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
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

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Sign-off Sheet

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Prepared by ______________________________

Mark Densmore, Senior Geologist

Reviewed by ______________________________

Matt Dagon, PG, Principal

Approved by ______________________________

John Griggs, PG, Senior Principal

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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
ERI	Electrical Resistivity Imaging
GSL	Groundwater Screening Level
IP	Induced Polarization
JSF Plant	John Sevier 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

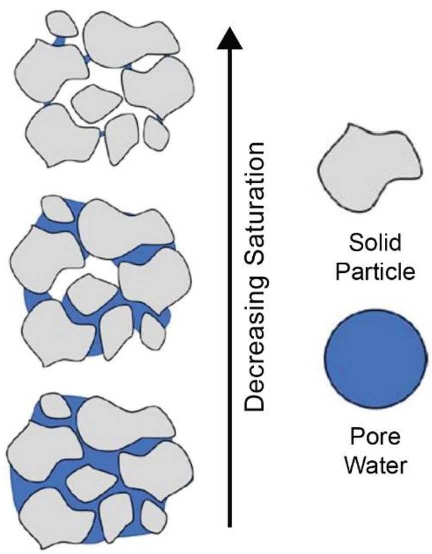
Stantec Consulting Services Inc. (Stantec), on behalf of the Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical and recent evaluations of hydrogeological and analytical results for groundwater and geochemical data at TVA's John Sevier Fossil Plant (JSF Plant) in Rogersville, 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 references 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 water 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 provide information about the direction of groundwater movement.

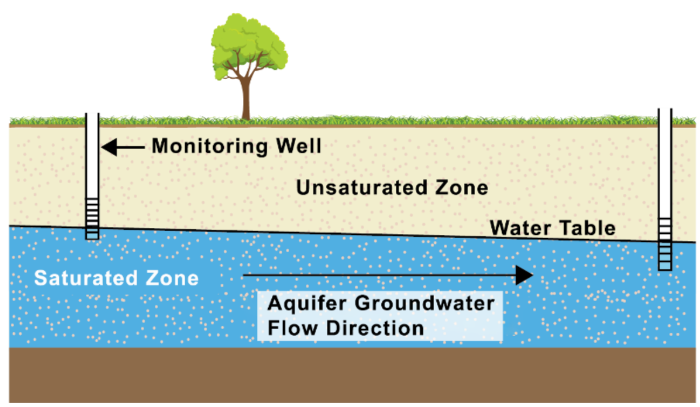
Pore Water



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 four CCR management units at the JSF Plant, including the Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J, and Highway 70 Borrow Area. 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 JSF Plant 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 JSF Plant and provide usable information related to geology, hydrogeology, groundwater quality, and CCR material characteristics. No previous studies of the geochemical interaction of geological materials, groundwater or pore water are known to have been conducted. 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. Each of the CCR management units was closed in accordance with applicable regulations in effect at the time of closure.

Exploratory drilling at the JSF Plant began in 1952 to evaluate the suitability for the foundation for a proposed power plant. Three geologic formations were described: alluvial deposits, older terrace deposits, and the Athens shale (TVA 1952). The bedrock was later determined to be the Sevier shale (Rodgers 1953).

The results of four subsurface explorations between 1986 and 1994 are presented in the *Report of Hydrogeologic and Engineering Evaluation* (Law 1994) to characterize hydrogeologic conditions at the Dry Fly Ash Stack. The 1994 Law study included map and literature research, site reconnaissance, and geotechnical exploration. The geotechnical exploration advanced 16 borings, including installation of ten piezometers and two wells. Borings were terminated on auger refusal. Analysis included soil sampling, penetrometer testing, water level gauging, slug testing, and pumping tests.

A hydrogeologic assessment of Ash Disposal Area J was conducted in 1992. This assessment involved map and literature research, site reconnaissance, and evaluation of existing geotechnical explorations to support development of a future closure plan for the inactive facility (Law 1992). In 1995, TDEC approved a Closure/Post-Closure Plan (Non-Registered Site No. 37-104-0062) for Ash Disposal Area J which included a requirement for semiannual groundwater monitoring. Groundwater was analyzed for inorganic constituents listed in Appendix I of Tennessee Solid Waste Regulations (TN regulations 1200-1-7-.04-51)

(TVA 2002). Groundwater monitoring at Ash Disposal Area J was discontinued in 2003 following TDEC approval that TVA had completed all of the requirements in the Post-Closure Plan (TDEC 2003).

In 2007, an investigation was conducted to evaluate the suitability of a proposed CCR landfill facility in terms of the hydrogeologic characteristics of the JSF Plant. Preliminary investigations were intended to evaluate general subsurface conditions and soil characteristics as a basis for design of a comprehensive geotechnical drilling and testing program and establish the seasonal high-water table and background groundwater quality near the proposed facility. Drilling investigations consisted of 11 soil test borings, installation of four temporary piezometers located within the footprint of the proposed landfill, and construction of five permanent monitoring wells around the perimeter of the proposed facility. Preliminary site investigations are reported in the *Report of Geotechnical Soil Sampling and Monitoring Well Installation - Hydrogeologic Exploration - Proposed Gypsum Stack – TVA John Sevier Fossil Plant* (MACTEC 2007a). Additional geotechnical drilling at the proposed facility was subsequently conducted in 2009 and consisted of a total of 71 soil test borings, one additional temporary piezometer within the proposed landfill footprint, and two additional piezometers in the footprint of a proposed sedimentation pond (MACTEC 2007b). The landfill was not constructed.

In 2015, activities were conducted including the installation of new groundwater monitoring wells, the closure of unnecessary wells, and the redevelopment of existing wells to update the groundwater monitoring systems for the CCR management units. The field work included installation of a total of five new monitoring wells, five soil borings to evaluate subsurface conditions adjacent to existing wells W-28 through W-32, closure of seven monitoring wells, and the redevelopment of ten existing wells as part of the monitoring system. Additionally, surface completions at existing wells were upgraded and new dedicated pumps were installed in wells to be sampled (Stantec 2016).

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. Six monitoring wells were installed. Well construction diagrams are included in Appendix C.1. 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/john-sevier/surface-impoundment---bottom-ash-pond-documents.

In 2018, TVA included historical information in Appendix G 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 G and included groundwater elevations and chemical and physical parameters.

2.2 CURRENT AND ONGOING GROUNDWATER MONITORING

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

- **CCR Rule Monitoring Program**: Monitoring at the Bottom Ash Pond is conducted per the CCR Rule. In accordance with the CCR Rule, TVA established a certified groundwater monitoring system. Baseline sampling, detection monitoring, and assessment monitoring phases were implemented from 2019 to 2022. 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 Bottom Ash Pond and determined that constituents detected at onsite downgradient monitoring wells had statistically significant increases over site-specific background levels (Stantec 2020). Based on the statistical evaluation, no Appendix IV CCR constituents were detected at statistically significant levels above CCR Rule groundwater protection standards; therefore, the Bottom Ash Pond remains in CCR Rule assessment monitoring. TVA will continue to produce Annual Groundwater Monitoring and Corrective Action Reports to document groundwater analytical results from continued groundwater assessment monitoring.

- **TDEC Permitted Landfill Monitoring Program:** From 1998 to 2022, TVA has conducted quarterly or semiannual assessment monitoring at the Dry Fly Ash Stack under Solid Waste Disposal Permit No. IDL 37-0097. The sampling has been conducted in accordance with Section VIII Groundwater Monitoring of the Operations Manual and updates for the Dry Fly Ash Stack (TVA 2008), and the Groundwater Quality Assessment Plan (TVA 2019). 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 JSF Plant 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 and installing permanent wells at ten planned locations, collecting soil samples from the screened interval of two proposed background well locations, completing downhole geophysical testing, obtaining saturated zone hydraulic conductivity data, and conducting six groundwater sampling events. 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 CCR management units. The groundwater and soil samples were analyzed for the CCR-related constituents listed in Appendices III and IV of the CCR Rule, except soil samples were not analyzed for total dissolved solids. In addition, five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the CCR Rule Appendices III and IV were analyzed to maintain continuity with the TDEC compliance 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 are hereafter referred to as CCR Parameters. For geochemical evaluation, groundwater samples were analyzed for major cations/anions not included in the CCR Parameters. The additional geochemical parameters included bicarbonate, carbonate, magnesium, potassium, and sodium. 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 January 22 and November 4, 2019, and consisted of hollow stem auger drilling in unconsolidated materials, HQ-3 wireline with split barrel and surface set bit or air rotary drilling techniques in bedrock, pressure testing and 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 of four background monitoring wells, JSF-106 (upgradient of Ash Disposal Area J) and JSF-110 (upgradient of the Highway 70 Borrow Area), were installed in unconsolidated materials. Background monitoring wells JSF-206 and JSF-210 located upgradient of the Highway 70 Borrow Area, were installed in bedrock. These background wells were installed to provide groundwater samples that have not been affected by the CCR management units and to be representative of background conditions. Borehole geophysical logging of JSF-206 identified two water bearing intervals in the upper bedrock. JSF-206 was installed in the upper interval, and JSF-210 was installed in the lower one to evaluate if the two intervals had different groundwater chemistry. Soil samples were collected from the screened intervals of each of the well borings for background wells completed in unconsolidated materials (JSF-106 and JSF-110) for analysis of CCR Parameters *Investigation SAR* (Appendix F.1).

Three permanent monitoring wells (JSF-107, JSF-108 and JSF-109) were installed in unconsolidated materials at locations downgradient of Ash Disposal Area J to provide locations to evaluate groundwater flow and quality in these areas. As shown in Table H.1-1, groundwater was not observed in the unconsolidated materials at the three proposed locations (JSF-111, JSF-112 and JSF-113) downgradient of the Highway 70 Borrow Area. Temporary piezometers were installed at each location and monitored for approximately one month to evaluate if groundwater was present in the unconsolidated materials. Based on the finding that sufficient amounts of groundwater did not exist within the unconsolidated materials, two borings (JSF-206 and JSF-207) were installed into bedrock. Rock coring and downhole geophysical testing were conducted to characterize bedrock at these two borings locations. The rock core data and the geophysical well logging were used to determine the screen intervals for three bedrock monitoring wells (JSF-207, JSF-208 and JSF-209) that were installed to provide downgradient sampling locations for the Highway 70 Borrow Area. Wells JSF-207 (boring JSF-207) and JSF-210 (boring JSF-206) were installed in the borings used to characterize bedrock.

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 selected based on the results of the boring log and the target stratum and was either five or 10 feet in length. Well construction details are included in the *Hydrogeological Investigation SAR.* Table H.1-2 shows the well construction summary for wells JSF-106 through JSF-110, JSF-206 through JSF-210, and other previously existing wells shown on Exhibit H.1-1.

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.4 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 exploratory drilling field program discussed in the *Hydrogeological Investigation SAR* (Appendix H.2), Stantec performed pressure testing to estimate hydraulic conductivity of upper bedrock in two bedrock borings (JSF-206 and JSF-207) at depths ranging from 1.8 to 39.4 feet below the bedrock contact (19.0 to 56.7 feet below ground surface). The bedrock was tested by isolating interval lengths of between 5 to 11 feet in 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 results ranged from 6.4 x 10^{-5} centimeters per second (cm/sec) to 3.4 x 10^{-4} cm/sec. The geometric mean of the hydraulic conductivities is 1.6 x 10^{-4} 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 ten permanent wells (wells JSF-106 through JSF-110 and JSF-206 through JSF-210) to estimate the hydraulic conductivity of the unconsolidated and bedrock geologic materials within the screen 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 or bedrock in the screened interval of each tested monitoring well. Calculated hydraulic conductivities are summarized in Table B.5 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 10 EI permanent wells, listed above, ranged from 8.6 x 10^{-6} cm/sec to 2.9 x 10^{-3} cm/sec in wells screened in unconsolidated materials, and from 1.4 x 10^{-5} cm/sec to 1.5 x 10^{-3} cm/sec in wells screened in bedrock.

A summary of the EI slug test results combined with the results of slug tests conducted in monitoring wells from other groundwater programs is provided in Table H.1-4. The hydraulic conductivity results presented in Table H.1-4 are grouped by CCR management unit and by unconsolidated materials and bedrock. The range of the geometric means of the hydraulic conductivities measured in wells screened in unconsolidated materials listed in Table H.1-4 is 5.9 x 10^{-5} cm/sec to 2.9 x 10^{-3} cm/sec. The range of the geometric means for wells screened in bedrock is 3.0 x 10^{-4} cm/sec to 1.1 x 10^{-3} cm/sec.

2.3.6 Groundwater Sampling

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

- Event 1 – August 12-15, 2019
- Event 2 – October 8-10, 2019
- Event 3 – December 3-5, 2019
- Event 4 – February 4-7, 2020
- Event 5 – April 7-9, 2020
- Event 6 – June 9-11, 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 Hydrogeological Assessment Results

Several soil boring and well installation projects at and in the vicinity of the JSF Plant CCR management units yielded information about the geology, hydrogeological properties of the geologic formations, groundwater elevations, groundwater flow direction, and groundwater quality. This section provides an evaluation of the hydrogeological setting of JSF Plant CCR management units.

2.3.7.1 Well Construction and Presence of CCR Material

Based on descriptions of encountered materials on a log for a boring drilled near well W-28, which is part of the groundwater monitoring system for the Dry Fly Ash Stack, the boring for well W-28 may have been advanced through CCR material above the well screen interval. While the screened interval of this monitoring well is not within the CCR material, CCR material near the boring in which well W-28 was installed creates uncertainty about the representativeness of groundwater samples collected from well W-28. This may lead to a re-evaluation of the groundwater monitoring system for compliance with the TDEC permitted landfill groundwater monitoring program. Consequently, a review of boring logs and additional polarized light microscopy (PLM) testing was conducted for monitoring wells that had reported concentrations of CCR constituents above the TDEC-approved groundwater screening levels (GSLs). PLM is a laboratory method used to identify the potential presence of ash on a percentage basis. The PLM investigation was conducted from September to October 2021 and consisted of drilling four borings near well W-28. The results indicated that the presence of ash was non-detect to 3%. This indicates that minimal, if any, CCR material is present at these boring locations. 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 JSF Plant. This section provides a discussion of the site-specific geology and lithology of the JSF Plant. 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 JSF Plant.

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 that are deposited by moving water. In the floodplain of the Holston River, there is fine-grained alluvium made up of mostly clay and silt. This surficial unit is underlain by coarser- grained sand and gravel lenses in some areas. The coarser-grained materials are not laterally continuous. The overall thickness of alluvium and residuum (collectively, unconsolidated materials) ranges from zero to approximately 25 feet. Exhibits H.1-3 and H.1-4 show three-dimensional representations of the extent of the unconsolidated materials consisting primarily of clay and silt, and primarily sand and gravel respectively.

The Sevier shale, which consists of shale with interbedded limestone, siltstone, and sandstone, underlies the residuum (TVA 1952). Exhibit H.1-5 is a geologic map of the JSF Plant. The shale bedrock surface elevation slopes to the northwest across the plant and ranges in elevation from approximately 1050 to 1200 feet above mean sea level. The Sevier shale is described in previous reports (Law 1994) and on logs for more recent borings drilled into bedrock near the Bottom Ash Pond and Highway 70 Borrow Area as consisting of a few feet of weathered shale transitioning to a competent, massively bedded shale. The shale is fractured, but many of the fractures have been filled with calcite. The rock quality designation, which is a measure of the degree of fracturing, ranged from 42 to 99 percent. A higher percentage means that the rock has few fractures. Exhibit H.1-6 shows a three-dimensional representation of the bedrock surface.

Rock coring and geophysical testing were conducted in five borings drilled into the Sevier shale. Three of the borings (JSF-200, JSF-201 and JSF-202) were previously drilled adjacent to the Bottom Ash Pond to depths ranging between approximately 147 and 152 feet below ground surface. Two of the borings (JSF-206 and JSF-207) adjacent to the Highway 70 Borrow Area were drilled as part of the EI. The geophysical testing provided information about the strike and dip of the bedrock bedding planes and fracture sets. In the borings drilled near the Bottom Ash Pond, the mean strike of the bedding planes is to the east-northeast, and the dip is to the southeast at approximately 29 degrees. A fracture set was identified with approximately the same strike and dip as the bedding planes. A second fracture set was identified with a similar strike, but a dip of approximately 50 degrees to the northwest. Voids or karst features, which would not be expected in a shale, were not observed. The geophysical testing also provided information about open fractures that could transmit groundwater. Under pumping conditions, fractures below approximately 70 feet below ground surface produced little water. The top 25 feet of bedrock produced water in each boring. This interval was the target for monitoring wells installed in bedrock around the Bottom Ash Pond. The geophysical testing report by ARM Geophysics, dated 2018, is provided in Attachment H.1-B.

In the borings drilled near the Highway 70 Borrow Area, the mean strike of the bedding planes is to the east-northeast, and the dip is to the southeast at approximately 44 degrees. A fracture set was identified with approximately the same strike and dip as the bedding planes. A second fracture set was identified with a similar strike, but a dip of approximately 45 degrees to the northwest. Voids or karst features, which would not be expected in a shale, were not observed. The geophysical testing also provided information about open fractures that could transmit groundwater. Under pumping conditions, the top 25 feet of bedrock produced water in each boring. This interval was the target for monitoring wells installed in bedrock around the Highway 70 Borrow Area. The geophysical testing report by ARM Geophysics, dated 2019, is provided in Appendix H.2.

Exhibit D-1 in Appendix D of the EAR shows the locations of transects for cross sections through each CCR management unit. Exhibits D-2 through D-5 in Appendix D of the EAR provide the cross sections and illustrate the geology encountered in borings completed at the JSF Plant.

2.3.7.3 Hydrostratigraphic Units and the Uppermost Aquifer

Hydrostratigraphic units are geological formations that are defined to characterize the hydrogeology of the JSF 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. The more permeable geological formations capable of yielding useable quantities of groundwater are called aquifers. Aquifers are targeted for development as water sources by property owners. The 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 CCR management units, the coarse-grained unconsolidated materials and upper bedrock shown on Exhibit D-2 in Appendix D of the EAR are hydraulically connected and defined as the uppermost aquifer, which is 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 hydrostratigraphic units to support the evaluations.

2.3.7.4 Groundwater Flow

This section provides a discussion of how groundwater flows at the JSF 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.1-7 shows the physiographic setting of the JSF Plant within the floodplain of the Holston River. The key characteristic of the setting is that the plant is situated in a low-lying area along the Holston River with higher elevation ridges to the south of the plant. Physiographic features that affect groundwater flow in the vicinity of the JSF Plant include the Holston River to the north, Polly Branch between the CCR management units, Dodson Creek to the west, and ridges that form watershed boundaries to the south (Exhibit H.1-8). Groundwater in the vicinity of the JSF Plant flows from the ridges south of the plant to the north toward the Holston River. This limits the potential for effects of CCR management to move to the south of the plant or to the north past the Holston River by the flow of groundwater.

Groundwater levels in the uppermost aquifer were measured in 31 wells and used for groundwater elevation contour map development. Sixteen of these wells were installed in unconsolidated materials, and 15 were installed in bedrock. Groundwater level measurements were also obtained from 17 piezometers installed for other programs. Nine of these piezometers were installed in foundation soils, and eight were installed in foundation soils and bedrock. Surface water level measurements for the Holston 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 Holston River level and elevation data from Event #4 in February 2020. Table H.1-6 provides elevation data from the Groundwater Investigation. Exhibit H.1-8 provides a representative groundwater elevation contour map for unconsolidated materials for the February 2020 event. Exhibit H.1-9 provides a representative groundwater elevation contour map for bedrock for Event #4 in February 2020. Groundwater elevation contour maps for other sampling events can be found in Appendices H.3, H.4, H.5, H.7 and H.8.

At the JSF Plant, groundwater levels were measured within the unconsolidated materials and upper bedrock. The measured groundwater levels showed that the elevation of groundwater in the unconsolidated materials and upper bedrock was similar, and both geologic units had similar horizontal flow directions. Generally, the horizontal groundwater flow direction for both the unconsolidated materials and upper bedrock was to the north-northwest or northwest toward the Holston River or, near Dodson Creek, to the west toward Dodson Creek. Groundwater flow in the unconsolidated materials and upper bedrock is bounded to the north by the Holston River and to the west by Dodson Creek. Exhibit H.1-8 from groundwater sampling Event #4 in February 2020 is a representative groundwater contour map for the unconsolidated materials. Exhibit H.1-9 from groundwater sampling Event #4 is a representative groundwater contour map for upper bedrock.

The potential for vertical groundwater flow was estimated by calculating vertical hydraulic gradients between the bedrock and overlying unconsolidated material where two wells were installed in the vicinity of each other. Five locations have paired wells. One pair (JSF-110 and JSF-206) was located upgradient and east of the Highway 70 Borrow Area and south of the western portion of the Bottom Ash Pond. One well pair (JSF-104 and JSF-200) was located south of the eastern portion of the Bottom Ash Pond and two well pairs (10-36 and JSF-202, and JSF-105 and JSF-201) were located north of the Bottom Ash Pond and south of the Dry Fly Ash Stack. One pair (JSF-106 and MW-4) was located upgradient of Ash Disposal Area J. Table H.1-7 provides a summary of vertical gradient calculations for groundwater sampling Events #3 through #6. Most bedrock wells were not gauged during sampling Events #1 and #2.

Results of the vertical hydraulic gradient analysis indicated downward vertical gradients from the unconsolidated materials to bedrock at each well pair location. The largest vertical gradients were observed directly east of the Highway 70 Borrow Area at upgradient well pair location JSF-110 and JSF-206 (0.1046 feet/foot to 0.1840 feet/foot). Lower vertical gradients (0.004695 feet/foot to 0.1037 feet/foot) were observed at the other four well pair locations (see Table H.1-7).

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 Bottom Ash Pond (for unconsolidated materials and bedrock), Ash Disposal Area J (for unconsolidated materials), and the Highway 70 Borrow Area (for bedrock). The Bottom Ash Pond hydraulic conductivity in the unconsolidated materials and upper bedrock is taken from the *Annual Groundwater Monitoring Report JSF Bottom Ash Pond* (Stantec 2021). The hydraulic conductivity for the Dry Fly Ash Stack is taken from the *John Sevier Fossil Plant, Dry Fly Ash Landfill Groundwater Assessment Monitoring Report, July 2021 Sampling Event* (TVA 2021). 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.1-8 provides a summary of the information used to estimate the average horizontal flow rate and the results of the calculations for each groundwater sampling event.

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

- Geometric mean of hydraulic conductivity of 3.5×10^{-4} cm/sec
- Average horizontal hydraulic gradient ranging from 0.013 feet/foot (Event #4) to 0.015 feet/foot (Events #1 and #2)
- Effective porosity of 10%. The reference for the effective porosity of the unconsolidated material uses specific yield as a proxy for effective porosity of unconsolidated material (Johnson, A.I. Revised 1966, page D18).

The average groundwater flow rate for the unconsolidated deposits at the Bottom Ash Pond ranged from 47 feet/year (Event #4) to 54 feet/year (Events #1 and #2). 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 bedrock at the Bottom Ash Pond, values used to calculate groundwater flow rates follow:

- Geometric mean of hydraulic conductivity of 1.1×10^{-3} cm/sec
- Average horizontal hydraulic gradient ranging from 0.019 feet/foot (Event #6) to 0.020 (Events #3, #4, and #5)
- Effective porosities ranging from 0.5% to 5.0% (Domenico and Schwartz 1990, page 26).

The average groundwater flow rate for the bedrock at the Bottom Ash Pond ranged from 432 feet/year (Event #6) to 455 feet/year (Events #3, #4, and #5) (5.0 % effective porosity) or 4,325 feet/year (Event #6) to 4,552 feet/year (Events #3, #4, and #5) (0.5% effective porosity).

For unconsolidated materials at the Dry Fly Ash Stack, values used to calculate groundwater flow rates follow:

- Hydraulic conductivity of 7.00 x 10^{-6} cm/sec
- Average horizontal hydraulic gradient ranging from 0.019 feet/foot (Event #2) to 0.022 feet/foot (Events #4 and #5)
- Effective porosity of 10% (Johnson, A.I. Revised 1966, page D18).

The average groundwater flow rate for the unconsolidated deposits at the Dry Fly Ash Stack ranged from 1.4 feet/year (Events #1, #2, and #6) to 1.6 feet/year (Events #4 and #5).

For unconsolidated materials at Ash Disposal Area J, values used to calculate groundwater flow rates follow:

- Geometric mean of hydraulic conductivity of 5.9 x 10^{-5} cm/sec
- Average horizontal hydraulic gradient ranging from 0.026 feet/foot (Event #6) to 0.047 feet/foot (Event #5)
- Effective porosity of 10% (Johnson, A.I. Revised 1966, page D18).

The average groundwater flow rate for the unconsolidated deposits at Ash Disposal Area J ranged from 16 feet/year (Event #6) to 29 feet/year (Event #5).

For bedrock at the Highway 70 Borrow Area, values used to calculate groundwater flow rates follow:

- Geometric mean of hydraulic conductivity of 3.0 x 10^{-4} cm/sec
- Average horizontal hydraulic gradient ranging from 0.063 feet/foot (Event #2) to 0.071 feet/foot (Events #5 and #6)
- Effective porosities ranging from 0.5% to 5.0% (Domenico and Schwartz 1990, page 26).

The average groundwater flow rate for the bedrock at the Highway 70 Borrow Area ranged from 391 feet/year (Event #2) to 441 feet/year (Events #5 and #6) (5.0% effective porosity) or 3,911 feet/year (Event #2) to 4,408 feet/year (Events #5 and #6) (0.5% effective porosity).

2.3.7.5 Analysis of Groundwater Elevation Data Along Southern Plant Boundary

Groundwater elevation data collected between February 2020 and August 2021 from monitoring well JSF-103, screened in unconsolidated materials, and bedrock monitoring wells JSF-200 through JSF-210 were reviewed to assess potential hydraulic gradient reversals near the southern JSF Plant boundary. Wells JSF-200, JSF-205, JSF-206 and JSF-210 are upgradient and situated near the southern boundary of the JSF Plant. Wells JSF-103, JSF-201, JSF-202, JSF-203, JSF-204, JSF-207, JSF-208 and JSF-209 are located to the north and downgradient of the Bottom Ash Pond and the Highway 70 Borrow Area. During this time, groundwater elevations were higher in the more southern wells indicating a consistent groundwater flow direction from the southern boundary of JSF Plant to the north toward the Holston River during the study period. This indicates that potable water wells screened in unconsolidated materials or bedrock located south and upgradient of the CCR management units would not be impacted by groundwater associated with the JSF Plant CCR management units based on the current groundwater flow patterns.

2.3.7.6 Groundwater/Surface Water/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 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.1-10a shows locations of wells and piezometers that are automated to record pore water and groundwater elevations. Exhibit H.10b-1 shows the locations of wells and piezometers used to manually gauge groundwater and pore water elevations. Exhibits H.1-11a and H.1-11b provide hydrographs of the Holston River, groundwater, and pore water elevations for automated piezometers and manually gauged piezometers and wells, respectively, for the Dry Fly Ash Stack. Exhibits H.1-12a and H.1-12b provide hydrographs of the Holston River, groundwater, and pore water elevations for automated piezometers and manually gauged piezometers and wells, respectively, for the Bottom Ash Pond. Exhibits H.1-13a and H.1-13b provide hydrographs of the Holston River, groundwater, and pore water elevations for automated piezometers and manually gauged piezometers and wells, respectively, for Ash Disposal Area J. Exhibits H.1-14a and H.1-14b provide hydrographs of the Holston River, groundwater, and pore water elevations for automated piezometers and manually gauged piezometers and wells, respectively, for the Highway 70 Borrow Area. Table H.1-6 provides a comparison of the groundwater elevations at wells and piezometers and the Holston River for the six sampling events. A complete set of hydrographs for available instrumentation is provided in Attachment H.1-C.

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

Within the Dry Fly Ash Stack, there has been a downward trend in the pore water phreatic surface since the geosynthetic cap was installed during the period 2013-2015. The downward trend in pore water levels suggests that the cap is performing as expected and has effectively eliminated infiltration into the CCR material. During the EI, the pore water phreatic surface was near the bottom of the unit (see Exhibits D-2 and D-4). Inferred groundwater elevations were estimated to be below the elevation of the phreatic surface (see Exhibits H.1-8 and H.1-11a). At piezometer JSF-JS-73C, which is installed in the shale beneath the CCR management unit, groundwater levels have dropped to below the base of the CCR management unit. At the upgradient edge of the CCR management unit, the CCR material was generally unsaturated, as shown in Exhibit D-2, and groundwater elevations in monitoring wells located to the south of the Dry Fly Ash Stack were higher than pore water elevations within the CCR management unit. This information indicates that pore water levels were not causing a reversal of the groundwater flow direction along the upgradient edge of this CCR management unit (sometimes referred to as mounding) and groundwater levels are below the base of the CCR management unit.

Within the Bottom Ash Pond, there has been a downward trend in the pore water phreatic surface since the geosynthetic cap was installed in 2016. The downward trend in pore water levels suggests that the cap is performing as expected and has effectively eliminated infiltration into the CCR material. During the

EI, much of the CCR management unit became dry. The phreatic surface was near the bottom of the unit where pore water remains (see Exhibits D-3 and D-5). Many of the piezometers installed within or just below the base of the CCR management unit have become dry (Exhibits H.1-12a and 12b). Inferred groundwater elevations were estimated to be below the elevation of the phreatic surface (see Exhibits H.1-8 and H.1-12a). At piezometer JSF-JS-BA18, which is installed in the shale beneath the CCR management unit, groundwater levels have dropped to the base of the CCR management unit. At the upgradient edge of the CCR management unit, the CCR material was unsaturated, as shown in Exhibit D-3, and groundwater elevations in monitoring wells located to the south of the Bottom Ash Pond were higher or similar pore water elevations within the CCR management unit. This information indicates that pore water levels were not causing a reversal of the groundwater flow direction along the upgradient edge of this CCR management unit and groundwater levels are below the base of the CCR management unit.

Within Ash Disposal Area J during the EI, the pore water phreatic surface was present above the base of the CCR management unit (see Exhibit D-2). Inferred groundwater elevations were estimated to be a few feet below the phreatic surface elevation (see Exhibits H.1-8 and H.1-13a). The higher phreatic surface within this unit also indicates that the low permeabilities of the perimeter dikes and foundation soils impede lateral and vertical flows, respectively, of pore water. The higher elevation of the phreatic surface compared to the groundwater elevations, combined with the fact that the elevation of the base of this CCR management unit is above the surface water elevation in the Holston River, indicates that the continued presence of pore water is caused by precipitation infiltrating into the CCR material. Along the southern boundary, available information is inconclusive regarding whether pore water levels are affecting the direction of groundwater flow; however, groundwater elevations were generally consistent with what would be expected based on observed groundwater flow patterns across the JSF Plant, which suggests that they have not been affected by pore water levels.

Within the Highway 70 Borrow Area during the EI, the pore water phreatic surface was present above the base of the CCR management unit (see Exhibit D-3). Inferred groundwater elevations were estimated to be near or a few feet below the phreatic surface elevation (see Exhibits H.1-8 and H.1-14a). The pore water phreatic surface was at about the same elevation as the groundwater elevations in the background wells located upgradient of this CCR management unit. During some groundwater sampling events, upgradient groundwater elevations were higher than pore water elevations. During other groundwater sampling events, groundwater elevations were lower than pore water elevations. These elevation differences indicate that if a reversal of the groundwater flow direction is ever present, then it is transient.

<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 Holston River, groundwater, pore water, and precipitation.

- **Holston River**: Exhibit H.1-11a shows a hydrograph for the Holston 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 the river. 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 Holston River stage.

- **Dry Fly Ash Stack**: Exhibit H.1-11a shows a comparison of river stage and groundwater level fluctuations at automated monitoring locations near the Dry Fly Ash Stack. The groundwater monitoring locations near the river, and generally within the coarser alluvial materials or upper bedrock, have fluctuation patterns that are similar to the river stage. The groundwater hydrographs for automated locations JSF-PZ-JS23 and JSF-PZ-JS35R, which are installed in upper bedrock, show fluctuation patterns similar to the river stage. The groundwater hydrograph for location JSF-PZ-JS28R, which is installed in clay, shows a muted response to river fluctuations with occasional responses to precipitation events. The groundwater hydrograph for automated location JSF-PZ-JS73C installed beneath the CCR management unit shows a gradual decrease in levels with no obvious fluctuations. The hydrograph for location JSF-PZ-JS42, which is an open standpipe type that extends into coarser alluvial materials, is interpreted to represent groundwater levels. It is located farther from the river and is generally flat with seasonal fluctuations that correlate with other groundwater monitoring locations.

  The groundwater hydrographs for the manually gauged or read instruments show generally stable groundwater elevations, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events (Exhibit H.1-11b).

  Exhibit H.1-11a shows a comparison of river stage and pore water level fluctuations at monitored locations within the Dry Fly Ash Stack. The pore water hydrographs for automated locations JSF-PZ-JS-34C, JSF-PZ-JS52, JSF-PZ73B, and JSF-PZ-JS75B had no apparent correlation between river stage and the pore water level fluctuations. The pore water elevations declined over time, with JSF-PZ-JS73B and JSF-PZ-JS75B dropping below the piezometer tip elevations.

  The pore water hydrographs for the manually gauged or read instruments, JSF-TW01, JSF-TW02, and JSF-TW05, show generally stable pore water elevations and had only small amounts of pore water or were dry (Exhibits H.1-11b).

- **Bottom Ash Pond**: Exhibit H.1-12a shows a comparison of river stage and groundwater level fluctuations at automated monitoring locations near the Bottom Ash Pond. The groundwater hydrographs for automated locations JSF-PZ-BA2 and JSF-PZ-BA8 show fluctuation patterns similar to the river stage, but because of the distance from the river these two piezometers would not be expected to be influenced by the river. This suggests that the fluctuations are related to water levels in Polly Branch or precipitation events. The groundwater hydrograph for automated location JSF-PZ-BA3 shows muted fluctuations on an overall decreasing trend. The groundwater hydrograph for automated location JSF-PZ-BA18 installed beneath the CCR management unit shows a declining elevation over time with no obvious fluctuations.

  The groundwater hydrographs for the manually gauged or read instruments show generally stable groundwater elevations, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events (Exhibit H.1-12b).

Exhibit H.1-12a also shows a comparison of river stage and pore water level fluctuations at monitored locations within the Bottom Ash Pond. The pore water hydrographs for automated locations JSF-PZ-BA16, JSF-PZ-BA17 and JSF-PZ-BA19 had no apparent correlation between river stage or precipitation and the pore water fluctuations. The pore water elevations declined over time before dropping below the piezometer tip elevation.

The pore water hydrographs for the manually gauged or read instruments, JSF-TW07 and JSF-TW08 show generally decreasing trends in pore water elevations. Location JSF-TW06 was dry, and location JSF-TW08 was dry for the last two gauging events (Exhibits H.1-12b).

- **Ash Disposal Area J**: Exhibit H.1-13a shows a comparison of river stage and groundwater level fluctuations at monitored locations near Ash Disposal Area J. The groundwater monitoring locations near the river have fluctuation patterns that are similar to the river stage. The groundwater hydrographs for automated locations JSF-B-08B, JSF-B-09B, and JSF-PZ-JP04 show fluctuation patterns similar to the river stage. The groundwater hydrograph for location JSF-PZ-JP05 shows a muted response to river stage fluctuations. The groundwater hydrograph for automated piezometers JSF-PZ-JP06 and JSF-B-12C, which is installed beneath the CCR management unit, show fluctuations that are correlated with the fluctuations of pore water within the CCR management unit and are different than the river stage fluctuations.

  The groundwater hydrographs for the manually gauged or read instruments show generally stable groundwater elevations, but do not have the resolution to make comparisons to short-term river level fluctuations or precipitation events (Exhibit H.1-13b).

  Exhibit H.1-13a also shows a comparison of river stage and pore water level fluctuations at monitored locations within Ash Disposal Area J. The pore water hydrographs for automated locations JSF-B-12A and JSF-B-12B show pore water level fluctuations that are different than river stage fluctuations. The pore water level fluctuations are variable and might correlate with precipitation events.

  The pore water hydrographs for the manually gauged or read instruments JSF-TW09, JSF-TW10, and JSF-TW11 show fluctuations that have some correlation to precipitation, but do not have the resolution to make comparisons to individual precipitation events (Exhibits H.1-13b).

- **Highway 70 Borrow Area**: Exhibit H.1-14a shows a comparison of river stage and groundwater level fluctuations at monitored locations near Highway 70 Borrow Area J. The groundwater hydrographs for automated locations JSF-B13A and JSF-B16A show fluctuation patterns that are different than the river stage fluctuations.

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

  Exhibit H.1-14b also shows a comparison of river stage and pore water level fluctuations at monitored locations within the Highway 70 Borrow Area. The pore water hydrographs for automated locations JSF-B14A and JSF-B15A show fluctuations that are different than the river stage. The pore water level fluctuations are variable and might correlate with precipitation events.

The pore water hydrograph for the manually gauged or read instrument JSF-TW12 shows fluctuations that are different than the river stage fluctuations. The pore water level fluctuations are variable and might correlate with precipitation events (Exhibit H.1-14b).

In summary, the fluctuations in groundwater levels in the uppermost aquifer near the river are correlated with fluctuations in the Holston River stage. The fluctuations in groundwater levels farther from the river appear to be correlated with precipitation events. Pore water levels in the Dry Fly Ash Stack and Bottom Ash Pond generally show declining trends and have no obvious correlation with river stage fluctuations or precipitation events. The fluctuations in pore water levels in Ash Disposal Area J and the Highway 70 Borrow Area do not correlate with river stage, are variable, and might correlate with some 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 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.1-9 provides the analytical results of groundwater samples used in the statistical evaluation. Table H.1-10 provides a summary of groundwater quality parameters used for the statistical analyses. Table H.1-11 lists the approved GSLs. Table H.1-12 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 May 2016 and August 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. This time period was selected because it coincides with modifications that were made to the monitoring program at the JSF Plant in 2016. Also, only the Dry Fly Ash Stack has groundwater data for sampling events conducted prior to May 2016. Because capping of this CCR management unit was completed in 2016 and the objective of the statistical evaluation is to characterize current conditions, data collected prior to May 2016 were not included in the statistical evaluation. This is consistent with the United States Environmental Protection Agency (USEPA) document "*Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance"* (USEPA 2009).

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 ten groundwater monitoring wells installed for the EI (JSF-106 through JSF-110, and JSF-206 through JSF-210) were sampled during ten events between August 2019 and August 2022 to complete the scope in the approved *Groundwater Investigation SAP* and additional sampling conducted in conjunction with sampling events for the CCR Rule and TDEC permitted landfill monitoring programs. Wells included in the CCR Rule (10-36, W-32, JSF-103, JSF-104, JSF-105, JSF-200, JSF-201, JSF-202, JSF-203, JSF-204, and JSF-205) and TDEC permitted landfill (W-28, W-29, W-30, W-31, W-32, W-1, 10-36, JSF-101, JSF-102, JSF-103, JSF-104, and JSF-105) groundwater monitoring systems and reporting were sampled between May 2016 and August 2022[2] per the required frequencies of those programs (see Table E.3-2 in Appendix E.3).

The statistical evaluation included screening for outliers, which are abnormally high or low values that may represent anomalous data or data errors. There were no outliers removed from further statistical analysis based on this evaluation. Appendix E.3 provides additional information regarding the outlier evaluation and methods used to compare results to the GSLs.

The statistical evaluation identified 17 CCR Rule Appendix III well-constituent pairs with statistically significant concentrations above a GSL or outside the GSL range for pH. These included boron, pH, sulfate, and total dissolved solids. Three well-constituent pairs for the CCR Rule Appendix IV constituents had a statistically significant concentration above a GSL. Lithium (W-31) and molybdenum (JSF-107 and W-31) were the only Appendix IV constituents with statistically significant concentrations above an approved level. No TDEC Appendix I constituents had a statistically significant concentration above a GSL. Table H.1-12 provides a summary of the statistical evaluation. Exhibits H.1-18 and H.1-19 provide the results of the statistical evaluations for CCR Rule Appendix IV and TDEC Appendix I constituents with at least one detection above the GSL. A detailed explanation of the interpretation of the graphs inset on these exhibits 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 20 statistically significant decreasing trends and 5 statistically significant increasing trends. Appendix E.3 provides more information about the trend analysis, and Table H.1-13 provides a summary of the trend evaluation.

As noted in Section 2.4.2, borehole geophysical logging of boring JSF-206 identified two water bearing intervals in the upper bedrock that appeared to potentially have different groundwater chemistry. Monitoring wells JSF-206 and JSF-210 were installed with each well screen located to intercept one of these intervals to evaluate this potential difference. The concentrations of CCR constituents reported in

[2] There were only seven groundwater samples available for JSF-107 between May 2016 and August 2022 because a sufficient amount of water for sampling was not consistently present.

groundwater samples collected from the two monitoring wells, JSF-206 and JSF-210, were similar, though somewhat higher in JSF-210. The major cation and anion concentrations of the two wells plot close together on the Piper diagrams, as discussed in the next section, indicating that the two intervals have similar groundwater quality.

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.1-20, which is considered to be representative of the major ion distribution of the groundwater near the JSF Plant CCR management units over the sampling time period. Piper diagrams for the remaining four events conducted between October 2019 and June 2020 are provided in Attachment H.1-D. Major ion data were not available for the August 2019 sampling event.

The groundwater-type of the background wells was observed to be a calcium-bicarbonate type. Groundwater near the Ash Disposal Area J was generally classified as a calcium-sulfate type to a mixed calcium-bicarbonate type groundwater. Groundwater samples collected from the Highway 70 Borrow Area were generally a calcium-sulfate-bicarbonate type. Major ion chemistry results were not available for other wells near the Dry Fly Ash Stack and Bottom Ash Pond to develop Piper plots for the five groundwater sampling events. Additional information regarding groundwater geochemistry is provided in Section 2.4.2.

2.4.2 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 CCR management units at the JSF 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 JSF 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 JSF 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 JSF Plant to influence groundwater quality will be included in the CARA Plan during assessments of remedies, where needed.

2.4.3 Summary

Downgradient of the CCR management units, two CCR Rule Appendix IV CCR constituents had statistically significant concentrations above a GSL in two wells, including lithium (W-31) and molybdenum (JSF-107 and W-31). No TDEC Appendix I constituents had a statistically significant concentration above a GSL. The groundwater impacts described above are limited to onsite areas downgradient along the perimeter of the CCR management units. These constituents 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 JSF Plant CCR management units. The key findings of the JSF 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	
CCR Management Unit	**Groundwater**
Ash Disposal Area J	Molybdenum (JSF-107)
Bottom Ash Pond	None
Dry Fly Ash Stack	Lithium (W-31) Molybdenum (W-31)
Highway 70 Borrow Area	None

- 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 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 pore water levels reported herein may not represent steady-state conditions. The low permeability of the geosynthetic caps is expected to result in the continued decrease in pore water levels in the Dry Fly Ash Stack and the Bottom Ash Pond. The low permeability of the perimeter dikes limits lateral flow into or out of the CCR management units. The pore water levels within Ash Disposal Area J and the Highway 70 Borrow Area would be expected to decrease in elevation if stormwater drainage or cap modifications were to be implemented. The use of the term "saturated" or references to the moisture content of CCR material does not imply that the pore water is readily separable from the CCR material.

- The coarse-grained unconsolidated materials and upper bedrock are defined as the uppermost aquifer, which is considered to be under unconfined conditions. The horizontal groundwater flow direction within the uppermost aquifer is generally to the north-northwest or northwest toward the Holston River or, near Dodson Creek, to the west toward Dodson Creek. Groundwater flow in the unconsolidated materials and upper bedrock is bounded to the north by the Holston River and to the west by Dodson Creek.

- Near the southern boundary of the JSF Plant, the groundwater flow direction was consistently from the southern boundary of the JSF Plant to the north toward the Holston River. Based on this finding, potable water wells located south and upgradient of the CCR management units would not be impacted by groundwater associated with the JSF Plant CCR management units.

- Results of the vertical hydraulic gradient analysis indicated downward vertical flow of groundwater from the unconsolidated materials to bedrock.

TVA will continue to monitor the trends of lithium and molybdenum and will 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

Appelo, C.A.J and D. Postma. (1996). *Geochemistry, Groundwater and Pollution.* A.A. Balkema.

ARM Geophysics. (2018). Results of Geophysical Borehole Logging. TVA John Sevier Fossil Plant (JSF), Rogersville Tennessee.

Domenico, P. and Schwartz, F. (1990). Physical and Chemical Hydrogeology. 2nd Edition. John Wiley & Sons, Inc.

Environmental Standards, Inc. (2018). Quality Assurance Project Plan for the Tennessee Valley Authority, John Sevier Fossil Plant Environmental Investigation. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Johnson, A.I. Revised 1966. *Specific Yield – Compilation of Specific Yields for Various Materials*. U.S. Geological Survey, Water Supply Paper 1662-D.

Law Engineering (Law). (1992). *Report of Hydrogeologic Evaluation, Pond J – Fly Ash Disposal Site, John Sevier Fossil Fuel Plant*. Prepared for Tennessee Valley Authority. July 9, 1992.

Law. (1994*). Report of Hydrogeologic and Engineering Evaluation (Revised) Proposed Dry Fly Ash Disposal Facility Site, John Sevier Fossil Plant, Rogersville, Tennessee*.

MACTEC Engineering and Consulting, Inc. (2007a). *Report of Geotechnical Soil Sampling and*

Monitoring Well Installation - Hydrogeologic Exploration - Proposed Gypsum Stack – TVA John Sevier Fossil Plant. April 9, 2007.

MACTEC Engineering and Consulting, Inc. (2007b). *Report of Geotechnical Exploration -*

Proposed Gypsum Stack - Site One Phase Two - TVA John Sevier Fossil Plant, October 25, 2007.

Rodgers, J. (1953). *Geologic Map of East Tennessee*. Tennessee Division of Geology.

Stantec Consulting Services Inc. (Stantec). (2010). *Report of Geotechnical Exploration, Dry Fly Ash Stack, Bottom Ash Disposal Area 2, Ash Disposal Area J, John Sevier Fossil Plant, Rogersville, Tennessee*. February 2010.

Stantec. (2016). *Geotechnical Field Services for Well Installations and Closures*. May 4, 2016.

Stantec. (2018a). *Groundwater Investigation Sampling and Analysis Plan*, John Sevier Fossil Plant. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. (2018b). *Hydrogeological Investigation Sampling and Analysis Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. (2020). *Annual Groundwater Monitoring and Corrective Action Report,* Tennessee Valley Authority John Sevier Fossil Plant Bottom Ash Pond CCR Unit. Prepared for Tennessee Valley Authority. July 31, 2020.

Tennessee Department of Environment and Conservation (TDEC). (2003). *Approval of Request to Discontinue Groundwater Monitoring* – TVA John Sevier Fossil Plant – Pond J. Non-Registered Site 37-104-0062. May 9, 2003.

TDEC. (2015). Commissioner's Order No. OGC15-0177. August 6, 2015

Tennessee Valley Authority (TVA). (1952). *Preliminary Geologic Investigations for the John Sevier Steam Plant.* Tennessee Valley Authority, Division of Water Control Planning Geologic Branch, Knoxville Tennessee. September 1952.

TVA. (2002). *John Sevier Fossil Plant, 2002 Groundwater Update Report*. October 2002.

TVA. (2008). *Operations Manual, Phase II – Dry Fly Ash Stacking Facility, Tennessee Valley Authority, John Sevier Fossil Plant*. Updated August 2008.

TVA. (2018*). Environmental Investigation Plan, John Sevier Fossil Plant. Revision 3 Final.* Prepared for Tennessee Valley Authority. October 19, 2018.

TVA. (2019). *Groundwater Quality Assessment Plan, John Sevier Fossil Plant. Dry Fly Ash Disposal Area. (IDL 37-0000097).* Tennessee Valley Authority. August 12, 2019.

TVA. (2021). *John Sevier Fossil Plant, Dry Fly Ash Landfill, Groundwater Assessment Monitoring Report July 2021 Sampling Event*. September 17, 2021.

United State Environmental Protection Agency. (2009). *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance*. EPA 530/R-09-007, 884 pp.

United States Geological Survey (USGS). (1999). Sustainability of Ground-Water Resources. USGS Circular 1186.

TABLES

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

<table>
<tr><th>Boring ID</th><th>Well ID</th><th>Location</th><th>Rationale</th></tr>
<tr><td>JSF-106</td><td>JSF-106</td><td>South of Ash Disposal Area J</td><td>To assess unconsolidated materials, groundwater flow and groundwater quality at a background location</td></tr>
<tr><td>JSF-107</td><td>JSF-107</td><td>Northeast of Ash Disposal Area J</td><td>To assess unconsolidated materials, groundwater flow and groundwater quality downgradient of the CCR Management Unit</td></tr>
<tr><td>JSF-108</td><td>JSF-108</td><td>Northwest of Ash Disposal Area J</td><td>To assess unconsolidated materials, groundwater flow and groundwater quality downgradient of the CCR Management Unit</td></tr>
<tr><td>JSF-109</td><td>NC</td><td rowspan="3">West of Ash Disposal Area J</td><td>Boring JSF-109 was not completed as a monitoring well because CCR material was encountered.</td></tr>
<tr><td>JSF-109Alt</td><td>NC</td><td>Boring JSF-109Alt was not completed as a monitoring well because CCR material was encountered.</td></tr>
<tr><td>JSF-109Alt2</td><td>JSF-109</td><td>To assess unconsolidated materials, groundwater flow and groundwater quality downgradient of the CCR Management Unit</td></tr>
<tr><td>JSF-110</td><td>JSF-110</td><td rowspan="3">Southeast of Highway 70 Borrow Area</td><td rowspan="3">Co-located permanent monitoring wells to assess unconsolidated materials (JSF-110) and bedrock (JSF-206 and JSF-210), groundwater flow and groundwater quality at a background location</td></tr>
<tr><td>JSF-206S</td><td>JSF-206</td></tr>
<tr><td>JSF-206</td><td>JSF-210</td></tr>
</table>

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

Boring ID	Well ID	Location	Rationale
JSF-111	NC	Northeast of Highway 70 Borrow Area	Boring drilled to assess unconsolidated material. Temporary piezometer installed to assess whether a suffiecient column of groundwater existed within the unconsolidated material to install a permanent monitoring well. Groundwater not encountered in unconsolidated materials. Piezometer replaced with bedrock well JSF-208.
JSF-208	JSF-208		To assess groundwater flow and groundwater quality in bedrock downgradient of the CCR Management Unit.
JSF-112Alt	NC	Northwest of Highway 70 Borrow Area	Boring drilled to assess unconsolidated material. Temporary piezometer installed to assess whether a suffiecient column of groundwater existed within the unconsolidated material to install a permanent monitoring well. Groundwater not encountered in unconsolidated materials. Piezometer replaced with bedrock well JSF-207.
JSF-207	JSF-207		To assess groundwater flow and groundwater quality in bedrock downgradient of the CCR Management Unit.
JSF-113Alt	NC	West of Highway 70 Borrow Area	Boring drilled to assess unconsolidated material. Temporary piezometer installed to assess whether a suffiecient column of groundwater existed within the unconsolidated material to install a permanent monitoring well. Groundwater not encountered in unconsolidated materials. Piezometer replaced with bedrock well JSF-209.
JSF-209	JSF-209		To assess groundwater flow and groundwater quality in bedrock downgradient of the CCR Management Unit.

Notes:

CCR - Coal Combustion Residuals

ID - Identification

NC - Not completed as a monitoring well

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

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
10-36	3.9	1,120.38	19.2	23.1	1,097.3	8.8	18.6	12.7	22.5	802.5	792.5
MW-2	3.4	1,131.24	29.8	33.2	1,098.0	19.3	29.3	22.7	32.7	1108.5	1098.5
MW-4	4.2	1,097.23	23.7	27.9	1,069.3	8.3	23.1	12.5	27.3	1084.7	1069.9
JSF-101	3.8	1,110.43	23.9	27.7	1,082.7	13.3	23.4	17.1	27.2	1093.3	1083.2
JSF-102	3.8	1,091.42	16.2	20.0	1,071.4	6.1	16.2	9.9	20	1081.5	1071.4
JSF-103	3.9	1,126.73	19.8	23.7	1,103.0	9.7	19.8	13.6	23.7	1113.1	1103.0
JSF-104	3.8	1,145.69	27.2	31.0	1,114.7	16.6	26.8	20.4	30.6	1125.3	1115.1
JSF-105	3.8	1,121.11	18.0	21.8	1,099.3	7.4	17.5	11.2	21.3	1109.9	1099.8
JSF-106	3.4	1,098.21	14.0	17.4	1,080.8	8.7	13.6	12.1	17.0	1086.1	1081.2
JSF-107	3.4	1,109.75	35.6	39.0	1,070.8	25.4	35.2	28.8	38.6	1081.0	1071.2
JSF-108	3.5	1,109.41	48.4	51.9	1,057.5	38.0	48.0	41.5	51.5	1067.9	1057.9
JSF-109	3.5	1,104.72	42.9	46.4	1,058.3	32.7	42.5	36.2	46.0	1068.5	1058.7
JSF-110	3.4	1,142.44	15.2	18.6	1,123.8	9.9	14.8	13.3	18.2	1129.1	1124.2
JSF-200	3.6	1,146.51	36.5	40.1	1,106.4	26.0	36.0	29.6	39.6	1116.9	1106.9
JSF-201	3.6	1,121.17	38.0	41.6	1,079.6	27.5	37.5	31.1	41.1	1090.1	1080.1
JSF-202	3.6	1,120.73	30.5	34.1	1,086.6	20.0	30.0	23.6	33.6	1097.1	1087.1
JSF-203	3.3	1,124.14	36.5	39.8	1,084.3	26.0	36.0	29.3	39.3	1094.8	1084.8
JSF-204	3.6	1,118.13	33.0	36.6	1,081.5	22.5	32.5	26.1	36.1	1092.0	1082.0
JSF-205	3.5	1,136.23	36.5	40.0	1,096.2	26.0	36.0	29.5	39.5	1106.7	1096.7
JSF-206	4.2	1,142.73	29.7	33.9	1,108.8	19.5	29.3	23.7	33.5	1119.0	1109.2
JSF-207	3.6	1,112.71	39.3	42.9	1,069.8	29.1	38.9	32.7	42.5	1080.0	1070.2
JSF-208	4.8	1,112.22	41.5	46.3	1,065.9	31.3	41.1	36.1	45.9	1076.1	1066.3
JSF-209	4.0	1,140.39	33.9	37.9	1,102.5	23.7	33.5	27.7	37.5	1112.7	1102.9
JSF-210	3.7	1,142.75	48.1	51.8	1,091.0	37.9	47.7	41.6	51.4	797.8	787.8
W-1 (aka JSF-1)	3.3	1,147.65	79.4	82.6	1,065.1	NA	NA	NA	NA	NA	NA
W-2 (aka JSF-2)	3.6	1,134.82	56.0	59.6	1,075.2	NA	NA	NA	NA	NA	NA
W-28	3.8	1,089.14	26.0	29.8	1,059.3	13.5	23.5	17.3	27.3	1071.8	1061.8
W-29	3.8	1,079.82	18.7	22.5	1,057.3	8.5	18.4	12.3	NA	NA	NA
W-30	4.2	1,081.33	18.0	22.2	1,059.1	7.8	17.7	12	21.9	1069.3	1059.4
W-31	3.5	1,085.61	15.3	18.8	1,066.8	4.8	14.8	8.3	18.3	1077.3	1067.3
W-32	3.9	1,105.12	23.2	27.1	1,078.0	11.2	21.1	15.1	25.0	1090.0	1080.1

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
NA	Well was completed in rock without a screen.

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

Boring ID	Depth Interval (ft)		Test Length (ft)	Flow Rate (gal/min)	Total Head (ft)	Hydraulic Conductivity (cm/sec)
JSF-206	19.0	26.1	7.1	Test failed due to packer leak		
JSF-206	25.1	36.1	11.0	3.07	48.3	2.6E-04
JSF-206	38.1	46.1	8.0	1.57	59.8	1.4E-04
JSF-206	46.1	55.0	8.9	0.90	68.2	6.4E-05
JSF-207	21.5	26.9	5.4	1.64	41.9	2.7E-04
JSF-207	30.4	36.7	6.3	2.76	51.2	3.4E-04
JSF-207	36.7	46.7	10.0	2.09	59.4	1.6E-04
JSF-207	46.7	56.7	10.0	1.12	69.4	7.1E-05
					Geometric Mean of Pressure Tests (cm/sec)	**1.6E-04**

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.

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

Monitoring Well ID	Monitoring Well Designation	Slug Test Hydraulic Conductivity (cm/sec)
Bottom Ash Pond - Unconsolidated Materials		
10-36*	Downgradient	1.5E-04
JSF-103*	Downgradient	7.5E-04
JSF-104*	Background	3.1E-04
JSF-105*	Downgradient	2.3E-04
W-32*	Downgradient	6.7E-04
Geometric Mean of Hydraulic Conductivity Unconsolidated Materials (cm/sec)		**3.5E-04**
Ash Disposal Area J - Unconsolidated Materials		
JSF-106	Background	2.8E-04
JSF-107	Downgradient	3.3E-04
JSF-108	Downgradient	1.5E-05
JSF-109	Downgradient	8.6E-06
Geometric Mean of Hydraulic Conductivity Unconsolidated Materials (cm/sec)		**5.9E-05**
Highway 70 Borrow Area - Unconsolidated Materials		
JSF-110	Downgradient	2.9E-03
Geometric Mean of Hydraulic Conductivity Unconsolidated Materials (cm/sec)		**2.9E-03**
Bottom Ash Pond - Bedrock		
JSF-200*	Background	2.0E-03
JSF-201*	Downgradient	3.1E-04
JSF-202*	Downgradient	9.0E-04
JSF-203*	Downgradient	9.3E-04
JSF-204*	Downgradient	4.2E-03
JSF-205*	Background	6.9E-04
Geometric Mean of Hydraulic Conductivity Bedrock (cm/sec)		**1.1E-03**
Highway 70 Borrow Area - Bedrock		
JSF-206	Background	1.5E-03
JSF-207	Downgradient	9.3E-04
JSF-208	Downgradient	1.4E-05
JSF-209	Downgradient	2.5E-04
JSF-210	Background	5.1E-04
Geometric Mean of Hydraulic Conductivity Bedrock (cm/sec)		**3.0E-04**

Notes

ID - identification

cm/sec - centimeters per second

*Hydraulic conductivity values for these wells are provided in the "Aquifer Testing Results, TVA CCR Rule, John Sevier Fossil Plant" written by Terracon Consultants, Inc. (Terracon) dated July 2019.

The hydraulic conductivity for the Dry Fly Ash Stack (7.00 x 10^{-6} cm/sec) is from the *John Sevier Fossil Plant, Dry Fly Ash Landfill Groundwater Assessment Monitoring Report, July 2021 Sampling Event . TVA.* September 17, 2021

TABLE H.1-5 – Groundwater Level Measurements, Groundwater Sampling Event 4 (February 3, 2020)
John Sevier 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	
JSF-00-GW-43-001	W-28	3-Feb-20	16.61	1089.14	1072.53	n/a	n/a	n/a	17.3 - 27.3	Unconsolidated Materials
JSF-00-GW-43-002	W-29	3-Feb-20	9.92	1079.82	1069.90	n/a	n/a	n/a	12.3 - 22.2	Unconsolidated Materials
JSF-00-GW-43-003	W-30	3-Feb-20	8.70	1081.33	1072.63	n/a	n/a	n/a	12.0 - 21.9	Unconsolidated Materials
JSF-00-GW-43-004	W-31	3-Feb-20	10.63	1085.61	1074.98	n/a	n/a	n/a	8.3 - 18.3	Unconsolidated Materials
JSF-00-GW-43-005	W-32	3-Feb-20	17.84	1105.12	1087.28	n/a	n/a	n/a	15.1 - 25.0	Unconsolidated Materials
JSF-00-GW-43-006	10-36	3-Feb-20	7.74	1120.38	1112.64	n/a	n/a	n/a	12.7 - 22.5	Unconsolidated Materials
JSF-00-GW-43-007	JSF-1 (W-1)	3-Feb-20	14.82	1147.65	1132.83	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	3-Feb-20	8.62	1134.82	1126.20	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	3-Feb-20	11.74	1131.24	1119.50	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	3-Feb-20	7.19	1097.23	1090.04	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	3-Feb-20	18.92	1110.43	1091.51	n/a	n/a	n/a	17.1 - 27.2	Unconsolidated Materials
JSF-00-GW-43-012	JSF-102	3-Feb-20	8.73	1091.42	1082.69	n/a	n/a	n/a	9.9 - 20.0	Unconsolidated Materials
JSF-00-GW-43-013	JSF-103	3-Feb-20	10.60	1126.73	1116.13	n/a	n/a	n/a	13.6 - 23.7	Unconsolidated Materials
JSF-00-GW-43-014	JSF-104	3-Feb-20	21.96	1145.69	1123.73	n/a	n/a	n/a	20.4 - 30.6	Unconsolidated Materials
JSF-00-GW-43-015	JSF-105	3-Feb-20	10.48	1121.11	1110.63	n/a	n/a	n/a	11.2 - 21.3	Unconsolidated Materials
JSF-00-GW-43-016	JSF-200	3-Feb-20	23.26	1146.51	1123.25	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	3-Feb-20	11.43	1121.17	1109.74	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	3-Feb-20	8.37	1120.73	1112.36	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	3-Feb-20	13.67	1124.14	1110.47	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	3-Feb-20	18.68	1118.13	1099.45	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	3-Feb-20	8.12	1136.23	1128.11	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	3-Feb-20	7.80	1098.21	1090.41	n/a	n/a	n/a	12.1 - 17.0	Unconsolidated Materials
JSF-00-GW-43-023	JSF-107	3-Feb-20	36.55	1109.75	1073.20	n/a	n/a	n/a	28.8 - 38.6	Unconsolidated Materials
JSF-00-GW-43-024	JSF-108	3-Feb-20	41.98	1109.41	1067.43	n/a	n/a	n/a	41.5 - 51.5	Unconsolidated Materials
JSF-00-GW-43-025	JSF-109	3-Feb-20	38.60	1104.72	1066.12	n/a	n/a	n/a	36.2 - 46.0	Unconsolidated Materials
JSF-00-GW-43-026	JSF-110	3-Feb-20	14.97	1142.44	1127.47	n/a	n/a	n/a	13.3 - 18.2	Unconsolidated Materials
JSF-00-GW-43-027	JSF-206	3-Feb-20	17.17	1142.73	1125.56	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	3-Feb-20	18.85	1112.71	1093.86	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	3-Feb-20	11.38	1112.22	1100.84	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	3-Feb-20	20.11	1140.39	1120.28	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	3-Feb-20	15.35	1142.75	1127.40	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	3-Feb-20	33.4	n/a	1112.6	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	3-Feb-20	22.4	n/a	1116.0	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	3-Feb-20	26.4	n/a	1108.2	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	3-Feb-20	25.5	n/a	1119.7	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	3-Feb-20	32.0	n/a	1120.8	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	3-Feb-20	31.4	n/a	1113.8	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	3-Feb-20	13.4	n/a	1071.6	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	3-Feb-20	4.5	n/a	1070.6	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	3-Feb-20	9.9	n/a	1069.0	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	3-Feb-20	10.2	n/a	1071.1	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	3-Feb-20	9.2	n/a	1073.1	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	3-Feb-20	25.6	n/a	1073.7	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	3-Feb-20	17.2	n/a	1072.5	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	3-Feb-20	15.2	n/a	1074.2	1089.4	1065.5	23.9	n/a	Foundation Clays
n/a	JSF_PZ_JP04	3-Feb-20	39.8	n/a	1065.8	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	3-Feb-20	33.3	n/a	1071.2	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	3-Feb-20	22.8	n/a	1083.5	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock

TABLE H.1-5 – Groundwater Level Measurements, Groundwater Sampling Event 4 (February 3, 2020)
John Sevier Fossil Plant

Surface Water Gauge										
Holston River gauge	n/a	3-Feb-20	n/a	n/a	1063.08	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

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. Holsten River data point is the reading closest to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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.

Table H.1-6 - Holston River and Groundwater Elevation Comparison
John Sevier Fossil Plant
August 2019-June 2020

	Groundwater Elevation by Date (ft amsl)					
Well ID	**8/12/2019**	**10/7/2019**	**12/2/2019**	**2/3/2020**	**4/6/2020**	**6/8/2020**
W-28	1072.23	1069.57	1072.75	1072.53	1073.03	1074.49
W-29	1071.54	1065.92	1073.13	1069.90	1071.41	1073.54
W-30	1073.73	1072.15	1073.34	1072.63	1073.21	1074.33
W-31	1076.13	1073.54	1075.07	1074.98	1075.89	1076.59
W-32	1087.08	1085.49	1087.34	1087.28	1087.94	1087.55
10-36	1109.36	1107.87	1111.22	1112.64	1112.25	1110.78
JSF-1 (W-1)	1131.35	1128.95	1130.71	1132.83	1133.79	1132.45
JSF-2 (W-2)	1123.63	1119.52	1124.46	1126.20	1126.39	1124.52
MW-2	1117.42	1113.92	1123.63	1119.50	1120.45	1116.79
MW-4	1087.83	1084.00	1090.25	1090.04	1091.31	1089.38
JSF-101	1090.71	1089.40	1090.71	1091.51	1092.09	1091.32
JSF-102	1082.14	1081.54	1085.12	1082.69	1083.39	1082.59
JSF-103	1113.66	1112.11	1116.25	1116.13	1115.89	1114.76
JSF-104	1123.10	1121.88	1123.17	1123.73	1124.54	1123.74
JSF-105	1107.77	1104.37	1109.43	1110.63	1110.49	1108.99
JSF-200	1122.71	1121.61	1122.87	1123.25	1123.72	1123.17
JSF-201	NM	NM	1108.78	1109.74	1108.75	1108.57
JSF-202	NM	NM	1111.17	1112.36	1112.02	1110.54
JSF-203	NM	NM	1110.43	1110.47	1110.69	1109.69
JSF-204	NM	NM	1098.45	1099.45	1100.04	1099.15
JSF-205	1125.22	1120.96	1126.18	1128.11	1128.49	1126.32
JSF-106	1088.39	1084.83	1090.72	1090.41	1091.62	1089.78
JSF-107	1073.16	1071.29	1071.22	1073.20	1073.40	1074.05
JSF-108	1070.80	1066.11	1067.54	1067.43	1062.62	1073.36
JSF-109	1069.55	1064.49	1065.61	1066.12	1066.99	1072.07
JSF-110	1126.24	Dry*	1125.62	1127.47	1128.70	1126.99
JSF-206	1124.89	1122.43	1124.49	1125.56	1126.43	1125.50
JSF-207	1092.66	1091.15	1095.03	1093.86	1094.68	1093.08
JSF-208	1099.43	1097.71	1101.21	1100.84	1101.27	1100.51
JSF-209	1118.67	1115.60	1119.79	1120.28	1122.69	1120.49
JSF-210	1126.00	1123.47	1125.24	1127.40	1128.61	1127.21
Holston River	1069.16	1061.17	1067.96	1063.08	1064.55	1072.41

Notes:

ft amsl	feet above mean sea level
ID	identification
NM	not measured
*	<0.4 ft (length of end cap) of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry

Table H.1-7 - Summary of Vertical Hydraulic Gradient Calculations
December 2019 - June 2020
John Sevier Fossil Plant

Nested Well Pair	TOC Elevation (ft msl)	Depth to Well Screen (ft btoc)	Screen length (ft)	Event 3 (12/2/19)		Event 4 (2/3/20)		Event 5 (4/6/20)		Event 6 (6/8/20)	
				DTW (ft btoc)	Vertical Gradient (ft/ft) and Direction	DTW (ft btoc)	Vertical Gradient (ft/ft) and Direction	DTW (ft btoc)	Vertical Gradient (ft/ft) and Direction	DTW (ft btoc)	Vertical Gradient (ft/ft) and Direction
JSF-105	1121.11	11.2	10.1	11.68	0.03325	10.48	0.04497	10.62	0.08792	12.12	0.02173
JSF-201	1121.17	31.1	10.0	12.39	Down	11.43	Down	12.42	Down	12.6	Down
10-36	1120.38	12.7	9.8	9.16	0.004695	7.74	0.02629	8.13	0.0216	9.6	0.02254
JSF-202	1120.73	23.6	10.0	9.56	Down	8.37	Down	8.71	Down	10.19	Down
JSF-104	1145.69	20.4	10.2	22.52	0.04155	21.96	0.064	21.15	0.1037	21.95	0.07595
JSF-200	1146.51	29.6	10.0	23.64	Down	23.26	Down	22.79	Down	23.34	Down
JSF-110	1142.44	13.3	4.9	16.82	0.1046	14.97	0.1629	13.74	0.1840	15.45	0.1297
JSF-206	1142.73	23.7	9.8	18.24	Down	17.17	Down	16.3	Down	17.23	Down
JSF-106	1098.21	12.1	4.9	7.49	0.07425	7.8	0.05845	6.59	0.04897	8.43	0.06319
MW-4	1097.23	12.5	14.8	6.98	Down	7.19	Down	5.92	Down	7.85	Down

Notes:

btoc - below top of casing

ft - feet

ft/ft - feet per foot

msl - mean sea level

1. Depth to water (DTW) values are obtained from the groundwater SARs Events 3 through 6

2. Vertical gradient is calculated from EPA On-line Tools for Site Assessment Calculation: https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/vgradient02.html

3. Groundwater gradient direction options: Up or Down

Table H.1-8 - Rate and Direction of Groundwater Flow Summary
John Sevier Fossil Plant

Bottom Ash Pond

Unconsolidated Materials

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	8/12/2019	10/7/2019	12/2/2019	2/3/2020	4/6/2020	6/8/2020
Horizontal Gradient (ft/ft)	0.015	0.015	0.014	0.013	0.014	0.014
Hydraulic Conductivity (cm/sec)	3.5E-04	3.5E-04	3.5E-04	3.5E-04	3.5E-04	3.5E-04
Effective Porosity	10%	10%	10%	10%	10%	10%
Flow Direction	Northwest	Northwest	Northwest	Northwest	Northwest	Northwest
Flow Rate (ft/yr)	54	54	51	47	51	51

Dry Fly Ash Stack

Unconsolidated Materials

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	8/12/2019	10/7/2019	12/2/2019	2/3/2020	4/6/2020	6/8/2020
Horizontal Gradient (ft/ft)	0.020	0.019	0.021	0.022	0.022	0.020
Hydraulic Conductivity (cm/sec)	7.0E-06	7.0E-06	7.0E-06	7.0E-06	7.0E-06	7.0E-06
Effective Porosity	10%	10%	10%	10%	10%	10%
Flow Direction	Northwest	Northwest	Northwest	Northwest	Northwest	Northwest
Flow Rate (ft/yr)	1.4	1.4	1.5	1.6	1.6	1.4

Ash Disposal Area J

Unconsolidated Materials

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	8/12/2019	10/7/2019	12/2/2019	2/3/2020	4/6/2020	6/8/2020
Horizontal Gradient (ft/ft)	0.028	0.028	0.036	0.035	0.047	0.026
Hydraulic Conductivity (cm/sec)	5.9E-05	5.9E-05	5.9E-05	5.9E-05	5.9E-05	5.9E-05
Effective Porosity	10%	10%	10%	10%	10%	10%
Flow Direction	Northwest	Northwest	Northwest	Northwest	Northwest	Northwest
Flow Rate (ft/yr)	17	17	22	21	29	16

Table H.1-8 - Rate and Direction of Groundwater Flow Summary
John Sevier Fossil Plant

Bottom Ash Pond

Bedrock

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	8/12/2019	10/7/2019	12/2/2019	2/3/2020	4/6/2020	6/8/2020
Horizontal Gradient (ft/ft)	*	*	0.017	0.017	0.017	0.017
Hydraulic Conductivity (cm/sec)	1.1E-03	1.1E-03	1.1E-03	1.1E-03	1.1E-03	1.1E-03
Effective Porosity	1% & 10%	1% & 10%	1% & 10%	1% & 10%	1% & 10%	1% & 10%
Flow Direction	Northwest	Northwest	Northwest	Northwest	Northwest	Northwest
Flow Rate, Effective Porosity = 1% (ft/yr)	*	*	1,935	1,935	1,935	1,935
Flow Rate, Effective Porosity = 10% (ft/yr)	*	*	193	193	193	193

Highway 70 Borrow Area

Bedrock

Sampling Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Groundwater Elevation Measurement Date	8/12/2019	10/7/2019	12/2/2019	2/3/2020	4/6/2020	6/8/2020
Horizontal Gradient (ft/ft)	0.056	0.053	0.052	0.056	0.058	0.057
Hydraulic Conductivity (cm/sec)	3.0E-04	3.0E-04	3.0E-04	3.0E-04	3.0E-04	3.0E-04
Effective Porosity	1% & 10%	1% & 10%	1% & 10%	1% & 10%	1% & 10%	1% & 10%
Flow Direction	Northwest	Northwest	Northwest	Northwest	Northwest	Northwest
Flow Rate, Effective Porosity = 1% (ft/yr)	1,738	1,645	1,614	1,738	1,800	1,769
Flow Rate, Effective Porosity = 10% (ft/yr)	174	165	161	174	180	177

Notes:

ft/ft - feet per foot

cm/sec - centimeter per second

ft/yr - feet per year

* - Wells JSF-201, JSF-202, JSF-203, and JSF-204 were not gauged during Events 1 and 2.

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		10-36										
Sample Date		10-May-16	14-Nov-16	25-Apr-17	22-Aug-17	4-Dec-17	21-Feb-18	22-May-18	22-May-18	28-Aug-18	26-Nov-18	23-Jan-19
Sample ID		JSF-10-36-0516	JSF-10-36-111416	JSF-10-36-042517	JSF-10-36-082217	JSF-10-36-120417	JSF-10-36-022118	JSF-10-36-052218	JSF-DUP-10-36-052218	JSF-10-36-GW-082818	JSF-10-36-GW-112618	JSF-GW-006-01232019
Parent Sample ID									JSF-10-36-0518			
Intake Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft
Sample Type		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	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	State Compliance	CCR Program
Total Metals												
Aluminum	ug/L	<100	<200	<200	-	<200	-	<200	<200	-	<200	13.7 U*
Antimony	ug/L	<2	<2	<2	-	<2	-	<2	<2	-	<2	<1.12
Arsenic	ug/L	<2	<1	<1	-	<1	-	<1	<1	-	<1	<0.323
Barium	ug/L	62.7	<200	<200	-	<200	-	<200	<200	-	<200	41
Beryllium	ug/L	<2	<1	<1	-	<1	-	<1	<1	-	<1	<0.057
Boron	ug/L	58.1	<200	<200	-	<200	-	<200	<200	-	<200	76.3 J
Cadmium	ug/L	<1	<1	<1	-	<1	-	<1	<1	-	<1	<0.125
Calcium	ug/L	-	140,000	141,000	163,000	-	137,000	140,000	137,000	139,000	132,000	137,000 J
Chromium	ug/L	<2	<2	<2	-	<2	-	<2	<2	-	<2	1.3 U*
Cobalt	ug/L	<2	1.24	1.02	-	1.52	-	0.558	0.53	-	0.723	<0.075
Copper	ug/L	<2	<2	<2	-	<2	-	<2	<2	-	<2	<1.3
Iron	ug/L	1,460	604	<100	-	167	-	<100	<100	-	201	22.5 J
Lead	ug/L	<2	<1	<1	-	<1	-	<1	<1	-	<1	<0.094
Lithium	ug/L	-	12.1	10.3	7.84	12.1	15.4	17.9	17.3	14.1	19.2	13.6
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	38,800
Manganese	ug/L	1,570	1,350	1,910	-	1,000	-	530	522	-	383	16
Mercury	ug/L	<0.2	<0.200	<0.200	-	<0.2	-	<0.2	<0.2	-	<0.2	<0.101
Molybdenum	ug/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.474
Nickel	ug/L	<2	<1	1.34	-	<1	-	<1	<1	-	<1	0.842 J
Potassium	ug/L	1,490	<5,000	<5,000	-	<5,000	-	<5,000	<5,000	-	<5,000	826
Selenium	ug/L	<2	<5	<5	-	<5	-	<5	<5	-	<5	<0.813
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<1	<1	-	<1	-	<1	<1	-	<1	-
Sodium	ug/L	18,000	14,200	20,100	-	15,600	-	18,700	18,200	-	20,900	16,200
Strontium	ug/L	837	784	926	-	933	-	808	790	-	958	870
Thallium	ug/L	<2	<1	<1	-	<1	-	<1	<1	-	<1	<0.063
Tin	ug/L	<50	<100	<100	-	<100	-	<100	<100	-	<100	-
Vanadium	ug/L	<4	<1	<1	-	<1	-	1.01	<1	-	<1	-
Zinc	ug/L	<25	<5	<5	-	<5	-	<5	<5	-	5.01	-
Radiological Parameters												
Radium-226	pCi/L	-	0.137 +/-(0.232)U	0.0601 +/-(0.0703)U	0.158 +/-(0.0741)	0.122 +/-(0.0672)	0.107 +/-(0.0653)	0.0475 +/-(0.0530)U	0.0589 +/-(0.0588)U	0.333 +/-(0.113)U*	0.0207 +/-(0.0455)U	0.122 +/-(0.0726)
Radium-228	pCi/L	-	0.935 +/-(0.320)	0.484 +/-(0.245)	0.0705 +/-(0.211)U	0.355 +/-(0.233)U	0.332 +/-(0.216)	-0.0272 +/-(0.203)U	0.117 +/-(0.249)U	0.0848 +/-(0.170)U	0.413 +/-(0.263)	0.226 +/-(0.242)U
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	0.347 +/-(0.253)J
Anions												
Chloride	mg/L	9.08	4.85	9.39	-	8.64	-	6.69	6.78	-	10.2	9.60
Fluoride	mg/L	0.101	<0.100	<0.100	-	<0.1	-	<0.100	<0.100	-	0.110	0.146
Sulfate	mg/L	174	93.4	134	-	117	-	109	107	-	111	129
General Chemistry												
Alkalinity, Bicarbonate	mg/L	408	-	-	-	-	-	-	-	-	-	448
Alkalinity, Carbonate	mg/L	<10.0	-	-	-	520	-	-	-	-	-	<5.00
pH (lab)	SU	-	-	-	-	-	-	7.3	7.3	7.1 J	7.2 J	-
Total Dissolved Solids	mg/L	-	555	637	669	595	548	614	615	587	558	605

See notes on last page.

