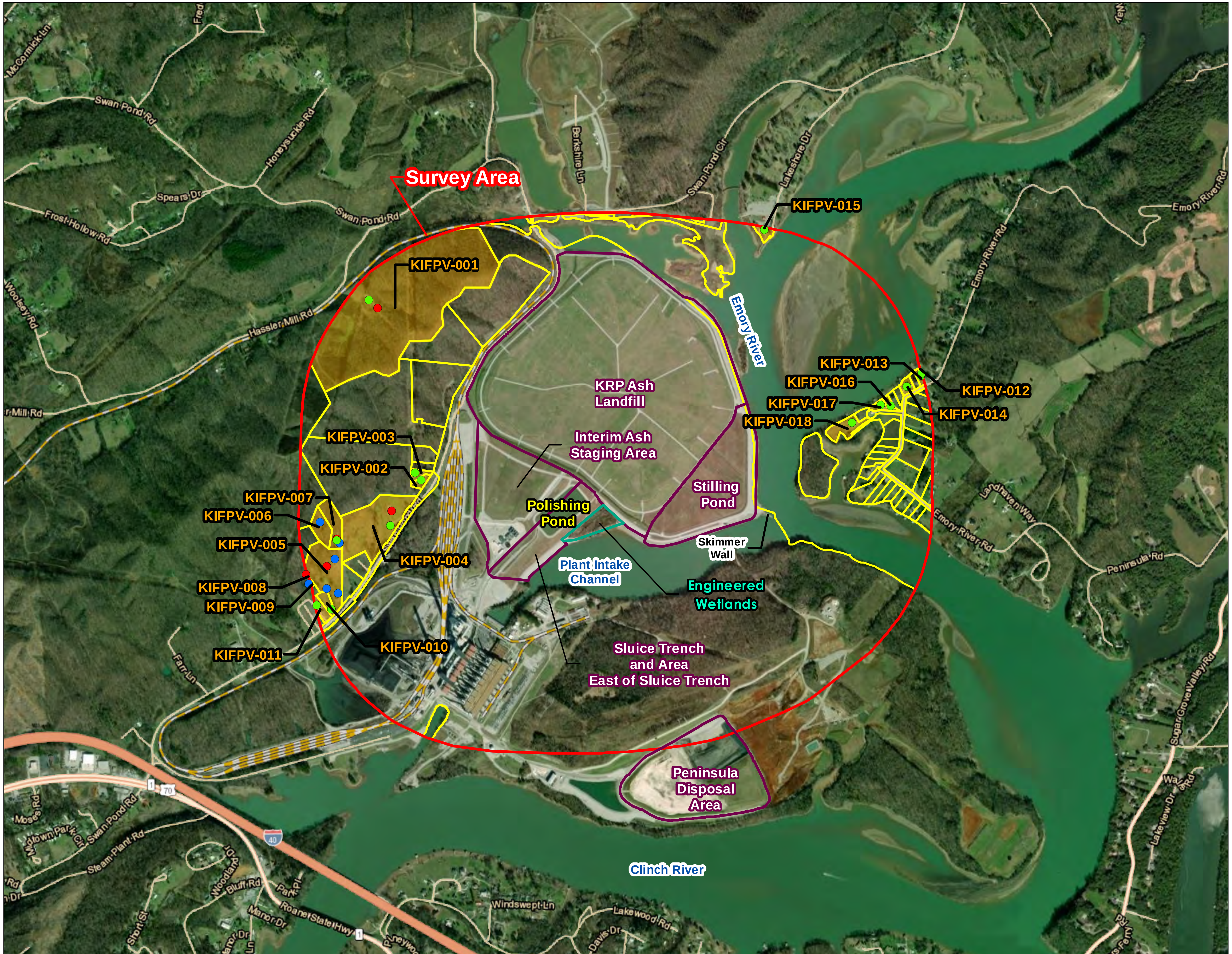


Exhibit No.

H.9-2

Title

Parcels in Survey Area with Potential Wells or Springs

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil Plant

Project Location

Roane County, Tennessee

Prepared by LB on 2023-10-19
Technical Review by CHH on 2023-10-19
Internal Review by CF on 2023-10-19