Stantec

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		10-36										
Sample Date		29-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	8-May-19	8-May-19	12-Jun-19
Sample ID		JSF-GW-006-01292019	JSF-GW-006-02052019	JSF-GW-006-02202019	JSF-GW-006-02272019	JSF-GW-006-03062019	JSF-GW-006-03202019	JSF-GW-006-03272019	JSF-GW-006-04022019	JSF-10-36-AW-050819	JSF-10-36-GW-050819	JSF-GW-006-06122019
Parent Sample ID										JSF-10-36-GW-050819		
Intake Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 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	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	State Compliance	CCR Program
Total Metals												
Aluminum	ug/L	<11.8	<12.5	<12.5	<12.5	47 U*	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Antimony	ug/L	<1.12	<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	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	0.351 J	0.407 J	0.372 J
Barium	ug/L	45.4	42.6	40.5	42.4	44.3	37.6	48.8	46.1	49	47.5	44.7
Beryllium	ug/L	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	63.5 J	88.6 U*	49.5 J	60.9 J	57.1 J	48.8 J	72 J	77.9 J	109	111	128
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	138,000	142,000	142,000	135,000	141,000 J	144,000	144,000	163,000	173,000	170,000	151,000
Chromium	ug/L	<0.631	<1.53	<1.53	<1.53	1.54 J	<1.53	<1.53	<1.53	<1.53	<1.53	2.35 U*
Cobalt	ug/L	0.075 J	<0.075	<0.075	<0.075	<0.075	<0.075	0.093 J	<0.075	0.504 J	0.486 J	0.26 J
Copper	ug/L	<1.3	0.839 J	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	<14.1	<14.1	<14.1	<14.1	75.2	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	0.214 J	0.6 J	<0.128	<0.128	<0.128	<0.128	0.299 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	12.7	16.6 U*	14	13.5 U*	12.3	13	13.4	15.4	23.1 J	21.8 J	22
Magnesium	ug/L	38,900	36,100	36,300	35,800	37,800	35,700	40,100	37,500	-	-	36,200
Manganese	ug/L	9.65	7.24	18.5	13	34.5	4.19 J	13.1	25.4 J	246	242	293
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	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	0.555 J	0.634 J	<0.312	0.677 J	0.628 J	0.499 J	0.636 J	0.481 J	0.643 J	0.608 J	0.686 J
Potassium	ug/L	802	758	718	754 U*	715	640	828	853	926	888	1,040
Selenium	ug/L	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	-	-	-	<0.121	<0.121	<0.121
Sodium	ug/L	15,400	14,500	14,400	13,700	14,000	13,100	16,500	17,200	23,800	23,300	28,300
Strontium	ug/L	873	884	871	832	784	817	952	981	1,290 J	1,240 J	1,090
Thallium	ug/L	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	<1.75	<1.75	-
Vanadium	ug/L	-	-	-	-	-	-	-	-	2.01 U*	1.75 U*	1.73 U*
Zinc	ug/L	-	-	-	-	-	-	-	-	<3.22	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	0.0903 +/-(0.0658)J	0.0686 +/-(0.0581)UJ	0.110 +/-(0.0716)J	0.0526 +/-(0.0525)U	0.0313 +/-(0.0550)U	0.135 +/-(0.0739)J	0.0870 +/-(0.0708)U	0.0846 +/-(0.0695)U	0.0710 +/-(0.0568)U	0.160 +/-(0.0742)	0.0612 +/-(0.0715)U
Radium-228	pCi/L	0.565 +/-(0.250)	0.0881 +/-(0.236)UJ	0.110 +/-(0.237)U	0.322 +/-(0.227)U	0.319 +/-(0.244)U	0.102 +/-(0.271)U	0.418 +/-(0.228)	0.267 +/-(0.265)U	0.282 +/-(0.270)U	0.256 +/-(0.292)U	0.420 +/-(0.330)U
Radium-226+228	pCi/L	0.655 +/-(0.259)J	0.157 +/-(0.243)UJ	0.220 +/-(0.248)J	0.374 +/-(0.233)U	0.350 +/-(0.250)U	0.237 +/-(0.281)J	0.505 +/-(0.239)J	0.352 +/-(0.274)U	-	-	0.481 +/-(0.338)U
Anions												
Chloride	mg/L	9.81	9.60	9.32	10.3	7.21	7.23	7.06	6.41	8.56	8.12	6.59
Fluoride	mg/L	0.111 U*	0.132	0.126	0.152	0.129	0.100	0.108	0.115	0.109	0.105	0.0960 J
Sulfate	mg/L	137	133	130	134	117	119	144	201	303	283	242
General Chemistry												
Alkalinity, Bicarbonate	mg/L	398	438	424	464	440	449	438	392	-	-	308
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-	-	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	7.4 J	7.5 J	-
Total Dissolved Solids	mg/L	616	586	617	1,730	574	595	639	722	748	752	733

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		10-36										
Sample Date		11-Sep-19	19-Nov-19	8-Jan-20	5-Feb-20	11-May-20	7-Jul-20	12-Aug-20	3-Nov-20	14-Jan-21	14-Jan-21	10-Feb-21
Sample ID		JSF-GW-006-09112019	JSF-GW-006-11192019	JSF-GW-006-01082020	JSF-GW-006-02052020	JSF-GW-10-36-051120	JSF-GW-006-07072020	JSF-GW-006-08122020	JSF-GW-10-36-110320	JSF-GW-10-36-01142021	JSF-GW-FD-01142021	JSF-GW-10-36-02102021
Parent Sample ID											JSF-GW-10-36-01142021	
Intake Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 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	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	28.5 J	<12.5	<34.0	<34.0	<12.5	<34.0	<34.0	<12.5	<34.0	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.570
Arsenic	ug/L	0.689 U*	0.557 J	<0.750	<0.750	0.401 J	<0.750	<0.750	0.477 J	<0.750	<0.750	<0.750
Barium	ug/L	38.4	47.7	45.3	43.0	45.8	36.2	36.5	36.0	41.5	41.9	44.8
Beryllium	ug/L	<0.182	<0.182	<0.305	<0.305	<0.182	<0.305	<0.305	<0.182	<0.305	<0.305	<0.305
Boron	ug/L	214	168	139	146	140	143	150	227 U*	165	172	153
Cadmium	ug/L	<0.125	<0.125	<0.197	<0.197	<0.217	<0.197	<0.197	<0.217	<0.197	<0.197	<0.197
Calcium	ug/L	129,000	120,000	127,000	134,000	159,000	118,000	117,000	113,000	111,000	116,000	132,000
Chromium	ug/L	3.12 U*	2.15 U*	<0.980	<0.980	<1.53	<0.980	<0.980	<1.53	<0.980	<0.980	<0.980
Cobalt	ug/L	0.715	0.506	0.247 J	<0.190	0.300 J	<0.190	0.358 J	0.309 J	0.335 J	0.319 J	0.230 J
Copper	ug/L	0.978 U*	0.898 U*	<1.70	<1.70	<0.627	<1.70	<1.70	<0.627	<1.70	<1.70	<1.70
Iron	ug/L	55.2	45.1 J	87.5 J	<47.0	45.5 J	<47.0	<47.0	60.4	72.3 J	64.7 J	<47.0
Lead	ug/L	<0.128	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.450
Lithium	ug/L	27.2	27.2	25.0	18.5	25.2	20.9 U*	25.6	26.4	26.8	28.1	28.7
Magnesium	ug/L	29,500	25,900	27,300	29,400	-	25,700	26,500	-	25,200	25,900	29,200
Manganese	ug/L	446	280	151	54.6	369	291	308	266	124	126	71.1
Mercury	ug/L	<0.101	<0.101	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08	<1.08
Nickel	ug/L	0.722 J	<0.336	<1.47	2.10	0.502 U*	<1.47	<1.47	0.367 J	<1.47	<1.47	<1.47
Potassium	ug/L	972	1,000	894 J	849 J	961	895 J	869 J	866	917 J	946 J	955 J
Selenium	ug/L	<1.51	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.0530
Sodium	ug/L	31,100	29,700	28,000	26,100	29,000	26,200	27,800	29,600	28,500	29,600	29,400
Strontium	ug/L	1,110	1,050	1,300	1,090	1,330	1,120	1,070	975	1,130	1,150	1,290
Thallium	ug/L	0.168 J	<0.148	<0.200	<0.200	<0.148	<0.200	<0.200	<0.148	<0.200	<0.200	<0.200
Tin	ug/L	-	<1.75	-	-	<0.960	-	-	1.46 U*	<3.00	<3.00	-
Vanadium	ug/L	1.96 U*	2.18 U*	<0.820	<0.820	<0.991	<0.820	<0.820	<0.991	<0.820	<0.820	<0.820
Zinc	ug/L	3.37 J	3.51 J	<15.0	17.6 J	<3.22	<15.0	<15.0	<3.22	<15.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.232 +/-(0.500)U	0.290 +/-(0.316)U	0.316 +/-(0.397)U	0.432 +/-(0.330)	0.145 +/-(0.515)U	0.720 +/-(0.634)U	0.383 +/-(0.541)U	0.171 +/-(0.416)U	0.592 +/-(0.633)U	-0.0922 +/-(0.376)U	0.00775 +/-(0.366)U
Radium-228	pCi/L	0.137 +/-(0.351)U	0.281 +/-(0.352)U	0.171 +/-(0.301)U	0.390 +/-(0.376)UJ	0.430 +/-(0.370)U	0.0499 +/-(0.281)U	0.238 +/-(0.433)U	0.0992 +/-(0.429)U	0.278 +/-(0.543)U	0.284 +/-(0.583)U	0.188 +/-(0.451)U
Radium-226+228	pCi/L	0.369 +/-(0.610)U	0.571 +/-(0.473)U	0.487 +/-(0.498)U	0.822 +/-(0.501)J	0.574 +/-(0.634)U	0.770 +/-(0.693)U	0.620 +/-(0.693)U	0.271 +/-(0.597)U	0.870 +/-(0.834)U	0.284 +/-(0.694)U	0.195 +/-(0.581)U
Anions												
Chloride	mg/L	6.56	10.2	9.13	9.14	9.31	9.01	9.23	9.81	9.31	9.36	9.47
Fluoride	mg/L	0.137	0.117	0.168	0.149	0.142	0.124	0.153	0.107	0.159	0.161	0.150
Sulfate	mg/L	144	142	234	204	208 J	160 J	137	112	148	148	201
General Chemistry												
Alkalinity, Bicarbonate	mg/L	310	306	270	288	299	308	303	296	291	291	281
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<2.60	<2.60	<5.00	<2.60	<2.60	<5.00	<2.60	<2.60	<2.60
pH (lab)	SU	-	7.3 J	-	-	8.0 J	-	-	7.8 J	7.2 J	7.3 J	-
Total Dissolved Solids	mg/L	539	464	627	621	654	565	526	473	552	549	665

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		10-36						JSF-106				
Sample Date		15-Jul-21	10-Aug-21	21-Jan-22	2-Mar-22	21-Jul-22	30-Aug-22	13-Aug-19	13-Aug-19	8-Oct-19	3-Dec-19	4-Feb-20
Sample ID		JSF-GW-10-36-07152021	JSF-GW-10-36-08102021	JSF-GW-10-36-01212022	JSF-GW-10-36-03022022	JSF-GW-10-36-07212022	JSF-GW-10-36-08302022	JSF-GW-022-20190813	JSF-GW-DUP01-20190813	JSF-GW-022-20191008	JSF-GW-022-20191203	JSF-GW-022-20200204
Parent Sample ID									JSF-GW-022-20190813			
Intake Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	16 ft	16 ft	16 ft	16 ft	16 ft
Sample Type		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	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	EIP	EIP	EIP	EIP	EIP
Total Metals												
Aluminum	ug/L	<34.0	<34.0	12.8 J	<15.5	<34.0	<34.0	-	-	-	-	-
Antimony	ug/L	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570	<0.378	<0.378	<0.378	<0.378	<0.570
Arsenic	ug/L	<0.750	<0.750	0.407 J	<0.282	<0.750	<0.750	0.492 U*	0.401 U*	0.380 J	0.412 J	<0.750
Barium	ug/L	38.1	31.7	45.4	49.3	42.1	36.0	76.4	72.9	75.4	52.6	46.0
Beryllium	ug/L	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620	<0.182	<0.182	<0.182	<0.182	<0.305
Boron	ug/L	135	133 J	199	133	122	127 J	308 U*	297 U*	308	126	88.4
Cadmium	ug/L	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197	<0.125	<0.125	<0.125	<0.125	<0.197
Calcium	ug/L	111,000	95,100 J	130,000	148,000	124,000	108,000 J	123,000	119,000	115,000	62,900	75,900
Chromium	ug/L	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47	2.99 U*	2.64 U*	2.17 U*	2.12 U*	<0.980
Cobalt	ug/L	0.443 J	0.286 J	0.184 J	<0.261	0.217 J	<0.190	2.06	1.96	0.550	0.171 J	<0.190
Copper	ug/L	<1.70	<1.70	<0.627	<1.14	<1.70	<1.70	1.52 U*	1.30 U*	2.48 U*	1.49 J	<1.70
Iron	ug/L	90.7 J	<47.0	89.4	<27.7	91.2 U*	<47.0	-	-	-	-	-
Lead	ug/L	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450	<0.128	<0.128	<0.128	<0.128	<0.450
Lithium	ug/L	26.9	21.3	28.4	18.1	23.8	22.3	<3.39	<3.39	<3.39	<3.39	<1.65
Magnesium	ug/L	25,000	21,800	25,600	29,300	26,900	23,300	13,800	13,400	12,100	8,870	10,900
Manganese	ug/L	428	225 J	113	15.7	317	205	-	-	-	-	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	<1.08	<1.08	<0.610	<0.610	<1.08	<1.08	<0.610	<0.610	<0.610	1.23 J	1.49 U*
Nickel	ug/L	<1.47	<1.47	<0.336	0.540 J	<1.47	<1.47	3.14	2.98	2.14	1.27 U*	<1.47
Potassium	ug/L	920 J	709 J	806	1,120	914 J	746 J	2,820	2,720	2,650	3,030	2,570
Selenium	ug/L	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890	<1.51	<1.51	<1.51	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530	<0.177	<0.177	<0.177	<0.177	<0.0530
Sodium	ug/L	28,000	24,200	29,000	45,300	29,000	25,900	44,800	43,000	32,900	40,100	16,400
Strontium	ug/L	1,060	941	1,250	1,100	1,160	1,030	-	-	-	-	-
Thallium	ug/L	0.290 J	<0.200	<0.148	<0.472	<0.200	<0.200	<0.148	<0.148	<0.148	<0.148	<0.200
Tin	ug/L	<3.00	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.991	0.860 J	<0.820	<0.820	1.66 U*	1.45 U*	<0.991	1.28 U*	<0.820
Zinc	ug/L	<15.0	<15.0	<3.22	<2.88	<15.0	<15.0	5.87 U*	9.00 U*	5.57 U*	7.58 U*	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.0959 +/-(0.324)U	0.385 +/-(0.412)U	-0.0425 +/-(0.149)U	0.316 +/-(0.436)U	0.417 +/-(0.406)U	0.440 +/-(0.543)U	0.895 +/-(0.598)	0.626 +/-(0.565)U	0.716 +/-(0.619)U	0.404 +/-(0.525)U	0.0911 +/-(0.404)U
Radium-228	pCi/L	0.182 +/-(0.255)U	-0.0706 +/-(0.235)U	0.324 +/-(0.334)U	-0.0115 +/-(0.378)U	0.498 +/-(0.580)U	1.05 +/-(0.714)	0.00814 +/-(0.196)U	-0.0911 +/-(0.297)U	0.458 +/-(0.489)U	0.0739 +/-(0.304)U	0.101 +/-(0.375)U
Radium-226+228	pCi/L	0.278 +/-(0.412)U	0.385 +/-(0.474)U	0.324 +/-(0.366)U	0.316 +/-(0.577)U	0.915 +/-(0.708)U	1.49 +/-(0.897)J	0.903 +/-(0.629)J	0.626 +/-(0.639)U	1.17 +/-(0.789)U	0.478 +/-(0.607)U	0.192 +/-(0.551)U
Anions												
Chloride	mg/L	9.48	9.46	10.5	10.4	9.75	9.17	9.71	9.68	10.5	9.70	4.74
Fluoride	mg/L	0.137	0.155	0.177	0.186 U*	0.135	0.130	0.0791 J	0.0801 J	0.0732 U*	0.112	0.116
Sulfate	mg/L	138	123	134	194	172	139	113	113	108	110	105
General Chemistry												
Alkalinity, Bicarbonate	mg/L	331	310	304	340	294	299	218	223	263	141	125
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	<5.00	<5.00	<2.60
pH (lab)	SU	7.3 J	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	518	483	529	626	459	472	464	470	461	348	354

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-106							JSF-107			
Sample Date		7-Apr-20	9-Jun-20	18-Feb-21	18-Feb-21	19-Jul-21	25-Jan-22	27-Jul-22	14-Aug-19	5-Feb-20	9-Apr-20	11-Jun-20
Sample ID		JSF-GW-022-20200407	JSF-GW-022-20200609	JSF-GW-FD-02182021	JSF-GW-JSF-106-02182021	JSF-GW-JSF-106-07192021	JSF-GW-JSF-106-01252022	JSF-GW-JSF-106-07272022	JSF-GW-023-20190814	JSF-GW-023-20200205	JSF-GW-023-20200409	JSF-GW-023-20200611
Parent Sample ID				JSF-GW-JSF-106-02182021								
Intake Depth		16 ft	16 ft	16 ft	16 ft	16 ft	16 ft	16 ft	37.5 ft	37.5 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	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	EIP	EIP	EIP	EIP
Total Metals												
Aluminum	ug/L	-	-	<34.0	<34.0	22.1 J	20.9 J	<15.5	-	-	-	-
Antimony	ug/L	<0.570	<0.570	<0.570	0.599 J	1.06 J	<0.378	0.691 J	<0.378	<0.570	<0.570	<0.570
Arsenic	ug/L	<0.750	<0.750	0.897 U*	1.29 U*	0.762 J	0.854 J	2.03	<0.323	<0.750	<0.750	<0.750
Barium	ug/L	37.5	42.6	36.1	35.9	45.9	37.9 J	62.8	26.9	27.8	22.6	21.8
Beryllium	ug/L	<0.305	<0.305	<0.305	0.607 J	<0.182	<0.182	<0.274	<0.182	<0.305	<0.305	<0.305
Boron	ug/L	87.9	110	85.4	87.6	147	183 U*	171	5,100	5,320	4,470	4,430
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.217	0.206 J	0.277 J	0.426 J	<0.197
Calcium	ug/L	69,500	75,500	59,000	60,100	80,400	62,200	96,600 J	82,600	79,400	74,700	76,900
Chromium	ug/L	<0.980	<0.980	<0.980	<0.980	<1.53	<1.53	<1.53	<1.53	<0.980	8.02	<0.980
Cobalt	ug/L	0.199 J	<0.190	<0.190	0.232 J	<0.134	0.156 J	<0.261	0.427 J	<0.190	<0.190	<0.190
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	1.16 J	<0.627	2.04	<0.627	<1.70	<1.70	<1.70
Iron	ug/L	-	-	<47.0	<47.0	<19.5	32.6 J	<27.7	-	-	-	-
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.128	<0.128	0.218 U*	<0.128	<0.450	<0.450	<0.450
Lithium	ug/L	<1.65	<1.65	<1.65	<1.65	<3.39	<3.39	0.937 J	<3.39	<1.65	<1.65	<1.65
Magnesium	ug/L	9,390	10,400	9,270	9,190	8,520	9,100	13,300	10,300	8,760	8,440	8,940
Manganese	ug/L	-	-	<2.06	<2.06	3.00 J	1.08 J	1.65 J	-	-	-	-
Mercury	ug/L	0.139 U*	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	7.88	1.91 J	1.42 J	1.80 J	1.56 J	1.91 J	2.67 J	1,070	886	1,160	849
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	0.948 J	0.428 J	1.22	1.60 U*	<1.47	<1.47	<1.47
Potassium	ug/L	2,300	2,820	2,100	2,210	2,180	2,450	4,000	1,580	1,480	1,370	1,360
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51	<0.739	<1.51	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	2,990	2,960	3,850	2,870	4,440	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	0.177 UJ	<0.223	<0.177	<0.0530	<0.0530	<0.0530
Sodium	ug/L	11,500	10,900	14,000	14,100	11,100	17,600	14,200	6,910	6,210	5,360	6,160
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	1.26	0.275 J	<0.200	0.505 J	<0.148	0.292 J	<0.472	<0.148	<0.200	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991	<0.776	<0.991	<0.820	<0.820	<0.820
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<3.22	<3.22	5.13 U*	4.76 J	21.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.124 +/-(0.446)U	0.0703 +/-(0.184)U	0.232 +/-(0.542)U	-0.00843 +/-(0.413)U	0.256 +/-(0.299)U	0.267 +/-(0.295)U	0.277 +/-(0.410)U	0.763 +/-(0.562)	0.246 +/-(0.525)U	0.508 +/-(0.586)U	-0.00429 +/-(0.529)U
Radium-228	pCi/L	-0.198 +/-(0.307)U	0.325 +/-(0.295)U	1.43 +/-(0.586)U*	0.0374 +/-(0.298)U	0.456 +/-(0.465)U	-0.281 +/-(0.204)U	0.332 +/-(0.380)U	0.120 +/-(0.360)U	0.0237 +/-(0.266)U	-0.0163 +/-(0.323)U	0.142 +/-(0.298)U
Radium-226+228	pCi/L	0.124 +/-(0.542)U	0.395 +/-(0.347)U	1.66 +/-(0.798)U*	0.0374 +/-(0.510)U	0.712 +/-(0.553)U	0.267 +/-(0.359)U	0.609 +/-(0.559)U	0.884 +/-(0.668)J	0.270 +/-(0.589)U	0.508 +/-(0.669)U	0.142 +/-(0.607)U
Anions												
Chloride	mg/L	3.23	3.19	2.79	2.78	3.42	2.89	2.81	2.61	3.10	3.24	3.69
Fluoride	mg/L	0.132	0.132	0.0891	0.0854	0.0870	0.109	0.111	0.730	0.759	0.829	0.640
Sulfate	mg/L	71.9	77.9	66.8 J	116 J	63.9	78.1	149	128	138	139	140
General Chemistry												
Alkalinity, Bicarbonate	mg/L	153	149	108 J	63.7 J	139	126	116	110	111	95.3	113
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60	<5.00	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	275	303	266	271	291	282	372	286	335	352	328

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-107			JSF-108						
Sample Date		18-Feb-21	21-Jul-21	27-Jul-22	14-Aug-19	9-Oct-19	4-Dec-19	6-Feb-20	9-Apr-20	11-Jun-20	17-Feb-21
Sample ID		JSF-GW-JSF-107-02182021	JSF-GW-JSF-107-07212021	JSF-GW-JSF-107-07272022	JSF-GW-024-20190814	JSF-GW-024-20191009	JSF-GW-024-20191204	JSF-GW-024-20200206	JSF-GW-024-20200409	JSF-GW-024-20200611	JSF-GW-JSF-108-02172021
Parent Sample ID											
Intake Depth		37.5 ft	37.5 ft	37.5 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 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	EIP	EIP	EIP	EIP	EIP	EIP	CCR Program
Total Metals											
Aluminum	ug/L	<34.0	<12.5	<15.5	-	-	-	-	-	-	<34.0
Antimony	ug/L	0.693 J	<0.378	0.508 J	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	<0.750	<0.313	0.380 J	<0.323	0.438 J	0.428 J	<0.750	<0.750	1.06 J	1.23 U*
Barium	ug/L	28.0	28.5	27.5	44.0	58.3	58.8	53.2	51.0	49.5	44.5
Beryllium	ug/L	<0.305	<0.182	<0.274	<0.182	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	4,280	4,310	3,960	5,770	5,570	4,830	5,920	5,480	5,420	5,740
Cadmium	ug/L	0.339 J	<0.217	0.227 J	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	74,100	85,600	80,000 J	193,000	167,000	171,000	182,000	174,000	168,000	167,000
Chromium	ug/L	<0.980	<1.53	<1.53	<1.53	1.85 U*	<1.53	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	<0.190	<0.134	<0.261	0.332 J	2.81	3.65	3.45	8.47	8.42	3.54
Copper	ug/L	<1.70	<0.627	<1.14	<0.627	1.18 U*	<0.627	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	<47.0	<19.5	<27.7	-	-	-	-	-	-	457
Lead	ug/L	<0.450	<0.128	0.267 U*	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	<1.65	<3.39	0.929 J	<3.39	<3.39	<3.39	<1.65	<1.65	<1.65	<1.65
Magnesium	ug/L	8,490	8,960	7,290	36,500	34,200	32,900	34,700	33,100	32,600	34,000
Manganese	ug/L	40.8	2.43 J	6.96	-	-	-	-	-	-	6,140
Mercury	ug/L	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	1,170	1,380	1,250	16.5	45.1	48.7	51.6	48.8	38.6	62.6
Nickel	ug/L	<1.47	0.485 J	<0.517	1.94 U*	1.96	1.76 U*	1.63 J	1.61 J	1.89 J	1.65 J
Potassium	ug/L	1,380	1,410	1,410	1,070	756	697	743 J	751 J	789 J	741 J
Selenium	ug/L	<0.890	<1.51	<0.739	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	4,340	3,800	3,490	-	-	-	-	-	-	3,360
Silver	ug/L	<0.0530	<0.177	<0.223	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	5,990	6,330	6,270	34,200	19,200	17,700	20,700	22,100	24,500	19,000
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.200	<0.148	<0.472	<0.148	<0.148	<0.148	<0.200	<0.200	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.991	<0.776	<0.991	<0.991	<0.991	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	<15.0	<3.22	10.9 U*	<3.22	4.07 U*	<3.22	<15.0	<15.0	<15.0	<15.0
Radiological Parameters											
Radium-226	pCi/L	1.26 +/-(0.791)	-0.141 +/-(0.310)U	0.112 +/-(0.396)U	0.392 +/-(0.435)U	0.206 +/-(0.434)U	0.309 +/-(0.452)U	0.229 +/-(0.530)U	0.0518 +/-(0.437)U	0.210 +/-(0.547)U	0.103 +/-(0.422)U
Radium-228	pCi/L	-0.0227 +/-(0.241)U	0.343 +/-(0.458)U	0.286 +/-(0.329)U	0.0808 +/-(0.418)U	0.216 +/-(0.529)U	0.398 +/-(0.477)U	-0.115 +/-(0.400)U	1.42 +/-(0.584)	-0.0315 +/-(0.430)U	0.537 +/-(0.555)U
Radium-226+228	pCi/L	1.26 +/-(0.827)J	0.343 +/-(0.553)U	0.398 +/-(0.515)U	0.472 +/-(0.603)U	0.422 +/-(0.684)U	0.707 +/-(0.657)U	0.229 +/-(0.665)U	1.48 +/-(0.730)J	0.210 +/-(0.696)U	0.640 +/-(0.698)U
Anions											
Chloride	mg/L	3.57	3.57	3.23	11.4	10.4	9.10	10.7	11.3	12.5	12.9
Fluoride	mg/L	1.04	1.07	1.18	0.165	0.153	0.200	0.224	0.408	0.199	0.215
Sulfate	mg/L	129	130	108	263	258	242	281	288	274	296
General Chemistry											
Alkalinity, Bicarbonate	mg/L	110	111	112	362	364	367	335	356	360	331
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	314	333	258	738	745	753	785	888	762	751

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-108			JSF-109						
Sample Date		21-Jul-21	25-Jan-22	27-Jul-22	14-Aug-19	9-Oct-19	4-Dec-19	6-Feb-20	9-Apr-20	11-Jun-20	17-Feb-21
Sample ID		JSF-GW-JSF-108-07212021	JSF-GW-JSF-108-01252022	JSF-GW-JSF-108-07272022	JSF-GW-025-20190814	JSF-GW-025-20191009	JSF-GW-025-20191204	JSF-GW-025-20200206	JSF-GW-025-20200409	JSF-GW-025-20200611	JSF-GW-JSF-109-02172021
Parent Sample ID											
Intake Depth		50 ft	50 ft	50 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 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	EIP	EIP	EIP	EIP	EIP	EIP	CCR Program
Total Metals											
Aluminum	ug/L	<12.5	<12.5	<15.5	-	-	-	-	-	-	<34.0
Antimony	ug/L	0.979 J	0.866 J	1.49 J	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	0.935 J
Arsenic	ug/L	0.861 J	0.374 J	0.337 J	15.5	7.97	4.22	3.98 J	8.90	19.9	9.59
Barium	ug/L	46.3	40.7 J	42.6	47.3	56.3	47.9	38.4	34.5	45.1	21.8
Beryllium	ug/L	<0.182	<0.182	<0.274	<0.182	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	5,860	6,540	6,080	191 U*	150	115	139	128	119	109
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	190,000	172,000	222,000 J	246,000	211,000	204,000	220,000	182,000	146,000	114,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	2.45 U*	1.66 U*	19.2	<0.980	<0.980	<0.980
Cobalt	ug/L	3.16	2.84	0.808	11.1	8.90	5.16	5.34	6.38	9.74	3.34
Copper	ug/L	<0.627	<0.627	<1.14	<0.627	1.76 U*	0.909 J	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	494	193	28.7 J	-	-	-	-	-	-	1,320
Lead	ug/L	<0.128	<0.128	<0.167	0.134 J	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	<3.39	<3.39	0.916 J	<3.39	6.17	3.68 J	<1.65	2.64 J	4.09 J	<1.65
Magnesium	ug/L	36,300	33,300	36,000	27,300	24,300	23,100	25,100	21,100	16,900	14,000
Manganese	ug/L	5,150	6,140	3,820	-	-	-	-	-	-	4,130
Mercury	ug/L	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	42.9	64.4	46.3	4.81 J	5.58	6.98	9.57	10.6	6.09	8.63
Nickel	ug/L	1.49	1.13	1.20	1.68 U*	3.36	2.29	14.0	4.82	2.91	1.58 J
Potassium	ug/L	771	717	808	2,600	2,150	1,910	2,040	2,180	2,180	1,460
Selenium	ug/L	<1.51	<1.51	<0.739	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	3,540	2,910	3,420	-	-	-	-	-	-	17,400
Silver	ug/L	<0.177	0.177 UJ	<0.223	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	32,100	16,900	45,700	873,000	595,000	485,000	483,000	500,000	531,000	396,000
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.148	0.172 J	<0.472	<0.148	<0.148	<0.148	<0.200	<0.200	0.230 J	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	<0.776	<0.991	1.24	1.30 U*	<0.820	1.03 J	1.02 J	2.21 J
Zinc	ug/L	<3.22	<3.22	3.05 U*	4.34 J	5.36 U*	<3.22	<15.0	<15.0	<15.0	<15.0
Radiological Parameters											
Radium-226	pCi/L	0.0152 +/-(0.221)U	-0.116 +/-(0.406)U	0.268 +/-(0.367)U	0.761 +/-(0.577)	0.156 +/-(0.497)U	0.451 +/-(0.548)U	0.937 +/-(0.662)U	0.746 +/-(0.627)U	0.183 +/-(0.425)U	0.243 +/-(0.443)U
Radium-228	pCi/L	0.301 +/-(0.357)U	0.292 +/-(0.297)U	0.306 +/-(0.364)U	-0.195 +/-(0.386)U	0.156 +/-(0.410)U	-0.223 +/-(0.342)U	0.260 +/-(0.384)U	-0.0535 +/-(0.299)U	0.102 +/-(0.300)U	0.997 +/-(0.604)
Radium-226+228	pCi/L	0.316 +/-(0.420)U	0.292 +/-(0.503)U	0.575 +/-(0.517)U	0.761 +/-(0.694)J	0.311 +/-(0.644)U	0.451 +/-(0.646)U	1.20 +/-(0.765)U	0.746 +/-(0.695)U	0.285 +/-(0.521)U	1.24 +/-(0.749)J
Anions											
Chloride	mg/L	20.0	11.6	39.6	559	431	416	392	481	417	223
Fluoride	mg/L	0.208	0.229	0.211	0.179 J	0.173 J	0.210 J	0.217	0.244	0.322	0.281
Sulfate	mg/L	294	246	317	751	638	468	410	410	348	324
General Chemistry											
Alkalinity, Bicarbonate	mg/L	352	354	318	725	613	628	601	720	647	648
Alkalinity, Carbonate	mg/L	<2.60	<5.00	<2.60	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	809	749	841	2,600	2,450	2,000	1,890	1,930	1,580	1,540

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-109					JSF-110			
Sample Date		22-Jul-21	26-Jan-22	26-Jan-22	28-Jul-22	28-Jul-22	12-Aug-19	4-Dec-19	4-Feb-20	7-Apr-20
Sample ID		JSF-GW-JSF-109-07222021	JSF-GW-FD03-01262022	JSF-GW-JSF-109-01262022	JSF-GW-FD02-07282022	JSF-GW-JSF-109-07282022	JSF-GW-026-20190812	JSF-GW-026-20191204	JSF-GW-026-20200204	JSF-GW-026-20200407
Parent Sample ID			JSF-GW-JSF-109-01262022		JSF-GW-JSF-109-07282022					
Intake Depth		45 ft	45 ft	45 ft	45 ft	45 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
Program	Units	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	EIP	EIP	EIP	EIP
Total Metals										
Aluminum	ug/L	<12.5	<12.5	<12.5	<15.5	<15.5	-	-	-	-
Antimony	ug/L	<0.378	1.16 J	1.22 J	5.61	5.48	<0.378	<0.378	1.12 J	<0.570
Arsenic	ug/L	13.2	7.47	7.31	10.0	9.94	0.413 U*	0.411 J	<0.750	<0.750
Barium	ug/L	27.7	16.7 J	14.9 J	42.6	43.2	45.1	85.2	54.4	74.2
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.274	<0.274	<0.182	<0.182	0.340 J	0.354 J
Boron	ug/L	128	165 U*	158 U*	123	116	<38.6	<38.6	<16.0	<16.0
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.197	<0.197
Calcium	ug/L	96,700	107,000	109,000	112,000 J	109,000 J	11,300	53,000	11,200	7,400
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	3.84 U*	2.32 U*	<0.980	<0.980
Cobalt	ug/L	5.74	0.453 J	0.369 J	17.7	17.3	2.73	0.900	1.54	1.56
Copper	ug/L	<0.627	3.20	3.26	1.37 J	<1.14	1.20 U*	1.15 J	<1.70	<1.70
Iron	ug/L	3,220	143	147	3,310	3,210	-	-	-	-
Lead	ug/L	<0.128	<0.128	<0.128	0.356 J	0.223 J	0.537 J	<0.128	<0.450	<0.450
Lithium	ug/L	4.34 J	<3.39	<3.39	3.45 J	3.31 J	4.47 U*	<3.39	<1.65	<1.65
Magnesium	ug/L	10,400	13,300	13,100	11,800	11,700	817	2,650	752 J	539 J
Manganese	ug/L	4,390	701	706	5,400	5,230	-	-	-	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.130	<0.130
Molybdenum	ug/L	4.78 J	7.09	6.88	4.56 J	4.45 J	<0.610	<0.610	7.96	<1.08
Nickel	ug/L	2.46	1.96	2.27	2.49	2.29	20.2	2.16	1.54 U*	2.01
Potassium	ug/L	1,870	1,370	1,360	1,580	1,530	725	1,000	329 J	412 J
Selenium	ug/L	<1.51	<1.51	<1.51	<0.739	<0.739	<1.51	<1.51	<0.890	<0.890
Silicon	ug/L	20,100	15,600	15,500	19,000	18,700	-	-	-	-
Silver	ug/L	<0.177	0.177 UJ	0.177 UJ	<0.223	<0.223	<0.177	<0.177	<0.0530	<0.0530
Sodium	ug/L	412,000	305,000	304,000	333,000	334,000	2,160	20,200	1,850	5,490
Strontium	ug/L	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.148	<0.148	<0.148	<0.472	<0.472	<0.148	<0.148	1.12 U*	0.254 J
Tin	ug/L	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.04	4.42	4.32	2.23	2.16	2.56 U*	1.47 U*	<0.820	<0.820
Zinc	ug/L	<3.22	<3.22	<3.22	14.3 U*	6.65 U*	11.1 U*	12.4 U*	<15.0	<15.0
Radiological Parameters										
Radium-226	pCi/L	-0.203 +/-(0.266)U	-0.123 +/-(0.270)U	0.0339 +/-(0.357)U	0.0684 +/-(0.362)U	-0.0355 +/-(0.424)U	0.692 +/-(0.624)U	0.979 +/-(0.655)U*	0.463 +/-(0.526)U	0.204 +/-(0.361)U
Radium-228	pCi/L	0.336 +/-(0.558)U	0.516 +/-(0.465)U	0.376 +/-(0.392)U	0.245 +/-(0.372)U	0.378 +/-(0.381)U	0.928 +/-(0.416)	0.0514 +/-(0.301)U	-0.118 +/-(0.245)U	0.0579 +/-(0.245)U
Radium-226+228	pCi/L	0.336 +/-(0.618)U	0.516 +/-(0.538)U	0.410 +/-(0.530)U	0.314 +/-(0.519)U	0.378 +/-(0.570)U	1.62 +/-(0.750)J	1.03 +/-(0.721)U*	0.463 +/-(0.580)U	0.262 +/-(0.436)U
Anions										
Chloride	mg/L	119	81.2	80.6	54.5	54.5	2.32	4.04	3.22	7.76
Fluoride	mg/L	0.316	0.235	0.275	0.246 U*	0.379 U*	0.0346 J	0.0692 J	0.0454 J	0.0493 J
Sulfate	mg/L	248	192	192	161	161	4.80	73.7	11.4	10.6
General Chemistry										
Alkalinity, Bicarbonate	mg/L	717	665	655	643	643	31.4	155	17.6	12.1
Alkalinity, Carbonate	mg/L	<2.60	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	1,370	1,150	1,130	914	884	55.0	279	98.0 J	47.0

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-110		JSF-200								
Sample Date		9-Jun-20	15-Feb-21	23-Jan-19	23-Jan-19	29-Jan-19	4-Feb-19	4-Feb-19	19-Feb-19	26-Feb-19	26-Feb-19	5-Mar-19
Sample ID		JSF-GW-026-20200609	JSF-GW-JSF-110-02152021	JSF-GW-016-01232019	JSF-GW-903-01232019	JSF-GW-016-01292019	JSF-GW-016-02042019	JSF-GW-903-02042019	JSF-GW-016-02192019	JSF-GW-016-02262019	JSF-GW-903-02262019	JSF-GW-016-03052019
Parent Sample ID					JSF-GW-016-01232019			JSF-GW-016-02042019			JSF-GW-016-02262019	
Intake Depth		17 ft	17 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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	Field Duplicate 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	CCR Program
Total Metals												
Aluminum	ug/L	-	63.6	<11.8	<11.8	<11.8	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Antimony	ug/L	<0.570	0.647 J	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.750	2.13 U*	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323
Barium	ug/L	55.3	50.5	202	204	240	212	205	211	217	208	205
Beryllium	ug/L	<0.305	0.975 J	<0.057	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	<16.0	136	<30.3	<30.3	<30.3	<30.3	<30.3	31.1 J	<30.3	<30.3	<30.3
Cadmium	ug/L	<0.197	0.253 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	5,880	18,400	99,600 J	101,000 J	95,900	96,100	93,600	103,000	103,000	100,000	96,700 J
Chromium	ug/L	<0.980	<0.980	1.73 U*	1.12 U*	<0.631	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	1.08	1.61	0.147 J	0.146 J	0.168 J	0.165 J	0.145 J	0.172 J	0.154 J	0.141 J	0.14 J
Copper	ug/L	<1.70	<1.70	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	-	<47.0	35.6 J	35.8 J	<14.1	24.8 J	24.6 J	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	<0.450	<0.450	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<1.65	2.55 J	12.9	13.1	12.1	17.2 U*	14.5 U*	14.3	14.6 U*	14.4 U*	12.7
Magnesium	ug/L	420 J	1,220	7,210	7,170	7,560	6,690	6,470	6,770	6,850	6,590	6,430
Manganese	ug/L	-	31.1	102	103	101	94.5	90.4	80	77.9	75.5	65.9
Mercury	ug/L	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<1.08	<1.08	<0.474	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	<1.47	1.96 J	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312
Potassium	ug/L	304 J	577 J	753	765	826	727	713	732	807 U*	778 U*	727
Selenium	ug/L	<0.890	1.32 J	<0.813	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	5,310	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	-	-	-	-	-	-	-	-	-
Sodium	ug/L	1,480	38,600	5,030	5,010	5,140	4,940	4,760	4,120	3,860	3,690	3,530
Strontium	ug/L	-	-	529	542	572	573	556	482	536	502	457
Thallium	ug/L	<0.200	0.930 J	<0.063	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	-	-	-	-	-	-	-	-	-
Zinc	ug/L	<15.0	<15.0	-	-	-	-	-	-	-	-	-
Radiological Parameters												
Radium-226	pCi/L	-0.0135 +/-(0.304)U	0.391 +/-(0.575)U	0.234 +/-(0.0950)	0.196 +/-(0.0936)	0.103 +/-(0.0739)J	0.139 +/-(0.0714)J	0.136 +/-(0.0802)J	0.195 +/-(0.0852)J	0.257 +/-(0.109)	0.149 +/-(0.0778)	0.157 +/-(0.0880)
Radium-228	pCi/L	-0.674 +/-(0.447)U	0.239 +/-(0.368)U	0.389 +/-(0.245)	0.515 +/-(0.262)	0.166 +/-(0.233)U	0.135 +/-(0.230)UJ	0.251 +/-(0.239)UJ	0.0765 +/-(0.231)U	0.445 +/-(0.292)J	-0.0242 +/-(0.152)UJ	-0.00624 +/-(0.194)U
Radium-226+228	pCi/L	0.000 +/-(0.541)U	0.630 +/-(0.683)U	0.623 +/-(0.263)	0.712 +/-(0.278)	0.269 +/-(0.244)J	0.274 +/-(0.241)J	0.387 +/-(0.252)J	0.272 +/-(0.246)J	0.702 +/-(0.312)J	0.149 +/-(0.171)J	0.157 +/-(0.213)J
Anions												
Chloride	mg/L	2.63	8.53	9.98	9.40	9.77	9.22	8.90	10.3	10.0	10.6	8.60
Fluoride	mg/L	0.0363 J	0.0305 J	<0.0263	0.0682 J	0.0273 U*	0.0328 J	0.0337 J	0.0348 J	<0.0263	0.0449 J	0.0278 J
Sulfate	mg/L	10.7	43.6	14.6	15.5	15.5	16.1	15.7	14.0	12.3	13.5	10.7
General Chemistry												
Alkalinity, Bicarbonate	mg/L	8.95	45.6	285	287	267	287	267	282	284	282	282
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	35.0 J	130	306	296	320	318	302	299	314	309	258

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-200										
Sample Date		19-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	11-Jun-19	10-Sep-19	21-Nov-19	7-Jan-20	4-Feb-20	7-Jul-20	11-Aug-20
Sample ID		JSF-GW-016-03192019	JSF-GW-903-03192019	JSF-GW-016-03262019	JSF-GW-016-04012019	JSF-GW-016-06112019	JSF-GW-016-09102019	JSF-GW-016-11212019	JSF-GW-016-01072020	JSF-GW-016-02042020	JSF-GW-016-07072020	JSF-GW-016-08112020
Parent Sample ID			JSF-GW-016-03192019									
Intake Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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
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	41.3 U*	<12.5	<34.0	<34.0	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	<0.323	<0.323	<0.323	<0.323	0.355 J	0.515 U*	<0.323	<0.750	<0.750	<0.750	<0.750
Barium	ug/L	188	194	231	202	228	203	214	182	195	185	188
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	41.4 J	17.7 J	18.4 J	17.6 J	16.1 J
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	96,200	98,500	102,000	103,000	101,000	101,000	102,000	95,400	100,000	99,700	103,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	2.17 U*	3.14 U*	<1.53	<0.980	<0.980	<0.980	1.13 J
Cobalt	ug/L	<0.075	0.076 J	0.151 J	<0.075	0.145 J	0.243 U*	0.106 U*	<0.190	<0.190	<0.190	<0.190
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	0.828 U*	<0.627	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	<14.1	<14.1	<14.1	<14.1	94.7 U*	43.6 J	58.5	67.8 J	68.0 J	<47.0	<47.0
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	13.6	14.4	12.9	12.3	12.4	14.2	13.5	11.4	10.9	16.0 U*	14.4
Magnesium	ug/L	5,930	6,120	6,730	6,030	7,030	6,820	7,110	6,280	6,410	6,300	6,740
Manganese	ug/L	67.1	68.8	71.3	74.5 J	74.8	62.5	70.4	52.2	52.6	43.0	49.9
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.130 UJ	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.610	<0.610	<1.08	<1.08	<1.08	<1.08
Nickel	ug/L	<0.312	<0.312	<0.312	<0.312	<0.312	<0.336	<0.336	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	668	682	747	706	734	708	799	697 J	709 J	696 J	719 J
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	<0.121	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	3,260	3,360	3,930	3,750	5,100	5,390	6,320	5,000	4,480	3,850	4,390
Strontium	ug/L	499	514	553	535	508	558	501	537	509	547	555
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.200	<0.200	<0.200	0.255 J
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	-	1.31 U*	1.81 U*	1.15 U*	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	-	-	-	-	<3.22	<3.22	4.04 J	<15.0	<15.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.263 +/-(0.102)J	0.283 +/-(0.103)J	0.192 +/-(0.0848)	0.267 +/-(0.109)	0.288 +/-(0.130)	0.104 +/-(0.366)U	0.319 +/-(0.361)U	0.376 +/-(0.448)U	0.172 +/-(0.399)U	0.820 +/-(0.678)U	0.293 +/-(0.544)U
Radium-228	pCi/L	0.165 +/-(0.231)U	0.258 +/-(0.233)U	0.316 +/-(0.240)U	0.664 +/-(0.329)	0.198 +/-(0.390)U	-0.0658 +/-(0.333)U	0.475 +/-(0.290)	0.145 +/-(0.356)U	0.0374 +/-(0.244)UJ	-0.135 +/-(0.260)U	0.397 +/-(0.306)U
Radium-226+228	pCi/L	0.428 +/-(0.253)J	0.541 +/-(0.255)J	0.508 +/-(0.255)J	0.932 +/-(0.347)	0.485 +/-(0.411)J	0.104 +/-(0.495)U	0.794 +/-(0.463)J	0.521 +/-(0.572)U	0.210 +/-(0.468)UJ	0.820 +/-(0.727)U	0.690 +/-(0.625)U
Anions												
Chloride	mg/L	7.68	7.72	7.55	7.24	7.74	7.40	9.33	9.77	9.38	8.13	8.46
Fluoride	mg/L	0.0356 J	0.0365 J	0.0395 J	0.0364 J	0.0391 J	0.0472 J	0.0494 J	0.0413 J	0.0414 J	0.0410 J	0.0440 J
Sulfate	mg/L	11.9	11.8	12.3	12.7	14.6	18.1	19.5	18.3	17.2	16.8 J	17.0
General Chemistry												
Alkalinity, Bicarbonate	mg/L	302	274	290	278	262	261	268	249	249	253	256
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	294	282	300	310	322	317	282	311	314	335	305

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-200								JSF-201		
Sample Date		12-Jan-21	9-Feb-21	14-Jul-21	10-Aug-21	19-Jan-22	1-Mar-22	20-Jul-22	30-Aug-22	24-Jan-19	30-Jan-19	5-Feb-19
Sample ID		JSF-GW-JSF-200-01122021	JSF-GW-JSF-200-02092021	JSF-GW-JSF-200-07142021	JSF-GW-JSF-200-08102021	JSF-GW-JSF-200-01192022	JSF-GW-JSF-200-03012022	JSF-GW-JSF-200-07202022	JSF-GW-JSF-200-08302022	JSF-GW-017-01242019	JSF-GW-017-01302019	JSF-GW-017-02052019
Parent Sample ID												
Intake Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	36 ft	36 ft	36 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	<34.0	<34.0	<34.0	<34.0	<12.5	<15.5	<34.0	<34.0	<11.8	38.4	<12.5
Antimony	ug/L	<0.570	<0.570	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570	<1.12	<1.12	<0.378
Arsenic	ug/L	<0.750	<0.750	<0.750	<0.750	<0.313	0.333 U*	<0.750	<0.750	<0.323	<0.323	<0.323
Barium	ug/L	167	187	163	170	182	176	174	166	96.9	104	95.3
Beryllium	ug/L	<0.305	<0.305	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620	<0.057	<0.057	<0.155
Boron	ug/L	<16.0	16.2 J	18.2 J	22.8 J	109 U*	77.1 J	<16.0	16.0 UJ	<30.3	<30.3	35.2 U*
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197	<0.125	<0.125	<0.125
Calcium	ug/L	85,100	96,400	86,700	90,300 J	94,100	95,800	98,600	99,900 J	78,800	82,100	79,000
Chromium	ug/L	<0.980	<0.980	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47	1.41 U*	1.72 U*	<1.53
Cobalt	ug/L	<0.190	<0.190	<0.190	0.255 J	<0.134	<0.261	<0.190	<0.190	0.099 J	0.113 J	0.077 J
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	<0.627	<1.14	<1.70	<1.70	<1.3	<1.3	<0.627
Iron	ug/L	<47.0	<47.0	62.3 J	108	324	352	74.3 U*	<47.0	40.2 J	45.4 J	<14.1
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450	<0.094	0.165 J	<0.128
Lithium	ug/L	11.9	13.7	10.0 U*	10.5	13.4	13.9	11.2	11.0	3.23 J	2.78 J	5.38 U*
Magnesium	ug/L	5,750	6,370	5,490	5,910	6,270	5,740	5,930	6,030	6,840	7,460	6,580
Manganese	ug/L	43.5	45.2	33.4	35.8 J	31.5	20.6	32.7	31.0	86.2	101	77.3
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101
Molybdenum	ug/L	<1.08	<1.08	<1.08	<1.08	<0.610	<0.610	<1.08	<1.08	<0.474	<0.474	<0.61
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	<0.336	<0.517	<1.47	<1.47	<0.312	<0.312	<0.312
Potassium	ug/L	674 J	765 J	607 J	641 J	805	740	670 J	642 J	380 J	429 J	365 J
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890	<0.813	<0.813	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530	-	-	-
Sodium	ug/L	3,810	4,290	3,370	3,680	3,600	3,400	3,400	3,550	2,920	3,050	2,950
Strontium	ug/L	492	549	462	482	482	482	465	485	291	310	320
Thallium	ug/L	<0.200	<0.200	<0.200	0.212 J	0.352 U*	<0.472	<0.200	<0.200	<0.063	<0.063	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820	-	-	-
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<3.22	<2.88	<15.0	<15.0	-	-	-
Radiological Parameters												
Radium-226	pCi/L	0.633 +/-(0.623)U	0.105 +/-(0.355)U	0.0896 +/-(0.441)U	0.150 +/-(0.376)U	0.533 +/-(0.437)U	0.791 +/-(0.640)U	0.220 +/-(0.296)U	0.511 +/-(0.491)U	0.128 +/-(0.0750)	0.0500 +/-(0.0598)UJ	0.145 +/-(0.0745)J
Radium-228	pCi/L	0.764 +/-(0.605)U	0.283 +/-(0.383)U	0.311 +/-(0.385)U	0.311 +/-(0.263)U	0.153 +/-(0.350)U	0.391 +/-(0.359)U	0.251 +/-(0.536)U	-0.0892 +/-(0.519)U	0.264 +/-(0.246)U	0.158 +/-(0.190)U	-0.108 +/-(0.195)UJ
Radium-226+228	pCi/L	1.40 +/-(0.868)U	0.388 +/-(0.522)U	0.401 +/-(0.585)U	0.461 +/-(0.459)U	0.686 +/-(0.560)U	1.18 +/-(0.734)U	0.470 +/-(0.612)U	0.511 +/-(0.714)U	0.392 +/-(0.257)J	0.208 +/-(0.199)UJ	0.145 +/-(0.209)J
Anions												
Chloride	mg/L	8.46	8.66	8.23	8.13	10.8	11.6	9.31	8.50	5.11	4.87	5.03
Fluoride	mg/L	0.0481 J	0.0394 J	0.0349 J	0.0403 J	0.0681 U*	0.0797 U*	0.0482 J	0.0294 J	0.0400 J	0.0333 U*	0.0590 J
Sulfate	mg/L	18.4	18.5	18.6	19.1	17.2	18.8	16.5	14.8	51.2	50.0	51.4
General Chemistry												
Alkalinity, Bicarbonate	mg/L	245	212	259	266	263	234	245	264	190	206	196
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	286	346	319	292	308	302	258	285	257	281	256

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-201										
Sample Date		20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	13-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20
Sample ID		JSF-GW-017-02202019	JSF-GW-017-02272019	JSF-GW-017-03062019	JSF-GW-017-03202019	JSF-GW-017-03272019	JSF-GW-017-04022019	JSF-GW-017-06132019	JSF-GW-017-09112019	JSF-GW-017-11202019	JSF-GW-017-01092020	JSF-GW-017-02062020
Parent Sample ID												
Intake Depth		36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 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	<12.5	<12.5	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	1.18 J	<0.378	<0.378	<0.378	<0.570	<0.570
Arsenic	ug/L	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	0.354 J	0.453 U*	<0.323	<0.750	<0.750
Barium	ug/L	79.3	106	107	96.8	109	98	113	117	115	106	117
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.305	<0.305
Boron	ug/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	16.3 J	18.9 J
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197
Calcium	ug/L	64,100	84,500	80,200 J	82,100	81,700	83,800	82,300	86,000	82,000	86,800	90,800
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	2.15 U*	3.38 U*	1.64 U*	<0.980	<0.980
Cobalt	ug/L	<0.075	0.086 J	<0.075	<0.075	0.089 J	<0.075	0.112 J	0.156 J	0.0820 J	<0.190	<0.190
Copper	ug/L	<0.627	2.11 U*	<0.627	<0.627	<0.627	<0.627	<0.627	0.950 U*	<0.627	<1.70	<1.70
Iron	ug/L	<14.1	16 U*	17.5 J	<14.1	<14.1	<14.1	<14.1	<19.5	<19.5	<47.0	<47.0
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450
Lithium	ug/L	<3.14	<3.14	<3.14	3.88 J	<3.14	<3.14	<3.14	4.24 J	4.59 J	2.80 J	2.91 J
Magnesium	ug/L	5,510	7,310	7,100	6,630	7,070	6,420	7,080	7,350	6,460	7,150	7,330
Manganese	ug/L	69.4	91.2	83.5	83.4	79.3	77 J	87.2	90.3	78.4	82.8	91.7
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	<0.61	1.24 J	<0.61	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.336	<0.336	<1.47	<1.47
Potassium	ug/L	248 J	383 U*	384 J	348 J	380 J	365 J	440 J	360 J	403 J	348 J	508 J
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	-	<0.121	<0.177	<0.177	<0.0530	<0.0530
Sodium	ug/L	2,370	2,980	2,990	2,820	3,150	2,780	3,320	3,670	3,550	3,200	3,250
Strontium	ug/L	268	313	289	317	329	313	291	362	292	341	349
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	-	-	-	1.41 U*	1.78 U*	1.46 U*	<0.820	<0.820
Zinc	ug/L	-	-	-	-	-	-	<3.22	4.81 J	<3.22	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.0814 +/-(0.0598)J	0.0682 +/-(0.0554)U	0.102 +/-(0.0672)	0.0540 +/-(0.0607)UJ	0.102 +/-(0.0698)	0.157 +/-(0.0830)	0.0575 +/-(0.0630)U	0.476 +/-(0.537)U	0.358 +/-(0.387)U	0.297 +/-(0.485)U	0.637 +/-(0.467)U
Radium-228	pCi/L	0.106 +/-(0.202)U	-0.121 +/-(0.203)U	0.173 +/-(0.221)U	-0.0686 +/-(0.200)U	0.415 +/-(0.238)	0.288 +/-(0.295)U	0.133 +/-(0.292)U	0.0598 +/-(0.327)U	0.124 +/-(0.262)U	-0.0314 +/-(0.261)U	0.664 +/-(0.447)J
Radium-226+228	pCi/L	0.188 +/-(0.211)J	0.0682 +/-(0.210)U	0.275 +/-(0.231)J	0.0540 +/-(0.209)UJ	0.518 +/-(0.248)	0.445 +/-(0.306)J	0.190 +/-(0.299)U	0.535 +/-(0.629)U	0.481 +/-(0.468)U	0.297 +/-(0.551)U	1.30 +/-(0.647)J
Anions												
Chloride	mg/L	4.23	4.35	3.41	3.25	4.13	3.24	3.85	3.53	5.59	3.94	3.43
Fluoride	mg/L	0.0770 J	0.0301 J	0.0420 J	0.0494 J	0.0509 J	0.0437 J	0.0457 J	0.0576 J	0.0543 U*	0.0462 J	0.0430 J
Sulfate	mg/L	48.1	49.3	46.5	47.5	47.6	46.4	46.3	51.2	48.4	50.7	51.9
General Chemistry												
Alkalinity, Bicarbonate	mg/L	198	198	200	219	250	195	187	187	188	187	194
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	274	267	261	262	275	668	268	257	237	294	279

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-201									
Sample Date		8-Jul-20	13-Aug-20	15-Jan-21	11-Feb-21	16-Jul-21	11-Aug-21	21-Jan-22	3-Mar-22	22-Jul-22	31-Aug-22
Sample ID		JSF-GW-017-07082020	JSF-GW-017-08132020	JSF-GW-JSF-201-01152021	JSF-GW-JSF-201-02112021	JSF-GW-JSF-201-07162021	JSF-GW-JSF-201-08112021	JSF-GW-JSF-201-01212022	JSF-GW-JSF-201-03032022	JSF-GW-JSF-201-07222022	JSF-GW-JSF-201-08312022
Parent Sample ID											
Intake Depth		36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 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
Total Metals											
Aluminum	ug/L	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	13.2 J	<15.5	<34.0	<34.0
Antimony	ug/L	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570
Arsenic	ug/L	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750	<0.313	<0.282	<0.750	<0.750
Barium	ug/L	116	112	120	116	111	109	126	125	121	110
Beryllium	ug/L	<0.305	<0.305	<0.305	<0.305	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620
Boron	ug/L	18.9 J	<16.0	24.7	42.8	23.4	25.0 J	74.1 J	<60.1	16.9 J	19.1 J
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197
Calcium	ug/L	90,500	87,900	91,000	88,700	86,800	83,900 J	92,700	88,200	92,500 J	83,900 J
Chromium	ug/L	<0.980	<0.980	<0.980	<0.980	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47
Cobalt	ug/L	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	0.154 J	<0.261	<0.190	<0.190
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	2.45	<1.14	<1.70	<1.70
Iron	ug/L	<47.0	<47.0	<47.0	<47.0	<47.0	<47.0	28.5 J	<27.7	<47.0	<47.0
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450
Lithium	ug/L	6.13 U*	4.36 J	2.47 J	2.44 J	2.75 U*	2.10 J	4.60 J	2.20 J	2.68 J	1.99 J
Magnesium	ug/L	7,020	7,220	7,510	7,110	6,940	6,950	7,060	7,390	7,170	6,490
Manganese	ug/L	97.6	111	107	75.7	109	89.8 J	205	78.8	129	98.7
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<0.336	<0.517	<1.47	<1.47
Potassium	ug/L	479 J	400 J	422 J	690 J	432 J	523 J	391 J	379 J	349 J	329 J
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530
Sodium	ug/L	3,610	3,630	3,760	3,550	4,010	3,990	3,740	3,860	4,070	4,060
Strontium	ug/L	352	336	395	376	364	335	384	373	363	331
Thallium	ug/L	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.148	<0.472	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<3.22	<2.88	<15.0	<15.0
Radiological Parameters											
Radium-226	pCi/L	0.736 +/-(0.632)U	-0.179 +/-(0.346)U	0.334 +/-(0.504)U	0.00197 +/-(0.427)U	0.165 +/-(0.306)U	-0.00665 +/-(0.315)U	-0.134 +/-(0.181)U	0.302 +/-(0.413)U	0.127 +/-(0.312)U	0.564 +/-(0.472)U
Radium-228	pCi/L	0.141 +/-(0.371)U	0.251 +/-(0.297)U	1.12 +/-(0.590)U*	-0.143 +/-(0.211)U	0.0289 +/-(0.201)U	0.618 +/-(0.420)	0.239 +/-(0.327)U	0.288 +/-(0.397)U	0.399 +/-(0.493)U	0.315 +/-(0.528)U
Radium-226+228	pCi/L	0.877 +/-(0.733)U	0.251 +/-(0.456)U	1.46 +/-(0.776)U*	0.00197 +/-(0.476)U	0.194 +/-(0.366)U	0.618 +/-(0.525)J	0.239 +/-(0.374)U	0.589 +/-(0.573)U	0.527 +/-(0.584)U	0.879 +/-(0.708)U
Anions											
Chloride	mg/L	3.29	3.71	3.55	3.19	3.70	3.87	3.93	3.02	3.62	4.04
Fluoride	mg/L	0.0367 J	0.0434 J	0.0438 J	0.0361 J	0.0357 J	0.0419 J	0.0513 J	0.0541 U*	0.0454 J	0.0351 J
Sulfate	mg/L	53.3 J	54.0	53.8	56.5	55.5	54.5	48.2	61.7	55.7	49.5
General Chemistry											
Alkalinity, Bicarbonate	mg/L	202	193	194	180	212	196	208	206	195	198
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	301	270	296	327	263	259	283	301	236 J	276

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-202										
Sample Date		23-Jan-19	29-Jan-19	5-Feb-19	20-Feb-19	26-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	12-Jun-19	11-Sep-19
Sample ID		JSF-GW-018-01232019	JSF-GW-018-01292019	JSF-GW-018-02052019	JSF-GW-018-02202019	JSF-GW-018-02262019	JSF-GW-018-03062019	JSF-GW-018-03202019	JSF-GW-018-03272019	JSF-GW-018-04022019	JSF-GW-018-06122019	JSF-GW-018-09112019
Parent Sample ID												
Intake Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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	<11.8	<11.8	<12.5	<12.5	16.6 J	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5
Antimony	ug/L	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.473 J	0.424 J	0.504 J	0.336 J	<0.323	0.393 J	<0.323	<0.323	<0.323	0.799 J	0.891 U*
Barium	ug/L	63	67.1	63.4	59.1	65.4	67.7	59.9	70.2	63.4	49.2	45.1
Beryllium	ug/L	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182
Boron	ug/L	155	149	178	126	160	152	127	151	153	138	158
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	191,000 J	195,000	205,000	210,000	214,000	213,000 J	236,000	242,000	246,000	164,000	136,000
Chromium	ug/L	1.07 U*	0.767 U*	1.92 J	<1.53	<1.53	1.88 J	<1.53	<1.53	<1.53	2.4 U*	2.77 U*
Cobalt	ug/L	0.138 J	0.162 J	0.171 J	0.12 J	0.184 J	0.107 J	<0.075	0.192 J	<0.075	0.146 J	0.185 J
Copper	ug/L	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.824 U*
Iron	ug/L	409	407	329	312	454 U*	436	242	231	150	829	697
Lead	ug/L	<0.094	0.223 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	39	38.6	44	37.8	42.6	38.7	40.3	41.4	40.8	33.3	29.9
Magnesium	ug/L	39,100	40,800	39,000	38,700	41,300	42,100	42,600	47,300	42,000	32,700	26,400
Manganese	ug/L	165	168	162	161	172	159	171	171	145 J	120	101
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	0.5 J	0.541 J	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	0.892 J	<0.610
Nickel	ug/L	0.562 J	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	0.444 J
Potassium	ug/L	812	846	798	840	850 U*	844	736	845	799	713	630
Selenium	ug/L	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	-	-	-	-	<0.121	<0.177
Sodium	ug/L	36,000	36,600	35,000	36,100	34,400	36,800	34,200	37,500	37,100	35,900	30,800
Strontium	ug/L	1,660	1,740	1,870	2,090	1,840	1,840	1,980	2,170	2,110	1,280	1,180
Thallium	ug/L	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	-	-	-	-	-	-	1.81 U*	1.84 U*
Zinc	ug/L	-	-	-	-	-	-	-	-	-	<3.22	3.90 J
Radiological Parameters												
Radium-226	pCi/L	0.213 +/-(0.0966)	0.135 +/-(0.0767)J	0.224 +/-(0.0908)J	0.233 +/-(0.101)J	0.167 +/-(0.0934)	0.154 +/-(0.0878)	0.154 +/-(0.0858)J	0.254 +/-(0.105)	0.158 +/-(0.0852)	0.150 +/-(0.0919)	0.440 +/-(0.527)U
Radium-228	pCi/L	0.372 +/-(0.260)U	0.561 +/-(0.264)	0.0596 +/-(0.277)UJ	0.240 +/-(0.296)U	0.259 +/-(0.218)U	0.102 +/-(0.218)U	0.0576 +/-(0.269)U	0.387 +/-(0.228)	0.164 +/-(0.254)U	0.0900 +/-(0.475)U	0.0603 +/-(0.328)U
Radium-226+228	pCi/L	0.585 +/-(0.277)J	0.697 +/-(0.275)J	0.284 +/-(0.292)J	0.473 +/-(0.313)J	0.426 +/-(0.237)J	0.256 +/-(0.235)J	0.211 +/-(0.282)J	0.640 +/-(0.251)	0.323 +/-(0.268)J	0.240 +/-(0.484)J	0.500 +/-(0.621)U
Anions												
Chloride	mg/L	8.08	8.13	7.67	7.65	7.43	6.45	6.00	5.70	5.49	7.61	7.96
Fluoride	mg/L	0.0773 J	0.100 U*	0.117	0.128	0.0829 J	0.0932 J	0.0959 J	0.0907 J	0.115	0.105	0.119
Sulfate	mg/L	478	494	535	547	519	517	645	617	546	344	239
General Chemistry												
Alkalinity, Bicarbonate	mg/L	234	230	238	268	248	308	284	244	240	229	231
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 (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	948	953	986	1,020	1,010	1,000	1,100	1,180	1,080	810	600

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-202									
Sample Date		21-Nov-19	9-Jan-20	5-Feb-20	7-Jul-20	12-Aug-20	14-Jan-21	10-Feb-21	10-Feb-21	15-Jul-21	12-Aug-21
Sample ID		JSF-GW-018-11212019	JSF-GW-018-01092020	JSF-GW-018-02052020	JSF-GW-018-07072020	JSF-GW-018-08122020	JSF-GW-JSF-202-01142021	JSF-GW-FD-02102021	JSF-GW-JSF-202-02102021	JSF-GW-JSF-202-07152021	JSF-GW-JSF-202-08122021
Parent Sample ID								JSF-GW-JSF-202-02102021			
Intake Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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
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	<12.5	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0
Antimony	ug/L	<0.378	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	0.494 J	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750
Barium	ug/L	48.4	54.8	55.5	37.3	37.5	54.8	51.7	52.0	36.7	38.3
Beryllium	ug/L	0.183 J	<0.305	<0.305	<0.305	<0.305	0.573 J	<0.305	<0.305	<0.620	<0.620
Boron	ug/L	168	161	171	147	139	180	156	160	125	126
Cadmium	ug/L	<0.125	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	126,000	176,000	181,000	135,000	123,000	170,000	176,000	178,000	128,000	115,000
Chromium	ug/L	<1.53	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<2.47	<2.47
Cobalt	ug/L	0.133 U*	<0.190	<0.190	<0.190	<0.190	0.298 J	0.193 J	<0.190	<0.190	<0.190
Copper	ug/L	<0.627	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	719	720	311	664	685	1,190	426	492	763	542
Lead	ug/L	<0.128	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	35.3	37.1	34.9	32.2	32.7	36.7	37.3	37.9	29.2	26.9
Magnesium	ug/L	25,100	32,500	32,800	24,600	23,400	32,600	33,600	33,800	24,500	21,800
Manganese	ug/L	94.2	134	87.5	118	98.0	143	123	126	117	93.9
Mercury	ug/L	<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	1.73 J	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08
Nickel	ug/L	2.55 U*	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	631	697 J	669 J	586 J	605 J	738 J	759 J	751 J	593 J	628 J
Selenium	ug/L	<1.51	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	32,100	36,300	33,900	30,300	29,900	33,000	34,500	35,000	28,600	26,800
Strontium	ug/L	1,060	1,550	1,520	1,200	1,110	1,510	1,570	1,570	1,110	1,040
Thallium	ug/L	<0.148	<0.200	<0.200	<0.200	<0.200	0.481 J	<0.200	<0.200	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	3.31 J	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0
Radiological Parameters											
Radium-226	pCi/L	0.255 +/-(0.375)U	0.495 +/-(0.580)U	0.277 +/-(0.386)U	0.141 +/-(0.449)U	0.604 +/-(0.629)U	0.648 +/-(0.640)U	0.310 +/-(0.476)U	-0.0289 +/-(0.288)U	-0.0467 +/-(0.120)U	0.655 +/-(0.568)U
Radium-228	pCi/L	0.109 +/-(0.253)U	-0.512 +/-(0.331)U	0.141 +/-(0.308)UJ	-0.109 +/-(0.465)U	0.389 +/-(0.374)U	0.113 +/-(0.571)U	-0.439 +/-(0.423)U	0.490 +/-(0.450)U	0.477 +/-(0.376)U	0.0552 +/-(0.512)U
Radium-226+228	pCi/L	0.364 +/-(0.452)U	0.495 +/-(0.668)U	0.418 +/-(0.494)UJ	0.141 +/-(0.646)U	0.994 +/-(0.732)U	0.761 +/-(0.858)U	0.310 +/-(0.637)U	0.490 +/-(0.534)U	0.477 +/-(0.395)U	0.711 +/-(0.764)U
Anions											
Chloride	mg/L	10.4	8.49	8.71	9.89	10.6	8.86	8.87	8.88	10.7	10.8
Fluoride	mg/L	0.134	0.131	0.126	0.117	0.135	0.138	0.128	0.127	0.127	0.133
Sulfate	mg/L	212	419	416	253 J	222	387	418	423	214	195
General Chemistry											
Alkalinity, Bicarbonate	mg/L	236	202	207	226	233	200	204	205	250	235
Alkalinity, Carbonate	mg/L	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	533	900	864	606	552	835	955	938	561	573

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-202						JSF-203				
Sample Date		20-Jan-22	2-Mar-22	2-Mar-22	21-Jul-22	30-Aug-22	30-Aug-22	23-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19
Sample ID		JSF-GW-JSF-202-01202022	JSF-GW-FD02-03022022	JSF-GW-JSF-202-03022022	JSF-GW-JSF-202-07212022	JSF-GW-FD02-08302022	JSF-GW-JSF-202-08302022	JSF-GW-019-01232019	JSF-GW-019-01302019	JSF-GW-019-02052019	JSF-GW-019-02202019	JSF-GW-019-02272019
Parent Sample ID			JSF-GW-JSF-202-03022022			JSF-GW-JSF-202-08302022						
Intake Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	34 ft	34 ft	34 ft	34 ft	34 ft
Sample Type		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	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	<15.5	<15.5	<34.0	<34.0	<34.0	13.2 U*	66.9	<12.5	<12.5	<12.5
Antimony	ug/L	<0.378	<0.506	<0.506	<0.570	<0.570	<0.570	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.313	<0.282	<0.282	<0.750	<0.750	<0.750	0.376 J	0.338 J	0.346 J	<0.323	0.452 J
Barium	ug/L	49.6	52.5	55.1	39.9	38.2	39.3	78.6	91	81.6	80.3	92.1
Beryllium	ug/L	<0.182	<0.274	<0.274	<0.620	<0.620	<0.620	<0.057	<0.057	<0.155	<0.155	<0.155
Boron	ug/L	185	159	165	115	119 J	126 J	1,640	1,570	1,700	1,290	1,650
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.197	<0.197	<0.197	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	132,000	170,000	174,000	119,000	116,000 J	118,000 J	98,900 J	101,000	95,700	92,300	99,100
Chromium	ug/L	<1.53	<1.53	<1.53	<2.47	<2.47	<2.47	1.64 U*	2.41 U*	1.6 J	<1.53	<1.53
Cobalt	ug/L	<0.134	<0.261	<0.261	<0.190	<0.190	<0.190	0.146 J	0.164 J	0.139 J	<0.075	0.093 J
Copper	ug/L	<0.627	<1.14	<1.14	<1.70	<1.70	<1.70	<1.3	<1.3	<0.627	<0.627	<0.627
Iron	ug/L	316	275	291	662	603	657	52.9	158	60	68.9	80.7 U*
Lead	ug/L	<0.128	<0.167	<0.167	<0.450	<0.450	<0.450	<0.094	0.133 J	<0.128	<0.128	<0.128
Lithium	ug/L	35.7	35.1	36.1	28.4	26.1	28.7	10.3	10.2	13 U*	11.6	12.9 U*
Magnesium	ug/L	26,200	32,300	32,300	23,100	21,800	22,500	14,200	14,800	13,300	12,700	14,000
Manganese	ug/L	99.7	29.0	30.0	106	88.7	91.8	60.4	59.6	53.4	52.3	58.3
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<1.08	<1.08	<1.08	43.6	36.4	42.6	15.2	16.8
Nickel	ug/L	<0.336	<0.517	<0.517	<1.47	<1.47	<1.47	0.74 J	0.858 J	0.824 J	<0.312	0.641 J
Potassium	ug/L	693	721	718	571 J	531 J	571 J	455 J	503	455 J	401 J	483 U*
Selenium	ug/L	<1.51	<0.739	<0.739	<0.890	<0.890	<0.890	<0.813	<0.813	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.223	<0.223	<0.0530	<0.0530	<0.0530	-	-	-	-	-
Sodium	ug/L	32,100	32,200	32,700	27,700	27,500	28,600	8,830	8,870	8,530	7,700	8,270
Strontium	ug/L	1,240	1,390	1,440	1,000	941	978	546	577	581	567	557
Thallium	ug/L	<0.148	<0.472	<0.472	<0.200	<0.200	<0.200	<0.063	<0.063	<0.128	<0.128	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.776	<0.776	<0.820	<0.820	<0.820	-	-	-	-	-
Zinc	ug/L	<3.22	<2.88	<2.88	<15.0	<15.0	<15.0	-	-	-	-	-
Radiological Parameters												
Radium-226	pCi/L	0.0605 +/-(0.292)U	0.354 +/-(0.429)U	0.724 +/-(0.653)U	0.0126 +/-(0.194)U	-0.134 +/-(0.243)U	0.175 +/-(0.317)U	0.0595 +/-(0.0650)U	0.145 +/-(0.0760)J	0.0798 +/-(0.0559)J	0.0667 +/-(0.0606)UJ	0.189 +/-(0.106)
Radium-228	pCi/L	0.0941 +/-(0.288)U	0.151 +/-(0.341)U	0.0738 +/-(0.303)U	0.610 +/-(0.578)U	0.387 +/-(0.519)U	0.257 +/-(0.566)U	0.0463 +/-(0.205)U	0.176 +/-(0.204)U	0.252 +/-(0.245)UJ	0.270 +/-(0.260)U	0.255 +/-(0.244)U
Radium-226+228	pCi/L	0.155 +/-(0.411)U	0.504 +/-(0.548)U	0.797 +/-(0.720)U	0.622 +/-(0.610)U	0.387 +/-(0.573)U	0.432 +/-(0.649)U	0.106 +/-(0.215)U	0.321 +/-(0.218)J	0.332 +/-(0.251)J	0.337 +/-(0.267)UJ	0.443 +/-(0.266)J
Anions												
Chloride	mg/L	9.74	9.80	10.0	10.9	10.2	10.0	14.4	14.3	13.9	14.4	14.3
Fluoride	mg/L	0.209	0.168 U*	0.172 U*	0.119	0.128	0.122	0.0764 J	0.0354 U*	0.0551 J	0.0809 J	0.0399 J
Sulfate	mg/L	258	399	425	219	174	172	64.1	64.6	67.0	66.5	66.7
General Chemistry												
Alkalinity, Bicarbonate	mg/L	216	211	216	222	231	240	240	236	250	258	250
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	607	769	779	559	470	422	350	371	349	355	356

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location	Units	JSF-203										
Sample Date		6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	12-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20	8-Jul-20	13-Aug-20
Sample ID		JSF-GW-019-03062019	JSF-GW-019-03202019	JSF-GW-019-03272019	JSF-GW-019-04022019	JSF-GW-019-06122019	JSF-GW-019-09112019	JSF-GW-019-11202019	JSF-GW-019-01092020	JSF-GW-019-02062020	JSF-GW-019-07082020	JSF-GW-019-08132020
Parent Sample ID												
Intake 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		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	<34.0	<34.0	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	1.00 J	<0.570	<0.570
Arsenic	ug/L	<0.323	<0.323	<0.323	<0.323	0.399 J	0.513 U*	0.344 J	<0.750	<0.750	<0.750	<0.750
Barium	ug/L	78.7	79.3	90.7	75.5	85.3	90.7	95.1	84.2	87.6	78.6	80.9
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	1,420	1,340	1,480	1,400	1,250	1,740	1,630	1,560	1,820	1,400	1,280
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	83,700 J	96,300	93,100	97,300	94,000	101,000	101,000	98,600	99,900	94,400	96,900
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	2.47 U*	2.80 U*	1.66 U*	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	<0.075	<0.075	0.11 J	<0.075	0.119 J	0.170 J	0.0910 J	<0.190	<0.190	<0.190	<0.190
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	0.909 U*	0.669 J	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	102	85.4	83.4	66.3 U*	238 U*	165	107	238	411	148	299
Lead	ug/L	<0.128	0.548 J	<0.128	<0.128	<0.128	<0.128	0.221 J	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	9.51	11.7	10.3	9.06	9.46	12.3	11.6	11.1	11.7	11.4 U*	11.9
Magnesium	ug/L	12,400	13,000	13,500	12,200	13,500	14,500	13,800	13,800	13,400	13,100	13,600
Manganese	ug/L	47	52.4	50	52.7 J	48.4	52.1	48.9	48.8	50.3	50.1	51.3
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	18.5	37.5	43.8	46.9	43.6	50.6	45.3	26.9	31.6	49.1	51.0
Nickel	ug/L	0.535 J	0.678 J	0.626 J	0.637 J	0.688 J	0.960 J	0.772 J	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	406 J	387 J	402 J	410 J	409 J	432 J	469 J	452 J	445 J	416 J	453 J
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	<0.121	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	7,550	8,370	8,990	8,090	8,750	9,590	9,040	8,600	8,400	9,240	9,070
Strontium	ug/L	447	567	582	559	500	649	552	619	576	619	608
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.200	1.07	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	-	1.52 U*	1.57 U*	1.75 U*	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	-	-	-	-	<3.22	3.99 J	3.45 U*	<15.0	<15.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.165 +/-(0.0809)	0.107 +/-(0.0763)J	0.112 +/-(0.0762)	0.131 +/-(0.0859)	0.139 +/-(0.0927)	0.592 +/-(0.623)U	0.0517 +/-(0.295)U	0.805 +/-(0.573)	0.336 +/-(0.283)U	1.22 +/-(0.724)	-0.0518 +/-(0.402)U
Radium-228	pCi/L	0.296 +/-(0.230)U	0.164 +/-(0.268)U	0.429 +/-(0.250)	0.343 +/-(0.350)U	0.272 +/-(0.306)U	0.0272 +/-(0.321)U	0.399 +/-(0.356)U	0.990 +/-(0.617)	0.0939 +/-(0.339)UJ	0.184 +/-(0.399)U	0.0667 +/-(0.430)U
Radium-226+228	pCi/L	0.461 +/-(0.244)J	0.270 +/-(0.279)J	0.541 +/-(0.261)	0.475 +/-(0.360)J	0.411 +/-(0.320)J	0.620 +/-(0.701)U	0.451 +/-(0.462)U	1.80 +/-(0.842)	0.430 +/-(0.442)UJ	1.40 +/-(0.826)J	0.0667 +/-(0.589)U
Anions												
Chloride	mg/L	12.6	10.7	10.2	9.59	10.3	12.0	15.7	15.4	15.7	13.8	14.8
Fluoride	mg/L	0.0585 J	0.0669 J	0.0658 J	0.0583 J	0.0580 J	0.0683 J	0.0664 U*	0.0714	0.0682	0.0563	0.0660
Sulfate	mg/L	67.0	67.4	67.5	64.7	68.6	67.0	72.1	74.1	75.4	73.0 J	74.9
General Chemistry												
Alkalinity, Bicarbonate	mg/L	296	242	258	213	229	224	239	220	221	220	219
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	306	343	361	343	353	349	336	374	394	362	388

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-203								JSF-204		
Sample Date		15-Jan-21	11-Feb-21	16-Jul-21	12-Aug-21	21-Jan-22	3-Mar-22	21-Jul-22	1-Sep-22	24-Jan-19	30-Jan-19	5-Feb-19
Sample ID		JSF-GW-JSF-203-01152021	JSF-GW-JSF-203-02112021	JSF-GW-JSF-203-07162021	JSF-GW-JSF-203-08122021	JSF-GW-JSF-203-01212022	JSF-GW-JSF-203-03032022	JSF-GW-JSF-203-07212022	JSF-GW-JSF-203-09012022	JSF-GW-020-01242019	JSF-GW-020-01302019	JSF-GW-020-02052019
Parent Sample ID												
Intake Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	30.5 ft	30.5 ft	30.5 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	<34.0	<34.0	<34.0	<34.0	<12.5	<15.5	<34.0	<34.0	<11.8	<11.8	<12.5
Antimony	ug/L	<0.570	<0.570	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570	<1.12	<1.12	<0.378
Arsenic	ug/L	<0.750	<0.750	<0.750	<0.750	<0.313	<0.282	<0.750	<0.750	0.428 J	0.426 J	0.387 J
Barium	ug/L	85.5	75.5	75.2	78.2	104	86.0	77.3	73.8	55.5	59.3	51.3
Beryllium	ug/L	<0.305	0.347 J	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620	<0.057	<0.057	<0.155
Boron	ug/L	1,600	1,480	1,350	1,300	1,640	1,390	1,160	1,260	91.5	90.5	108 U*
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197	<0.125	<0.125	<0.125
Calcium	ug/L	96,200	87,800	92,800	93,900	100,000	90,700	92,900	92,000	89,800	93,300	86,000
Chromium	ug/L	<0.980	<0.980	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47	1.48 U*	1.3 U*	<1.53
Cobalt	ug/L	<0.190	<0.190	<0.190	<0.190	<0.134	<0.261	<0.190	<0.190	0.254 J	0.279 J	0.262 J
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	<0.627	<1.14	<1.70	<1.70	<1.3	<1.3	<0.627
Iron	ug/L	133	49.3 J	191	59.6 J	145	96.9	87.5 U*	81.1 J	49.1 J	98.8	41.4 J
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450	<0.094	<0.094	<0.128
Lithium	ug/L	12.3	10.6	9.88 U*	9.75	12.3	9.56	9.71	9.22	6.39	5.91	7.7 U*
Magnesium	ug/L	13,900	12,300	13,300	13,200	13,300	13,600	13,100	12,800 J	5,230	5,730	4,940
Manganese	ug/L	45.9	24.7	101	57.6	47.6	12.4	89.4	46.2	596	637	550
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101
Molybdenum	ug/L	37.9	36.6	53.3	58.0	32.3	30.1	52.2	49.5	<0.474	<0.474	<0.61
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	0.530 J	0.523 J	<1.47	<1.47	0.401 J	0.508 J	0.42 J
Potassium	ug/L	456 J	442 J	406 J	534 J	440 J	428 J	421 J	363 J	478 J	521	458 J
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890	<0.813	<0.813	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530	-	-	-
Sodium	ug/L	9,060	8,770	10,500	9,880	8,800	9,290	11,000	10,300	17,300	18,600	16,600
Strontium	ug/L	647	598	615	637	612	589	568	553 J	257	270	270
Thallium	ug/L	<0.200	0.507 J	<0.200	<0.200	<0.148	<0.472	<0.200	<0.200	<0.063	<0.063	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820	-	-	-
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<3.22	<2.88	<15.0	<15.0	-	-	-
Radiological Parameters												
Radium-226	pCi/L	-0.0833 +/-(0.415)U	0.440 +/-(0.561)U	0.0446 +/-(0.310)U	0.625 +/-(0.630)U	0.317 +/-(0.262)U	0.477 +/-(0.536)U	0.0687 +/-(0.363)U	0.302 +/-(0.535)U	0.114 +/-(0.0771)	0.105 +/-(0.0690)J	0.0926 +/-(0.0631)J
Radium-228	pCi/L	1.77 +/-(0.762)U*	0.0542 +/-(0.314)U	0.230 +/-(0.368)U	-0.256 +/-(0.492)U	0.158 +/-(0.305)U	0.485 +/-(0.453)U	0.492 +/-(0.573)U	0.676 +/-(0.590)U	0.0798 +/-(0.229)U	0.303 +/-(0.222)U	-0.125 +/-(0.192)UJ
Radium-226+228	pCi/L	1.77 +/-(0.868)U*	0.494 +/-(0.643)U	0.275 +/-(0.481)U	0.625 +/-(0.799)U	0.475 +/-(0.402)U	0.962 +/-(0.702)U	0.561 +/-(0.678)U	0.977 +/-(0.796)U	0.194 +/-(0.242)J	0.409 +/-(0.232)J	0.0926 +/-(0.202)J
Anions												
Chloride	mg/L	14.6	14.9	12.8	13.4	13.6	14.3	10.5	10.3	11.5	11.7	13.2
Fluoride	mg/L	0.0753	0.0614	0.0614	0.0632	0.0904 J	0.0853 U*	0.0759	0.0593	0.0405 J	0.0592 U*	0.0485 J
Sulfate	mg/L	73.7	78.1	74.3	73.2	67.0	86.6	73.2	67.8	49.7	48.3	48.9
General Chemistry												
Alkalinity, Bicarbonate	mg/L	216	196	235	227	233	227	215	232	246	232	244
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	369	385	357	371	365	353	322	305	323	324 J	340

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-204											
Sample Date		20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	2-Apr-19	13-Jun-19	13-Jun-19	11-Sep-19	20-Nov-19	20-Nov-19
Sample ID		JSF-GW-020-02202019	JSF-GW-020-02272019	JSF-GW-020-03062019	JSF-GW-020-03202019	JSF-GW-020-03272019	JSF-GW-020-04022019	JSF-GW-903-04022019	JSF-GW-020-06132019	JSF-GW-903-06132019	JSF-GW-020-09112019	JSF-GW-020-11202019	JSF-GW-903-11202019
Parent Sample ID								JSF-GW-020-04022019		JSF-GW-020-06132019			JSF-GW-020-11202019
Intake Depth		30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 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	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	<12.5	<12.5	<12.5	<12.5	<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	0.381 J	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.323	0.464 J	0.457 J	0.376 J	0.63 J	0.507 J	0.409 J	0.771 J	0.92 J	3.13	1.15	1.20
Barium	ug/L	51.4	59.9	56.4	54.2	64	55.6	53.1	60.9	62.2	85.4	61.6	64.9
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182
Boron	ug/L	72.6 J	104	93.5	83.4	103	87.5	92.7	87.8	104	108	94.0	96.8
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	87,500	96,000	89,000 J	93,400	96,800	94,200	98,600	92,300	94,300	95,300	94,400	97,100
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	2.42 U*	2.82 U*	3.30 U*	1.66 U*	2.02 U*
Cobalt	ug/L	0.174 J	0.292 J	0.225 J	0.337 J	0.328 J	0.248 J	0.207 J	0.36 J	0.443 J	0.534	0.365 J	0.360 J
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.638 J	<0.627	<0.627	0.916 U*	<0.627	<0.627
Iron	ug/L	46.6 J	72.4 U*	86	94.8	118	105 U*	103 U*	171 U*	167 U*	1,430	684	706
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	6.51	8.1 U*	5.98	6.89	6.09	6.49	5.73	5.44	5.85	7.50	6.26	6.47
Magnesium	ug/L	4,780	5,580	5,310	5,070	5,620	4,780	5,060	5,240	5,390	5,470	5,090	5,230
Manganese	ug/L	579	695	636	748	776	758 J	796 J	786	816	833	800	833
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	<0.610	<0.610	<0.610
Nickel	ug/L	<0.312	0.446 J	0.351 J	0.488 J	0.434 J	0.373 J	<0.312	0.442 J	0.483 J	0.544 J	0.378 J	0.397 J
Potassium	ug/L	439 J	527 U*	526	444 J	510	437 J	477 J	460 J	473 J	455 J	450 J	481 J
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	-	-	<0.121	<0.121	<0.177	<0.177	<0.177
Sodium	ug/L	16,700	18,400	17,700	17,000	18,700	16,100	17,000	17,700	18,100	19,000	18,000	18,800
Strontium	ug/L	272	266	246	280	304	269	276	249	250	314	255	259
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.141 J	<0.148	<0.148	<0.148
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	-	-	-	-	1.38 U*	1.69 U*	1.99 U*	1.38 U*	1.81 U*
Zinc	ug/L	-	-	-	-	-	-	-	<3.22	<3.22	3.65 J	<3.22	3.29 U*
Radiological Parameters													
Radium-226	pCi/L	0.0290 +/-(0.0542)UJ	0.0797 +/-(0.0674)U	0.0744 +/-(0.0642)U	0.0769 +/-(0.0877)UJ	0.128 +/-(0.0685)	0.0185 +/-(0.0470)UJ	0.133 +/-(0.0760)J	0.0626 +/-(0.0776)U	0.0507 +/-(0.0565)U	0.351 +/-(0.532)U	0.316 +/-(0.312)U	0.132 +/-(0.279)U
Radium-228	pCi/L	0.206 +/-(0.225)U	0.0635 +/-(0.199)U	0.155 +/-(0.211)U	0.218 +/-(0.267)U	0.355 +/-(0.221)	0.0581 +/-(0.270)U	0.304 +/-(0.320)U	-0.0238 +/-(0.264)U	0.146 +/-(0.249)U	0.445 +/-(0.409)U	0.230 +/-(0.262)U	0.238 +/-(0.277)U
Radium-226+228	pCi/L	0.235 +/-(0.231)UJ	0.143 +/-(0.210)U	0.229 +/-(0.221)U	0.295 +/-(0.281)UJ	0.484 +/-(0.231)	0.0766 +/-(0.274)UJ	0.437 +/-(0.329)J	0.0626 +/-(0.275)U	0.197 +/-(0.255)U	0.796 +/-(0.671)U	0.546 +/-(0.407)U	0.370 +/-(0.393)U
Anions													
Chloride	mg/L	10.6	10.8	9.30	9.32	9.29	8.91	9.17	9.39	9.40	8.37	9.54	9.30
Fluoride	mg/L	0.0327 J	0.0264 J	0.0334 J	0.0406 J	0.0405 J	0.0387 J	0.0391 J	0.0399 J	0.0398 J	0.0522 J	0.0443 U*	0.0523 U*
Sulfate	mg/L	47.5	48.2	46.4	48.4	48.2	46.1	48.1	47.8	47.9	54.5	45.6	47.3
General Chemistry													
Alkalinity, Bicarbonate	mg/L	288	242	258	242	246	256	248	232	229	231	241	238
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 (lab)	SU	-	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	330	229	307	327	334	326	314	335	328	321	287	279

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-204										
Sample Date		9-Jan-20	6-Feb-20	8-Jul-20	8-Jul-20	13-Aug-20	13-Aug-20	13-Jan-21	11-Feb-21	14-Jul-21	11-Aug-21	11-Aug-21
Sample ID		JSF-GW-020-01092020	JSF-GW-020-02062020	JSF-GW-020-07082020	JSF-GW-903-07082020	JSF-GW-020-08132020	JSF-GW-903-08132020	JSF-GW-JSF-204-01132021	JSF-GW-JSF-204-02112021	JSF-GW-JSF-204-07142021	JSF-GW-FD02-08112021	JSF-GW-JSF-204-08112021
Parent Sample ID					JSF-GW-020-07082020		JSF-GW-020-08132020				JSF-GW-JSF-204-08112021	
Intake Depth		30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft
Sample Type		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	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	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0	<34.0
Antimony	ug/L	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	0.922 J	1.80 J	1.23 J	0.820 J	0.882 J	<0.750	1.43 J	1.08 J	3.55 J	0.811 J	0.952 J
Barium	ug/L	50.2	57.0	52.0	51.6	51.3	50.8	50.5	49.1	50.0	42.8	43.7
Beryllium	ug/L	<0.305	<0.305	0.464 J	<0.305	<0.305	<0.305	<0.305	<0.305	<0.620	<0.620	<0.620
Boron	ug/L	80.7	103	91.9	85.5	86.4	79.0	85.0	85.5	87.2	74.9 J	76.6 J
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	85,200	93,200	89,300	88,400	88,700	88,800	83,500	86,900	79,200	71,500 J	72,300 J
Chromium	ug/L	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<2.47	<2.47	<2.47
Cobalt	ug/L	0.275 J	0.316 J	0.486 J	0.398 J	0.466 J	0.382 J	0.447 J	0.510 J	0.795 J	0.538 J	0.659 J
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	580	1,250	410	426	248	257	486	422	2,730	727	718
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	5.07 J	5.74 J	3.54 U*	5.64 U*	5.96 J	6.57 J	4.73 J	4.79 J	4.92 U*	2.93 J	3.69 J
Magnesium	ug/L	4,850	5,080	4,820	4,720	4,610	4,660	4,660	4,680	4,470	4,110	4,230
Manganese	ug/L	719	773	1,020	1,020	953	963	931	913	1,320	896 J	929 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	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08	<1.08
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	480 J	478 J	452 J	417 J	465 J	437 J	450 J	495 J	374 J	401 J	368 J
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	16,400	17,400	16,700	16,600	17,000	17,300	16,200	16,400	15,600	14,100	14,600
Strontium	ug/L	266	271	262	259	260	257	260	272	240	215	219
Thallium	ug/L	<0.200	<0.200	0.444 J	<0.200	0.326 J	<0.200	<0.200	0.388 J	<0.200	<0.200	0.404 J
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.345 +/-(0.447)U	0.192 +/-(0.320)U	-0.127 +/-(0.415)U	0.445 +/-(0.577)U	0.315 +/-(0.530)U	0.131 +/-(0.513)U	0.150 +/-(0.434)U	0.354 +/-(0.536)U	0.401 +/-(0.505)U	0.0262 +/-(0.298)U	0.0315 +/-(0.300)U
Radium-228	pCi/L	-0.107 +/-(0.308)U	0.466 +/-(0.382)UJ	0.0326 +/-(0.345)U	0.00387 +/-(0.317)U	0.243 +/-(0.348)U	0.0704 +/-(0.381)U	0.396 +/-(0.549)U	0.681 +/-(0.509)U	0.121 +/-(0.330)U	-0.238 +/-(0.282)U	0.184 +/-(0.299)U
Radium-226+228	pCi/L	0.345 +/-(0.543)U	0.659 +/-(0.498)UJ	0.0326 +/-(0.539)U	0.448 +/-(0.659)U	0.557 +/-(0.634)U	0.202 +/-(0.639)U	0.546 +/-(0.700)U	1.03 +/-(0.739)U	0.522 +/-(0.603)U	0.0262 +/-(0.410)U	0.215 +/-(0.424)U
Anions												
Chloride	mg/L	9.17	9.07	8.07	8.08	8.11	8.12	7.24	7.44	6.97	7.01	7.00
Fluoride	mg/L	0.0455 J	0.0431 J	0.0380 J	0.0380 J	0.0429 J	0.0505	0.0499 J	0.0416 J	0.0396 J	0.0849	0.0471 J
Sulfate	mg/L	50.5	50.9	47.6	47.6 J	47.6	47.5	45.4	47.2	44.0	42.9	43.0
General Chemistry												
Alkalinity, Bicarbonate	mg/L	219	221	220	220	218	218	212	187	219	221	224
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	337	328	318	314	315	323	298	329	298	276	286

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-204					JSF-205					
Sample Date		21-Jan-22	3-Mar-22	22-Jul-22	22-Jul-22	31-Aug-22	23-Jan-19	28-Jan-19	4-Feb-19	19-Feb-19	27-Feb-19	5-Mar-19
Sample ID		JSF-GW-JSF-204-01212022	JSF-GW-JSF-204-03032022	JSF-GW-FD02-07222022	JSF-GW-JSF-204-07222022	JSF-GW-JSF-204-08312022	JSF-GW-021-01232019	JSF-GW-021-01282019	JSF-GW-021-02042019	JSF-GW-021-02192019	JSF-GW-021-02272019	JSF-GW-021-03052019
Parent Sample ID				JSF-GW-JSF-204-07222022								
Intake Depth		30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	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	<15.5	<34.0	<34.0	<34.0	20 U*	<11.8	<12.5	<12.5	<12.5	<12.5
Antimony	ug/L	<0.378	<0.506	<0.570	<0.570	<0.570	<1.12	<1.12	0.577 J	<0.378	<0.378	<0.378
Arsenic	ug/L	1.65	1.38 U*	2.10 J	2.39 J	0.883 J	0.699 J	0.718 J	0.922 J	0.872 J	1.06	0.983 J
Barium	ug/L	62.1	51.5	45.2	46.4	41.7	56	66.5	61.3	60	67.3	67.7
Beryllium	ug/L	<0.182	<0.274	<0.620	<0.620	<0.620	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	191	99.4	68.0	68.0	67.3 J	<30.3	<30.3	53.3 J	<30.3	<30.3	<30.3
Cadmium	ug/L	<0.217	<0.217	<0.197	<0.197	<0.197	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	86,900	80,100	75,500 J	78,000 J	74,600 J	74,900 J	77,600	71,800	72,500	77,200	73,700 J
Chromium	ug/L	<1.53	<1.53	<2.47	<2.47	<2.47	1.8 U*	1.06 U*	1.63 J	<1.53	<1.53	<1.53
Cobalt	ug/L	0.466 J	0.442 J	0.489 J	0.499 J	0.495 J	0.418 J	0.39 J	0.465 J	0.294 J	0.343 J	0.269 J
Copper	ug/L	<0.627	<1.14	<1.70	<1.70	<1.70	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	701	725	1,540	1,760	202	37.2 J	18.4 J	15.6 J	<14.1	<14.1	15.1 J
Lead	ug/L	<0.128	<0.167	<0.450	<0.450	<0.450	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	7.85	4.02 J	4.35 J	3.40 J	4.03 J	5.08	4.62 J	6.72 U*	3.73 J	5.68 U*	4.04 J
Magnesium	ug/L	4,510	4,610	4,190	4,230	4,070	5,590	5,910	5,080	4,900	5,450	5,430
Manganese	ug/L	958	1,040	899	940	819	163	170	153	153	175	163
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<1.08	<1.08	<1.08	0.68 J	0.587 J	0.824 J	0.929 U*	<0.61	<0.61
Nickel	ug/L	<0.336	<0.517	<1.47	<1.47	<1.47	1.2	0.91 J	0.765 J	<0.312	0.343 J	<0.312
Potassium	ug/L	434 J	423 J	367 J	380 J	321 J	1,320	1,400	1,260	1,400	1,740	2,050
Selenium	ug/L	<1.51	<0.739	<0.890	<0.890	<0.890	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.223	<0.0530	<0.0530	<0.0530	-	-	-	-	-	-
Sodium	ug/L	16,700	16,800	14,100	14,300	13,800	4,200	4,400	3,990	3,900	4,390	4,380
Strontium	ug/L	278	248	222	230	216	216	233	232	235	223	212
Thallium	ug/L	0.184 J	<0.472	<0.200	<0.200	0.382 J	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.776	<0.820	<0.820	<0.820	-	-	-	-	-	-
Zinc	ug/L	<3.22	<2.88	<15.0	<15.0	<15.0	-	-	-	-	-	-
Radiological Parameters												
Radium-226	pCi/L	0.0196 +/-(0.151)U	-0.0822 +/-(0.300)U	0.154 +/-(0.341)U	0.440 +/-(0.496)U	0.545 +/-(0.449)U	0.154 +/-(0.0856)	0.0306 +/-(0.0594)UJ	0.0592 +/-(0.0528)UJ	0.0713 +/-(0.0621)UJ	0.0744 +/-(0.0649)U	0.00513 +/-(0.0473)U
Radium-228	pCi/L	0.343 +/-(0.339)U	0.286 +/-(0.373)U	-0.201 +/-(0.413)U	0.179 +/-(0.454)U	-0.0398 +/-(0.471)U	0.330 +/-(0.247)U	-0.0672 +/-(0.184)U	-0.172 +/-(0.212)UJ	0.204 +/-(0.252)U	0.314 +/-(0.230)U	0.269 +/-(0.255)U
Radium-226+228	pCi/L	0.363 +/-(0.371)U	0.286 +/-(0.479)U	0.154 +/-(0.536)U	0.619 +/-(0.672)U	0.545 +/-(0.651)U	0.484 +/-(0.261)J	0.0306 +/-(0.193)UJ	0.0592 +/-(0.218)UJ	0.275 +/-(0.260)UJ	0.388 +/-(0.239)U	0.274 +/-(0.259)U
Anions												
Chloride	mg/L	7.02	7.03	6.50	6.52	6.15	7.09	7.59	7.20	7.09	7.41	6.01
Fluoride	mg/L	0.0624 J	0.0467 U*	0.0516	0.0480 J	0.0413 J	0.0947 J	0.0591 U*	0.0767 J	0.0803 J	0.0363 J	0.0613 J
Sulfate	mg/L	38.2	40.6	38.3	38.5	35.2	16.4	18.1	17.1	17.0	17.0	14.7
General Chemistry												
Alkalinity, Bicarbonate	mg/L	228	212	207	204	212	208	222	208	198	220	196
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<2.60	<2.60	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	293	301	248 J	244 J	226 J	185	249	238	254	138	185

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-205										
Sample Date		19-Mar-19	26-Mar-19	1-Apr-19	12-Jun-19	10-Sep-19	19-Nov-19	8-Jan-20	4-Feb-20	8-Jul-20	11-Aug-20	12-Jan-21
Sample ID		JSF-GW-021-03192019	JSF-GW-021-03262019	JSF-GW-021-04012019	JSF-GW-021-06122019	JSF-GW-021-09102019	JSF-GW-021-11192019	JSF-GW-021-01082020	JSF-GW-021-02042020	JSF-GW-021-07082020	JSF-GW-021-08112020	JSF-GW-JSF-205-01122021
Parent Sample ID												
Intake Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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	<34.0	<34.0	<34.0	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	0.641 J	<0.570	0.803 J
Arsenic	ug/L	1.18	1.13	1.02	1.95	1.56 U*	1.39	<0.750	<0.750	<0.750	<0.750	1.21 J
Barium	ug/L	62.6	77.9	62	76.2	83.5	84.2	73.7	75.7	83.5	81.9	74.8
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<16.0	<16.0	16.0 J	<16.0	<16.0
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	74,500	74,800	74,500	75,100	79,000	74,800	69,700	71,900	70,000	68,900	62,400
Chromium	ug/L	<1.53	<1.53	<1.53	2.27 U*	3.35 U*	1.86 U*	<0.980	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	0.288 J	0.265 J	0.225 J	0.549	0.535	0.334 J	<0.190	<0.190	<0.190	<0.190	<0.190
Copper	ug/L	<0.627	<0.627	0.933 J	<0.627	0.816 U*	1.06 U*	<1.70	<1.70	<1.70	<1.70	<1.70
Iron	ug/L	16.9 J	31.7 U*	<14.1	270 U*	307	293	81.7 J	<47.0	<47.0	<47.0	<47.0
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	6.95	7.93	9.68	4.75 J	6.40	6.46	3.55 J	2.94 J	5.88 U*	7.88 J	4.53 J
Magnesium	ug/L	5,060	5,480	4,980	5,560	5,700	5,190	4,850	4,990	4,820	4,540	4,350
Manganese	ug/L	162	157	154 J	237	175	166	31.2	8.52	113	10.8	12.0
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.130 UJ	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	0.803 J	1.07 J	1.79 J	1.68 J	6.58	6.80	6.09
Nickel	ug/L	<0.312	<0.312	<0.312	<0.312	<0.336	<0.336	<1.47	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	4,400	6,810	7,960	3,070	1,160	1,640	1,200	1,870	1,860	3,330	1,780
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	<0.121	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	4,560	5,390	5,100	6,540	7,440	6,790	6,510	6,950	11,300	12,100	8,610
Strontium	ug/L	236	248	235	213	263	217	238	219	219	215	209
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.200	<0.200	<0.200	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	-	-	-	1.57 U*	1.84 U*	1.72 U*	<0.820	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	-	-	-	<3.22	4.12 J	<3.22	<15.0	<15.0	<15.0	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.0781 +/-(0.0667)UJ	0.149 +/-(0.0811)	0.112 +/-(0.0747)	0.0142 +/-(0.0659)U	0.135 +/-(0.335)U	0.311 +/-(0.297)U	0.157 +/-(0.319)U	0.248 +/-(0.250)U	-0.266 +/-(0.386)U	0.0626 +/-(0.466)U	0.486 +/-(0.585)U
Radium-228	pCi/L	0.0653 +/-(0.254)U	0.216 +/-(0.230)U	0.529 +/-(0.283)	0.199 +/-(0.299)U	-0.00967 +/-(0.314)U	0.0521 +/-(0.326)U	-0.238 +/-(0.383)U	0.00887 +/-(0.291)UJ	0.0510 +/-(0.297)U	0.285 +/-(0.484)U	0.314 +/-(0.554)U
Radium-226+228	pCi/L	0.143 +/-(0.263)UJ	0.365 +/-(0.244)J	0.641 +/-(0.293)	0.213 +/-(0.306)U	0.135 +/-(0.459)U	0.363 +/-(0.441)U	0.157 +/-(0.498)U	0.257 +/-(0.384)UJ	0.0510 +/-(0.487)U	0.348 +/-(0.672)U	0.800 +/-(0.806)U
Anions												
Chloride	mg/L	5.93	5.96	5.73	6.38	5.91	7.62	7.52	7.48	7.01	7.05	6.88
Fluoride	mg/L	0.0726 J	0.0692 J	0.0634 J	0.0612 J	0.0648 J	0.0662 J	0.0784 U*	0.0710	0.0896	0.105	0.101
Sulfate	mg/L	15.5	15.6	15.4	17.4	21.2	21.5	25.1	24.6	29.8 J	29.5	26.8
General Chemistry												
Alkalinity, Bicarbonate	mg/L	240	227	225	201	187	190	180	182	180	180	173
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	241	235	255	255	250	141	247	249	238	225	205

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-205							JSF-206			
Sample Date		9-Feb-21	14-Jul-21	12-Aug-21	20-Jan-22	1-Mar-22	20-Jul-22	1-Sep-22	13-Aug-19	8-Oct-19	3-Dec-19	5-Feb-20
Sample ID		JSF-GW-JSF-205-02092021	JSF-GW-JSF-205-07142021	JSF-GW-JSF-205-08122021	JSF-GW-JSF-205-01202022	JSF-GW-JSF-205-03012022	JSF-GW-JSF-205-07202022	JSF-GW-JSF-205-09012022	JSF-GW-027-20190813	JSF-GW-027-20191008	JSF-GW-027-20191203	JSF-GW-027-20200205
Parent Sample ID												
Intake Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 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	EIP	EIP	EIP	EIP
Total Metals												
Aluminum	ug/L	<34.0	<34.0	<34.0	<12.5	<15.5	<34.0	<34.0	-	-	-	-
Antimony	ug/L	0.923 J	<0.570	<0.570	<0.378	0.840 U*	0.573 J	<0.570	<0.378	<0.378	<0.378	<0.570
Arsenic	ug/L	<0.750	<0.750	<0.750	1.37	0.812 U*	<0.750	<0.750	0.638 U*	0.671 J	0.558 J	<0.750
Barium	ug/L	87.9	79.1	90.5	105	93.5	92.1	94.9	163	174	168	198
Beryllium	ug/L	<0.305	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620	<0.182	<0.182	<0.182	<0.305
Boron	ug/L	<16.0	17.7 J	<16.0	46.8 J	<60.1	<16.0	19.4 U*	<38.6	<38.6	<38.6	17.8 J
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197	<0.125	<0.125	<0.125	<0.197
Calcium	ug/L	72,500	59,800	69,200	64,700	65,400	65,900	69,900	112,000	105,000	96,100	120,000
Chromium	ug/L	<0.980	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47	2.23 U*	2.69 U*	2.04 U*	<0.980
Cobalt	ug/L	<0.190	<0.190	<0.190	0.692	<0.261	<0.190	<0.190	1.19	0.744	0.656	0.270 J
Copper	ug/L	<1.70	<1.70	<1.70	<0.627	<1.14	<1.70	<1.70	<0.627	1.56 U*	<0.627	<1.70
Iron	ug/L	<47.0	<47.0	<47.0	110	<27.7	<47.0	<47.0	-	-	-	-
Lead	ug/L	<0.450	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450	<0.128	<0.128	<0.128	<0.450
Lithium	ug/L	4.39 J	3.44 U*	5.61 J	4.41 J	6.94	5.00 J	3.91 J	10.0 U*	10.4	7.64	10.6
Magnesium	ug/L	5,070	4,040	4,610	4,730	4,660	4,460	4,740 J	6,770	6,060	5,560	6,530
Manganese	ug/L	9.47	<6.20	<6.20	491	1.59 U*	<6.20	<6.20	-	-	-	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	6.96	4.07 J	4.47 J	8.10	5.54	5.71	5.70	<0.610	<0.610	<0.610	<1.08
Nickel	ug/L	<1.47	<1.47	<1.47	0.553 J	0.519 J	<1.47	<1.47	1.25 U*	1.28	1.26 U*	<1.47
Potassium	ug/L	1,770	708 J	1,570	817	1,630	1,760	1,370	993	1,020	994	1,030
Selenium	ug/L	<0.890	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890	<1.51	<1.51	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530	<0.177	<0.177	<0.177	<0.0530
Sodium	ug/L	10,100	6,820	7,490	8,830	8,300	9,240	9,380	9,460	8,450	8,260	8,650
Strontium	ug/L	236	191	222	218	222	210	205 J	-	-	-	-
Thallium	ug/L	<0.200	<0.200	<0.200	<0.148	<0.472	<0.200	<0.200	<0.148	<0.148	<0.148	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820	1.15 U*	<0.991	1.34 U*	<0.820
Zinc	ug/L	<15.0	<15.0	<15.0	4.57 J	<2.88	15.4 J	16.1 J	3.24 U*	3.78 U*	4.47 U*	<15.0
Radiological Parameters												
Radium-226	pCi/L	-0.382 +/-(0.385)U	0.0263 +/-(0.305)U	0.453 +/-(0.490)U	-0.394 +/-(0.215)U	-0.212 +/-(0.203)U	0.246 +/-(0.333)U	1.03 +/-(0.789)U*	0.122 +/-(0.450)U	0.449 +/-(0.573)U	0.672 +/-(0.646)U	1.03 +/-(0.788)
Radium-228	pCi/L	0.324 +/-(0.554)U	-0.286 +/-(0.285)U	-0.274 +/-(0.448)U	0.913 +/-(0.544)	0.309 +/-(0.387)U	0.632 +/-(0.578)U	0.435 +/-(0.577)U	0.228 +/-(0.248)U	0.374 +/-(0.405)U	0.0814 +/-(0.301)U	0.233 +/-(0.355)U
Radium-226+228	pCi/L	0.324 +/-(0.675)U	0.0263 +/-(0.418)U	0.453 +/-(0.663)U	0.913 +/-(0.584)J	0.309 +/-(0.438)U	0.878 +/-(0.667)U	1.47 +/-(0.977)U*	0.350 +/-(0.514)U	0.823 +/-(0.701)U	0.753 +/-(0.713)U	1.26 +/-(0.864)J
Anions												
Chloride	mg/L	7.29	6.67	6.63	8.31	7.48	6.80	6.45	15.9	11.9	11.0	30.0
Fluoride	mg/L	0.0847	0.0750	0.0817	0.125 U*	0.121 U*	0.0957	0.0789	0.0507 J	0.0566 U*	0.0711 J	0.0466 J
Sulfate	mg/L	29.8	25.8	25.4	29.7	29.4	27.4	24.9	47.8	44.5	37.2	67.4
General Chemistry												
Alkalinity, Bicarbonate	mg/L	172	180	175	184	164	171	186	249	242	239	233
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	<5.00	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	317	234	236	239	232	215 J	192	353	334	308	363

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-206						JSF-207				
Sample Date		7-Apr-20	9-Jun-20	15-Feb-21	20-Jul-21	25-Jan-22	25-Jul-22	15-Aug-19	10-Oct-19	10-Oct-19	5-Dec-19	5-Dec-19
Sample ID		JSF-GW-027-20200407	JSF-GW-027-20200609	JSF-GW-JSF-206-02152021	JSF-GW-JSF-206-07202021	JSF-GW-JSF-206-01252022	JSF-GW-JSF-206-07252022	JSF-GW-028-20190815	JSF-GW-028-20191010	JSF-GW-DUP01-20191010	JSF-GW-028-20191205	JSF-GW-DUP01-20191205
Parent Sample ID										JSF-GW-028-20191010		JSF-GW-028-20191205
Intake Depth		28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 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	Normal Environmental Sample	Field Duplicate Sample
Program	Units	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program	EIP	EIP	EIP	EIP	EIP
Total Metals												
Aluminum	ug/L	-	-	<34.0	<12.5	<12.5	<34.0	-	-	-	-	-
Antimony	ug/L	<0.570	<0.570	<0.570	<0.378	<0.378	<0.570	<0.378	0.421 J	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.750	<0.750	0.914 U*	<0.313	0.789 J	1.95 J	1.00 U*	0.926 J	0.827 J	0.567 J	0.435 J
Barium	ug/L	162	164	180	187	156	245	250	260	257	138	141
Beryllium	ug/L	<0.305	<0.305	<0.305	0.265 J	0.424 J	1.43	0.396 U*	0.374 J	0.200 J	0.182 UJ	0.182 UJ
Boron	ug/L	16.3 J	<16.0	18.4 J	<38.6	<38.6	<16.0	294 U*	303	290	161	152
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	0.131 J	<0.125	<0.125	0.157 J	<0.125
Calcium	ug/L	95,800	91,500	106,000	99,000	84,900	99,400	102,000	103,000	102,000	93,600	96,200
Chromium	ug/L	<0.980	<0.980	<0.980	<1.53	<1.53	<2.47	<1.53	1.61 U*	<1.53	2.45 U*	1.79 U*
Cobalt	ug/L	0.205 J	0.237 J	0.301 J	0.416 J	0.450 J	1.79	0.220 J	0.192 J	0.135 J	0.375 J	0.284 J
Copper	ug/L	<1.70	<1.70	<1.70	0.966 J	<0.627	<1.70	0.684 U*	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	-	-	2,350	8,600	12,800	38,500	-	-	-	-	-
Lead	ug/L	<0.450	<0.450	<0.450	<0.128	<0.128	<0.450	0.167 J	0.128 J	<0.128	0.150 J	<0.128
Lithium	ug/L	8.82	8.76	10.6	9.79	8.79	8.34	11.2 U*	11.1	10.6	22.6 U*	15.6 U*
Magnesium	ug/L	5,080	4,750	5,930	5,100	4,630	5,410	13,000	12,500	12,300	10,000	10,300
Manganese	ug/L	-	-	170	166	143	259	-	-	-	-	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<1.08	<1.08	<1.08	<0.610	<0.610	<1.08	2.15 J	2.66 J	2.48 J	0.829 J	0.850 J
Nickel	ug/L	<1.47	<1.47	<1.47	1.10	2.86	2.85	0.379 U*	0.750 J	<0.336	0.748 U*	0.712 U*
Potassium	ug/L	881 J	877 J	947 J	867	966	944 J	763	648	644	706	701
Selenium	ug/L	<0.890	<0.890	<0.890	<1.51	<1.51	<0.890	<1.51	<1.51	<1.51	<1.51	<1.51
Silicon	ug/L	-	-	6,980	7,230	6,990	8,720	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.177	<0.177	<0.0530	<0.177	<0.177	<0.177	<0.177	<0.177
Sodium	ug/L	7,470	7,220	7,920	7,830	7,460	8,190	13,100	12,900	13,000	8,470	8,550
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.200	<0.200	<0.200	<0.148	<0.148	<0.200	0.246 U*	0.260 J	<0.148	0.265 J	<0.148
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.991	<0.991	<0.820	<0.991	<0.991	<0.991	2.52 U*	1.95 U*
Zinc	ug/L	<15.0	<15.0	<15.0	7.02 U*	4.78 J	15.5 U*	3.97 J	<3.22	<3.22	3.74 U*	4.19 U*
Radiological Parameters												
Radium-226	pCi/L	0.0798 +/-(0.426)U	0.544 +/-(0.388)	0.804 +/-(0.665)U	0.389 +/-(0.329)U	0.0405 +/-(0.251)U	0.568 +/-(0.544)U	0.606 +/-(0.608)U	0.290 +/-(0.525)U	0.161 +/-(0.476)U	0.390 +/-(0.535)U	0.414 +/-(0.502)U
Radium-228	pCi/L	0.0272 +/-(0.513)U	-0.349 +/-(0.419)U	0.0325 +/-(0.340)U	-0.124 +/-(0.281)U	0.146 +/-(0.369)U	0.795 +/-(0.668)U	0.261 +/-(0.530)U	-0.135 +/-(0.444)U	0.621 +/-(0.601)U	-0.342 +/-(0.273)U	0.223 +/-(0.399)U
Radium-226+228	pCi/L	0.107 +/-(0.667)U	0.544 +/-(0.571)J	0.837 +/-(0.747)U	0.389 +/-(0.433)U	0.187 +/-(0.446)U	1.36 +/-(0.861)U	0.867 +/-(0.806)U	0.290 +/-(0.687)U	0.782 +/-(0.767)U	0.390 +/-(0.601)U	0.637 +/-(0.641)U
Anions												
Chloride	mg/L	11.2	9.17	23.8	12.6	12.0	17.9	10.7	11.4	11.4	6.95	6.94
Fluoride	mg/L	0.0465 J	0.0435 J	0.0390 J	0.0422 J	0.135 U*	0.100 U*	0.0639 J	0.0585 J	0.0577 J	0.0704 J	0.0681 J
Sulfate	mg/L	43.3	38.9	62.0	47.5	28.8	46.7	68.0	75.2	74.6	72.6	72.5
General Chemistry												
Alkalinity, Bicarbonate	mg/L	218	222	209	237	213	203	231	235	235	226	221
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60	<5.00	<5.00	<5.00	<5.00	<5.00
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	315	324	364	299	284	324	382	345 J	395	318	325

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-207									
Sample Date		6-Feb-20	6-Feb-20	8-Apr-20	8-Apr-20	10-Jun-20	10-Jun-20	17-Feb-21	21-Jul-21	26-Jan-22	26-Jul-22
Sample ID		JSF-GW-028-20200206	JSF-GW-DUP01-20200206	JSF-GW-028-20200408	JSF-GW-DUP01-20200408	JSF-GW-028-20200610	JSF-GW-DUP01-20200610	JSF-GW-JSF-207-02172021	JSF-GW-JSF-207-07212021	JSF-GW-JSF-207-01262022	JSF-GW-JSF-207-07262022
Parent Sample ID			JSF-GW-028-20200206		JSF-GW-028-20200408		JSF-GW-028-20200610				
Intake Depth		36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	-	-	-	-	-	-	<34.0	<12.5	<12.5	<34.0
Antimony	ug/L	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.378	<0.378	<0.570
Arsenic	ug/L	<0.750	<0.750	<0.750	<0.750	<0.750	<0.750	1.06 U*	0.745 J	0.396 J	<0.750
Barium	ug/L	169	168	226	218	227	231	172	239	172	200
Beryllium	ug/L	<0.305	<0.305	<0.305	<0.305	<0.305	<0.305	<0.305	<0.182	<0.182	<0.620
Boron	ug/L	161	159	337	337	388	384	243	346	366	325
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197
Calcium	ug/L	91,000	90,100	97,000	94,400	97,000	99,300	91,100	116,000	95,500	98,800
Chromium	ug/L	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<1.53	<1.53	<2.47
Cobalt	ug/L	0.216 J	0.236 J	<0.190	<0.190	<0.190	<0.190	<0.190	0.147 J	<0.134	<0.190
Copper	ug/L	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	1.03 J	<0.627	<1.70
Iron	ug/L	-	-	-	-	-	-	411	537	328	244
Lead	ug/L	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.128	<0.128	<0.450
Lithium	ug/L	5.84 J	5.90 J	10.9	9.37	9.80	10.0	7.24 J	10.7	8.35	9.17
Magnesium	ug/L	8,950	8,900	12,000	11,800	12,100	12,400	10,300	12,400	10,600	12,000
Manganese	ug/L	-	-	-	-	-	-	34.8	37.6	30.0	35.8
Mercury	ug/L	<0.130	<0.130	0.130 UJ	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	2.22 J	1.45 J	2.87 J	2.85 J	3.44 J	3.34 J	1.72 J	2.50 J	1.46 J	2.52 J
Nickel	ug/L	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<1.47	<0.336	0.498 J	<1.47
Potassium	ug/L	644 J	638 J	579 J	607 J	569 J	573 J	634 J	592	689	545 J
Selenium	ug/L	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	7,380	7,770	6,690	7,790
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.177	<0.0530
Sodium	ug/L	7,520	7,490	11,400	11,200	11,200	11,400	10,000	12,900	10,900	11,700
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	0.230 J	<0.148	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991	<0.820
Zinc	ug/L	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	4.25 U*	<3.22	<15.0
Radiological Parameters											
Radium-226	pCi/L	1.18 +/-(0.740)	0.429 +/-(0.566)U	0.603 +/-(0.597)U	0.507 +/-(0.438)U	0.197 +/-(0.253)U	0.526 +/-(0.361)	0.191 +/-(0.447)U	0.268 +/-(0.332)U	-0.114 +/-(0.317)U	0.400 +/-(0.524)U
Radium-228	pCi/L	-0.320 +/-(0.372)U	-0.0253 +/-(0.287)U	0.853 +/-(0.615)U	0.0722 +/-(0.417)U	0.320 +/-(0.312)U	0.306 +/-(0.363)U	0.589 +/-(0.490)U	0.532 +/-(0.394)U	0.186 +/-(0.274)U	0.255 +/-(0.525)U
Radium-226+228	pCi/L	1.18 +/-(0.829)J	0.429 +/-(0.635)U	1.46 +/-(0.857)U	0.579 +/-(0.605)U	0.518 +/-(0.402)U	0.833 +/-(0.512)J	0.780 +/-(0.663)U	0.800 +/-(0.515)U	0.186 +/-(0.419)U	0.654 +/-(0.742)U
Anions											
Chloride	mg/L	8.33	8.32	9.92	9.91	9.16	9.11	9.43	9.12	9.25	7.44
Fluoride	mg/L	0.0655	0.0647	0.0695	0.0686	0.0679	0.0661	0.0587	0.0545	0.0796 J	0.0732
Sulfate	mg/L	58.2	58.3	85.7	85.7	88.4	88.5	75.7	82.8	67.5	87.4
General Chemistry											
Alkalinity, Bicarbonate	mg/L	200	199	227	227	230	227	212	232	218	225
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	325	345	342	362	412	390	359	262	407	320

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-208									
Sample Date		15-Aug-19	10-Oct-19	5-Dec-19	7-Feb-20	8-Apr-20	10-Jun-20	17-Feb-21	21-Jul-21	26-Jan-22	28-Jul-22
Sample ID		JSF-GW-029-20190815	JSF-GW-029-20191010	JSF-GW-029-20191205	JSF-GW-029-20200207	JSF-GW-029-20200408	JSF-GW-029-20200610	JSF-GW-JSF-208-02172021	JSF-GW-JSF-208-07212021	JSF-GW-JSF-208-01262022	JSF-GW-JSF-208-07282022
Parent Sample ID											
Intake Depth		40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	-	-	-	-	-	-	<34.0	<12.5	<12.5	<15.5
Antimony	ug/L	<0.378	<0.378	<0.378	<0.570	1.27 J	1.09 J	<0.570	1.34 J	0.554 J	1.53 J
Arsenic	ug/L	1.70 U*	5.75	3.38	3.71 J	1.16 J	1.03 J	7.62	0.916 J	3.91	0.685 J
Barium	ug/L	61.2	68.6	63.6	39.4	34.7	41.1	60.1	56.4	57.2	54.9
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305	<0.182	<0.182	<0.274
Boron	ug/L	1,920	1,510	1,410	1,690	1,630	1,710	1,560	1,650	1,700	1,560
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.197	0.658 J	<0.197	<0.197	<0.217	<0.217	<0.217
Calcium	ug/L	174,000	180,000	169,000	161,000	161,000	159,000	158,000	180,000	162,000	186,000 J
Chromium	ug/L	<1.53	<1.53	2.65 U*	<0.980	<0.980	<0.980	<0.980	<1.53	<1.53	<1.53
Cobalt	ug/L	0.490 J	0.381 J	0.349 J	<0.190	<0.190	<0.190	0.338 J	0.176 J	0.160 J	<0.261
Copper	ug/L	1.34 U*	<0.627	<0.627	<1.70	<1.70	<1.70	<1.70	0.687 J	<0.627	<1.14
Iron	ug/L	-	-	-	-	-	-	3,210	64.1	2,000	43.9 J
Lead	ug/L	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450	<0.128	<0.128	0.191 J
Lithium	ug/L	17.9 U*	8.24	23.6 U*	8.19	9.70	7.69 J	5.66 J	6.94	5.65	5.85
Magnesium	ug/L	26,300	28,100	26,500	23,300	25,000	24,500	27,000	27,700	26,500	26,400
Manganese	ug/L	-	-	-	-	-	-	92.4	23.3	50.2	2.89 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.130	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	7.48	7.21	6.73	6.21	6.17	5.80	4.37 J	4.86 J	3.63 J	3.87 J
Nickel	ug/L	1.48 U*	0.790 J	0.685 U*	<1.47	<1.47	<1.47	<1.47	0.766 J	<0.336	0.707 J
Potassium	ug/L	6,910	3,360	4,460	4,180	3,870	2,820	1,730	1,520	1,260	1,220
Selenium	ug/L	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51	<0.739
Silicon	ug/L	-	-	-	-	-	-	9,780	8,900	8,560	8,610
Silver	ug/L	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.177	<0.223
Sodium	ug/L	34,500	52,100	45,100	37,200	36,400	35,100	35,500	34,600	32,100	34,200
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.148	<0.148	<0.148	<0.200	0.571 U*	<0.200	<0.200	<0.148	<0.148	<0.472
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	0.996 U*	1.15	2.06 U*	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991	<0.776
Zinc	ug/L	5.11	<3.22	4.28 U*	<15.0	<15.0	<15.0	<15.0	4.20 U*	<3.22	10.4 U*
Radiological Parameters											
Radium-226	pCi/L	-0.137 +/-(0.367)U	0.0813 +/-(0.419)U	0.459 +/-(0.447)U	0.888 +/-(0.685)U	0.367 +/-(0.468)U	0.120 +/-(0.312)U	0.631 +/-(0.600)U	-0.104 +/-(0.138)U	0.217 +/-(0.264)U	-0.0547 +/-(0.422)U
Radium-228	pCi/L	0.133 +/-(0.548)U	0.457 +/-(0.457)U	0.955 +/-(0.602)	0.224 +/-(0.301)U	0.386 +/-(0.393)U	0.305 +/-(0.277)U	0.402 +/-(0.360)U	0.184 +/-(0.367)U	0.431 +/-(0.386)U	0.230 +/-(0.460)U
Radium-226+228	pCi/L	0.133 +/-(0.660)U	0.538 +/-(0.620)U	1.41 +/-(0.749)J	1.11 +/-(0.748)U	0.753 +/-(0.611)U	0.424 +/-(0.417)U	1.03 +/-(0.700)U	0.184 +/-(0.392)U	0.649 +/-(0.467)U	0.230 +/-(0.624)U
Anions											
Chloride	mg/L	26.8	22.1	25.3	26.4	23.6	22.4	17.3	16.6	13.5	14.3
Fluoride	mg/L	0.0661 J	0.0729 J	0.106	0.118	0.155	0.135	0.140	0.136	0.142	0.132 U*
Sulfate	mg/L	294	297	276	268	283	285	268	280	262	266
General Chemistry											
Alkalinity, Bicarbonate	mg/L	299	309	312	286	286	289	279	283	280	268
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	793	978	740	789	711	754	767	721	694	556

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-209										
Sample Date		13-Aug-19	10-Oct-19	5-Dec-19	5-Feb-20	8-Apr-20	10-Jun-20	16-Feb-21	21-Jul-21	21-Jul-21	24-Jan-22	26-Jul-22
Sample ID		JSF-GW-030-20190813	JSF-GW-030-20191010	JSF-GW-030-20191205	JSF-GW-030-20200205	JSF-GW-030-20200408	JSF-GW-030-20200610	JSF-GW-JSF-209-02162021	JSF-GW-FD-07212021	JSF-GW-JSF-209-07212021	JSF-GW-JSF-209-01242022	JSF-GW-JSF-209-07262022
Parent Sample ID									JSF-GW-JSF-209-07212021			
Intake Depth		32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft
Sample Type		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	Normal Environmental Sample	Normal Environmental Sample
Program	Units	EIP	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	-	-	-	-	-	-	<34.0	<12.5	<12.5	13.1 J	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	<0.570	<0.378	<0.378	<0.378	<0.570
Arsenic	ug/L	0.983 U*	0.583 J	0.411 J	<0.750	<0.750	<0.750	<0.750	<0.313	0.371 J	<0.313	<0.750
Barium	ug/L	35.0	32.3	30.8	31.0	30.2	33.2	27.6	28.8	28.6	25.8	26.6
Beryllium	ug/L	<0.182	<0.182	0.182 UJ	<0.305	<0.305	<0.305	<0.305	0.277 J	0.325 J	<0.182	<0.620
Boron	ug/L	117 U*	85.6 U*	<38.6	36.5	38.7	63.2	25.7	<38.6	45.5 J	42.2 J	26.5
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.217	<0.197
Calcium	ug/L	85,200	76,200	66,100	67,700	65,400	71,100	62,200	63,800	62,100	62,200	60,000
Chromium	ug/L	2.06 U*	<1.53	1.60 U*	<0.980	<0.980	<0.980	<0.980	1.53 UJ	12.3 J	<1.53	<2.47
Cobalt	ug/L	0.474 U*	0.159 J	0.100 J	<0.190	<0.190	<0.190	<0.190	<0.134	0.152 J	<0.134	<0.190
Copper	ug/L	<0.627	<0.627	<0.627	<1.70	<1.70	<1.70	<1.70	<0.627	<0.627	0.727 J	<1.70
Iron	ug/L	-	-	-	-	-	-	198	19.5 UJ	106 J	51.5	<47.0
Lead	ug/L	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450	0.195 J	0.218 J	<0.128	<0.450
Lithium	ug/L	5.74 U*	3.63 J	16.5 U*	3.13 J	3.42 J	3.16 J	3.86 J	3.93 J	4.60 J	4.01 J	3.06 J
Magnesium	ug/L	4,690	3,980	3,540	3,420	3,490	3,600	3,300	3,240	3,230	3,290	3,110
Manganese	ug/L	-	-	-	-	-	-	12.8	4.24 J	4.98 J	9.71	<6.20
Mercury	ug/L	<0.101	<0.101	<0.101	<0.130	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	1.24 J	<0.610	<0.610	5.04 U*	<1.08	<1.08	<1.08	<0.610	<0.610	<0.610	<1.08
Nickel	ug/L	<0.336	<0.336	<0.336	<1.47	<1.47	<1.47	<1.47	<0.336	0.712 J	<0.336	<1.47
Potassium	ug/L	749	759	643	686 J	731 J	697 J	864 J	689	648	759	611 J
Selenium	ug/L	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	5,670	5,630	5,570	5,210	5,580
Silver	ug/L	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.177	<0.177	<0.0530
Sodium	ug/L	21,100	11,400	9,920	9,210	12,100	13,000	6,630	6,010	6,160	4,190	4,590
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.148	<0.148	<0.148	0.813 U*	0.285 U*	<0.200	<0.200	0.443 J	0.607 J	<0.148	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	1.05 U*	<0.991	1.42 U*	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991	<0.991	<0.820
Zinc	ug/L	4.32 U*	<3.22	3.80 U*	<15.0	<15.0	<15.0	<15.0	<3.22	<3.22	<3.22	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.760 +/-(0.636)U	0.410 +/-(0.566)U	0.474 +/-(0.430)U	0.450 +/-(0.577)U	0.0189 +/-(0.391)U	-0.0279 +/-(0.205)U	0.260 +/-(0.450)U	0.536 +/-(0.550)U	-0.00682 +/-(0.337)U	0.116 +/-(0.333)U	0.0232 +/-(0.344)U
Radium-228	pCi/L	-0.0948 +/-(0.209)U	-0.0129 +/-(0.389)U	-0.364 +/-(0.399)U	0.186 +/-(0.274)U	0.383 +/-(0.542)U	-0.00802 +/-(0.300)U	0.144 +/-(0.360)U	-0.356 +/-(0.443)U	0.802 +/-(0.513)U*	0.0400 +/-(0.316)U	0.0352 +/-(0.558)U
Radium-226+228	pCi/L	0.760 +/-(0.670)U	0.410 +/-(0.687)U	0.474 +/-(0.587)U	0.636 +/-(0.638)U	0.402 +/-(0.669)U	0.000 +/-(0.363)U	0.404 +/-(0.576)U	0.536 +/-(0.707)U	0.802 +/-(0.614)U*	0.156 +/-(0.459)U	0.0585 +/-(0.655)U
Anions												
Chloride	mg/L	3.71	3.19	4.25	3.81	3.60	3.55	4.52	4.30	4.30	3.94	4.29
Fluoride	mg/L	0.0602 J	0.0537 J	0.0447 J	0.0664	0.0679	0.0737	0.0677	0.0518	0.0527	0.0649 J	0.0265 J
Sulfate	mg/L	64.4	55.5	34.5	41.0	40.8	48.9	28.0	33.7	33.3	20.3	27.2
General Chemistry												
Alkalinity, Bicarbonate	mg/L	233	262	193	204	216	225	150	186	187	161	174
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	361	595	228	273	267	377	222 J	239	235	201	236

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-210									
Sample Date		14-Aug-19	8-Oct-19	3-Dec-19	4-Feb-20	7-Apr-20	9-Jun-20	16-Feb-21	20-Jul-21	25-Jan-22	26-Jul-22
Sample ID		JSF-GW-031-20190814	JSF-GW-031-20191008	JSF-GW-031-20191203	JSF-GW-031-20200204	JSF-GW-031-20200407	JSF-GW-031-20200609	JSF-GW-JSF-210-02162021	JSF-GW-JSF-210-07202021	JSF-GW-JSF-210-01252022	JSF-GW-JSF-210-07262022
Parent Sample ID											
Intake Depth		46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	-	-	-	-	-	-	<34.0	<12.5	<12.5	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	<0.570	<0.378	<0.378	<0.570
Arsenic	ug/L	0.939 U*	1.04	1.17	<0.750	<0.750	<0.750	0.924 J	0.614 J	1.16	<0.750
Barium	ug/L	131	146	170	157	134	133	160	149	153	125
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.305	<0.305	<0.305	<0.305	<0.182	<0.182	<0.620
Boron	ug/L	<38.6	<38.6	<38.6	19.8 J	17.9 J	18.2 J	19.0 J	90.9	62.3 U*	<16.0
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.197	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197
Calcium	ug/L	121,000	116,000	114,000	137,000	122,000	112,000	124,000	118,000	122,000	119,000
Chromium	ug/L	<1.53	2.76 U*	<1.53	<0.980	<0.980	<0.980	<0.980	<1.53	<1.53	<2.47
Cobalt	ug/L	0.544	0.684	0.606	0.553 J	0.993 J	<0.190	0.996 J	0.641	0.664	0.480 J
Copper	ug/L	<0.627	1.62 U*	0.643 J	<1.70	<1.70	<1.70	<1.70	<0.627	<0.627	<1.70
Iron	ug/L	-	-	-	-	-	-	728	759	1,450	719
Lead	ug/L	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.450	<0.128	<0.128	<0.450
Lithium	ug/L	8.71 U*	12.3	10.8	11.8	9.67	10.2	10.7	11.6	10.0	8.22
Magnesium	ug/L	7,000	6,240	6,000	7,240	6,420	6,120	6,970	6,250	6,470	6,210
Manganese	ug/L	-	-	-	-	-	-	373	240	314	223
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	0.963 J	0.622 J	<0.610	1.15 U*	<1.08	<1.08	<1.08	<0.610	<0.610	<1.08
Nickel	ug/L	0.515 U*	0.381 J	<0.336	<1.47	<1.47	<1.47	<1.47	<0.336	<0.336	<1.47
Potassium	ug/L	1,540	1,110	1,060	1,080	1,020	1,030	1,040	952	1,030	879 J
Selenium	ug/L	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	7,860	7,310	7,250	7,930
Silver	ug/L	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.177	<0.0530
Sodium	ug/L	18,700	12,000	11,200	12,300	10,700	10,700	10,800	10,400	10,200	9,480
Strontium	ug/L	-	-	-	-	-	-	-	-	-	-
Thallium	ug/L	<0.148	<0.148	0.165 J	<0.200	<0.200	<0.200	0.300 J	<0.148	<0.148	<0.200
Tin	ug/L	-	-	-	-	-	-	-	-	-	-
Vanadium	ug/L	<0.991	<0.991	1.14 U*	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991	<0.820
Zinc	ug/L	3.44 J	3.67 U*	<3.22	<15.0	<15.0	<15.0	<15.0	4.81 U*	<3.22	<15.0
Radiological Parameters											
Radium-226	pCi/L	0.581 +/-(0.510)U	0.209 +/-(0.523)U	0.597 +/-(0.515)U	0.467 +/-(0.573)U	0.423 +/-(0.382)U	0.173 +/-(0.294)U	0.210 +/-(0.484)U	0.141 +/-(0.240)U	-0.0237 +/-(0.417)U	0.0336 +/-(0.342)U
Radium-228	pCi/L	0.0917 +/-(0.253)U	0.167 +/-(0.318)U	0.421 +/-(0.399)U	0.593 +/-(0.429)U	-0.296 +/-(0.307)U	0.192 +/-(0.319)U	0.194 +/-(0.319)U	0.542 +/-(0.489)U	0.595 +/-(0.748)U	-0.309 +/-(0.529)U
Radium-226+228	pCi/L	0.673 +/-(0.569)U	0.377 +/-(0.612)U	1.02 +/-(0.651)U	1.06 +/-(0.716)U	0.423 +/-(0.490)U	0.365 +/-(0.434)U	0.404 +/-(0.580)U	0.683 +/-(0.545)U	0.595 +/-(0.856)U	0.0336 +/-(0.630)U
Anions											
Chloride	mg/L	14.8	15.5	19.9	40.9	20.4	14.9	36.6	21.2	26.4	35.9
Fluoride	mg/L	0.0671 J	0.0599 U*	0.0576 J	0.0606	0.0544	0.0529	0.0687	0.0477 J	0.0594 U*	0.0482 J
Sulfate	mg/L	57.6	57.7	62.9	87.9	69.1	56.7	87.9	66.7	66.3	84.0
General Chemistry											
Alkalinity, Bicarbonate	mg/L	274	262	262	250	265	260	209	260	255	243
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<2.60
pH (lab)	SU	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	327	387	397	499	424	405	447 J	368	418	424

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-103										
Sample Date		17-May-16	16-Nov-16	1-May-17	1-May-17	28-Aug-17	28-Nov-17	26-Feb-18	26-Feb-18	23-May-18	6-Sep-18	6-Sep-18
Sample ID		JSF-103-0516	JSF-103-111616	JSF-103-050117	JSF-103-DUP-050117	JSF-103-082817	JSF-103-112817	JSF-103-022618	JSF-103-DUP-022618	JSF-103-052318	JSF-103-GW-090618	JSF-103-GW-DUP-090618
Parent Sample ID					JSF-103-0517				JSF-103-0218			JSF-103-GW-090618
Intake Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	Field Duplicate Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<100	<200	<200	<200	-	<200	-	-	<200	-	-
Antimony	ug/L	<2	<2	<2	<2	-	<2	-	-	<2	-	-
Arsenic	ug/L	2 UJ	<1	<1	<1	-	<1	-	-	<1	-	-
Barium	ug/L	20.6	<200	<200	<200	-	<200	-	-	<200	-	-
Beryllium	ug/L	<2	<1	<1	<1	-	<1	-	-	<1	-	-
Boron	ug/L	577	638	<200	<200	-	591	-	-	<200	-	-
Cadmium	ug/L	1 UJ	<1	<1	<1	-	<1	-	-	<1	-	-
Calcium	ug/L	-	655,000	86,800	86,100	488,000	-	109,000	108,000	83,500	141,000	143,000
Chromium	ug/L	<2	<2	<2	<2	-	<2	-	-	<2	-	-
Cobalt	ug/L	<2	1.15	<0.5	<0.5	-	<0.5	-	-	<0.5	-	-
Copper	ug/L	<2	<2	<2	<2	-	<2	-	-	<2	-	-
Iron	ug/L	<100	<100	<100	<100	-	127	-	-	<100	-	-
Lead	ug/L	2 UJ	<1	<1	<1	-	<1	-	-	<1	-	-
Lithium	ug/L	-	9.24 J	<5	<5	5.61	5.89	<5	<5	<5	<5	<5
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	186	1,220	49.3	48.9	-	292	-	-	23.3	-	-
Mercury	ug/L	<0.2	<0.200	<0.200	<0.200	-	<0.2	-	-	<0.2	-	-
Molybdenum	ug/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Nickel	ug/L	4.5	4.55	9.86	9.79	-	3.94	-	-	6.2	-	-
Potassium	ug/L	1,400	<5,000	<5,000	<5,000	-	<5,000	-	-	<5,000	-	-
Selenium	ug/L	<2	<5	<5	<5	-	<5	-	-	<5	-	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<1	<1	<1	-	<1	-	-	<1	-	-
Sodium	ug/L	15,800	17,500	5,710	5,660	-	15,800	-	-	5,260	-	-
Strontium	ug/L	478	535	92.1	91.6	-	487	-	-	83.9	-	-
Thallium	ug/L	2 UJ	<1	<1	<1	-	<1	-	-	<1	-	-
Tin	ug/L	<50	<100	<100	<100	-	<100	-	-	<100	-	-
Vanadium	ug/L	<4	<1	<1	<1	-	<1	-	-	<1	-	-
Zinc	ug/L	<25	<5	8.9	9.3	-	<5	-	-	6.89	-	-
Radiological Parameters												
Radium-226	pCi/L	-	-0.0320 +/-(0.178)U	0.0467 +/-(0.0633)U	0.0304 +/-(0.0554)U	0.0559 +/-(0.0523)U	0.0477 +/-(0.0464)U	0.0603 +/-(0.0510)U	0.0368 +/-(0.0437)U	-0.00283 +/-(0.0394)U	0.182 +/-(0.0754)U*	0.257 +/-(0.0883)U*
Radium-228	pCi/L	-	0.341 +/-(0.281)U	0.400 +/-(0.277)U	0.199 +/-(0.229)U	1.98 +/-(0.415)	0.227 +/-(0.248)U	0.151 +/-(0.262)U	0.435 +/-(0.224)	0.0401 +/-(0.233)U	0.0542 +/-(0.195)U	0.212 +/-(0.231)U
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	11.1	8.67	4.76	4.82	-	10.5	-	-	3.43	-	-
Fluoride	mg/L	<0.100	<0.500	<0.100	<0.100	-	<0.1	-	-	<0.100	-	-
Sulfate	mg/L	1,230	<1,230	266	265	-	1,360	-	-	208	-	-
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	-	255	-	-	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	-	6.3	6.3 J	6.3 J
Total Dissolved Solids	mg/L	-	2,340	517	526	2,110	2,120	497	522	385	632	623

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-103										
Sample Date		27-Nov-18	23-Jan-19	28-Jan-19	5-Feb-19	19-Feb-19	26-Feb-19	5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	13-May-19
Sample ID		JSF-103-GW-112718	JSF-GW-013-01232019	JSF-GW-013-01282019	JSF-GW-013-02052019	JSF-GW-013-02192019	JSF-GW-013-02262019	JSF-GW-013-03052019	JSF-GW-013-03192019	JSF-GW-013-03262019	JSF-GW-013-04012019	JSF-GW-103-051319
Parent Sample ID												
Intake Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance
Total Metals												
Aluminum	ug/L	<200	<11.8	<11.8	<12.5	14.2 J	<12.5	12.5 U*	<12.5	<12.5	<12.5	13.5 J
Antimony	ug/L	<2	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<1	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323
Barium	ug/L	<200	24.1	26.3	24.7	25.7	31.5	29.7	29	36	33.3	38.7
Beryllium	ug/L	<1	0.163 J	0.141 J	0.19 J	<0.155	0.204 J	<0.155	0.215 J	0.2 J	<0.155	0.25 J
Boron	ug/L	<200	40.7 J	36.6 J	58.6 U*	<30.3	40.8 J	<30.3	<30.3	<30.3	34.5 J	42.3 J
Cadmium	ug/L	<1	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.129 J
Calcium	ug/L	41,100	16,200 J	14,200	13,200	13,200	14,100	12,400 J	11,000	13,700	16,300	17,700
Chromium	ug/L	3.47	3.17 U*	2.46 U*	2.83	<1.53	2.47	2.3	<1.53	2.09 U*	<1.53	4.07 U*
Cobalt	ug/L	<0.5	0.155 J	0.155 J	0.136 J	0.278 J	0.417 J	0.301 J	0.243 J	0.17 J	0.078 J	0.216 J
Copper	ug/L	<2	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.933 U*
Iron	ug/L	<100	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	<1	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<5	<2.56	<2.56	3.67 U*	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	4.5 U*
Magnesium	ug/L	-	4,240	3,990	3,470	3,600	3,990	3,720	3,190	3,970	4,130	-
Manganese	ug/L	32.1	36.6	37.2	34.1	36.1	41.8	38	39.9	40.7	38.4 J	38.2
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
Molybdenum	ug/L	<5	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	12.3	7.37	7.53	7.18	6.76	8.35	7.95	7.89	8.42	9.43	11.4
Potassium	ug/L	<5,000	371 J	385 J	323 J	319 J	382 U*	335 J	294 J	345 J	352 J	332 J
Selenium	ug/L	<5	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<1	-	-	-	-	-	-	-	-	-	<0.121
Sodium	ug/L	<5,000	2,860	2,820	2,560	2,600	2,830	2,640	2,310	2,820	2,620	3,320
Strontium	ug/L	57	21.4	20.9	20.7	21.6	20.5	17.6	18.5	22.4	24.2	29.6
Thallium	ug/L	<1	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Tin	ug/L	<100	-	-	-	-	-	-	-	-	-	<1.75
Vanadium	ug/L	<1	-	-	-	-	-	-	-	-	-	2.31 U*
Zinc	ug/L	12.9	-	-	-	-	-	-	-	-	-	8.67
Radiological Parameters												
Radium-226	pCi/L	0.0318 +/-(0.0428)U	0.0734 +/-(0.0727)U	-0.0311 +/-(0.0353)UJ	0.0753 +/-(0.0647)UJ	0.0424 +/-(0.0495)UJ	0.0910 +/-(0.0839)U	-0.00610 +/-(0.0556)U	0.0488 +/-(0.0587)UJ	0.0610 +/-(0.0539)U	0.0396 +/-(0.0510)U	0.0290 +/-(0.0461)U
Radium-228	pCi/L	0.171 +/-(0.198)U	-0.0905 +/-(0.221)U	0.517 +/-(0.238)	0.276 +/-(0.241)UJ	0.286 +/-(0.254)U	0.342 +/-(0.200)	0.309 +/-(0.227)U	0.282 +/-(0.249)U	0.609 +/-(0.248)U*	0.134 +/-(0.261)U	0.0583 +/-(0.246)U
Radium-226+228	pCi/L	-	0.0734 +/-(0.233)U	0.517 +/-(0.241)J	0.351 +/-(0.250)UJ	0.329 +/-(0.259)UJ	0.433 +/-(0.217)J	0.309 +/-(0.234)U	0.331 +/-(0.256)UJ	0.670 +/-(0.254)U*	0.174 +/-(0.266)U	-
Anions												
Chloride	mg/L	4.68	3.32	3.34	3.30	3.12	3.44	2.95	2.74	2.95	2.80	3.88
Fluoride	mg/L	<0.100	0.0555 J	<0.0263	<0.0263	<0.0263	<0.0263	<0.0263	0.0279 J	0.0271 J	<0.0263	<0.0263
Sulfate	mg/L	131	45.5	43.8	43.6	41.2	40.1	35.5	29.0	39.7	45.5	49.3
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	8.08	<5.00	<5.00	5.50	6.00	5.00	5.08	6.60	9.64	-
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-
pH (lab)	SU	6.0 J	-	-	-	-	-	-	-	-	-	5.8 J
Total Dissolved Solids	mg/L	197	96.0	84.0	80.0	91.0	78.0	86.0 J	64.0	69.0	90.0	77.0

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-103										
Sample Date		12-Jun-19	10-Sep-19	19-Nov-19	8-Jan-20	5-Feb-20	5-May-20	7-Jul-20	11-Aug-20	16-Nov-20	13-Jan-21	9-Feb-21
Sample ID		JSF-GW-013-06122019	JSF-GW-013-09102019	JSF-GW-013-11192019	JSF-GW-013-01082020	JSF-GW-013-02052020	JSF-GW-103-050520	JSF-GW-013-07072020	JSF-GW-013-08112020	JSF-GW-103-111620	JSF-GW-JSF-103-01132021	JSF-GW-JSF-103-02092021
Parent Sample ID												
Intake Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	42.4 U*	23.9 U*	<34.0	<34.0	15.6 J	<34.0	<34.0	<12.5	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570
Arsenic	ug/L	0.335 J	0.690 U*	<0.323	<0.750	<0.750	<0.313	<0.750	<0.750	<0.313	<0.750	<0.750
Barium	ug/L	56.9	86.1	93.8	32.8	29.1	32.9	111	113	44.4	38.8	35.7
Beryllium	ug/L	<0.155	<0.182	<0.182	<0.305	<0.305	0.262 J	<0.305	<0.305	0.218 J	<0.305	<0.305
Boron	ug/L	76.6 J	247	273	33.0	27.2	<38.6	125	166	59.0 U*	22.2	17.5 J
Cadmium	ug/L	<0.125	0.229 J	<0.125	<0.197	<0.197	<0.217	<0.197	<0.197	<0.217	<0.197	<0.197
Calcium	ug/L	54,700	161,000	196,000	18,400	12,700	8,690	84,600	121,000	17,700	10,700	8,510
Chromium	ug/L	4.25 U*	4.77 U*	5.48 U*	2.74	2.51	2.25	2.22	2.10	2.75	2.20	3.10
Cobalt	ug/L	0.106 J	0.339 U*	0.195 J	<0.190	<0.190	0.321 J	<0.190	<0.190	<0.134	0.195 J	0.261 J
Copper	ug/L	<0.627	1.14 U*	0.969 U*	<1.70	<1.70	<0.627	<1.70	<1.70	<0.627	<1.70	<1.70
Iron	ug/L	<14.1	42.5 J	24.1 J	<47.0	<47.0	<19.5	<47.0	<47.0	<19.5	<47.0	<47.0
Lead	ug/L	<0.128	0.172 J	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450
Lithium	ug/L	<3.14	4.34 J	4.05 J	<1.65	<1.65	6.09 U*	3.90 U*	2.92 J	<3.39	2.02 J	<1.65
Magnesium	ug/L	10,700	21,300	27,000	4,410	3,420	-	12,400	15,800	-	3,100	2,800
Manganese	ug/L	17.1	12.0	8.61	18.2	23.4	31.7	21.4	13.5	15.0	24.5	27.0
Mercury	ug/L	<0.101	<0.101	<0.101	0.130 UJ	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.61	<0.610	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08
Nickel	ug/L	8.4	7.44	6.34	7.59	7.33	8.21	10.8	6.49	8.83	8.68	8.14
Potassium	ug/L	502	797	1,010	356 J	313 J	302 J	567 J	629 J	364 J	275 J	336 J
Selenium	ug/L	<2.62	<1.51	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.121	<0.177	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530
Sodium	ug/L	4,430	7,840	9,130	2,790	2,400	2,330	4,870	5,900	3,200	2,530	2,420
Strontium	ug/L	64.8	214	212	26.4	19.1	16.0	131	175	29.9	19.7	15.9
Thallium	ug/L	<0.128	0.315 J	<0.148	<0.200	<0.200	0.253 J	<0.200	<0.200	<0.148	<0.200	<0.200
Tin	ug/L	-	-	<1.75	-	-	<0.960	-	-	<0.960	<3.00	-
Vanadium	ug/L	1.83 U*	1.82 U*	1.75 U*	<0.820	<0.820	<0.991	<0.820	<0.820	<0.991	<0.820	<0.820
Zinc	ug/L	7.1	7.62	9.07	<15.0	<15.0	10.6	<15.0	<15.0	10.6	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	-0.0189 +/-(0.0599)U	0.304 +/-(0.392)U	0.173 +/-(0.323)U	0.565 +/-(0.451)U	0.119 +/-(0.315)U	0.437 +/-(0.570)U	-0.311 +/-(0.475)U	0.750 +/-(0.686)U	-0.226 +/-(0.349)U	0.183 +/-(0.506)U	-0.217 +/-(0.283)U
Radium-228	pCi/L	0.676 +/-(0.390)J	0.594 +/-(0.450)U	0.185 +/-(0.294)U	-0.0233 +/-(0.254)U	0.185 +/-(0.357)UJ	0.0891 +/-(0.298)U	0.406 +/-(0.481)U	-0.0563 +/-(0.254)U	-0.465 +/-(0.367)U	-0.593 +/-(0.500)U	0.537 +/-(0.604)U
Radium-226+228	pCi/L	0.676 +/-(0.395)J	0.898 +/-(0.597)U	0.358 +/-(0.437)U	0.565 +/-(0.518)U	0.304 +/-(0.476)UJ	0.526 +/-(0.643)U	0.406 +/-(0.676)U	0.750 +/-(0.731)U	0.000 +/-(0.506)U	0.183 +/-(0.711)U	0.537 +/-(0.667)U
Anions												
Chloride	mg/L	3.80	4.42	6.56	3.74	3.24	3.28	4.12	4.97	4.58	3.39	3.23
Fluoride	mg/L	0.0346 J	0.0785 J	0.0548 J	<0.0240	<0.0240	<0.0263	0.0431 J	0.0492 J	<0.0440	<0.0240	<0.0240
Sulfate	mg/L	93.0	332	495	55.9	38.2	20.4	144 J	287	48.2	60.4	24.4
General Chemistry												
Alkalinity, Bicarbonate	mg/L	32.4	109	83.9	11.1 J	10.6 J	-	58.0	74.2	12.5	9.65	8.52
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<2.60	<2.60	-	<2.60	<2.60	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	6.5 J	-	-	5.7 J	-	-	5.6 J	5.3 J	-
Total Dissolved Solids	mg/L	209	629	776	114	81.0 J	53.0	293	489	92.0 J	97.0 J	103

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-103					
Sample Date		15-Jul-21	10-Aug-21	20-Jan-22	1-Mar-22	20-Jul-22	1-Sep-22
Sample ID		JSF-GW-JSF-103-07152021	JSF-GW-JSF-103-08102021	JSF-GW-JSF-103-01202022	JSF-GW-JSF-103-03012022	JSF-GW-JSF-103-07202022	JSF-GW-JSF-103-09012022
Parent Sample ID							
Intake Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 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
Total Metals							
Aluminum	ug/L	<34.0	<34.0	<12.5	<15.5	<34.0	<34.0
Antimony	ug/L	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570
Arsenic	ug/L	<0.750	<0.750	<0.313	<0.282	<0.750	<0.750
Barium	ug/L	101	133	41.3	36.4	91.8	54.5
Beryllium	ug/L	<0.620	<0.620	0.257 J	<0.274	<0.620	<0.620
Boron	ug/L	102	183 J	43.6 J	<60.1	124	102 U*
Cadmium	ug/L	0.290 J	<0.197	<0.217	<0.217	<0.197	<0.197
Calcium	ug/L	76,300	131,000 J	14,200	10,400	99,100	65,500
Chromium	ug/L	2.79 J	<2.47	2.94	3.40	<2.47	<2.47
Cobalt	ug/L	0.273 J	0.255 J	0.170 J	0.323 J	<0.190	<0.190
Copper	ug/L	<1.70	<1.70	<0.627	<1.14	<1.70	<1.70
Iron	ug/L	<47.0	<47.0	<19.5	<27.7	<47.0	<47.0
Lead	ug/L	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450
Lithium	ug/L	3.82 U*	2.23 J	<3.39	1.68 J	<1.65	<1.65
Magnesium	ug/L	12,700	16,200	4,110	3,390	14,300	11,400 J
Manganese	ug/L	11.6	7.61 J	16.6	22.7	6.85 J	<6.20
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<1.08	<1.08	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	10.3	6.64	9.03	8.92	7.61	6.75
Potassium	ug/L	605 J	628 J	348 J	308 J	606 J	514 J
Selenium	ug/L	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530
Sodium	ug/L	4,900	6,360	2,950	2,650	5,600	5,180
Strontium	ug/L	115	192	26.0	19.1	133	84.8 J
Thallium	ug/L	0.747 J	<0.200	<0.148	<0.472	<0.200	<0.200
Tin	ug/L	<3.00	-	-	-	-	-
Vanadium	ug/L	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820
Zinc	ug/L	<15.0	<15.0	9.29	9.46	<15.0	21.3
Radiological Parameters							
Radium-226	pCi/L	-0.0758 +/-(0.314)U	-0.260 +/-(0.294)U	0.0233 +/-(0.235)U	-0.132 +/-(0.368)U	0.163 +/-(0.278)U	0.829 +/-(0.749)U
Radium-228	pCi/L	-0.153 +/-(0.307)U	0.211 +/-(0.304)U	0.419 +/-(0.358)U	0.133 +/-(0.310)U	-0.155 +/-(0.481)U	-0.151 +/-(0.465)U
Radium-226+228	pCi/L	0.000 +/-(0.440)U	0.211 +/-(0.423)U	0.442 +/-(0.428)U	0.133 +/-(0.481)U	0.163 +/-(0.556)U	0.829 +/-(0.881)U
Anions							
Chloride	mg/L	4.61	5.46	3.89	3.62	5.01	3.99
Fluoride	mg/L	0.0427 J	0.0503	0.0544 U*	0.0421 U*	0.0519	<0.0240
Sulfate	mg/L	141	340	43.3	35.0	240	125
General Chemistry							
Alkalinity, Bicarbonate	mg/L	45.3	94.6	9.91	7.76	66.1	33.7
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	6.1 J	-	-	-	-	-
Total Dissolved Solids	mg/L	279	564	94.0	67.0	409	219 J

Sample Location		JSF-104				
Sample Date		16-May-16	21-Nov-16	26-Apr-17	29-Aug-17	20-Nov-17
Sample ID		JSF-104-0516	JSF-104-112116	JSF-104-042617	JSF-104-082917	JSF-104-112017
Parent Sample ID						
Intake Depth		29 ft	29 ft	29 ft	29 ft	29 ft
Sample Type		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
Total Metals						
Aluminum	ug/L	<100	<200	<200	-	<200
Antimony	ug/L	<2	<2	<2	-	<2
Arsenic	ug/L	<2	<1	<1	-	<1
Barium	ug/L	43	<200	<200	-	<200
Beryllium	ug/L	<2	<1	<1	-	<1
Boron	ug/L	<50	<200	750	-	<200
Cadmium	ug/L	<1	<1	<1	-	<1
Calcium	ug/L	-	38,600	127,000	15,000	35,200
Chromium	ug/L	<2	<2	<2	-	<2
Cobalt	ug/L	<2	<0.5	<0.5	-	<0.5
Copper	ug/L	<2	<2	<2	-	<2
Iron	ug/L	<100	<100	<100	-	<100
Lead	ug/L	<2	<1	<1	-	<1
Lithium	ug/L	-	9.21	<5	5.55	8.84
Magnesium	ug/L	-	-	-	-	-
Manganese	ug/L	4.84	43.8	884	-	<5
Mercury	ug/L	<0.2	<0.200	<0.200	-	<0.2
Molybdenum	ug/L	-	<5	<5	<5	<5
Nickel	ug/L	<2	<1	<1	-	<1
Potassium	ug/L	<1,000	<5,000	<5,000	-	<5,000
Selenium	ug/L	<2	<5	<5	-	<5
Silicon	ug/L	-	-	-	-	-
Silver	ug/L	<2	<1	<1	-	<1
Sodium	ug/L	2,730	<5,000	14,600	-	<5,000
Strontium	ug/L	148	285	1,430	-	258
Thallium	ug/L	<2	<1	<1	-	<1
Tin	ug/L	<50	<100	<100	-	<100
Vanadium	ug/L	<4	<1	<1	-	<1
Zinc	ug/L	<25	<5	<5	-	<5
Radiological Parameters						
Radium-226	pCi/L	-	0.177 +/-(0.228)U	0.0243 +/-(0.0546)U	0.0515 +/-(0.0550)U	0.0490 +/-(0.0488)U
Radium-228	pCi/L	-	0.334 +/-(0.300)U	-0.0139 +/-(0.195)U	0.617 +/-(0.235)	0.522 +/-(0.267)
Radium-226+228	pCi/L	-	-	-	-	-
Anions						
Chloride	mg/L	8.33	5.42	3.78	-	7.75
Fluoride	mg/L	<0.100	<0.100	0.244	-	<0.1
Sulfate	mg/L	4.40	3.66	93.0	-	6.61
General Chemistry						
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-
Alkalinity, Carbonate	mg/L	-	-	-	-	111
pH (lab)	SU	-	-	-	-	-
Total Dissolved Solids	mg/L	-	140	558	68	121

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-104										
Sample Date		27-Feb-18	29-May-18	29-May-18	29-Aug-18	7-Sep-18	27-Nov-18	27-Nov-18	22-Jan-19	28-Jan-19	4-Feb-19	19-Feb-19
Sample ID		JSF-104-022718	JSF-104-052918	JSF-104-DUP-052918	JSF-104-GW-082918	JSF-104-GW-090718	JSF-104-DUP-GW-112718	JSF-104-GW-112718	JSF-GW-014-01222019	JSF-GW-014-01282019	JSF-GW-014-02042019	JSF-GW-014-02192019
Parent Sample ID				JSF-104-0518			JSF-104-GW-112718					
Intake Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft
Sample Type		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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	-	<200	<200	-	-	<200	<200	45.6 U*	<11.8	27 J	<12.5
Antimony	ug/L	-	<2	<2	-	-	<2	<2	<1.12	<1.12	<0.378	<0.378
Arsenic	ug/L	-	<1	<1	-	-	<1	<1	0.333 J	<0.323	<0.323	<0.323
Barium	ug/L	-	<200	<200	-	-	<200	<200	36.5	45	37.3	46.8
Beryllium	ug/L	-	<1	<1	-	-	<1	<1	<0.057	<0.057	<0.155	<0.155
Boron	ug/L	-	<200	<200	-	-	<200	<200	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	-	<1	<1	-	-	<1	<1	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,300	16,500	16,200	14,600	-	14,900	15,000	14,300 J	14,300	13,000	15,600
Chromium	ug/L	-	<2	<2	-	-	<2	<2	5.38 U*	1.6 U*	1.72 J	1.6 J
Cobalt	ug/L	-	<0.5	<0.5	-	-	<0.5	<0.5	0.519	<0.075	<0.075	<0.075
Copper	ug/L	-	<2	<2	-	-	<2	<2	5.8	<1.3	<0.627	<0.627
Iron	ug/L	-	<100	<100	-	-	<100	<100	89.9	<14.1	26 J	<14.1
Lead	ug/L	-	<1	<1	-	-	<1	<1	0.239 J	0.114 J	0.155 J	<0.128
Lithium	ug/L	7.2	6.58	6.83	5.97	-	6.59	6.72	6.24	6.26	9.19 U*	6.94
Magnesium	ug/L	-	-	-	-	-	-	-	1,330	1,380	1,190	1,410
Manganese	ug/L	-	<5	<5	-	-	<5	<5	61.7	6.75	6.15	5.18
Mercury	ug/L	-	<0.2	<0.2	-	-	<0.2	<0.2	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<5	<5	<5	<5	-	<5	<5	<0.474	<0.474	<0.61	<0.61
Nickel	ug/L	-	1.41	1.55	-	-	1.24	1.3	3.13	1.52	1.42	1.6
Potassium	ug/L	-	<5,000	<5,000	-	-	<5,000	<5,000	871	933	794	876
Selenium	ug/L	-	<5	<5	-	-	<5	<5	<0.813	<0.813	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	<1	<1	-	-	<1	<1	-	-	-	-
Sodium	ug/L	-	<5,000	<5,000	-	-	<5,000	<5,000	3,870	4,410	3,440	4,640
Strontium	ug/L	-	154	152	-	-	145	145	119	125	122	119
Thallium	ug/L	-	<1	<1	-	-	<1	<1	<0.063	<0.063	<0.128	<0.128
Tin	ug/L	-	<100	<100	-	-	<100	<100	-	-	-	-
Vanadium	ug/L	-	<1	<1	-	-	<1	<1	-	-	-	-
Zinc	ug/L	-	<5	<5	-	-	<5	<5	-	-	-	-
Radiological Parameters												
Radium-226	pCi/L	0.0481 +/-(0.0486)U	0.291 +/-(0.0433)U	0.0939 +/-(0.0856)U	0.188 +/-(0.0864)U*	-	-0.00712 +/-(0.0308)U	-0.00559 +/-(0.0321)U	0.0227 +/-(0.0543)U	-0.0178 +/-(0.0404)UJ	0.0178 +/-(0.0495)UJ	0.0417 +/-(0.0483)UJ
Radium-228	pCi/L	0.135 +/-(0.177)U	-0.0245 +/-(0.234)U	-0.244 +/-(0.276)U	0.00365 +/-(0.169)U	-	0.288 +/-(0.214)U	0.144 +/-(0.204)U	0.339 +/-(0.241)U	0.219 +/-(0.200)U	-0.0934 +/-(0.228)UJ	0.202 +/-(0.254)U
Radium-226+228	pCi/L	-	-	-	-	-	-	-	0.362 +/-(0.247)U	0.219 +/-(0.204)UJ	0.0178 +/-(0.233)UJ	0.244 +/-(0.259)UJ
Anions												
Chloride	mg/L	-	6.50	8.06	-	-	8.63	8.85	8.79	8.70	7.77	8.85
Fluoride	mg/L	-	<0.100	<0.100	-	-	<0.100	<0.100	<0.0263	<0.0263	<0.0263	<0.0263
Sulfate	mg/L	-	4.34	5.26	-	-	6.67	7.06	7.73	8.56	7.78	6.83
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	-	16.7	44.4	32.3	16.0
Alkalinity, Carbonate	mg/L	-	-	-	-	-	-	-	<5.00	<5.00	<5.00	<5.00
pH (lab)	SU	-	5.8	5.8	5.9 J	-	6.2 J	6.3 J	-	-	-	-
Total Dissolved Solids	mg/L	74	82.0	84.0	-	96.0	68.0	75.0	60.0	70.0	59.0	76.0

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-104											
Sample Date		26-Feb-19	5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	14-May-19	11-Jun-19	10-Sep-19	21-Nov-19	7-Jan-20	4-Feb-20
Sample ID		JSF-GW-014-02262019	JSF-GW-014-03052019	JSF-GW-014-03192019	JSF-GW-014-03262019	JSF-GW-014-04012019	JSF-GW-104-051419	JSF-GW-014-06112019	JSF-GW-014-09102019	JSF-GW-014-11212019	JSF-GW-014-01072020	JSF-GW-014-02042020
Parent Sample ID												
Intake Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 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	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	44.4 U*	<12.5	15.2 J	<12.5	31.6	34.4	13.9 U*	<12.5	<34.0	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570
Arsenic	ug/L	<0.323	<0.323	0.477 J	<0.323	<0.323	0.356 U*	<0.323	0.442 U*	<0.323	<0.750	<0.750
Barium	ug/L	45.7	48.1	43.3	48.4	39.5	44.1	44.8	56.7	50.6	41.7	41.0
Beryllium	ug/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	0.297 J	<0.305	<0.305
Boron	ug/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<16.0	<16.0
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197
Calcium	ug/L	14,400	14,200 J	13,700	14,700	13,900	14,600	15,200	22,200	27,200	20,400	15,700
Chromium	ug/L	<1.53	1.73 J	<1.53	1.97 U*	<1.53	3.24 U*	3.04 U*	4.26 U*	<1.53	1.78 J	<0.980
Cobalt	ug/L	<0.075	<0.075	<0.075	<0.075	<0.075	0.098 J	<0.075	0.112 U*	0.147 U*	<0.190	<0.190
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.856 U*	<0.627	<1.70	<1.70
Iron	ug/L	<14.1	50.4	<14.1	23.3 U*	<14.1	36.8 J	41.2 U*	<19.5	<19.5	<47.0	<47.0
Lead	ug/L	<0.128	<0.128	0.39 U*	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450
Lithium	ug/L	6.32 U*	6.34	7.31	6.21	6.14	7.66	6.05	9.35	8.95	6.06 J	4.05 J
Magnesium	ug/L	1,360	1,370	1,250	1,350	1,190	-	1,380	1,800	2,100	1,620	1,320
Manganese	ug/L	5.58 U*	7.44	4.57 J	5.1	4.04 J	5.22	4.77 J	3.90 J	3.93 U*	3.00 J	3.02 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.130 UJ	<0.130
Molybdenum	ug/L	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	1.54	1.48	1.42	1.46	1.43	1.79	1.38	1.27	3.22 U*	<1.47	<1.47
Potassium	ug/L	882 U*	866	755	835	749	733	783	791	781	760 J	758 J
Selenium	ug/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	<0.121	<0.121	<0.177	<0.177	<0.0530	<0.0530
Sodium	ug/L	4,500	4,270	3,430	3,510	2,970	3,800	3,510	3,300	2,810	3,640	3,080
Strontium	ug/L	126	117	131	140	129	147	120	196	212	182	134
Thallium	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	0.264 J	<0.200	<0.200
Tin	ug/L	-	-	-	-	-	<1.75	-	-	<1.75	-	-
Vanadium	ug/L	-	-	-	-	-	2.43 U*	1.54 U*	1.90 U*	<0.991	<0.820	<0.820
Zinc	ug/L	-	-	-	-	-	<3.22	<3.22	4.05 J	4.74 J	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	-0.00602 +/-(0.0612)U	0.0568 +/-(0.0567)U	0.0187 +/-(0.0491)UJ	0.0311 +/-(0.0457)U	0.0227 +/-(0.0763)U	0.0234 +/-(0.0402)U	-0.00703 +/-(0.0491)U	-0.0505 +/-(0.443)U	0.349 +/-(0.371)U	0.412 +/-(0.460)U	0.175 +/-(0.305)U
Radium-228	pCi/L	0.232 +/-(0.212)U	-0.0301 +/-(0.243)U	-0.00201 +/-(0.206)U	0.289 +/-(0.218)U	0.0425 +/-(0.235)U	-0.104 +/-(0.210)U	0.0196 +/-(0.261)U	-0.294 +/-(0.323)U	0.0996 +/-(0.235)U	-0.0163 +/-(0.311)U	-0.169 +/-(0.401)UJ
Radium-226+228	pCi/L	0.232 +/-(0.221)U	0.0568 +/-(0.250)U	0.0187 +/-(0.212)UJ	0.321 +/-(0.223)U	0.0652 +/-(0.247)U	-	0.0196 +/-(0.266)U	0.00 +/-(0.548)U	0.448 +/-(0.439)U	0.412 +/-(0.555)U	0.175 +/-(0.504)UJ
Anions												
Chloride	mg/L	9.30	8.37	8.46	8.08	7.53	8.24	7.68	6.11	6.84	7.94	7.55
Fluoride	mg/L	<0.0263	<0.0263	0.0288 J	<0.0263	<0.0263	<0.0263	0.0267 J	0.0338 J	0.0356 J	0.0291 J	<0.0240
Sulfate	mg/L	6.71	5.80	7.18	6.19	5.68	6.45	4.86	5.42	5.89	7.26	9.78
General Chemistry												
Alkalinity, Bicarbonate	mg/L	32.0	62.0	15.2	19.8	30.5	-	33.0	50.0	71.4	45.0	32.3
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	-	<5.00	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	-	-	-	6.0 J	-	-	6.7 J	-	-
Total Dissolved Solids	mg/L	72.0	80.0 J	62.0	68.0	67.0	42.0	113	103	130	93.0	83.0

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-104										
Sample Date		5-May-20	7-Jul-20	11-Aug-20	16-Nov-20	12-Jan-21	9-Feb-21	13-Jul-21	13-Jul-21	10-Aug-21	19-Jan-22	19-Jan-22
Sample ID		JSF-GW-104-050520	JSF-GW-014-07072020	JSF-GW-014-08112020	JSF-GW-104-111620	JSF-GW-JSF-104-01122021	JSF-GW-JSF-104-02092021	JSF-GW-FD-07132021	JSF-GW-JSF-104-07132021	JSF-GW-JSF-104-08102021	JSF-GW-FD03-01192022	JSF-GW-JSF-104-01192022
Parent Sample ID								JSF-GW-JSF-104-07132021			JSF-GW-JSF-104-01192022	
Intake Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 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	Field Duplicate Sample	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	<34.0	<34.0	<12.5	<34.0	<34.0	<34.0	<34.0	<34.0	<12.5	<12.5
Antimony	ug/L	<0.378	<0.570	<0.570	<0.378	1.77 J	<0.570	<0.570	<0.570	<0.570	<0.378	<0.378
Arsenic	ug/L	<0.313	<0.750	0.808 J	<0.313	<0.750	<0.750	<0.750	<0.750	<0.750	<0.313	<0.313
Barium	ug/L	52.4	43.6	47.4	49.8	47.2	46.2	42.1	42.8	40.3	51.4	52.3
Beryllium	ug/L	<0.182	0.670 J	0.968 J	<0.182	0.671 J	<0.305	<0.620	<0.620	<0.620	<0.182	<0.182
Boron	ug/L	<38.6	<16.0	<16.0	<38.6	<16.0	<16.0	<16.0	<16.0	16.0 UJ	<38.6	<38.6
Cadmium	ug/L	<0.217	0.221 J	0.441 J	<0.217	<0.197	<0.197	<0.197	<0.197	0.205 J	<0.217	<0.217
Calcium	ug/L	16,000	17,600	23,100	26,200	22,400	21,100	19,500	19,800	20,800 J	23,400	23,700
Chromium	ug/L	<1.53	1.06 J	1.27 J	<1.53	<0.980	1.23 J	<2.47	<2.47	<2.47	<1.53	<1.53
Cobalt	ug/L	<0.134	0.202 J	0.410 J	<0.134	<0.190	<0.190	<0.190	<0.190	0.251 J	<0.134	<0.134
Copper	ug/L	<0.627	<1.70	<1.70	<0.627	<1.70	<1.70	<1.70	<1.70	<1.70	<0.627	<0.627
Iron	ug/L	<19.5	<47.0	<47.0	23.8 J	<47.0	<47.0	<47.0	<47.0	<47.0	<19.5	<19.5
Lead	ug/L	<0.128	<0.450	0.519 J	<0.128	<0.450	<0.450	<0.450	<0.450	<0.450	<0.128	<0.128
Lithium	ug/L	10.6 U*	6.38 U*	10.2	8.15	8.74	8.40	6.21 U*	6.97 U*	6.33 J	8.68	8.72
Magnesium	ug/L	-	1,340	1,730	-	1,640	1,600	1,460	1,480	1,530	1,890	1,920
Manganese	ug/L	4.92 J	5.30	2.30 J	1.55 J	<2.06	<2.06	<6.20	<6.20	6.20 UJ	1.21 J	1.18 J
Mercury	ug/L	0.130 UJ	<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	<1.08	<1.08	<0.610	1.61 J	<1.08	<1.08	<1.08	<1.08	<0.610	<0.610
Nickel	ug/L	1.90	2.44	<1.47	1.03	<1.47	<1.47	<1.47	<1.47	<1.47	0.905 J	0.959 J
Potassium	ug/L	850	764 J	778 J	616	764 J	792 J	699 J	734 J	605 J	790	774
Selenium	ug/L	<1.51	<0.890	1.51 J	<1.51	<0.890	<0.890	<0.890	<0.890	<0.890	<1.51	<1.51
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.0530	0.0930 J	<0.177	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.177	<0.177
Sodium	ug/L	3,520	3,000	2,890	2,760	3,050	3,240	2,900	3,020	2,470	2,990	3,000
Strontium	ug/L	144	152	189	200	192	184	158	161	166	201	204
Thallium	ug/L	<0.148	0.723 J	1.15	<0.148	0.532 J	<0.200	<0.200	<0.200	0.622 J	<0.148	<0.148
Tin	ug/L	<0.960	-	-	<0.960	<3.00	-	<3.00	<3.00	-	-	-
Vanadium	ug/L	<0.991	<0.820	<0.820	<0.991	3.20 J	<0.820	<0.820	<0.820	<0.820	<0.991	<0.991
Zinc	ug/L	<3.22	<15.0	<15.0	<3.22	<15.0	<15.0	<15.0	<15.0	<15.0	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	0.307 +/-(0.530)U	0.118 +/-(0.532)U	0.192 +/-(0.495)U	0.0822 +/-(0.407)U	0.474 +/-(0.589)U	0.0843 +/-(0.226)U	0.253 +/-(0.472)U	0.368 +/-(0.433)U	0.0939 +/-(0.262)U	0.312 +/-(0.417)U	0.207 +/-(0.360)U
Radium-228	pCi/L	-0.157 +/-(0.351)U	-0.0797 +/-(0.324)U	0.0138 +/-(0.402)U	1.43 +/-(0.643)	0.537 +/-(0.571)U	0.293 +/-(0.326)U	0.250 +/-(0.270)UJ	0.929 +/-(0.519)J	-0.236 +/-(0.218)U	0.190 +/-(0.327)U	0.278 +/-(0.353)U
Radium-226+228	pCi/L	0.307 +/-(0.636)U	0.118 +/-(0.623)U	0.205 +/-(0.637)U	1.51 +/-(0.761)J	1.01 +/-(0.821)U	0.377 +/-(0.397)U	0.503 +/-(0.543)UJ	1.30 +/-(0.676)J	0.0939 +/-(0.341)U	0.502 +/-(0.530)U	0.485 +/-(0.505)U
Anions												
Chloride	mg/L	6.96	7.37	6.87	6.90	7.11	7.78	7.60	7.59	7.13	9.78	8.06
Fluoride	mg/L	<0.0263	<0.0240	0.0349 J	<0.0440	0.0334 J	0.0261 J	<0.0240	<0.0240	0.0245 J	0.107 U*	0.0534 U*
Sulfate	mg/L	11.0	7.81 J	7.61	7.40	8.75	9.58	8.53 J	14.5 J	9.74	11.5 J	9.12 J
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	39.3	51.5	63.0	56.4	46.7	51.9	43.2	59.3	59.2	58.3
Alkalinity, Carbonate	mg/L	-	<2.60	<2.60	<5.00	<2.60	<2.60	<2.60	<2.60	<2.60	<5.00	<5.00
pH (lab)	SU	6.2 J	-	-	6.3 J	6.2 J	-	6.2 J	6.7 J	-	-	-
Total Dissolved Solids	mg/L	71.0	101 J	103	94.0 J	70.0	117	101 J	78.0 J	86.0	108	106

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-104			JSF-105							
Sample Date		1-Mar-22	20-Jul-22	30-Aug-22	16-May-16	16-Nov-16	26-Apr-17	28-Aug-17	28-Nov-17	26-Feb-18	23-May-18	28-Aug-18
Sample ID		JSF-GW-JSF-104-03012022	JSF-GW-JSF-104-07202022	JSF-GW-JSF-104-08302022	JSF-105-0516	JSF-105-111616	JSF-105-042617	JSF-105-082817	JSF-105-112817	JSF-105-022618	JSF-105-052318	JSF-105-GW-082818
Parent Sample ID												
Intake Depth		29 ft	29 ft	29 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<15.5	<34.0	<34.0	<100	<200	<200	-	<200	-	<200	-
Antimony	ug/L	<0.506	<0.570	<0.570	<2	<2	<2	-	<2	-	<2	-
Arsenic	ug/L	<0.282	<0.750	<0.750	<2	<1	<1	-	<1	-	<1	-
Barium	ug/L	55.4	50.9	43.3	61.3	<200	<200	-	<200	-	<200	-
Beryllium	ug/L	<0.274	<0.620	<0.620	<2	<1	<1	-	<1	-	<1	-
Boron	ug/L	<60.1	<16.0	16.0 UJ	<50	<200	<200	-	<200	-	<200	-
Cadmium	ug/L	<0.217	<0.197	<0.197	1 UJ	<1	<1	-	<1	-	<1	-
Calcium	ug/L	18,800	28,000	24,400 J	-	86,700	37,700	85,100	-	44,100	55,200	85,800
Chromium	ug/L	<1.53	<2.47	<2.47	<2	<2	<2	-	<2	-	<2	-
Cobalt	ug/L	<0.261	<0.190	<0.190	<2	<0.5	<0.5	-	<0.5	-	<0.5	-
Copper	ug/L	<1.14	<1.70	<1.70	<2	<2	<2	-	<2	-	<2	-
Iron	ug/L	<27.7	<47.0	<47.0	<100	134	<100	-	<100	-	<100	-
Lead	ug/L	<0.167	<0.450	<0.450	<2	<1	<1	-	<1	-	<1	-
Lithium	ug/L	7.89	7.85 J	6.56 J	-	5 UJ	<5	<5	<5	<5	<5	<5
Magnesium	ug/L	1,610	1,930	1,660	-	-	-	-	-	-	-	-
Manganese	ug/L	3.18 U*	<6.20	<6.20	5.05	12.8	<5	-	<5	-	<5	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.2	<0.200	<0.200	-	<0.2	-	<0.2	-
Molybdenum	ug/L	<0.610	<1.08	<1.08	-	<5	<5	<5	<5	<5	<5	<5
Nickel	ug/L	2.40	<1.47	<1.47	<2	<1	1.29	-	<1	-	<1	-
Potassium	ug/L	849	729 J	589 J	<1,000	<5,000	<5,000	-	<5,000	-	<5,000	-
Selenium	ug/L	<0.739	<0.890	<0.890	<2	<5	<5	-	<5	-	<5	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.223	<0.0530	<0.0530	<2	<1	<1	-	<1	-	<1	-
Sodium	ug/L	4,700	2,950	2,480	2,880	<5,000	<5,000	-	<5,000	-	<5,000	-
Strontium	ug/L	171	212	181	283	229	135	-	249	-	143	-
Thallium	ug/L	<0.472	<0.200	0.638 J	<2	<1	<1	-	<1	-	<1	-
Tin	ug/L	-	-	-	<50	<100	<100	-	<0.100	-	<100	-
Vanadium	ug/L	<0.776	<0.820	<0.820	<4	<1	<1	-	<1	-	<1	-
Zinc	ug/L	<2.88	<15.0	<15.0	<25	<5	<5	-	<5	-	<5	-
Radiological Parameters												
Radium-226	pCi/L	0.364 +/-(0.589)U	-0.323 +/-(0.153)U	-0.0752 +/-(0.258)U	-	-0.0931 +/-(0.171)U	0.0172 +/-(0.0516)U	0.106 +/-(0.0627)	0.115 +/-(0.0651)	0.00866 +/-(0.0408)U	0.0255 +/-(0.0468)U	0.250 +/-(0.0992)U*
Radium-228	pCi/L	0.0672 +/-(0.304)U	-0.00618 +/-(0.501)U	0.203 +/-(0.523)U	-	0.0536 +/-(0.249)U	0.308 +/-(0.209)U	1.39 +/-(0.336)	0.226 +/-(0.242)U	0.505 +/-(0.224)	-0.00437 +/-(0.220)U	0.123 +/-(0.198)U
Radium-226+228	pCi/L	0.432 +/-(0.662)U	0.000 +/-(0.524)U	0.203 +/-(0.583)U	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	10.8	7.96	7.56	3.62	2.89	1.46	-	3.31	-	1.07	-
Fluoride	mg/L	0.0483 U*	0.0690	0.0295 J	<0.100	<0.100	<0.100	-	<0.1	-	<0.100	-
Sulfate	mg/L	12.3	8.37	7.54	56.8	52.8	63.1	-	65.9	-	63.4	-
General Chemistry												
Alkalinity, Bicarbonate	mg/L	42.5	62.0	71.2	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<5.00	<2.60	<2.60	-	-	-	-	186	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	-	-	6.7	6.9 J
Total Dissolved Solids	mg/L	94.0	77.0	46.0	-	214	176	216	286	194	203	292

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-105										
Sample Date		27-Oct-18	24-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	14-May-19
Sample ID		JSF-105-GW-112718	JSF-GW-015-01242019	JSF-GW-015-01302019	JSF-GW-015-02052019	JSF-GW-015-02202019	JSF-GW-015-02272019	JSF-GW-015-03062019	JSF-GW-015-03202019	JSF-GW-015-03272019	JSF-GW-015-04022019	JSF-AW-105-051419
Parent Sample ID												JSF-GW-105-051419
Intake Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance
Total Metals												
Aluminum	ug/L	<200	19 U*	100	14.4 J	<12.5	32.2	<12.5	<12.5	<12.5	<12.5	<12.5
Antimony	ug/L	<2	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<1	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	0.547 U*
Barium	ug/L	<200	55.5	61.1	54.8	56	61.7	63	55.6	68.8	59.7	66.2
Beryllium	ug/L	<1	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	<200	<30.3	<30.3	42.4 U*	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	<1	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.13 J
Calcium	ug/L	83,200	61,500 J	57,300	55,600	59,300	61,800	61,200 J	59,400	65,000	65,100	69,200
Chromium	ug/L	<2	0.975 U*	1.09 U*	1.59 J	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	3.07 U*
Cobalt	ug/L	<0.5	0.122 J	0.223 J	0.122 J	0.143 J	0.266 J	0.208 J	0.134 J	0.182 J	<0.075	0.249 J
Copper	ug/L	<2	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.907 J
Iron	ug/L	<100	19.4 J	122	15.7 J	<14.1	<14.1	<14.1	<14.1	60.7 U*	<14.1	14.1 UJ
Lead	ug/L	<1	<0.094	0.195 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<5	<2.56	<2.56	4.05 U*	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	3.47 J
Magnesium	ug/L	-	3,580	3,420	3,150	3,400	3,550	3,630	3,250	3,810	3,490	-
Manganese	ug/L	<5	20.1	24.8	20	26.5	38.1	34.5	28.9	30.9	28.9 J	8.96
Mercury	ug/L	<0.2	<0.101	<0.101	<0.101	<0.101	<0.101	0.106 J	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<5	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	<1	1.84	2.04	1.91	0.841 J	2.08	2.04	1.99	2.01	1.9	1.64
Potassium	ug/L	<5,000	333 J	387 J	311 J	281 J	338 U*	328 J	281 J	312 J	318 J	294 J
Selenium	ug/L	<5	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<1	-	-	-	-	-	-	-	-	-	<0.121
Sodium	ug/L	<5,000	4,820	4,860	4,750	4,600	4,700	4,810	10,400	8,230	6,300	5,990
Strontium	ug/L	261	169	167	172	183	171	167	174	204	192	226
Thallium	ug/L	<1	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.173 J
Tin	ug/L	<100	-	-	-	-	-	-	-	-	-	2.1 J
Vanadium	ug/L	<1	-	-	-	-	-	-	-	-	-	3.46 U*
Zinc	ug/L	<5	-	-	-	-	-	-	-	-	-	<3.22
Radiological Parameters												
Radium-226	pCi/L	0.0697 +/-(0.0512)	0.0416 +/-(0.0574)U	0.128 +/-(0.0740)J	0.0221 +/-(0.0429)UJ	-0.0108 +/-(0.0374)UJ	0.0885 +/-(0.0697)U	0.0642 +/-(0.0586)U	0.0795 +/-(0.0672)UJ	0.0519 +/-(0.0543)U	0.0268 +/-(0.0488)U	0.102 +/-(0.0657)
Radium-228	pCi/L	0.189 +/-(0.215)U	0.102 +/-(0.191)U	-0.0580 +/-(0.196)U	0.0288 +/-(0.223)UJ	0.132 +/-(0.234)U	0.127 +/-(0.223)U	0.215 +/-(0.212)U	0.142 +/-(0.225)U	0.341 +/-(0.215)	0.355 +/-(0.315)U	0.0843 +/-(0.235)U
Radium-226+228	pCi/L	-	0.143 +/-(0.199)U	0.128 +/-(0.210)J	0.0509 +/-(0.227)UJ	0.132 +/-(0.237)UJ	0.215 +/-(0.234)U	0.279 +/-(0.220)U	0.221 +/-(0.235)UJ	0.393 +/-(0.222)J	0.382 +/-(0.319)U	-
Anions												
Chloride	mg/L	4.72	1.47	1.57	1.38	1.18	1.21	1.46	1.67	1.48	1.18	1.76
Fluoride	mg/L	<0.100	<0.0263	<0.0263	<0.0263	<0.0263	<0.0263	<0.0263	0.0338 J	0.0330 J	0.0278 J	<0.0263
Sulfate	mg/L	60.3	103	85.9	94.1	104	101	90.0	101	98.4	93.8	98.5
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	84.8	50.5	99.0	136	66.0	80.0	118	71.1	79.2	-
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-
pH (lab)	SU	7.2 J	-	-	-	-	-	-	-	-	-	6.6 J
Total Dissolved Solids	mg/L	254	226	227	224	239	223	203	236	249	238	209

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location							JSF-105					
Sample Date		14-May-19	13-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20	5-May-20	8-Jul-20	13-Aug-20	9-Nov-20	14-Jan-21
Sample ID		JSF-GW-105-051419	JSF-GW-015-06132019	JSF-GW-015-09112019	JSF-GW-015-11202019	JSF-GW-015-01092020	JSF-GW-015-02062020	JSF-GW-105-050520	JSF-GW-015-07082020	JSF-GW-015-08132020	JSF-GW-105-110920	JSF-GW-JSF-105-01142021
Parent Sample ID												
Intake Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program
Total Metals												
Aluminum	ug/L	<12.5	<12.5	118	33.2 U*	36.6 J	<34.0	14.0 J	<34.0	119	<12.5	<34.0
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.378	<0.570
Arsenic	ug/L	0.4 U*	<0.323	0.432 U*	<0.323	<0.750	<0.750	<0.313	<0.750	<0.750	<0.313	<0.750
Barium	ug/L	65.5	82.1	72.1	67.3	55.7	52.3	66.9	83.0	80.9	68.9	55.2
Beryllium	ug/L	<0.155	<0.155	<0.182	<0.182	<0.305	<0.305	<0.182	<0.305	<0.305	<0.182	0.592 J
Boron	ug/L	<30.3	<30.3	44.8 J	<38.6	24.1	18.6 J	<38.6	43.6	43.0	69.5 U*	25.5
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.197	<0.197	<0.217	<0.197	<0.197	<0.217	<0.197
Calcium	ug/L	70,400	107,000	99,200	93,000	46,100	46,600	60,200	112,000	115,000	97,500	52,200
Chromium	ug/L	2.47 U*	2.15 U*	2.98 U*	1.74 U*	2.50	<0.980	<1.53	<0.980	<0.980	<1.53	<0.980
Cobalt	ug/L	0.147 J	0.112 J	0.229 J	0.0820 J	<0.190	<0.190	<0.134	<0.190	<0.190	<0.134	0.194 J
Copper	ug/L	0.703 J	<0.627	0.950 U*	0.634 J	<1.70	<1.70	<0.627	<1.70	<1.70	<0.627	<1.70
Iron	ug/L	185 J	<14.1	170	35.5 J	<47.0	<47.0	<19.5	<47.0	124	<19.5	<47.0
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.128	<0.450
Lithium	ug/L	<3.14	<3.14	<3.39	<3.39	<1.65	<1.65	5.05 U*	3.96 U*	2.36 J	<3.39	2.02 J
Magnesium	ug/L	-	5,060	4,710	4,070	3,190	2,850	-	5,650	5,040	-	3,750
Manganese	ug/L	8.85	<1.35	2.76 J	<1.35	7.87	5.63	6.30	<2.06	3.59 J	<0.866	4.86 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	0.130 UJ	<0.130	<0.130	0.130 UJ	<0.130
Molybdenum	ug/L	<0.61	<0.61	<0.610	<0.610	<1.08	1.36 J	<0.610	<1.08	<1.08	<0.610	<1.08
Nickel	ug/L	1.58	0.603 J	0.589 J	<0.336	2.46	1.94 J	2.50	<1.47	<1.47	0.341 J	2.11
Potassium	ug/L	274 J	361 J	377 J	370 J	330 J	292 J	363 J	398 J	455 J	598	460 J
Selenium	ug/L	<2.62	<2.62	<1.51	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<1.51	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.121	<0.121	<0.177	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.177	<0.0530
Sodium	ug/L	5,900	5,230	4,650	3,300	7,890	5,690	7,160	10,300	7,620	19,000	8,180
Strontium	ug/L	230	270	302	242	145	138	178	321	319	443	216
Thallium	ug/L	<0.128	<0.128	<0.148	<0.148	<0.200	0.348 J	<0.148	<0.200	<0.200	<0.148	0.295 J
Tin	ug/L	<1.75	-	-	<1.75	-	-	<0.960	-	-	<0.960	<3.00
Vanadium	ug/L	2.9 U*	1.26 U*	1.54 U*	1.73 U*	<0.820	<0.820	<0.991	<0.820	<0.820	<0.991	<0.820
Zinc	ug/L	<3.22	<3.22	4.09 J	3.62 U*	<15.0	<15.0	3.25 J	<15.0	<15.0	<3.22	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.0247 +/-(0.0533)U	0.0618 +/-(0.0784)U	0.479 +/-(0.463)U	0.402 +/-(0.355)U	0.151 +/-(0.323)U	0.591 +/-(0.422)	-0.107 +/-(0.426)U	0.0618 +/-(0.463)U	0.0341 +/-(0.368)U	0.532 +/-(0.614)U	0.278 +/-(0.505)U
Radium-228	pCi/L	0.0688 +/-(0.241)U	0.511 +/-(0.308)J	-0.164 +/-(0.350)U	-0.453 +/-(0.320)U	0.258 +/-(0.477)U	0.0798 +/-(0.260)UJ	0.218 +/-(0.255)U	0.358 +/-(0.405)U	0.176 +/-(0.257)U	-0.0390 +/-(0.345)U	0.284 +/-(0.423)U
Radium-226+228	pCi/L	-	0.573 +/-(0.318)J	0.479 +/-(0.580)U	0.402 +/-(0.477)U	0.409 +/-(0.576)U	0.671 +/-(0.495)J	0.218 +/-(0.497)U	0.420 +/-(0.615)U	0.211 +/-(0.449)U	0.532 +/-(0.704)U	0.562 +/-(0.659)U
Anions												
Chloride	mg/L	1.72	1.90	3.24	4.57	1.55	1.43	1.27	1.47	2.16	3.24	1.30
Fluoride	mg/L	0.0282 J	0.0387 J	0.0526 J	0.0538 U*	0.0384 J	0.0295 J	0.0445 J	0.0507	0.0571	0.0756 J	0.0340 J
Sulfate	mg/L	97.3	78.2	71.1	67.6	95.1	92.2	104	111 J	99.9	120	105
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	147	174	188	39.3	49.5	-	165	206	183	44.6
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<2.60	<2.60	-	<2.60	<2.60	<5.00	<2.60
pH (lab)	SU	6.7 J	-	-	7.3 J	-	-	6.3 J	-	-	7.4 J	6.1 J
Total Dissolved Solids	mg/L	211	286	296	244	191	222	227	346	363	349	215