N

0 1,500 3,000 Feet

(At original document size of 11x17)
1:18,000

Legend

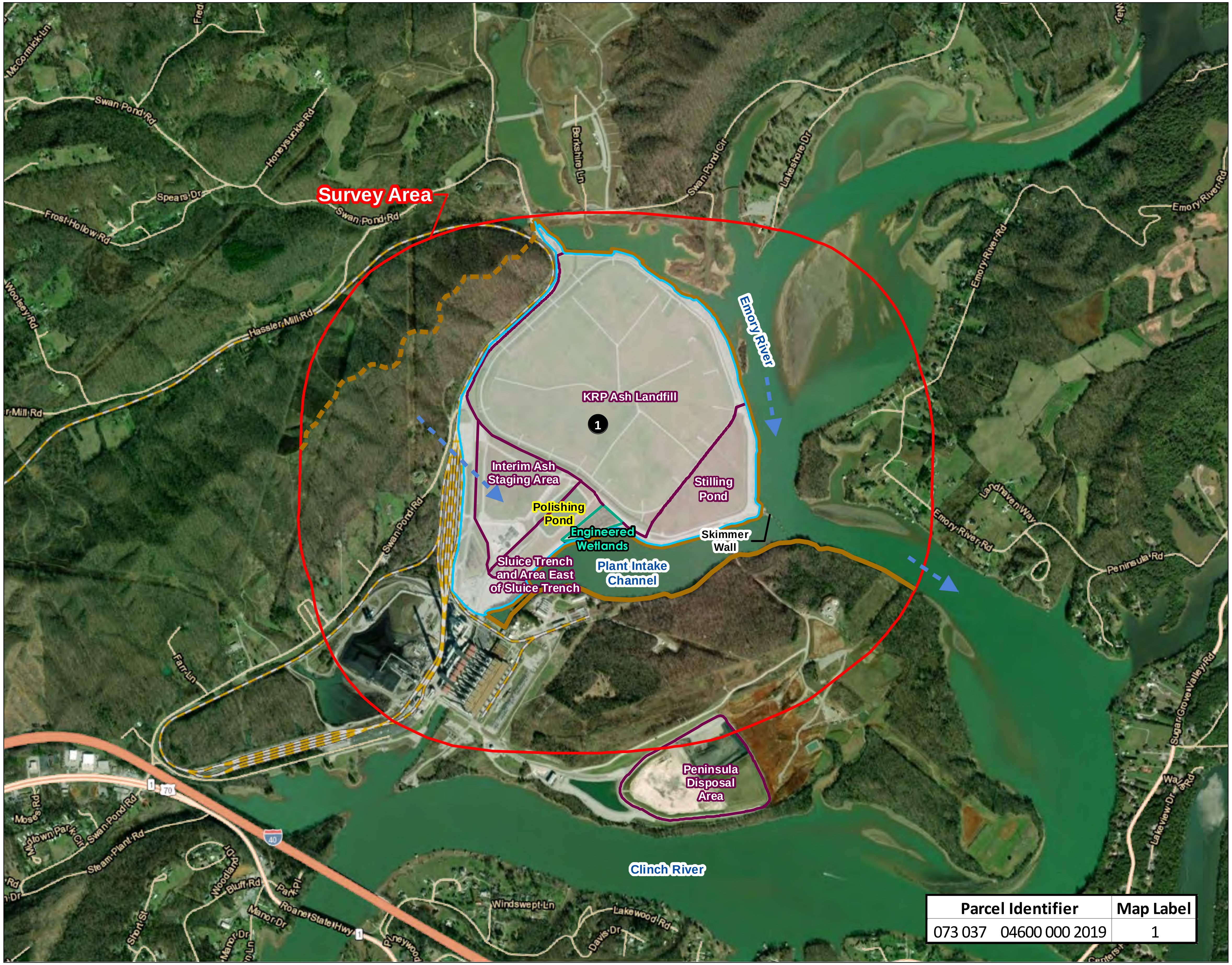
- Potential Well Location (recent or current building present and private/individual water source in County parcel records)
- Historical Report Potable Well Locations
- TDEC Well Logs
- Major Highways
- Highways/Major Roads
- Local Streets
- Railroad
- Survey Area (1/2 Mile)
- Parcels with Potential Wells and or Springs
- Parcel Boundary
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)

KIFPV-### Assigned ID for Parcel with Potential Well and/or Spring

CCR = Coal Combustion Residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Background: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
3. Parcel boundaries obtained from Roane County Tennessee PVA March 2019.
4. Only parcel boundaries within the Survey Area are shown in yellow. Parcel boundaries may extend beyond the limits of the Survey Area.



Parcel Identifier	Map Label
073 037 04600 000 2019	1

Exhibit No.

H.9-3

Title

Parcels in Area of Interest and Hydrogeologically Downgradient of KIF Plant TDEC Order CCR Management Units

Client/Project 175668043

Tennessee Valley Authority
Kingston Fossil Plant

Project Location

Roane County, Tennessee

Prepared by LB on 2023-09-18
Technical Review by CHH on 2023-09-18
Internal Review by CF on 2023-09-18

N

0 1,500 3,000 Feet

(At original document size of 11x17)
1:18,000

Legend

- Hydrogeological Divide
- Surface stream that bounds groundwater flow
- General Groundwater/Surface Water Flow Direction
- Major Highways
- Highways/Major Roads
- Local Streets
- Railroad
- Survey Area (1/2 mile)
- Water Use Survey Area of Interest
- CCR Unit Area (Approximate)
- Engineered Wetlands Area (Approximate)
- # Parcel Identifier

CCR = Coal Combustion Residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Background: Esri, HERE, Garmin, (c) OpenStreetMap contributors
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

TVA

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ATTACHMENT H.9-A - POSTCARDS

Tennessee Valley Authority
c/o Stantec Consulting Services Inc.
601 Grassmere Park, Suite 22
Nashville, Tennessee 37211

As the legal owner of the parcel # 04600 000 2019 (714 Swan Pond Road), TVA is requesting your assistance answering the following questions:

1. Are you currently receiving drinking water from Kingston Water Department?
   (circle one) **YES** **NO**
2. Does a private water supply well and/or spring exist on your parcel?
   (circle one) **YES** **NO**
3. If you answered YES to 2., is the water supply well or spring for any of the following uses:
   ☐ Drinking Water ☐ Irrigation ☐ Water for Livestock
   ☐ Other ______

Form completed by (signature): Jeff Kickert

Form completed by (printed name): Jeff Kickert

Date signed: 2/12/2024

Contact Telephone Number: 865-171-2157

Contact Email: amdennison@tva.gov

Owner's Mailing Address: 714 Swan Pond Road Harriman, TN 37748

If you have any questions, please contact us at **tvainfo@tva.gov**.
For more information, go to **tva.gov/watersurvey**.