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		JSF-105							W-1			
Sample Date		11-Feb-21	19-Jul-21	11-Aug-21	21-Jan-22	3-Mar-22	22-Jul-22	31-Aug-22	16-May-16	14-Nov-16	1-May-17	30-Aug-17
Sample ID		JSF-GW-JSF-105-02112021	JSF-GW-JSF-105-07192021	JSF-GW-JSF-105-08112021	JSF-GW-JSF-105-01212022	JSF-GW-JSF-105-03032022	JSF-GW-JSF-105-07222022	JSF-GW-JSF-105-08312022	JSF-W1-0516	JSF-W1-111416	JSF-W1-	JSF-W1-083017
Parent Sample ID												
Intake Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	79 ft	79 ft	79 ft	79 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	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<34.0	<34.0	<34.0	82.9	20.2 U*	<34.0	<34.0	<100	<200	<200	-
Antimony	ug/L	<0.570	<0.570	<0.570	<0.378	<0.506	<0.570	<0.570	<2	<2	<2	-
Arsenic	ug/L	<0.750	<0.750	<0.750	0.588 J	0.423 U*	<0.750	<0.750	<2	1.11	<1	-
Barium	ug/L	53.8	77.8	94.6	79.7	45.4	165	112	204	221	<200	-
Beryllium	ug/L	<0.305	<0.620	<0.620	<0.182	<0.274	<0.620	<0.620	<2	<1	<1	-
Boron	ug/L	31.3	67.2	91.8 J	78.6 J	<60.1	114	95.7 J	<50	<200	<200	-
Cadmium	ug/L	<0.197	<0.197	<0.197	<0.217	<0.217	<0.197	<0.197	<1	<1	<1	-
Calcium	ug/L	53,400	117,000	119,000 J	118,000	57,800	234,000 J	173,000 J	-	85,300	91,600	84,200
Chromium	ug/L	<0.980	<2.47	<2.47	<1.53	<1.53	<2.47	<2.47	<2	<2	<2	-
Cobalt	ug/L	<0.190	<0.190	0.375 J	0.243 J	<0.261	0.218 J	<0.190	<2	<0.5	<0.5	-
Copper	ug/L	<1.70	<1.70	2.46	1.79 J	<1.14	4.25	3.16	<2	<2	<2	-
Iron	ug/L	<47.0	<47.0	<47.0	105	<27.7	<47.0	<47.0	1,010	5,370	1,000	-
Lead	ug/L	<0.450	<0.450	<0.450	<0.128	<0.167	<0.450	<0.450	<2	<1	<1	-
Lithium	ug/L	<1.65	<1.65	<1.65	<3.39	<0.831	<1.65	<1.65	-	9.99	10.5	8.93
Magnesium	ug/L	3,570	8,000	11,200	13,100	6,350	31,800	22,900	-	-	-	-
Manganese	ug/L	5.72	<6.20	6.20 UJ	5.85	<1.34	<6.20	<6.20	14.3	37.4	24.7	-
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.2	<0.200	<0.200	-
Molybdenum	ug/L	<1.08	<1.08	<1.08	<0.610	<0.610	2.28 U*	1.77 J	-	<5	<5	<5
Nickel	ug/L	1.66 J	<1.47	<1.47	0.708 J	0.704 J	<1.47	<1.47	<2	<1	<1	-
Potassium	ug/L	472 J	992 J	1,820	2,320	1,380	5,820	4,670	<1,000	<5,000	<5,000	-
Selenium	ug/L	<0.890	<0.890	<0.890	<1.51	<0.739	<0.890	<0.890	<2	<5	<5	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.0530	<0.0530	<0.0530	<0.177	<0.223	<0.0530	<0.0530	<2	<1	<1	-
Sodium	ug/L	7,800	10,900	24,800	10,600	5,640	7,110	5,610	6,650	6,190 J	6,570	-
Strontium	ug/L	220	520	838	864	329	965	660	706	662	584	-
Thallium	ug/L	<0.200	<0.200	<0.200	<0.148	<0.472	<0.200	<0.200	<2	<1	<1	-
Tin	ug/L	-	<3.00	-	-	-	-	-	<50	<100	<100	-
Vanadium	ug/L	<0.820	<0.820	<0.820	<0.991	<0.776	<0.820	<0.820	<4	<1	<1	-
Zinc	ug/L	<15.0	<15.0	<15.0	3.32 J	<2.88	<15.0	<15.0	<25	<5	<5	-
Radiological Parameters												
Radium-226	pCi/L	-0.113 +/-(0.419)U	0.559 +/-(0.370)	0.355 +/-(0.462)U	0.711 +/-(0.381)	0.756 +/-(0.573)	1.49 +/-(0.538)	1.18 +/-(0.627)	-	0.311 +/-(0.277)U	0.193 +/-(0.0912)	0.396 +/-(0.116)
Radium-228	pCi/L	0.635 +/-(0.506)U	-0.00749 +/-(0.230)U	0.329 +/-(0.398)U	0.524 +/-(0.375)U	0.578 +/-(0.430)U	1.03 +/-(0.618)	0.622 +/-(0.514)U	-	0.374 +/-(0.257)U	0.310 +/-(0.265)U	1.36 +/-(0.377)
Radium-226+228	pCi/L	0.635 +/-(0.657)U	0.559 +/-(0.436)J	0.685 +/-(0.610)U	1.23 +/-(0.534)J	1.33 +/-(0.717)J	2.52 +/-(0.819)	1.80 +/-(0.811)J	-	-	-	-
Anions												
Chloride	mg/L	1.24	1.15	2.83	1.44	0.798 J	1.49	0.810 J	10.4	6.57	11.3	-
Fluoride	mg/L	0.0314 J	0.107	0.143	0.122	0.126 U*	0.287	0.241	<0.100	<0.100	<0.100	-
Sulfate	mg/L	95.0	97.3	144	125	97.9	406	300	29.6	21.8	25.0	-
General Chemistry												
Alkalinity, Bicarbonate	mg/L	56.6	225	215	203	101	164	187	-	-	-	-
Alkalinity, Carbonate	mg/L	<2.60	<2.60	<2.60	<5.00	<5.00	<2.60	<2.60	-	-	-	-
pH (lab)	SU	-	6.8 J	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	222	365	469	419	230	753 J	703	-	297	304	270

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-1										
Sample Date		28-Nov-17	28-Feb-18	30-May-18	22-Aug-18	28-Nov-18	20-May-19	19-Nov-19	13-May-20	17-Nov-20	20-Jan-21	20-Jul-21
Sample ID		JSF-W1-112817	JSF-W1-022818	JSF-W1-053018	JSF-W1-GW-082218	JSF-W1-GW-112818	JSF-GW-W1-052019	JSF-GW-1-111919	JSF-GW-W1-051320	JSF-GW-W1-111720	JSF-GW-W-1-01202021	JSF-GW-W1-07202021
Parent Sample ID												
Intake Depth		79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	<200	-	<200	-	<200	<12.5	12.5 UJ	23.4 J	<12.5	<34.0	<34.0
Antimony	ug/L	<2	-	<2	-	<2	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570
Arsenic	ug/L	1.05	-	<1	-	2.13	1.95	0.812 J	1.10	1.04	<0.750	1.85 J
Barium	ug/L	233	-	212	-	236	253	205	229	245	208	243
Beryllium	ug/L	<1	-	<1	-	<1	<0.155	0.903 J	<0.182	<0.182	<0.305	<0.620
Boron	ug/L	<200	-	<200	-	<200	<30.3	<38.6	40.6 J	<38.6	<16.0	16.5 J
Cadmium	ug/L	<1	-	<1	-	<1	<0.125	<0.125	<0.217	<0.217	<0.197	<0.197
Calcium	ug/L	-	94,100	90,700	81,900	83,900	84,700	59,000 J	93,400	87,000	80,900	78,700
Chromium	ug/L	<2	-	<2	-	<2	<1.53	<1.53	<1.53	<1.53	<0.980	<2.47
Cobalt	ug/L	<0.5	-	<0.5	-	<0.5	0.163 J	0.271 U*	0.240 J	<0.134	<0.190	0.413 J
Copper	ug/L	<2	-	<2	-	<2	0.738 J	0.698 J	1.32 U*	0.665 J	<1.70	<1.70
Iron	ug/L	7,900	-	808	-	10,600	9,700	2,200	5,070	5,050	881	9,150
Lead	ug/L	<1	-	<1	-	<1	0.192 J	0.145 J	0.302 J	0.343 J	<0.450	<0.450
Lithium	ug/L	10.1	10.9	10.1	8.88	10	14 U*	10.6 J	10.9	10.9	10.4	10.3
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	62.4	-	9.42	-	37.3	98.7	35.2 J	94.7	60.1	29.5	106
Mercury	ug/L	<0.2	-	<0.2	-	<0.2	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<5	<5	<5	5 UR	<5	<0.61	<0.610	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	<1	-	<1	-	<1	0.492 U*	2.45 U*	<0.336	<0.336	<1.47	<1.47
Potassium	ug/L	<5,000	-	<5,000	-	<5,000	592	390 U*	566	421 J	581 J	539 J
Selenium	ug/L	<5	-	<5	-	<5	<2.62	<1.51	<1.51	<1.51	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<1	-	<1	-	<1	<0.121	<0.177	<0.177	<0.177	<0.0530	<0.0530
Sodium	ug/L	6,210	-	7,120	-	6,370	6,470	4,720 J	6,320	6,400	6,560	6,310
Strontium	ug/L	712	-	692	-	693	711	622	724	775	746	799
Thallium	ug/L	<1	-	<1	-	<1	<0.128	0.914 J	<0.148	<0.148	<0.200	0.435 J
Tin	ug/L	<100	-	<100	-	<100	1.86 J	<1.75	<0.960	<0.960	<3.00	<3.00
Vanadium	ug/L	<1	-	<1	-	<1	1.25 U*	<0.991	<0.991	<0.991	<0.820	<0.820
Zinc	ug/L	<5	-	<5	-	<5	<3.22	3.61 J	9.08	<3.22	<15.0	<15.0
Radiological Parameters												
Radium-226	pCi/L	0.377 +/-(0.111)	0.221 +/-(0.0809)	0.205 +/-(0.0994)	0.290 +/-(0.0992)U*	0.246 +/-(0.0892)	0.438 +/-(0.147)J	0.319 +/-(0.353)U	0.184 +/-(0.517)U	0.396 +/-(0.555)U	0.542 +/-(0.603)U	0.533 +/-(0.507)U
Radium-228	pCi/L	0.942 +/-(0.332)	0.169 +/-(0.205)U	-0.00997 +/-(0.219)U	0.246 +/-(0.231)U	0.167 +/-(0.228)U	0.128 +/-(0.271)U	0.424 +/-(0.380)U	0.0905 +/-(0.238)U	0.278 +/-(0.492)U	0.879 +/-(0.499)	0.579 +/-(0.359)
Radium-226+228	pCi/L	-	-	-	-	-	-	0.742 +/-(0.518)U	0.274 +/-(0.569)U	0.673 +/-(0.742)U	1.42 +/-(0.783)J	1.11 +/-(0.621)J
Anions												
Chloride	mg/L	9.15	-	9.78	-	10.4	9.71	10.3	10.8	9.40	10.3	9.00
Fluoride	mg/L	<0.1	-	<0.100	-	<0.100	0.0677 J	0.0662 J	0.0802 J	0.0624 J	0.0642 J	0.0633
Sulfate	mg/L	27.9	-	25.5	-	24.6	26.8	24.0	25.0 J	28.0	29.2 J	29.5
General Chemistry												
Alkalinity, Bicarbonate	mg/L	-	-	-	-	-	-	225	230	224	213	223
Alkalinity, Carbonate	mg/L	250	-	-	-	-	-	<5.00	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	7.4	7.4 J	7.5 J	7.7 J	7.6 J	8.0 J	7.4 J	7.5 J	7.4 J
Total Dissolved Solids	mg/L	294	278	303	292	287	265	286	282	305	305	284

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-1		W-28								
Sample Date		8-Mar-22	6-Sep-22	9-May-16	7-Nov-16	24-Apr-17	28-Aug-17	29-Nov-17	20-Feb-18	20-Feb-18	21-May-18	21-Aug-18
Sample ID		JSF-GW-W-1-03082022	JSF-GW-W-1-09062022	JSF-28-0516	JSF-28-110716	JSF-28-042417	JSF-28-082817	JSF-W28-112917	JSF-28-022018	JSF-28-DUP-022018	JSF-28-052118	JSF-28-GW-082118
Parent Sample ID										JSF-W28-0218		
Intake Depth		79 ft	79 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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	Normal Environmental Sample	Normal Environmental Sample
Program	Units	CCR Program	CCR Program	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	29.7 J	<34.0	<100	<200	<200	-	<200	-	-	<200	-
Antimony	ug/L	<0.506	<0.570	<2	<2	<2	-	<2	-	-	<2	-
Arsenic	ug/L	4.76	<0.750	<2	<1	<1	-	<1	-	-	<1	-
Barium	ug/L	348	249	15.5	<200	<200	-	<200	-	-	<200	-
Beryllium	ug/L	0.389 J	<0.620	<2	<1	<1	-	<1	-	-	<1	-
Boron	ug/L	75.3 J	19.4 J	2,900	3,230	2,610	-	2,670	-	-	2,720	-
Cadmium	ug/L	<0.217	<0.197	<1	<1	<1	-	<1	-	-	<1	-
Calcium	ug/L	81,100	89,500	-	295,000	213,000	290,000	-	243,000	247,000	302,000	260,000
Chromium	ug/L	<1.53	<2.47	<2	<2	<2	-	<2	-	-	<2	-
Cobalt	ug/L	0.326 J	<0.190	4.5	3.03	7.54	-	4.66	-	-	3.02	-
Copper	ug/L	1.51 U*	<1.70	<2	<2	<2	-	<2	-	-	<2	-
Iron	ug/L	34,500	508	<100	1,030	349	-	783	-	-	771	-
Lead	ug/L	0.384 J	<0.450	<2	<1	<1	-	<1	-	-	<1	-
Lithium	ug/L	10.9	9.39	-	5.13	<5	<5	<5	<5	<5	8.12	7.41
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	322	49.9	5,040	3,370	6,190	-	4,460	-	-	3,330	-
Mercury	ug/L	<0.130	<0.130	<0.2	<0.200	<0.200	-	<0.2	-	-	<0.2	-
Molybdenum	ug/L	<0.610	<1.08	-	<5	<5	<5	<5	<5	<5	<5	5 UR
Nickel	ug/L	<0.517	<1.47	3.03	1.4	2.93	-	1.48	-	-	1.14	-
Potassium	ug/L	517	559 J	1,400	<5,000	<5,000	-	<5,000	-	-	<5,000	-
Selenium	ug/L	<0.739	<0.890	<2	<5	<5	-	<5	-	-	<5	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.223	<0.0530	<2	<1	<1	-	<1	-	-	<1	-
Sodium	ug/L	6,330	6,790	20,200	21,200	19,200	-	19,400	-	-	18,300	-
Strontium	ug/L	715	850	994	855	760	-	763	-	-	789	-
Thallium	ug/L	<0.472	0.308 U*	<2	<1	<1	-	<1	-	-	<1	-
Tin	ug/L	<2.02	<3.00	<50	<100	<100	-	<100	-	-	<100	-
Vanadium	ug/L	0.999 J	<0.820	<4	<1	<1	-	<1	-	-	<1	-
Zinc	ug/L	6.41 U*	16.0 J	<25	<5	<5	-	<5	-	-	<5	-
Radiological Parameters												
Radium-226	pCi/L	-0.353 +/-(0.247)U	0.328 +/-(0.553)U	-	0.0440 +/-(0.222)U	0.00459 +/-(0.0391)U	0.0807 +/-(0.0548)	0.111 +/-(0.0679)	0.0898 +/-(0.0604)	0.0449 +/-(0.0535)U	0.0662 +/-(0.0530)U	0.243 +/-(0.0938)U*
Radium-228	pCi/L	0.858 +/-(0.480)U*	1.66 +/-(0.793)	-	0.306 +/-(0.220)U	0.265 +/-(0.232)U	0.877 +/-(0.313)	0.297 +/-(0.245)U	0.224 +/-(0.238)U	0.268 +/-(0.234)U	0.174 +/-(0.276)U	0.313 +/-(0.245)U
Radium-226+228	pCi/L	0.858 +/-(0.540)U*	1.99 +/-(0.967)J	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	8.53	8.59	12.9	6.10	10.2	-	11.4	-	-	7.47	-
Fluoride	mg/L	0.0900 J	0.0643	<0.100	<0.100	0.102 J	-	<0.1	-	-	<0.250	-
Sulfate	mg/L	25.3	25.9	684	629	583	-	689	-	-	525	-
General Chemistry												
Alkalinity, Bicarbonate	mg/L	231	227	245	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<5.00	<2.60	<10.0	-	-	-	332	-	-	-	-
pH (lab)	SU	7.4 J	7.3 J	-	-	-	-	-	-	-	6.7	6.8 J
Total Dissolved Solids	mg/L	285	170	-	1,380	1,120	1,240	1,250	1,020	1,010	1,300	1,290

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-28									
Sample Date		15-Nov-18	6-May-19	19-Nov-19	11-May-20	3-Nov-20	12-Jan-21	19-Jul-21	2-Mar-22	31-Aug-22	31-Aug-22
Sample ID		JSF-28-GW-111518	JSF-28-GW-050619	JSF-GW-28-111919	JSF-GW-28-051120	JSF-GW-W28-110320	JSF-GW-W28-01122021	JSF-GW-W28-07192021	JSF-GW-W-28-03022022	JSF-GW-FD02-08312022	JSF-GW-W-28-08312022
Parent Sample ID										JSF-GW-W-28-08312022	
Intake Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	<200	<12.5	12.5 UJ	<12.5	<12.5	<34.0	<34.0	<15.5	<34.0	<34.0
Antimony	ug/L	<2	<0.378	<0.378	<0.378	<0.378	0.857 J	0.604 J	0.911 J	<0.570	<0.570
Arsenic	ug/L	<1	<0.323	0.781 J	<0.313	0.318 J	<0.750	<0.750	<0.282	<0.750	<0.750
Barium	ug/L	<200	16.4	16.3	16.9	15.4	15.9	16.6	13.1	18.7	18.4
Beryllium	ug/L	<1	<0.155	0.210 J	<0.182	<0.182	<0.305	<0.620	<0.274	<0.620	<0.620
Boron	ug/L	2,510	2,480	2,430 J	2,590	3,000	2,250	2,570	2,040	2,480	2,420
Cadmium	ug/L	<1	<0.125	<0.125	<0.217	<0.217	<0.197	<0.197	<0.217	<0.197	<0.197
Calcium	ug/L	244,000	288,000	227,000 J	288,000	278,000	196,000	274,000	200,000	256,000	252,000
Chromium	ug/L	<2	<1.53	<1.53	<1.53	<1.53	<0.980	<2.47	<1.53	<2.47	<2.47
Cobalt	ug/L	5.72	3.91	3.31	4.36	2.40	7.30	2.97	3.92	3.67	3.71
Copper	ug/L	<2	<0.627	<0.627	0.694 U*	<0.627	<1.70	<1.70	<1.14	<1.70	<1.70
Iron	ug/L	734	956	891	1,130	890	594	1,570	112	1,810	1,720
Lead	ug/L	<1	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.167	<0.450	<0.450
Lithium	ug/L	<5	9.88 U*	4.65 J	7.33	6.79	<1.65	7.49 J	2.52 J	5.92 J	5.38 J
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	5,370	3,340	3,190 J	4,280	3,340	5,780	2,960	4,360	3,530	3,470
Mercury	ug/L	<0.2	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<5	<0.61	<0.610	<0.610	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08
Nickel	ug/L	2.57	1.51	3.66 U*	1.77 U*	1.42	2.77	<1.47	4.56	<1.47	<1.47
Potassium	ug/L	<5,000	1,120	1,020 U*	1,250	1,150	1,340	1,130	1,200	1,070	1,060
Selenium	ug/L	<5	<2.62	<1.51	<1.51	<1.51	<0.890	<0.890	<0.739	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<1	<0.121	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.223	<0.0530	<0.0530
Sodium	ug/L	18,900	18,500	17,200 J	18,100	18,600	16,200	18,300	16,400	17,500	17,000
Strontium	ug/L	701	829	768	831	807	738	860	680	741 J	716 J
Thallium	ug/L	<1	<0.128	0.285 J	<0.148	<0.148	<0.200	<0.200	<0.472	<0.200	<0.200
Tin	ug/L	<100	<1.75	<1.75	<0.960	<0.960	<3.00	<3.00	<2.02	<3.00	<3.00
Vanadium	ug/L	<1	<0.899	<0.991	<0.991	<0.991	<0.820	<0.820	<0.776	<0.820	<0.820
Zinc	ug/L	<5	<3.22	5.25	<3.22	<3.22	<15.0	<15.0	6.39	<15.0	<15.0
Radiological Parameters											
Radium-226	pCi/L	0.0172 +/-(0.0494)U	-0.00683 +/-(0.0453)U	0.372 +/-(0.382)U	0.556 +/-(0.599)U	-0.152 +/-(0.396)U	-0.211 +/-(0.490)U	0.299 +/-(0.487)U	0.0368 +/-(0.319)U	-	-
Radium-228	pCi/L	0.614 +/-(0.286)U*	0.132 +/-(0.232)U	0.680 +/-(0.400)	0.216 +/-(0.316)U	-0.366 +/-(0.428)U	0.559 +/-(0.486)U	0.180 +/-(0.403)U	0.625 +/-(0.469)U	-	-
Radium-226+228	pCi/L	-	-	1.05 +/-(0.553)J	0.772 +/-(0.677)U	0.000 +/-(0.583)U	0.559 +/-(0.690)U	0.479 +/-(0.632)U	0.661 +/-(0.568)U	-	-
Anions											
Chloride	mg/L	9.72	9.78	9.62	9.26	10.2	8.41	9.63	7.87	8.46	8.20
Fluoride	mg/L	<0.100	0.0849 J	0.0690 J	0.0709 J	0.0470 J	0.0582	0.0619	0.133 U*	0.0570	0.0565
Sulfate	mg/L	522	553	514	450 J	543	479	547	455	437	502
General Chemistry											
Alkalinity, Bicarbonate	mg/L	-	-	264	291	312	190	363	202	286	290
Alkalinity, Carbonate	mg/L	-	-	<5.00	<5.00	<5.00	<2.60	<2.60	<5.00	<2.60	<2.60
pH (lab)	SU	6.5 J	6.9 J	6.7 J	7.6 J	7.4 J	6.4 J	6.6 J	6.5 J	6.5 J	6.7 J
Total Dissolved Solids	mg/L	1,020	1,250	1,100	1,110	1,150	882	1,230	892	1,040	969

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-29										
Sample Date		10-May-16	10-May-16	8-Nov-16	8-Nov-16	24-Apr-17	23-Aug-17	29-Nov-17	20-Feb-18	21-May-18	21-Aug-18	13-Nov-18
Sample ID		JSF-29-0516	JSF-W29-0516-DUP	JSF-29-110816	JSF-29-DUP-110816	JSF-29-042417	JSF-29-082317	JSF-W29-112917	JSF-29-022018	JSF-29-052118	JSF-29-GW-082118	JSF-29-GW-111318
Parent Sample ID			JSF-W29-0516		JSF-29-110816							
Intake Depth		20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 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	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<100	<100	<200	<200	<200	-	<200	-	<200	-	<200
Antimony	ug/L	<2	<2	<2	<2	<2	-	<2	-	<2	-	<2
Arsenic	ug/L	<2	<2	<1	<1	<1	-	<1	-	<1	-	<1
Barium	ug/L	40	40.9	<200	<200	<200	-	<200	-	<200	-	<200
Beryllium	ug/L	<2	<2	<1	<1	<1	-	<1	-	<1	-	<1
Boron	ug/L	994	1,030	1,370	1,360	<200	-	1,010	-	847	-	902
Cadmium	ug/L	<1	<1	<1	<1	<1	-	<1	-	<1	-	<1
Calcium	ug/L	-	-	153,000	148,000	13,800	150,000	-	153,000	161,000	151,000	156,000
Chromium	ug/L	<2	<2	<2	<2	<2	-	<2	-	<2	-	<2
Cobalt	ug/L	<2	<2	1.17	1.14	<0.5	-	0.567	-	<0.5	-	<0.5
Copper	ug/L	<2	<2	<2	<2	<2	-	<2	-	<2	-	<2
Iron	ug/L	<100	<100	<100	<100	<100	-	<100	-	<100	-	<100
Lead	ug/L	<2	<2	<1	<1	<1	-	<1	-	<1	-	<1
Lithium	ug/L	-	-	<5	<5	5.97	<5	<5	<5	<5	<5	<5
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	4,480	4,360	5,310	5,260	28.7	-	4,130	-	301	-	284
Mercury	ug/L	<0.2	<0.2	<0.200	<0.200	<0.200	-	<0.2	-	<0.2	-	<0.2
Molybdenum	ug/L	-	-	<5	<5	<5	<5	<5	<5	<5	5 UR	<5
Nickel	ug/L	<2	<2	1.24 J	3.57 J	1.49	-	<1	-	<1	-	<1
Potassium	ug/L	1,200	1,340	<5,000	<5,000	<5,000	-	<5,000	-	<5,000	-	<5,000
Selenium	ug/L	<2	<2	<5	<5	<5	-	<5	-	<5	-	<5
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<2	<1	<1	<1	-	<1	-	<1	-	<1
Sodium	ug/L	8,850	9,070	9,570	9,470	<5,000	-	8,060	-	10,400	-	17,600
Strontium	ug/L	1,270	1,300	1,020	994	149	-	1,060	-	1,280	-	1,470
Thallium	ug/L	<2	<2	<1	<1	<1	-	<1	-	<1	-	<1
Tin	ug/L	<50	<50	<100	<100	<100	-	<100	-	<100	-	<100
Vanadium	ug/L	<4	<4	<1	<1	<1	-	<1	-	<1	-	<1
Zinc	ug/L	<25	<25	<5	<5	<5	-	<5	-	<5	-	<5
Radiological Parameters												
Radium-226	pCi/L	-	-	0.0788 +/-(0.198)U	-0.0637 +/-(0.153)U	0.0330 +/-(0.0365)U	-0.0115 +/-(0.0360)U	0.0738 +/-(0.0545)	0.0745 +/-(0.0559)	0.0190 +/-(0.0355)U	0.204 +/-(0.0889)U*	0.0104 +/-(0.0407)U
Radium-228	pCi/L	-	-	0.0303 +/-(0.207)U	0.197 +/-(0.221)U	-0.130 +/-(0.199)U	0.337 +/-(0.222)	0.410 +/-(0.240)	0.198 +/-(0.222)U	0.253 +/-(0.285)U	0.116 +/-(0.247)U	0.512 +/-(0.284)
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	3.68	4.45	2.55	2.75	8.49	-	4.11	-	2.69	-	4.12
Fluoride	mg/L	0.211	0.193	0.169	0.179	<0.100	-	0.183	-	0.190	-	0.256
Sulfate	mg/L	186	162	134	133	5.58	-	134	-	88.8	-	113
General Chemistry												
Alkalinity, Bicarbonate	mg/L	418	419	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<10.0	<10.0	-	-	-	-	503	-	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	-	6.9	6.7 J	6.8 J
Total Dissolved Solids	mg/L	-	-	646	645	91.0	586	627	605	625	623	600

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-29								
Sample Date		7-May-19	18-Nov-19	18-Nov-19	11-May-20	4-Nov-20	11-Jan-21	19-Jul-21	2-Mar-22	30-Aug-22
Sample ID		JSF-W29-GW-050719	JSF-AW-29-111819	JSF-GW-29-111819	JSF-GW-29-051120	JSF-GW-W29-110420	JSF-GW-W29-01112021	JSF-GW-W29-07192021	JSF-GW-W-29-03022022	JSF-GW-W-29-08302022
Parent Sample ID			JSF-GW-29-111819							
Intake Depth		20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 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
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals										
Aluminum	ug/L	<12.5	<12.5	<12.5	<12.5	20.8 J	<34.0	<34.0	<15.5	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	<0.506	-
Arsenic	ug/L	<0.323	0.761 J	<0.323	<0.313	<0.313	<0.750	<0.750	2.86	-
Barium	ug/L	62.8	37.6 U*	43.3 U*	67.2	62.9	67.1	40.2	49.4	-
Beryllium	ug/L	<0.155	0.607 J	0.194 J	<0.182	<0.182	<0.305	<0.620	<0.274	-
Boron	ug/L	610	1,140 J	972 J	601	971	733	699	399	-
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.217	<0.217	<0.197	<0.197	<0.217	-
Calcium	ug/L	151,000	166,000 J	145,000 J	178,000	182,000	158,000	155,000	136,000	-
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<0.980	<2.47	<1.53	-
Cobalt	ug/L	0.147 U*	0.441 J	0.318 U*	<0.134	<0.134	0.209 J	<0.190	<0.261	-
Copper	ug/L	0.74 J	<0.627	<0.627	<0.627	<0.627	<1.70	<1.70	<1.14	-
Iron	ug/L	<14.1	<19.5	<19.5	<19.5	<19.5	<47.0	<47.0	<27.7	-
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.167	-
Lithium	ug/L	4.1 J	<3.39	<3.39	<3.39	<3.39	<1.65	<1.65	<0.831	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-
Manganese	ug/L	58.8	2,330 J	2,050 J	69.9	170	34.0	697	15.6	-
Mercury	ug/L	<0.101	0.101 UJ	0.101 UJ	<0.130	<0.130	<0.130	<0.130	<0.130	-
Molybdenum	ug/L	0.622 J	0.679 J	<0.610	1.07 J	0.947 J	<1.08	<1.08	2.00 J	-
Nickel	ug/L	0.341 J	2.57 U*	2.20 U*	<0.336	0.417 J	<1.47	<1.47	<0.517	-
Potassium	ug/L	3,870	1,700 J	1,420 J	3,470	3,120	3,810	2,060	5,080	-
Selenium	ug/L	<2.62	<1.51	<1.51	<1.51	<1.51	2.33 J	<0.890	4.77 J	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.223	-
Sodium	ug/L	11,300	9,140 J	7,810 J	7,450	8,850	8,820	7,110	5,540	-
Strontium	ug/L	1,530	1,290 J	1,300 J	1,780	1,700	1,840	1,510	1,490	-
Thallium	ug/L	<0.128	<0.148	<0.148	<0.148	<0.148	<0.200	<0.200	<0.472	-
Tin	ug/L	<1.75	<1.75	<1.75	<0.960	<0.960	<3.00	<3.00	<2.02	-
Vanadium	ug/L	1.34 U*	<0.991	<0.991	<0.991	<0.991	<0.820	<0.820	0.951 J	-
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<15.0	<15.0	<2.88	-
Radiological Parameters										
Radium-226	pCi/L	0.0375 +/-(0.0616)U	0.152 +/-(0.292)U	0.126 +/-(0.373)U	-0.180 +/-(0.412)U	0.664 +/-(0.651)U	0.162 +/-(0.489)U	0.0524 +/-(0.371)U	0.00749 +/-(0.457)U	0.115 +/-(0.353)U
Radium-228	pCi/L	0.245 +/-(0.265)U	-0.0692 +/-(0.344)U	-0.197 +/-(0.317)U	0.137 +/-(0.245)U	0.209 +/-(0.343)U	0.400 +/-(0.431)U	0.350 +/-(0.331)U	-0.111 +/-(0.303)U	-0.0120 +/-(0.478)U
Radium-226+228	pCi/L	-	0.152 +/-(0.451)U	0.126 +/-(0.490)U	0.137 +/-(0.479)U	0.873 +/-(0.736)U	0.563 +/-(0.652)U	0.402 +/-(0.498)U	0.00749 +/-(0.548)U	0.115 +/-(0.594)U
Anions										
Chloride	mg/L	2.56	3.27	3.43	2.25	2.47	2.31	2.11	1.07	-
Fluoride	mg/L	0.185	0.133	0.155	0.243	0.202	0.210	0.226	0.197 U*	-
Sulfate	mg/L	85.3	120	127	71.2 J	99.8	109	89.7	58.5	-
General Chemistry										
Alkalinity, Bicarbonate	mg/L	-	491	479	443	477	447	512	385	-
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<5.00	-
pH (lab)	SU	6.9 J	6.8 J	6.7 J	7.9 J	7.0 J	6.9 J	6.8 J	7.6 J	-
Total Dissolved Solids	mg/L	557	538	561	550	640	642	652	492	-

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-30										
Sample Date		10-May-16	7-Nov-16	24-Apr-17	24-Apr-17	23-Aug-17	29-Nov-17	20-Feb-18	22-May-18	21-Aug-18	13-Nov-18	7-May-19
Sample ID		JSF-30-0516	JSF-30-110716	JSF-30-042417	JSF-30-DUP-042417	JSF-30-082317	JSF-W30-112917	JSF-30-022018	JSF-30-052218	JSF-30-GW-082118	JSF-30-GW-111318	JSF-W30-GW-050719
Parent Sample ID					JSF-30-042417							
Intake Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<100	<200	<200	<200	-	<200	-	<200	-	<200	397
Antimony	ug/L	<2	<2	<2	<2	-	<2	-	<2	-	<2	<0.378
Arsenic	ug/L	<2	<1	<1	<1	-	<1	-	<1	-	<1	0.432 J
Barium	ug/L	23.8	<200	<200	<200	-	<200	-	<200	-	<200	21.5
Beryllium	ug/L	<2	<1	<1	<1	-	<1	-	<1	-	<1	<0.155
Boron	ug/L	4,050	4,630	3,080	3,100	-	3,760	-	4,050	-	3,320	2,970
Cadmium	ug/L	<1	<1	<1	<1	-	<1	-	<1	-	<1	0.195 J
Calcium	ug/L	-	425,000	260,000	266,000	378,000	-	365,000	393,000	333,000	297,000	365,000
Chromium	ug/L	<2	<2	<2	<2	-	<2	-	<2	-	<2	<1.53
Cobalt	ug/L	2.33	2.97	1.34	1.35	-	2.40	-	2.33	-	2.35	3.03
Copper	ug/L	<2	<2	<2	<2	-	<2	-	<2	-	<2	0.904 J
Iron	ug/L	<100	<100	<100	<100	-	<100	-	209	-	110	582
Lead	ug/L	<2	<1	<1	<1	-	<1	-	<1	-	<1	0.242 J
Lithium	ug/L	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	4.97 J
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	3,120	3,160	1,660	1,720	-	3,610	-	3,800	-	2,760	3,360
Mercury	ug/L	<0.2	<0.200	<0.200	<0.200	-	<0.2	-	<0.2	-	<0.2	<0.101
Molybdenum	ug/L	-	<5	<5	<5	<5	<5	<5	<5	5 UR	<5	<0.61
Nickel	ug/L	<2	2.22	1.44	1.47	-	1.82	-	2.1	-	1.77	2.7
Potassium	ug/L	1,480	<5,000	<5,000	<5,000	-	<5,000	-	<5,000	-	<5,000	1,360
Selenium	ug/L	<2	<5	<5	<5	-	<5	-	<5	-	<5	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<1	<1	<1	-	<1	-	<1	-	<1	<0.121
Sodium	ug/L	34,200	35,000	27,000	27,500	-	32,800	-	30,400	-	28,400	27,200
Strontium	ug/L	5,450	4,950	3,750	3,760	-	4,640	-	4,740	-	3,770	4,690
Thallium	ug/L	<2	<1	<1	<1	-	<1	-	<1	-	<1	<0.128
Tin	ug/L	<50	<100	<100	<100	-	<100	-	<100	-	<100	<1.75
Vanadium	ug/L	<4	<1	<1	<1	-	<1	-	1.32	-	<1	2.43 U*
Zinc	ug/L	<25	<5	<5	<5	-	<5	-	<5	-	<5	<3.22
Radiological Parameters												
Radium-226	pCi/L	-	0.210 +/-(0.260)U	0.0449 +/-(0.0532)U	0.0629 +/-(0.0673)U	0.0741 +/-(0.0597)U	0.154 +/-(0.0737)	0.0572 +/-(0.0553)U	0.0531 +/-(0.0516)U	0.220 +/-(0.0845)U*	0.0409 +/-(0.0572)U	0.0665 +/-(0.0590)U
Radium-228	pCi/L	-	0.669 +/-(0.292)	0.144 +/-(0.208)U	0.328 +/-(0.243)U	0.707 +/-(0.278)	0.832 +/-(0.320)	0.377 +/-(0.244)	0.490 +/-(0.301)	0.195 +/-(0.196)U	0.214 +/-(0.259)U	-0.0762 +/-(0.243)U
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	12.5	10.4	9.40	9.52	-	13.8	-	8.71	-	10.9	12.3
Fluoride	mg/L	0.291	0.340	0.297	0.300	-	0.300	-	0.332	-	0.362	0.302
Sulfate	mg/L	1,150	952	751	750	-	1,100	-	887	-	780	815
General Chemistry												
Alkalinity, Bicarbonate	mg/L	395	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<10.0	-	-	-	-	468	-	-	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	6.8	6.8 J	6.8 J	6.8 J
Total Dissolved Solids	mg/L	-	1,990	1,440	1,430	1,800	1,890	1,710	1,900	1,790	1,490	1,700

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-30								
Sample Date		13-Nov-19	12-May-20	12-May-20	4-Nov-20	12-Jan-21	12-Jan-21	14-Jul-21	8-Mar-22	30-Aug-22
Sample ID		JSF-GW-30-111319	JSF-AW-30-051220	JSF-GW-30-051220	JSF-GW-W30-110420	JSF-AW-W30-01122021	JSF-GW-W30-01122021	JSF-GW-W30-07142021	JSF-GW-W-30-03082022	JSF-GW-W-30-08302022
Parent Sample ID			JSF-GW-30-051220			JSF-GW-W30-01122021				
Intake Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft
Sample Type		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
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals										
Aluminum	ug/L	<12.5	14.0 J	16.7 J	20.1 J	<34.0	<34.0	<34.0	18.7 J	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	<0.570	<0.506	-
Arsenic	ug/L	0.346 J	<0.313	<0.313	<0.313	<0.750	<0.750	<0.750	<0.282	-
Barium	ug/L	23.7	19.5	19.4	20.8	18.8	19.1	20.2	18.7	-
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.305	0.525 J	<0.620	<0.274	-
Boron	ug/L	3,580	2,810	2,640	3,550	3,050	2,940	2,700	2,390	-
Cadmium	ug/L	0.173 J	<0.217	<0.217	<0.217	<0.197	0.221 J	<0.197	<0.217	-
Calcium	ug/L	332,000	378,000	381,000	357,000	305,000	300,000	330,000	332,000	-
Chromium	ug/L	1.98 U*	<1.53	<1.53	<1.53	<0.980	<0.980	<2.47	<1.53	-
Cobalt	ug/L	2.73	2.62	2.62	2.83	2.87	2.95	3.18	1.98	-
Copper	ug/L	0.772 J	<0.627	0.650 U*	<0.627	<1.70	<1.70	<1.70	<1.14	-
Iron	ug/L	<19.5	<19.5	40.2 U*	23.1 J	<47.0	<47.0	<47.0	29.3 J	-
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.450	<0.167	-
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<1.65	<1.65	<1.65	1.25 J	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-
Manganese	ug/L	3,230	3,620	3,730	3,390	3,250	3,200	3,740	3,060	-
Mercury	ug/L	<0.101	<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	<1.08	<1.08	<1.08	<0.610	-
Nickel	ug/L	1.98	1.94 U*	2.40 U*	1.68	1.99 J	2.03	1.95 J	1.71	-
Potassium	ug/L	1,500	1,330	1,320	1,450	1,470	1,350	1,520	1,350	-
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<0.890	<0.890	<0.890	<0.739	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.0530	<0.223	-
Sodium	ug/L	28,200	25,600	26,600	26,500	24,200	23,700	25,200	24,500	-
Strontium	ug/L	4,470	4,690	4,820	4,550	4,490	4,440	4,570	4,560	-
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.200	0.371 J	<0.200	<0.472	-
Tin	ug/L	<1.75	<0.960	<0.960	<0.960	<3.00	<3.00	<3.00	<2.02	-
Vanadium	ug/L	1.31 U*	<0.991	<0.991	<0.991	<0.820	<0.820	<0.820	<0.776	-
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<15.0	<15.0	<15.0	<2.88	-
Radiological Parameters										
Radium-226	pCi/L	0.518 +/-(0.531)U	0.295 +/-(0.515)U	-0.0189 +/-(0.385)U	0.150 +/-(0.491)U	0.571 +/-(0.602)U	0.566 +/-(0.616)U	0.0629 +/-(0.308)U	0.0399 +/-(0.233)U	0.0185 +/-(0.347)U
Radium-228	pCi/L	0.569 +/-(0.487)U	-0.282 +/-(0.285)U	0.245 +/-(0.271)U	0.0413 +/-(0.243)U	-0.0196 +/-(0.388)U	0.431 +/-(0.415)U	0.215 +/-(0.289)U	0.310 +/-(0.293)U	0.629 +/-(0.717)U
Radium-226+228	pCi/L	1.09 +/-(0.720)U	0.295 +/-(0.588)U	0.245 +/-(0.470)U	0.191 +/-(0.548)U	0.571 +/-(0.716)U	0.998 +/-(0.743)U	0.278 +/-(0.422)U	0.350 +/-(0.375)U	0.648 +/-(0.797)U
Anions										
Chloride	mg/L	11.8	11.0	10.2	12.2	11.6	11.5	11.5	11.0	-
Fluoride	mg/L	0.252	0.300	0.280	0.243	0.335	0.336	0.332	0.297	-
Sulfate	mg/L	848	685 J	720 J	808	833	861	811	880	-
General Chemistry										
Alkalinity, Bicarbonate	mg/L	427	407	405	378	377	373	400	392	-
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<2.60	<5.00	-
pH (lab)	SU	6.9 J	7.8 J	7.6 J	7.0 J	6.8 J	6.9 J	7.5 J	7.0 J	-
Total Dissolved Solids	mg/L	1,600 J	1,600	1,590	1,440	1,570	1,510	1,620	1,550	-

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-31										
Sample Date		11-May-16	8-Nov-16	25-Apr-17	23-Aug-17	23-Aug-17	4-Dec-17	20-Feb-18	22-May-18	22-Aug-18	22-Aug-18	15-Nov-18
Sample ID		JSF-31-0516	JSF-3111-0816	JSF-31-042517	JSF-31-082317	JSF-31-DUP-082317	JSF-31-120417	JSF-31-022018	JSF-31-052218	JSF-31-GW-082218	JSF-31-GW-DUP-082218	JSF-31-GW-111518
Parent Sample ID						JSF-W-31-0817					JSF-31-GW-082218	
Intake 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<100	<200	<200	-	-	<200	-	<200	-	-	<200
Antimony	ug/L	<2	<2	<2	-	-	<2	-	<2	-	-	<2
Arsenic	ug/L	<2	<1	<1	-	-	<1	-	<1	-	-	<1
Barium	ug/L	33.6	<200	<200	-	-	<200	-	<200	-	-	<200
Beryllium	ug/L	<2	<1	<1	-	-	<1	-	<1	-	-	<1
Boron	ug/L	15,800	14,700	9,350	-	-	11,800	-	11,300	-	-	4,590
Cadmium	ug/L	<1	<1	<1	-	-	<1	-	<1	-	-	<1
Calcium	ug/L	-	416,000	226,000	330,000	333,000	-	151,000	302,000	242,000	248,000	164,000
Chromium	ug/L	<2	<2	<2	-	-	<2	-	<2	-	-	4.74
Cobalt	ug/L	<2	<0.5	<0.5	-	-	<0.5	-	<0.5	-	-	0.617
Copper	ug/L	<2	<2	<2	-	-	<2	-	<2	-	-	8.57
Iron	ug/L	<100	<100	<100	-	-	<100	-	<100	-	-	<100
Lead	ug/L	<2	<1	<1	-	-	<1	-	<1	-	-	<1
Lithium	ug/L	-	1,630	775	1,490	1,500	1,710	505	1,270	1,240	1,280	562
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	<4	<5	<5	-	-	<5	-	<5	-	-	28.2
Mercury	ug/L	<0.2	<0.200	<0.200	-	-	<0.2	-	<0.2	-	-	<0.2
Molybdenum	ug/L	-	4,130	2,110	3,340	3,390	3,950	2,010	2,650	2,600 J	2,620 J	2,150
Nickel	ug/L	<2	4.99	<1	-	-	1.67	-	<1	-	-	4.75
Potassium	ug/L	45,500	56,500	26,500	-	-	52,900	-	32,000	-	-	25,600
Selenium	ug/L	<2	<5	<5	-	-	<5	-	<5	-	-	<5
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<1	<1	-	-	<1	-	<1	-	-	<1
Sodium	ug/L	69,000	57,900	42,300	-	-	46,900	-	42,300	-	-	22,800
Strontium	ug/L	5,000	4,170	2,630	-	-	3,480	-	2,940	-	-	1,710
Thallium	ug/L	<2	<1	<1	-	-	<1	-	<1	-	-	<1
Tin	ug/L	<50	<100	<100	-	-	<100	-	<100	-	-	<100
Vanadium	ug/L	<4	<1	<1	-	-	<1	-	1.22	-	-	<1
Zinc	ug/L	<25	<5	<5	-	-	<5	-	<5	-	-	216
Radiological Parameters												
Radium-226	pCi/L	-	0.243 +/-(0.255)U	0.122 +/-(0.0842)	0.124 +/-(0.0687)	0.0769 +/-(0.0614)U	0.124 +/-(0.0646)	0.0982 +/-(0.0608)	0.138 +/-(0.0707)	0.212 +/-(0.0935)U*	0.299 +/-(0.0990)U*	0.0649 +/-(0.0563)U
Radium-228	pCi/L	-	0.479 +/-(0.309)	0.0777 +/-(0.210)U	0.949 +/-(0.279)	0.390 +/-(0.245)	0.827 +/-(0.257)	0.134 +/-(0.211)U	0.387 +/-(0.249)	1.52 +/-(0.534)J	0.676 +/-(0.294)J	0.453 +/-(0.281)U*
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	10.4	10.4	7.66	-	-	10.2	-	6.99	-	-	5.55
Fluoride	mg/L	0.433	0.488	0.413	-	-	0.520	-	0.434	-	-	0.530
Sulfate	mg/L	1,870	1,020	678	-	-	816	-	702	-	-	338
General Chemistry												
Alkalinity, Bicarbonate	mg/L	408	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<10.0	-	-	-	-	465	-	-	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	7.2	7.1 J	7.1 J	7.2 J
Total Dissolved Solids	mg/L	-	2,050	1,350	1,680	1,700	1,640	711	1,580	1,430	1,400	792

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Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-31									
Sample Date		13-May-19	13-Nov-19	12-May-20	4-Nov-20	4-Nov-20	11-Jan-21	14-Jul-21	7-Mar-22	7-Mar-22	30-Aug-22
Sample ID		JSF-GW-31-051319	JSF-GW-31-111319	JSF-GW-31-051220	JSF-AW-W31-110420	JSF-GW-W31-110420	JSF-GW-W31-01112021	JSF-GW-W31-07142021	JSF-GW-FD-03072022	JSF-GW-W-31-03072022	JSF-GW-W-31-08302022
Parent Sample ID					JSF-GW-W31-110420				JSF-GW-W-31-03072022		
Intake 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	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program
Total Metals											
Aluminum	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<34.0	<34.0	<15.5	<15.5	-
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.570	<0.570	<0.506	<0.506	-
Arsenic	ug/L	0.626 U*	0.438 J	<0.313	0.498 J	0.355 J	<0.750	<0.750	<0.282	<0.282	-
Barium	ug/L	41	43.0	38.0	45.8	46.7	39.3	43.4	63.4	61.9	-
Beryllium	ug/L	<0.155	<0.182	<0.182	<0.182	<0.182	<0.305	<0.620	<0.274	<0.274	-
Boron	ug/L	7,810	8,670	7,670	8,450	7,860	7,600	7,110	5,640	5,340	-
Cadmium	ug/L	0.701 J	0.629 J	<0.217	0.299 J	0.232 J	0.854 J	0.510 J	0.234 J	<0.217	-
Calcium	ug/L	256,000	258,000	274,000	257,000	260,000	226,000	244,000	223,000	219,000	-
Chromium	ug/L	2.79 U*	1.82 U*	<1.53	<1.53	<1.53	<0.980	<2.47	<1.53	<1.53	-
Cobalt	ug/L	0.22 J	0.180 J	<0.134	<0.134	<0.134	0.251 J	0.224 J	<0.261	<0.261	-
Copper	ug/L	2.17 U*	0.703 J	<0.627	<0.627	<0.627	<1.70	<1.70	<1.14	<1.14	-
Iron	ug/L	<14.1	<19.5	<19.5	<19.5	<19.5	<47.0	<47.0	<27.7	<27.7	-
Lead	ug/L	0.198 J	<0.128	<0.128	<0.128	<0.128	<0.450	<0.450	<0.167	<0.167	-
Lithium	ug/L	779	1,040	671	797	823	886	761	634	638	-
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	1.53 J	1.66 J	0.898 U*	1.09 J	1.12 J	<2.06	<6.20	<1.34	<1.34	-
Mercury	ug/L	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	-
Molybdenum	ug/L	2,700	3,550	1,780	3,170	3,240	2,860	2,350	2,170	2,100	-
Nickel	ug/L	1.2	1.03	0.948 U*	0.892 J	0.749 J	<1.47	<1.47	0.676 J	0.818 J	-
Potassium	ug/L	26,600	41,400	19,600	35,700	36,200	34,800	28,700	28,900	28,900	-
Selenium	ug/L	<2.62	<1.51	<1.51	<1.51	<1.51	<0.890	<0.890	<0.739	<0.739	-
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.0530	<0.0530	<0.223	<0.223	-
Sodium	ug/L	40,800	37,300	36,600	32,200	32,700	30,800	33,800	26,300	26,100	-
Strontium	ug/L	3,030	3,090	2,780	2,800	2,880	2,880	2,810	2,470	2,450	-
Thallium	ug/L	<0.128	<0.148	<0.148	0.456 U*	<0.148	<0.200	<0.200	<0.472	<0.472	-
Tin	ug/L	<1.75	<1.75	<0.960	1.02 J	<0.960	<3.00	<3.00	<2.02	<2.02	-
Vanadium	ug/L	4.24 U*	1.41 U*	<0.991	<0.991	<0.991	<0.820	<0.820	<0.776	<0.776	-
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<15.0	<15.0	<2.88	<2.88	-
Radiological Parameters											
Radium-226	pCi/L	0.167 +/-(0.0830)	0.238 +/-(0.506)U	0.250 +/-(0.518)U	0.557 +/-(0.597)U	0.596 +/-(0.623)U	0.582 +/-(0.616)U	0.307 +/-(0.316)U	0.131 +/-(0.279)U	0.110 +/-(0.287)U	-0.0752 +/-(0.176)U
Radium-228	pCi/L	-0.0988 +/-(0.267)U	0.609 +/-(0.583)U	0.0524 +/-(0.264)U	0.340 +/-(0.364)U	0.673 +/-(0.398)	-0.0486 +/-(0.349)U	0.476 +/-(0.438)U	0.197 +/-(0.438)U	0.573 +/-(0.459)U	0.328 +/-(0.624)U
Radium-226+228	pCi/L	-	0.848 +/-(0.772)U	0.303 +/-(0.581)U	0.897 +/-(0.700)U	1.27 +/-(0.739)J	0.582 +/-(0.709)U	0.783 +/-(0.540)U	0.328 +/-(0.519)U	0.683 +/-(0.541)U	0.328 +/-(0.648)U
Anions											
Chloride	mg/L	9.29	9.69	10.0	9.59	9.85	10.0	9.96	9.98	9.47	-
Fluoride	mg/L	0.384	0.400	0.339	0.396	0.409	0.551	0.455	0.456	0.445	-
Sulfate	mg/L	677	702	759 J	593	593	684	649	588	566	-
General Chemistry											
Alkalinity, Bicarbonate	mg/L	-	365	255	327	332	321	306	310	306	-
Alkalinity, Carbonate	mg/L	-	<5.00	<5.00	<5.00	<5.00	<2.60	<2.60	<5.00	<5.00	-
pH (lab)	SU	7.2 J	7.3 J	7.9 J	7.3 J	7.5 J	7.3 J	7.5 J	7.3 J	7.3 J	-
Total Dissolved Solids	mg/L	1,300	1,350	1,270	1,240	1,230	1,350	1,290	1,080	1,080	-

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-32										
Sample Date		11-May-16	14-Nov-16	25-Apr-17	22-Aug-17	4-Dec-17	4-Dec-17	21-Feb-18	23-May-18	22-Aug-18	26-Nov-18	26-Nov-18
Sample ID		JSF-32-0516	JSF-32-111416	JSF-32-042517	JSF-32-082217	JSF-32-120417	JSF-32-DUP-120417	JSF-32-022118	JSF-32-052318	JSF-32-GW-082218	JSF-32-DUP-GW-112618	JSF-32-GW-112618
Parent Sample ID							JSF-W32-1217				JSF-32-GW-112618	
Intake Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Total Metals												
Aluminum	ug/L	<100	<200	<200	-	<200	<200	-	<200	-	<200	<200
Antimony	ug/L	<2	<2	<2	-	<2	<2	-	<2	-	<2	<2
Arsenic	ug/L	<2	<1	<1	-	<1	<1	-	<1	-	<1	<1
Barium	ug/L	54.2	<200	<200	-	<200	<200	-	<200	-	<200	<200
Beryllium	ug/L	<2	<1	<1	-	<1	<1	-	<1	-	<1	<1
Boron	ug/L	74.9	<200	<200	-	<200	<200	-	<200	-	<200	<200
Cadmium	ug/L	<1	<1	<1	-	<1	<1	-	<1	-	<1	<1
Calcium	ug/L	-	141,000	99,700	118,000	-	-	115,000	122,000	118,000	116,000	113,000
Chromium	ug/L	<2	2.14	<2	-	<2	<2	-	<2	-	<2	<2
Cobalt	ug/L	<2	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5
Copper	ug/L	<2	<2	<2	-	<2	<2	-	<2	-	<2	<2
Iron	ug/L	<100	<100	144	-	<100	<100	-	128	-	<100	<100
Lead	ug/L	<2	<1	<1	-	<1	<1	-	<1	-	<1	<1
Lithium	ug/L	-	<5	<5	<5	5.12	<5	<5	5.28	<5	<5	<5
Magnesium	ug/L	-	-	-	-	-	-	-	-	-	-	-
Manganese	ug/L	<4	<5	193	-	<5	<5	-	7.38	-	<5	<5
Mercury	ug/L	<0.2	<0.200	<0.200	-	<0.2	<0.2	-	<0.2	-	<0.2	<0.2
Molybdenum	ug/L	-	<5	5.45	<5	<5	<5	<5	<5	5 UR	<5	<5
Nickel	ug/L	<2	1.45	<1	-	<1	<1	-	<1	-	<1	<1
Potassium	ug/L	1,470	<5,000	<5,000	-	<5,000	<5,000	-	<5,000	-	<5,000	<5,000
Selenium	ug/L	<2	<5	<5	-	<5	<5	-	<5	-	<5	<5
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<2	<1	<1	-	<1	<1	-	<1	-	<1	<1
Sodium	ug/L	7,250	6,800	8,080	-	7,060	7,360	-	7,000	-	7,640	7,440
Strontium	ug/L	270	285	240	-	276	289	-	232	-	254	248
Thallium	ug/L	<2	<1	<1	-	<1	<1	-	<1	-	<1	<1
Tin	ug/L	<50	<100	<100	-	<100	<100	-	<100	-	<100	<100
Vanadium	ug/L	<4	<1	<1	-	<1	<1	-	1.07	-	<1	<1
Zinc	ug/L	<25	21.3	<5	-	<5	<5	-	<5	-	<5	<5
Radiological Parameters												
Radium-226	pCi/L	-	0.0390 +/-(0.203)U	0.0686 +/-(0.0681)U	0.0478 +/-(0.0465)U	0.0974 +/-(0.0597)	0.0624 +/-(0.0556)U	0.0216 +/-(0.0427)U	0.0602 +/-(0.0567)U	0.147 +/-(0.0794)U*	0.0262 +/-(0.0427)UJ	0.105 +/-(0.0626)J
Radium-228	pCi/L	-	0.536 +/-(0.300)	0.208 +/-(0.194)U	0.302 +/-(0.211)U	0.509 +/-(0.241)	0.304 +/-(0.208)U	0.268 +/-(0.205)U	0.420 +/-(0.283)U	0.455 +/-(0.249)	0.344 +/-(0.237)U	0.580 +/-(0.293)
Radium-226+228	pCi/L	-	-	-	-	-	-	-	-	-	-	-
Anions												
Chloride	mg/L	12.1	7.33	11.6	-	13.3	14.2	-	8.57	-	11.2	11.5
Fluoride	mg/L	<0.100	<0.100	<0.100	-	<0.1	<0.1	-	<0.100	-	<0.100	<0.100
Sulfate	mg/L	60.6	48.4	48.6	-	54.9	57.0	-	46.2	-	50.8	50.7
General Chemistry												
Alkalinity, Bicarbonate	mg/L	260	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	<10.0	-	-	-	384	390	-	-	-	-	-
pH (lab)	SU	-	-	-	-	-	-	-	7.0	7.0 J	6.9 J	6.9 J
Total Dissolved Solids	mg/L	-	436	380	361	411	408	358	363	392	381	381

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-32										
Sample Date		24-Jan-19	29-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	13-May-19	12-Jun-19
Sample ID		JSF-GW-005-01242019	JSF-GW-005-01292019	JSF-GW-005-02052019	JSF-GW-005-02202019	JSF-GW-005-02272019	JSF-GW-005-03062019	JSF-GW-005-03202019	JSF-GW-005-03272019	JSF-GW-005-04022019	JSF-GW-32-051319	JSF-GW-005-06122019
Parent Sample ID												
Intake Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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	CCR Program
Total Metals												
Aluminum	ug/L	123	86.2 U*	145	79.1	63	88.7	30.1	26.1 J	34.6	140	26.1 J
Antimony	ug/L	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	<0.323	0.457 U*	<0.323
Barium	ug/L	58.3	70.1	58.2	64.5	84.3	65.2	61.6	71.2	60.7	61.2	61.5
Beryllium	ug/L	<0.057	<0.057	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	68.3 J	51.7 J	78.7 U*	41.4 J	57.4 J	50.1 J	44.3 J	53.7 J	51 J	60.3 J	49.9 J
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.145 J	<0.125
Calcium	ug/L	123,000 J	109,000	113,000	129,000	131,000	130,000 J	132,000	134,000	142,000	120,000	132,000
Chromium	ug/L	2.17 U*	2.16 U*	2.04	<1.53	<1.53	1.57 J	<1.53	<1.53	1.56 J	3.45 U*	2.8 U*
Cobalt	ug/L	0.116 J	0.122 J	0.148 J	<0.075	0.109 J	<0.075	<0.075	0.109 J	0.108 J	0.195 J	0.104 J
Copper	ug/L	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	1.65 U*	<0.627
Iron	ug/L	157	109	146	80.8	70.8 U*	99.8	38.9 J	42.4 U*	7,000	137	31.7 U*
Lead	ug/L	0.135 J	0.11 J	0.149 J	0.13 J	<0.128	<0.128	<0.128	<0.128	<0.128	0.259 J	<0.128
Lithium	ug/L	2.69 J	2.82 J	5.72 U*	3.32 J	3.51 U*	3.25 J	<3.14	<3.14	3.68 J	8.97 U*	<3.14
Magnesium	ug/L	5,710	6,050	4,930	5,480	6,490	5,900	5,460	5,980	5,180	-	5,320
Manganese	ug/L	5.07	2.79 J	2.45 J	3.46 J	2.1 U*	1.4 J	<1.35	<1.35	19.7 J	2.78 J	3.36 J
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	<0.474	<0.474	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61	<0.61
Nickel	ug/L	0.556 J	0.462 J	0.432 J	<0.312	0.438 J	<0.312	0.334 J	0.374 J	0.69 J	0.689 J	0.338 J
Potassium	ug/L	1,570	1,680	1,460	1,510	1,770	1,500	1,340	1,540	1,390	1,370	1,340
Selenium	ug/L	<0.813	<0.813	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	-	-	-	-	-	-	-	-	-	<0.121	<0.121
Sodium	ug/L	7,380	7,650	6,590	6,850	7,600	7,120	6,460	7,260	6,340	6,940	6,820
Strontium	ug/L	231	236	241	267	264	241	263	295	272	275	241
Thallium	ug/L	<0.063	<0.063	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Tin	ug/L	-	-	-	-	-	-	-	-	-	<1.75	-
Vanadium	ug/L	-	-	-	-	-	-	-	-	-	2.47 U*	1.52 U*
Zinc	ug/L	-	-	-	-	-	-	-	-	-	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	0.0489 +/-(0.0583)U	0.0412 +/-(0.0578)UJ	0.0427 +/-(0.0495)UJ	0.0708 +/-(0.0676)UJ	0.112 +/-(0.0627)	0.0202 +/-(0.0583)U	0.0789 +/-(0.0653)UJ	0.0555 +/-(0.0613)U	0.0558 +/-(0.0635)U	0.0582 +/-(0.0655)U	0.160 +/-(0.0804)
Radium-228	pCi/L	0.312 +/-(0.267)U	0.187 +/-(0.204)U	0.0734 +/-(0.226)UJ	0.0919 +/-(0.252)U	0.181 +/-(0.210)U	0.237 +/-(0.233)U	0.169 +/-(0.302)U	0.198 +/-(0.230)U	0.261 +/-(0.303)U	0.0951 +/-(0.309)U	0.503 +/-(0.324)J
Radium-226+228	pCi/L	0.361 +/-(0.273)U	0.229 +/-(0.212)UJ	0.116 +/-(0.231)UJ	0.163 +/-(0.261)UJ	0.293 +/-(0.219)J	0.257 +/-(0.240)U	0.248 +/-(0.309)UJ	0.254 +/-(0.238)U	0.317 +/-(0.310)U	-	0.663 +/-(0.334)J
Anions												
Chloride	mg/L	13.0	13.1	13.2	14.6	14.2	11.6	10.7	10.5	10.6	12.4	9.96
Fluoride	mg/L	<0.0263	0.0345 U*	0.0426 J	0.0546 J	0.0371 J	0.0445 J	0.0580 J	0.0544 J	0.0458 J	0.0394 J	0.0401 J
Sulfate	mg/L	59.1	61.7	62.4	59.8	65.1	64.4	61.3	61.4	62.2	57.2	53.0
General Chemistry												
Alkalinity, Bicarbonate	mg/L	307	295	273	322	328	304	319	363	311	-	271
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 (lab)	SU	-	-	-	-	-	-	-	-	-	7.4 J	-
Total Dissolved Solids	mg/L	375	388	373	420	180	376	390	411	409	377	382

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-32											
Sample Date		11-Sep-19	21-Nov-19	8-Jan-20	5-Feb-20	13-May-20	7-Jul-20	12-Aug-20	9-Nov-20	13-Jan-21	10-Feb-21	15-Jul-21
Sample ID		JSF-GW-005-09112019	JSF-GW-005-11212019	JSF-GW-005-01082020	JSF-GW-005-02052020	JSF-GW-32-051320	JSF-GW-005-07072020	JSF-GW-005-08122020	JSF-GW-W32-110920	JSF-GW-W-32-01132021	JSF-GW-W-32-02102021	JSF-GW-W-32-07152021
Parent Sample ID												
Intake Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Total Metals												
Aluminum	ug/L	69.5	66.3 U*	62.9	34.2 J	28.3 J	<34.0	174	22.6 J	62.4	163	89.3
Antimony	ug/L	<0.378	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.378	<0.570	<0.570	<0.570
Arsenic	ug/L	0.671 U*	<0.323	<0.750	<0.750	<0.313	<0.750	<0.750	<0.313	<0.750	<0.750	<0.750
Barium	ug/L	67.4	53.4	50.6	56.2	71.9	58.6	59.4	62.7	59.8	59.3	55.5
Beryllium	ug/L	0.339 J	0.231 J	<0.305	<0.305	<0.182	<0.305	<0.305	<0.182	<0.305	<0.305	<0.620
Boron	ug/L	112	59.5 J	46.0	56.2	78.2 J	54.2	49.6	86.4 U*	55.7	51.4	49.3
Cadmium	ug/L	0.173 J	<0.125	<0.197	<0.197	<0.217	<0.197	<0.197	<0.217	<0.197	<0.197	<0.197
Calcium	ug/L	127,000	137,000	128,000	135,000	138,000	138,000	123,000	122,000	112,000	137,000	105,000
Chromium	ug/L	3.98 U*	<1.53	<0.980	<0.980	<1.53	<0.980	<0.980	<1.53	<0.980	<0.980	<2.47
Cobalt	ug/L	0.305 J	0.201 U*	<0.190	<0.190	<0.134	<0.190	<0.190	<0.134	<0.190	0.190 J	0.201 J
Copper	ug/L	1.28 U*	<0.627	<1.70	<1.70	<0.627	<1.70	<1.70	<0.627	<1.70	<1.70	<1.70
Iron	ug/L	84.4	91.8	68.0 J	<47.0	65.9	<47.0	201	28.3 J	63.0 J	151	102
Lead	ug/L	0.333 J	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.128	<0.450	<0.450	<0.450
Lithium	ug/L	5.49	3.84 J	2.51 J	<1.65	<3.39	5.69 U*	3.24 J	<3.39	3.04 J	4.04 J	3.81 U*
Magnesium	ug/L	5,620	4,910	4,390	4,460	-	5,200	4,890	-	4,810	5,040	4,900
Manganese	ug/L	2.81 J	4.97 U*	<2.06	<2.06	<0.866	<2.06	6.04	0.996 J	<2.06	3.12 J	<6.20
Mercury	ug/L	<0.101	<0.101	0.130 UJ	<0.130	<0.130	<0.130	<0.130	0.130 UJ	<0.130	<0.130	<0.130
Molybdenum	ug/L	<0.610	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08	<0.610	<1.08	<1.08	<1.08
Nickel	ug/L	0.822 J	2.89 U*	<1.47	<1.47	0.379 U*	<1.47	<1.47	0.337 J	<1.47	<1.47	<1.47
Potassium	ug/L	1,620	1,270	1,280	1,280	1,470	1,260	1,410	1,320	1,520	1,510	1,450
Selenium	ug/L	<1.51	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<1.51	<0.890	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-	-	-	-	-	-	-
Silver	ug/L	<0.177	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.177	<0.0530	<0.0530	<0.0530
Sodium	ug/L	8,360	6,350	6,040	6,210	7,000	6,460	6,870	7,120	7,020	6,880	6,790
Strontium	ug/L	283	272	286	272	279	284	249	252	242	301	225
Thallium	ug/L	0.306 J	<0.148	<0.200	<0.200	<0.148	<0.200	<0.200	<0.148	<0.200	<0.200	<0.200
Tin	ug/L	-	<1.75	-	-	<0.960	-	-	<0.960	<3.00	-	<3.00
Vanadium	ug/L	1.97 U*	<0.991	<0.820	<0.820	<0.991	<0.820	<0.820	<0.991	<0.820	<0.820	<0.820
Zinc	ug/L	5.16	5.38	<15.0	<15.0	<3.22	<15.0	<15.0	<3.22	<15.0	<15.0	46.4
Radiological Parameters												
Radium-226	pCi/L	0.211 +/-(0.452)U	0.626 +/-(0.399)	0.512 +/-(0.443)U	0.207 +/-(0.285)U	0.526 +/-(0.585)U	0.468 +/-(0.568)U	-0.0536 +/-(0.475)U	0.0936 +/-(0.477)U	0.172 +/-(0.437)U	0.108 +/-(0.329)U	0.0586 +/-(0.234)U
Radium-228	pCi/L	0.661 +/-(0.451)	0.185 +/-(0.331)U	0.260 +/-(0.342)U	0.605 +/-(0.450)UJ	0.184 +/-(0.228)U	0.0837 +/-(0.452)U	0.0447 +/-(0.211)U	-0.287 +/-(0.238)U	-0.252 +/-(0.428)U	-0.0917 +/-(0.237)U	0.0362 +/-(0.247)U
Radium-226+228	pCi/L	0.872 +/-(0.638)J	0.811 +/-(0.518)J	0.772 +/-(0.560)U	0.812 +/-(0.533)UJ	0.710 +/-(0.628)U	0.552 +/-(0.726)U	0.0447 +/-(0.519)U	0.0936 +/-(0.533)U	0.172 +/-(0.611)U	0.108 +/-(0.406)U	0.0948 +/-(0.340)U
Anions												
Chloride	mg/L	8.57	11.1	11.1	11.0	11.1	10.3	11.1	10.7	10.1	10.8	9.31
Fluoride	mg/L	0.0442 J	0.0464 J	0.0406 U*	0.0404 J	0.0931 J	0.0387 J	0.0424 J	<0.0440	0.0419 J	0.0347 J	0.0326 J
Sulfate	mg/L	54.8	49.4	54.7	55.5	51.8 J	52.9 J	57.8	59.7	57.4	65.7	52.5
General Chemistry												
Alkalinity, Bicarbonate	mg/L	276	274	255	252	292	285	286	280	258	285	289
Alkalinity, Carbonate	mg/L	<5.00	<5.00	<2.60	<2.60	<5.00	<2.60	<2.60	<5.00	<2.60	<2.60	<2.60
pH (lab)	SU	-	7.2 J	-	-	7.9 J	-	-	7.4 J	6.9 J	-	7.0 J
Total Dissolved Solids	mg/L	366	334	368	356	426	411	393	388	348	400	380

Table H.1-9 - Groundwater Analytical Results
John Sevier Fossil Plant

Sample Location		W-32				
Sample Date		10-Aug-21	20-Jan-22	2-Mar-22	20-Jul-22	1-Sep-22
Sample ID		JSF-GW-W-32-08102021	JSF-GW-W-32-01202022	JSF-GW-W-32-03022022	JSF-GW-W-32-07202022	JSF-GW-W-32-09012022
Parent Sample ID						
Intake Depth		25 ft	25 ft	25 ft	25 ft	25 ft
Sample Type		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
Total Metals						
Aluminum	ug/L	37.3 J	55.3	67.0 U*	45.3 U*	34.9 J
Antimony	ug/L	<0.570	<0.378	<0.506	<0.570	<0.570
Arsenic	ug/L	<0.750	<0.313	<0.282	<0.750	<0.750
Barium	ug/L	49.4	62.0	69.3	53.6	45.9
Beryllium	ug/L	<0.620	<0.182	<0.274	<0.620	<0.620
Boron	ug/L	49.0 J	85.9	<60.1	38.1	52.5 U*
Cadmium	ug/L	<0.197	<0.217	<0.217	<0.197	<0.197
Calcium	ug/L	122,000 J	97,700	102,000	134,000	121,000
Chromium	ug/L	<2.47	<1.53	<1.53	<2.47	<2.47
Cobalt	ug/L	0.193 J	<0.134	<0.261	<0.190	<0.190
Copper	ug/L	<1.70	<0.627	<1.14	<1.70	<1.70
Iron	ug/L	<47.0	55.3	93.4	53.4 U*	<47.0
Lead	ug/L	<0.450	<0.128	<0.167	<0.450	<0.450
Lithium	ug/L	2.76 J	<3.39	2.55 J	2.17 J	1.66 J
Magnesium	ug/L	4,570	4,810	5,190	4,970	4,160 J
Manganese	ug/L	6.20 UJ	1.60 J	1.61 J	<6.20	<6.20
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	<1.08	<0.610	<0.610	<1.08	<1.08
Nickel	ug/L	<1.47	0.604 J	0.757 J	<1.47	<1.47
Potassium	ug/L	1,120	1,440	1,500	1,230	1,030
Selenium	ug/L	<0.890	<1.51	<0.739	<0.890	<0.890
Silicon	ug/L	-	-	-	-	-
Silver	ug/L	<0.0530	<0.177	<0.223	<0.0530	<0.0530
Sodium	ug/L	5,850	6,760	7,440	6,230	5,470
Strontium	ug/L	261	220	225	278	245 J
Thallium	ug/L	<0.200	<0.148	<0.472	<0.200	<0.200
Tin	ug/L	-	-	<2.02	-	<3.00
Vanadium	ug/L	<0.820	<0.991	<0.776	<0.820	<0.820
Zinc	ug/L	<15.0	<3.22	<2.88	<15.0	<15.0
Radiological Parameters						
Radium-226	pCi/L	0.603 +/-(0.604)U	0.155 +/-(0.371)U	0.677 +/-(0.547)U	-0.185 +/-(0.232)U	0.883 +/-(0.700)U
Radium-228	pCi/L	0.0610 +/-(0.319)U	0.190 +/-(0.354)U	0.206 +/-(0.361)U	0.172 +/-(0.536)U	0.0964 +/-(0.518)U
Radium-226+228	pCi/L	0.664 +/-(0.683)U	0.345 +/-(0.513)U	0.883 +/-(0.655)U	0.172 +/-(0.584)U	0.979 +/-(0.871)U
Anions						
Chloride	mg/L	9.17	9.81	9.73	8.55	7.81
Fluoride	mg/L	0.0375 J	0.0657 U*	0.0627 U*	0.0387 J	0.0314 J
Sulfate	mg/L	54.3	51.5	62.5	51.8	46.5
General Chemistry						
Alkalinity, Bicarbonate	mg/L	279	265	253	306	271
Alkalinity, Carbonate	mg/L	<2.60	<5.00	<5.00	<2.60	<2.60
pH (lab)	SU	-	-	7.3 J	-	7.2 J
Total Dissolved Solids	mg/L	362	374	357	398	332

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
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
SU	Standard Units

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		10-36									
Sample Date		10-May-16	14-Nov-16	25-Apr-17	22-Aug-17	4-Dec-17	21-Feb-18	22-May-18	28-Aug-18	26-Nov-18	23-Jan-19
Sample ID		JSF-10-36-0516	JSF-10-36-111416	JSF-10-36-042517	JSF-10-36-082217	JSF-10-36-120417	JSF-10-36-022118	JSF-10-36-052218	JSF-10-36-GW-082818	JSF-10-36-GW-112618	JSF-GW-006-01232019
Parent Sample ID											
Sample Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 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	State Compliance	State Compliance	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	28.6
Dissolved Oxygen	mg/L	0.2	1.1	1.25	0.87	0.89	2.03	0	1.51	1.71	2.87
ORP	Mv	190	243	298	180	267	491	280	397	216	155.5
pH (field)	SU	6.4	6.9	6.21	6.41	6.4	6.51	6.49	6.7	7.05	6.69
Specific Cond. (Field)	uS/cm	967	937	1,001	1,050	953	866	855	905	871	920
Temperature, Water (C)	DEG C	-	-	16.19	20.52	17.81	17.89	18.08	21.34	14.51	15.4
Turbidity, field	NTU	0.93	0.74	1.79	4.67	0.72	0.57	0.6	0.99	1.04	0.66

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		10-36										
Sample Date		29-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	8-May-19	12-Jun-19	11-Sep-19
Sample ID		JSF-GW-006-01292019	JSF-GW-006-02052019	JSF-GW-006-02202019	JSF-GW-006-02272019	JSF-GW-006-03062019	JSF-GW-006-03202019	JSF-GW-006-03272019	JSF-GW-006-04022019	JSF-10-36-GW-050819	JSF-GW-006-06122019	JSF-GW-006-09112019
Parent Sample ID												
Sample Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 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	State Compliance	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	24.4	24.0	22.3	24.1	22.2	18	18.7	23	-	4.2	2.8
Dissolved Oxygen	mg/L	2.55	2.41	2.26	2.40	2.30	1.9	1.91	2.3	1.16	0.40	0.25
ORP	Mv	144.7	145.2	191.9	111.9	237.2	33.3	68.2	33.7	413	74.2	18.8
pH (field)	SU	7.01	6.88	6.96	6.89	6.83	6.60	7.09	6.78	6.78	6.90	7.29
Specific Cond. (Field)	uS/cm	920	920	780	840	780	940	970	980	1,170	1,000	840
Temperature, Water (C)	DEG C	13.1	15.1	14.5	15.3	13.4	14.8	14.4	14.1	17.85	17.2	20.5
Turbidity, field	NTU	0.28	0.44	0.33	0.52	2.40	0.37	0.24	0.31	0.18	0.15	2.30

See notes on last page.

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Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		10-36									
Sample Date		19-Nov-19	8-Jan-20	5-Feb-20	11-May-20	7-Jul-20	12-Aug-20	3-Nov-20	14-Jan-21	10-Feb-21	15-Jul-21
Sample ID		JSF-GW-006-11192019	JSF-GW-006-01082020	JSF-GW-006-02052020	JSF-GW-10-36-051120	JSF-GW-006-07072020	JSF-GW-006-08122020	JSF-GW-10-36-110320	JSF-GW-10-36-01142021	JSF-GW-10-36-02102021	JSF-GW-10-36-07152021
Parent Sample ID											
Sample Depth		21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 ft	21 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	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	5.0	13.0	16.8	-	7.3	6.3	-	13.5	16.4	13.7
Dissolved Oxygen	mg/L	0.47	1.29	1.69	1.57	0.68	0.55	1.50	1.45	1.67	1.26
ORP	Mv	42.1	90.9	158.5	351	83.6	-148.0	108	59.1	-132.9	11.7
pH (field)	SU	7.08	7.12	6.96	6.74	6.97	7.07	6.82	7.2	7.03	7.03
Specific Cond. (Field)	uS/cm	830	900	900	958	831	800	755	800	900	710
Temperature, Water (C)	DEG C	17.6	15.8	15.0	14.98	18.1	20.5	15.22	13.1	15.3	20.5
Turbidity, field	NTU	0.63	0.59	0.39	0.61	0.56	0.52	1.02	0.67	0.87	2.28

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		10-36					JSF-106					
Sample Date		10-Aug-21	21-Jan-22	2-Mar-22	21-Jul-22	30-Aug-22	13-Aug-19	8-Oct-19	3-Dec-19	4-Feb-20	7-Apr-20	9-Jun-20
Sample ID		JSF-GW-10-36-08102021	JSF-GW-10-36-01212022	JSF-GW-10-36-03022022	JSF-GW-10-36-07212022	JSF-GW-10-36-08302022	JSF-GW-022-20190813	JSF-GW-022-20191008	JSF-GW-022-20191203	JSF-GW-022-20200204	JSF-GW-022-20200407	JSF-GW-022-20200609
Parent Sample ID												
Sample Depth		21 ft	21 ft	21 ft	21 ft	21 ft	16 ft	16 ft	16 ft	16 ft	16 ft	16 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	EIP	EIP	EIP	EIP	EIP	EIP
Field Parameters												
Dissolved Oxygen	%	64.3	20.4	6.7	4.2	0.6	5.6	3.5	26.8	40.1	21.0	3.8
Dissolved Oxygen	mg/L	5.74	2.13	0.67	0.39	0.06	0.59	0.30	2.72	4.30	2.10	0.38
ORP	Mv	104.2	70.3	44.3	-180.7	101.2	171.0	129.0	-233.7	263.6	141.4	52.8
pH (field)	SU	6.80	6.76	7.34	6.67	7.03	6.43	6.61	6.57	6.62	6.58	6.60
Specific Cond. (Field)	uS/cm	800	750	930	810	842	812	645	554.7	415.2	415.6	628
Temperature, Water (C)	DEG C	21.1	13.7	16.3	19.2	20.0	21.4	22.4	13.7	12.8	14.2	18.4
Turbidity, field	NTU	0.31	1.29	0.76	0.52	0.48	1.36	3.06	1.59	0.60	4.59	1.87

See notes on last page.
See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-106				JSF-107						
Sample Date		18-Feb-21	19-Jul-21	25-Jan-22	27-Jul-22	14-Aug-19	5-Feb-20	9-Apr-20	11-Jun-20	18-Feb-21	21-Jul-21	27-Jul-22
Sample ID		JSF-GW-JSF-106-02182021	JSF-GW-JSF-106-07192021	JSF-GW-JSF-106-01252022	JSF-GW-JSF-106-07272022	JSF-GW-023-20190814	JSF-GW-023-20200205	JSF-GW-023-20200409	JSF-GW-023-20200611	JSF-GW-JSF-107-02182021	JSF-GW-JSF-107-07212021	JSF-GW-JSF-107-07272022
Parent Sample ID												
Sample Depth		16 ft	16 ft	16 ft	16 ft	37.5 ft	37.5 ft	37.5 ft	37.5 ft	37.5 ft	37.5 ft	37.5 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	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	45.2	4.5	51.4	22.6	8.0	7.2 J	27.0	4.1	22.7	28.9	17.9
Dissolved Oxygen	mg/L	4.95	0.40	5.48	2.04	0.84	0.72 J	2.63	0.40	2.43	2.65	1.65
ORP	Mv	128.9	45.6	-32.0	-149.1	124.5	226.9	170.7	6.46	111.7	100.5	-155.6
pH (field)	SU	3.92	6.45	6.39	5.98	6.30	6.22	6.32	6.46	4.05	6.36	6.41
Specific Cond. (Field)	uS/cm	434	481	424	590	481.6	395.5	418.2	598.1	470	421	414
Temperature, Water (C)	DEG C	11.2	21.0	12.4	20.1	18.4	15.5	15.9	18.1	12.2	19.8	19.2
Turbidity, field	NTU	1.01	0.52	2.14	1.17	0.99	0.24	0.11	1.11	1.55	2.72	0.79

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-108									
Sample Date		14-Aug-19	9-Oct-19	4-Dec-19	6-Feb-20	9-Apr-20	11-Jun-20	17-Feb-21	21-Jul-21	25-Jan-22	27-Jul-22
Sample ID		JSF-GW-024-20190814	JSF-GW-024-20191009	JSF-GW-024-20191204	JSF-GW-024-20200206	JSF-GW-024-20200409	JSF-GW-024-20200611	JSF-GW-JSF-108-02172021	JSF-GW-JSF-108-07212021	JSF-GW-JSF-108-01252022	JSF-GW-JSF-108-07272022
Parent Sample ID											
Sample Depth		50 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 ft	50 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	11.8	8.2	28.0	6.1	12.4	3.5	9.3	14.2	9.7	13.1
Dissolved Oxygen	mg/L	1.15	0.77	2.83	0.61	1.22	0.35	0.97	1.32	0.97	1.22
ORP	Mv	221.9	63.5	52.2	142.8	78.4	0.0	-37.9	-54.0	-175.6	-182.6
pH (field)	SU	6.85	8.14	6.91	7.02	6.85	6.71	4.11	6.72	6.90	6.73
Specific Cond. (Field)	uS/cm	1,133	983	1,072	1,114	991	1,385	1,090	1,010	970	1,140
Temperature, Water (C)	DEG C	19.9	19.5	14.6	15.4	16.6	17.9	13.3	18.9	14.4	19.0
Turbidity, field	NTU	1.70	2.14	3.72	0.44	2.03	1.93	0.56	0.95	2.63	0.41

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-109									
Sample Date		14-Aug-19	9-Oct-19	4-Dec-19	6-Feb-20	9-Apr-20	11-Jun-20	17-Feb-21	22-Jul-21	26-Jan-22	28-Jul-22
Sample ID		JSF-GW-025-20190814	JSF-GW-025-20191009	JSF-GW-025-20191204	JSF-GW-025-20200206	JSF-GW-025-20200409	JSF-GW-025-20200611	JSF-GW-JSF-109-02172021	JSF-GW-JSF-109-07222021	JSF-GW-JSF-109-01262022	JSF-GW-JSF-109-07282022
Parent Sample ID											
Sample Depth		45 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 ft	45 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	2.4	5.5	11.2	4.2	5.2	4.1	7.8	5.1	13.3	7.5
Dissolved Oxygen	mg/L	0.22	0.52	1.15	0.42	0.50	0.40	0.79	0.48	1.38	0.70
ORP	Mv	-111.4	-89.1	-63.1	-26.3	-24.4	-82.4	-72.1	-110.2	-73.4	-186.7
pH (field)	SU	6.45	7.14	6.92	7.05	6.73	6.51	5.13	6.60	6.73	6.36
Specific Cond. (Field)	uS/cm	4,296	3,243	3,209	3,141	2,977	3,839	2,380	1,830	1,860	1,590
Temperature, Water (C)	DEG C	19.4	18.0	14.5	15.6	17.1	17.6	14	17.4	13.3	18.2
Turbidity, field	NTU	5.84	3.58	4.40	4.82	2.12	1.43	2.99	1.37	1.35	1.46

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-110						JSF-200				
Sample Date		12-Aug-19	4-Dec-19	4-Feb-20	7-Apr-20	9-Jun-20	15-Feb-21	23-Jan-19	29-Jan-19	4-Feb-19	19-Feb-19	26-Feb-19
Sample ID		JSF-GW-026-20190812	JSF-GW-026-20191204	JSF-GW-026-20200204	JSF-GW-026-20200407	JSF-GW-026-20200609	JSF-GW-JSF-110-02152021	JSF-GW-016-01232019	JSF-GW-016-01292019	JSF-GW-016-02042019	JSF-GW-016-02192019	JSF-GW-016-02262019
Parent Sample ID												
Sample Depth		17 ft	17 ft	17 ft	17 ft	17 ft	17 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	14.8	29.7	24.9	23.2	7.4	31.2	6.3	8.4	14.2	7.1	7.0
Dissolved Oxygen	mg/L	1.43	3.16	2.64	2.39	0.73	3.32	0.62	0.85	1.44	0.69	0.68
ORP	Mv	149.0	133.4	288.4	238.6	111.7	-53.7	144.8	197.5	125.4	229.8	213.2
pH (field)	SU	5.15	6.69	5.47	5.04	4.44	5.64	6.94	7.15	7.00	7.28	6.97
Specific Cond. (Field)	uS/cm	78.4	399.5	64.5	71.7	771	296	512	510	510	430	430
Temperature, Water (C)	DEG C	21.0	11.9	13.2	13.6	17.3	12.6	16.0	15.6	16.4	16.0	16.8
Turbidity, field	NTU	36.7	2.44	0.30	1.79	2.86	1.21	0.09	0.25	0.15	0.28	1.09

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-200										
Sample Date		5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	11-Jun-19	10-Sep-19	21-Nov-19	7-Jan-20	4-Feb-20	7-Jul-20	11-Aug-20
Sample ID		JSF-GW-016-03052019	JSF-GW-016-03192019	JSF-GW-016-03262019	JSF-GW-016-04012019	JSF-GW-016-06112019	JSF-GW-016-09102019	JSF-GW-016-11212019	JSF-GW-016-01072020	JSF-GW-016-02042020	JSF-GW-016-07072020	JSF-GW-016-08112020
Parent Sample ID												
Sample Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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
Field Parameters												
Dissolved Oxygen	%	15.7	5	4.3	7.6	6.8	8.1	4.8	66.0	7.4	20.0	34.1
Dissolved Oxygen	mg/L	1.55	0.5	0.43	0.75	0.69	0.79	0.47	6.44	0.74	1.91	3.07
ORP	Mv	264.1	44.7	68.7	-57.9	49.3	7.0	67.2	103.5	122.8	54.7	-85.5
pH (field)	SU	7.07	6.60	7.14	6.77	6.85	7.84	7.18	7.01	6.89	6.98	7.03
Specific Cond. (Field)	uS/cm	429	506.3	460	512	506	530	573	522	527	507	509
Temperature, Water (C)	DEG C	15.8	16.6	16.3	16.4	17.3	18.7	16.1	16.4	16.2	17.2	18.2
Turbidity, field	NTU	0.21	0.21	0.17	0.17	2.05	0.84	0.66	0.67	0.37	0.38	0.55

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-200							
Sample Date		12-Jan-21	9-Feb-21	14-Jul-21	10-Aug-21	19-Jan-22	1-Mar-22	20-Jul-22	30-Aug-22
Sample ID		JSF-GW-JSF-200-01122021	JSF-GW-JSF-200-02092021	JSF-GW-JSF-200-07142021	JSF-GW-JSF-200-08102021	JSF-GW-JSF-200-01192022	JSF-GW-JSF-200-03012022	JSF-GW-JSF-200-07202022	JSF-GW-JSF-200-08302022
Parent Sample ID									
Sample Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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	CCR Program
Field Parameters									
Dissolved Oxygen	%	7.7	73.4	9.9	28.7	8.6	47.8	15.4	2.7
Dissolved Oxygen	mg/L	0.75	7.48	0.96	2.72	0.89	4.84	1.55	0.25
ORP	Mv	91.9	125.3	86.5	117.3	159.4	110.6	-110.2	72.8
pH (field)	SU	6.93	7.32	7.01	6.69	6.99	6.75	6.81	7.09
Specific Cond. (Field)	uS/cm	498	537	461	537	461	472	483	541
Temperature, Water (C)	DEG C	16	15.6	17.0	18.1	14.0	14.8	17.7	18.2
Turbidity, field	NTU	0.63	0.55	1.00	2.41	3.14	2.77	1.71	0.67

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-201										
Sample Date		24-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	13-Jun-19	11-Sep-19
Sample ID		JSF-GW-017-01242019	JSF-GW-017-01302019	JSF-GW-017-02052019	JSF-GW-017-02202019	JSF-GW-017-02272019	JSF-GW-017-03062019	JSF-GW-017-03202019	JSF-GW-017-03272019	JSF-GW-017-04022019	JSF-GW-017-06132019	JSF-GW-017-09112019
Parent Sample ID												
Sample Depth		36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 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
Field Parameters												
Dissolved Oxygen	%	11.1	11.6	13.3	21.4	42.5	27.8	7	5.3	8	4.7	3.1
Dissolved Oxygen	mg/L	1.13	1.23	1.39	2.20	4.12	2.80	0.7	0.52	0.8	0.38	0.28
ORP	Mv	133.3	130.9	144.6	111.7	22.1	164.7	-30.2	62.7	-34.9	102.7	8.8
pH (field)	SU	7.31	7.24	7.23	7.47	7.76	7.37	7.14	7.96	7.24	7.31	7.47
Specific Cond. (Field)	uS/cm	426	425	431	365	393	368	439	449	433	427	450
Temperature, Water (C)	DEG C	14.1	14.0	16.8	14.3	17.0	14.3	16.1	16.2	15.3	16.4	19.9
Turbidity, field	NTU	0.17	2.87	0.17	0.30	0.32	0.24	0.23	0.20	0.12	0.20	0.46

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-201										
Sample Date		20-Nov-19	9-Jan-20	6-Feb-20	8-Jul-20	13-Aug-20	15-Jan-21	11-Feb-21	16-Jul-21	11-Aug-21	21-Jan-22	3-Mar-22
Sample ID		JSF-GW-017-11202019	JSF-GW-017-01092020	JSF-GW-017-02062020	JSF-GW-017-07082020	JSF-GW-017-08132020	JSF-GW-JSF-201-01152021	JSF-GW-JSF-201-02112021	JSF-GW-JSF-201-07162021	JSF-GW-JSF-201-08112021	JSF-GW-JSF-201-01212022	JSF-GW-JSF-201-03032022
Parent Sample ID												
Sample Depth		36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 ft	36 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
Field Parameters												
Dissolved Oxygen	%	13.9	8.1	10.8	28.0	21.5	12.1	45.3	8.6	11.5	13.7	19.4
Dissolved Oxygen	mg/L	1.39	0.78	1.10	2.58	1.95	1.27	4.68	0.88	1.05	1.41	1.89
ORP	Mv	100.7	90.7	177.1	181.5	-126.9	82.8	-96	16.5	41.7	-173.8	56.4
pH (field)	SU	7.42	7.35	7.22	7.35	7.22	7.4	7.29	7.29	7.03	7.35	7.23
Specific Cond. (Field)	uS/cm	457	461	476	467	464	481	501	423	479	445	471
Temperature, Water (C)	DEG C	17.0	16.6	15.2	19.3	19.7	14.7	14	18.4	20.4	15.1	16.6
Turbidity, field	NTU	0.33	0.15	0.27	0.31	1.06	0.21	0.59	1.01	0.53	1.15	0.29

See notes on last page.

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Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-201		JSF-202									
Sample Date		22-Jul-22	31-Aug-22	23-Jan-19	29-Jan-19	5-Feb-19	20-Feb-19	26-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19
Sample ID		JSF-GW-JSF-201-07222022	JSF-GW-JSF-201-08312022	JSF-GW-018-01232019	JSF-GW-018-01292019	JSF-GW-018-02052019	JSF-GW-018-02202019	JSF-GW-018-02262019	JSF-GW-018-03062019	JSF-GW-018-03202019	JSF-GW-018-03272019	JSF-GW-018-04022019
Parent Sample ID												
Sample Depth		36 ft	36 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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
Field Parameters												
Dissolved Oxygen	%	8.6	1.0	7.0	12.3	11.8	11.3	25.1	9.1	12	6.1	32
Dissolved Oxygen	mg/L	0.81	0.09	0.65	1.23	1.18	1.14	2.50	0.92	1.2	0.60	3.2
ORP	Mv	-152.0	153.3	88.8	163.0	163.1	102.6	221.2	150.1	82.5	67.9	122.9
pH (field)	SU	7.15	7.30	6.95	7.20	7.07	7.17	7.05	7.01	6.95	7.27	7.06
Specific Cond. (Field)	uS/cm	448	476	1,220	1,200	1,260	1,080	1,080	1,080	1,380	1,340	1,300
Temperature, Water (C)	DEG C	19.3	19.6	16.6	15.3	16.2	15.7	15.9	14.4	14.5	15.0	14.9
Turbidity, field	NTU	0.64	0.35	3.66	4.30	4.32	4.01	4.98	4.21	4.87	3.07	2.28

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location							JSF-202					
Sample Date		12-Jun-19	11-Sep-19	21-Nov-19	9-Jan-20	5-Feb-20	7-Jul-20	12-Aug-20	14-Jan-21	10-Feb-21	15-Jul-21	12-Aug-21
Sample ID		JSF-GW-018-06122019	JSF-GW-018-09112019	JSF-GW-018-11212019	JSF-GW-018-01092020	JSF-GW-018-02052020	JSF-GW-018-07072020	JSF-GW-018-08122020	JSF-GW-JSF-202-01142021	JSF-GW-JSF-202-02102021	JSF-GW-JSF-202-07152021	JSF-GW-JSF-202-08122021
Parent Sample ID												
Sample Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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
Field Parameters												
Dissolved Oxygen	%	5.5	1.8	5.4	5.9	4.9	8.4	15.2	7.1	17.3	36.3	15.3
Dissolved Oxygen	mg/L	0.51	0.19	0.59	0.60	0.48	0.78	1.38	0.72	1.77	3.42	1.47
ORP	Mv	-42.7	-85.1	21.1	9.0	111.6	-61.1	-135.6	-80.3	-115.6	-38.6	18.4
pH (field)	SU	7.10	7.90	6.09	7.10	7.07	7.18	7.26	7.09	7.1	7.19	6.88
Specific Cond. (Field)	uS/cm	1,050	890	860	1,130	1,150	904	820	1,090	1,160	760	840
Temperature, Water (C)	DEG C	16.9	19.5	17.6	15.6	16.1	18.7	18.5	15.8	14.4	18.5	17.9
Turbidity, field	NTU	2.39	2.15	0.88	2.03	3.38	2.93	3.99	2.33	4.56	4.99	2.56

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-202				JSF-203						
Sample Date		20-Jan-22	2-Mar-22	21-Jul-22	30-Aug-22	23-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19
Sample ID		JSF-GW-JSF-202-01202022	JSF-GW-JSF-202-03022022	JSF-GW-JSF-202-07212022	JSF-GW-JSF-202-08302022	JSF-GW-019-01232019	JSF-GW-019-01302019	JSF-GW-019-02052019	JSF-GW-019-02202019	JSF-GW-019-02272019	JSF-GW-019-03062019	JSF-GW-019-03202019
Parent Sample ID												
Sample Depth		28 ft	28 ft	28 ft	28 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
Field Parameters												
Dissolved Oxygen	%	20.2	6.4	3.2	1.9	13.2	10.0	8.8	12.2	28.7	13.1	7
Dissolved Oxygen	mg/L	2.11	0.62	0.30	0.18	1.42	1.02	0.78	1.21	2.83	1.30	0.7
ORP	Mv	54.1	35.1	-147.1	-21.1	73.3	170.0	116.8	65.2	19.4	100.8	-23.0
pH (field)	SU	6.93	7.23	6.82	7.27	7.11	7.18	7.18	7.35	7.93	7.25	6.74
Specific Cond. (Field)	uS/cm	830	1,010	780	832	570	570	570	476	501	471	554
Temperature, Water (C)	DEG C	14.8	16.2	18.0	18.7	17.0	14.8	17.2	16.4	17.1	15.6	16.5
Turbidity, field	NTU	2.53	3.11	4.90	4.80	0.42	3.96	0.50	1.04	0.78	1.46	1.33

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-203										
Sample Date		27-Mar-19	2-Apr-19	12-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20	8-Jul-20	13-Aug-20	15-Jan-21	11-Feb-21
Sample ID		JSF-GW-019-03272019	JSF-GW-019-04022019	JSF-GW-019-06122019	JSF-GW-019-09112019	JSF-GW-019-11202019	JSF-GW-019-01092020	JSF-GW-019-02062020	JSF-GW-019-07082020	JSF-GW-019-08132020	JSF-GW-JSF-203-01152021	JSF-GW-JSF-203-02112021
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
Field Parameters												
Dissolved Oxygen	%	3.7	7	3.8	2.4	7.5	10.0	8.7	18.7	7.6	14.5	23.9
Dissolved Oxygen	mg/L	0.36	0.7	0.38	0.22	0.72	1.10	0.88	1.72	0.68	1.47	2.35
ORP	Mv	69.0	-61.0	-14.6	-28.7	38.3	55.2	85.5	47.0	-89.0	19.9	-119.3
pH (field)	SU	7.46	6.88	7.21	7.49	7.23	7.30	7.05	7.31	7.15	7.3	7.26
Specific Cond. (Field)	uS/cm	565	547	550	600	619	592	597	565	570	581	610
Temperature, Water (C)	DEG C	16.5	16.1	17.6	19.1	17.4	16.3	16.4	19.4	19.0	16	16
Turbidity, field	NTU	0.59	0.77	1.80	1.88	0.52	2.32	3.71	1.54	2.47	1.38	0.63

See notes on last page.

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Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-203						JSF-204				
Sample Date		16-Jul-21	12-Aug-21	21-Jan-22	3-Mar-22	21-Jul-22	1-Sep-22	24-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19
Sample ID		JSF-GW-JSF-203-07162021	JSF-GW-JSF-203-08122021	JSF-GW-JSF-203-01212022	JSF-GW-JSF-203-03032022	JSF-GW-JSF-203-07212022	JSF-GW-JSF-203-09012022	JSF-GW-020-01242019	JSF-GW-020-01302019	JSF-GW-020-02052019	JSF-GW-020-02202019	JSF-GW-020-02272019
Parent Sample ID												
Sample Depth		34 ft	34 ft	34 ft	34 ft	34 ft	34 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 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
Field Parameters												
Dissolved Oxygen	%	48.3	53.7	16.1	12.3	39.1	1.4	15.7	13.1	15.7	11.9	29.2
Dissolved Oxygen	mg/L	4.56	4.77	1.65	1.21	3.71	0.13	1.82	1.48	1.54	1.20	2.80
ORP	Mv	51.3	81.9	28.8	53.7	-139.1	-5.7	132.3	128.9	139.9	53.8	12.3
pH (field)	SU	7.23	6.85	7.02	7.00	7.00	7.30	7.08	7.24	6.97	7.22	6.90
Specific Cond. (Field)	uS/cm	517	590	540	543	533	591	527	530	530	450	477
Temperature, Water (C)	DEG C	18.8	19.2	14.0	16.3	19.4	19.0	14.8	15.7	17.4	16.7	17.4
Turbidity, field	NTU	2.68	0.28	0.56	0.85	1.50	0.41	0.61	0.39	0.11	0.11	0.28

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-204										
Sample Date		6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	13-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20	8-Jul-20	13-Aug-20
Sample ID		JSF-GW-020-03062019	JSF-GW-020-03202019	JSF-GW-020-03272019	JSF-GW-020-04022019	JSF-GW-020-06132019	JSF-GW-020-09112019	JSF-GW-020-11202019	JSF-GW-020-01092020	JSF-GW-020-02062020	JSF-GW-020-07082020	JSF-GW-020-08132020
Parent Sample ID												
Sample Depth		30.5 ft	30.5 ft	25.8 - 35.8 ft	30.5 ft	29 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 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
Field Parameters												
Dissolved Oxygen	%	8.8	6	2.4	14	5.1	1.6	16.7	30.5	10.1	3.7	7.0
Dissolved Oxygen	mg/L	0.85	0.6	0.23	1.4	0.52	0.15	1.60	3.01	0.97	0.35	0.65
ORP	Mv	58.0	-40.7	51.5	-49.8	-11.3	-8.7	7.5	7.5	18.5	0.6	-116.8
pH (field)	SU	7.12	6.87	7.70	6.97	7.03	7.11	7.13	7.17	7.06	7.12	7.17
Specific Cond. (Field)	uS/cm	450	530	535	527	522	540	552	531	536	508	505
Temperature, Water (C)	DEG C	16.3	17.0	17.1	16.3	17.2	18.6	17.4	17.7	17.2	17.8	18.6
Turbidity, field	NTU	0.26	0.26	0.30	0.11	0.65	3.66	1.66	2.59	4.86	3.89	2.61

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-204								JSF-205		
Sample Date		13-Jan-21	11-Feb-21	14-Jul-21	11-Aug-21	21-Jan-22	3-Mar-22	22-Jul-22	31-Aug-22	23-Jan-19	28-Jan-19	4-Feb-19
Sample ID		JSF-GW-JSF-204-01132021	JSF-GW-JSF-204-02112021	JSF-GW-JSF-204-07142021	JSF-GW-JSF-204-08112021	JSF-GW-JSF-204-01212022	JSF-GW-JSF-204-03032022	JSF-GW-JSF-204-07222022	JSF-GW-JSF-204-08312022	JSF-GW-021-01232019	JSF-GW-021-01282019	JSF-GW-021-02042019
Parent Sample ID												
Sample Depth		30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	30.5 ft	34.5 ft	34.5 ft	34.5 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
Field Parameters												
Dissolved Oxygen	%	6	20.6	2.7	10.0	13.8	1.9	1.7	0.3	24.1	21.1	16.6
Dissolved Oxygen	mg/L	0.57	2.04	0.24	0.95	1.43	0.18	0.16	0.03	2.46	2.23	1.71
ORP	Mv	-30.8	-120.6	-8.6	18.1	-142.0	-50.0	-209.7	-53.4	112.6	151.9	141.5
pH (field)	SU	7.17	7.07	7.15	6.89	7.19	7.02	7.00	7.17	7.23	7.01	7.26
Specific Cond. (Field)	uS/cm	505	521	439	504	454	454	445	478	396	394	399
Temperature, Water (C)	DEG C	17.1	15.9	19.1	17.8	16.3	17.6	17.1	17.7	14.0	13.6	13.7
Turbidity, field	NTU	1.43	3.24	35.4	4.52	3.33	2.76	9.00	11.3	2.39	0.56	0.34

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-205										
Sample Date		19-Feb-19	27-Feb-19	5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	12-Jun-19	10-Sep-19	19-Nov-19	8-Jan-20	4-Feb-20
Sample ID		JSF-GW-021-02192019	JSF-GW-021-02272019	JSF-GW-021-03052019	JSF-GW-021-03192019	JSF-GW-021-03262019	JSF-GW-021-04012019	JSF-GW-021-06122019	JSF-GW-021-09102019	JSF-GW-021-11192019	JSF-GW-021-01082020	JSF-GW-021-02042020
Parent Sample ID												
Sample Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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
Field Parameters												
Dissolved Oxygen	%	22.8	27.5	35.8	15	16.9	20	3.6	7.9	13.2	8.7	37.6
Dissolved Oxygen	mg/L	2.40	2.92	3.74	1.5	1.70	2.1	0.44	0.78	1.32	0.91	3.86
ORP	Mv	200.2	194.6	257.4	13.8	72.7	-52.0	-48.5	-82.8	-139.4	103.0	178.0
pH (field)	SU	7.56	7.04	7.47	6.83	7.59	7.44	7.18	7.49	7.35	7.37	7.35
Specific Cond. (Field)	uS/cm	336	360	339	409.2	373	418	408	420	466	405	409
Temperature, Water (C)	DEG C	13.0	12.4	12.7	14.3	13.8	13.9	15.0	17.5	15.1	13.1	13.9
Turbidity, field	NTU	0.44	0.62	0.43	0.26	0.29	0.24	0.79	0.73	0.22	0.75	0.65

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-205									
Sample Date		8-Jul-20	11-Aug-20	12-Jan-21	9-Feb-21	14-Jul-21	12-Aug-21	20-Jan-22	1-Mar-22	20-Jul-22	1-Sep-22
Sample ID		JSF-GW-021-07082020	JSF-GW-021-08112020	JSF-GW-JSF-205-01122021	JSF-GW-JSF-205-02092021	JSF-GW-JSF-205-07142021	JSF-GW-JSF-205-08122021	JSF-GW-JSF-205-01202022	JSF-GW-JSF-205-03012022	JSF-GW-JSF-205-07202022	JSF-GW-JSF-205-09012022
Parent Sample ID											
Sample Depth		34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 ft	34.5 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	%	14.6	33.5	42.7	49.8	7.3	69.4	16.2	47.2	24.9	1.0
Dissolved Oxygen	mg/L	1.45	2.99	4.41	5.18	0.75	6.76	1.67	4.89	2.39	0.10
ORP	Mv	224.1	-81.7	117.3	226.9	51.1	14.8	-144.2	112.9	-112.5	208.1
pH (field)	SU	7.00	7.51	7.57	7.33	7.48	7.18	7.26	7.58	7.40	7.47
Specific Cond. (Field)	uS/cm	404	405	389	412	346	395	370	368	372	412
Temperature, Water (C)	DEG C	15.7	17.3	13.8	13.5	16.2	16.7	13.2	13.9	16.7	15.5
Turbidity, field	NTU	0.62	2.31	1.28	0.89	2.09	0.39	2.06	0.21	0.61	0.11

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-206									
Sample Date		13-Aug-19	8-Oct-19	3-Dec-19	5-Feb-20	7-Apr-20	9-Jun-20	15-Feb-21	20-Jul-21	25-Jan-22	25-Jul-22
Sample ID		JSF-GW-027-20190813	JSF-GW-027-20191008	JSF-GW-027-20191203	JSF-GW-027-20200205	JSF-GW-027-20200407	JSF-GW-027-20200609	JSF-GW-JSF-206-02152021	JSF-GW-JSF-206-07202021	JSF-GW-JSF-206-01252022	JSF-GW-JSF-206-07252022
Parent Sample ID											
Sample Depth		28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 ft	28.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	3.4	4.2	4.3	3.1 J	2.9	1.7	4.2	15.2	4.0	6.2
Dissolved Oxygen	mg/L	0.34	0.40	0.42	0.31 J	0.28	0.17	0.42	1.46	0.40	0.57
ORP	Mv	-25.0	-53.9	-301.1	-15.3	-17.1	44.6	-161.3	-7.6	-95.0	-165.5
pH (field)	SU	6.87	7.10	6.99	7.01	6.88	6.71	6.77	6.81	6.75	6.58
Specific Cond. (Field)	uS/cm	600	453.7	518.9	530	457.4	633	640	467	429	490
Temperature, Water (C)	DEG C	17.9	17.6	15.5	15.6	16.3	16.7	14.9	17.1	14.9	18.8
Turbidity, field	NTU	3.41	2.09	1.65	3.40	4.71	4.80	4.77	40.1	38.0	281

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-207									
Sample Date		15-Aug-19	10-Oct-19	5-Dec-19	6-Feb-20	8-Apr-20	10-Jun-20	17-Feb-21	21-Jul-21	26-Jan-22	26-Jul-22
Sample ID		JSF-GW-028-20190815	JSF-GW-028-20191010	JSF-GW-028-20191205	JSF-GW-028-20200206	JSF-GW-028-20200408	JSF-GW-028-20200610	JSF-GW-JSF-207-02172021	JSF-GW-JSF-207-07212021	JSF-GW-JSF-207-01262022	JSF-GW-JSF-207-07262022
Parent Sample ID											
Sample Depth		36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 ft	36.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	4.2	3.6	92.0	11.6	4.5	6.5	28.4	7.3	5.1	5.7
Dissolved Oxygen	mg/L	0.42	0.36	1.38	1.18	0.44	0.64	3.11	0.71	0.53	0.55
ORP	Mv	-55.1	66.4	54.6	192.8	24.5	38.1	167.5	-0.8	-153.6	-187.9
pH (field)	SU	7.37	7.34	7.48	7.48	7.32	7.18	3.97	7.22	7.39	7.13
Specific Cond. (Field)	uS/cm	578.2	516.0	548.9	505.0	533.0	802	561	522	511	572
Temperature, Water (C)	DEG C	15.9	15.4	13.5	14.4	14.8	16.1	11.5	16.5	13.0	18.0
Turbidity, field	NTU	2.08	1.56	0.57	0.26	0.38	4.61	3.36	4.50	2.73	2.50

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-208									
Sample Date		15-Aug-19	10-Oct-19	5-Dec-19	7-Feb-20	8-Apr-20	10-Jun-20	17-Feb-21	21-Jul-21	26-Jan-22	28-Jul-22
Sample ID		JSF-GW-029-20190815	JSF-GW-029-20191010	JSF-GW-029-20191205	JSF-GW-029-20200207	JSF-GW-029-20200408	JSF-GW-029-20200610	JSF-GW-JSF-208-02172021	JSF-GW-JSF-208-07212021	JSF-GW-JSF-208-01262022	JSF-GW-JSF-208-07282022
Parent Sample ID											
Sample Depth		40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 ft	40.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	5.1	4.9	8.7	5.3	17.9	4.4	32.5	19.9	9.1	21.0
Dissolved Oxygen	mg/L	0.49	0.49	0.88	0.59	1.87	0.44	3.57	1.83	0.93	1.92
ORP	Mv	-32.5	-47.9	-101.2	-0.7	172.0	32.6	24.6	35.8	-154.1	-190.7
pH (field)	SU	7.02	7.08	7.18	7.17	7.27	6.97	4.11	7.19	7.14	7.00
Specific Cond. (Field)	uS/cm	1,128	1,039	1,118	1,110	950	1,039	1,050	910	930	920
Temperature, Water (C)	DEG C	17.1	15.7	15.4	11.6	14.4	16.2	11.9	19.4	13.6	19.9
Turbidity, field	NTU	2.46	2.87	0.97	0.63	1.13	2.39	1.77	0.99	1.71	1.05

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-209									
Sample Date		13-Aug-19	10-Oct-19	5-Dec-19	5-Feb-20	8-Apr-20	10-Jun-20	16-Feb-21	21-Jul-21	24-Jan-22	26-Jul-22
Sample ID		JSF-GW-030-20190813	JSF-GW-030-20191010	JSF-GW-030-20191205	JSF-GW-030-20200205	JSF-GW-030-20200408	JSF-GW-030-20200610	JSF-GW-JSF-209-02162021	JSF-GW-JSF-209-07212021	JSF-GW-JSF-209-01242022	JSF-GW-JSF-209-07262022
Parent Sample ID											
Sample Depth		32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 ft	32.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	3.3	4.2	7.5	19.9 J	5.3	5.2	30	18.9	8.6	9.8
Dissolved Oxygen	mg/L	0.32	0.40	0.79	2.00 J	0.54	0.52	3.22	1.85	0.86	0.95
ORP	Mv	-68.7	73.0	24.1	101.2	151.2	53.2	-110	73.0	-121.2	-174.2
pH (field)	SU	7.25	7.30	7.36	7.35	7.31	7.05	7.2	6.94	7.24	6.98
Specific Cond. (Field)	uS/cm	463.9	377.6	390.2	314.0	347.8	522	405	302	313	309
Temperature, Water (C)	DEG C	16.7	16.4	14.7	15.6	15.8	16.6	12.2	16.1	14.9	16.6
Turbidity, field	NTU	1.98	1.29	0.67	0.36	0.70	3.33	1.38	0.78	0.93	1.13

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-210									
Sample Date		14-Aug-19	8-Oct-19	3-Dec-19	4-Feb-20	7-Apr-20	9-Jun-20	16-Feb-21	20-Jul-21	25-Jan-22	26-Jul-22
Sample ID		JSF-GW-031-20190814	JSF-GW-031-20191008	JSF-GW-031-20191203	JSF-GW-031-20200204	JSF-GW-031-20200407	JSF-GW-031-20200609	JSF-GW-JSF-210-02162021	JSF-GW-JSF-210-07202021	JSF-GW-JSF-210-01252022	JSF-GW-JSF-210-07262022
Parent Sample ID											
Sample Depth		46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 ft	46.5 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	EIP	EIP	EIP	EIP	EIP	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters											
Dissolved Oxygen	%	5.0	3.1	5.8	10.2	6.1	3.8	21.7	23.4	3.9	6.3
Dissolved Oxygen	mg/L	0.45	0.31	0.61	1.00	0.62	0.38	2.36	2.22	0.39	0.59
ORP	Mv	-52.6	-73.2	-303.9	-53.4	-27.6	72.9	-157	-14.5	-95.2	-173.3
pH (field)	SU	7.01	7.18	7.20	7.13	7.03	6.84	7.14	7.06	7.11	6.85
Specific Cond. (Field)	uS/cm	643	514.8	633.9	610	593.3	769	800	573	606	680
Temperature, Water (C)	DEG C	18.9	17.1	13.9	14.9	16.3	18.4	11.6	17.9	15.0	17.6
Turbidity, field	NTU	5.45	4.83	2.40	0.59	3.11	4.06	0.98	3.88	0.60	4.03

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-103										
Sample Date		17-May-16	16-Nov-16	1-May-17	28-Aug-17	28-Nov-17	26-Feb-18	23-May-18	6-Sep-18	27-Nov-18	23-Jan-19	28-Jan-19
Sample ID		JSF-103-0516	JSF-103-111616	JSF-103-050117	JSF-103-082817	JSF-103-112817	JSF-103-022618	JSF-103-052318	JSF-103-GW-090618	JSF-103-GW-112718	JSF-GW-013-01232019	JSF-GW-013-01282019
Parent Sample ID												
Sample Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	36.8	33.9
Dissolved Oxygen	mg/L	0.1	1	3.31	0.1	1.28	4.35	4.72	1.6	4.5	3.57	3.36
ORP	Mv	453	367	399	381	351	676	506	459	511	131.8	136.7
pH (field)	SU	6.2	6.6	5.53	6.2	6.17	5.21	5.31	5.86	5.42	4.79	4.85
Specific Cond. (Field)	uS/cm	2,161	2,457	540	2,239	2,318	631	520	1,070	338	142	132
Temperature, Water (C)	DEG C	-	-	16.72	18.66	17.01	14.18	16.94	20.03	14.1	15.9	16.0
Turbidity, field	NTU	0.29	1.19	0.91	2.79	0.43	0.46	0.24	0.44	0.61	0.26	0.10

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-103										
Sample Date		5-Feb-19	19-Feb-19	26-Feb-19	5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19	13-May-19	12-Jun-19	10-Sep-19	19-Nov-19
Sample ID		JSF-GW-013-02052019	JSF-GW-013-02192019	JSF-GW-013-02262019	JSF-GW-013-03052019	JSF-GW-013-03192019	JSF-GW-013-03262019	JSF-GW-013-04012019	JSF-GW-103-051319	JSF-GW-013-06122019	JSF-GW-013-09102019	JSF-GW-013-11192019
Parent Sample ID												
Sample Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	State Compliance	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	32.2	31.2	27.9	28.1	28	36.3	41	-	12.1	3.0	18.9
Dissolved Oxygen	mg/L	3.26	3.21	2.78	2.88	2.7	3.61	4.2	3.47	1.14	0.27	1.89
ORP	Mv	180.0	304.1	313.0	367.7	74.8	73.7	150.3	547	191.5	38.8	85.1
pH (field)	SU	4.76	5.34	5.06	5.20	4.85	5.63	5.25	5	5.79	6.80	6.01
Specific Cond. (Field)	uS/cm	127	110	107	101	997	133	155	147	417	870	1,130
Temperature, Water (C)	DEG C	15.2	14.3	15.5	14.0	15.6	15.7	14.8	16.49	16.0	19.9	17.0
Turbidity, field	NTU	0.11	0.39	0.27	0.21	0.25	0.34	0.14	0.2	0.36	1.43	1.14

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location							JSF-103					
Sample Date		8-Jan-20	5-Feb-20	5-May-20	7-Jul-20	11-Aug-20	16-Nov-20	13-Jan-21	9-Feb-21	15-Jul-21	10-Aug-21	20-Jan-22
Sample ID		JSF-GW-013-01082020	JSF-GW-013-02052020	JSF-GW-103-050520	JSF-GW-013-07072020	JSF-GW-013-08112020	JSF-GW-103-111620	JSF-GW-JSF-103-01132021	JSF-GW-JSF-103-02092021	JSF-GW-JSF-103-07152021	JSF-GW-JSF-103-08102021	JSF-GW-JSF-103-01202022
Parent Sample ID												
Sample Depth		22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 ft	22 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	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	27.0	24.0	-	7.1	5.3	-	32.7	79.9	9.6	56.2	56.6
Dissolved Oxygen	mg/L	2.73	2.42	2.62	0.69	0.50	4.26	3.36	8.15	0.94	5.19	5.81
ORP	Mv	260.5	306.8	567	201.4	-122.4	361	247	279.5	141.6	120.3	203.4
pH (field)	SU	5.28	4.79	4.9	6.06	6.21	5.00	4.96	5.25	5.99	5.99	4.68
Specific Cond. (Field)	uS/cm	171	125	90	549	720	174	108	90	459	840	131
Temperature, Water (C)	DEG C	15.3	15.5	15.84	16.9	18.9	16.21	14.1	14.5	17.3	19.1	14.3
Turbidity, field	NTU	0.41	0.71	0.46	0.68	0.81	1.02	0.33	2.49	0.51	0.22	0.27

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-103			JSF-104							
Sample Date		1-Mar-22	20-Jul-22	1-Sep-22	16-May-16	21-Nov-16	26-Apr-17	29-Aug-17	20-Nov-17	27-Feb-18	29-May-18	29-Aug-18
Sample ID		JSF-GW-JSF-103-03012022	JSF-GW-JSF-103-07202022	JSF-GW-JSF-103-09012022	JSF-104-0516	JSF-104-112116	JSF-104-042617	JSF-104-082917	JSF-104-112017	JSF-104-022718	JSF-104-052918	JSF-104-GW-082918
Parent Sample ID												
Sample Depth		22 ft	22 ft	22 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters												
Dissolved Oxygen	%	28.4	15.4	1.5	-	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	2.84	1.44	0.15	3.3	1.4	4.53	4.03	3.4	4.97	4.67	4.62
ORP	Mv	270.9	-125.0	217.0	515	371	426	458	411	585	492	559
pH (field)	SU	5.08	5.90	5.83	5.3	6.5	4.88	5.25	6.14	5.24	5.06	5.49
Specific Cond. (Field)	uS/cm	108	590	495	107	227	111	108	210	118	108	107
Temperature, Water (C)	DEG C	15.4	18.3	18.0	-	-	18.25	18.58	16.12	16.51	17.44	19
Turbidity, field	NTU	0.13	0.87	0.14	0.32	0.83	2.48	3.38	0.44	0.49	0.26	0.61

See notes on last page.

Stantec

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-104										
Sample Date		7-Sep-18	27-Nov-18	22-Jan-19	28-Jan-19	4-Feb-19	19-Feb-19	26-Feb-19	5-Mar-19	19-Mar-19	26-Mar-19	1-Apr-19
Sample ID		JSF-104-GW-090718	JSF-104-GW-112718	JSF-GW-014-01222019	JSF-GW-014-01282019	JSF-GW-014-02042019	JSF-GW-014-02192019	JSF-GW-014-02262019	JSF-GW-014-03052019	JSF-GW-014-03192019	JSF-GW-014-03262019	JSF-GW-014-04012019
Parent Sample ID												
Sample Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 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	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	-	-	37.4	40.9	26.4	42.6	42.6	38.6	39	41.4	44
Dissolved Oxygen	mg/L	5.12	5.02	3.67	4.04	2.59	4.26	4.19	3.91	3.9	4.11	4.4
ORP	Mv	508	483	125.0	141.7	144.9	269.9	369.1	320.2	73.8	74.2	17.0
pH (field)	SU	5.58	5.7	5.30	5.32	5.33	5.73	5.49	5.59	5.42	5.68	5.42
Specific Cond. (Field)	uS/cm	47	111	108	109	113	95	94	94	1,160	113	112
Temperature, Water (C)	DEG C	20.25	14.8	16.3	15.7	16.4	15.4	15.9	14.7	15.5	15.6	16.3
Turbidity, field	NTU	0.69	1.86	1.85	0.20	0.51	0.26	0.74	1.78	0.25	0.68	0.14

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-104										
Sample Date		14-May-19	11-Jun-19	10-Sep-19	21-Nov-19	7-Jan-20	4-Feb-20	5-May-20	7-Jul-20	11-Aug-20	16-Nov-20	12-Jan-21
Sample ID		JSF-GW-104-051419	JSF-GW-014-06112019	JSF-GW-014-09102019	JSF-GW-014-11212019	JSF-GW-014-01072020	JSF-GW-014-02042020	JSF-GW-104-050520	JSF-GW-014-07072020	JSF-GW-014-08112020	JSF-GW-104-111620	JSF-GW-JSF-104-01122021
Parent Sample ID												
Sample Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 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	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program
Field Parameters												
Dissolved Oxygen	%	-	47.3	34.9	38.0	38.6	41.5	-	45.9	37.7	-	44.21
Dissolved Oxygen	mg/L	5.12	4.54	3.18	3.80	3.73	4.05	4.74	4.42	3.47	6.95	4.59
ORP	Mv	581	189.9	138.2	160.7	207.2	261.8	597	233.7	-50.3	355	194.7
pH (field)	SU	5.34	5.34	6.16	6.10	5.86	5.31	5.14	5.42	5.30	5.48	5.62
Specific Cond. (Field)	uS/cm	111	109	141	204	143	119	115	127.3	147	160	146
Temperature, Water (C)	DEG C	17.79	17.8	19.4	15.9	16.7	16.1	15.64	17.2	17.4	14.95	14.8
Turbidity, field	NTU	0.45	1.20	2.01	0.45	0.25	0.17	0.3	0.33	0.56	1.06	0.49

See notes on last page.

Stantec

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-104							JSF-105			
Sample Date		9-Feb-21	13-Jul-21	10-Aug-21	19-Jan-22	1-Mar-22	20-Jul-22	30-Aug-22	16-May-16	16-Nov-16	26-Apr-17	28-Aug-17
Sample ID		JSF-GW-JSF-104-02092021	JSF-GW-JSF-104-07132021	JSF-GW-JSF-104-08102021	JSF-GW-JSF-104-01192022	JSF-GW-JSF-104-03012022	JSF-GW-JSF-104-07202022	JSF-GW-JSF-104-08302022	JSF-105-0516	JSF-105-111616	JSF-105-042617	JSF-105-082817
Parent Sample ID												
Sample Depth		29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	29 ft	20 ft	20 ft	20 ft	20 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	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters												
Dissolved Oxygen	%	77.1	39.0	67.0	63.1	54.2	41.0	6.3	-	-	-	-
Dissolved Oxygen	mg/L	8.03	3.77	6.32	6.33	5.44	3.94	0.60	0.2	1	1.38	1.48
ORP	Mv	221.5	124.2	125.0	194.4	171.8	-32.4	214.6	398	361	409	351
pH (field)	SU	6.04	5.63	5.34	5.32	5.43	5.29	5.94	6.6	6.8	5.14	6.46
Specific Cond. (Field)	uS/cm	144	123	168	147	141	165	184	474	385	255	483
Temperature, Water (C)	DEG C	13.4	17.5	17.8	15.1	15.4	17.5	18.2	-	-	15.28	19.51
Turbidity, field	NTU	0.17	0.85	0.39	0.31	0.12	1.02	0.18	0.22	0.67	1.71	3.21

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-105										
Sample Date		28-Nov-17	26-Feb-18	23-May-18	28-Aug-18	27-Oct-18	24-Jan-19	30-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19
Sample ID		JSF-105-112817	JSF-105-022618	JSF-105-052318	JSF-105-GW-082818	JSF-105-GW-112718	JSF-GW-015-01242019	JSF-GW-015-01302019	JSF-GW-015-02052019	JSF-GW-015-02202019	JSF-GW-015-02272019	JSF-GW-015-03062019
Parent Sample ID												
Sample Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	-	-	-	-	-	14.4	13.7	16.9	16.9	12.5	14.0
Dissolved Oxygen	mg/L	1.68	1.16	4.35	1.37	1.17	1.55	1.50	1.67	1.77	1.26	1.48
ORP	Mv	322	579	485	438	375	151.5	138.0	145.9	247.4	135.2	286.3
pH (field)	SU	6.63	5.38	5.7	6.64	6.93	5.93	5.97	5.81	5.99	6.83	5.87
Specific Cond. (Field)	uS/cm	470	245	297	462	445	343	316	332	298	308	289
Temperature, Water (C)	DEG C	18.12	13.23	16.23	19.65	15.38	13.2	11.3	16.1	13.7	14.9	12.9
Turbidity, field	NTU	0.26	0.75	0.18	0.81	0.55	0.57	3.68	0.39	0.18	0.36	0.34

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-105										
Sample Date		20-Mar-19	27-Mar-19	2-Apr-19	14-May-19	13-Jun-19	11-Sep-19	20-Nov-19	9-Jan-20	6-Feb-20	5-May-20	8-Jul-20
Sample ID		JSF-GW-015-03202019	JSF-GW-015-03272019	JSF-GW-015-04022019	JSF-GW-105-051419	JSF-GW-015-06132019	JSF-GW-015-09112019	JSF-GW-015-11202019	JSF-GW-015-01092020	JSF-GW-015-02062020	JSF-GW-105-050520	JSF-GW-015-07082020
Parent Sample ID												
Sample Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	CCR Program
Field Parameters												
Dissolved Oxygen	%	27	22.5	31	-	7.9	2.4	5.1	14.8	17.4	-	7.9
Dissolved Oxygen	mg/L	2.7	2.28	3.2	2.52	0.75	0.23	0.49	1.46	1.77	1.91	0.73
ORP	Mv	26.8	63.4	10.5	538	161.4	-23.9	61.6	141.0	220.0	558	184.1
pH (field)	SU	5.59	6.80	5.89	5.85	6.56	7.31	7.01	5.64	5.55	5.47	6.56
Specific Cond. (Field)	uS/cm	373	381	371	380	527	490	501	302	303	360	586
Temperature, Water (C)	DEG C	14.6	14.7	14.0	15.29	16.6	20.8	17.3	16.2	14.7	14.36	18.5
Turbidity, field	NTU	0.24	0.23	0.13	0.13	0.51	4.35	1.16	0.61	0.32	0.65	0.79

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		JSF-105									
Sample Date		**13-Aug-20**	**9-Nov-20**	**14-Jan-21**	**11-Feb-21**	**19-Jul-21**	**11-Aug-21**	**21-Jan-22**	**3-Mar-22**	**22-Jul-22**	**31-Aug-22**
Sample ID		**JSF-GW-015-08132020**	**JSF-GW-105-110920**	**JSF-GW-JSF-105-01142021**	**JSF-GW-JSF-105-02112021**	**JSF-GW-JSF-105-07192021**	**JSF-GW-JSF-105-08112021**	**JSF-GW-JSF-105-01212022**	**JSF-GW-JSF-105-03032022**	**JSF-GW-JSF-105-07222022**	**JSF-GW-JSF-105-08312022**
Parent Sample ID											
Sample Depth		**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 ft**	**20 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**	**CCR Program**	**CCR Program**	**CCR Program**	**CCR Program**	**CCR Program**	**CCR Program**	**CCR Program**	**CCR Program**
Field Parameters											
Dissolved Oxygen	%	13.2	-	19.1	16.8	26.5	43.2	42.4	29.3	42.6	15.8
Dissolved Oxygen	mg/L	1.18	4.50	1.92	1.79	2.40	3.97	4.37	2.97	3.85	1.43
ORP	Mv	-128.9	303	150.9	-73.4	85.1	79.7	-85.0	132.2	-113.7	219.0
pH (field)	SU	6.77	6.57	5.92	5.86	6.75	6.37	6.56	6.18	6.47	6.65
Specific Cond. (Field)	uS/cm	610	581	327	338	546	760	607	363	1,210	1,040
Temperature, Water (C)	DEG C	19.3	19.8	15.2	12.7	19.8	20.6	13.5	14.6	20.2	20.0
Turbidity, field	NTU	2.13	1.01	0.35	0.81	1.81	0.67	2.21	0.95	0.87	0.70

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-1										
Sample Date		16-May-16	14-Nov-16	1-May-17	30-Aug-17	28-Nov-17	28-Feb-18	30-May-18	22-Aug-18	28-Nov-18	20-May-19	19-Nov-19
Sample ID		JSF-W1-0516	JSF-W1-111416	JSF-W1-	JSF-W1-083017	JSF-W1-112817	JSF-W1-022818	JSF-W1-053018	JSF-W1-GW-082218	JSF-W1-GW-112818	JSF-GW-W1-052019	JSF-GW-1-111919
Parent Sample ID												
Sample Depth		79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	79 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	State Compliance	State Compliance	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	0.1	0.1	0.69	0.15	0.1	0.2	0	0.58	0.67	0.59	0.24
ORP	Mv	344	236	238	229	251	484	319	240	289	465	282
pH (field)	SU	6.9	7.4	7.26	6.98	6.88	8.73	6.78	7.05	7.28	7.1	7.06
Specific Cond. (Field)	uS/cm	486	485	492	488	481	484	492	471	491	475	490
Temperature, Water (C)	DEG C	-	-	15.97	17.61	15.9	14.14	16.64	17.98	15.46	18.5	15.7
Turbidity, field	NTU	4.8	13	4.06	112	352	34	-	9.68	98	831	40

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-1						W-28				
Sample Date		13-May-20	17-Nov-20	20-Jan-21	20-Jul-21	8-Mar-22	6-Sep-22	9-May-16	7-Nov-16	24-Apr-17	28-Aug-17	29-Nov-17
Sample ID		JSF-GW-W1-051320	JSF-GW-W1-111720	JSF-GW-W-1-01202021	JSF-GW-W1-07202021	JSF-GW-W-1-03082022	JSF-GW-W-1-09062022	JSF-28-0516	JSF-28-110716	JSF-28-042417	JSF-28-082817	JSF-W28-112917
Parent Sample ID												
Sample Depth		79 ft	79 ft	79 ft	79 ft	79 ft	79 ft	28 ft	28 ft	28 ft	28 ft	28 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	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program	CCR Program	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters												
Dissolved Oxygen	%	-	-	5.5	46.1	5.3	28.0	-	-	-	-	-
Dissolved Oxygen	mg/L	0.1	2.29	0.53	4.19	0.53	2.59	0.2	1.2	0.65	0.1	1.4
ORP	Mv	438	242	66	128	121	61	400	255	186	267	260
pH (field)	SU	7.02	6.87	7.19	6.99	7.09	7.13	6	6.7	5.64	5.98	6.01
Specific Cond. (Field)	uS/cm	490	488	487	493	487	500	1,652	1,691	1,349	1,550	1,574
Temperature, Water (C)	DEG C	15.6	16.44	15.5	18.40	15.34	19.53	-	-	16.71	18.98	15.58
Turbidity, field	NTU	58	78.4	3.42	19.1	49	2.09	0.86	1.32	3.32	3.79	1.72

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-28								
Sample Date		20-Feb-18	21-May-18	21-Aug-18	15-Nov-18	6-May-19	19-Nov-19	11-May-20	3-Nov-20	12-Jan-21
Sample ID		JSF-28-022018	JSF-28-052118	JSF-28-GW-082118	JSF-28-GW-111518	JSF-28-GW-050619	JSF-GW-28-111919	JSF-GW-28-051120	JSF-GW-W28-110320	JSF-GW-W28-01122021
Parent Sample ID										
Sample Depth		28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 ft	28 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	0	1.27	0.77	1.35	2.89	1.25	2.59	3.17
ORP	Mv	472	255	228	308	261	331	262	95	170
pH (field)	SU	5.74	6.15	6.48	6.22	6.4	6.15	6.28	6.21	5.92
Specific Cond. (Field)	uS/cm	1,281	1,589	1,624	1,334	1,596	1,386	1,564	1,480	1,177
Temperature, Water (C)	DEG C	16.74	17.95	19.8	15.61	18.47	15.28	15.64	17.34	13.92
Turbidity, field	NTU	0.97	-	0.97	2.14	1.46	1.24	1.03	1.88	0.91

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-28			W-29						
Sample Date		19-Jul-21	2-Mar-22	31-Aug-22	10-May-16	8-Nov-16	24-Apr-17	23-Aug-17	29-Nov-17	20-Feb-18	21-May-18
Sample ID		JSF-GW-W28-07192021	JSF-GW-W-28-03022022	JSF-GW-W-28-08312022	JSF-29-0516	JSF-29-110816	JSF-29-042417	JSF-29-082317	JSF-W29-112917	JSF-29-022018	JSF-29-052118
Parent Sample ID											
Sample Depth		28 ft	28 ft	28 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters											
Dissolved Oxygen	%	15.5	20.5	37.0	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	1.49	1.99	3.28	0.3	1.3	0.18	0.1	1.58	4.32	0
ORP	Mv	46.3	161	49.0	370	373	299	353	376	516	376
pH (field)	SU	6.42	5.99	6.03	6.2	6.3	6.06	6.29	6.09	6.32	6.13
Specific Cond. (Field)	uS/cm	1,556	1,142	1,558	951	929	839	934	968	920	923
Temperature, Water (C)	DEG C	18.75	15.27	20.87	-	-	15.59	20.77	17.41	14.59	17
Turbidity, field	NTU	1.08	1.02	1.87	0.8	0.51	3.37	-	0.48	-	-

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-29							
Sample Date		21-Aug-18	7-May-19	11-May-20	4-Nov-20	11-Jan-21	19-Jul-21	2-Mar-22	30-Aug-22
Sample ID		JSF-29-GW-082118	JSF-W29-GW-050719	JSF-GW-29-051120	JSF-GW-W29-110420	JSF-GW-W29-01112021	JSF-GW-W29-07192021	JSF-GW-W-29-03022022	JSF-GW-W-29-08302022
Parent Sample ID									
Sample Depth		20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 ft	20.5 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	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters									
Dissolved Oxygen	%	-	-	-	-	-	24.0	71.2	44.6
Dissolved Oxygen	mg/L	1.36	2.23	1.6	1.89	3.31	2.21	7.20	3.88
ORP	Mv	332	470	418	299	318	194.0	196	140
pH (field)	SU	6.41	6.5	6.41	6.35	6.45	6.37	6.86	6.55
Specific Cond. (Field)	uS/cm	984	841	964	1,062	976	1,052	714	938
Temperature, Water (C)	DEG C	21.82	16.86	15.70	20.64	11.18	19.55	14.28	22.14
Turbidity, field	NTU	0.83	0.42	0.4	3.34	0.90	0.38	1.58	1.06

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-30										
Sample Date		10-May-16	7-Nov-16	24-Apr-17	23-Aug-17	29-Nov-17	20-Feb-18	22-May-18	21-Aug-18	7-May-19	12-May-20	4-Nov-20
Sample ID		JSF-30-0516	JSF-30-110716	JSF-30-042417	JSF-30-082317	JSF-W30-112917	JSF-30-022018	JSF-30-052218	JSF-30-GW-082118	JSF-W30-GW-050719	JSF-GW-30-051220	JSF-GW-W30-110420
Parent Sample ID												
Sample Depth		20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 ft	20 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	State Compliance	State Compliance	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	0.1	1.2	1.5	1.21	0.34	0.1	0	0.86	0.81	0.29	0.98
ORP	Mv	379	330	326	363	365	483	381	345	398	452	299
pH (field)	SU	6.2	6.5	5.97	6.2	6.17	6.14	6.11	6.35	6.34	6.26	6.26
Specific Cond. (Field)	uS/cm	2,225	2,287	1,626	2,165	2,239	2,023	2,147	2,092	2,040	1,945	1,898
Temperature, Water (C)	DEG C	-	-	15.32	21.15	18.17	15.39	16.4	22.3	17.94	14.18	18.64
Turbidity, field	NTU	2.79	2.56	6.59	-	3.59	-	-	8.08	9.76	1.00	3.00

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-30				W-31						
Sample Date		12-Jan-21	14-Jul-21	8-Mar-22	30-Aug-22	11-May-16	8-Nov-16	25-Apr-17	23-Aug-17	4-Dec-17	20-Feb-18	22-May-18
Sample ID		JSF-GW-W30-01122021	JSF-GW-W30-07142021	JSF-GW-W-30-03082022	JSF-GW-W-30-08302022	JSF-31-0516	JSF-3111-0816	JSF-31-042517	JSF-31-082317	JSF-31-120417	JSF-31-022018	JSF-31-052218
Parent Sample ID												
Sample Depth		20 ft	20 ft	20 ft	20 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	Normal Environmental Sample
Program	Units	State Compliance	CCR Program	CCR Program	CCR Program	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance
Field Parameters												
Dissolved Oxygen	%	-	26.8	20.2	12.0	-	-	-	-	-	-	-
Dissolved Oxygen	mg/L	0.71	2.40	2.12	1.10	0.2	0.9	1.4	0.1	0.52	6.87	0
ORP	Mv	408	184	150	158	411	336	363	335	358	515	390
pH (field)	SU	6.28	6.26	6.37	6.35	6.5	6.8	6.26	6.53	6.58	6.59	6.45
Specific Cond. (Field)	uS/cm	1,902	1,933	1,853	1,860	2,592	2,450	1,637	2,108	2,030	1,013	1,839
Temperature, Water (C)	DEG C	13.55	22.01	12.99	21.77	-	-	14.45	20.89	15.43	13.16	16.1
Turbidity, field	NTU	2.10	3.37	2.55	1.73	0.4	2.92	1.54	-	1.25	-	-

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-31								
Sample Date		22-Aug-18	15-Nov-18	13-May-19	12-May-20	4-Nov-20	11-Jan-21	14-Jul-21	7-Mar-22	30-Aug-22
Sample ID		JSF-31-GW-082218	JSF-31-GW-111518	JSF-GW-31-051319	JSF-GW-31-051220	JSF-GW-W31-110420	JSF-GW-W31-01112021	JSF-GW-W31-07142021	JSF-GW-W-31-03072022	JSF-GW-W-31-08302022
Parent Sample ID										
Sample Depth		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
Program	Units	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters										
Dissolved Oxygen	%	-	-	-	-	-	-	16.4	21.4	34.1
Dissolved Oxygen	mg/L	1.23	4.57	3.4	2.56	0.97	1.40	1.51	2.26	3.15
ORP	Mv	346	476	468	485	277	275	185	204	158
pH (field)	SU	6.58	6.78	6.55	6.33	6.64	6.67	6.49	6.78	6.62
Specific Cond. (Field)	uS/cm	1,725	1,131	1,656	1,627	1,579	1,686	1,627	1,428	1,552
Temperature, Water (C)	DEG C	21.22	15.48	15.71	15.66	17.9	12.24	19.44	13.00	20.85
Turbidity, field	NTU	0.71	1.45	0.43	0.33	0.67	0.77	0.33	0.55	0.94

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-32									
Sample Date		11-May-16	14-Nov-16	25-Apr-17	22-Aug-17	4-Dec-17	21-Feb-18	23-May-18	22-Aug-18	26-Nov-18	24-Jan-19
Sample ID		JSF-32-0516	JSF-32-111416	JSF-32-042517	JSF-32-082217	JSF-32-120417	JSF-32-022118	JSF-32-052318	JSF-32-GW-082218	JSF-32-GW-112618	JSF-GW-005-01242019
Parent Sample ID											
Sample Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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	State Compliance	State Compliance	CCR Program
Field Parameters											
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	19.6
Dissolved Oxygen	mg/L	2.2	3.4	3.67	2.78	2.2	2.87	0	3.12	3.17	1.75
ORP	Mv	444	349	82	366	366	488	428	373	370	148.7
pH (field)	SU	6.2	6.9	6.07	6.35	6.5	6.23	6.03	6.47	6.48	6.71
Specific Cond. (Field)	uS/cm	555	693	582	578	647	571	547	625	575	620
Temperature, Water (C)	DEG C	-	-	15.72	19.85	17.33	16.82	16.8	20.04	15.13	14.7
Turbidity, field	NTU	2.07	1.72	4.53	-	0.98	-	-	1.44	4.65	4.20

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-32									
Sample Date		29-Jan-19	5-Feb-19	20-Feb-19	27-Feb-19	6-Mar-19	20-Mar-19	27-Mar-19	2-Apr-19	13-May-19	12-Jun-19
Sample ID		JSF-GW-005-01292019	JSF-GW-005-02052019	JSF-GW-005-02202019	JSF-GW-005-02272019	JSF-GW-005-03062019	JSF-GW-005-03202019	JSF-GW-005-03272019	JSF-GW-005-04022019	JSF-GW-32-051319	JSF-GW-005-06122019
Parent Sample ID											
Sample Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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	State Compliance	CCR Program
Field Parameters											
Dissolved Oxygen	%	24.4	20.4	31.9	51.5	26.3	33	30.8	32	-	18.1
Dissolved Oxygen	mg/L	2.56	2.03	3.21	5.13	2.70	3.5	3.18	3.2	4.04	1.76
ORP	Mv	166.5	167.2	229.1	135.5	217.3	139.2	72.7	165.2	479	72.8
pH (field)	SU	6.80	6.71	6.93	6.55	6.86	6.85	7.00	6.83	6.58	6.84
Specific Cond. (Field)	uS/cm	610	610	560	600	550	680	680	670	672	660
Temperature, Water (C)	DEG C	13.8	15.9	15.2	15.1	13.5	14.0	13.9	14.3	16.44	17.1
Turbidity, field	NTU	4.21	4.67	3.44	4.23	7.61	1.67	1.43	2.19	3.39	1.52

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-32										
Sample Date		11-Sep-19	21-Nov-19	8-Jan-20	5-Feb-20	13-May-20	7-Jul-20	12-Aug-20	9-Nov-20	13-Jan-21	10-Feb-21	15-Jul-21
Sample ID		JSF-GW-005-09112019	JSF-GW-005-11212019	JSF-GW-005-01082020	JSF-GW-005-02052020	JSF-GW-32-051320	JSF-GW-005-07072020	JSF-GW-005-08122020	JSF-GW-W32-110920	JSF-GW-W-32-01132021	JSF-GW-W-32-02102021	JSF-GW-W-32-07152021
Parent Sample ID												
Sample Depth		25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 ft	25 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	State Compliance	CCR Program	CCR Program	State Compliance	CCR Program	CCR Program	CCR Program
Field Parameters												
Dissolved Oxygen	%	15.2	14.5	11.5	11.1	-	21.5	17.9	-	23.9	28	50.3
Dissolved Oxygen	mg/L	1.44	1.40	1.13	1.05	4.21	2.00	1.60	3.80	2.2	2.95	4.71
ORP	Mv	196.9	85.2	197.3	282.9	528	135.4	-90.4	307	161.9	-38.1	87.9
pH (field)	SU	6.50	6.99	6.91	6.77	6.51	6.82	6.85	6.37	6.61	6.87	6.60
Specific Cond. (Field)	uS/cm	610	716	690	690	701	685	650	619	576	710	509
Temperature, Water (C)	DEG C	18.0	17.4	16.2	15.8	14.02	18.9	18.3	18.66	15.2	13.3	18.4
Turbidity, field	NTU	4.63	3.81	2.27	1.14	0.44	1.04	3.28	1.91	1.99	4.14	3.66

See notes on last page.

Table H.1-10 - Groundwater Quality Parameters
John Sevier Fossil Plant

Sample Location		W-32				
Sample Date		10-Aug-21	20-Jan-22	2-Mar-22	20-Jul-22	1-Sep-22
Sample ID		JSF-GW-W-32-08102021	JSF-GW-W-32-01202022	JSF-GW-W-32-03022022	JSF-GW-W-32-07202022	JSF-GW-W-32-09012022
Parent Sample ID						
Sample Depth		25 ft	25 ft	25 ft	25 ft	25 ft
Sample Type		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
Field Parameters						
Dissolved Oxygen	%	42.9	35.7	42.0	22.8	3.4
Dissolved Oxygen	mg/L	3.44	3.71	4.30	2.15	0.32
ORP	Mv	134.7	-110.4	116.4	-120.1	208.6
pH (field)	SU	6.56	6.59	6.27	6.74	6.86
Specific Cond. (Field)	uS/cm	720	523	518	660	738
Temperature, Water (C)	DEG C	19.4	14.3	14.0	19.3	19.0
Turbidity, field	NTU	2.27	2.67	2.61	2.23	1.06

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
J	quantitation is approximate due to limitations identified during data validation
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.1-11 - Screening Levels for Groundwater
John Sevier 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

Stantec

Table H.1-12 - Summary of Statistically Significant Concentrations/Values Compared to Groundwater Screening Levels
John Sevier Fossil Plant

Parameter	Background										Ash Disposal Area J			Highway 70 Borrow Area		
	JSF-101*	JSF-102*	JSF-104**	JSF-106	JSF-110	JSF-200	JSF-205	JSF-206	JSF-210	W-1	JSF-107	JSF-108	JSF-109	JSF-207	JSF-208	JSF-209
CCR Rule Appendix III Parameters																
Boron	Green	Green	Green*	Green	Green*	Green	Green*	Green*	Green*	Green*	Green	Red	Green	Green	Green	Green*
Chloride	Green	Green	Green	Green	Green	Green	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	Green*	Green	Green	Green	Green	Green
pH (field)	Green	Green	Red	Green	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sulfate	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Red	Green	Green	Green	Green
Total Dissolved Solids	Red	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Red	Green	Green	Green	Green
CCR Rule Appendix IV Parameters																
Antimony	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Arsenic	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green	Green*	Green*	Green	Green*	Green	Green*
Barium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Green	Green	Green	Green	Green
Beryllium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Cadmium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Chromium	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Cobalt	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Green*	Green	Green	Green	Green*	Green*
Lead	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*
Lithium	Green	Green	Green	Green*	Green*	Green	Green	Green	Green	Green	Green*	Green*	Green	Green	Green	Green
Mercury	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Molybdenum	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Red	Green	Green	Green	Green	Green*
Radium-226+228	Green	Green	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*
Selenium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Thallium	Green*	Green*	Green*	Green*	Green*	Green*	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*	Green*	Green*	Green*	Green*	Green*	Green*
Nickel	Green	Green	Green	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*	Green	Green	Green*	Green*	Green*
Silver	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Vanadium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Zinc	Green*	Green*	Green*	Green*	Green*	Green*	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 greater than or equal to the upper GSL or less than or equal to the lower GSL 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 greater than or equal to the upper GSL or less than or equal to the lower GSL for pH.
Red	Statistically significant concentration greater than or equal to the GSL for constituents other than pH or a statistically significant difference greater than or equal to the upper GSL or less than or equal to the lower GSL for pH.

Notes:

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.

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

* Wells JSF-101 and JSF-102 were added to Dry Fly Ash Landfill permitted compliance network as background monitoring wells in February 2022.

** Not currently part of the permitted compliance network for the Dry Fly Ash Landfill. Wells are included in groundwater sampling events for the Dry Fly Ash Stack for comparison purposes.

*** Well W-32 is in the permitted compliance network for the Dry Fly Ash Landfill and the certified CCR groundwater monitoring network for the Bottom Ash Pond.

Stantec

Table H.1-12 - Summary of Statistically Significant Concentrations/Values Compared to Groundwater Screening Levels
John Sevier Fossil Plant

Parameter	Bottom Ash Pond								Dry Fly Ash Stack Landfill			
	10-36**	JSF-103**	JSF-105**	JSF-201	JSF-202	JSF-203	JSF-204	W-32***	W-28	W-29	W-30	W-31
CCR Rule Appendix III Parameters												
Boron	Green	Green	Green	Green*	Green	Green	Green	Green	Green	Green	Green	Green
Chloride	Green	Green	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	Green	Green
pH (field)	Green	Red	Red	Green	Green	Green	Green	Green	Red	Green	Red	Green
Sulfate	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red	Green
Total Dissolved Solids	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red	Red
CCR Rule Appendix IV Parameters												
Antimony	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Arsenic	Green	Green*	Green*	Green*	Green	Green	Green	Green*	Green*	Green*	Green*	Green*
Barium	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Beryllium	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Cadmium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Chromium	Green*	Green	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*
Cobalt	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green*	Green	Green*
Lead	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green	Green*	Green*	Green*	Green*
Lithium	Green	Green	Green*	Green	Green	Green	Green	Green	Green	Green*	Green*	Red
Mercury	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Molybdenum	Green*	Green*	Green*	Green*	Green	Green	Green*	Green*	Green*	Green*	Green*	Red
Radium-226+228	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Selenium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Thallium	Green*	Green*	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*	Green*	Green*
Nickel	Green	Green	Green	Green*	Green*	Green	Green	Green	Green	Green	Green	Green
Silver	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Vanadium	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*	Green*
Zinc	Green	Green	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 greater than or equal to the upper GSL or less than or equal to the lower GSL 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 greater than or equal to the upper GSL or less than or equal to the lower GSL for pH.
Red	Statistically significant concentration greater than or equal to the GSL for constituents other than pH or a statistically significant difference greater than or equal to the upper GSL or less than or equal to the lower GSL for pH.

Notes:

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.

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

* Wells JSF-101 and JSF-102 were added to Dry Fly Ash Landfill permitted compliance network as background monitoring wells in February 2022.

** Not currently part of the permitted compliance network for the Dry Fly Ash Landfill. Wells are included in groundwater sampling events for the Dry Fly Ash Stack for comparison purposes.

*** Well W-32 is in the permitted compliance network for the Dry Fly Ash Landfill and the certified CCR groundwater monitoring network for the Bottom Ash Pond.

Table H.1-13 - Linear Regression Results
John Sevier Fossil Plant - Rogersville, Tennessee

Well	Constituent Type	Constituent	p-value	Trend summary[1]
JSF-101	CCR Rule Appendix III Parameters	pH	0.425	No trend detected
		Sulfate	<0.0001	Decreasing
		Total Dissolved Solids	<0.0001	Decreasing
JSF-102	CCR Rule Appendix III Parameters	pH	0.317	No trend detected
		Total Dissolved Solids	0.717	No trend detected
JSF-104	CCR Rule Appendix III Parameters	pH	0.915	No trend detected
		Total Dissolved Solids	0.104	No trend detected
JSF-106	CCR Rule Appendix III Parameters	pH	0.383	No trend detected
JSF-110	CCR Rule Appendix III Parameters	pH	0.81	No trend detected
W-1	CCR Rule Appendix III Parameters	pH	0.537	No trend detected
JSF-107	CCR Rule Appendix III Parameters	Boron	0.0208	Decreasing
		pH	0.84	No trend detected
	CCR Rule Appendix IV Parameters	Molybdenum	0.12	No trend detected
JSF-108	CCR Rule Appendix III Parameters	Boron	0.0372	Increasing
		pH	0.415	No trend detected
		Sulfate	0.146	No trend detected
		Total Dissolved Solids	0.4	No trend detected
	CCR Rule Appendix IV Parameters	Cobalt	0.528	No trend detected
JSF-109	CCR Rule Appendix III Parameters	Chloride	<0.0001	Decreasing
		pH	0.336	No trend detected
		Sulfate	0.0006	Decreasing
		Total Dissolved Solids	<0.0001	Decreasing
	CCR Rule Appendix IV Parameters	Arsenic	0.966	No trend detected
		Cobalt	0.842	No trend detected
JSF-207	CCR Rule Appendix III Parameters	pH	0.595	No trend detected
JSF-208	CCR Rule Appendix III Parameters	pH	0.696	No trend detected
		Sulfate	0.023	Decreasing
		Total Dissolved Solids	0.015	Decreasing
JSF-209	CCR Rule Appendix III Parameters	Total Dissolved Solids	0.0925	No trend detected
10-36	CCR Rule Appendix III Parameters	pH	0.0005	Increasing
		Sulfate	0.257	No trend detected
		Total Dissolved Solids	0.285	No trend detected
JSF-103	CCR Rule Appendix III Parameters	pH	0.178	No trend detected
		Sulfate	0.0014	Decreasing
		Total Dissolved Solids	0.0025	Decreasing
JSF-105	CCR Rule Appendix III Parameters	pH	0.469	No trend detected
		Sulfate	0.0006	Increasing
		Total Dissolved Solids	0.0001	Increasing
JSF-201	CCR Rule Appendix III Parameters	Total Dissolved Solids	0.562	No trend detected
JSF-202	CCR Rule Appendix III Parameters	pH	0.885	No trend detected
		Sulfate	0.0005	Decreasing
		Total Dissolved Solids	0.0004	Decreasing
	CCR Rule Appendix IV Parameters	Lithium	0.0008	Decreasing
W-32	CCR Rule Appendix III Parameters	pH	0.149	No trend detected
W-28	CCR Rule Appendix III Parameters	pH	0.692	No trend detected
		Sulfate	0.0015	Decreasing
		Total Dissolved Solids	0.0292	Decreasing
	CCR Rule Appendix IV Parameters	Cobalt	0.577	No trend detected

Table H.1-13- Linear Regression Results
John Sevier Fossil Plant - Rogersville, Tennessee

Well	Constituent Type	Constituent	p-value	Trend summary[1]
W-29	CCR Rule Appendix III Parameters	pH	0.0036	Increasing
		Total Dissolved Solids	0.44	No trend detected
W-30	CCR Rule Appendix III Parameters	Boron	0.0025	Decreasing
		pH	0.316	No trend detected
		Sulfate	0.0698	No trend detected
		Total Dissolved Solids	0.0241	Decreasing
W-31	CCR Rule Appendix III Parameters	Boron	0.0012	Decreasing
		pH	0.493	No trend detected
		Sulfate	0.0324	Decreasing
		Total Dissolved Solids	0.13	No trend detected
	CCR Rule Appendix IV Parameters	Lithium	0.0342	Decreasing
		Molybdenum	0.204	No trend detected

Notes
CCR Rule - Title 40, Code of Federal Regulations, Part 257
p-value - probability value
[1.] Trend evaluated using linear regression. Slope considered significant when $p<0.05$.

EXHIBITS

Exhibit No.

H.1-1

Title

Monitoring Well and Piezometer Network

Client/Project

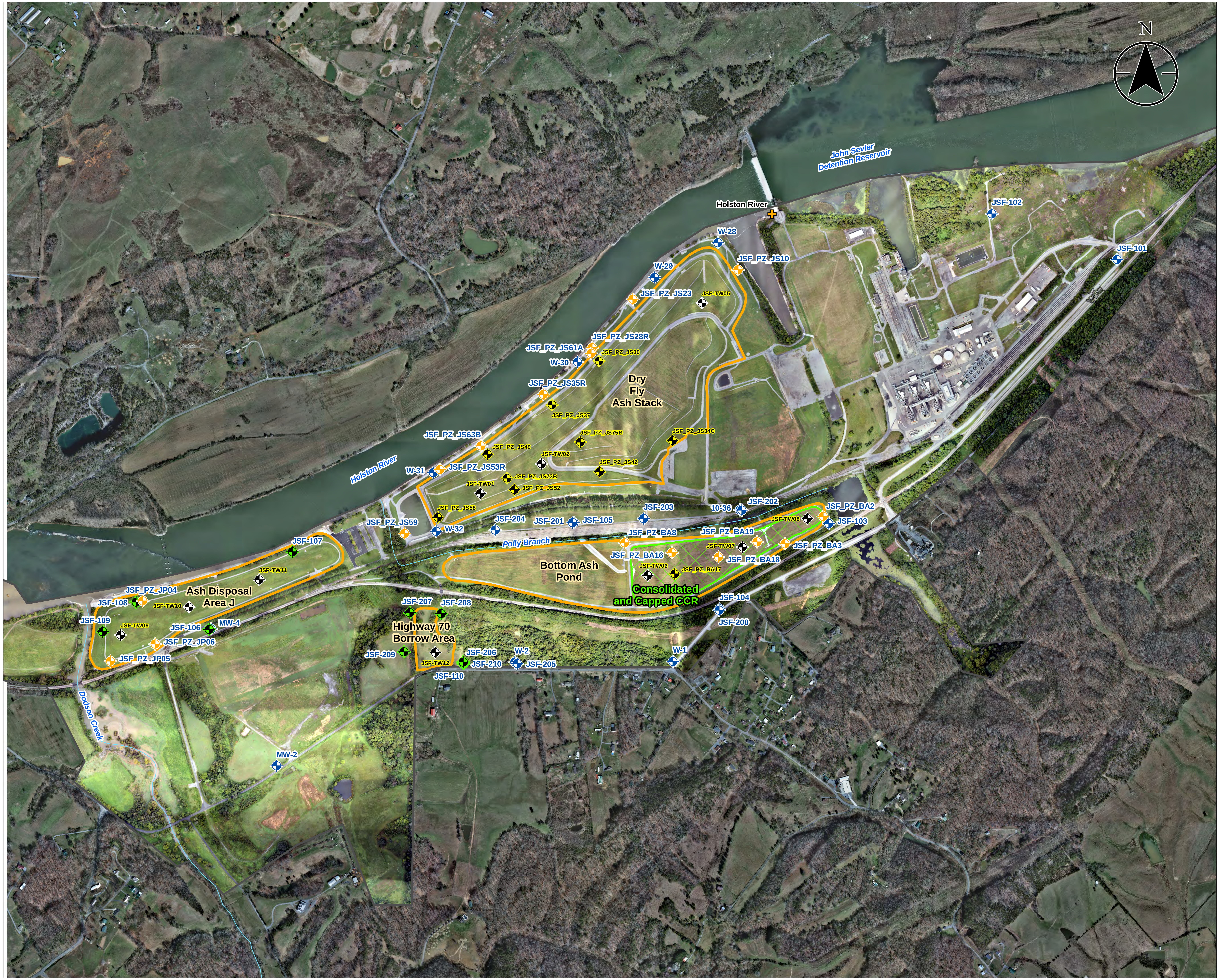
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2022-06-09
Technical Review by MT on 2022-06-09

0 500 1,000 1,500 2,000 Feet
1:6,000 (At original document size of 22x34)



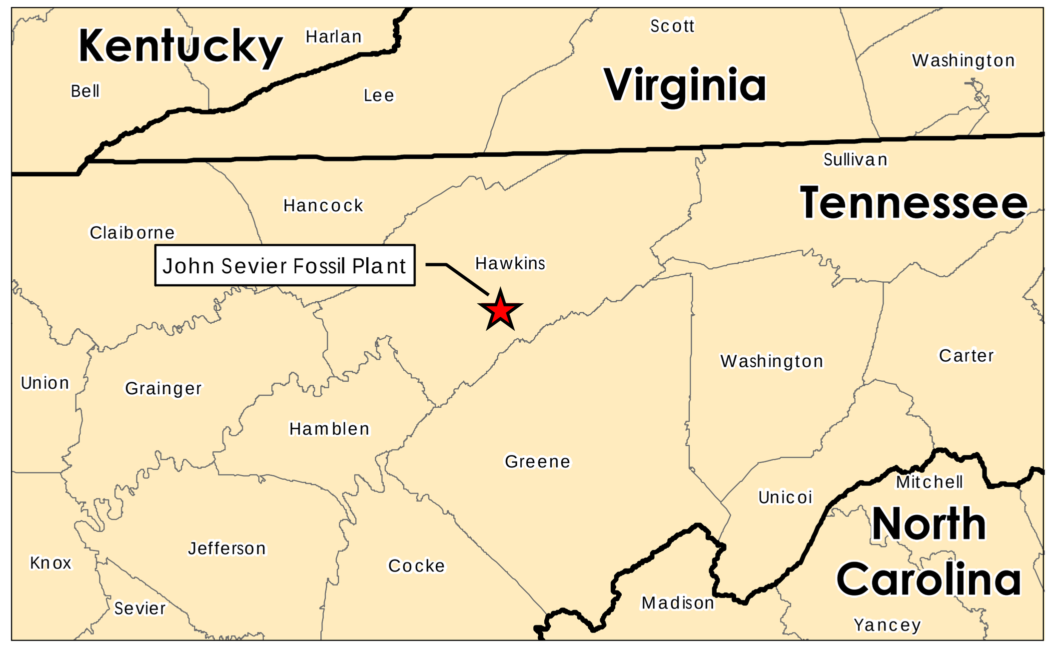
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec

TVA

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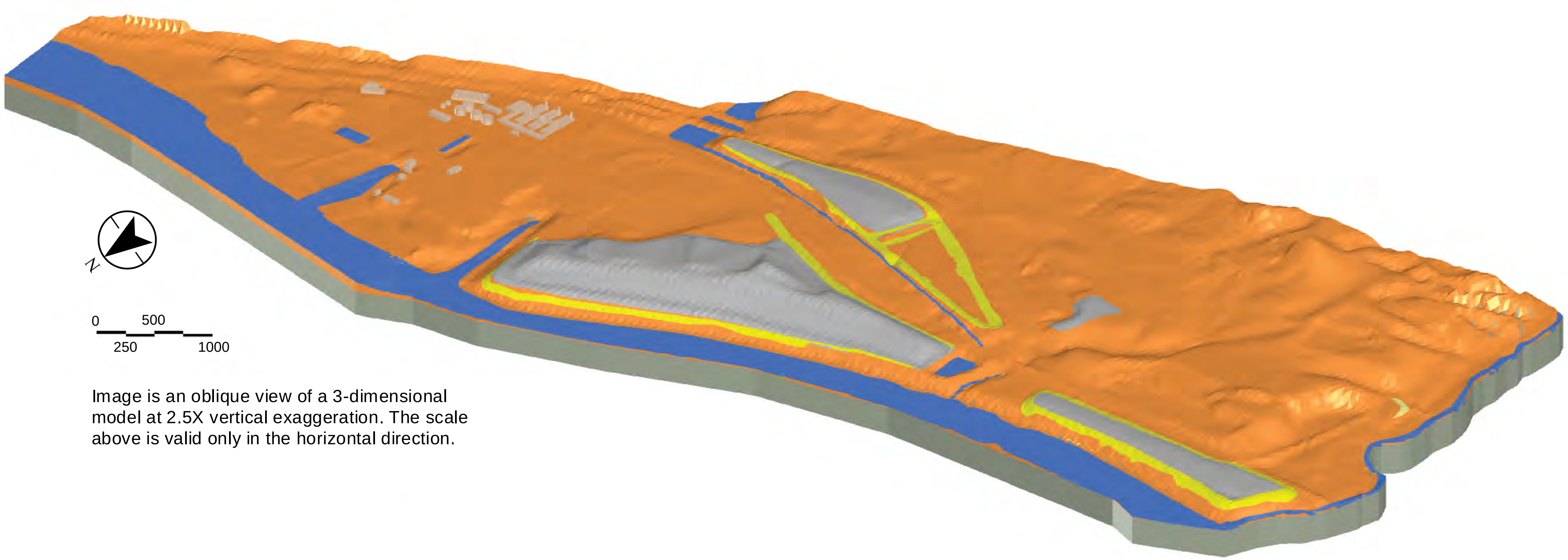


Image is an oblique view of a 3-dimensional model at 2.5X vertical exaggeration. The scale above is valid only in the horizontal direction.

Figure No.

H.1-2

Title

Lithologic Model (Oblique View Looking Southeast)

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by DMB on 2023-06-15
Technical Review by BL on 2023-06-15

Legend

- Building Structure
- CCR Material
- Clay Dike
- Unconsolidated Materials (Primarily Clay and Silt)
- Unconsolidated Materials (Primarily Sand and Gravel)
- Waterbody
- Bedrock

CCR: Coal combustion residuals

Stantec

TVA

U:\TVA-EIP\175568225_JSF_Phase2\gis\mxd\EAR\GW_EAR\Ex\H.1-2_LithologicalModel_ObliqueSE.mxd Revised: 2023-06-15 By: mbough

Figure No.
H.1-3

Title
Lithologic Model – Top of Unconsolidated Materials – Primarily Clay and Silt (Oblique View Looking Southeast)

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

Prepared by DMB on 2023-06-15
Technical Review by BL on 2023-06-15

Legend
- Building Structure
- Clay Dike
- Unconsolidated Materials (Primarily Clay and Silt)
- Unconsolidated Materials (Primarily Sand and Gravel)
- Waterbody
- Bedrock

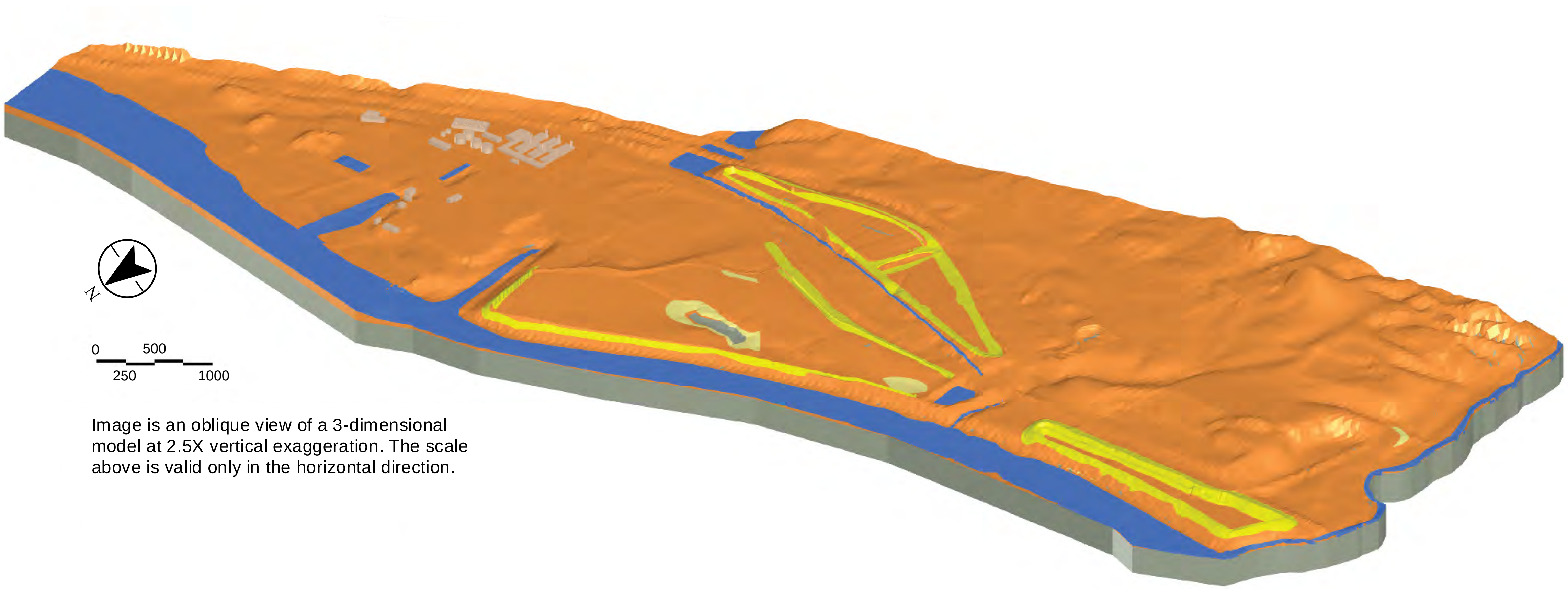
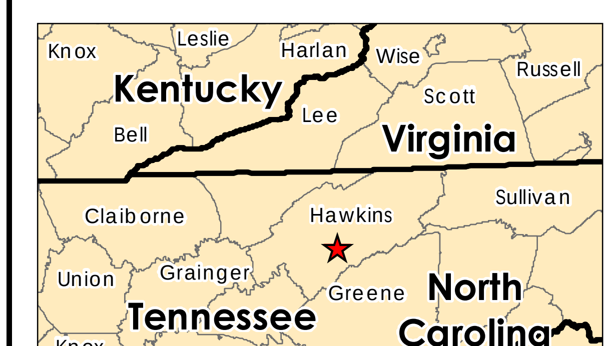


Image is an oblique view of a 3-dimensional model at 2.5X vertical exaggeration. The scale above is valid only in the horizontal direction.



Stantec

TVA

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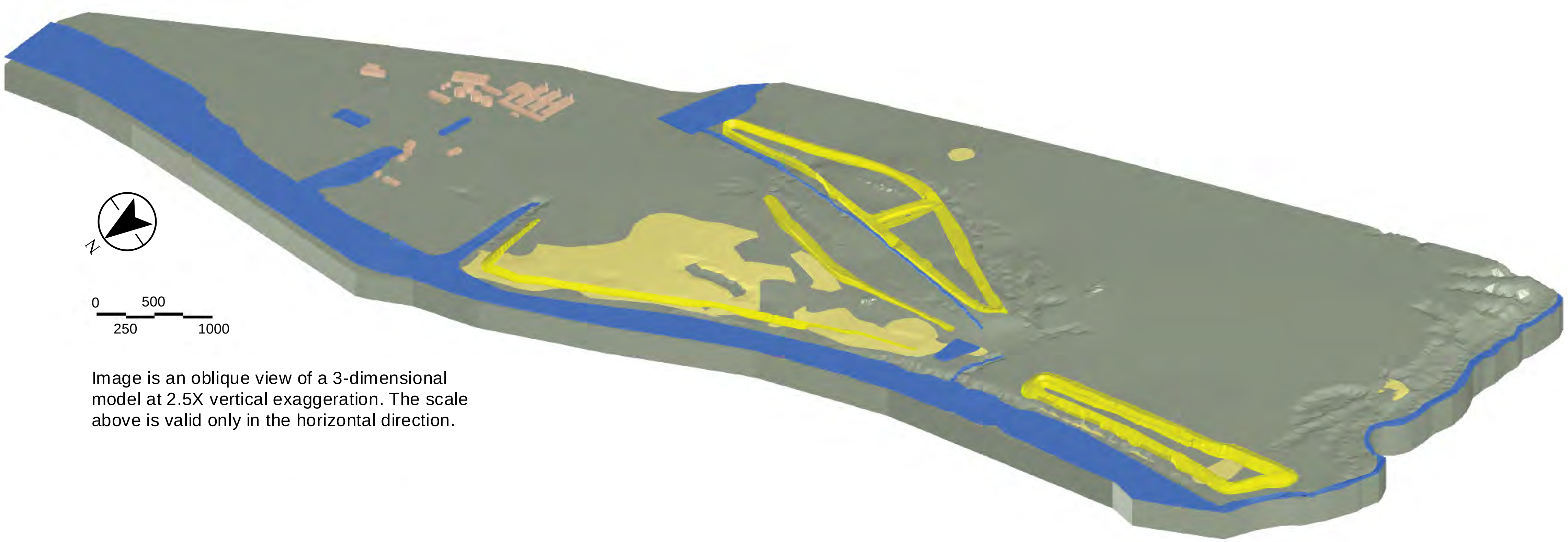


Image is an oblique view of a 3-dimensional model at 2.5X vertical exaggeration. The scale above is valid only in the horizontal direction.

Figure No.

H.1-4

Title

Lithologic Model – Top of Unconsolidated Materials – Primarily Sand and Gravel (Oblique View Looking Southeast)

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

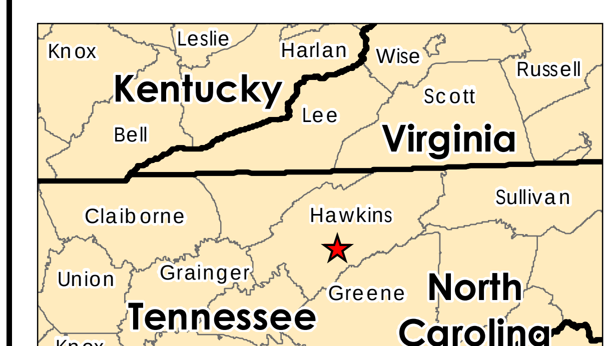
Project Location

Rogersville, Tennessee

Prepared by DMB on 2023-06-15
Technical Review by BL on 2023-06-15

Legend

- Building Structure
- Clay Dike
- Unconsolidated Materials (Primarily Sand and Gravel)
- Waterbody
- Bedrock



Stantec

TVA

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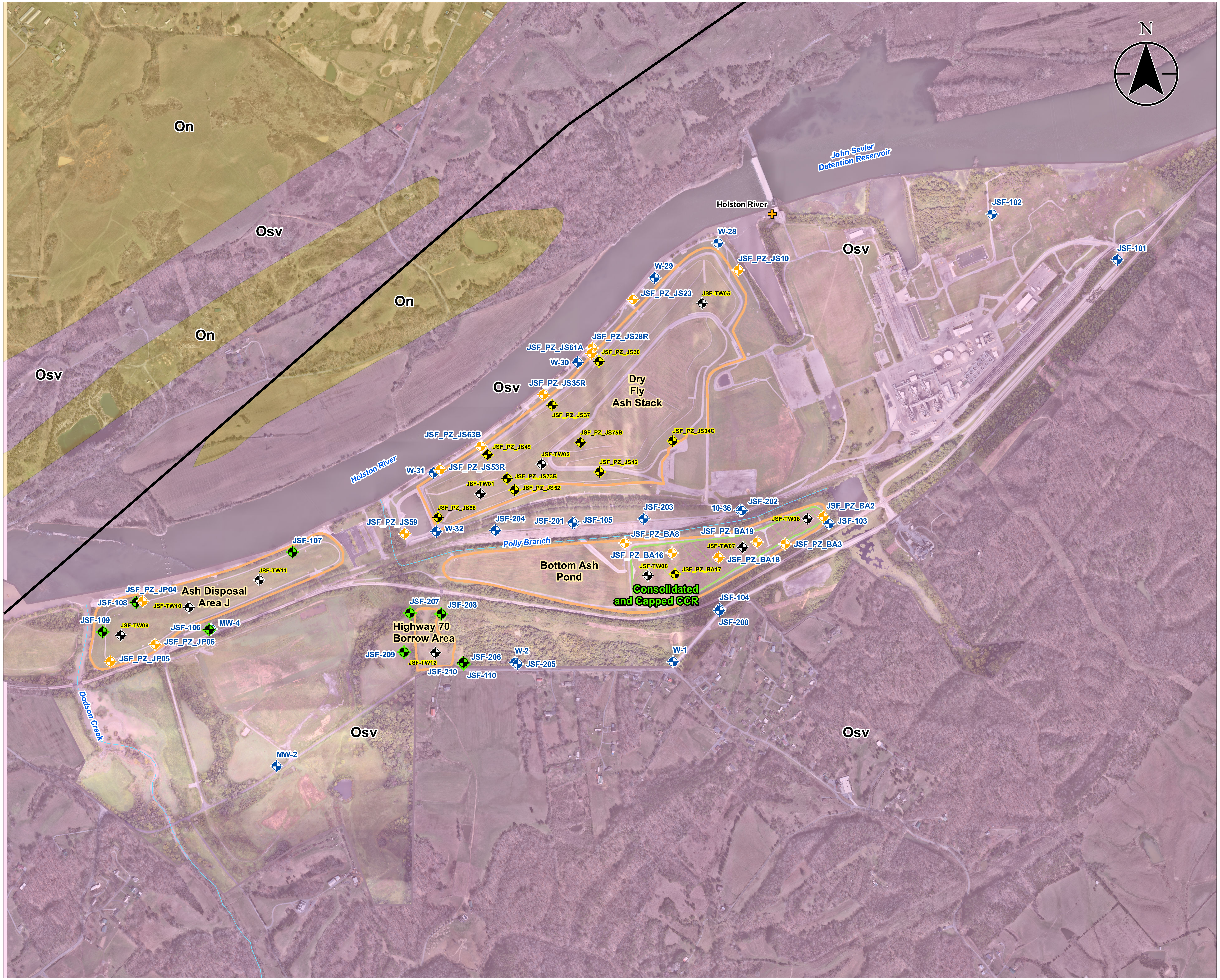

Exhibit No.

H.1-5

Title

Geologic Map

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2023-05-12
Technical Review by MT on 2023-05-12

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge
- Fault
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

Geologic Formations

- Newala Formation (On)
- Sevier Shale (Osv)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Geologic formations and fault obtained from Geologic Map: Rodgers, 1953 Geologic formations shown are the Newala Formation (On) and Sevier Shale (Osv). Refer to the legend for identification of these formations. Other shading is representative of features shown on the USGS Topographic map.

Stantec TVA

Figure No.
H.1-6

Title
Lithologic Model – Top of Bedrock (Oblique View Looking Southeast)

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

Prepared by DMB on 2023-06-15
Technical Review by BL on 2023-06-15

Legend

- Building Structure
- Clay Dike
- Waterbody
- Bedrock

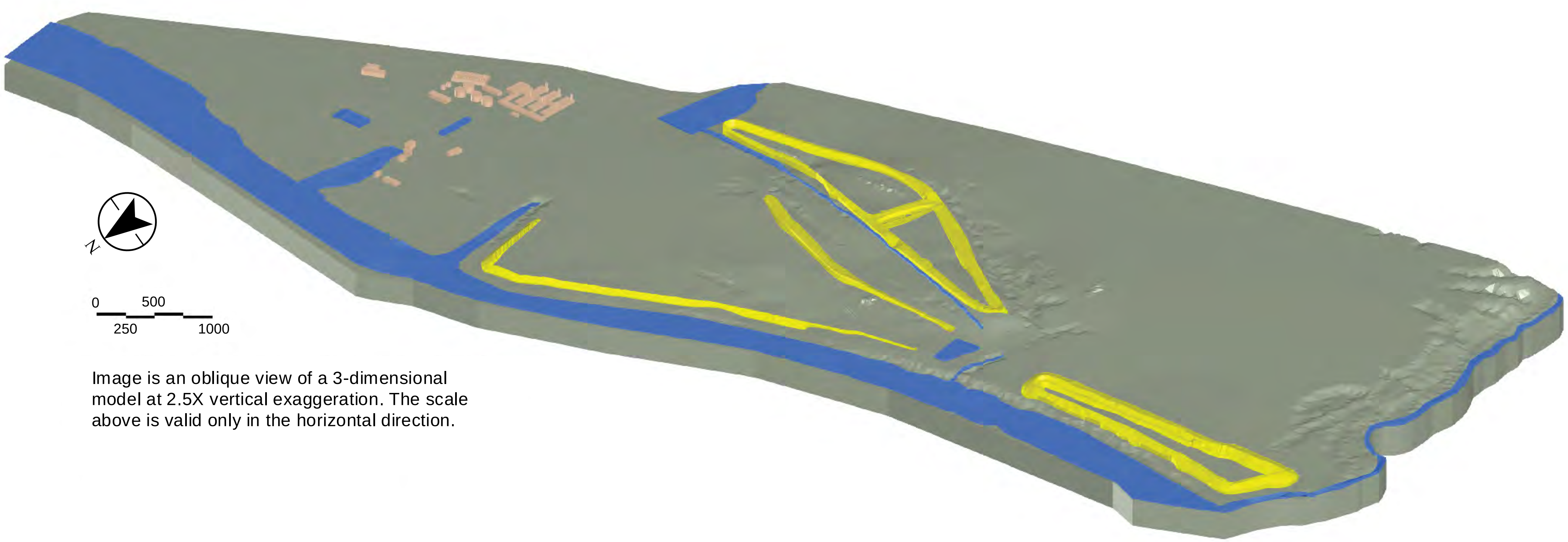

Image is an oblique view of a 3-dimensional model at 2.5X vertical exaggeration. The scale above is valid only in the horizontal direction.

Stantec
TVA

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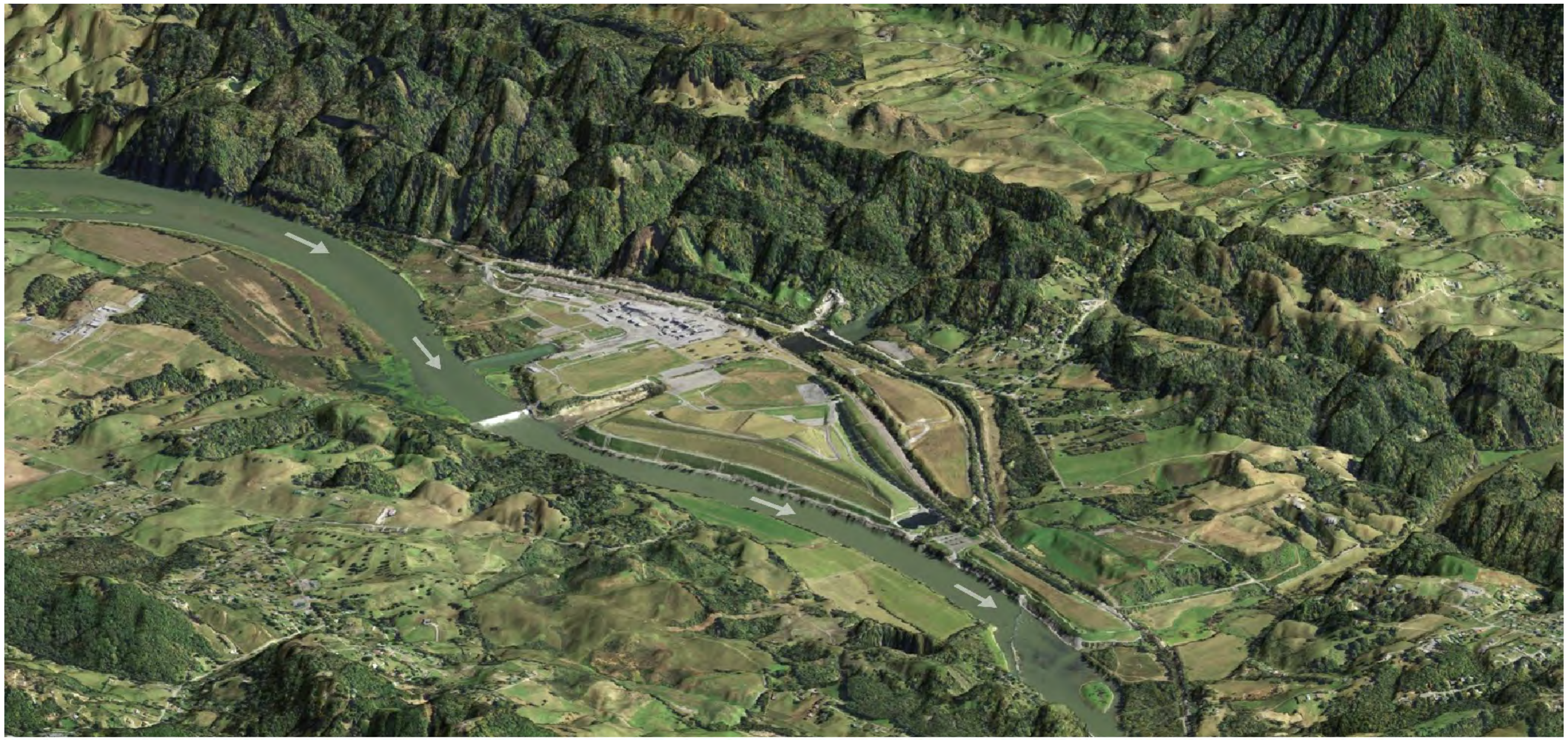


Figure No.

H.1-7

Title

Lithologic Model – Physiographic Setting (Oblique View Looking Southeast)

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

Prepared by DMB on 2023-05-15
Technical Review by BL on 2023-05-15

Legend

Typical Surface Stream Flow Direction

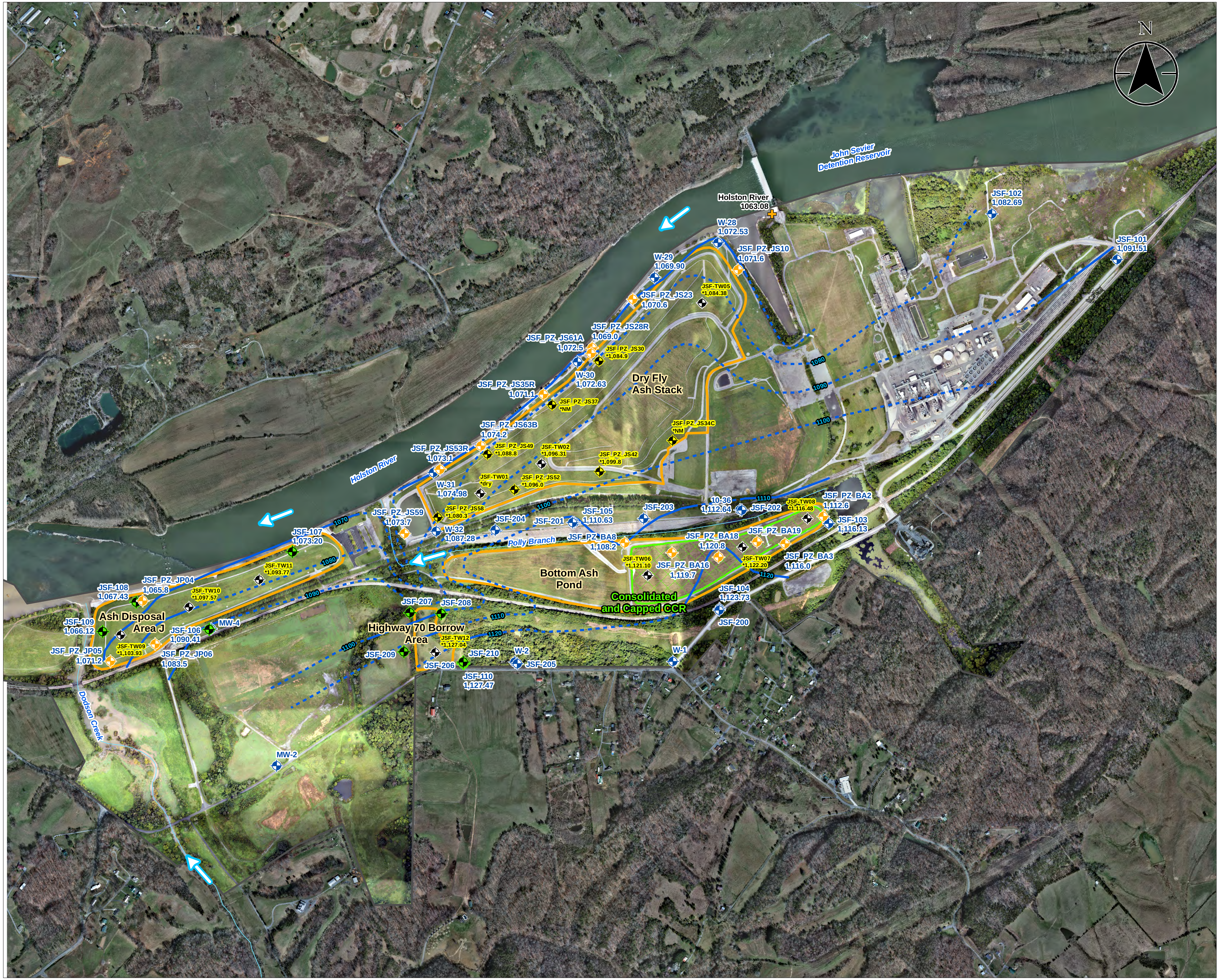


Exhibit No.

H.1-8

Title

Groundwater Elevation Contour Map, Event #4 (February 3, 2020), Unconsolidated Materials

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2022-11-09
Technical Review by MD on 2022-11-09

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Stream Channel (Approximate)
- Surface Stream Flow
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

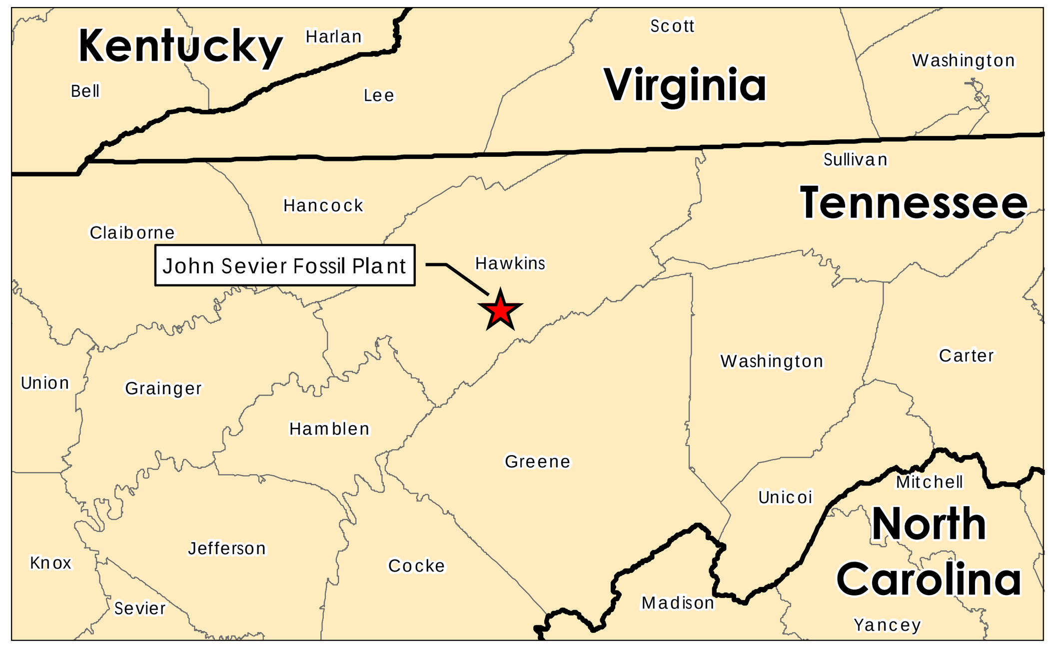
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

Exhibit No.

H.1-9

Title

Groundwater Elevation Contour Map, Event #4 (February 3, 2020), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2022-11-07
Technical Review by MD on 2022-11-07

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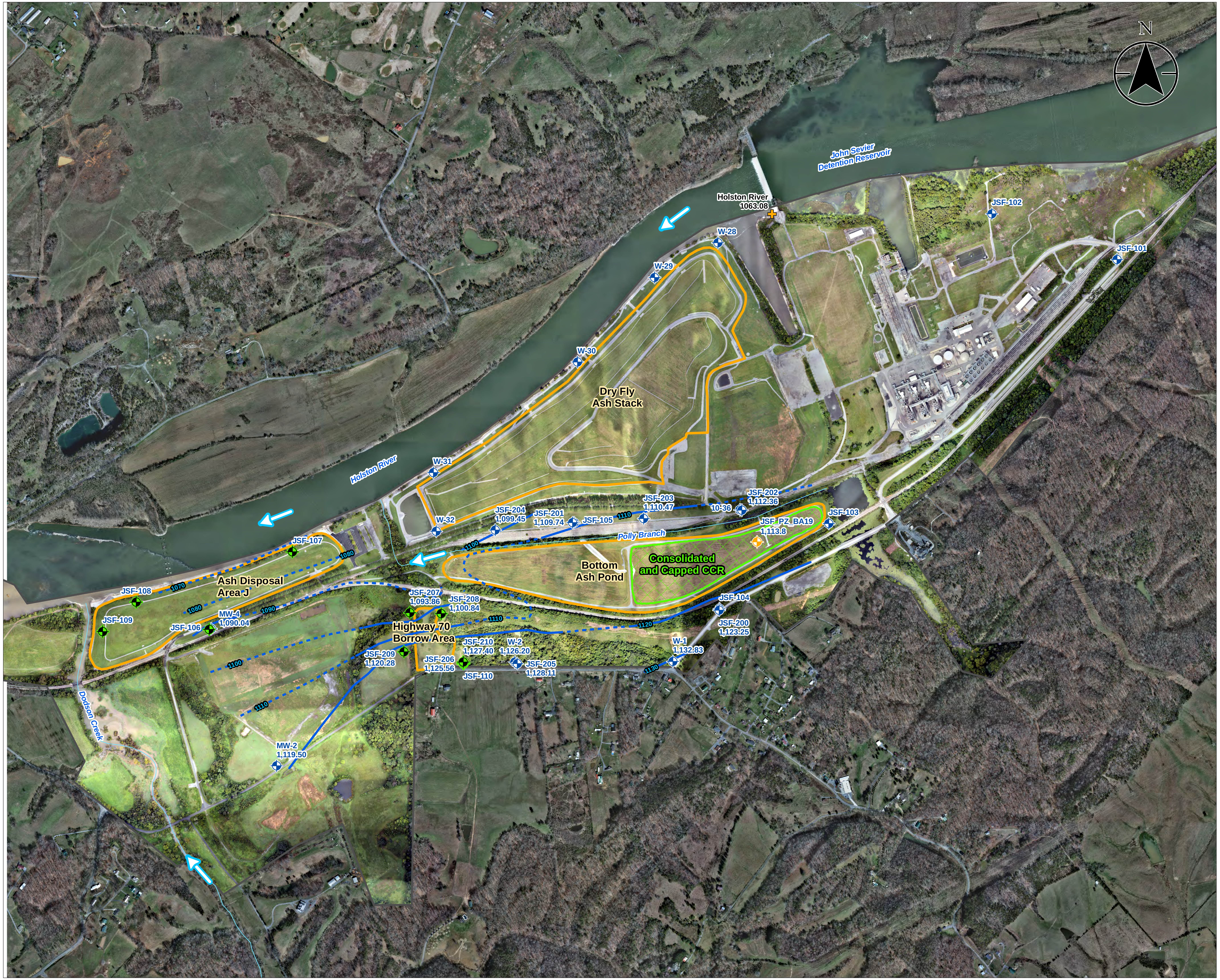


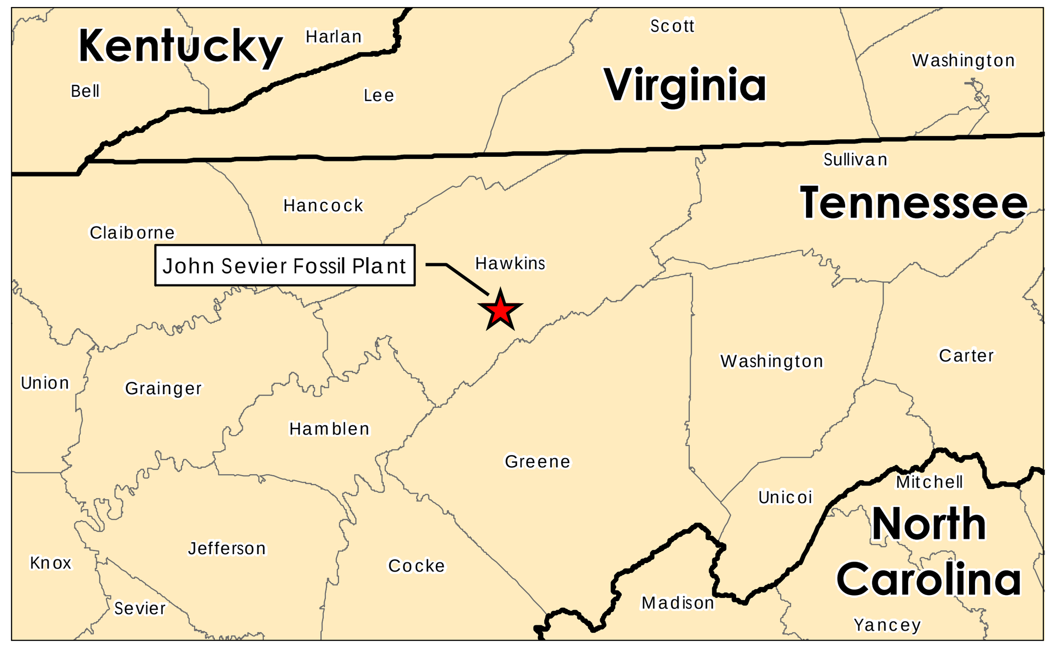
Legend

- 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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Stream Channel (Approximate)
- Surface Stream Flow
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

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Exhibit No.

H.1-10a

Title

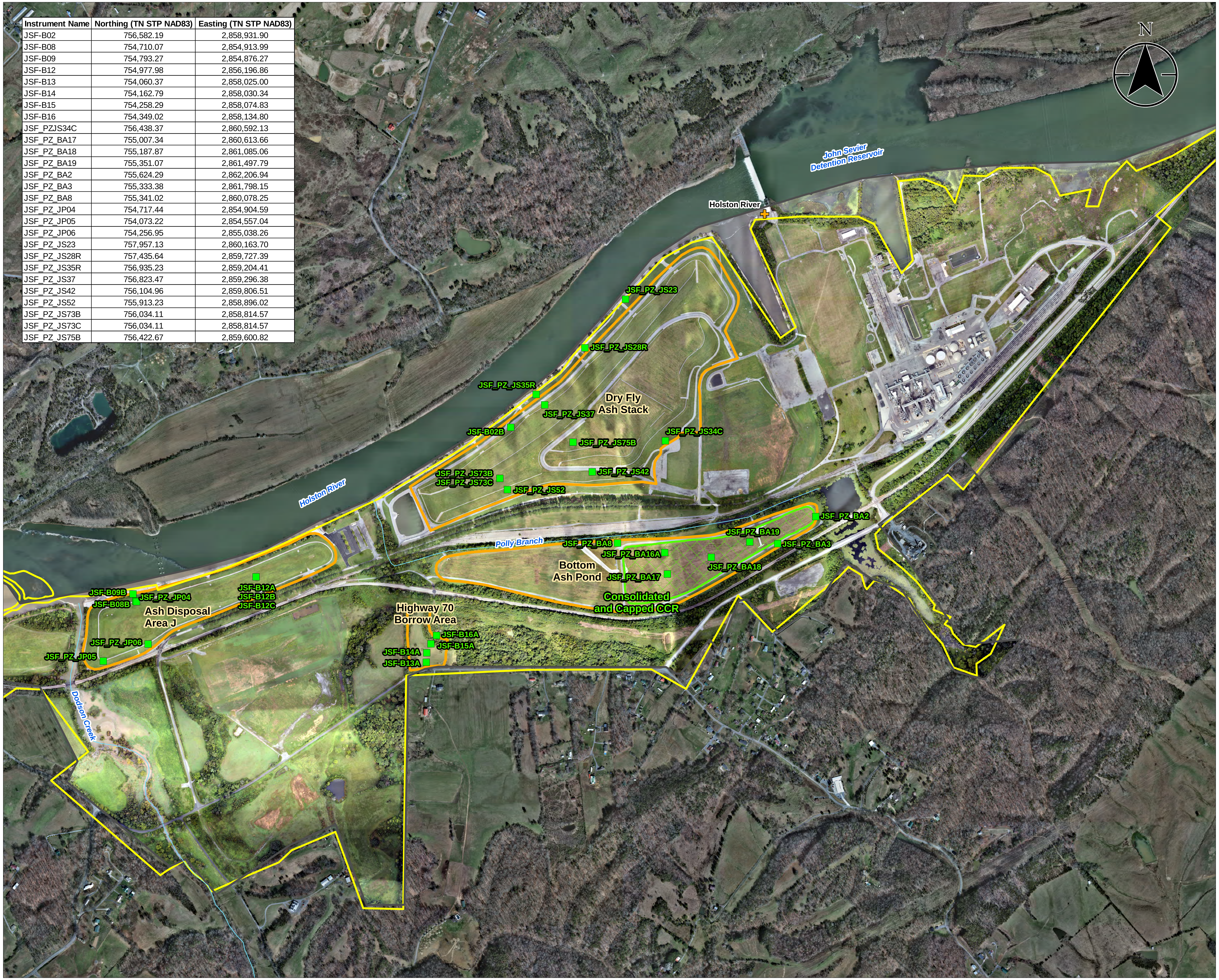
Automated Instrumentation Used for Surface Water / Pore Water / Groundwater Hydrograph Comparison

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location	175568225
Rogersville, Tennessee	Prepared by PR on 2023-06-27
	Technical Review by MD on 2023-06-27

Instrument Name	Northing (TN STP NAD83)	Easting (TN STP NAD83)
JSF-B02	756,582.19	2,858,931.90
JSF-B08	754,710.07	2,854,913.99
JSF-B09	754,793.27	2,854,876.27
JSF-B12	754,977.98	2,856,196.86
JSF-B13	754,060.37	2,858,025.00
JSF-B14	754,162.79	2,858,030.34
JSF-B15	754,258.29	2,858,074.83
JSF-B16	754,349.02	2,858,134.80
JSF_PZJS34C	756,438.37	2,860,592.13
JSF_PZ_BA17	755,007.34	2,860,613.66
JSF_PZ_BA18	755,187.87	2,861,085.06
JSF_PZ_BA19	755,351.07	2,861,497.79
JSF_PZ_BA2	755,624.29	2,862,206.94
JSF_PZ_BA3	755,333.38	2,861,798.15
JSF_PZ_BA8	755,341.02	2,860,078.25
JSF_PZ_JP04	754,717.44	2,854,904.59
JSF_PZ_JP05	754,073.22	2,854,557.04
JSF_PZ_JP06	754,256.95	2,855,038.26
JSF_PZ_JS23	757,957.13	2,860,163.70
JSF_PZ_JS28R	757,435.64	2,859,727.39
JSF_PZ_JS35R	756,935.23	2,859,204.41
JSF_PZ_JS37	756,823.47	2,859,296.38
JSF_PZ_JS42	756,104.96	2,859,806.51
JSF_PZ_JS52	755,913.23	2,858,896.02
JSF_PZ_JS73B	756,034.11	2,858,814.57
JSF_PZ_JS73C	756,034.11	2,858,814.57
JSF_PZ_JS75B	756,422.67	2,859,600.82



0 500 1,000 1,500 2,000 Feet

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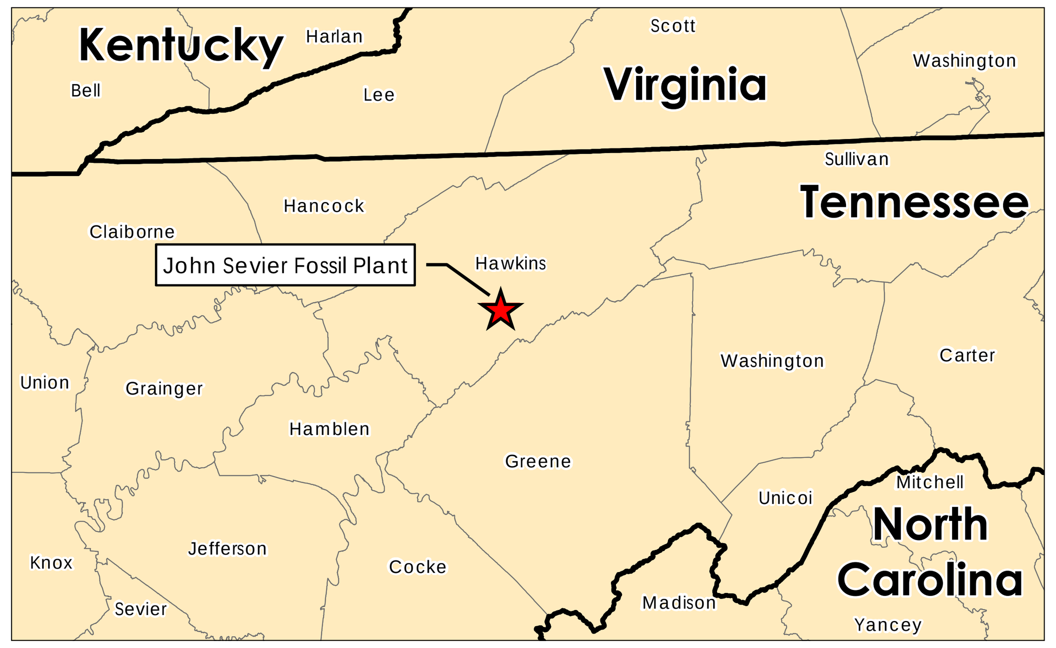
Legend

- Piezometer
- Holston River Gauge
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- TVA Property Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec

TVA

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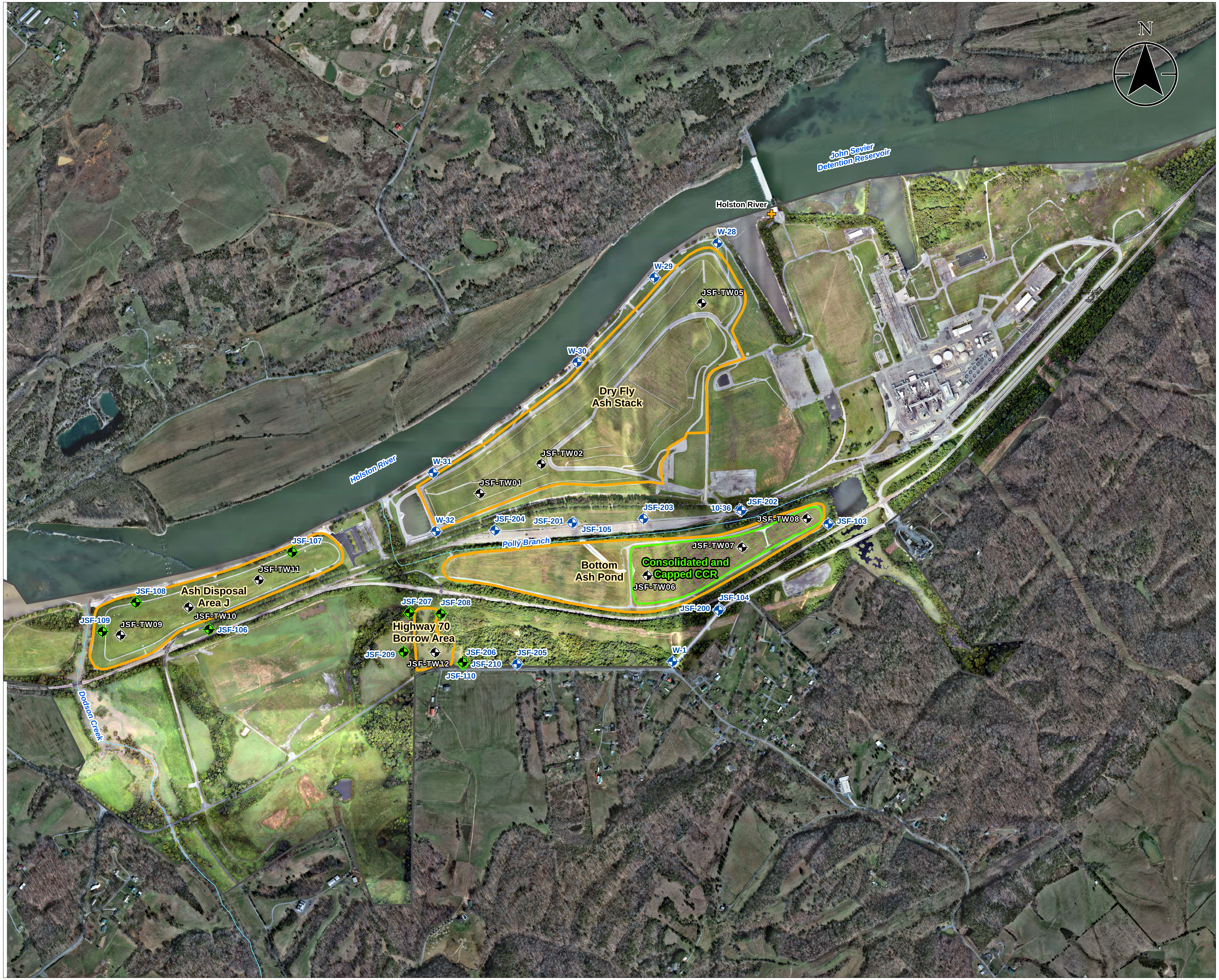


Exhibit No.

H.1-10b

Title

JSF Manual Instrumentation used for Surface Water / Pore Water / Groundwater Hydrograph Comparison

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by PR on 2023-06-21
Technical Review by MT on 2023-06-21

0 500 1,000 1,500 2,000 Feet

1:6,000 (At original document size of 22x34)

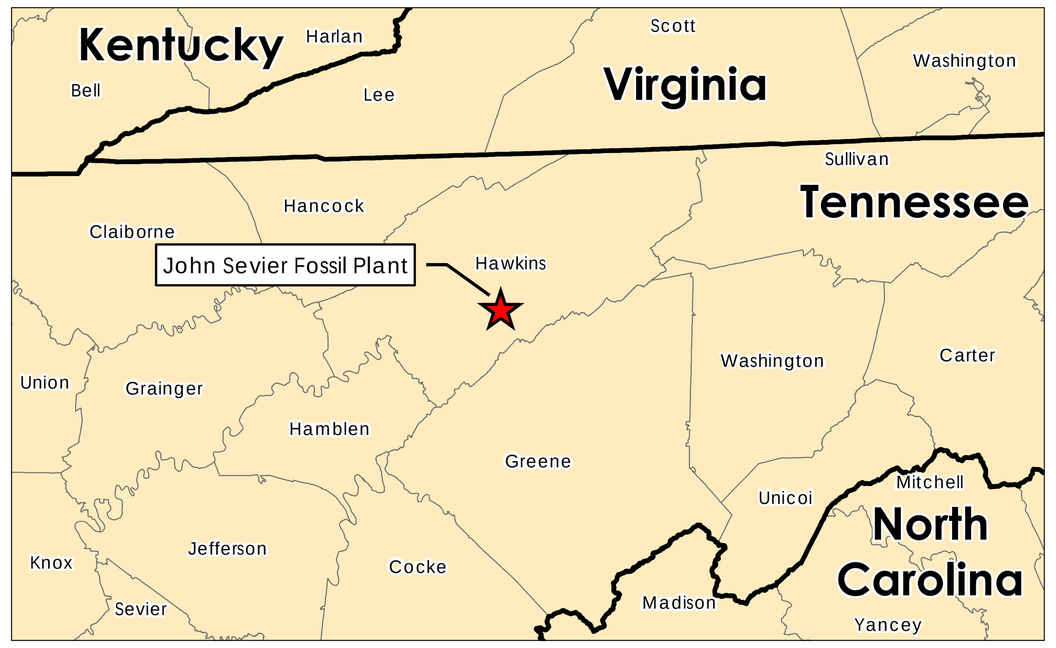
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Temporary Well within CCR Material
- Holston River Gauge
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec TVA

Figure No.
H.1-11a

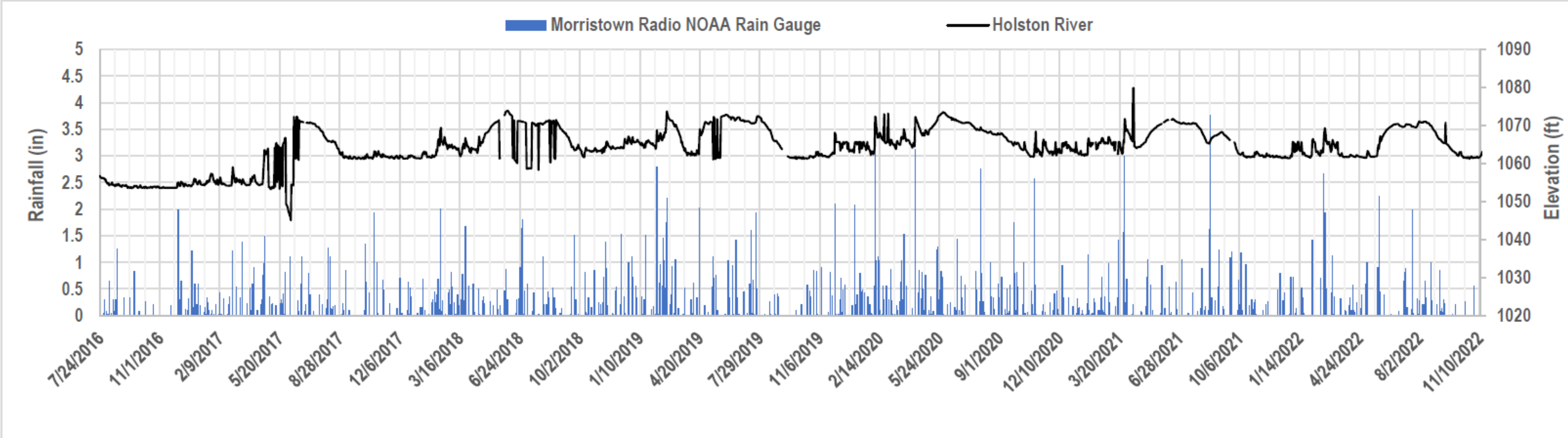
Title
Automated Instrument Hydrographs - Dry Fly Ash Stack

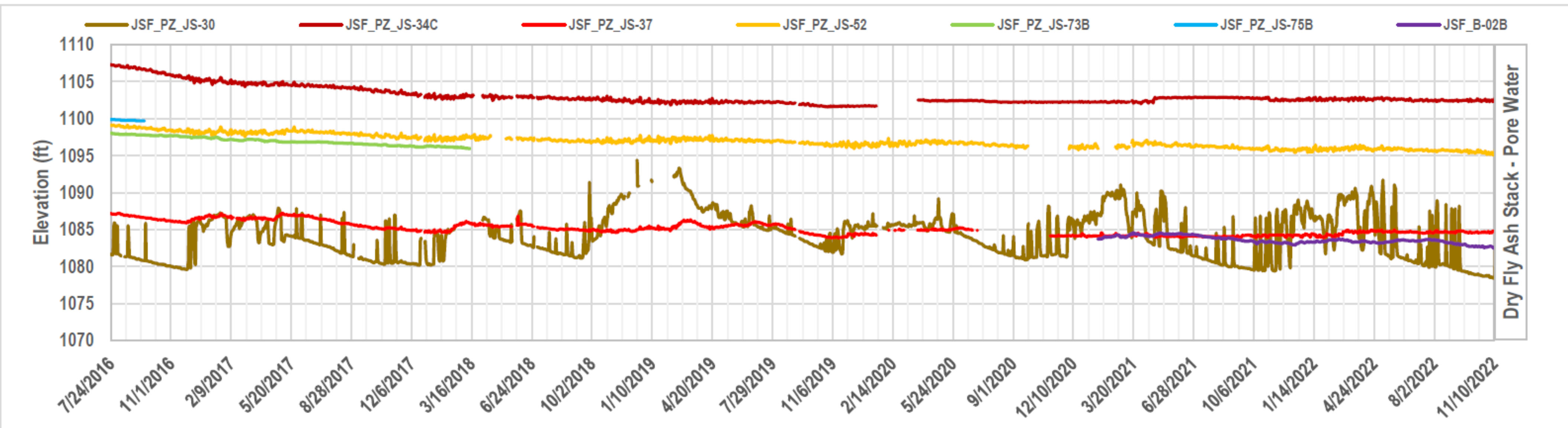
Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

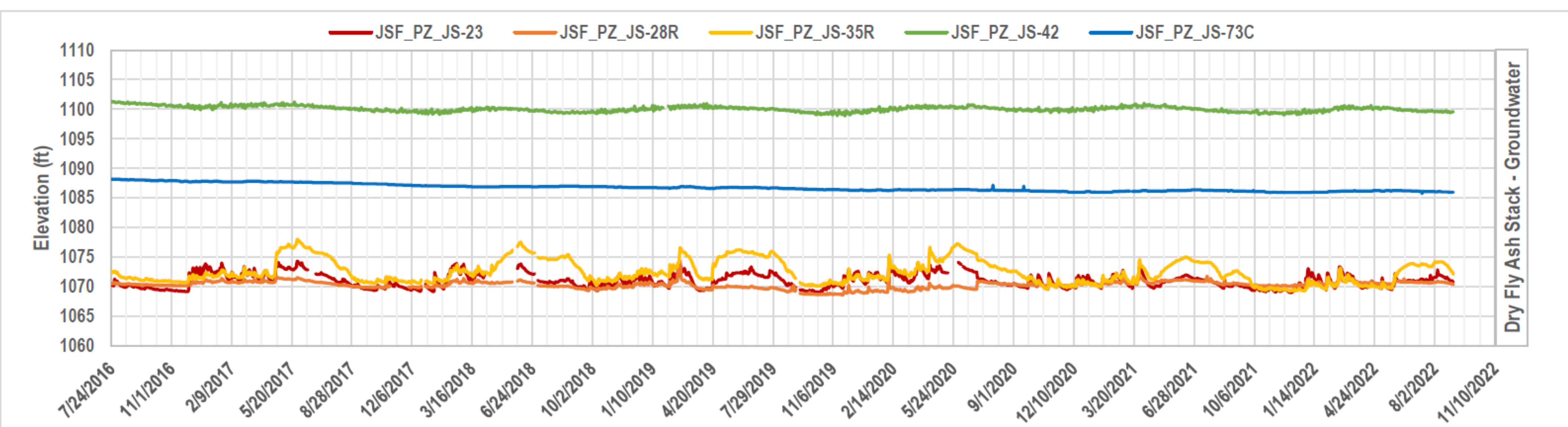
Project Location
Rogersville, Tennessee

Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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







Stantec

TVA

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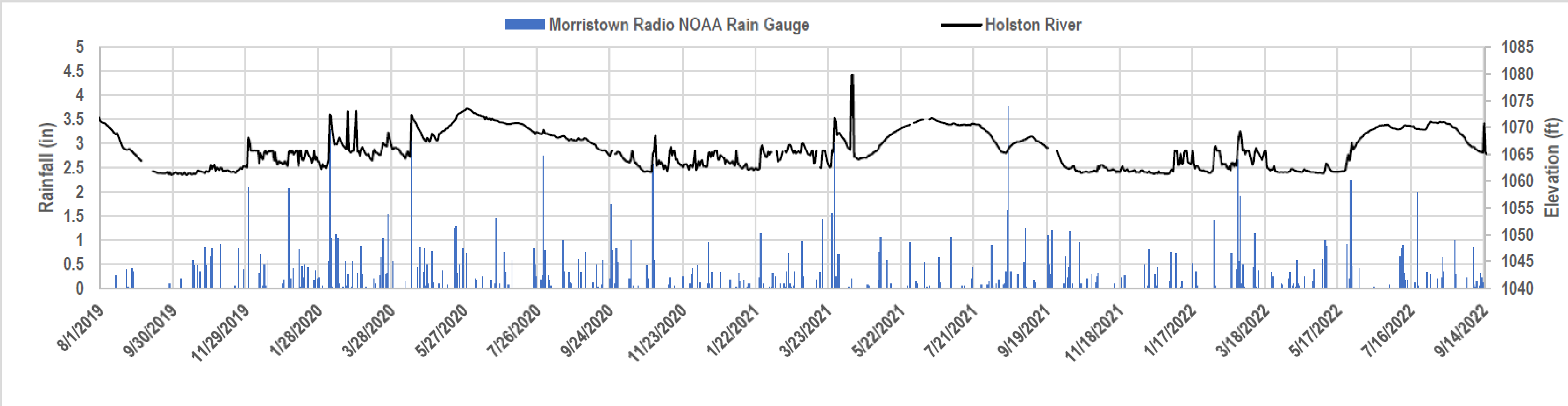

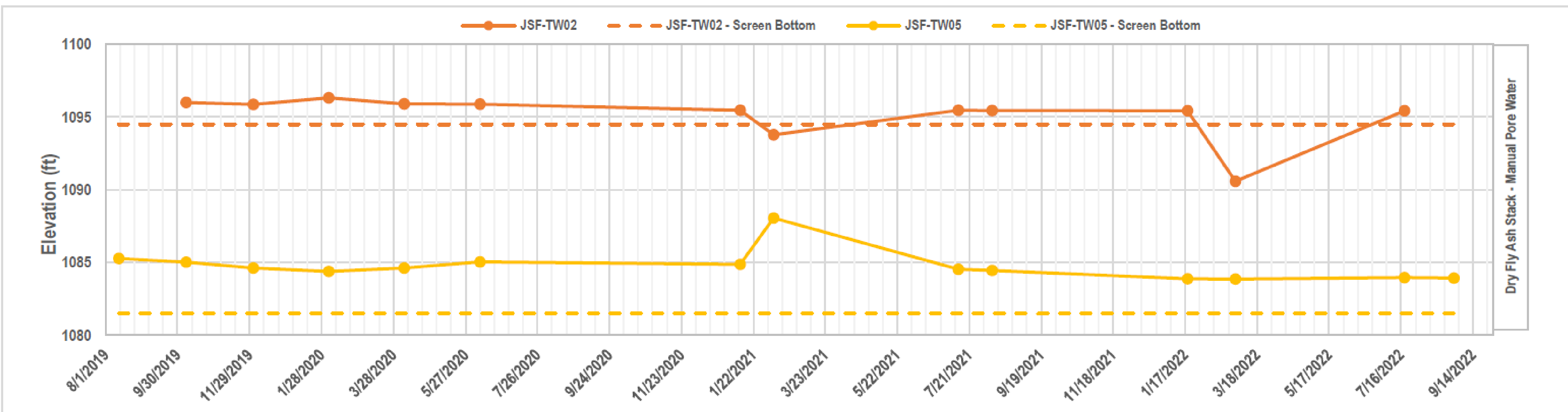

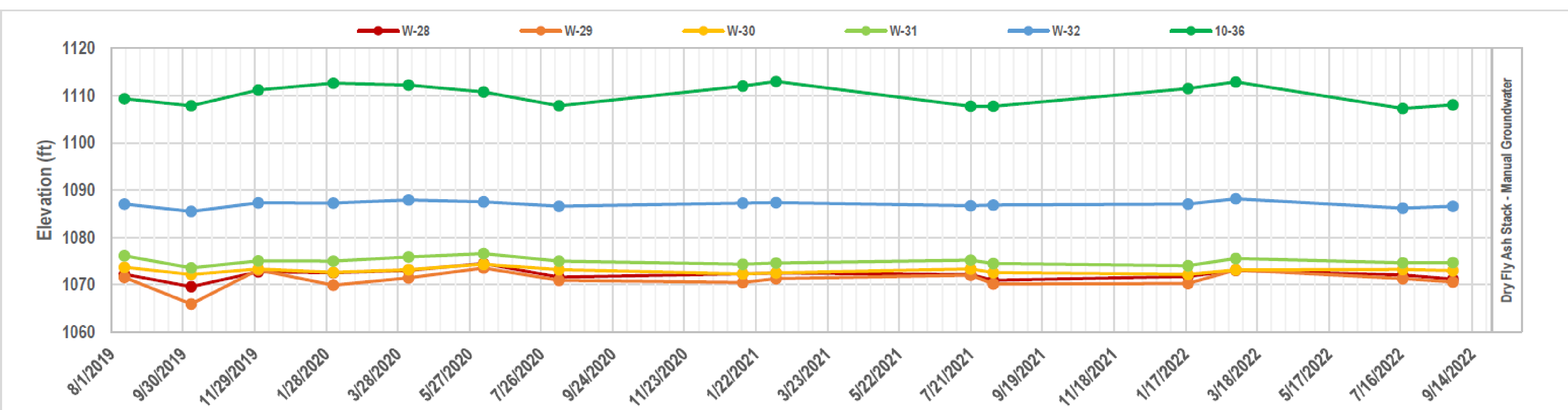

Figure No.
H.1-11b

Title
Manually Gauged Instrument Hydrographs - Dry Fly Ash Stack

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec
TVA

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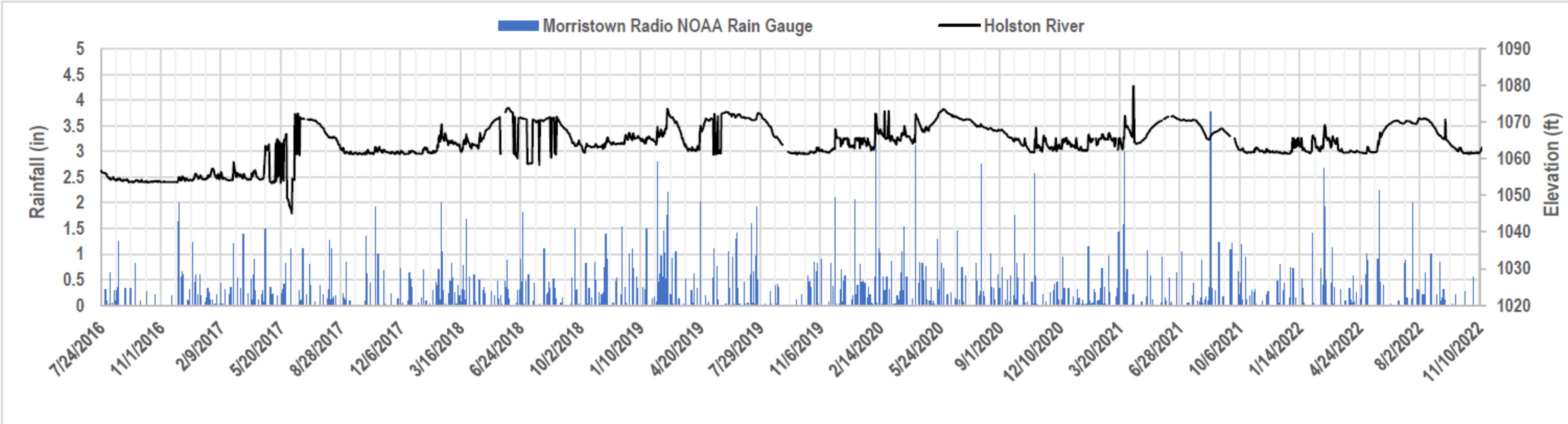
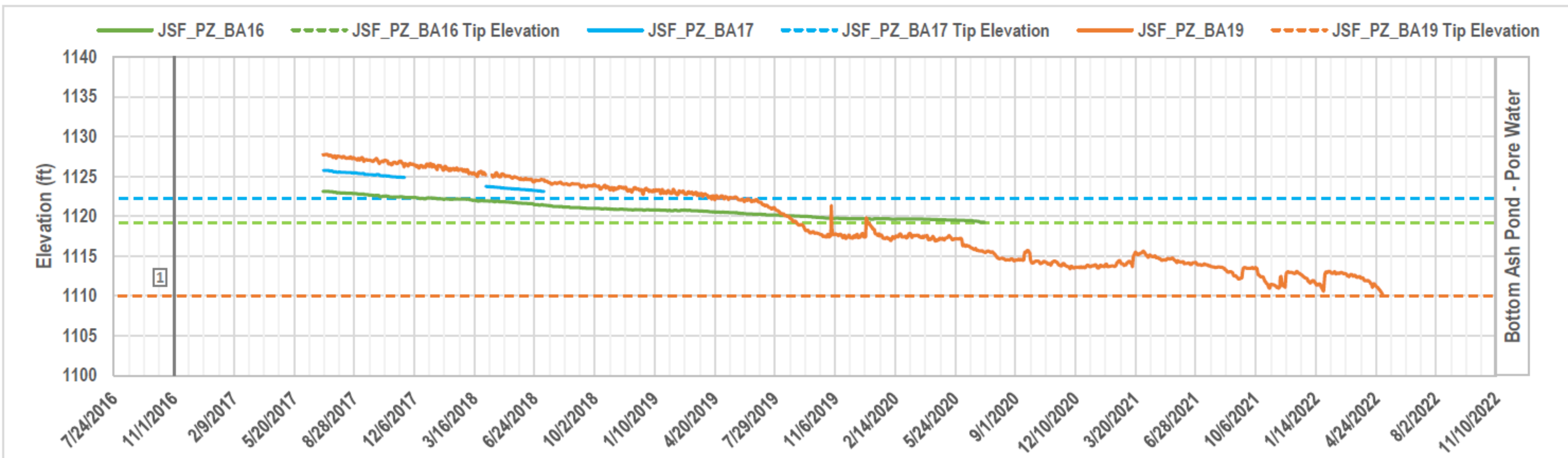
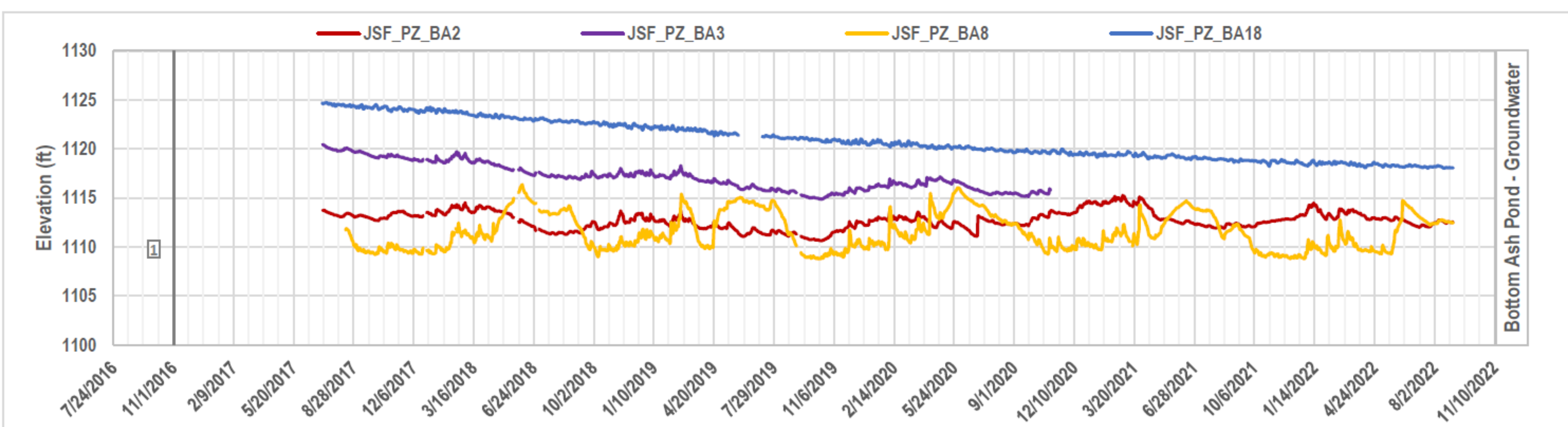






Timeline:

1 - BAP Liner Installation Completed

Figure No.
H.1-12a

Title
Automated Instrument Hydrographs - Bottom Ash Pond

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

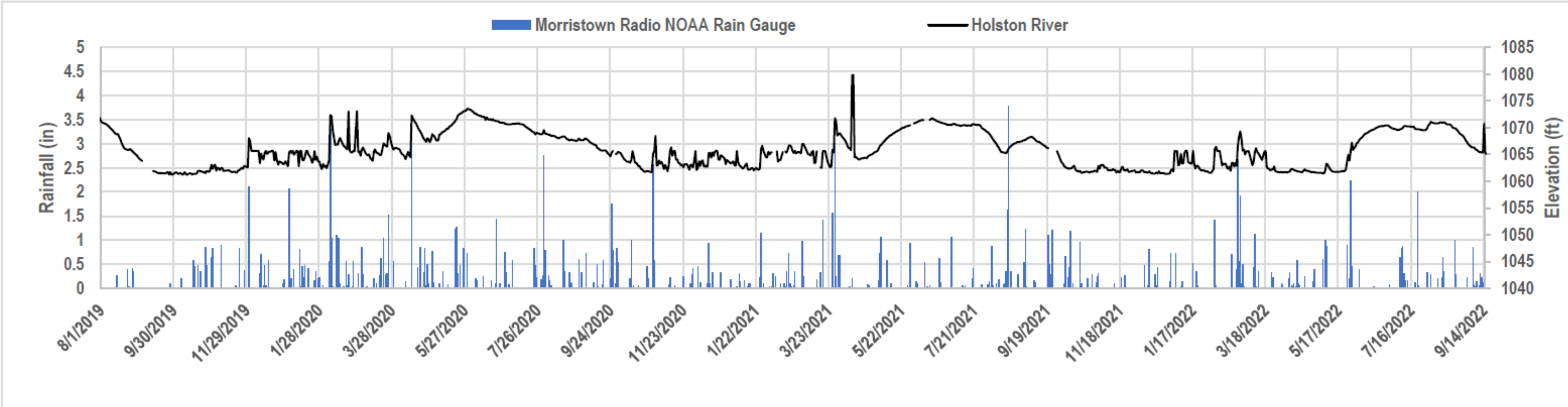
Project Location
Rogersville, Tennessee

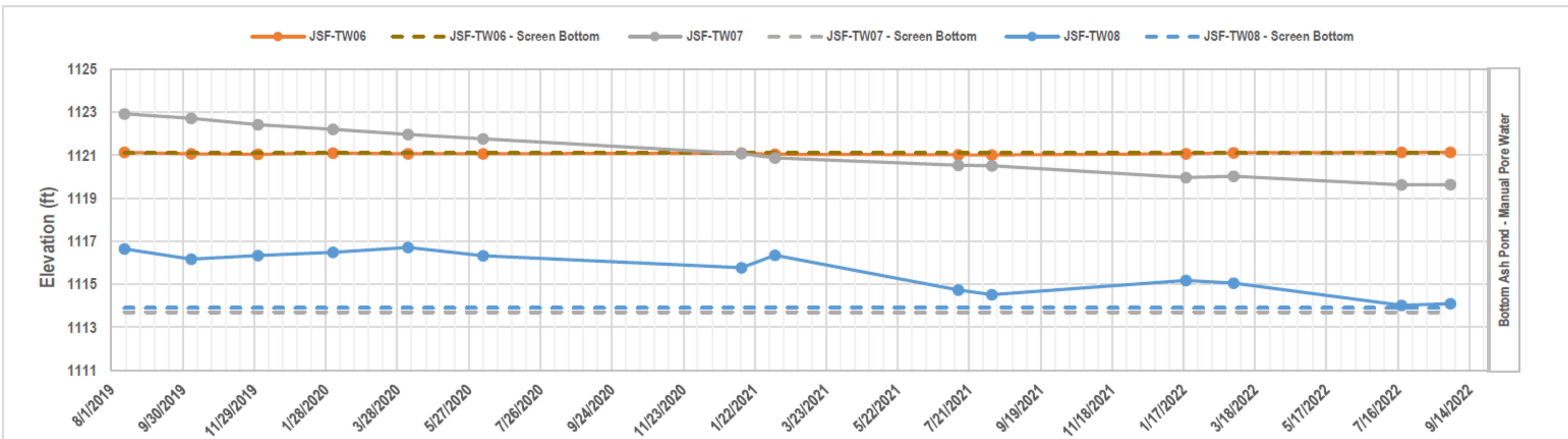
Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec

TVA





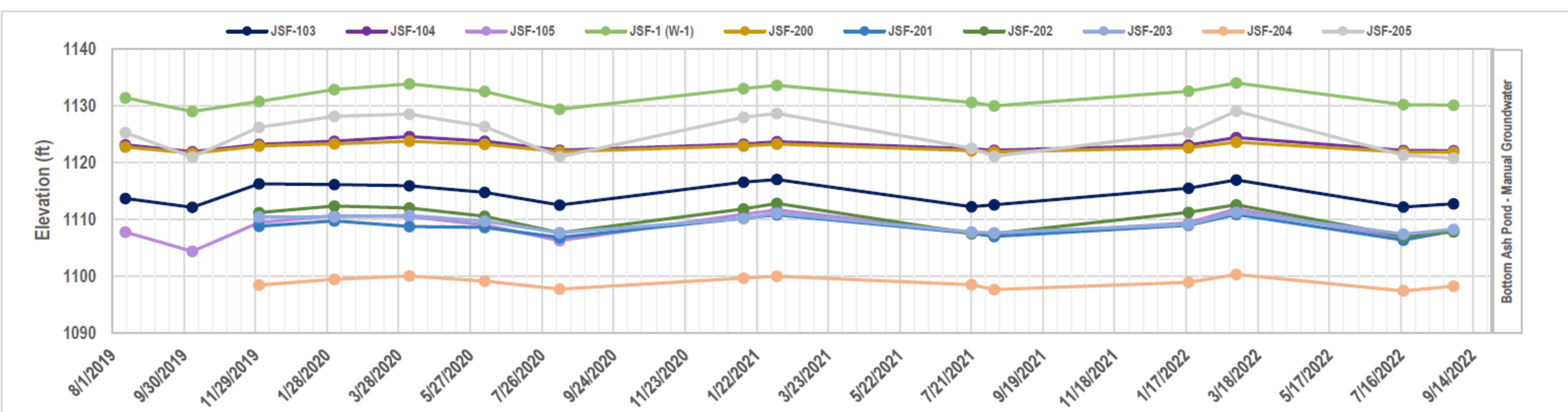


Figure No.

H.1-12b

Title

Manually Gauged Instrument Hydrographs - Bottom Ash Pond

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

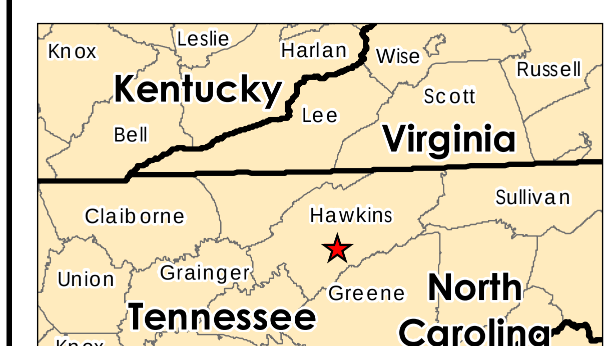
Project Location

Rogersville, Tennessee

Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

Legend

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



Stantec

TVA

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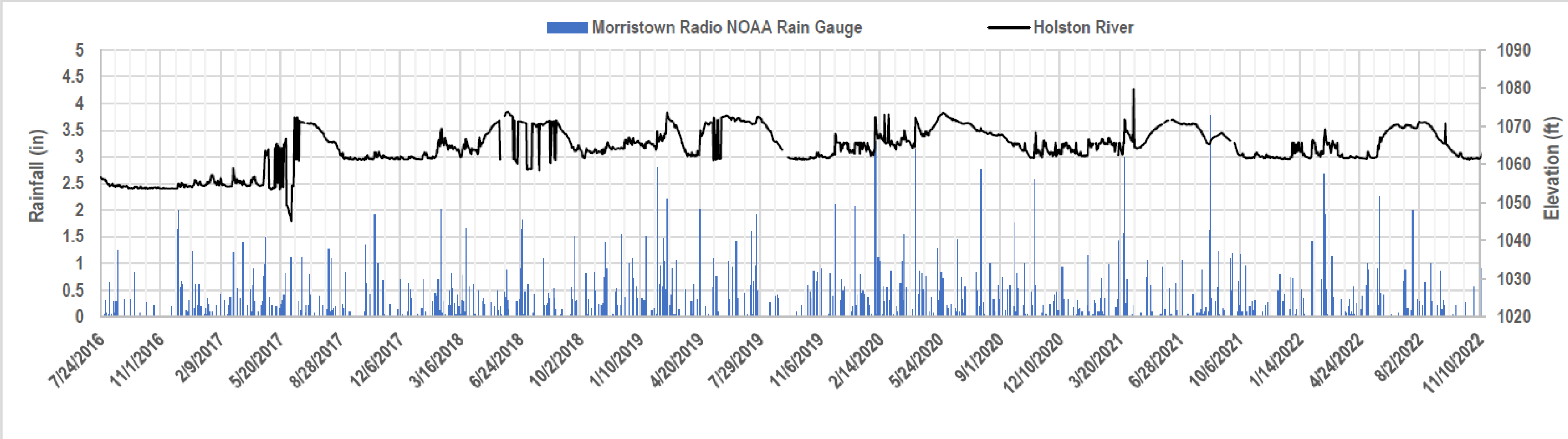

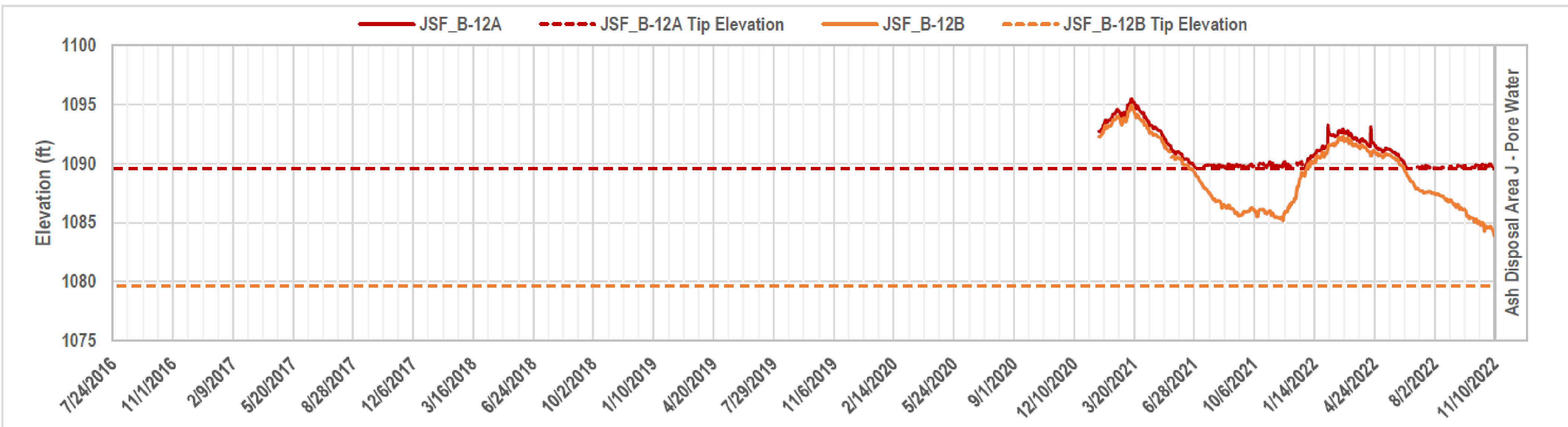

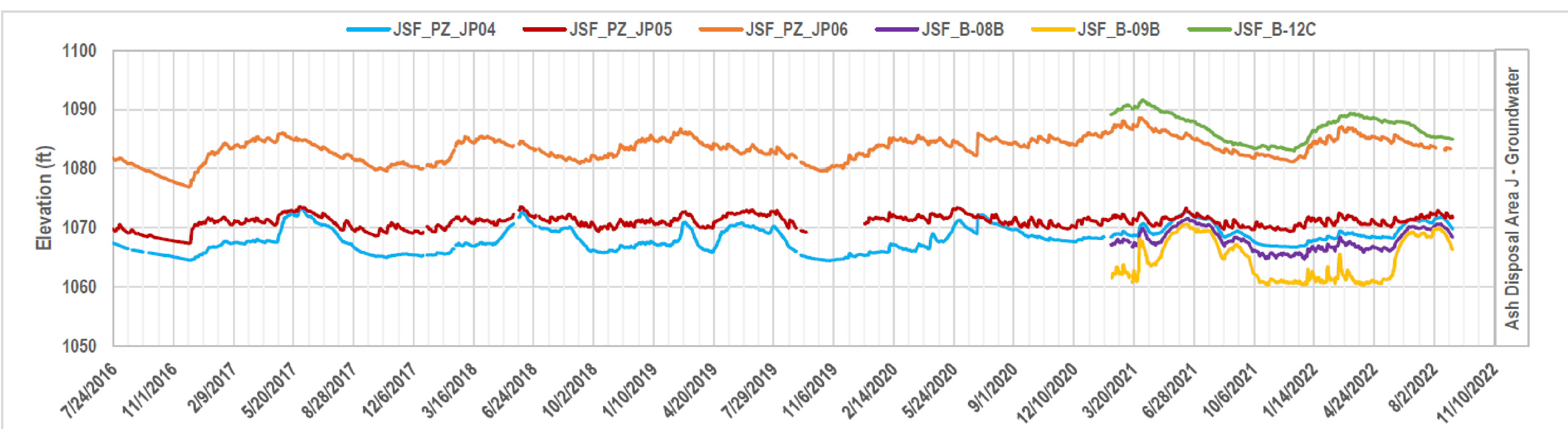

Figure No.
H.1-13a

Title
Automated Instrument Hydrographs - Ash Disposal Area J

Client/Project
175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee
Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec
TVA

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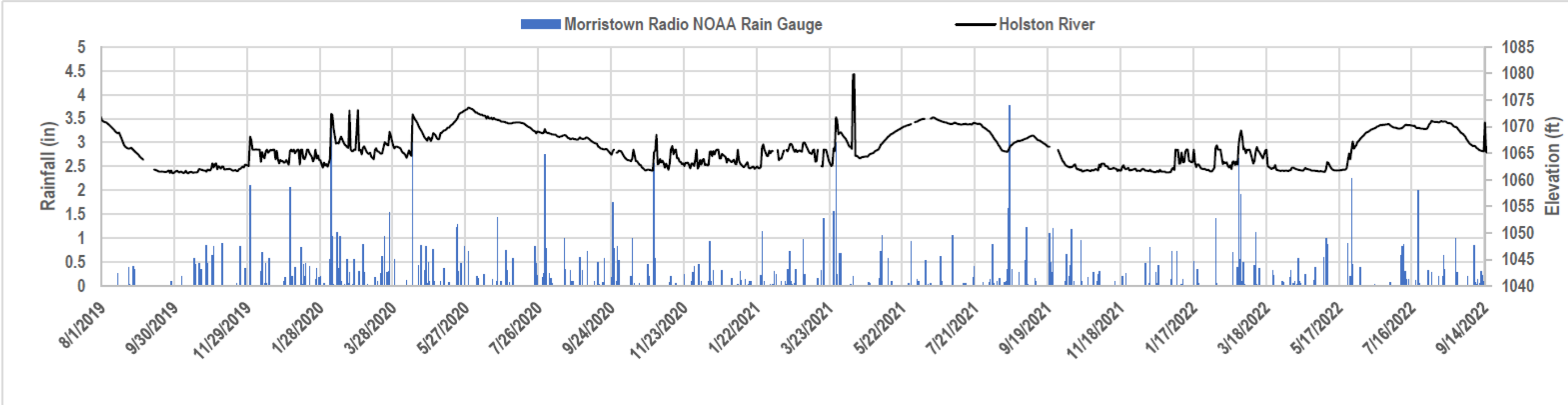
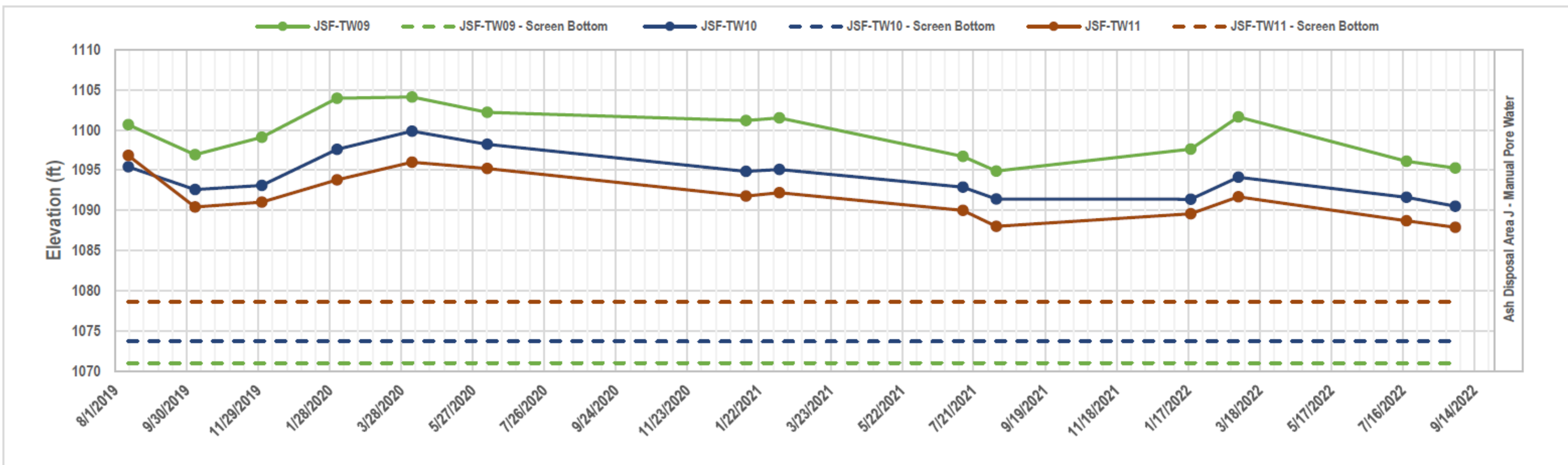
Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.





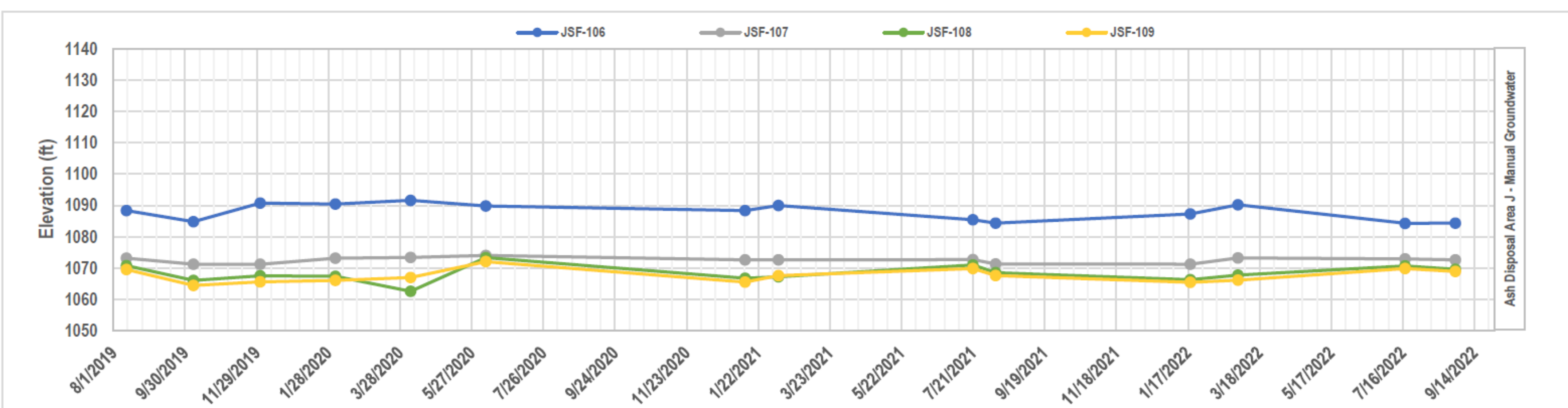


Figure No.
H.1-13b

Title
Manually Gauged Instrument Hydrographs - Ash Disposal Area J

Client/Project
175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee
Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec

TVA

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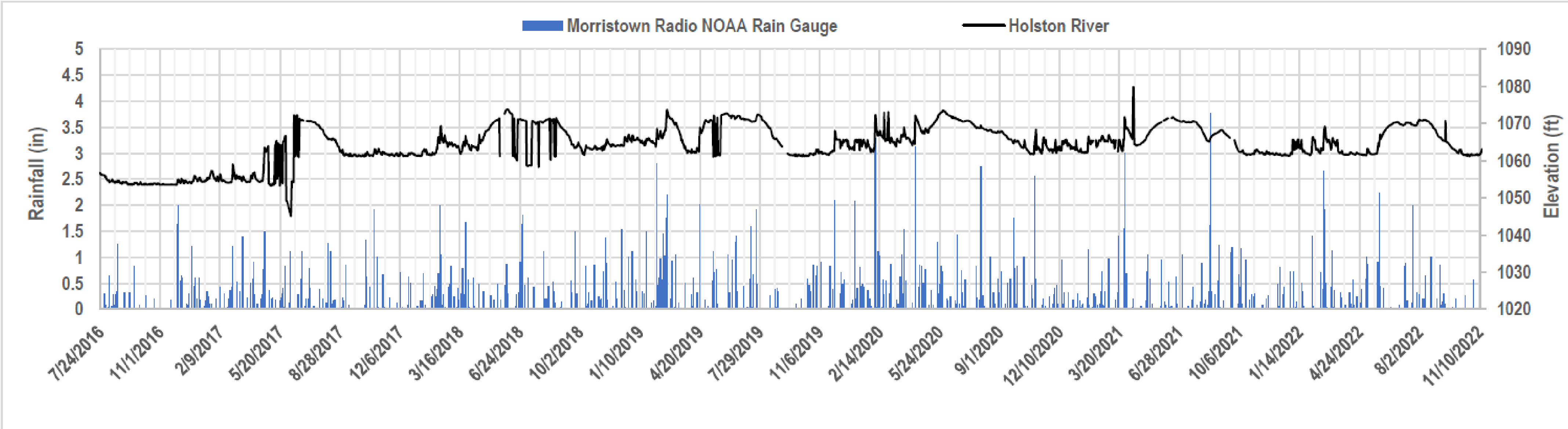
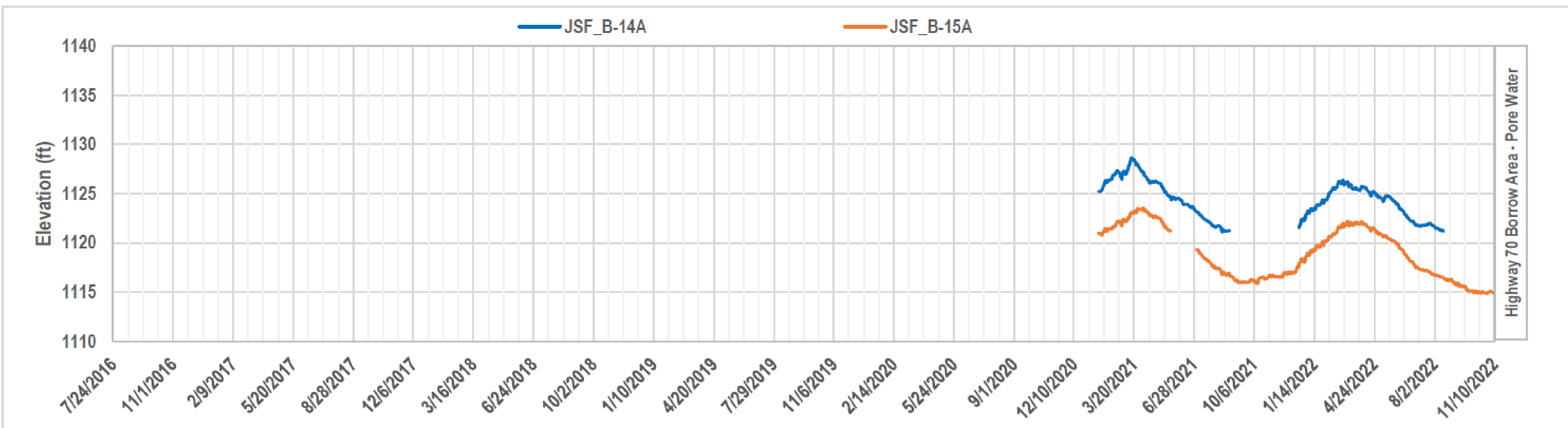




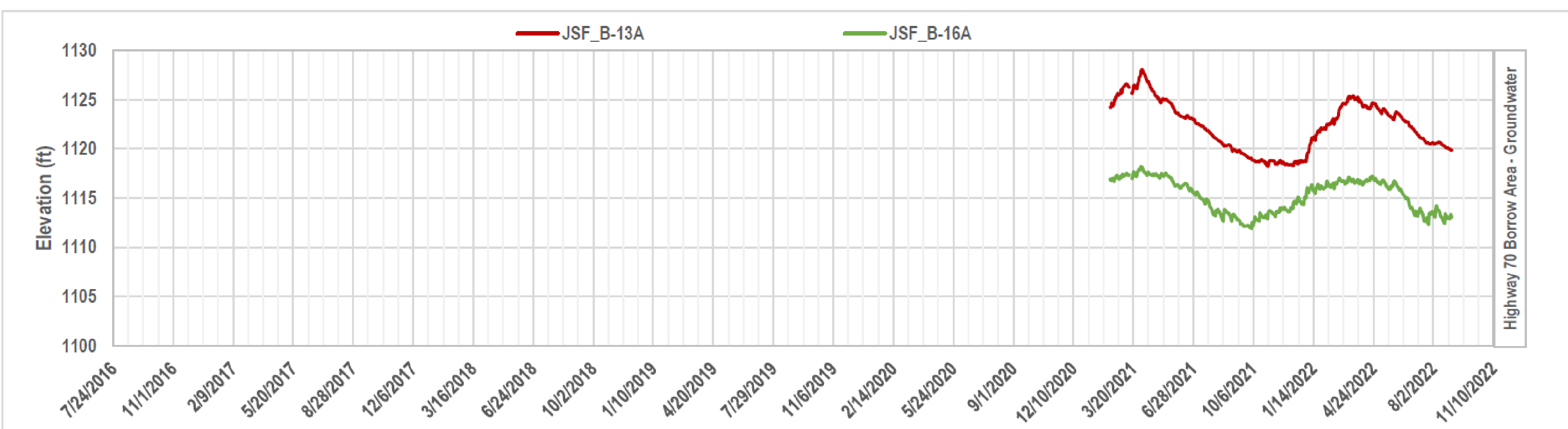


Figure No.
H.1-14a

Title
Automated Instrument Hydrographs - Highway 70 Borrow Area

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

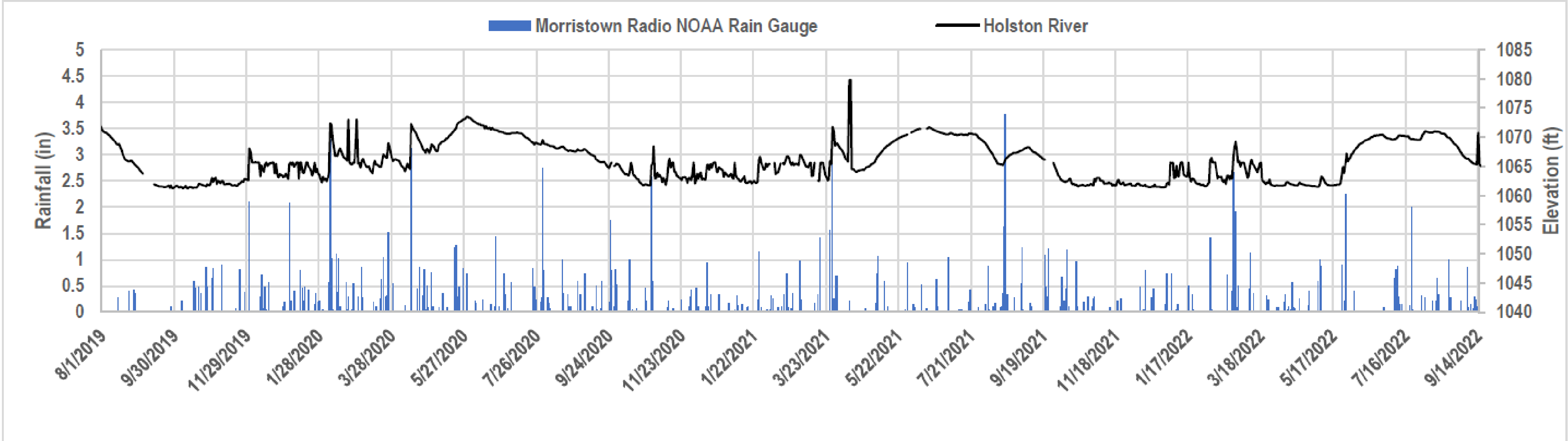
Project Location
Rogersville, Tennessee

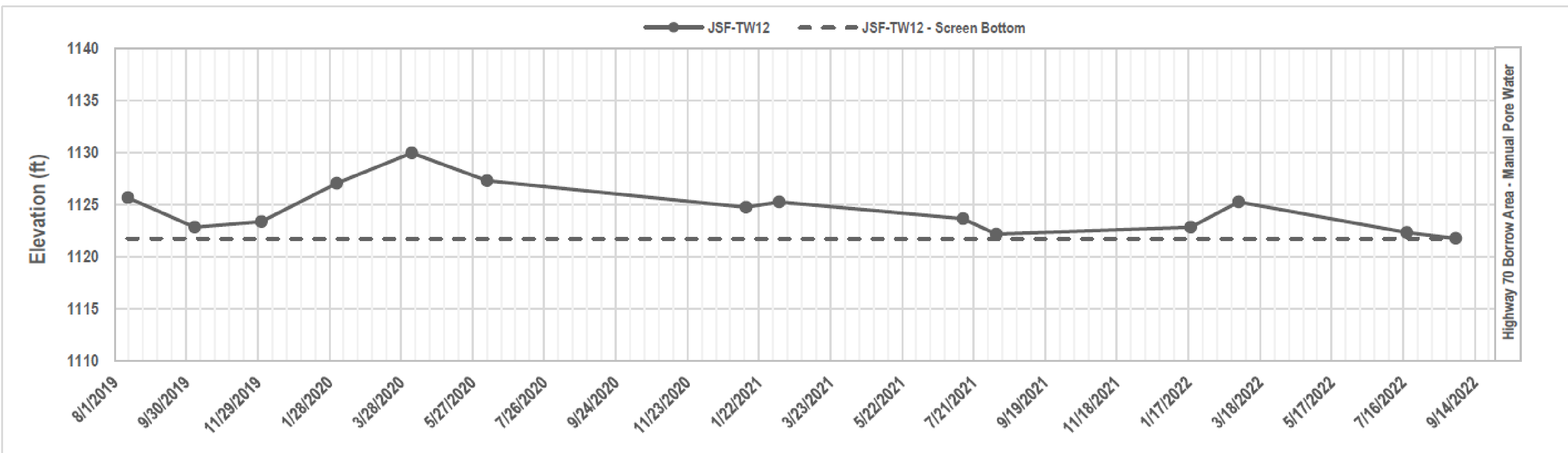
Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec

TVA





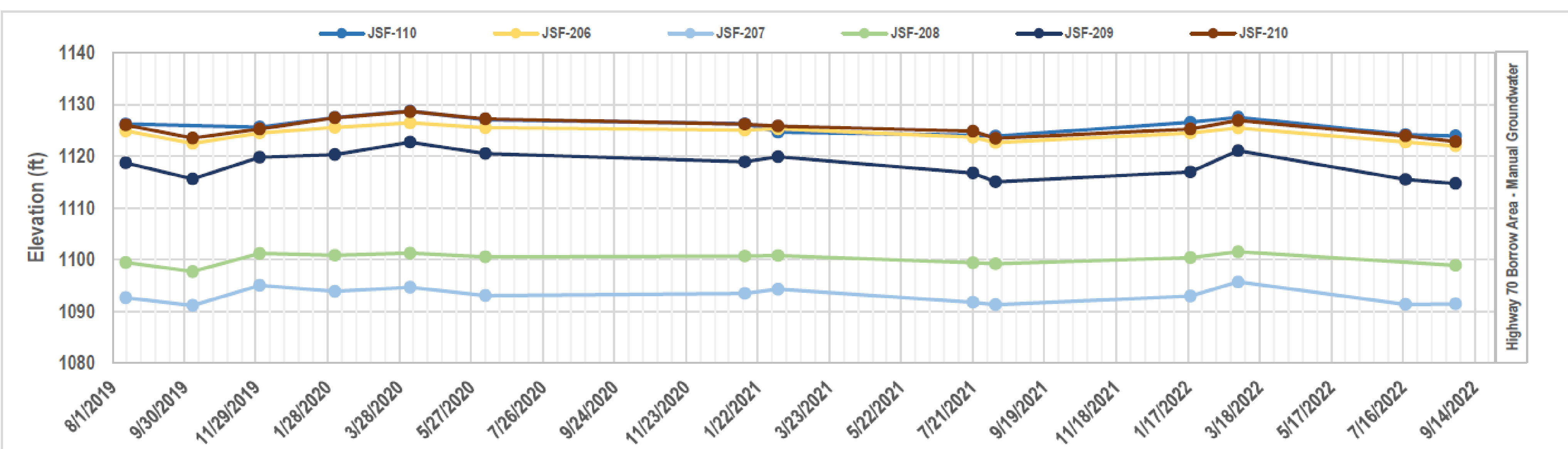


Figure No.
H.1-14b

Title
Manually Gauged Instrument Hydrographs - Highway 70 Borrow Area

Client/Project 175568225
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

Prepared by DMB on 2022-11-09
Technical Review by BL on 2022-11-09

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

Stantec TVA

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Exhibit No.
H.1-15

Title
Summary of Statistical Evaluation of Groundwater Analytical Results for CCR Rule Appendix IV and TDEC Appendix I Constituents - Ash Disposal Area J

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2023-04-20
Technical Review by LP on 2023-04-20

0 200 400 600 800 Feet
1:2,400 (At original document size of 22x34)

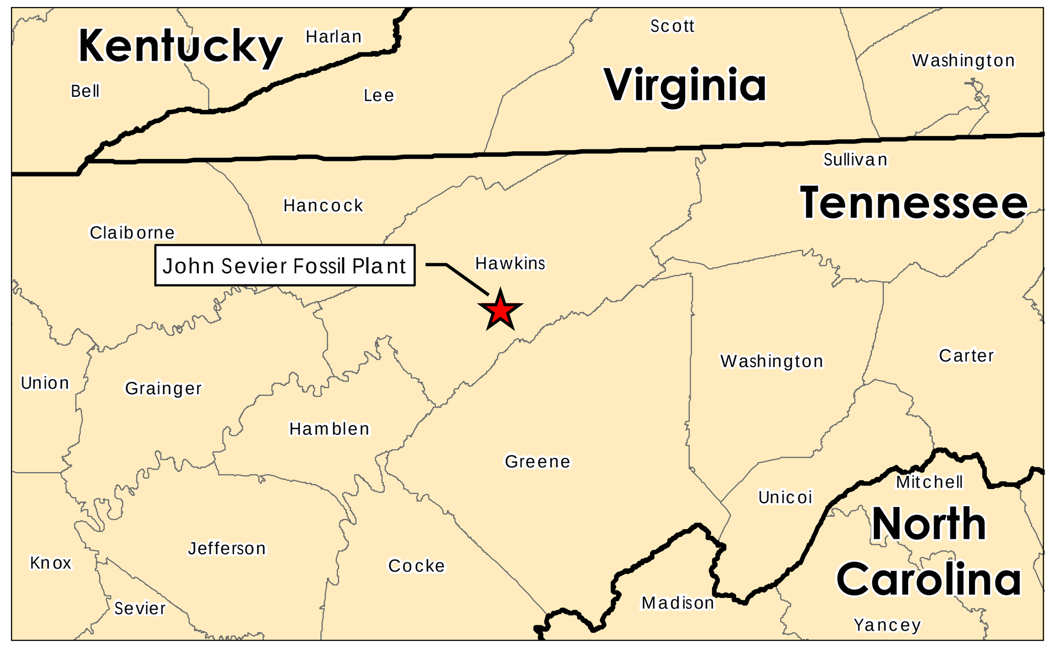
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec
TVA

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Exhibit No.

H.1-16

Title **Summary of Statistical Evaluation of Groundwater Analytical Results for CCR Rule Appendix IV and TDEC Appendix I Constituents - Bottom Ash Pond and Dry Fly Ash Stack**

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2022-11-09
Technical Review by LP on 2022-11-09

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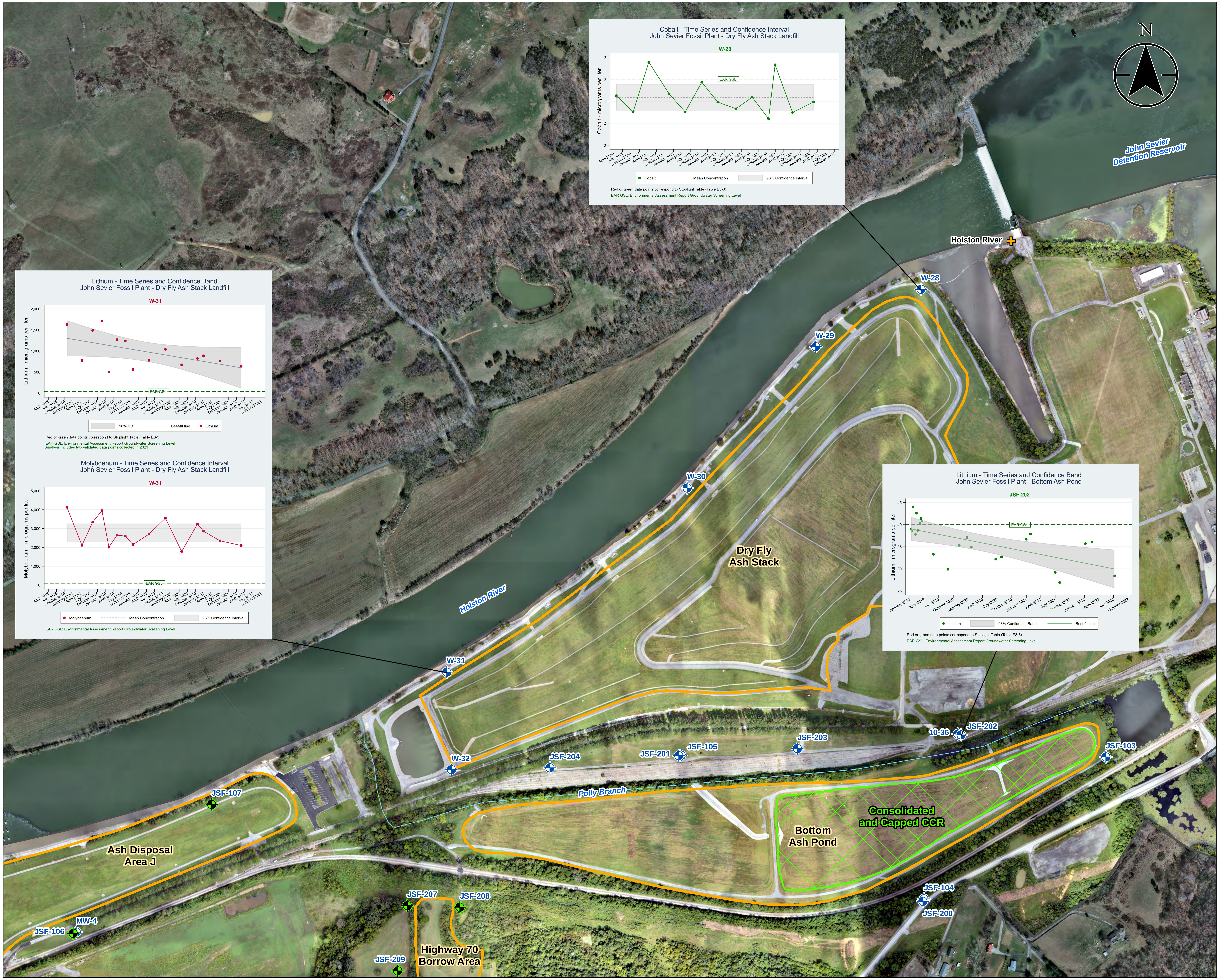
1:3,600 (At original document size of 22x34)



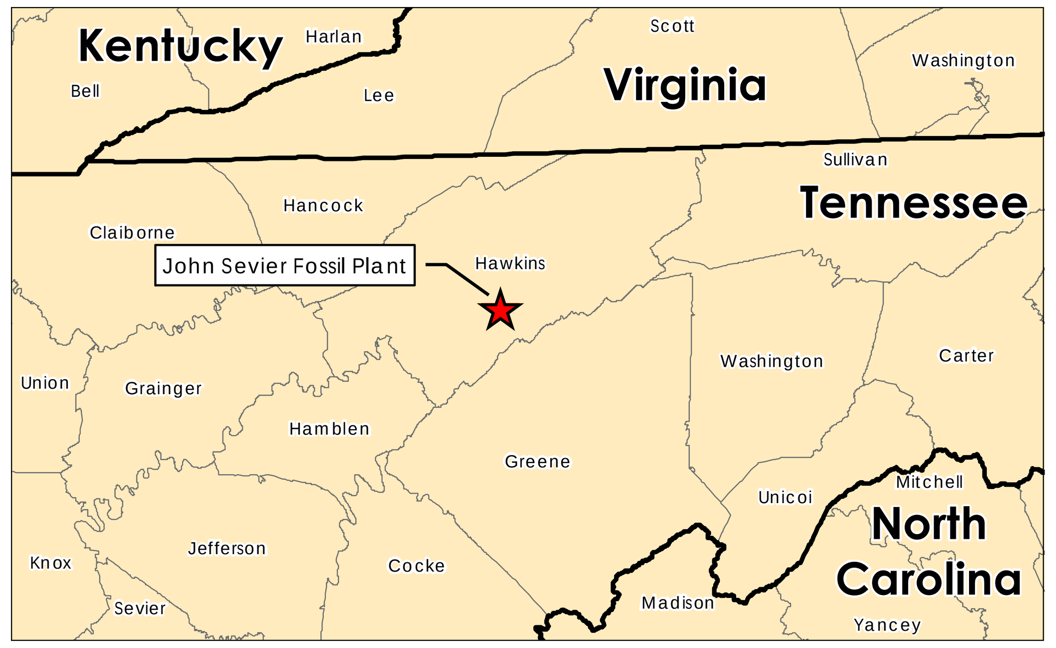
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Holston River Gauge
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



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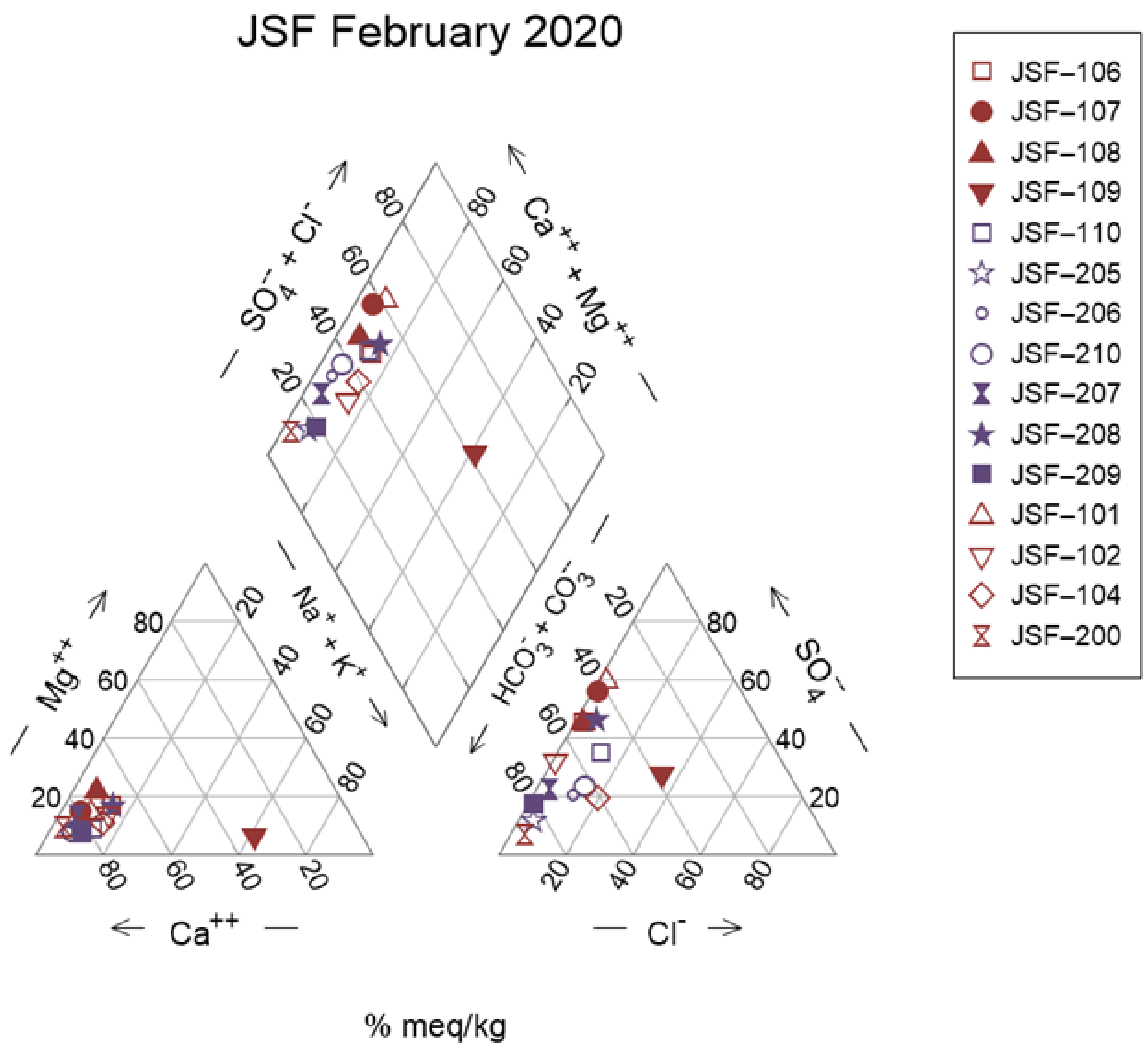

Figure No.

H.1-17

Title

Piper Diagram - February 2020

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by LMB on 2021-11-04
Technical Review by BL on 2021-11-04

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

ATTACHMENT H.1-A POLARIZED LIGHT MICROSCOPY LABORATORY REPORTS

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

October 21, 2021

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

RE: JSF Supplemental PLM – Analytical Report
RJ Lee Group Project Number COH1063779-0

Dear Mr. Thomas,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 19 samples on October 5, 2021 associated with Tennessee Valley Authority (TVA) JSF Supplemental. The samples were logged into RJ Lee Group project number COH1063779-0 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

Chain of Custody

RJ Lee Group Work Order #: COH1063779-0
Project Name/Case #: John Sevier Fossil Plant

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
10549775	JSF-SS-DFAS-SB01-11.8/12.0-20210927	10/05/2021 1:32 PM EDT
10549776	JSF-SS-DFAS-SB01-13.8/14.0-20210927	10/05/2021 1:32 PM EDT
10549777	JSF-SS-DFAS-SB01-15.8/16.0-20210927	10/05/2021 1:32 PM EDT
10549778	JSF-SS-DFAS-SB01-17.8/18.0-20210927	10/05/2021 1:32 PM EDT
10549779	JSF-SS-DFAS-SB01-19.8/20.0-20210927	10/05/2021 1:32 PM EDT
10549780	JSF-SS-DFAS-SB01-21.8/22.0-20210927	10/05/2021 1:32 PM EDT
10549781	JSF-SS-DFAS-SB04-1.8/2.0-20210927	10/05/2021 1:32 PM EDT
10549782	JSF-SS-DFAS-SB04-3.8/4.0-20210927	10/05/2021 1:32 PM EDT
10549783	JSF-SS-DFAS-SB04-5.8/6.0-20210928	10/05/2021 1:32 PM EDT
10549784	JSF-SS-DFAS-SB04-7.8/8.0-20210928	10/05/2021 1:32 PM EDT
10549785	QC-JSF-SS-DFAS-SB04-7.8/8.0-20210928	10/05/2021 1:32 PM EDT
10549786	JSF-SS-DFAS-SB04-9.8/10.0-20210928	10/05/2021 1:32 PM EDT
10549787	JSF-SS-DFAS-SB04-11.8/12.0-20210929	10/05/2021 1:32 PM EDT
10549788	JSF-SS-DFAS-SB04-13.8/14.0-20210929	10/05/2021 1:32 PM EDT
10549789	QC-JSF-SS-DFAS-SB04-13.8/4.0-20210929	10/05/2021 1:32 PM EDT
10549790	JSF-SS-DFAS-SB04-15.8/16.0-20210929	10/05/2021 1:32 PM EDT
10549791	JSF-SS-DFAS-SB04-17.8/18.0-20210929	10/05/2021 1:32 PM EDT
10549792	JSF-SS-DFAS-SB04-19.8/20.0-20210929	10/05/2021 1:32 PM EDT
10549793	JSF-SS-DFAS-SB04-21.8/22.0-20210929	10/05/2021 1:32 PM EDT
10549794	JSF-SS-DUP03-20210929	10/05/2021 1:32 PM EDT
10549795	JSF-SS-DUP04-20210929	10/05/2021 1:32 PM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express	
	Company: TVA Bull Run Fossil Plant		**Date:** 10/05/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed	
	Company: RJ Lee Group, Inc.		**Date:** 10/05/2021

	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:	10/5/2021	Log In Date:	10/6/2021
Time Received:	1:32 PM	By:	Brianna Zidek	COC# :	JSF_SI_09272021_2C
Project:	COH1063779-0	# Coolers Received	1	Means of Shipment:	FedEx
Air Bill:	2844 8393 4693				

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 10/6/21

Analyst Signature: Bri Zi 10/6/21

Manager Signature: [signature] 10/6/21

TVA Tennessee Valley Authority

TVA Environmental Investigations

COH1063779-0

COOLER No.:	1	of	1
COC No:	JSF_SI_09272021_2C		
_1_ of _2_ Pages			
Task Desc:	JSF_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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	C. Sexton / K. Nguyen/ S. Stanley
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville; State, Zip: TN, 37057	City/State	Nashville, TN; Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/4/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		SRS 10/4/2021		
	SRS 10/4/2021				

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

SRS 10/4/2021

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	JSF-SS-DFAS-SB01-11.8/12.0-20210927	JSF-DFAS-SB01	11.8	12.0	SS	G	N	9/27/2021	1318	1	NA	X
2	JSF-SS-DFAS-SB01-13.8/14.0-20210927	JSF-DFAS-SB01	13.8	14.0	SS	G	N	9/27/2021	1320	1	NA	X
3	JSF-SS-DFAS-SB01-15.8/16.0-20210927	JSF-DFAS-SB01	15.8	16.0	SS	G	N	9/27/2021	1400	1	NA	X
4	JSF-SS-DFAS-SB01-17.8/18.0-20210927	JSF-DFAS-SB01	17.8	18.0	SS	G	N	9/27/2021	1403	1	NA	X
5	JSF-SS-DFAS-SB01-19.8/20.0-20210927	JSF-DFAS-SB01	19.8	20.0	SS	G	N	9/27/2021	1405	1	NA	X
6	JSF-SS-DFAS-SB01-21.8/22.0-20210927	JSF-DFAS-SB01	21.8	22.0	SS	G	N	9/27/2021	1420	1	NA	X
7	JSF-SS-DFAS-SB04-1.8/2.0-20210927	JSF-DFAS-SB04	1.8	2.0	SS	G	N	9/27/2021	1630	1	NA	X
8	JSF-SS-DFAS-SB04-3.8/4.0-20210927	JSF-DFAS-SB04	3.8	4.0	SS	G	N	9/27/2021	1635	1	NA	X
9	JSF-SS-DFAS-SB04-5.8/6.0-20210928	JSF-DFAS-SB04	5.8	6.0	SS	G	N	9/28/2021	1554	1	NA	X
10	JSF-SS-DFAS-SB04-7.8/8.0-20210928	JSF-DFAS-SB04	7.8	8.0	SS	G	N	9/28/2021	1559	1	NA	X
11	JSF-SS-DFAS-SB04-9.8/10.0-20210928	JSF-DFAS-SB04	9.8	10.0	SS	G	N	9/28/2021	1604	1	NA	X
12	JSF-SS-DFAS-SB04-11.8/12.0-20210929	JSF-DFAS-SB04	11.8	12.0	SS	G	N	9/29/2021	0848	1	N/A	X
13	JSF-SS-DFAS-SB04-13.8/14.0-20210929	JSF-DFAS-SB04	13.8	14.0	SS	G	N	9/29/2021	0853	1	N/A	X

SRS 10/4/2021 SRS 10/4/2021 SRS 10/4/2021

Additional Comments/Special Instructions:

SRS 10/4/2021

RELINQISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Kevin Nguyen / Stantec	9/28/2021	0701	[signature]	09/28/2021	0701	☐ Yes ☐ No	☐ Yes ☑ No	☑ Yes ☐ No	☐ Yes ☑ No
Mark Buckreis/Stantc	10/01/2021	0821	Scott R. Stanley	10/01/2021	0821	☐ Yes ☐ No	☐ Yes ☑ No	☑ Yes ☐ No	☐ Yes ☑ No
Scott Stanley/Stantc	10/04/2021	1045	[signature]	10/5/21	1:32	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
SRS 10/4/2021						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantc Scott R. Stanley

Form TVA 30067A

TVA Tennessee Valley Authority

TVA Environmental Investigations

COH1063779-0

COOLER No.:	1	of	1
COC No:	JSF_SI_09272021_2C		
2 of 2 Pages			
Task Desc:	JSF_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:

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

SRS 10/4/2021

Required Project Information:

Site ID #:	JOHN SEVIER FOSSIL PLANT		
Project #:	175568225		
Site Address	Plant 611 Old Hwy 70 S		
City	Rogersville	State, Zip:	TN, 37057
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:	prthomas0@tva.gov		

SRS 10/4/2021

Required Sampler Information

Sampler:	C. Sexton / K. Nguyen/ S. Stanley		
Sampling Company:	Stantec		
Address	601 Grassmere Park Unite 22		
City/State	Nashville, TN	Phone No:	615-885-1144
Sampling Team Number:	2		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

SRS 10/4/2021

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

SRS 10/4/2021

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	JSF-SS-DFAS-SB04-15.8/16.0-20210929	JSF-DFAS-SB04	15.8	16.0	SS	G	N	9/29/2021	0924	1	NA	X
2	JSF-SS-DFAS-SB04-17.8/18.0-20210929	JSF-DFAS-SB04	17.8	18.0	SS	G	N	9/29/2021	0928	1	NA	X
3	JSF-SS-DFAS-SB04-19.8/20.0-20210929	JSF-DFAS-SB04	19.8	20.0	SS	G	N	9/29/2021	0933	1	NA	X
4	JSF-SS-DFAS-SB04-21.8/22.0-20210929	JSF-DFAS-SB04	21.8	22.0	SS	G	N	9/29/2021	1058	1	NA	X
5	JSF-SS-DUP03-20210929	-	-	-	SS	G	FD	9/29/2021	-	1	NA	X
6	JSF-SS-DUP04-20210929	-	-	-	SS	G	FD	9/29/2021	-	1	NA	X

SRS 10/4/2021

Additional Comments/Special Instructions:

SRS 10/4/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Kevin Nguyen / Stantec	9/28/2021	0701	[signature]	09/28/2021	0701	☐ Yes ☐ No	☐ Yes ☑ No	☑ Yes ☐ No	☐ Yes ☑ No
Mark Buckreis/Stantc	10/01/2021	0821	Scott R. Stanley	10/01/2021	0821	☐ Yes ☐ No	☐ Yes ☑ No	☑ Yes ☐ No	☐ Yes ☑ No
Scott Stanley/Stantc	10/04/2021	1045	[signature]	10/5/21	1:32	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

SRS 10/4/2021

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantc [signature]

Form TVA 30067A

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10549775	JSF-SS-DFAS-SB01-11.8/12.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549776	JSF-SS-DFAS-SB01-13.8/14.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549777	JSF-SS-DFAS-SB01-15.8/16.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549778	JSF-SS-DFAS-SB01-17.8/18.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549779	JSF-SS-DFAS-SB01-19.8/20.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549780	JSF-SS-DFAS-SB01-21.8/22.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549781	JSF-SS-DFAS-SB04-1.8/2.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549782	JSF-SS-DFAS-SB04-3.8/4.0-20210927	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549783	JSF-SS-DFAS-SB04-5.8/6.0-20210928	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549784	JSF-SS-DFAS-SB04-7.8/8.0-20210928	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549785	QC-JSF-SS-DFAS-SB04-7.8/8.0-20210928	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549786	JSF-SS-DFAS-SB04-9.8/10.0-20210928	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549787	JSF-SS-DFAS-SB04-11.8/12.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549788	JSF-SS-DFAS-SB04-13.8/14.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549789	QC-JSF-SS-DFAS-SB04-13.8/4.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549790	JSF-SS-DFAS-SB04-15.8/16.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549791	JSF-SS-DFAS-SB04-17.8/18.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549792	JSF-SS-DFAS-SB04-19.8/20.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549793	JSF-SS-DFAS-SB04-21.8/22.0-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549794	JSF-SS-DUP03-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693
10549795	JSF-SS-DUP04-20210929	COH1063779-0	10/06/2021 13:23	10/05/2021 13:32	Fly Ash Determination by PLM	10/13/2021 13:18	2844 8393 4693

Appendix B

Mineral Identification Report

RJ LeeGroup, Inc.

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
TVA Bull Run Fossil Plant
1265 Edgemoor Road
Clinton, TN 37716 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 10/21/2021
Sample Received Date: 10/05/2021
RJLG Project: COH1063779-0
Customer COC: JSF_SI_09272021_2C
Purchase Order:
Analytical Method: Fly Ash Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB01-11.8/12.0-20210927	10549775	10/21/2021	09/27/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB01-13.8/14.0-20210927	10549776	10/21/2021	09/27/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB01-15.8/16.0-20210927	10549777	10/21/2021	09/27/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB01-17.8/18.0-20210927	10549778	10/21/2021	09/27/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB01-19.8/20.0-20210927	10549779	10/21/2021	09/27/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB01-21.8/22.0-20210927	10549780	10/21/2021	09/27/2021	2%	Carbonate Clay Opaques Quartz	Gray Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB04-1.8/2.0-20210927	10549781	10/21/2021	09/27/2021	3%	Carbonate Clay Opaques Quartz	Gray Sediment.
JSF-SS-DFAS-SB04-11.8/12.0-20210929	10549787	10/21/2021	09/29/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB04-13.8/14.0-20210929	10549788	10/21/2021	09/29/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB04-15.8/16.0-20210929	10549790	10/21/2021	09/29/2021	1%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB04-17.8/18.0-20210929	10549791	10/21/2021	09/29/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB04-19.8/20.0-20210929	10549792	10/21/2021	09/29/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB04-21.8/22.0-20210929	10549793	10/21/2021	09/29/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Yellowish Brown Sediment
JSF-SS-DFAS-SB04-3.8/4.0-20210927	10549782	10/21/2021	09/27/2021	1%	Carbonate Clay Opaques Quartz	Gray Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB04-5.8/6.0-20210928	10549783	10/21/2021	09/28/2021	1%	Clay Opaques Quartz	Beige Sediment.
JSF-SS-DFAS-SB04-7.8/8.0-20210928	10549784	10/21/2021	09/28/2021	1%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB04-9.8/10.0-20210928	10549786	10/21/2021	09/28/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DUP03-2021092	910549794	10/21/2021		ND	Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DUP04-2021092	910549795	10/21/2021		ND	Clay Feldspar Mica Misc. Silicates Opaques Quartz	Yellow Sediment
QC-JSF-SS-DFAS-SB04-13.8/4.0-20210929	10549789	10/21/2021	09/29/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
QC-JSF-SS-DFAS-SB04-7.8/8.0-20210928	10549785	10/21/2021	09/28/2021	ND	Clay Diatoms Misc. Silicates Opaques Quartz	Pale Yellow 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.

October 25, 2021

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

RE: JSF Supplemental PLM – Analytical Report
RJ Lee Group Project Number COH1063779-1

Dear Mr. Thomas,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 48 samples on September 28, 2021 associated with Tennessee Valley Authority (TVA) JSF Supplemental. The samples were logged into RJ Lee Group project number COH1063779-1 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with sample labels and custody seals intact. Discrepancies between the samples and COC occurred. 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,

Monica McGrath-Koerner
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A

Chain of Custody Forms

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

Effective Date: October 2019
Form A FOR.002.5

Chain of Custody

RJ Lee Group Work Order #: COH1063779-1
Project Name/Case #: John Sevier Fossil Plant

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
10549807	JSF-SS-DFAS-SB08-2.3/2.5-20210921	09/28/2021 1:33 PM EDT
10549808	JSF-SS-DFAS-SB08-4.8/5.0-20210921	09/28/2021 1:33 PM EDT
10549809	JSF-SS-DFAS-SB08-7.3/7.5-20210921	09/28/2021 1:33 PM EDT
10549810	JSF-SS-DFAS-SB08-9.8/10.0-20210921	09/28/2021 1:33 PM EDT
10549811	JSF-SS-DFAS-SB08-11.8/12.0-20210921	09/28/2021 1:33 PM EDT
10549812	JSF-SS-DFAS-SB08-13.8/14.0-20210921	09/28/2021 1:33 PM EDT
10549813	JSF-SS-DFAS-SB08-15.8/16.0-20210921	09/28/2021 1:33 PM EDT
10549814	JSF-SS-DFAS-SB08-17.8/18.0-20210921	09/28/2021 1:33 PM EDT
10549815	JSF-SS-DFAS-SB08-19.8/20.0-20210921	09/28/2021 1:33 PM EDT
10549816	JSF-SS-DFAS-SB08-21.8/22.0-20210921	09/28/2021 1:33 PM EDT
10549817	QC-JSF-SS-DFAS-SB08-21.8/22.0-20210921	09/28/2021 1:33 PM EDT
10549818	JSF-SS-DFAS-SB08-23.8/24.0-20210921	09/28/2021 1:33 PM EDT
10549819	JSF-SS-DFAS-SB08-25.8/26.0-20210921	09/28/2021 1:33 PM EDT
10549820	JSF-SS-DFAS-SB08-27.8/28.0-20210921	09/28/2021 1:33 PM EDT
10549821	JSF-SS-DFAS-SB08-29.8/30.0-20210921	09/28/2021 1:33 PM EDT
10549822	JSF-SS-DFAS-SB08-31.8/32.0-20210922	09/28/2021 1:33 PM EDT
10549823	JSF-SS-DFAS-SB03-1.8/2.0-20210922	09/28/2021 1:33 PM EDT
10549824	JSF-SS-DFAS-SB03-3.8/4.0-20210922	09/28/2021 1:33 PM EDT
10549825	JSF-SS-DFAS-SB03-5.8/6.0-20210922	09/28/2021 1:33 PM EDT
10549826	JSF-SS-DFAS-SB03-7.8/8.0-20210922	09/28/2021 1:33 PM EDT
10549827	JSF-SS-DFAS-SB03-9.8/10.0-20210922	09/28/2021 1:33 PM EDT
10549828	QC-JSF-SS-DFAS-SB03-9.8/10.0-20210922	09/28/2021 1:33 PM EDT
10549829	JSF-SS-DFAS-SB03-11.8/12.0-20210922	09/28/2021 1:33 PM EDT
10549830	JSF-SS-DFAS-SB03-13.8/14.0-20210922	09/28/2021 1:33 PM EDT
10549831	JSF-SS-DFAS-SB03-15.8/16.0-20210923	09/28/2021 1:33 PM EDT
10549832	JSF-SS-DFAS-SB03-17.8/18.0-20210923	09/28/2021 1:33 PM EDT
10549833	JSF-SS-DFAS-SB03-19.8/20.0-20210923	09/28/2021 1:33 PM EDT
10549834	JSF-SS-DFAS-SB03-21.8/22.0-20210923	09/28/2021 1:33 PM EDT
10549835	JSF-SS-DFAS-SB03-23.8/24.0-20210923	09/28/2021 1:33 PM EDT

Sample ID	Client Sample ID	Date Received
10549836	JSF-SS-DFAS-SB03-25.6/25.8-20210923	09/28/2021 1:33 PM EDT
10549837	JSF-SS-DFAS-SB02-1.8/2.0-20210923	09/28/2021 1:33 PM EDT
10549838	JSF-SS-DFAS-SB02-3.8/4.0-20210923	09/28/2021 1:33 PM EDT
10549839	QC-JSF-SS-DFAS-SB02-3.8/4.0-20210923	09/28/2021 1:33 PM EDT
10549840	JSF-SS-DFAS-SB02-5.8/6.0-20210923	09/28/2021 1:33 PM EDT
10549841	JSF-SS-DFAS-SB02-7.8/8.0-20210923	09/28/2021 1:33 PM EDT
10549842	JSF-SS-DFAS-SB02-9.8/10.0-20210923	09/28/2021 1:33 PM EDT
10549843	JSF-SS-DFAS-SB02-10.6/10.8-20210923	09/28/2021 1:33 PM EDT
10549844	JSF-SS-DFAS-SB02-13.8/14.0-20210923	09/28/2021 1:33 PM EDT
10549845	JSF-SS-DFAS-SB02-15.8/16.0-20210923	09/28/2021 1:33 PM EDT
10549846	JSF-SS-DFAS-SB02-17.8/18.0-20210923	09/28/2021 1:33 PM EDT
10549847	JSF-SS-DFAS-SB02-19.8/20.0-20210923	09/28/2021 1:33 PM EDT
10549848	JSF-SS-DFAS-SB02-21.8/22.0-20210923	09/28/2021 1:33 PM EDT
10549849	JSF-SS-DFAS-SB02-23.8/24.0-20210923	09/28/2021 1:33 PM EDT
10549850	QC-JSF-SS-DFAS-SB02-23.8/24.0-20210923	09/28/2021 1:33 PM EDT
10549851	JSF-SS-DFAS-SB02-25.0/25.2-20210924	09/28/2021 1:33 PM EDT
10549852	JSF-SS-DFAS-SB01-1.8/2.0-20210924	09/28/2021 1:33 PM EDT
10549853	JSF-SS-DFAS-SB01-3.8/4.0-20210924	09/28/2021 1:33 PM EDT
10549854	JSF-SS-DFAS-SB01-5.8/6.0-20210924	09/28/2021 1:33 PM EDT
10549855	JSF-SS-DFAS-SB01-7.8/8.0-20210924	09/28/2021 1:33 PM EDT
10549856	JSF-SS-DFAS-SB01-9.0/9.2-20210924	09/28/2021 1:33 PM EDT
10549857	JSF-SS-DUP01-20210921	09/28/2021 1:33 PM EDT
10549858	JSF-SS-DUP02-20210923	09/28/2021 1:33 PM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express
	Company: TVA Bull Run Fossil Plant	**Date:** 09/28/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed
	Company: RJ Lee Group, Inc.	**Date:** 09/28/2021

	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:**

RJ Lee Group
Sample Receipt and Log in Check List

Client:	Tennessee Valley Authority	Date Received:	9/28/2021	Log in Date:	10/6/2021
Time Received:	1:33 PM	By:	Brianna Zidek	COC#:	JSF_SI_09212021_2C
Project:	COH1063779-1	# Coolers Received:	1	Means of Shipment:	FedEx
Air Bill:	6498 5715 0370				

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?	✓		see comments
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

errors between COC & sample labels

Analyst Signature: [signature] 10/7/21

Manager Signature: [signature] 10/07/2021

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063779-1

Box (BH 9/24/21)

COOLER No.:	1	of	1
COC No:	JSF_SI_09212021_1C		
1 of 4 Pages			
Task Desc:	JSF_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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	Benjamin Herries / Abigail Murn
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	3052 Beaumont Centre Circle
		City	Rogersville State, Zip: TN, 37057	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		BH 9/24/21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
BH 9/24/21		BH 9/24/21			

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

BH 9/24/21

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Depth Unit: Feet)	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-DFAS-SB08-2.3/2.5-20210921	DFAS-SB08	2.3	2.5	SS	G	N	9/21/2021	1317	1	NA	X
2	JSF-SS-DFAS-SB08-4.8/5.0-20210921	DFAS-SB08	4.8	5.0	SS	G	N	9/21/2021	1319	1	NA	X
3	JSF-SS-DFAS-SB08-7.3/7.5-20210921	DFAS-SB08	7.3	7.5	SS	G	N	9/21/2021	1345	1	NA	X
4	JSF-SS-DFAS-SB08-9.8/10.0-20210921	DFAS-SB08	9.8	10.0	SS	G	N	9/21/2021	1348	1	NA	X
5	JSF-SS-DFAS-SB08-11.8/12.0-20210921	DFAS-SB08	11.8	12.0	SS	G	N	9/21/2021	1420	1	NA	X
6	JSF-SS-DFAS-SB08-13.8/14.0-20210921	DFAS-SB08	13.8	14.0	SS	G	N	9/21/2021	1421	1	NA	X
7	JSF-SS-DFAS-SB08-15.8/16.0-20210921	DFAS-SB08	15.8	16.0	SS	G	N	9/21/2021	1502	1	NA	X
8	JSF-SS-DFAS-SB08-17.8/18.0-20210921	DFAS-SB08	17.8	18.0	SS	G	N	9/21/2021	1506	1	NA	X
9	JSF-SS-DFAS-SB08-19.8/20.0-20210921	DFAS-SB08	19.8	20.0	SS	G	N	9/21/2021	1508	1	NA	X
10	JSF-SS-DFAS-SB08-21.8/22.0-20210921	DFAS-SB08	21.8	22.0	SS	G	N	9/21/2021	1550	1	NA	X
11	JSF-SS-DFAS-SB08-23.8/24.0-20210921	DFAS-SB08	23.8	24.0	SS	G	N	9/21/2021	1552	1	NA	X
12	JSF-SS-DFAS-SB08-25.8/26.0-20210921	DFAS-SB08	25.8	26.0	SS	G	N	9/21/2021	1616	1	NA	X
13	JSF-SS-DFAS-SB08-27.8/28.0-20210921	DFAS-SB08	27.8	28.0	SS	G	N	9/21/2021	1619	1	NA	X

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Ben Herries / BH / Stantec	9/24/21	1320	[signature]	9/28/21	1:33

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
Fed Ex	Ben Herries [signature]
	ABIGAIL MURN [signature]

Form TVA 30067A

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063779-1

Box (BH 9/24/21)

COOLER No.:	1	of	1
COC No:	JSF_SI_09212021_1C		
2 of 4 Pages			
Task Desc:	JSF_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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	Benjamin Herries / Abigail Murn
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	3052 Beaumont Centre Circle
		City	Rogersville State, Zip: TN, 37057	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		BH 9/24/21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		BH 9/24/21		
BH 9/24/21					

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 (Feet)	End Depth (Feet)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-DFAS-SB08-29.8/30.0-20210921	DFAS-SB08	29.8	30.0	SS	G	N	9/21/2021	1620	1	NA	X
2	JSF-SS-DFAS-SB08-31.8/32.0-20210922	DFAS-SB08	31.8	32.0	SS	G	N	9/22/2021	0826	1	NA	X
3	JSF-SS-DFAS-SB03-1.8/2.0-20210922	DFAS-SB03	1.8	2.0	SS	G	N	9/22/2021	1542	1	NA	X
4	JSF-SS-DFAS-SB03-3.8/4.0-20210922	DFAS-SB03	3.8	4.0	SS	G	N	9/22/2021	1546	1	NA	X
5	JSF-SS-DFAS-SB03-5.8/6.0-20210922	DFAS-SB03	5.8	6.0	SS	G	N	9/22/2021	1608	1	NA	X
6	JSF-SS-DFAS-SB03-7.8/8.0-20210922	DFAS-SB03	7.8	8.0	SS	G	N	9/22/2021	1610	1	NA	X
7	JSF-SS-DFAS-SB03-9.8/10.0-20210922	DFAS-SB03	9.8	10.0	SS	G	N	9/22/2021	1613	1	NA	X
8	JSF-SS-DFAS-SB03-11.8/12.0-20210922	DFAS-SB03	11.8	12.0	SS	G	N	9/22/2021	1631	1	NA	X
9	JSF-SS-DFAS-SB03-13.8/14.0-20210922	DFAS-SB03	13.8	14.0	SS	G	N	9/22/2021	1629	1	NA	X
10	JSF-SS-DFAS-SB03-15.8/16.0-20210923	DFAS-SB03	15.8	16.0	SS	G	N	9/23/2021	0845	1	NA	X
11	JSF-SS-DFAS-SB03-17.8/18.0-20210923	DFAS-SB03	17.8	18.0	SS	G	N	9/23/2021	0850	1	NA	X
12	JSF-SS-DFAS-SB03-19.8/20.0-20210923	DFAS-SB03	19.8	20.0	SS	G	N	9/23/2021	0853	1	NA	X
13	JSF-SS-DFAS-SB03-21.8/22.0-20210923	DFAS-SB03	21.8	22.0	SS	G	N	9/23/2021	0924	1	NA	X

BH 9/24/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Ben Herries / BH / Stantec	9/24/21	1320	[signature]	9/28/21	1:33

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	Ben Herries / Benjamin Herries
	ABIGAIL MURN [signature]

Form TVA 30067A

Box (BH 9/24/21)

TVA Environmental Investigations

COH1063779-1

Tennessee Valley Authority

COOLER No.:	1	of	1
COC No:	JSF_SI_09212021_1C		
3 of 4 Pages			
Task Desc:	JSF_SI_2021_09		

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	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	3052 Beaumont Centre Circle
		City	Rogersville State, Zip: TN, 37057	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		BH 9/24/21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		BH 9/24/21		
BH 9/24/21					

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☐ 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 (Feet)	End Depth (Feet)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-DFAS-SB03-23.8/24.0-20210923	DFAS-SB03	23.8	24.0	SS	G	N	9/23/2021	0928	1	NA	X
2	JSF-SS-DFAS-SB03-25.6/25.8-20210923	DFAS-SB03	25.6	25.8	SS	G	N	9/23/2021	1002	1	NA	X
3	JSF-SS-DFAS-SB02-1.8/2.0-20210923	DFAS-SB02	1.8	2.0	SS	G	N	9/23/2021	1320	1	NA	X
4	JSF-SS-DFAS-SB02-3.8/4.0-20210923	DFAS-SB02	3.8	4.0	SS	G	N	9/23/2021	1324	1	NA	X
5	JSF-SS-DFAS-SB02-5.8/6.0-20210923	DFAS-SB02	5.8	6.0	SS	G	N	9/23/2021	1352	1	NA	X
6	JSF-SS-DFAS-SB02-7.8/8.0-20210923	DFAS-SB02	7.8	8.0	SS	G	N	9/23/2021	1355	1	NA	X
7	JSF-SS-DFAS-SB02-9.8/10.0-20210923	DFAS-SB02	9.8	10.0	SS	G	N	9/23/2021	1357	1	NA	X
8	JSF-SS-DFAS-SB02-10.6/10.8-20210923	DFAS-SB02	10.6	10.8	SS	G	N	9/23/2021	1457	1	NA	X
9	JSF-SS-DFAS-SB02-13.8/14.0-20210923	DFAS-SB02	13.8	14.0	SS	G	N	9/23/2021	1458	1	NA	X
10	JSF-SS-DFAS-SB02-15.8/16.0-20210923	DFAS-SB02	15.8	16.0	SS	G	N	9/23/2021	1535	1	NA	X
11	JSF-SS-DFAS-SB02-17.8/18.0-20210923	DFAS-SB02	17.8	18.0	SS	G	N	9/23/2021	1538	1	NA	X
12	JSF-SS-DFAS-SB02-19.8/20.0-20210923	DFAS-SB02	19.8	20.0	SS	G	N	9/23/2021	1542	1	NA	X
13	JSF-SS-DFAS-SB02-21.8/22.0-20210923	DFAS-SB02	21.8	22.0	SS	G	N	9/23/2021	1622	1	NA	X

BH 9/24/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temperature in °C	Sample on Ice?	Sample Intact?	Trip Blank?
Benjamin Herries / BH/ Stantec	9/24/21	1320	[signature]	9/28/21	1:33	☐ 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	Ben Herries [signature]
	ABIGAIL MURN [signature]

Form TVA 30067A

TVA

Tennessee Valley Authority

TVA Environmental Investigations

COH1063779-1

Box (BH 9/24/21)

COOLER No.:	1	of	1
COC No:	JSF_SI_09212021_1C		
4 of 4 Pages			
Task Desc:	JSF_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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	Benjamin Herries / Abigail Murn
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	3052 Beaumont Centre Circle
		City	Rogersville State, Zip: TN, 37057	City/State	Lexington, KY Phone No: 859-422-3000
Lab Manager Contact Information		Site PM Name:	Paul Thomas		BH 9/24/21
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		BH 9/24/21		
BH 9/24/21					

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 (Feet)	End Depth (Feet)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-DFAS-SB02-23.8/24.0-20210923	DFAS-SB02	23.8	24.0	SS	G	N	9/23/2021	1623	1	NA	X
2	JSF-SS-DFAS-SB02-25.0/25.2-20210924	DFAS-SB02	25.0	25.2	SS	G	N	9/24/2021	0841	1	NA	X
3	JSF-SS-DFAS-SB01-1.8/2.0-20210924	DFAS-SB01	1.8	2.0	SS	G	N	9/24/2021	1006	1	NA	X
4	JSF-SS-DFAS-SB01-3.8/4.0-20210924	DFAS-SB01	3.8	4.0	SS	G	N	9/24/2021	1008	1	NA	X
5	JSF-SS-DFAS-SB01-5.8/6.0-20210924	DFAS-SB01	5.8	6.0	SS	G	N	9/24/2021	1027	1	NA	X
6	JSF-SS-DFAS-SB01-7.8/8.0-20210924	DFAS-SB01	7.8	8.0	SS	G	N	9/24/2021	1029	1	NA	X
7	JSF-SS-DFAS-SB01-9.0/9.2-20210924	DFAS-SB01	9.0	9.2	SS	G	N	9/24/2021	1030	1	NA	X
8	JSF-SS-DUP01-20210921				SS	G	FD	9/21/2021		1	NA	X
9	JSF-SS-DUP02-20210923				SS	G	FD	9/23/2021		1	NA	X

BH 9/24/21

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Benjamin Herries / BH/ Stantec	9/24/21	1320	[signature]	9/28/21	1:33

Sample Receipt Conditions

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

SHIPPING METHOD: (Select Appropriate)

Fedex

SAMPLER NAME AND SIGNATURE

Ben Herries [signature]

ABIGAIL MURN [signature]

Form TVA 30067A

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10549807	JSF-SS-DFAS-SB08-2.3/2.5-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549808	JSF-SS-DFAS-SB08-4.8/5.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549809	JSF-SS-DFAS-SB08-7.3/7.5-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549810	JSF-SS-DFAS-SB08-9.8/10.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549811	JSF-SS-DFAS-SB08-11.8/12.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549812	JSF-SS-DFAS-SB08-13.8/14.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549813	JSF-SS-DFAS-SB08-15.8/16.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549814	JSF-SS-DFAS-SB08-17.8/18.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549815	JSF-SS-DFAS-SB08-19.8/20.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549816	JSF-SS-DFAS-SB08-21.8/22.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549817	QC-JSF-SS-DFAS-SB08-21.8/22.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549818	JSF-SS-DFAS-SB08-23.8/24.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549819	JSF-SS-DFAS-SB08-25.8/26.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549820	JSF-SS-DFAS-SB08-27.8/28.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549821	JSF-SS-DFAS-SB08-29.8/30.0-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549822	JSF-SS-DFAS-SB08-31.8/32.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549823	JSF-SS-DFAS-SB03-1.8/2.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549824	JSF-SS-DFAS-SB03-3.8/4.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549825	JSF-SS-DFAS-SB03-5.8/6.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549826	JSF-SS-DFAS-SB03-7.8/8.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549827	JSF-SS-DFAS-SB03-9.8/10.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549828	QC-JSF-SS-DFAS-SB03-9.8/10.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549829	JSF-SS-DFAS-SB03-11.8/12.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549830	JSF-SS-DFAS-SB03-13.8/14.0-20210922	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549831	JSF-SS-DFAS-SB03-15.8/16.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549832	JSF-SS-DFAS-SB03-17.8/18.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549833	JSF-SS-DFAS-SB03-19.8/20.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549834	JSF-SS-DFAS-SB03-21.8/22.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549835	JSF-SS-DFAS-SB03-23.8/24.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549836	JSF-SS-DFAS-SB03-25.6/25.8-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549837	JSF-SS-DFAS-SB02-1.8/2.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549838	JSF-SS-DFAS-SB02-3.8/4.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549839	QC-JSF-SS-DFAS-SB02-3.8/4.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549840	JSF-SS-DFAS-SB02-5.8/6.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549841	JSF-SS-DFAS-SB02-7.8/8.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549842	JSF-SS-DFAS-SB02-9.8/10.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549843	JSF-SS-DFAS-SB02-10.6/10.8-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549844	JSF-SS-DFAS-SB02-13.8/14.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549845	JSF-SS-DFAS-SB02-15.8/16.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549846	JSF-SS-DFAS-SB02-17.8/18.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370

Sample #	Customer Sample #	Work Order	Login Date	ate And Time Receive	Protocol Assigned	Due Date	Delivery Tracking #
10549847	JSF-SS-DFAS-SB02-19.8/20.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549848	JSF-SS-DFAS-SB02-21.8/22.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549849	JSF-SS-DFAS-SB02-23.8/24.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549850	QC-JSF-SS-DFAS-SB02-23.8/24.0-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549851	JSF-SS-DFAS-SB02-25.0/25.2-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549852	JSF-SS-DFAS-SB01-1.8/2.0-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549853	JSF-SS-DFAS-SB01-3.8/4.0-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549854	JSF-SS-DFAS-SB01-5.8/6.0-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549855	JSF-SS-DFAS-SB01-7.8/8.0-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549856	JSF-SS-DFAS-SB01-9.0/9.2-20210924	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549857	JSF-SS-DUP01-20210921	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370
10549858	JSF-SS-DUP02-20210923	COH1063779-1	10/06/2021 14:56	09/28/2021 13:33	Fly Ash Determination by PLM	10/13/2021 14:52	6498 5715 0370

Oct 7, 2021, 3:18 PM

Appendix B

Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Paul Thomas
TVA Bull Run Fossil Plant
1265 Edgemoor Road
Clinton, TN 37716 United States
Email: prthomas0@tva.gov
Main: 423-751-2926

Report Date: 10/25/2021
Sample Received Date: 09/28/2021
RJLG Project: COH1063779-1
Customer COC: JSF_SI_09212021_1C
Purchase Order:
Analytical Method: Fly Ash Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB01-1.8/2.0-20210924	10549852	10/23/2021	09/24/2021	2%	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Grayish brown sediment
JSF-SS-DFAS-SB01-3.8/4.0-20210924	10549853	10/23/2021	09/24/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-DFAS-SB01-5.8/6.0-20210924	10549854	10/24/2021	09/24/2021	1%	Carbonate Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB01-7.8/8.0-20210924	10549855	10/24/2021	09/24/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment
JSF-SS-DFAS-SB01-9.0/9.2-20210924	10549856	10/24/2021	09/24/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Organic Particulate Quartz	Light grayish brown sediment
JSF-SS-DFAS-SB02-1.8/2.0-20210923	10549837	10/23/2021	09/23/2021	ND	Clay Misc. Silicates Opaques Quartz	Light grayish brown sediment
JSF-SS-DFAS-SB02-10.6/10.8-20210923	10549843	10/23/2021	09/23/2021	ND	Carbonate Clay Mica Misc. Silicates Opaques Organic Particulate Quartz	Brown sediment
JSF-SS-DFAS-SB02-13.8/14.0-20210923	10549844	10/23/2021	09/23/2021	ND	Clay Mica Opaques Quartz	Light yellowish brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB02-15.8/16.0-20210923	10549845	10/23/2021	09/23/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment
JSF-SS-DFAS-SB02-17.8/18.0-20210923	10549846	10/23/2021	09/23/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-DFAS-SB02-19.8/20.0-20210923	10549847	10/23/2021	09/23/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment
JSF-SS-DFAS-SB02-21.8/22.0-20210923	10549848	10/23/2021	09/23/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB02-23.8/24.0-20210923	10549849	10/23/2021	09/23/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-DFAS-SB02-25.0/25.2-20210924	10549851	10/24/2021	09/24/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment
JSF-SS-DFAS-SB02-3.8/4.0-20210923	10549838	10/23/2021	09/23/2021	ND	Carbonate Clay Misc. Silicates Opaques Quartz	Light gray sediment
JSF-SS-DFAS-SB02-5.8/6.0-20210923	10549840	10/23/2021	09/23/2021	ND	Clay Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-DFAS-SB02-7.8/8.0-20210923	10549841	10/23/2021	09/23/2021	ND	Carbonate Clay Misc. Silicates Opaques Quartz	Light grayish brown sediment
JSF-SS-DFAS-SB02-9.8/10.0-20210923	10549842	10/23/2021	09/23/2021	ND	Carbonate Clay Misc. Silicates Opaques Quartz	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB03-1.8/2.0-20210922	10549823	10/21/2021	09/22/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pink Sediment
JSF-SS-DFAS-SB03-11.8/12.0-20210922	10549829	10/23/2021	09/22/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Reddish brown sediment
JSF-SS-DFAS-SB03-13.8/14.0-20210922	10549830	10/23/2021	09/22/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Brown sediment
JSF-SS-DFAS-SB03-15.8/16.0-20210923	10549831	10/22/2021	09/23/2021	ND	Clay Feldspar Mica Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB03-17.8/18.0-20210923	10549832	10/22/2021	09/23/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB03-19.8/20.0-20210923	10549833	10/22/2021	09/23/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB03-21.8/22.0-20210923	10549834	10/21/2021	09/23/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB03-23.8/24.0-20210923	10549835	10/21/2021	09/23/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Light Reddish Yellow Sediment
JSF-SS-DFAS-SB03-25.6/25.8-20210923	10549836	10/23/2021	09/23/2021	1%	Clay Opaques Quartz	Light grayish brown sediment
JSF-SS-DFAS-SB03-3.8/4.0-20210922	10549824	10/21/2021	09/22/2021	ND	Feldspar Misc. Silicates Opaques Quartz	Pink Sediment
JSF-SS-DFAS-SB03-5.8/6.0-20210922	10549825	10/21/2021	09/22/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pink Sediment
JSF-SS-DFAS-SB03-7.8/8.0-20210922	10549826	10/21/2021	09/22/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pink Sediment
JSF-SS-DFAS-SB03-9.8/10.0-20210922	10549827	10/21/2021	09/22/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB08-11.8/12.0-20210921	10549811	10/21/2021	09/21/2021	2%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-13.8/14.0-20210921	10549812	10/21/2021	09/21/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB08-15.8/16.0-20210921	10549813	10/21/2021	09/21/2021	2%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-17.8/18.0-20210921	10549814	10/21/2021	09/21/2021	1%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-19.8/20.0-20210921	10549815	10/21/2021	09/21/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-2.3/2.5-20210921	10549807	10/21/2021	09/21/2021	ND	Carbonate Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-21.8/22.0-20210921	10549816	10/21/2021	09/21/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-23.8/24.0-20210921	10549818	10/21/2021	09/21/2021	1%	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-25.8/26.0-20210921	10549819	10/21/2021	09/21/2021	ND	Clay Opaques Quartz	Tan Sediment.

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DFAS-SB08-27.8/28.0-20210921	10549820	10/21/2021	09/21/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Pink Sediment
JSF-SS-DFAS-SB08-29.8/30.0-20210921	10549821	10/21/2021	09/21/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
JSF-SS-DFAS-SB08-31.8/32.0-20210922	10549822	10/21/2021	09/22/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-4.8/5.0-20210921	10549808	10/21/2021	09/21/2021	ND	Carbonate Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-7.3/7.5-20210921	10549809	10/21/2021	09/21/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DFAS-SB08-9.8/10.0-20210921	10549810	10/21/2021	09/21/2021	ND	Clay Opaques Quartz	Tan Sediment.
JSF-SS-DUP01-20210921	10549857	10/24/2021	09/21/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Light yellowish brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
JSF-SS-DUP02-20210923	10549858	10/24/2021	09/21/2021	ND	Carbonate Clay Feldspar Mica Misc. Silicates Opaques Quartz	Yellowish brown sediment
QC-JSF-SS-DFAS-SB02-23.8/24.0-20210923	10549850	10/24/2021	09/23/2021	ND	Clay Opaques Quartz	Tan Sediment.
QC-JSF-SS-DFAS-SB02-3.8/4.0-20210923	10549839	10/24/2021	09/23/2021	1%	Carbonate Clay Opaques Quartz	Beige Sediment.
QC-JSF-SS-DFAS-SB03-9.8/10.0-20210922	10549828	10/23/2021	09/22/2021	ND	Carbonate Clay Feldspar Misc. Silicates Opaques Quartz	Light grayish brown sediment
QC-JSF-SS-DFAS-SB08-21.8/22.0-20210921	10549817	10/21/2021	09/21/2021	ND	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, 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

Revised COC appended to the data package via Environmental Standards, Inc
(AEH 1/21/2022)
(MBC 2/18/2022)

November 10, 2021

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

RE: JSF Supplemental PLM – Analytical Report
RJ Lee Group Project Number COH1063779-2

Dear Mr. Thomas,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 92 samples on October 22, 2021 associated with Tennessee Valley Authority (TVA) JSF Supplemental. The samples were logged into RJ Lee Group project number COH1063779-2 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with sample labels and custody seals intact. Discrepancies between the samples and COC occurred. 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

350 Hochberg Road, Monroeville, PA 15146 | PH: 724.325.1776 | F: 724.733.1799

Appendix A
Chain of Custody Forms

Chain of Custody

RJ Lee Group Work Order #: COH1063779-2

Project Name/Case #: John Sevier Fossil Plant

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
10551186	JSF-SS-DFAS-SB06-1.8/2.0-20211011	10/22/2021 9:00 AM EDT
10551187	JSF-SS-DFAS-SB06-3.8/4.0-20211011	10/22/2021 9:00 AM EDT
10551188	JSF-SS-DFAS-SB06-5.8/6.0-20211011	10/22/2021 9:00 AM EDT
10551189	JSF-SS-DFAS-SB06-7.8/8.0-20211011	10/22/2021 9:00 AM EDT
10551190	JSF-SS-DFAS-SB06-9.8/10.0-20211011	10/22/2021 9:00 AM EDT
10551191	JSF-SS-DFAS-SB06-11.8/12.0-20211011	10/22/2021 9:00 AM EDT
10551192	JSF-SS-DFAS-SB06-13.8/14.0-20211011	10/22/2021 9:00 AM EDT
10551193	JSF-SS-DFAS-SB06-15.8/16.0-20211012	10/22/2021 9:00 AM EDT
10551194	JSF-SS-DFAS-SB05-1.8/2.0-20211012	10/22/2021 9:00 AM EDT
10551195	JSF-SS-DFAS-SB05-3.8/4.0-20211012	10/22/2021 9:00 AM EDT
10551196	QC-JSF-SS-DFAS-SB05-3.8/4.0-20211012	10/22/2021 9:00 AM EDT
10551197	JSF-SS-DFAS-SB05-5.8/6.0-20211012	10/22/2021 9:00 AM EDT
10551198	JSF-SS-DFAS-SB05-7.8/8.0-20211012	10/22/2021 9:00 AM EDT
10551199	JSF-SS-DFAS-SB05-9.8/10.0-20211012	10/22/2021 9:00 AM EDT
10551200	JSF-SS-DFAS-SB05-11.8/12.0-20211012	10/22/2021 9:00 AM EDT
10551201	JSF-SS-DFAS-SB05-13.8/14.0-20211012	10/22/2021 9:00 AM EDT
10551202	JSF-SS-ADAJ-SB09-1.8/2.0-20211013	10/22/2021 9:00 AM EDT
10551203	JSF-SS-ADAJ-SB09-3.8/4.0-20211013	10/22/2021 9:00 AM EDT
10551204	JSF-SS-ADAJ-SB09-5.8/6.0-20211013	10/22/2021 9:00 AM EDT
10551205	JSF-SS-ADAJ-SB09-7.8/8.0-20211013	10/22/2021 9:00 AM EDT
10551206	JSF-SS-ADAJ-SB09-9.8/10.0-20211013	10/22/2021 9:00 AM EDT
10551207	QC-JSF-SS-ADAJ-SB09-9.8/10.0-20211013	10/22/2021 9:00 AM EDT
10551208	JSF-SS-ADAJ-SB09-11.8/12.0-20211013	10/22/2021 9:00 AM EDT
10551209	JSF-SS-ADAJ-SB09-13.8/14.0-20211013	10/22/2021 9:00 AM EDT
10551210	JSF-SS-ADAJ-SB09-15.8/16.0-20211013	10/22/2021 9:00 AM EDT
10551211	JSF-SS-ADAJ-SB09-17.8/18.0-20211013	10/22/2021 9:00 AM EDT
10551212	JSF-SS-ADAJ-SB09-19.8/20.0-20211013	10/22/2021 9:00 AM EDT
10551213	JSF-SS-ADAJ-SB09-21.8/22.0-20211013	10/22/2021 9:00 AM EDT
10551214	JSF-SS-ADAJ-SB09-23.8/24.0-20211013	10/22/2021 9:00 AM EDT

Sample ID	Client Sample ID	Date Received
10551215	JSF-SS-ADAJ-SB09-25.8/26.0-20211013	10/22/2021 9:00 AM EDT
10551216	JSF-SS-ADAJ-SB09-27.8/28.0-20211013	10/22/2021 9:00 AM EDT
10551217	JSF-SS-ADAJ-SB09-29.8/30.0-20211013	10/22/2021 9:00 AM EDT
10551218	QC-JSF-SS-ADAJ-SB09-29.8/30.0-20211013	10/22/2021 9:00 AM EDT
10551219	JSF-SS-ADAJ-SB09-31.8/32.0-20211014	10/22/2021 9:00 AM EDT
10551220	JSF-SS-ADAJ-SB09-33.8/34.0-20211014	10/22/2021 9:00 AM EDT
10551221	JSF-SS-ADAJ-SB09-35.6/35.8-20211014	10/22/2021 9:00 AM EDT
10551222	JSF-SS-ADAJ-SB10-1.8/2.0-20211014	10/22/2021 9:00 AM EDT
10551223	JSF-SS-ADAJ-SB10-3.8/4.0-20211014	10/22/2021 9:00 AM EDT
10551224	JSF-SS-ADAJ-SB10-5.8/6.0-20211014	10/22/2021 9:00 AM EDT
10551225	JSF-SS-ADAJ-SB10-7.8/8.0-20211014	10/22/2021 9:00 AM EDT
10551226	JSF-SS-ADAJ-SB10-9.8/10.0-20211014	10/22/2021 9:00 AM EDT
10551227	JSF-SS-ADAJ-SB10-11.8/12.0-20211014	10/22/2021 9:00 AM EDT
10551228	JSF-SS-ADAJ-SB10-13.8/14.0-20211014	10/22/2021 9:00 AM EDT
10551229	QC-JSF-SS-ADAJ-SB10-13.8/14.0-20211014	10/22/2021 9:00 AM EDT
10551230	JSF-SS-ADAJ-SB10-15.8/16.0-20211014	10/22/2021 9:00 AM EDT
10551231	JSF-SS-ADAJ-SB10-17.8/18.0-20211014	10/22/2021 9:00 AM EDT
10551232	JSF-SS-ADAJ-SB10-19.8/20.0-20211015	10/22/2021 9:00 AM EDT
10551233	JSF-SS-ADAJ-SB10-21.8/22.0-20211015	10/22/2021 9:00 AM EDT
10551234	JSF-SS-ADAJ-SB10-23.8/24.0-20211014	10/22/2021 9:00 AM EDT
10551235	JSF-SS-ADAJ-SB10-25.8/26.0-20211014	10/22/2021 9:00 AM EDT
10551236	JSF-SS-ADAJ-SB10-27.8/28.0-20211014	10/22/2021 9:00 AM EDT
10551237	JSF-SS-ADAJ-SB10-29.8/30.0-20211014	10/22/2021 9:00 AM EDT
10551238	JSF-SS-ADAJ-SB10-31.8/32.0-20211015	10/22/2021 9:00 AM EDT
10551239	JSF-SS-ADAJ-SB10-33.8/34.0-20211015	10/22/2021 9:00 AM EDT
10551240	QC-JSF-SS-ADAJ-SB10-33.8/34.0-20211015	10/22/2021 9:00 AM EDT
10551241	JSF-SS-ADAJ-SB10-35.6/36.0-20211015	10/22/2021 9:00 AM EDT
10551242	JSF-SS-ADAJ-SB11-1.8/2.0-20211018	10/22/2021 9:00 AM EDT
10551243	JSF-SS-ADAJ-SB11-3.8/4.0-20211018	10/22/2021 9:00 AM EDT
10551244	JSF-SS-ADAJ-SB11-5.8/6.0-20211018	10/22/2021 9:00 AM EDT
10551245	JSF-SS-ADAJ-SB11-7.8/8.0-20211018	10/22/2021 9:00 AM EDT
10551246	JSF-SS-ADAJ-SB11-9.8/10.0-20211018	10/22/2021 9:00 AM EDT
10551247	JSF-SS-ADAJ-SB11-11.8/12.0-20211018	10/22/2021 9:00 AM EDT
10551248	JSF-SS-ADAJ-SB11-13.8/14.0-20211018	10/22/2021 9:00 AM EDT
10551249	JSF-SS-ADAJ-SB11-15.8/16.0-20211018	10/22/2021 9:00 AM EDT
10551250	JSF-SS-ADAJ-SB11-17.8/18.0-20211018	10/22/2021 9:00 AM EDT
10551251	QC-JSF-SS-ADAJ-SB11-17.8/18.0-20211018	10/22/2021 9:00 AM EDT
10551252	JSF-SS-ADAJ-SB11-19.8/20.0-20211018	10/22/2021 9:00 AM EDT
10551253	JSF-SS-ADAJ-SB11-21.8/22.0-20211018	10/22/2021 9:00 AM EDT
10551254	JSF-SS-ADAJ-SB11-23.8/24.0-20211019	10/22/2021 9:00 AM EDT
10551255	JSF-SS-ADAJ-SB11-25.8/26.0-20211019	10/22/2021 9:00 AM EDT
10551256	JSF-SS-ADAJ-SB11-27.8/28.0-20211019	10/22/2021 9:00 AM EDT
10551257	JSF-SS-ADAJ-SB11-29.8/30.0-20211019	10/22/2021 9:00 AM EDT
10551258	JSF-SS-ADAJ-SB11-31.8/32.0-20211019	10/22/2021 9:00 AM EDT
10551259	JSF-SS-ADAJ-SB11-33.8/34.0-20211019	10/22/2021 9:00 AM EDT
10551260	JSF-SS-ADAJ-SB11-35.6/35.8-20211019	10/22/2021 9:00 AM EDT
10551261	JSF-SS-ADAJ-SB12-1.8/2.0-20211019	10/22/2021 9:00 AM EDT
10551262	QC-JSF-SS-ADAJ-SB12-1.8/2.0-20211019	10/22/2021 9:00 AM EDT
10551263	JSF-SS-ADAJ-SB12-3.8/4.0-20211019	10/22/2021 9:00 AM EDT

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

Sample ID	Client Sample ID	Date Received
10551264	JSF-SS-ADAJ-SB12-5.8/6.0-20211019	10/22/2021 9:00 AM EDT
10551265	JSF-SS-ADAJ-SB12-7.8/8.0-20211019	10/22/2021 9:00 AM EDT
10551266	JSF-SS-ADAJ-SB12-9.8/10.0-20211019	10/22/2021 9:00 AM EDT
10551267	JSF-SS-ADAJ-SB12-11.8/12.0-20211019	10/22/2021 9:00 AM EDT
10551268	JSF-SS-ADAJ-SB12-13.8/14.0-20211019	10/22/2021 9:00 AM EDT
10551269	JSF-SS-ADAJ-SB12-15.8/16.0-20211019	10/22/2021 9:00 AM EDT
10551270	JSF-SS-ADAJ-SB12-17.8/18.0-20211019	10/22/2021 9:00 AM EDT
10551271	JSF-SS-ADAJ-SB12-19.8/20.0-20211020	10/22/2021 9:00 AM EDT
10551272	JSF-SS-ADAJ-SB12-21.8/22.0-20211020	10/22/2021 9:00 AM EDT
10551273	QC-JSF-SS-ADAJ-SB12-21.8/22.0-20211020	10/22/2021 9:00 AM EDT
10551274	JSF-SS-ADAJ-SB12-23.8/24.0-20211020	10/22/2021 9:00 AM EDT
10551275	JSF-SS-ADAJ-SB12-25.8/26.0-20211020	10/22/2021 9:00 AM EDT
10551276	JSF-SS-ADAJ-SB12-27.8/28.0-20211020	10/22/2021 9:00 AM EDT
10551277	JSF-SS-ADAJ-SB12-29.8/30.0-20211020	10/22/2021 9:00 AM EDT
10551278	JSF-SS-ADAJ-SB12-31.8/32.0-20211020	10/22/2021 9:00 AM EDT
10551279	JSF-SS-ADAJ-SB12-33.8/34.0-20211020	10/22/2021 9:00 AM EDT
10551280	JSF-SS-ADAJ-SB12-35.6/35.8-20211020	10/22/2021 9:00 AM EDT
10551281	JSF-SS-DUP05-20211011	10/22/2021 9:00 AM EDT
10551282	JSF-SS-DUP06-20211013	10/22/2021 9:00 AM EDT
10551283	JSF-SS-DUP07-20211014	10/22/2021 9:00 AM EDT
10551284	QC-JSF-SS-DUP07-20211014	10/22/2021 9:00 AM EDT
10551285	JSF-SS-DUP08-20211018	10/22/2021 9:00 AM EDT
10551286	JSF-SS-DUP09-20211020	10/22/2021 9:00 AM EDT

	Received From: Paul Thomas	Method of Shipment: Federal Express
	Company: TVA Bull Run Fossil Plant	**Date:** 10/22/2021
	Received By: Brianna Zidek	Package Condition Upon Receipt: Sealed
	Company: RJ Lee Group, Inc.	**Date:** 10/22/2021

	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:	10/22/2021	Log in Date:	10/26/2021
Time Received:	9:00 AM	By:	Brianna Zidek	COC# :	JSF_SI_10112021_2C
Project:	COH1063779-2	# Coolers Received	2	Means of Shipment:	FedEx
Air Bill:	2851 9399 6028				

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?		√	see comments
Were there any discrepancies among samples and COC?	√		See comments
Is the COC completely filled out?	√		
Was the COC relinquished properly?	√		

List any anomalies associated with Sample Receipt

Sample labeled as JSF-SS-ADAJ-SB12-17.8/18.0-20211019 was missing from the COC

Analyst Signature: [signature] 10/27/21

Manager Signature: [signature] 10/27/21

TVA

Tennessee Valley Authority

TVA Environmental Investigations

10 1 2021 BB 10/29/2021 Rev 2 BB 10/29/21

COOLER No.:	1	of	2
COC No:	JSF_SI_101121_2C		
1 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1 BB 10/29/21

Rev 3 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

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	afischer@rjleegroup.com				
SRS 10/21/2021		SRS 10/21/2021			

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 — SRS 10/21/2021

Preserve: None — SRS 10/21/2021

Analysis: PLM — SRS 10/21/2021

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE 20211011	SAMPLE LOCATION ID 10/21/21	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	JSF-SS-DFAS-SB06-1.8/2.0-2021011	JSF-DFAS-SB06	1.8	2.0	SS	G	N	10/11/2021	1421	1	NA	X
2	JSF-SS-DFAS-SB06-3.8/4.0-20211011	JSF-DFAS-SB06	3.8	4.0	SS	G	N	10/11/2021	1423	1	NA	X
3	JSF-SS-DFAS-SB06-5.8/6.0-20211011	JSF-DFAS-SB06	5.8	6.0	SS	G	N	10/11/2021	1454	1	NA	X
4	JSF-SS-DFAS-SB06-7.8/8.0-20211011	JSF-DFAS-SB06	7.8	8.0	SS	G	N	10/11/2021	1457	1	NA	X
5	JSF-SS-DFAS-SB06-9.8/10.0-20211011	JSF-DFAS-SB06	9.8	10.0	SS	G	N	10/11/2021	~~1408~~	1	1503 NA	X
6	JSF-SS-DFAS-SB06-11.8/12.0-20211011	JSF-DFAS-SB06	11.8	12.0	SS	G	N	10/11/2021	~~1503~~	1	1557 NA	X
7	JSF-SS-DFAS-SB06-13.8/14.0-20211011	JSF-DFAS-SB06	13.8	14.0	SS	G	N	10/11/2021	~~1557~~	1	1011 NA	X
8	JSF-SS-DFAS-SB06-15.8/16.0-20211012	JSF-DFAS-SB06	15.8	16.0	SS	G	N	10/12/2021	0845	1	NA	X
9	JSF-SS-DFAS-SB05-1.8/2.0-20211012	JSF-DFAS-SB05	1.8	2.0	SS	G	N	10/12/2021	1148	1	NA	X
10	JSF-SS-DFAS-SB05-3.8/4.0-20211012	JSF-DFAS-SB05	3.8	4.0	SS	G	N	10/12/2021	1153	1	NA	X
11	JSF-SS-DFAS-SB05-5.8/6.0-20211012	JSF-DFAS-SB05	5.8	6.0	SS	G	N	10/12/2021	1311	1	NA	X
12	JSF-SS-DFAS-SB05-7.8/8.0-20211012	JSF-DFAS-SB05	7.8	8.0	SS	G	N	10/12/2021	1315	1	N/A	X
13	JSF-SS-DFAS-SB05-9.8/10.0-20211012	JSF-DFAS-SB05	9.8	10.0	SS	G	N	10/12/2021	1317	1	N/A	X

Sample Depth: Depth Unit / Select Unit

SRS 10/21/2021

BB 1/21/22

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Mark Buckreis / Stantec	10/21/2021	10:15	[signature]	10/22/21	9:00	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
						☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

TVA

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	2
COC No:	JSF_SI_10112021_2C		
2 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1
BJ
10/29/21

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

SRS 10/21/2021

Required Project Information:

Site ID #:	JOHN SEVIER FOSSIL PLANT		
Project #:	175568225		
Site Address	Plant 611 Old Hwy 70 S		
City	Rogersville	State, Zip:	TN, 37057
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:	prthomas0@tva.gov		

SRS 10/21/2021

Required Sampler Information:

Sampler:	S. Stanley/ M. Buckrels		
Sampling Company:	Stantec		
Address	601 Grassmere Park Unite 22		
City/State	Nashville, TN	Phone No:	615-885-1144
Sampling Team Number:	2		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

SRS 10/21/2021

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-DFAS-SB05-11.8/12.0-20211012	JSF-DFAS-SB05	11.8	12.0	SS	G	N	10/12/2021	1416	1	NA	X
2	JSF-SS-DFAS-SB05-13.8/14.0-20211012	JSF-DFAS-SB05	13.8	14.0	SS	G	N	10/12/2021	1421	1	NA	X
3	JSF-SS-ADAJ-SB09-1.8/2.0-20211013	JSF-ADAJ-SB09	1.8	2.0	SS	G	N	10/13/2021	1018	1	NA	X
4	JSF-SS-ADAJ-SB09-3.8/4.0-20211013	JSF-ADAJ-SB09	3.8	4.0	SS	G	N	10/13/2021	1021	1	NA	X
5	JSF-SS-ADAJ-SB09-5.8/6.0-20211013	JSF-ADAJ-SB09	5.8	6.0	SS	G	N	10/13/2021	1052	1	NA	X
6	JSF-SS-ADAJ-SB09-7.8/8.0-20211013	JSF-ADAJ-SB09	7.8	8.0	SS	G	N	10/13/2021	1055	1	NA	X
7	JSF-SS-ADAJ-SB09-9.8/10.0-20211013	JSF-ADAJ-SB09	9.8	10.0	SS	G	N	10/13/2021	1058	1	NA	X
8	JSF-SS-ADAJ-SB09-11.8/12.0-20211013	JSF-ADAJ-SB09	11.8	12.0	SS	G	N	10/13/2021	1144	1	NA	X
9	JSF-SS-ADAJ-SB09-13.8/14.0-20211013	JSF-ADAJ-SB09	13.8	14.0	SS	G	N	10/13/2021	1147	1	NA	X
10	JSF-SS-ADAJ-SB09-15.8/16.0-20211013	JSF-ADAJ-SB09	15.8	16.0	SS	G	N	10/13/2021	1211	1	NA	X
11	JSF-SS-ADAJ-SB09-17.8/18.0-20211013	JSF-ADAJ-SB09	17.8	18.0	SS	G	N	10/13/2021	1215	1	NA	X
12	JSF-SS-ADAJ-SB09-19.8/20.0-20211013	JSF-ADAJ-SB09	19.8	20.0	SS	G	N	10/13/2021	1218	1	NA	X
13	JSF-SS-ADAJ-SB09-21.8/22.0-20211013	JSF-ADAJ-SB09	21.8	22.0	SS	G	N	10/13/2021	1224	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Mark Buckrels/Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00	☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☐Yes ☒No
						☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No

[redacted]

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Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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COOLER No.:	1	of	1
COC No:	JSF_SI_10112021_2C		
3 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1 BB 10/29/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	501 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	prthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envsid.com
Lab Email:	efischer@rjleegroup.com		SRS 10/21/2021		
	SRS 10/21/2021				

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-ADAJ-SB09-23.8/24.0-20211013	JSF-ADAJ-SB09	23.8	24.0	SS	G	N	10/13/2021	1326	1	NA	X
2	JSF-SS-ADAJ-SB09-25.8/26.0-20211013	JSF-ADAJ-SB09	25.8	26.0	SS	G	N	10/13/2021	1617	1	NA	X
3	JSF-SS-ADAJ-SB09-27.8/28.0-20211013	JSF-ADAJ-SB09	27.8	28.0	SS	G	N	10/13/2021	1620	1	NA	X
4	JSF-SS-ADAJ-SB09-29.8/30.0-20211013	JSF-ADAJ-SB09	29.8	30.0	SS	G	N	10/13/2021	1623	1	NA	X
5	JSF-SS-ADAJ-SB09-31.8/32.0-20211014	JSF-ADAJ-SB09	31.8	32.0	SS	G	N	10/14/2021	0816	1	NA	X
6	JSF-SS-ADAJ-SB09-33.8/34.0-20211014	JSF-ADAJ-SB09	33.8	34.0	SS	G	N	10/14/2021	0844	1	NA	X
7	JSF-SS-ADAJ-SB09-35.6/35.8-20211014	JSF-ADAJ-SB09	35.6	35.8	SS	G	N	10/14/2021	0905	1	NA	X
8	JSF-SS-ADAJ-SB10-1.8/2.0-20211014	JSF-ADAJ-SB10	1.8	2.0	SS	G	N	10/14/2021	1250	1	NA	X
9	JSF-SS-ADAJ-SB10-3.8/4.0-20211014	JSF-ADAJ-SB10	3.8	4.0	SS	G	N	10/14/2021	1256	1	NA	X
10	JSF-SS-ADAJ-SB10-5.8/6.0-20211014	JSF-ADAJ-SB10	5.8	6.0	SS	G	N	10/14/2021	1411	1	NA	X
11	JSF-SS-ADAJ-SB10-7.8/8.0-20211014	JSF-ADAJ-SB10	7.8	8.0	SS	G	N	10/14/2021	1313	1	NA	X
12	JSF-SS-ADAJ-SB10-9.8/10.0-20211014	JSF-ADAJ-SB10	9.8	10.0	SS	G	N	10/14/2021	1315	1	NA	X
13	JSF-SS-ADAJ-SB10-11.8/12.0-20211014	JSF-ADAJ-SB10	11.8	12.0	SS	G	N	10/14/2021	1344	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Mark Buckreis / Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00	☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☐Yes ☒No
						☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No

TVA

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	2
COC No:	JSF_SI_10112021_2C		
4 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1
BP 10/29/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568226	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		SRS 10/21/2021		
	SRS 10/21/2021				

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

SRS 10/21/2021

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	JSF-SS-ADAJ-SB10-13.8/14.0-20211014	JSF-ADAJ-SB10	13.8	14.0	SS	G	N	10/14/2021	1346	1	NA	X
2	JSF-SS-ADAJ-SB10-15.8/16.0-20211014	JSF-ADAJ-SB10	15.8	16.0	SS	G	N	10/14/2021	1418	1	NA	X
3	JSF-SS-ADAJ-SB10-17.8/18.0-20211014	JSF-ADAJ-SB10	17.8	18.0	SS	G	N	10/14/2021	1420	1	NA	X
4	JSF-SS-ADAJ-SB10-19.8/20.0-20211015	JSF-ADAJ-SB10	19.8	20.0	SS	G	N	10/14/2021	1442	1	NA	X
5	JSF-SS-ADAJ-SB10-21.8/22.0-20211015	JSF-ADAJ-SB10	21.8	22.0	SS	G	N	10/14/2021	1444	1	NA	X
6	JSF-SS-ADAJ-SB10-23.8/24.0-20211014	JSF-ADAJ-SB10	23.8	24.0	SS	G	N	10/14/2021	1513	1	NA	X
7	JSF-SS-ADAJ-SB10-25.8/26.0-20211014	JSF-ADAJ-SB10	25.8	26.0	SS	G	N	10/14/2021	1537	1	NA	X
8	JSF-SS-ADAJ-SB10-27.8/28.0-20211014	JSF-ADAJ-SB10	27.8	28.0	SS	G	N	10/14/2021	1539	1	NA	X
9	JSF-SS-ADAJ-SB10-29.8/30.0-20211014	JSF-ADAJ-SB10	29.8	30.0	SS	G	N	10/14/2021	1612	1	NA	X
10	JSF-SS-ADAJ-SB10-31.8/32.0-20211015	JSF-ADAJ-SB10	31.8	32.0	SS	G	N	10/15/2021	0832	1	NA	X
11	JSF-SS-ADAJ-SB10-33.8/34.0-20211015	JSF-ADAJ-SB10	33.8	34.0	SS	G	N	10/15/2021	0924	1	NA	X
12	JSF-SS-ADAJ-SB10-35.6/36.0-20211015	JSF-ADAJ-SB10	35.8	36.0	SS	G	N	10/15/2021	0927	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

20211014
BP 10/27/21

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Mark Buckreis / Stantec	10:15		[signature]	10/22/21	9:00	☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☐Yes ☒No
						☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☑No
						☐Yes	☐Yes	☐Yes	☐Yes

TVA

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
5 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1
BB
10/29/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckrais
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unit 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas	SRS 10/21/2021	
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/21/2021		SRS 10/21/2021			

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

SRS 10/21/2021

SRS 10/21/2021

SRS 10/21/2021

SRS 10/21/2021

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	JSF-SS-ADAJ-SB11-1.8/2.0-20211018	JSF-ADAJ-SB11	1.8	2.0	SS	G	N	10/18/2021	1417	1	NA	X
2	JSF-SS-ADAJ-SB11-3.8/4.0-20211018	JSF-ADAJ-SB11	3.8	4.0	SS	G	N	10/18/2021	1419	1	NA	X
3	JSF-SS-ADAJ-SB11-5.8/6.0-20211018	JSF-ADAJ-SB11	5.8	6.0	SS	G	N	10/18/2021	1437	1	NA	X
4	JSF-SS-ADAJ-SB11-7.8/8.0-20211018	JSF-ADAJ-SB11	7.8	8.0	SS	G	N	10/18/2021	1439	1	NA	X
5	JSF-SS-ADAJ-SB11-9.8/10.0-20211018	JSF-ADAJ-SB11	9.8	10.0	SS	G	N	10/18/2021	1442	1	NA	X
6	JSF-SS-ADAJ-SB11-11.8/12.0-20211018	JSF-ADAJ-SB11	11.8	12.0	SS	G	N	10/18/2021	1510	1	NA	X
7	JSF-SS-ADAJ-SB11-13.8/14.0-20211018	JSF-ADAJ-SB11	13.8	14.0	SS	G	N	10/18/2021	1512	1	NA	X
8	JSF-SS-ADAJ-SB11-15.8/16.0-20211018	JSF-ADAJ-SB11	15.8	16.0	SS	G	N	10/18/2021	1546	1	NA	X
9	JSF-SS-ADAJ-SB11-17.8/18.0-20211018	JSF-ADAJ-SB11	17.8	18.0	SS	G	N	10/18/2021	1548	1	NA	X
10	JSF-SS-ADAJ-SB11-19.8/20.0-20211018	JSF-ADAJ-SB11	19.8	20.0	SS	G	N	10/18/2021	1608	1	NA	X
11	JSF-SS-ADAJ-SB11-21.8/22.0-20211018	JSF-ADAJ-SB11	21.8	22.0	SS	G	N	10/18/2021	1610	1	NA	X
12	JSF-SS-ADAJ-SB11-23.8/24.0-20211019	JSF-ADAJ-SB11	23.8	24.0	SS	G	N	10/19/2021	0857	1	NA	X
13	JSF-SS-ADAJ-SB11-25.8/26.0-20211019	JSF-ADAJ-SB11	25.8	26.0	SS	G	N	10/19/2021	0905	1	NA	X

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Mark Buckrais / Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00	☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☐Yes ☒No
						☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No

TVA Environmental Investigations

TVA Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
6 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rec'd
B3
10/29/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckrais
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/21/2021		SRS 10/21/2021			

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	JSF-SS-ADAJ-SB11-27.8/28.0-20211019	JSF-ADAJ-SB11	27.8	28.0	SS	G	N	10/19/2021	0927	1	NA	X
2	JSF-SS-ADAJ-SB11-29.8/30.0-20211019	JSF-ADAJ-SB11	29.8	30.0	SS	G	N	10/19/2021	1046	1	NA	X
3	JSF-SS-ADAJ-SB11-31.8/32.0-20211019	JSF-ADAJ-SB11	31.8	32.0	SS	G	N	10/19/2021	1118	1	NA	X
4	JSF-SS-ADAJ-SB11-33.8/34.0-20211019	JSF-ADAJ-SB11	33.8	34.0	SS	G	N	10/19/2021	1155	1	NA	X
5	JSF-SS-ADAJ-SB11-35.6/35.8-20211019	JSF-ADAJ-SB11	35.6	35.8	SS	G	N	10/19/2021	1159	1	NA	X
6	JSF-SS-ADAJ-SB12-1.8/2.0-20211019	JSF-ADAJ-SB12	1.8	2.0	SS	G	N	10/19/2021	1500	1	NA	X
7	JSF-SS-ADAJ-SB12-3.8/4.0-20211019	JSF-ADAJ-SB12	3.8	4.0	SS	G	N	10/19/2021	1503	1	NA	X
8	JSF-SS-ADAJ-SB12-5.8/6.0-20211019	JSF-ADAJ-SB12	5.8	6.0	SS	G	N	10/19/2021	1527	1	NA	X
9	JSF-SS-ADAJ-SB12-7.8/8.0-20211019	JSF-ADAJ-SB12	7.8	8.0	SS	G	N	10/19/2021	1529	1	NA	X
10	JSF-SS-ADAJ-SB12-9.8/10.0-20211019	JSF-ADAJ-SB12	9.8	10.0	SS	G	N	10/19/2021	1531	1	NA	X
11	JSF-SS-ADAJ-SB12-11.8/12.0-20211019	JSF-ADAJ-SB12	11.8	12.0	SS	G	N	10/19/2021	1548	1	NA	X
12	JSF-SS-ADAJ-SB12-13.8/14.0-20211019	JSF-ADAJ-SB12	13.8	14.0	SS	G	N	10/19/2021	1550	1	NA	X
13	JSF-SS-ADAJ-SB12-15.8/16.0-20211019	JSF-ADAJ-SB12	15.8	16.0	SS	G	N	10/19/2021	1606	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Buckrais / Stantec [signature]	10/21/2021	16:15	[signature]	10/22/21	9:00	☐Yes ☒No / ☐Yes ☒No / ☒Yes ☐No / ☐Yes ☒No
						☐Yes ☐No / ☐Yes ☐No / ☐Yes ☐No / ☐Yes ☐No

TVA

Tennessee Valley Authority

TVA Environmental Investigations

Rev'
B
10/29/21

COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
7 of 9 Pages			
Task Desc:	JSF_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:

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

SRS 10/21/2021

Required Project Information:

Site ID #:	JOHN SEVIER FOSSIL PLANT
Project #:	175568225
Site Address	Plant 611 Old Hwy 70 S
City	Rogersville — State, Zip: TN, 37057
Site PM Name:	Paul Thomas
Phone/Fax:	(423) 751-2926
Site PM Email:	prthomas0@tva.gov

SRS 10/21/2021

Required Sampler Information

Sampler:	S. Stanley/ M. Buckrels
Sampling Company:	Stantec
Address	601 Grassmere Park Unite 22
City/State	Nashville, TN — Phone No: 615-885-1144
Sampling Team Number:	2
Send EDD/Hard Copy to:	tva_deliverables@envstd.com

SRS 10/21/2021

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	JSF-SS-ADAJ-SB12-19.8/20.0-20211020	JSF-ADAJ-SB12	19.8	20.0	SS	G	N	10/20/2021	0823	1	NA	X
2	JSF-SS-ADAJ-SB12-21.8/22.0-20211020	JSF-ADAJ-SB12	21.8	22.0	SS	G	N	10/20/2021	0826	1	NA	X
3	JSF-SS-ADAJ-SB12-23.8/24.0-20211020	JSF-ADAJ-SB12	23.8	24.0	SS	G	N	10/20/2021	0842	1	NA	X
4	JSF-SS-ADAJ-SB12-25.8/26.0-20211020	JSF-ADAJ-SB12	25.8	26.0	SS	G	N	10/20/2021	0907	1	NA	X
5	JSF-SS-ADAJ-SB12-27.8/28.0-20211020	JSF-ADAJ-SB12	27.8	28.0	SS	G	N	10/20/2021	0909	1	NA	X
6	JSF-SS-ADAJ-SB12-29.8/30.0-20211020	JSF-ADAJ-SB12	29.8	30.0	SS	G	N	10/20/2021	0949	1	NA	X
7	JSF-SS-ADAJ-SB12-31.8/32.0-20211020	JSF-ADAJ-SB12	31.8	32.0	SS	G	N	10/20/2021	1029	1	NA	X
8	JSF-SS-ADAJ-SB12-33.8/34.0-20211020	JSF-ADAJ-SB12	33.8	34.0	SS	G	N	10/20/2021	1124	1	NA	X
9	JSF-SS-ADAJ-SB12-35.6/35.8-20211020	JSF-ADAJ-SB12	35.6	35.8	SS	G	N	10/20/2021	1126	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckrels / Stantec [signature]	10/21/21	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

SHIPPING METHOD: (Select Appropriate) — SAMPLER NAME AND SIGNATURE

Sample Receipt Conditions

☐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

°C

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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	2
COC No:	JSF_SI_10112021_2C		
8 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev1
B3 10/29/21

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

SRS 10/21/2021

Required Project Information:

Site ID #:	JOHN SEVIER FOSSIL PLANT		
Project #:	175568225		
Site Address	Plant 611 Old Hwy 70 S		
City	Rogersville	State, Zip:	TN, 37057
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:	prthomas0@tva.gov		

SRS 10/21/2021

Required Sampler Information

Sampler:	S. Stanley/ M. Buckreis		
Sampling Company:	Stantec		
Address	601 Grassmere Park Unite 22		
City/State	Nashville, TN	Phone No:	615-885-1144
Sampling Team Number:	2		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

SRS 10/21/2021

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)

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.	Filtered: N / Preserve: None / Analysis: PLM
1	JSF-SS-DUP05-20211011	-	-	-	SS	G	FD	10/11/2021	-	1	NA	X
2	JSF-SS-DUP06-20211013	-	-	-	SS	G	FD	10/13/2021	-	1	NA	X
3	JSF-SS-DUP07-20211014	-	-	-	SS	G	FD	10/14/2021	-	1	NA	X

SRS 10/21/2021
SRS 10/21/2021
SRS 10/21/2021
SRS 10/21/2021

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/ Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantc [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

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Tennessee Valley Authority

TVA Environmental Investigations

COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
9 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rec'd BB 10/29/21

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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road, Monroeville, PA 15146	Project #:	175568225	Sampling Company:	Stantec
		Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville; State, Zip: TN, 37057	City/State	Nashville, TN; Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		SRS 10/21/2021		
SRS 10/21/2021					

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)

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.	Filtered: N / Preserve: None / Analysis: PLM
#REF!	JSF-SS-DUP08-20211018	-	-	-	SS	G	FD	10/18/2021	-	1	NA	X
#REF!	JSF-SS-DUP09-20211020	-	-	-	SS	G	FD	10/20/2021	-	1	NA	X
	JSF-SS-ADA3-SB12-17.8/18.0-20211109		17.8	18.0	SS			10/19/2021	1608	6	N	X PLM

SRS 10/21/2021 (Filtered, Preserve, Analysis columns)

BB 10/29/21

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/ Stantec	10/21/2021	10:15	[signature]	10/29/21	9:00

SRS 10/21/2021

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantec [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

TVA

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	2
COC No:	JSF_SI_101121_2C		
1 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/21/2021		SRS 10/21/2021			

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-DFAS-SB06-1.8/2.0-2021011	JSF-DFAS-SB06	1.8	2.0	SS	G	N	10/11/2021	1421	1	NA	X
2	JSF-SS-DFAS-SB06-3.8/4.0-20211011	JSF-DFAS-SB06	3.8	4.0	SS	G	N	10/11/2021	1423	1	NA	X
3	JSF-SS-DFAS-SB06-5.8/6.0-20211011	JSF-DFAS-SB06	5.8	6.0	SS	G	N	10/11/2021	1454	1	NA	X
4	JSF-SS-DFAS-SB06-7.8/8.0-20211011	JSF-DFAS-SB06	7.8	8.0	SS	G	N	10/11/2021	1457	1	NA	X
5	JSF-SS-DFAS-SB06-9.8/10.0-20211011	JSF-DFAS-SB06	9.8	10.0	SS	G	N	10/11/2021	1405	1	NA	X
6	JSF-SS-DFAS-SB06-11.8/12.0-20211011	JSF-DFAS-SB06	11.8	12.0	SS	G	N	10/11/2021	1503	1	NA	X
7	JSF-SS-DFAS-SB06-13.8/14.0-20211011	JSF-DFAS-SB06	13.8	14.0	SS	G	N	10/11/2021	1557	1	NA	X
8	JSF-SS-DFAS-SB06-15.8/16.0-20211012	JSF-DFAS-SB06	15.8	16.0	SS	G	N	10/12/2021	0845	1	NA	X
9	JSF-SS-DFAS-SB05-1.8/2.0-20211012	JSF-DFAS-SB05	1.8	2.0	SS	G	N	10/12/2021	1148	1	NA	X
10	JSF-SS-DFAS-SB05-3.8/4.0-20211012	JSF-DFAS-SB05	3.8	4.0	SS	G	N	10/12/2021	1153	1	NA	X
11	JSF-SS-DFAS-SB05-5.8/6.0-20211012	JSF-DFAS-SB05	5.8	6.0	SS	G	N	10/12/2021	1311	1	NA	X
12	JSF-SS-DFAS-SB05-7.8/8.0-20211012	JSF-DFAS-SB05	7.8	8.0	SS	G	N	10/12/2021	1315	1	N/A	X
13	JSF-SS-DFAS-SB05-9.8/10.0-20211012	JSF-DFAS-SB05	9.8	10.0	SS	G	N	10/12/2021	1317	1	N/A	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Buckreis / Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00	Yes / No; Yes / No; Yes / No; Yes / No
						Yes / No; Yes / No; Yes / No; Yes / No

[redacted]

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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	2
COC No:	JSF_SI_10112021_2C		
2 of 9 Pages			
Task Desc:	JSF_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

SRS 10/21/2021

Required Project Information:

Site ID #:	JOHN SEVIER FOSSIL PLANT		
Project #:	175568225		
Site Address	Plant 611 Old Hwy 70 S		
City	Rogersville	State, Zip:	TN, 37057
Site PM Name:	Paul Thomas		
Phone/Fax:	(423) 751-2926		
Site PM Email:	prthomas0@tva.gov		

SRS 10/21/2021

Required Sampler Information

Sampler:	S. Stanley/ M. Buckreis		
Sampling Company:	Stantec		
Address	601 Grassmere Park Unite 22		
City/State	Nashville, TN	Phone No:	615-885-1144
Sampling Team Number:	2		
Send EDD/Hard Copy to:	tva_deliverables@envstd.com		

SRS 10/21/2021

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

SRS 10/21/2021

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	JSF-SS-DFAS-SB05-11.8/12.0-20211012	JSF-DFAS-SB05	11.8	12.0	SS	G	N	10/12/2021	1416	1	NA	X
2	JSF-SS-DFAS-SB05-13.8/14.0-20211012	JSF-DFAS-SB05	13.8	14.0	SS	G	N	10/12/2021	1421	1	NA	X
3	JSF-SS-ADAJ-SB09-1.8/2.0-20211013	JSF-ADAJ-SB09	1.8	2.0	SS	G	N	10/13/2021	1018	1	NA	X
4	JSF-SS-ADAJ-SB09-3.8/4.0-20211013	JSF-ADAJ-SB09	3.8	4.0	SS	G	N	10/13/2021	1021	1	NA	X
5	JSF-SS-ADAJ-SB09-5.8/6.0-20211013	JSF-ADAJ-SB09	5.8	6.0	SS	G	N	10/13/2021	1052	1	NA	X
6	JSF-SS-ADAJ-SB09-7.8/8.0-20211013	JSF-ADAJ-SB09	7.8	8.0	SS	G	N	10/13/2021	1055	1	NA	X
7	JSF-SS-ADAJ-SB09-9.8/10.0-20211013	JSF-ADAJ-SB09	9.8	10.0	SS	G	N	10/13/2021	1058	1	NA	X
8	JSF-SS-ADAJ-SB09-11.8/12.0-20211013	JSF-ADAJ-SB09	11.8	12.0	SS	G	N	10/13/2021	1144	1	NA	X
9	JSF-SS-ADAJ-SB09-13.8/14.0-20211013	JSF-ADAJ-SB09	13.8	14.0	SS	G	N	10/13/2021	1147	1	NA	X
10	JSF-SS-ADAJ-SB09-15.8/16.0-20211013	JSF-ADAJ-SB09	15.8	16.0	SS	G	N	10/13/2021	1211	1	NA	X
11	JSF-SS-ADAJ-SB09-17.8/18.0-20211013	JSF-ADAJ-SB09	17.8	18.0	SS	G	N	10/13/2021	1215	1	NA	X
12	JSF-SS-ADAJ-SB09-19.8/20.0-20211013	JSF-ADAJ-SB09	19.8	20.0	SS	G	N	10/13/2021	1218	1	NA	X
13	JSF-SS-ADAJ-SB09-21.8/22.0-20211013	JSF-ADAJ-SB09	21.8	22.0	SS	G	N	10/13/2021	1224	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/Stantec	10/21/2021	10:15		10/22/21	9:00

Sample Receipt Conditions

☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

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:	JSF_SI_10112021_2C		
3 of 9 Pages	[redacted]		
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas	SRS 10/21/2021	
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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	SRS 10/21/2021			
SRS 10/21/2021					

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 — SRS 10/21/2021

Preserve: None — SRS 10/21/2021

Analysis: SRS 10/21/2021

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	JSF-SS-ADAJ-SB09-23.8/24.0-20211013	JSF-ADAJ-SB09	23.8	24.0	SS	G	N	10/13/2021	1328	1	NA	X
2	JSF-SS-ADAJ-SB09-25.8/26.0-20211013	JSF-ADAJ-SB09	25.8	26.0	SS	G	N	10/13/2021	1617	1	NA	X
3	JSF-SS-ADAJ-SB09-27.8/28.0-20211013	JSF-ADAJ-SB09	27.8	28.0	SS	G	N	10/13/2021	1620	1	NA	X
4	JSF-SS-ADAJ-SB09-29.8/30.0-20211013	JSF-ADAJ-SB09	29.8	30.0	SS	G	N	10/13/2021	1623	1	NA	X
5	JSF-SS-ADAJ-SB09-31.8/32.0-20211014	JSF-ADAJ-SB09	31.8	32.0	SS	G	N	10/14/2021	0816	1	NA	X
6	JSF-SS-ADAJ-SB09-33.8/34.0-20211014	JSF-ADAJ-SB09	33.8	34.0	SS	G	N	10/14/2021	0844	1	NA	X
7	JSF-SS-ADAJ-SB09-35.6/35.8-20211014	JSF-ADAJ-SB09	35.6	35.8	SS	G	N	10/14/2021	0905	1	NA	X
8	JSF-SS-ADAJ-SB10-1.8/2.0-20211014	JSF-ADAJ-SB10	1.8	2.0	SS	G	N	10/14/2021	1250	1	NA	X
9	JSF-SS-ADAJ-SB10-3.8/4.0-20211014	JSF-ADAJ-SB10	3.8	4.0	SS	G	N	10/14/2021	1256	1	NA	X
10	JSF-SS-ADAJ-SB10-5.8/6.0-20211014	JSF-ADAJ-SB10	5.8	6.0	SS	G	N	10/14/2021	1411	1	NA	X
11	JSF-SS-ADAJ-SB10-7.8/8.0-20211014	JSF-ADAJ-SB10	7.8	8.0	SS	G	N	10/14/2021	1313	1	NA	X
12	JSF-SS-ADAJ-SB10-9.8/10.0-20211014	JSF-ADAJ-SB10	9.8	10.0	SS	G	N	10/14/2021	1315	1	NA	X
13	JSF-SS-ADAJ-SB10-11.8/12.0-20211014	JSF-ADAJ-SB10	11.8	12.0	SS	G	N	10/14/2021	1344	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Buckreis / Stantec	10/21/2021	10:15		10/22/21	9:00	☐Yes ☒No / ☐Yes ☒No / ☒Yes ☐No / ☐Yes ☒No
						☐Yes ☐No / ☐Yes ☐No / ☐Yes ☐No / ☐Yes ☐No

[redacted]

TVA Environmental Investigations

Tennessee Valley Authority

COOLER No.:	1	of	2
COC No:	JSF_SI_10112021_2C		
4 of 9 Pages			
Task Desc:	JSF_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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/21/2021		SRS 10/21/2021			

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-ADAJ-SB10-13.8/14.0-20211014	JSF-ADAJ-SB10	13.8	14.0	SS	G	N	10/14/2021	1346	1	NA	X
2	JSF-SS-ADAJ-SB10-15.8/16.0-20211014	JSF-ADAJ-SB10	15.8	16.0	SS	G	N	10/14/2021	1418	1	NA	X
3	JSF-SS-ADAJ-SB10-17.8/18.0-20211014	JSF-ADAJ-SB10	17.8	18.0	SS	G	N	10/14/2021	1420	1	NA	X
4	JSF-SS-ADAJ-SB10-19.8/20.0-20211015	JSF-ADAJ-SB10	19.8	20.0	SS	G	N	10/14/2021	1442	1	NA	X
5	JSF-SS-ADAJ-SB10-21.8/22.0-20211015	JSF-ADAJ-SB10	21.8	22.0	SS	G	N	10/14/2021	1444	1	NA	X
6	JSF-SS-ADAJ-SB10-23.8/24.0-20211014	JSF-ADAJ-SB10	23.8	24.0	SS	G	N	10/14/2021	1513	1	NA	X
7	JSF-SS-ADAJ-SB10-25.8/26.0-20211014	JSF-ADAJ-SB10	25.8	26.0	SS	G	N	10/14/2021	1537	1	NA	X
8	JSF-SS-ADAJ-SB10-27.8/28.0-20211014	JSF-ADAJ-SB10	27.8	28.0	SS	G	N	10/14/2021	1539	1	NA	X
9	JSF-SS-ADAJ-SB10-29.8/30.0-20211014	JSF-ADAJ-SB10	29.8	30.0	SS	G	N	10/14/2021	1612	1	NA	X
10	JSF-SS-ADAJ-SB10-31.8/32.0-20211015	JSF-ADAJ-SB10	31.8	32.0	SS	G	N	10/15/2021	0832	1	NA	X
11	JSF-SS-ADAJ-SB10-33.8/34.0-20211015	JSF-ADAJ-SB10	33.8	34.0	SS	G	N	10/15/2021	0924	1	NA	X
12	JSF-SS-ADAJ-SB10-35.6/36.0-20211015	JSF-ADAJ-SB10	35.8	36.0	SS	G	N	10/15/2021	0927	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis / Stantec (signature)	10:15		(signature)	10/22/21	9:00

Sample Receipt Conditions

☐Yes ☒No	☐Yes ☒No	☒Yes ☐No	☐Yes ☒No
☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☑No
☐Yes	☐Yes	☐Yes	☐Yes

[redacted]

TVA

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
5 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/4/2021		SRS 10/21/2021			

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 — SRS 10/21/2021

Preserve: None — SRS 10/21/2021

Analysis: PLM — SRS 10/21/2021

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	JSF-SS-ADAJ-SB11-1.8/2.0-20211018	JSF-ADAJ-SB11	1.8	2.0	SS	G	N	10/18/2021	1417	1	NA	X
2	JSF-SS-ADAJ-SB11-3.8/4.0-20211018	JSF-ADAJ-SB11	3.8	4.0	SS	G	N	10/18/2021	1419	1	NA	X
3	JSF-SS-ADAJ-SB11-5.8/6.0-20211018	JSF-ADAJ-SB11	5.8	6.0	SS	G	N	10/18/2021	1437	1	NA	X
4	JSF-SS-ADAJ-SB11-7.8/8.0-20211018	JSF-ADAJ-SB11	7.8	8.0	SS	G	N	10/18/2021	1439	1	NA	X
5	JSF-SS-ADAJ-SB11-9.8/10.0-20211018	JSF-ADAJ-SB11	9.8	10.0	SS	G	N	10/18/2021	1442	1	NA	X
6	JSF-SS-ADAJ-SB11-11.8/12.0-20211018	JSF-ADAJ-SB11	11.8	12.0	SS	G	N	10/18/2021	1510	1	NA	X
7	JSF-SS-ADAJ-SB11-13.8/14.0-20211018	JSF-ADAJ-SB11	13.8	14.0	SS	G	N	10/18/2021	1512	1	NA	X
8	JSF-SS-ADAJ-SB11-15.8/16.0-20211018	JSF-ADAJ-SB11	15.8	16.0	SS	G	N	10/18/2021	1546	1	NA	X
9	JSF-SS-ADAJ-SB11-17.8/18.0-20211018	JSF-ADAJ-SB11	17.8	18.0	SS	G	N	10/18/2021	1548	1	NA	X
10	JSF-SS-ADAJ-SB11-19.8/20.0-20211018	JSF-ADAJ-SB11	19.8	20.0	SS	G	N	10/18/2021	1608	1	NA	X
11	JSF-SS-ADAJ-SB11-21.8/22.0-20211018	JSF-ADAJ-SB11	21.8	22.0	SS	G	N	10/18/2021	1610	1	NA	X
12	JSF-SS-ADAJ-SB11-23.8/24.0-20211019	JSF-ADAJ-SB11	23.8	24.0	SS	G	N	10/19/2021	0857	1	NA	X
13	JSF-SS-ADAJ-SB11-25.8/26.0-20211019	JSF-ADAJ-SB11	25.8	26.0	SS	G	N	10/19/2021	0905	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Buckreis / Stantec	10/21/2021	10:15		10/22/21	9:00	☐Yes ☒No · ☐Yes ☒No · ☒Yes ☐No · ☐Yes ☒No
						☐Yes ☐No · ☐Yes ☐No · ☐Yes ☐No · ☐Yes ☐No

[redacted]

TVA

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
6 of 9 Pages	[redacted]		
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:		Required Project Information:				Required Sampler Information			
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT			Sampler:	S. Stanley/ M. Buckreis		
Lab Address:	350 Hochberg Road	Project #:	175568225			Sampling Company:	Stantec		
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S			Address	601 Grassmere Park Unite 22		
		City	Rogersville	State, Zip:	TN, 37057	City/State	Nashville, TN	Phone No:	615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas			SRS 10/21/2021			
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926			Sampling Team Number:	2		
Phone/Fax:	724-325-1776	Site PM Email:	pthomas0@tva.gov			Send EDD/Hard Copy to:	tva_deliverables@envstd.com		
Lab Email:	efischer@rjleegroup.com								
SRS 10/21/2021		SRS 10/21/2021							

Analysis Turnaround Time

- [ ] CALENDAR DAYS
- [x] WORKING DAYS

TAT if different from Below __N/A____

- [ ] 24 Hours
- [ ] 3 Business Days
- [ ] 5 Business Days
- [x] 10 Business Days (Standard)

Filtered: N — SRS 10/21/2021

Preserve: None — SRS 10/21/2021

Analysis: PLM — SRS 10/21/2021

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth Start Depth (Depth Unit)	Sample Depth 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	JSF-SS-ADAJ-SB11-27.8/28.0-20211019	JSF-ADAJ-SB11	27.8	28.0	SS	G	N	10/19/2021	0927	1	NA	X
2	JSF-SS-ADAJ-SB11-29.8/30.0-20211019	JSF-ADAJ-SB11	29.8	30.0	SS	G	N	10/19/2021	1046	1	NA	X
3	JSF-SS-ADAJ-SB11-31.8/32.0-20211019	JSF-ADAJ-SB11	31.8	32.0	SS	G	N	10/19/2021	1118	1	NA	X
4	JSF-SS-ADAJ-SB11-33.8/34.0-20211019	JSF-ADAJ-SB11	33.8	34.0	SS	G	N	10/19/2021	1155	1	NA	X
5	JSF-SS-ADAJ-SB11-35.6/35.8-20211019	JSF-ADAJ-SB11	35.6	35.8	SS	G	N	10/19/2021	1159	1	NA	X
6	JSF-SS-ADAJ-SB12-1.8/2.0-20211019	JSF-ADAJ-SB12	1.8	2.0	SS	G	N	10/19/2021	1500	1	NA	X
7	JSF-SS-ADAJ-SB12-3.8/4.0-20211019	JSF-ADAJ-SB12	3.8	4.0	SS	G	N	10/19/2021	1503	1	NA	X
8	JSF-SS-ADAJ-SB12-5.8/6.0-20211019	JSF-ADAJ-SB12	5.8	6.0	SS	G	N	10/19/2021	1527	1	NA	X
9	JSF-SS-ADAJ-SB12-7.8/8.0-20211019	JSF-ADAJ-SB12	7.8	8.0	SS	G	N	10/19/2021	1529	1	NA	X
10	JSF-SS-ADAJ-SB12-9.8/10.0-20211019	JSF-ADAJ-SB12	9.8	10.0	SS	G	N	10/19/2021	1531	1	NA	X
11	JSF-SS-ADAJ-SB12-11.8/12.0-20211019	JSF-ADAJ-SB12	11.8	12.0	SS	G	N	10/19/2021	1548	1	NA	X
12	JSF-SS-ADAJ-SB12-13.8/14.0-20211019	JSF-ADAJ-SB12	13.8	14.0	SS	G	N	10/19/2021	1550	1	NA	X
13	JSF-SS-ADAJ-SB12-15.8/16.0-20211019	JSF-ADAJ-SB12	15.8	16.0	SS	G	N	10/19/2021	1606	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis / Stantec	10/21/2021	16:15		10/22/21	9:00

Sample Receipt Conditions

Yes / [x] No	Yes / [x] No	[x] Yes / No	Yes / [x] No
Yes / No	Yes / No	Yes / No	Yes / No

[redacted]

TVA Environmental Investigations

Tennessee Valley Authority

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2 of 2
COC No:	JSF_SI_10112021_2C
7 of 9 Pages	
Task Desc:	JSF_SI_2021_09

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	pthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@envstd.com
Lab Email:	efischer@rjleegroup.com				
SRS 10/4/2021		SRS 10/21/2021			

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-ADAJ-SB12-19.8/20.0-20211020	JSF-ADAJ-SB12	19.8	20.0	SS	G	N	10/20/2021	0823	1	NA	X
2	JSF-SS-ADAJ-SB12-21.8/22.0-20211020	JSF-ADAJ-SB12	21.8	22.0	SS	G	N	10/20/2021	0826	1	NA	X
3	JSF-SS-ADAJ-SB12-23.8/24.0-20211020	JSF-ADAJ-SB12	23.8	24.0	SS	G	N	10/20/2021	0842	1	NA	X
4	JSF-SS-ADAJ-SB12-25.8/26.0-20211020	JSF-ADAJ-SB12	25.8	26.0	SS	G	N	10/20/2021	0907	1	NA	X
5	JSF-SS-ADAJ-SB12-27.8/28.0-20211020	JSF-ADAJ-SB12	27.8	28.0	SS	G	N	10/20/2021	0909	1	NA	X
6	JSF-SS-ADAJ-SB12-29.8/30.0-20211020	JSF-ADAJ-SB12	29.8	30.0	SS	G	N	10/20/2021	0949	1	NA	X
7	JSF-SS-ADAJ-SB12-31.8/32.0-20211020	JSF-ADAJ-SB12	31.8	32.0	SS	G	N	10/20/2021	1029	1	NA	X
8	JSF-SS-ADAJ-SB12-33.8/34.0-20211020	JSF-ADAJ-SB12	33.8	34.0	SS	G	N	10/20/2021	1124	1	NA	X
9	JSF-SS-ADAJ-SB12-35.6/35.8-20211020	JSF-ADAJ-SB12	35.6	35.8	SS	G	N	10/20/2021	1126	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis / Stantec	10/21/21	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

SHIPPING METHOD: (Select Appropriate) | SAMPLER NAME AND SIGNATURE

Sample Receipt Conditions

☐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

TVA

Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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8 of 9 Pages			
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Lab Address:	350 Hochberg Road, Monroeville, PA 15146	Project #:	175568225	Sampling Company:	Stantec
		Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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		SRS 10/21/2021		
	SRS 10/21/2021				

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

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	JSF-SS-DUP05-20211011	-	-	-	SS	G	FD	10/11/2021	-	1	NA	X
2	JSF-SS-DUP06-20211013	-	-	-	SS	G	FD	10/13/2021	-	1	NA	X
3	JSF-SS-DUP07-20211014	-	-	-	SS	G	FD	10/14/2021	-	1	NA	X

Sample Depth: Depth Unit / Select Unit

SRS 10/21/2021

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/ Stantec	10/21/2021	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

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	Scott Stanley/Stantc [signature]

TVA

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.:	2	of	2
COC No:	JSF_SI_10112021_2C		
9 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:		Required Project Information:		Required Sampler Information	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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				
SRS 10/21/2021		SRS 10/21/2021			

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021 — SRS 10/21/2021

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
#REF!	JSF-SS-DUP08-20211018	-	-	-	SS	G	FD	10/18/2021	-	1	NA	X
#REF!	JSF-SS-DUP09-20211020	-	-	-	SS	G	FD	10/20/2021	-	1	NA	X

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/ Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantc [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

Sample #	Customer Sample #	Work Order	Login Date	Date And Time Received	Protocol Assigned	Due Date	Delivery Tracking #
10551186	JSF-SS-DFAS-SB06-1.8/2.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551187	JSF-SS-DFAS-SB06-3.8/4.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551188	JSF-SS-DFAS-SB06-5.8/6.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551189	JSF-SS-DFAS-SB06-7.8/8.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551190	JSF-SS-DFAS-SB06-9.8/10.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551191	JSF-SS-DFAS-SB06-11.8/12.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551192	JSF-SS-DFAS-SB06-13.8/14.0-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551193	JSF-SS-DFAS-SB06-15.8/16.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551194	JSF-SS-DFAS-SB05-1.8/2.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551195	JSF-SS-DFAS-SB05-3.8/4.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551196	QC-JSF-SS-DFAS-SB05-3.8/4.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551197	JSF-SS-DFAS-SB05-5.8/6.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551198	JSF-SS-DFAS-SB05-7.8/8.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551199	JSF-SS-DFAS-SB05-9.8/10.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551200	JSF-SS-DFAS-SB05-11.8/12.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551201	JSF-SS-DFAS-SB05-13.8/14.0-20211012	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551202	JSF-SS-ADAJ-SB09-1.8/2.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551203	JSF-SS-ADAJ-SB09-3.8/4.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551204	JSF-SS-ADAJ-SB09-5.8/6.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551205	JSF-SS-ADAJ-SB09-7.8/8.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551206	JSF-SS-ADAJ-SB09-9.8/10.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551207	QC-JSF-SS-ADAJ-SB09-9.8/10.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551208	JSF-SS-ADAJ-SB09-11.8/12.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551209	JSF-SS-ADAJ-SB09-13.8/14.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551210	JSF-SS-ADAJ-SB09-15.8/16.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551211	JSF-SS-ADAJ-SB09-17.8/18.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551212	JSF-SS-ADAJ-SB09-19.8/20.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551213	JSF-SS-ADAJ-SB09-21.8/22.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551214	JSF-SS-ADAJ-SB09-23.8/24.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551215	JSF-SS-ADAJ-SB09-25.8/26.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551216	JSF-SS-ADAJ-SB09-27.8/28.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551217	JSF-SS-ADAJ-SB09-29.8/30.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551218	QC-JSF-SS-ADAJ-SB09-29.8/30.0-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551219	JSF-SS-ADAJ-SB09-31.8/32.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551220	JSF-SS-ADAJ-SB09-33.8/34.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551221	JSF-SS-ADAJ-SB09-35.6/35.8-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551222	JSF-SS-ADAJ-SB10-1.8/2.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551223	JSF-SS-ADAJ-SB10-3.8/4.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551224	JSF-SS-ADAJ-SB10-5.8/6.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551225	JSF-SS-ADAJ-SB10-7.8/8.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551226	JSF-SS-ADAJ-SB10-9.8/10.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551227	JSF-SS-ADAJ-SB10-11.8/12.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028

10551228	JSF-SS-ADAJ-SB10-13.8/14.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551229	QC-JSF-SS-ADAJ-SB10-13.8/14.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551230	JSF-SS-ADAJ-SB10-15.8/16.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551231	JSF-SS-ADAJ-SB10-17.8/18.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551232	JSF-SS-ADAJ-SB10-19.8/20.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551233	JSF-SS-ADAJ-SB10-21.8/22.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551234	JSF-SS-ADAJ-SB10-23.8/24.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551235	JSF-SS-ADAJ-SB10-25.8/26.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551236	JSF-SS-ADAJ-SB10-27.8/28.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551237	JSF-SS-ADAJ-SB10-29.8/30.0-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551238	JSF-SS-ADAJ-SB10-31.8/32.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551239	JSF-SS-ADAJ-SB10-33.8/34.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551240	QC-JSF-SS-ADAJ-SB10-33.8/34.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551241	JSF-SS-ADAJ-SB10-35.6/36.0-20211015	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551242	JSF-SS-ADAJ-SB11-1.8/2.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551243	JSF-SS-ADAJ-SB11-3.8/4.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551244	JSF-SS-ADAJ-SB11-5.8/6.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551245	JSF-SS-ADAJ-SB11-7.8/8.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551246	JSF-SS-ADAJ-SB11-9.8/10.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551247	JSF-SS-ADAJ-SB11-11.8/12.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551248	JSF-SS-ADAJ-SB11-13.8/14.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551249	JSF-SS-ADAJ-SB11-15.8/16.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551250	JSF-SS-ADAJ-SB11-17.8/18.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551251	QC-JSF-SS-ADAJ-SB11-17.8/18.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551252	JSF-SS-ADAJ-SB11-19.8/20.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551253	JSF-SS-ADAJ-SB11-21.8/22.0-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551254	JSF-SS-ADAJ-SB11-23.8/24.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551255	JSF-SS-ADAJ-SB11-25.8/26.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551256	JSF-SS-ADAJ-SB11-27.8/28.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551257	JSF-SS-ADAJ-SB11-29.8/30.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551258	JSF-SS-ADAJ-SB11-31.8/32.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551259	JSF-SS-ADAJ-SB11-33.8/34.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551260	JSF-SS-ADAJ-SB11-35.6/35.8-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551261	JSF-SS-ADAJ-SB12-1.8/2.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551262	QC-JSF-SS-ADAJ-SB12-1.8/2.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551263	JSF-SS-ADAJ-SB12-3.8/4.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551264	JSF-SS-ADAJ-SB12-5.8/6.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551265	JSF-SS-ADAJ-SB12-7.8/8.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551266	JSF-SS-ADAJ-SB12-9.8/10.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551267	JSF-SS-ADAJ-SB12-11.8/12.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551268	JSF-SS-ADAJ-SB12-13.8/14.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551269	JSF-SS-ADAJ-SB12-15.8/16.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551270	JSF-SS-ADAJ-SB12-17.8/18.0-20211019	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028

10551271	JSF-SS-ADAJ-SB12-19.8/20.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551272	JSF-SS-ADAJ-SB12-21.8/22.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551273	QC-JSF-SS-ADAJ-SB12-21.8/22.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551274	JSF-SS-ADAJ-SB12-23.8/24.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551275	JSF-SS-ADAJ-SB12-25.8/26.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551276	JSF-SS-ADAJ-SB12-27.8/28.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551277	JSF-SS-ADAJ-SB12-29.8/30.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551278	JSF-SS-ADAJ-SB12-31.8/32.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551279	JSF-SS-ADAJ-SB12-33.8/34.0-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551280	JSF-SS-ADAJ-SB12-35.6/35.8-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551281	JSF-SS-DUP05-20211011	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551282	JSF-SS-DUP06-20211013	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551283	JSF-SS-DUP07-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551284	QC-JSF-SS-DUP07-20211014	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551285	JSF-SS-DUP08-20211018	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028
10551286	JSF-SS-DUP09-20211020	COH1063779-2	10/26/2021 09:11	10/22/2021 09:00	Fly Ash Determination by PLM	11/09/2021 09:02	2851 9399 6028

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: 11/10/2021
Sample Received Date: 10/22/2021
RJLG Project: COH1063779-2
Customer COC: JSF_SI_101121_2C
Purchase Order:
Analytical Method: SOP OPT.023 Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB09-1.8/2.0-20211013	10551202	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
JSF-SS-ADAJ-SB09-11.8/12.0-20211013	10551208	11/03/2021	10/13/2021	ND	Misc. Silicates Opaques	Yellow brown sediment
JSF-SS-ADAJ-SB09-13.8/14.0-20211013	10551209	11/06/2021	10/13/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellow sediment
JSF-SS-ADAJ-SB09-15.8/16.0-20211013	10551210	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB09-17.8/18.0-20211013	10551211	11/03/2021	10/13/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-ADAJ-SB09-19.8/20.0-20211013	10551212	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB09-21.8/22.0-20211013	10551213	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Light yellow sediment
JSF-SS-ADAJ-SB09-23.8/24.0-20211013	10551214	11/03/2021	10/13/2021	ND		Very pale brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB09-25.8/26.0-20211013	10551215	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
JSF-SS-ADAJ-SB09-27.8/28.0-20211013	10551216	11/05/2021	10/13/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-ADAJ-SB09-29.8/30.0-20211013	10551217	11/05/2021	10/13/2021	ND	Misc. Silicates Opaques	Yellowish brown sediment
JSF-SS-ADAJ-SB09-3.8/4.0-20211013	10551203	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
JSF-SS-ADAJ-SB09-31.8/32.0-20211014	10551219	11/04/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB09-33.8/34.0-20211014	10551220	11/04/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB09-35.6/35.8-20211014	10551221	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light grayish-brown sediment
JSF-SS-ADAJ-SB09-5.8/6.0-20211013	10551204	11/04/2021	10/13/2021	ND	Misc. Silicates	Light gray sediment
JSF-SS-ADAJ-SB09-7.8/8.0-20211013	10551205	11/06/2021	10/13/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB09-9.8/10.0-20211013	10551206	11/04/2021	10/13/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-ADAJ-SB10-1.8/2.0-20211014	10551222	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellow sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB10-11.8/12.0-20211014	10551227	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellow sediment
JSF-SS-ADAJ-SB10-13.8/14.0-20211014	10551228	11/05/2021	10/14/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
JSF-SS-ADAJ-SB10-15.8/16.0-20211014	10551230	11/06/2021	10/14/2021	ND	Mica Opaques Quartz	Light beige sediment
JSF-SS-ADAJ-SB10-17.8/18.0-20211014	10551231	11/04/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB10-19.8/20.0-20211014	10551232	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellow sediment
JSF-SS-ADAJ-SB10-21.8/22.0-20211014	10551233	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-ADAJ-SB10-23.8/24.0-20211014	10551234	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Quartz	Reddish-brown sediment
JSF-SS-ADAJ-SB10-25.8/26.0-20211014	10551235	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB10-27.8/28.0-20211014	10551236	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellowish-brown sediment
JSF-SS-ADAJ-SB10-29.8/30.0-20211014	10551237	11/04/2021	10/14/2021	ND	Mica Misc. Silicates	Pale brown sediment
JSF-SS-ADAJ-SB10-3.8/4.0-20211014	10551223	11/04/2021	10/14/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB10-31.8/32.0-20211015	10551238	11/05/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB10-33.8/34.0-20211015	10551239	11/05/2021	10/15/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB10-35.6/36.0-20211015	10551241	11/06/2021	10/15/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB10-5.8/6.0-20211014	10551224	11/04/2021	10/14/2021	ND	Misc. Silicates Opaques	Yellow brown sediment
JSF-SS-ADAJ-SB10-7.8/8.0-20211014	10551225	11/06/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellow sediment
JSF-SS-ADAJ-SB10-9.8/10.0-20211014	10551226	11/05/2021	10/14/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-ADAJ-SB11-1.8/2.0-20211018	10551242	11/06/2021	10/18/2021	1%	Clay Mica Misc. Silicates Opaques Quartz	Grayish-brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB11-11.8/12.0-20211018	10551247	11/05/2021	10/18/2021	ND	Misc. Silicates Opaques	Brownish yellow sediment
JSF-SS-ADAJ-SB11-13.8/14.0-20211018	10551248	11/06/2021	10/18/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Yellowish-brown sediment
JSF-SS-ADAJ-SB11-15.8/16.0-20211018	10551249	11/06/2021	10/18/2021	ND	Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-ADAJ-SB11-17.8/18.0-20211018	10551250	11/05/2021	10/18/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-19.8/20.0-20211018	10551252	11/07/2021	10/18/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB11-21.8/22.0-20211018	10551253	11/04/2021	10/18/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-23.8/24.0-20211019	10551254	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-25.8/26.0-20211019	10551255	11/07/2021	10/19/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB11-27.8/28.0-20211019	10551256	11/04/2021	10/19/2021	ND	Misc. Silicates Opaques	Light yellow brown sediment
JSF-SS-ADAJ-SB11-29.8/30.0-20211019	10551257	11/04/2021	10/19/2021	ND	Misc. Silicates Opaques	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB11-3.8/4.0-20211018	10551243	11/06/2021	10/18/2021	ND	Misc. Silicates Opaques Quartz	Light gray sediment
JSF-SS-ADAJ-SB11-31.8/32.0-20211019	10551258	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-33.8/34.0-20211019	10551259	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
JSF-SS-ADAJ-SB11-35.6/35.8-20211019	10551260	11/07/2021	10/19/2021	1%	Mica Misc. Silicates Opaques Quartz	Light gray sediment
JSF-SS-ADAJ-SB11-5.8/6.0-20211018	10551244	11/04/2021	10/18/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-5.8/6.0-20211018	10551244	11/05/2021	10/18/2021	ND		
JSF-SS-ADAJ-SB11-7.8/8.0-20211018	10551245	11/04/2021	10/18/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB11-9.8/10.0-20211018	10551246	11/06/2021	10/18/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB12-1.8/2.0-20211019	10551261	11/07/2021	10/19/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Yellowish-brown sediment
JSF-SS-ADAJ-SB12-11.8/12.0-20211019	10551267	11/07/2021	10/19/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB12-13.8/14.0-20211019	10551268	11/07/2021	10/19/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB12-15.8/16.0-20211019	10551269	11/07/2021	10/19/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-ADAJ-SB12-17.8/18.0-20211019	10551270	11/05/2021	10/20/2021	ND	Misc. Silicates Opaques	Pale brown sediment
JSF-SS-ADAJ-SB12-19.8/20.0-20211020	10551271	11/04/2021	10/20/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB12-21.8/22.0-20211020	10551272	11/04/2021	10/20/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB12-23.8/24.0-20211020	10551274	11/07/2021	10/20/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-ADAJ-SB12-25.8/26.0-20211020	10551275	11/05/2021	10/20/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-ADAJ-SB12-27.8/28.0-20211020	10551276	11/07/2021	10/20/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB12-29.8/30.0-20211020	10551277	11/04/2021	10/20/2021	ND	Misc. Silicates Opaques	Brownish yellow sewdiment
JSF-SS-ADAJ-SB12-3.8/4.0-20211019	10551263	11/04/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-ADAJ-SB12-31.8/32.0-20211020	10551278	11/07/2021	10/20/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-ADAJ-SB12-33.8/34.0-20211020	10551279	11/07/2021	10/20/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Grayish-brown sediment
JSF-SS-ADAJ-SB12-35.6/35.8-20211020	10551280	11/04/2021	10/20/2021	ND	Misc. Silicates Opaques	Light brownish gray sediment
JSF-SS-ADAJ-SB12-5.8/6.0-20211019	10551264	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB12-7.8/8.0-20211019	10551265	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-ADAJ-SB12-9.8/10.0-20211019	10551266	11/05/2021	10/19/2021	ND	Misc. Silicates Opaques	Yellow sediment
JSF-SS-DFAS-SB05-1.8/2.0-20211012	10551194	11/05/2021	10/12/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB05-11.8/12.0-20211012	10551200	11/06/2021	10/12/2021	ND	Clay Misc. Silicates Opaques Quartz	Light grayish-brown sediment
JSF-SS-DFAS-SB05-13.8/14.0-20211012	10551201	11/06/2021	10/12/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light gray sediment
JSF-SS-DFAS-SB05-3.8/4.0-20211012	10551195	11/05/2021	10/12/2021	ND	Misc. Silicates Opaques	Reddish yellow sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-DFAS-SB05-5.8/6.0-20211012	10551197	11/04/2021	10/12/2021	ND	Misc. Silicates Opaques	Yellowish brown sediment
JSF-SS-DFAS-SB05-7.8/8.0-20211012	10551198	11/04/2021	10/12/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB05-9.8/10.0-20211012	10551199	11/08/2021	10/12/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB06-1.8/2.0-20211011	10551186	11/05/2021	10/11/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB06-11.8/12.0-20211011	10551191	11/07/2021	10/11/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
JSF-SS-DFAS-SB06-13.8/14.0-20211011	10551192	11/08/2021	10/11/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Yellowish Brown Sediment
JSF-SS-DFAS-SB06-15.8/16.0-20211012	10551193	11/04/2021	10/12/2021	ND	Misc. Silicates Opaques	Grayish brown sediment
JSF-SS-DFAS-SB06-3.8/4.0-20211011	10551187	11/05/2021	10/11/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB06-5.8/6.0-20211011	10551188	11/04/2021	10/11/2021	ND	Misc. Silicates Opaques	Reddish yellow sediment
JSF-SS-DFAS-SB06-7.8/8.0-20211011	10551189	11/04/2021	10/11/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
JSF-SS-DFAS-SB06-9.8/10.0-20211011	10551190	11/05/2021	10/11/2021	ND	Misc. Silicates Opaques	Very pale brown sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
JSF-SS-DUP05-20211011	10551281	11/07/2021	10/11/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-DUP06-20211013	10551282	11/07/2021	10/13/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellowish-brown sediment
JSF-SS-DUP07-20211014	10551283	11/07/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-DUP08-20211018	10551285	11/07/2021	10/18/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment
JSF-SS-DUP09-20211020	10551286	11/05/2021	10/20/2021	ND	Misc. Silicates Opaques	Very pale brown sediment
QC-JSF-SS-ADAJ-SB09-29.8/30.0-20211013	10551218	11/07/2021	10/13/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
QC-JSF-SS-ADAJ-SB09-9.8/10.0-20211013	10551207	11/07/2021	10/13/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light beige sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % CCP	Other Components	Comments
QC-JSF-SS-ADAJ-SB10-13.8/14.0-20211014	10551229	11/07/2021	10/14/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light yellowish-orange sediment
QC-JSF-SS-ADAJ-SB10-33.8/34.0-20211015	10551240	11/07/2021	10/15/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
QC-JSF-SS-ADAJ-SB11-17.8/18.0-20211018	10551251	11/07/2021	10/18/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Light brown sediment
QC-JSF-SS-ADAJ-SB12-1.8/2.0-20211019	10551262	11/08/2021	10/19/2021	ND	Misc. Silicates Opaques	Very pale yellowish brown sediment
QC-JSF-SS-ADAJ-SB12-21.8/22.0-20211020	10551273	11/08/2021	10/20/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Reddish Yellow Sediment
QC-JSF-SS-DFAS-SB05-3.8/4.0-20211012	10551196	11/07/2021	10/12/2021	ND	Clay Mica Misc. Silicates Opaques Quartz	Brown sediment
QC-JSF-SS-DUP07-20211014	10551284	11/08/2021	10/14/2021	ND	Clay Feldspar Misc. Silicates Opaques Quartz	Very Pale Yellow 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

Tennessee Valley Authority

TVA Environmental Investigations

10/11/2021 ~~BS 10/29/2021~~ Rev 2 BS 10/29/2021 Rev 1

COOLER No.:	1	of	2
COC No:	JSF_SI_101121_2C		
1 of 5 Pages			
Task Desc:	JSF_SI_2021_09		

BS 10/29/21

Rev 3

BS 1/21/22

REV 4 CLM 2/17/22

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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanton/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175668225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address:	Plant 611 Old Hwy 70 S	Address:	601 Grassmere Park Suite 22
		City:	Rogersville State, Zip: TN, 37057	City/State:	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information:		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	[illegible]	Send EDD/Hard Copy to:	[illegible]
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)

SRS 10/21/2021

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	JSF-SS-DFAS-SB06-1.8/2.0-~~20210~~ 20211011	JSF-DFAS-SB05	1.8	2.0	SS	G	N	10/11/2021	1421	1	N/A	X
2	JSF-SS-DFAS-SB06-3.8/4.0-20211011	JSF-DFAS-SB06	3.8	4.0	SS	G	N	10/11/2021	1423	1	N/A	X
3	JSF-SS-DFAS-SB06-5.8/6.0-20211011	JSF-DFAS-SB06	5.8	6.0	SS	G	N	10/11/2021	1454	1	N/A	X
4	JSF-SS-DFAS-SB06-7.8/8.0-20211011	JSF-DFAS-SB06	7.8	8.0	SS	G	N	10/11/2021	[illegible]			
5	JSF-SS-DFAS-SB06-9.8/10.0-20211011	JSF-DFAS-SB06	9.8	10.0	SS	G	N	10/11/2021	~~[illegible]~~	1	1525 N/A	X
6	JSF-SS-DFAS-SB06-11.8/12.0-20211011	JSF-DFAS-SB06	11.8	12.0	SS	G	N	10/11/2021	~~1503~~	1	1557 NA	X
7	JSF-SS-DFAS-SB06-13.8/14.0-20211011	JSF-DFAS-SB06	13.8	14.0	SS	G	N	10/11/2021	~~1557~~	1		X
8	JSF-SS-DFAS-SB06-15.8/16.0-20211012	JSF-DFAS-SB06	15.8	16.0	SS	G	N	10/12/2021	0845	1	NA	X
9	JSF-SS-DFAS-SB05-1.8/2.0-20211012	JSF-DFAS-SB05	1.8	2.0	SS	G	N	10/12/2021	1148	1	NA	X
10	JSF-SS-DFAS-SB05-3.8/4.0-20211012	JSF-DFAS-SB05	3.8	4.0	SS	G	N	10/12/2021	1153	1	NA	X
11	JSF-SS-DFAS-SB05-5.8/6.0-20211012	JSF-DFAS-SB05	5.8	6.0	SS	G	N	10/12/2021	1311	1	NA	X
12	JSF-SS-DFAS-SB05-7.8/8.0-20211012	JSF-DFAS-SB05	7.8	8.0	SS	G	N	10/12/2021	1315	1	N/A	X
13	JSF-SS-DFAS-SB05-9.8/10.0-20211012	JSF-DFAS-SB05	9.8	10.0	SS	G	N	10/12/2021	1317	1	N/A	X

20211011 ID 1/21/21

SRS 10/21/2021

BS 1/21/22

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Buckreis / Stantec	10/21/2021	10:45	[signature]	10/22/21	9:00	

TVA 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 2
COC No:	JSF_SI_10112021_2C
2 of 9 Pages	
Task Desc:	JSF_SI_2021_09

Rev 1 BB 10/22/21

Required Ship to Lab:		Required Project Information:		Required Sample Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/M. Stutoski
Lab Address:	350 Hochberg Road	Project #:	175668226	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Units 22
		City	Rogersville State, Zip: TN, 37057	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	pdthomas0@tva.gov	Send EDD/Hard Copy to:	[illegible]
Lab Email:	efischer@rjleegroup.com				
SRS 10/21/2021		SRS 10/21/2021			

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)

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth (Sample Depth, Depth Unit)	End Depth (Sample Depth, Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	Filtered: N / Preserve: None / Analysis: PLM
1	JSF-SS-DFAS-SB05-11.8/12.0-20211012	JSF-DFAS-SB05	11.8	12.0	SS	G	N	10/12/2021	1416	1	NA	X
2	JSF-SS-DFAS-SB05-13.8/14.0-20211012	JSF-DFAS-SB05	13.8	14.0	SS	G	N	10/12/2021	1421	1	NA	X
3	JSF-SS-ADAJ-SB09-1.8/2.0-20211013	JSF-ADAJ-SB09	1.8	2.0	SS	G	N	10/13/2021	1018	1	NA	X
4	JSF-SS-ADAJ-SB09-3.8/4.0-20211013	JSF-ADAJ-SB09	3.8	4.0	SS	G	N	10/13/2021	1021	1	NA	X
5	JSF-SS-ADAJ-SB09-5.8/6.0-20211013	JSF-ADAJ-SB09	5.8	6.0	SS	G	N	10/13/2021	1052	1	NA	X
6	JSF-SS-ADAJ-SB09-7.8/8.0-20211013	JSF-ADAJ-SB09	7.8	8.0	SS	G	N	10/13/2021	1055	1	NA	X
7	JSF-SS-ADAJ-SB09-9.8/10.0-20211013	JSF-ADAJ-SB09	9.8	10.0	SS	G	N	10/13/2021	1058	1	NA	X
8	JSF-SS-ADAJ-SB09-11.8/12.0-20211013	JSF-ADAJ-SB09	11.8	12.0	SS	G	N	10/13/2021	1144	1	NA	X
9	JSF-SS-ADAJ-SB09-13.8/14.0-20211013	JSF-ADAJ-SB09	13.8	14.0	SS	G	N	10/13/2021	1147	1	NA	X
10	JSF-SS-ADAJ-SB09-15.8/16.0-20211013	JSF-ADAJ-SB09	15.8	16.0	SS	G	N	10/13/2021	1211	1	NA	X
11	JSF-SS-ADAJ-SB09-17.8/18.0-20211013	JSF-ADAJ-SB09	17.8	18.0	SS	G	N	10/13/2021	1215	1	NA	X
12	JSF-SS-ADAJ-SB09-19.8/20.0-20211013	JSF-ADAJ-SB09	19.8	20.0	SS	G	N	10/13/2021	1218	1	NA	X
13	JSF-SS-ADAJ-SB09-21.8/22.0-20211013	JSF-ADAJ-SB09	21.8	22.0	SS	G	N	10/13/2021	1324 ~~[illegible]~~	1	NA	X

SRS 10/21/2021

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Stutoski/Stantec	10/21/2021	10:15	BiZin	10/22/21	9:00	☐Yes ☑No ☐Yes ☐No

CLM 2/17/22

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.:	JSF_SI_10112021_2C		
3 of 9 Pages	[redacted]		
Task Desc:	JSF_SI_2021_09		

Required Ship to Lab:	Required Project Information:		Required Sampler Information:	
RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/T. Budreis
350 Hochberg Road	Project #:	[illegible]	Sampling Company:	Stantec
Monroeville, PA 15146	Site Address:	Plant 611 Old Hwy 70 S	Address:	501 Gr[illegible] Park Dr. Ste 22
	City:	Rogersville State, Zip: TN, 37857	City/State:	Nashville, TN Phone No.: 615-885-1144
Lab Manager Contact Information	Site PM Name:	Paul Thomas		
Elizabeth Fischer	Phone/Fax:	(423) 751-2938	Sampling Team Number:	3
724-325-1776	Site PM Email:	[illegible]	Send EDD/Hard Copy to:	[illegible]
efischer@rjleegroup.com				

Analysis Turnaround Time: ☐ Calendar Days ☑ Working Days

TAT Reference/Time Below: N/A

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

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
JSF-SS-ADAJ-SB09-23.8/24.0-20211013	JSF-ADAJ-SB09	23.8	24.0	SS	G	N	10/13/2021	1330	1	N/A	X
JSF-SS-ADAJ-SB09-25.8/26.0-20211013	JSF-ADAJ-SB09	25.8	26.0	SS	G	N	10/13/2021	1617	1	N/A	X
JSF-SS-ADAJ-SB09-27.8/28.0-20211013	JSF-ADAJ-SB09	27.8	28.0	SS	G	N	10/13/2021	1820	1	N/A	X
JSF-SS-ADAJ-SB09-29.8/30.0-20211013	JSF-ADAJ-SB09	29.8	30.0	SS	G	N	10/13/2021	1923	1	N/A	X
JSF-SS-ADAJ-SB09-31.8/32.0-20211014	JSF-ADAJ-SB09	31.8	32.0	SS	G	N	10/14/2021	0818	1	N/A	X
JSF-SS-ADAJ-SB09-33.8/34.0-20211014	JSF-ADAJ-SB09	33.8	34.0	SS	G	N	10/14/2021	0844	1	N/A	X
JSF-SS-ADAJ-SB09-35.8/35.9-20211014	JSF-ADAJ-SB09	35.8	35.9	SS	G	N	10/14/2021	0905	1	N/A	X
JSF-SS-ADAJ-SB10-1.8/2.0-20211014	JSF-ADAJ-SB10	1.8	2.0	SS	G	N	10/14/2021	1250	1	N/A	X
JSF-SS-ADAJ-SB10-3.8/4.0-20211014	JSF-ADAJ-SB10	3.8	4.0	SS	G	N	10/14/2021	1258	1	N/A	X
JSF-SS-ADAJ-SB10-5.8/6.0-20211014	JSF-ADAJ-SB10	5.8	6.0	SS	G	N	10/14/2021	1411	1	N/A	X
JSF-SS-ADAJ-SB10-7.8/8.0-20211014	JSF-ADAJ-SB10	7.8	8.0	SS	G	N	10/14/2021	1313	1	N/A	X
JSF-SS-ADAJ-SB10-9.8/10.0-20211014	JSF-ADAJ-SB10	9.8	10.0	SS	G	N	10/14/2021	1315	1	N/A	X
JSF-SS-ADAJ-SB10-11.8/12.0-20211014	JSF-ADAJ-SB10	11.8	12.0	SS	G	N	10/14/2021	1344	1	N/A	X

SRS 10/26/2021

Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Budreis / Stantec [signature]	10/21/2021	20:15	[signature]	10/[illegible]	9:00

Sample Receipt Conditions

TVA

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	2
COC No:	JSF_SI_10112021_2C		
4 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1
BP 10/21/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568226	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	501 Grassmere Park Unite 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2928	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	pdthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@enosti.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)

Analysis: PLM — Filtered: N — Preserve: None

SRS 10/21/2021

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	JSF-SS-ADAJ-SB10-13.8/14.0-20211014	JSF-ADAJ-SB10	13.8	14.0	SS	G	N	10/14/2021	1346	1	NA	X
2	JSF-SS-ADAJ-SB10-15.8/16.0-20211014	JSF-ADAJ-SB10	15.8	16.0	SS	G	N	10/14/2021	1418	1	NA	X
3	JSF-SS-ADAJ-SB10-17.8/18.0-20211014	JSF-ADAJ-SB10	17.8	18.0	SS	G	N	10/14/2021	1420	1	NA	X
4	JSF-SS-ADAJ-SB10-19.8/20.0-20211015	JSF-ADAJ-SB10	19.8	20.0	SS	G	N	10/14/2021	1442	1	NA	X
5	JSF-SS-ADAJ-SB10-21.8/22.0-20211015	JSF-ADAJ-SB10	21.8	22.0	SS	G	N	10/14/2021	1444	1	NA	X
6	JSF-SS-ADAJ-SB10-23.8/24.0-20211014	JSF-ADAJ-SB10	23.8	24.0	SS	G	N	10/14/2021	1513	1	NA	X
7	JSF-SS-ADAJ-SB10-25.8/26.0-20211014	JSF-ADAJ-SB10	25.8	26.0	SS	G	N	10/14/2021	1527	1	NA	X
8	JSF-SS-ADAJ-SB10-27.8/28.0-20211014	JSF-ADAJ-SB10	27.8	28.0	SS	G	N	10/14/2021	1539	1	NA	X
9	JSF-SS-ADAJ-SB10-29.8/30.0-20211014	JSF-ADAJ-SB10	29.8	30.0	SS	G	N	10/14/2021	1512	1	NA	X
10	JSF-SS-ADAJ-SB10-31.8/32.0-20211015	JSF-ADAJ-SB10	31.8	32.0	SS	G	N	10/15/2021	0832	1	NA	X
11	JSF-SS-ADAJ-SB10-33.8/34.0-20211015	JSF-ADAJ-SB10	33.8	34.0	SS	G	N	10/15/2021	0924	1	NA	X
12	JSF-SS-ADAJ-SB10-35.8/36.0-20211015	JSF-ADAJ-SB10	35.8	36.0	SS	G	N	10/15/2021	0927	1	NA	X

Additional Comments/Special Instructions:

20211014
BP 10/21/21

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis / Stantec [signature]	10:15		[signature]	10/22/21	9:00

Sample Receipt Conditions

olw 2/17/22

TVA Environmental Investigations

TVA

Tennessee Valley Authority

COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
5 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1 BB 10/27/21

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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/M. Bucirała
Lab Address:	350 Hochberg Road	Project #:	175568025	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unit 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
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 __NA__

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

Analysis: Filtered: N; Preserve: None; PLM

ITEM #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-ADAJ-SB11-1.8/2.0-20211018	JSF-ADAJ-SB11	1.8	2.0	SS	G	N	10/18/2021	1417	1	NA	X
2	JSF-SS-ADAJ-SB11-3.8/4.0-20211018	JSF-ADAJ-SB11	3.8	4.0	SS	G	N	10/18/2021	1419	1	NA	X
3	JSF-SS-ADAJ-SB11-5.8/6.0-20211018	JSF-ADAJ-SB11	5.8	6.0	SS	G	N	10/18/2021	1437	1	NA	X
4	JSF-SS-ADAJ-SB11-7.8/8.0-20211018	JSF-ADAJ-SB11	7.8	8.0	SS	G	N	10/18/2021	1439	1	NA	X
5	JSF-SS-ADAJ-SB11-9.8/10.0-20211018	JSF-ADAJ-SB11	9.8	10.0	SS	G	N	10/18/2021	1442	1	NA	X
6	JSF-SS-ADAJ-SB11-11.8/12.0-20211018	JSF-ADAJ-SB11	11.8	12.0	SS	G	N	10/18/2021	1510	1	NA	X
7	JSF-SS-ADAJ-SB11-13.8/14.0-20211018	JSF-ADAJ-SB11	13.8	14.0	SS	G	N	10/18/2021	1512	1	NA	X
8	JSF-SS-ADAJ-SB11-15.8/16.0-20211018	JSF-ADAJ-SB11	15.8	16.0	SS	G	N	10/18/2021	1546	1	NA	X
9	JSF-SS-ADAJ-SB11-17.8/18.0-20211018	JSF-ADAJ-SB11	17.8	18.0	SS	G	N	10/18/2021	1548	1	NA	X
10	JSF-SS-ADAJ-SB11-19.8/20.0-20211018	JSF-ADAJ-SB11	19.8	20.0	SS	G	N	10/18/2021	1808	1	NA	X
11	JSF-SS-ADAJ-SB11-21.8/22.0-20211018	JSF-ADAJ-SB11	21.8	22.0	SS	G	N	10/18/2021	1810	1	NA	X
12	JSF-SS-ADAJ-SB11-23.8/24.0-20211019	JSF-ADAJ-SB11	23.8	24.0	SS	G	N	10/19/2021	0857	1	NA	X
13	JSF-SS-ADAJ-SB11-25.8/26.0-20211019	JSF-ADAJ-SB11	25.8	26.0	SS	G	N	10/19/2021	0924 ~~[illegible]~~	1	NA	X

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions
Mark Bucirała / Stantec	10/21/2021	1615		10/22/21	9:00	

CAM 2/11/22

TVA 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.:	2	of	2
CCC No:	JSF_SI_10112021_2C		
6 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Recd BZ 10/29/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/M. Buckalo
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unit 22
		City	Rogersville State, Zip: TN, 37857	City/State	Nashville, TN Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	[illegible]	Send EDD/Hard Copy to:	[illegible]
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)

Analysis: Filtered: N; Preserved: None; PLM

SHS 10/21/2021

ITEM #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Start Depth	End Depth	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	PLM
1	JSF-SS-ADAJ-SB11-27.8/28.0-20211019	JSF-ADAJ-SB11	27.8	28.0	SS	G	N	10/19/2021	0927	1	NA	X
2	JSF-SS-ADAJ-SB11-29.8/30.0-20211019	JSF-ADAJ-SB11	29.8	30.0	SS	G	N	10/19/2021	1046	1	NA	X
3	JSF-SS-ADAJ-SB11-31.8/32.0-20211019	JSF-ADAJ-SB11	31.8	32.0	SS	G	N	10/19/2021	1118	1	NA	X
4	JSF-SS-ADAJ-SB11-33.8/34.0-20211019	JSF-ADAJ-SB11	33.8	34.0	SS	G	N	10/19/2021	1155	1	NA	X
5	JSF-SS-ADAJ-SB11-35.6/35.8-20211019	JSF-ADAJ-SB11	35.6	35.8	SS	G	N	10/19/2021	1159	1	NA	X
6	JSF-SS-ADAJ-SB12-1.8/2.0-20211019	JSF-ADAJ-SB12	1.8	2.0	SS	G	N	10/19/2021	1500	1	NA	X
7	JSF-SS-ADAJ-SB12-3.8/4.0-20211019	JSF-ADAJ-SB12	3.8	4.0	SS	G	N	10/19/2021	1503	1	NA	X
8	JSF-SS-ADAJ-SB12-5.8/6.0-20211019	JSF-ADAJ-SB12	5.8	6.0	SS	G	N	10/19/2021	1527	1	NA	X
9	JSF-SS-ADAJ-SB12-7.8/8.0-20211019	JSF-ADAJ-SB12	7.8	8.0	SS	G	N	10/19/2021	1529	1	NA	X
10	JSF-SS-ADAJ-SB12-9.8/10.0-20211019	JSF-ADAJ-SB12	9.8	10.0	SS	G	N	10/19/2021	1531	1	NA	X
11	JSF-SS-ADAJ-SB12-11.8/12.0-20211019	JSF-ADAJ-SB12	11.8	12.0	SS	G	N	10/19/2021	1548	1	NA	X
12	JSF-SS-ADAJ-SB12-13.8/14.0-20211019	JSF-ADAJ-SB12	13.8	14.0	SS	G	N	10/19/2021	1550	1	NA	X
13	JSF-SS-ADAJ-SB12-15.8/16.0-20211019	JSF-ADAJ-SB12	15.8	16.0	SS	G	N	10/19/2021	1606	1	NA	X

Sample Depth: Depth Unit / Select Unit

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckalo // Stantec	10/21/2021	16:15	[signature]	10/22/21	9:00

Sample Receipt Conditions

TVA

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TVA Environmental Investigations

COOLER No.:	2	of	2
COC No:	JSF_SI_10112021_2C		
7 of 9 Pages			
Task Desc:	JSF_SI_2021_09		

Rev 1 SB 10/29/21

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 #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckals
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	501 Grassmere Park Unite 22
		City	Rogersville; State, Zip: TN, 37857	City/State	Nashville, TN; Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	pthomas0@tva.gov	Send EDD/Hard Copy to:	tva_deliverables@enviroaddress.com
Lab Email:	efischer@rjleegroup.com				
SRS 10/21/2021		SRS 10/21/2021			

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis: PLM — SRS 10/21/2021

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Start Depth (Depth Unit)	Sample Depth: 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	JSF-SS-ADAJ-SB12-19.8/20.0-20211020	JSF-ADAJ-SB12	19.8	20.0	SS	G	N	10/20/2021	0823	1	NA	X
2	JSF-SS-ADAJ-SB12-21.8/22.0-20211020	JSF-ADAJ-SB12	21.8	22.0	SS	G	N	10/20/2021	0826	1	NA	X
3	JSF-SS-ADAJ-SB12-23.8/24.0-20211020	JSF-ADAJ-SB12	23.8	24.0	SS	G	N	10/20/2021	0842	1	NA	X
4	JSF-SS-ADAJ-SB12-25.8/26.0-20211020	JSF-ADAJ-SB12	25.8	26.0	SS	G	N	10/20/2021	0907	1	NA	X
5	JSF-SS-ADAJ-SB12-27.8/28.0-20211020	JSF-ADAJ-SB12	27.8	28.0	SS	G	N	10/20/2021	0909	1	NA	X
6	JSF-SS-ADAJ-SB12-29.8/30.0-20211020	JSF-ADAJ-SB12	29.8	30.0	SS	G	N	10/20/2021	0949	1	NA	X
7	JSF-SS-ADAJ-SB12-31.8/32.0-20211020	JSF-ADAJ-SB12	31.8	32.0	SS	G	N	10/20/2021	1029	1	NA	X
8	JSF-SS-ADAJ-SB12-33.8/34.0-20211020	JSF-ADAJ-SB12	33.8	34.0	SS	G	N	10/20/2021	1124	1	NA	X
9	JSF-SS-ADAJ-SB12-35.6/35.8-20211020	JSF-ADAJ-SB12	35.6	35.8	SS	G	N	10/20/2021	1126	1	NA	X

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckals / Stantec [signature]	10/21/21	1015	[signature]	10/22/21	9:00
SRS 10/21/2021					

Sample Receipt Conditions

SHIPPING METHOD: (Check Appropriate) SAMPLER NAME AND SIGNATURE

TVA Tennessee Valley Authority

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Chain-of-Custody / Analytical Request Document

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COOLER No.:	1 of 2
COC No:	JSF_SI_10112021_2C
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Task Desc:	JSF_SI_2021_09

Rev1
BB 10/24/21

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT	Sampler:	S. Stanley/ M. Buckreis
Lab Address:	350 Hochberg Road	Project #:	175568225	Sampling Company:	Stantec
	Monroeville, PA 15146	Site Address	Plant 611 Old Hwy 70 S	Address	601 Grassmere Park Unit 22
		City	Rogersville; State, Zip: TN, 37857	City/State	Nashville, TN; Phone No: 615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas		SRS 10/21/2021
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926	Sampling Team Number:	2
Phone/Fax:	724-325-1776	Site PM Email:	[illegible]	Send EDD/Hard Copy to:	[illegible]
Lab Email:	[illegible]				
SRS 10/21/2021		SRS 10/21/2021			

Analysis Turnaround Time

☐ Calendar Days ☑ Working Days

TAT Fulfilment from Below __NA__

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

ITEM #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth: Start Depth (Depth Unit)	Sample Depth: End Depth (Select Unit)	MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/Lab Sample I.D.	Analysis: PLM
1	JSF-SS-DUP05-20211011	-	-	-	SS	G	FD	10/11/2021	-	1	NA	X
2	JSF-SS-DUP06-20211013	-	-	-	SS	G	FD	10/13/2021	-	1	NA	X
3	JSF-SS-DUP07-20211014	-	-	-	SS	G	FD	10/14/2021	-	1	NA	X

SRS 10/21/2021 SRS 10/21/2021 SRS 10/21/2021

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckreis/ Stantec [signature]	10/21/2021	10:15	[signature]	10/22/21	9:00

SRS 10/21/2021

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

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantec [signature]

TVA Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

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COOLER No.:	2 of 2
COC No:	JSF_SI_10112021_2C
Pages	
Task Code:	JSF_SI_2021_09

Recd
BJ
10/27/21

Required Ship to Lab		Required Project Information				Required Sampler			
Lab Name:	RJ Lee Group, Inc.	Site ID #:	JOHN SEVIER FOSSIL PLANT			Sampler:		S. Stanley/M. Buckrele	
Lab Address:	350 Hochberg Road	Project #:	175566225			Sampling Company:		Stantec	
	Monroeville, PA 15146	Site Address:	Plant 611 Old Hwy 70 S			Address	601 Grassmere Park Unit 22		
		City	Rogersville	State, Zip:	TN, 37857	City/State	Nashville, TN	Phone No:	615-885-1144
Lab Manager Contact Information		Site PM Name:	Paul Thomas			SRS 10/21/2021			
Lab PM:	Elizabeth Fischer	Phone/Fax:	(423) 751-2926			Sampling Team Number:	2		
Phone/Fax:	724-325-1776	Site PM Email:	[illegible]			Send EDD/Hard Copy to:	[illegible]		
Lab Email:	efischer@rjleegroup.com								
SRS 10/21/2021		SRS 10/21/2021							

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 — SRS 10/21/2021
Preserve: None — SRS 10/21/2021
Analysis — SRS 10/21/2021
SRS 10/21/2021

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
#REF!	JSF-SS-DUP08-20211019	-	-	-	SS	G	FD	10/19/2021	-	1	NA	X
#REF!	JSF-SS-DUP09-20211020	-	-	-	SS	G	FD	10/20/2021	-	1	NA	X
	JSA-SS-ADA5-SB12-128/12.0-~~20211019~~ 20211019		12.8	18.0	SS	G	N	10/19/2021	1608			X

PLM

Additional Comments/Special Instructions:

SRS 10/21/2021

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Mark Buckrele/ Stantec [signature]	10/21/2021	10:15	[signature]	10/28/21	9:00

SRS 10/27/2021

SHIPPING METHOD: (Select Appropriate)	SAMPLER NAME AND SIGNATURE
Fedex	Scott Stanley/Stantec [signature]

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

BJ 10/28/21

clm 2/17/22

ATTACHMENT H.1-B ARM GEOPHYSICS – BOREHOLE LOGGING (JSF-200, JSF-201 AND JSF-202)

September 21, 2018

Mr. Barry Bryant
Stantec
3052 Beaumont Centre Circle
Lexington, KY 40513-1703

Subject: Results of Geophysical Borehole Logging
Three Boreholes (JSF-200, JSF-201, and JSF-202)
TVA John Sevier Fossil Plant (JSF)
Rogersville, TN
ARM Project: 180462

Dear Mr. Bryant,

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 August 29 – 31, 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.

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

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 9. 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. Figure 5 presents the same data, with the data set(s) categorized by borehole.

ARM used statistical contouring to identify windows in which to calculate the mean orientation of all bedding and fracture planes. Figure 6 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 8 shows a predominant ENE/WSW strike direction.

Figures 7 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 9 show a predominant ENE/WSW 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	29	145	N55E/29SE
Fracture Set 1	29	151	N61E/29SE
Fracture Set 2	50	334	N64E/50NW

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.

Tables 2A and 2B present the interpreted flow zones (under ambient and 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.

Downward and upward flow were detected under ambient conditions in JSF-200 and under pumping conditions in JSF-201. Upward flow was detected under pumping conditions in JSF-200 and under ambient and pumping conditions in JSF-202. Downward flow was detected under ambient conditions in JSF-201. Flow direction and associated symbols in all Hydro Logs represent heat pulse flowmeter under ambient conditions.

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

Borehole	Depth (Feet)	Indicators	Type
JSF-200	25-27	A, C, E	Producing zone
JSF-200	28-29	A, C, D	Producing zone
JSF-200	32-33	B, C, E	Receiving zone
JSF-200	39-41	A, C, D	Producing zone
JSF-200	44-46	A, C, D, E	Producing zone
JSF-200	62-64	B, C	Receiving zone
JSF-200	104-105	B, C, E	Receiving zone
JSF-200	132-133	B, C, D, E	Receiving zone
JSF-201	33-34	A, C, D, E	Producing zone
JSF-201	36-38	A, C, E	Producing zone
JSF-201	51-52	A, C, D, E	Producing zone
JSF-201	55-56	B, C, D, E	Receiving zone
JSF-201	72-74	A, C, E	Producing zone
JSF-201	92-93	B, C	Receiving zone
JSF-201	123-125	B, C, D, E	Receiving zone
JSF-201	140-142	B, C, E	Receiving zone
JSF-202	17-19	A, C, E	Producing zone

Table 2B: 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
JSF-200	32-33	B, C, E	Receiving zone
JSF-200	44-46	A, C, D, E	Producing zone
JSF-200	104-105	A, C, E	Producing zone
JSF-201	33-34	A, C, D, E	Producing zone
JSF-201	59.-61	A, C, E	Producing zone
JSF-201	72-74	A, C, E	Producing zone
JSF-201	83-85	A, C	Producing zone
JSF-201	92-93	A, C	Producing zone
JSF-201	131-133	B, C, E	Receiving zone
JSF-202	20-22	A, C, D, E	Producing zone
JSF-202	28-29	A, C	Producing zone
JSF-202	114-116	A, C, D, E	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 Rajković

Duro Rajkovic
Senior Geophysicist

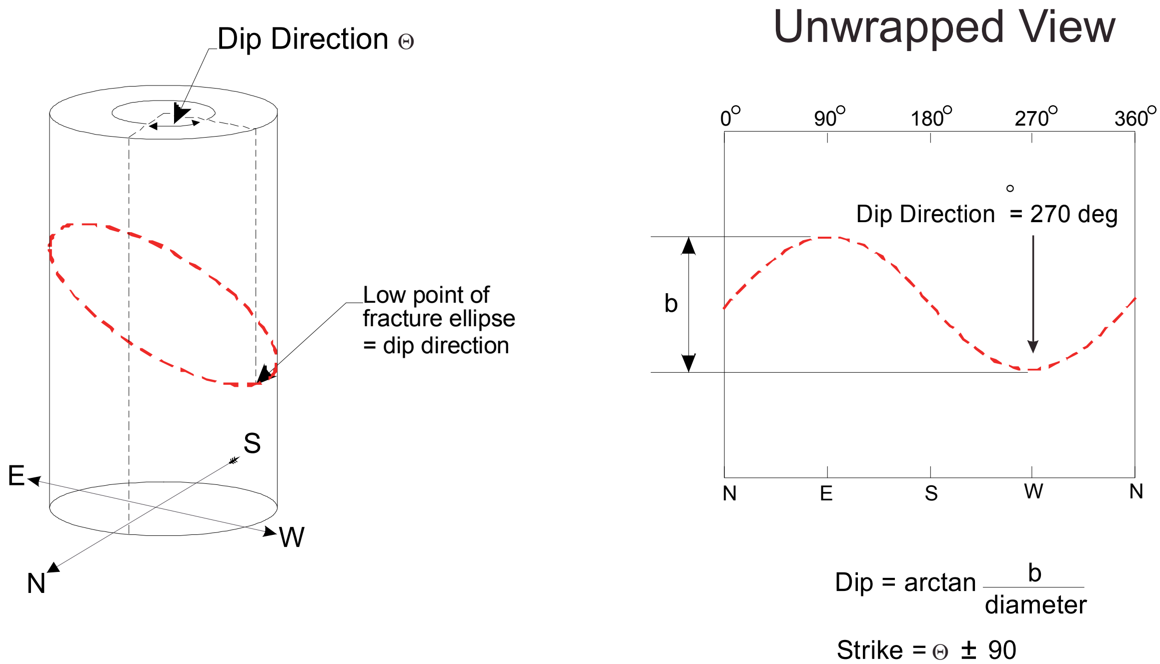


Figure 1: Diagram illustrating unwrapped view of fracture signature.

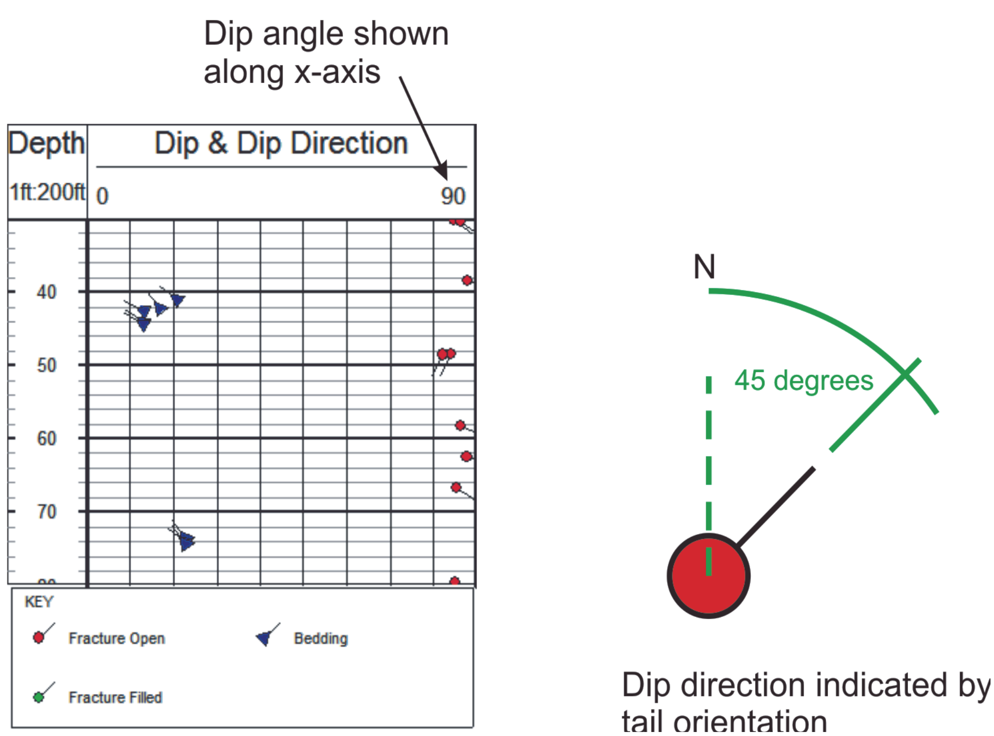


Figure 2: Dip & dip direction determination from the tadpole plot.

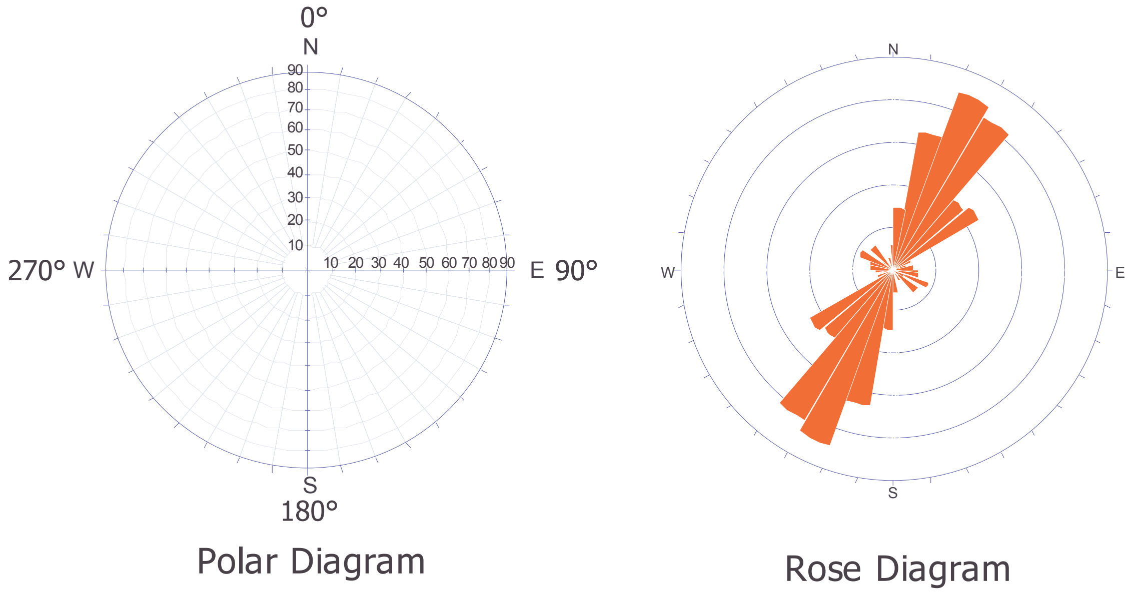


Figure 3: Example polar and rose diagrams. Polar diagram is used in this report for plotting dip and dip direction. Rose diagrams are used for plotting the frequency or number of strike measurements per sector.

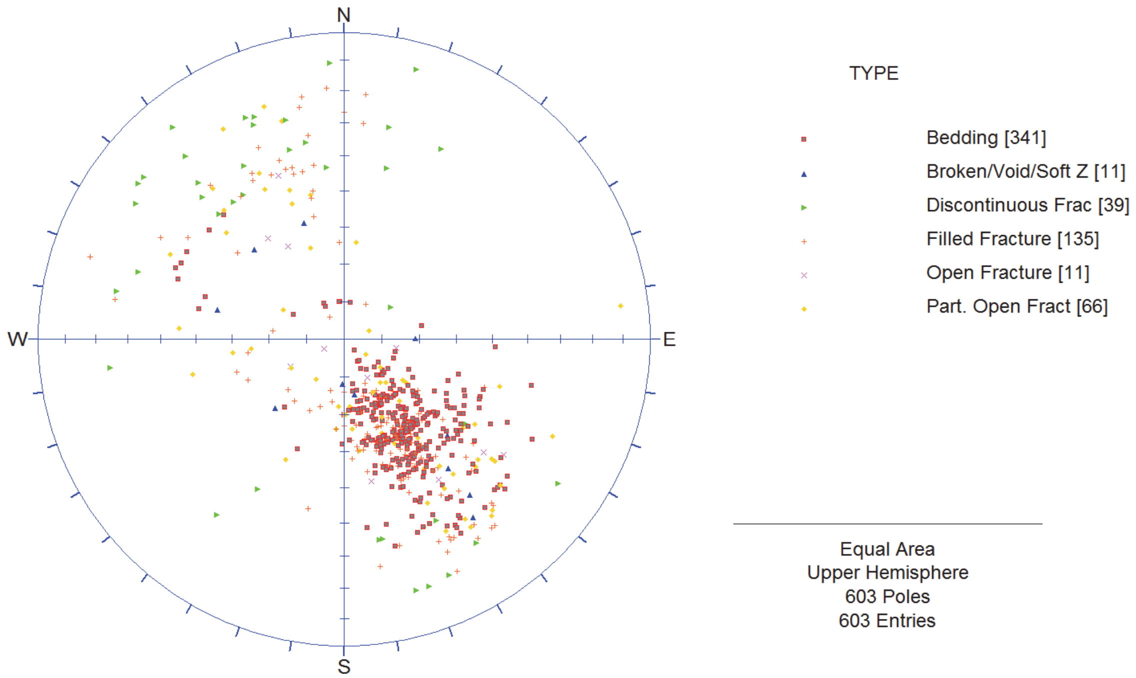


Figure 4: A polar diagram plotting dip and dip direction of all planes categorized by plane type.

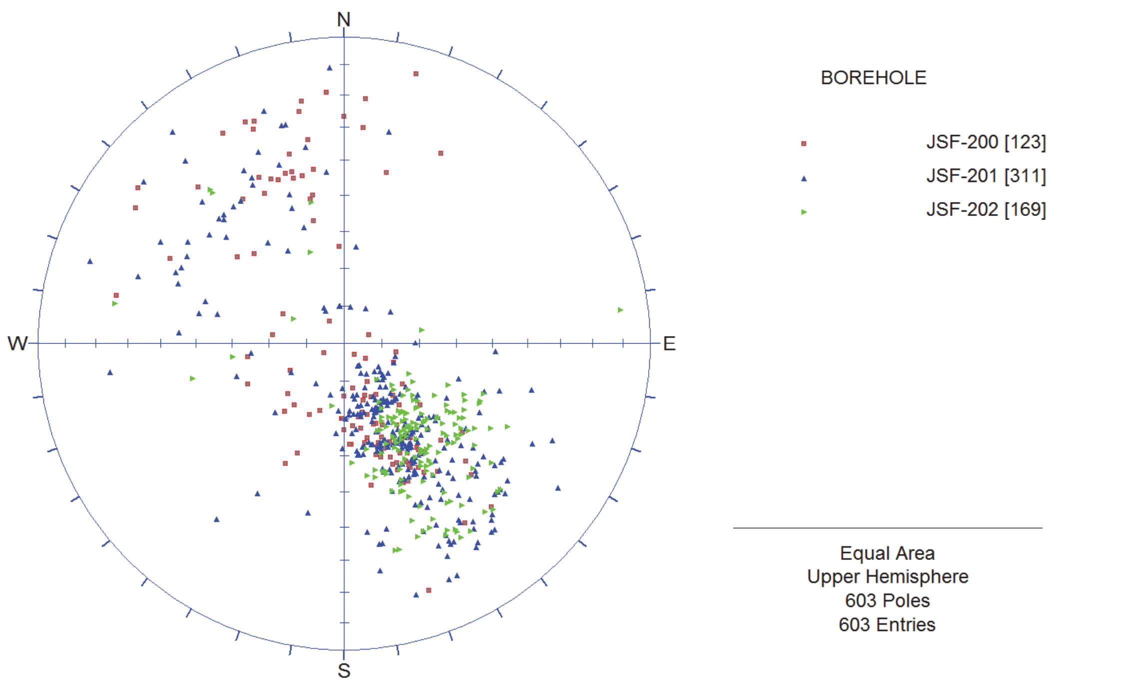


Figure 5: A polar diagram plotting dip and dip direction of all planes categorized by borehole.

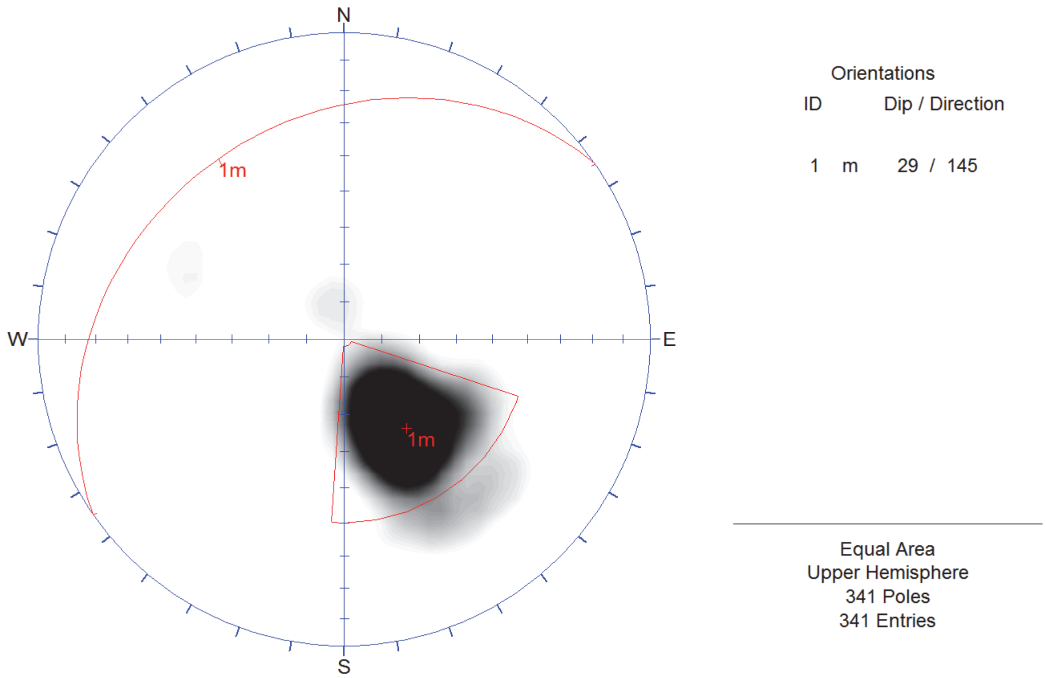


Figure 6: A polar diagram with statistical contouring of all bedding planes. The calculated mean dip angle and direction is shown at the right of the diagram.

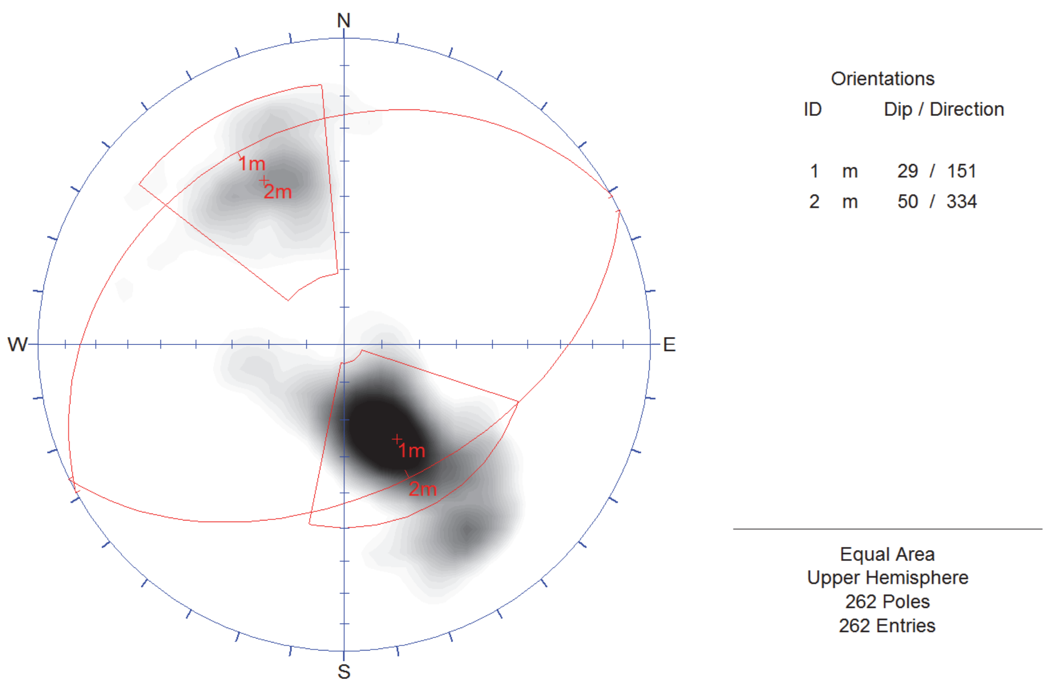


Figure 7: A polar diagram with statistical contouring of all fracture planes. The calculated mean dip angle and direction is shown at the right of the diagram.

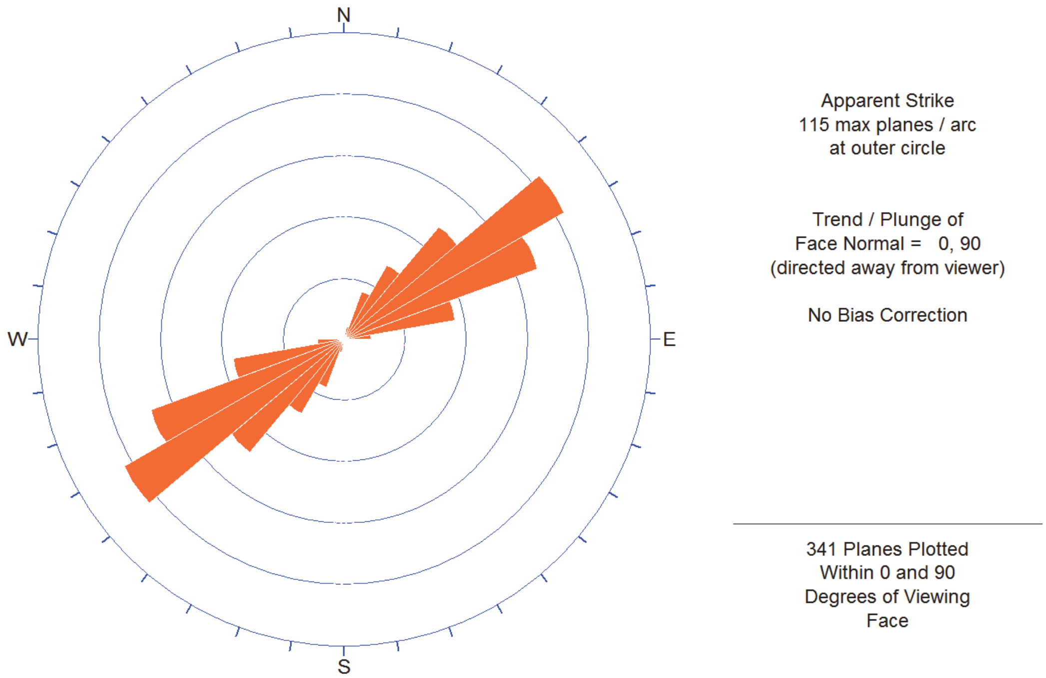


Figure 8: A rose diagram illustrating strike distribution of all bedding planes.

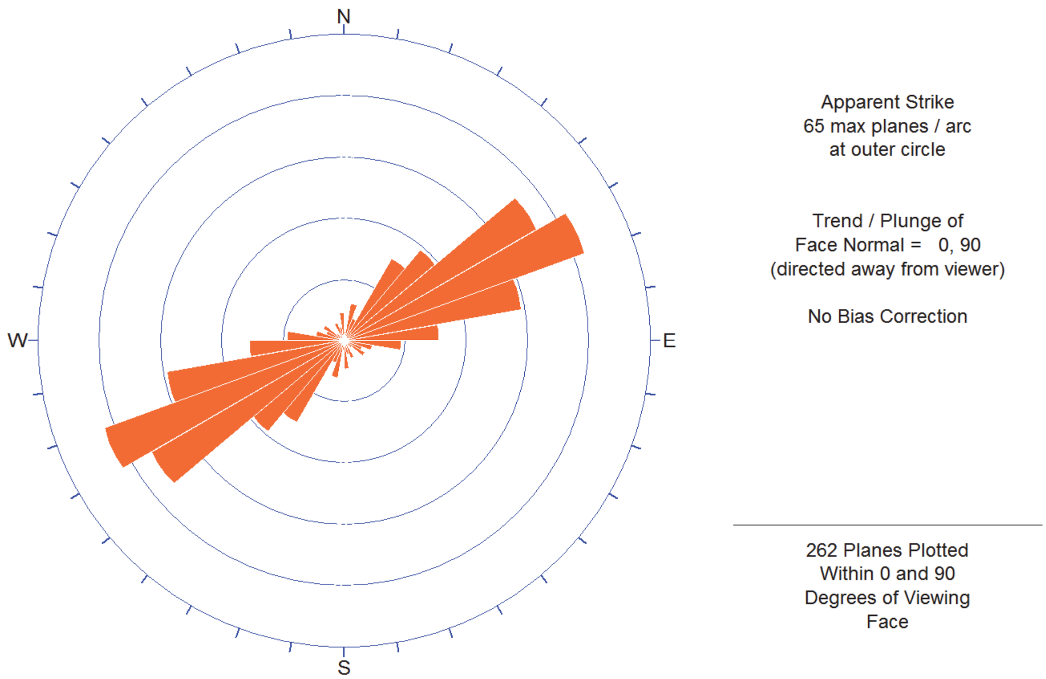


Figure 9: A rose diagram illustrating strike distribution of all fractures.

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.

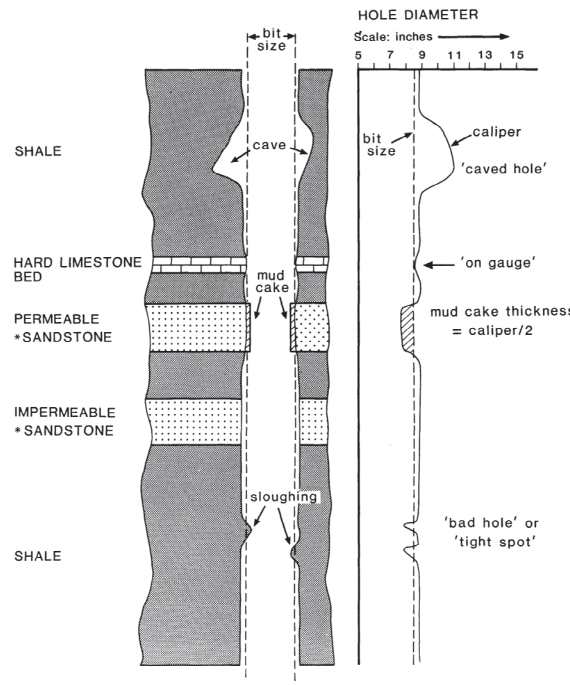


Figure A- 1: The caliper log showing some typical responses. (From Rider, 2002).

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.

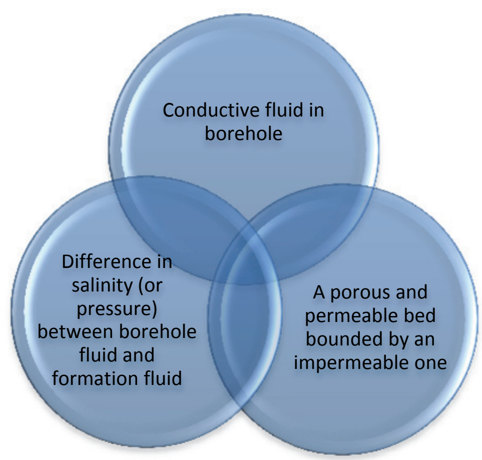


Figure A- 2: Conditions required to produce an SP response.

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.

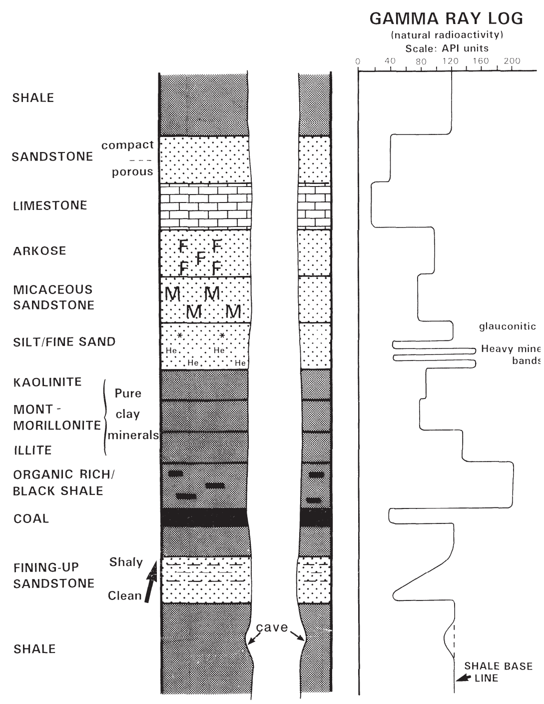


Figure A- 3: Characteristic gamma ray responses. (From Rider, 2002).

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.

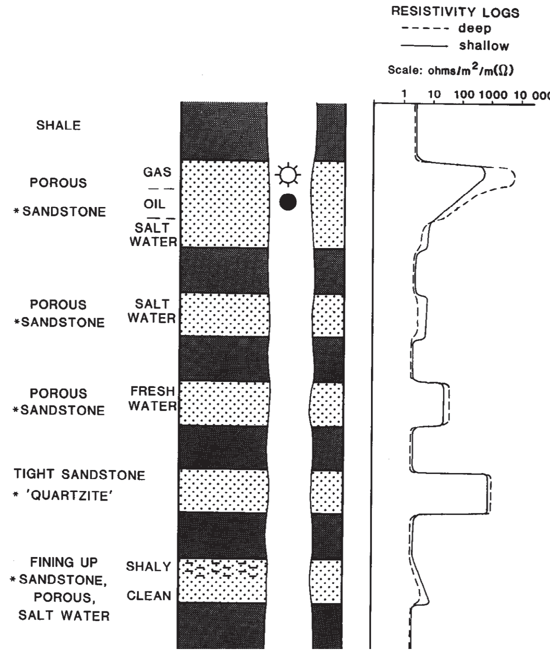


Figure A- 4: Characteristic resistivity responses. (From Rider, 2002)

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.

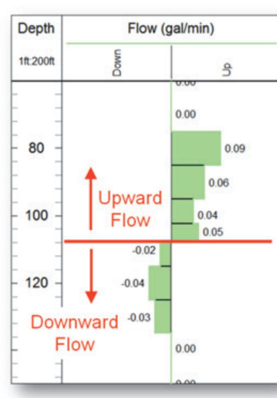


Figure A- 5: Example heat pulse flowmeter log.

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.

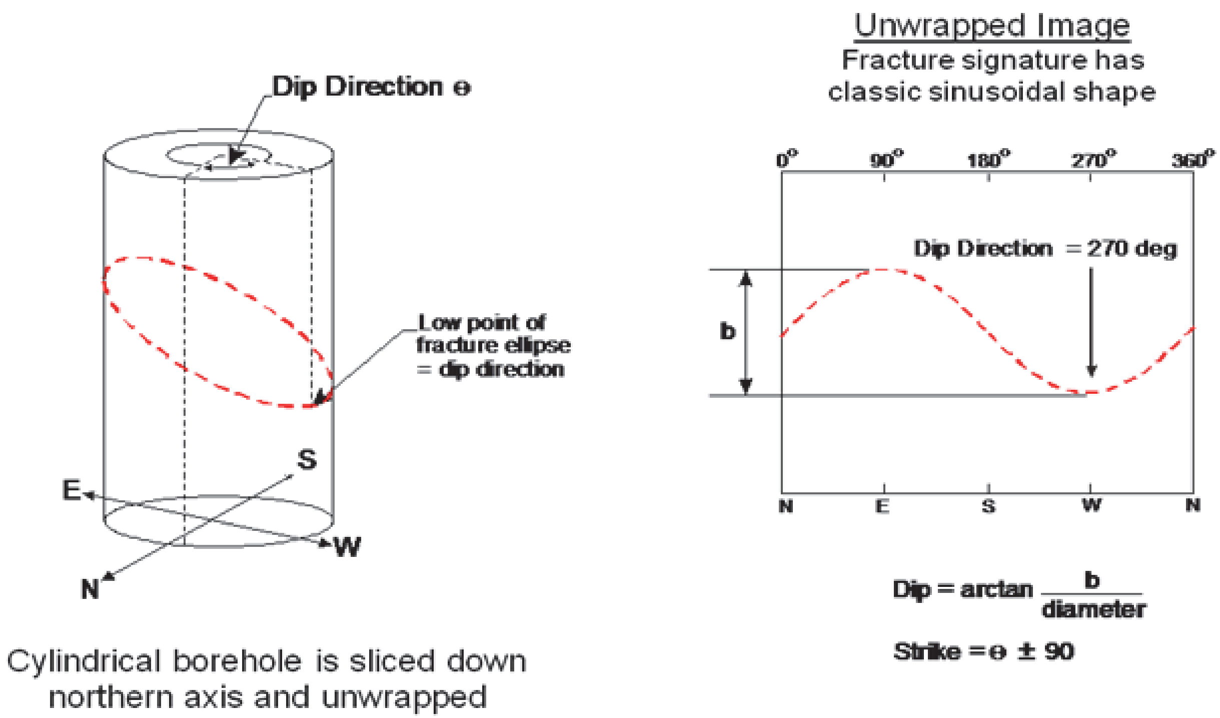


Figure A- 6: Schematic showing the sinusoidal fracture signature in the unwrapped borehole view.

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.

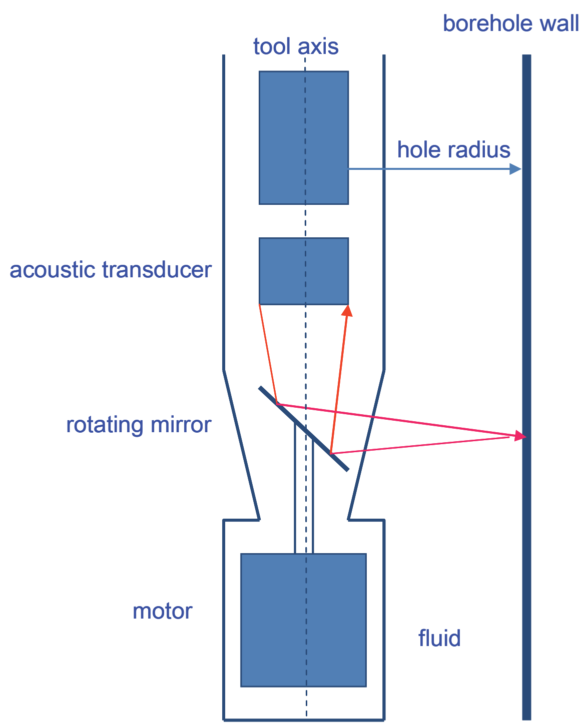
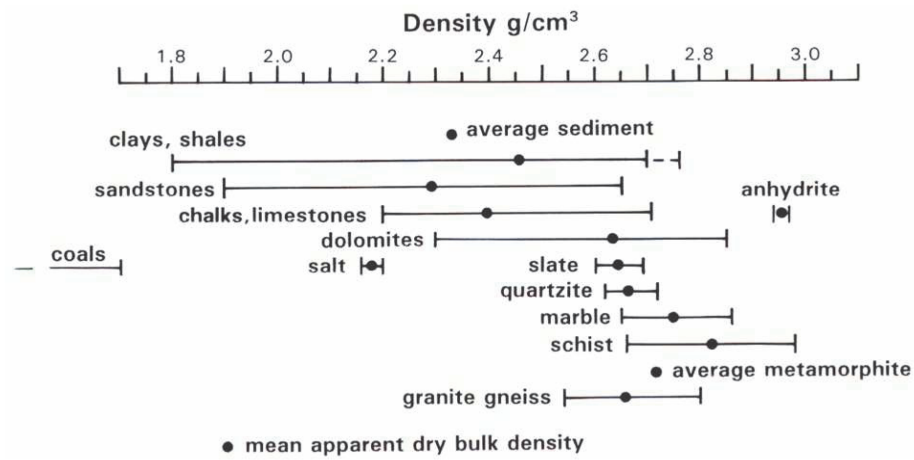


Figure A- 7: Schematic of the acoustic televiewer tool.

DENSITY LOGS

Density logs are most often used to determine formation porosity. The probe uses a radioactive source capsule (typically containing cesium) to bombard the formation with low energy gamma rays. These rays can be thought of as particles that collide with the electrons in the formation. As these particles collide, the gamma rays are attenuated or lose energy. This loss of energy, called Compton Scattering, is directly related to the number of electrons in the formation. Therefore, the tool responds to electron density which is linearly related to bulk density. Bulk density in turn, is related to the density of the rock matrix material, the porosity of the formation, and the density of the fluids filling the pores. The density ranges for common rock types is shown below:



The density of the matrix materials and pore fluids must be known or estimated to calculate formation porosity. The porosity of the formation can be determined by:

$$\phi_{density} = \frac{\rho_{ma} - \rho_b}{\rho_{ma} - \rho_f}$$

Where:
ρ_{ma} = matrix density
ρ_b = bulk density
ρ_f = fluid density

Densities for common matrix lithologies and fluid type are shown below:

Material	Density
Sandstone	2.65 g/cm3
Limestone	2.71 g/cm3
Dolomite	2.87 g/cm3
Fresh water	1.00 g/cm3
Salt water (200g/l)	1.13 g/cm3
Fresh water + 30% oil	0.73 - 0.78 g/cm3

NEUTRON LOGS

Neutron logs are typically used to identify porous formations and determine their porosity. Neutron tools use a sealed radioactive source such as americium-beryllium to measure the amount of hydrogen in a formation. Fast neutrons are emitted from the tool and bombard the formation, causing collisions with the nuclei of formation materials. These collisions attenuate the neutron energy. The greatest amount of energy is lost when particles of nearly equal mass collide. Neutrons have a mass almost identical to hydrogen. Thus the attenuation of neutron energy is largely controlled by the amount of hydrogen in the formation.

Since water and oil contain a lot of hydrogen, the tool response reflects the liquid-filled porosity in clay-free formations such as sandstone and limestone. However, shales contain bound water in its crystal structure that will produce higher apparent porosity than the actual effective porosity of the formation. For this reason it is important to interpret the results in conjunction with the gamma ray log, which is good indicator of clay/shale volume.

SONIC LOGS

Sonic logs are typically used to help identify lithology, porosity, and mechanical rock properties. The sonic tool contains acoustic transmitters and receivers. A sound pulse is generated by a transmitter and travels through the formation. One or more receivers record the sound pulse as it passes. The sonic log is simply a record of the time interval at which sound travels through 1 ft of formation. This measurement is called the interval transit time, slowness, or delta t (Δt) and is the reciprocal of the velocity of the sound wave.

As the sound wave emitted by the transmitter encounters the borehole wall, 1) compressional and shear waves are generated in the formation, 2) surface wave along the borehole wall, and 3) tube waves in the borehole fluid. The first and second sound wave arrivals at the receiver are the compressional (P-wave) and shear (S-wave) arrivals, respectively. These are the most common signals used in sonic logging and their transit times vary with lithology and porosity. In addition, the interrelationship between the S- and P-waves and density can be used to calculate mechanical rock properties such as Poisson's ratio, bulk modulus, Young's modulus, and shear modulus.

Sonic-derived porosity is given by:

$$\phi_{sonic} = \frac{\Delta t_{\log} - \Delta t_{ma}}{\Delta t_f - \Delta t_{ma}}$$

Where:

ϕ_{sonic} = sonic derived porosity
Δt_{ma} = interval transit time (compressional) for matrix
Δt_f = interval transit time for borehole fluid

The interval transit times for common materials are shown below:

Material	Δt_{ma} msec/ft
Sandstone	55.5
Limestone	47.6
Dolomite	43.5
Water + 20% NaCl	189
Water + 10% NaCl	208
Water (pure)	218

Engineering mechanical rock properties are calculated using the shear and compressional interval travel times measured by the sonic log and bulk density measured by the gamma density log. The following engineering properties can be calculated from these logs:

- **Shear Modulus (μ)** also called rigidity modulus, measures the opposition of a substance to shear stresses.

$$\mu = C\frac{\rho_b}{\Delta t_s^{\ 2}}$$

μ = Shear Modulus
C = Constant ($1.34 \ *10^{10}$)
ρ_b = Bulk Density
Δt_s = Shear wave transit time $\cong \Delta t_c * 1.75$
Δt_c = Compressional wave transit time

- **Young's modulus (E)** measures opposition of a substance to extensional stress.

$$E = \left(\frac{\rho_b}{\Delta t_s^{\ 2}}\right)\left(\frac{3\Delta t_s^{\ 2} - 4\Delta t_c^{\ 2}}{\Delta t_s^{\ 2} - \Delta t_c^{\ 2}}\right)C$$

- **Bulk modulus (K)** is the coefficient of incompressibility and measures opposition of substance to compressional stress.

$$K = \rho_b\left(\frac{3\Delta t_s^{\ 2} - 4\Delta t_c^{\ 2}}{3\Delta t_s^{\ 2}\Delta t_c^{\ 2}}\right)C$$

- **Poisson's Ratio (σ)** is the ratio of relative decrease in diameter to relative elongation.

$$\sigma = 1/2\left(\frac{\Delta t_s{}^2 - 2\Delta t_c{}^2}{\Delta t_s{}^2 - \Delta t_c{}^2}\right)C$$

ATTACHMENT B
BOREHOLE LOGS

Televiewer Log

ARM GEOPHYSICS
Surface & Borehole Services

COMPANY: Stantec
WELL ID: JSF-200
FIELD/SITE: Rogersville
COUNTY: Hawkins
STATE: TN
ARM NO.: 180462
API NO.: N/A

LOCATION:
NORTHING:
EASTING:
OTHER SERVICES

SEC: TWP: QUAD:

COMP Stantec
WELL JSF-200
FLD Rogersville
CNTY Hawkins
STAT TN
ARM 180462
API N/A

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 0.3 G.L.

LOGGING DATE	08.30.2018				
RUN NO	2				
TYPE LOG	OTV.GR				
DRILLER DEPTH (FT)	147.3				
ARM DEPTH (FT)	145.7				
BTM LOGGED INTERVAL (FT)	146.2				
TOP LOGGED INTERVAL (FT)	6.36				
CASING SIZE (IN)/DEPTH (FT)	3/25.5				
CASING ARM (FT)	25.22				
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	20.58				
MAG. DECLINATION (DEG)	6.57 W				
RECORDED BY	R. Gecelosky				
WITNESSED BY					

REMARKS:

Symbols

Bottom of Casing

Fluid Level

Structure

Open Fracture
Bedding
Discontinuous Fract
Part. Open Fract
Filled Fracture
Broken/Void/Soft Zone

Optical Image	Depth	Plane Projection	Dip & Dip Direction
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	Symbols		
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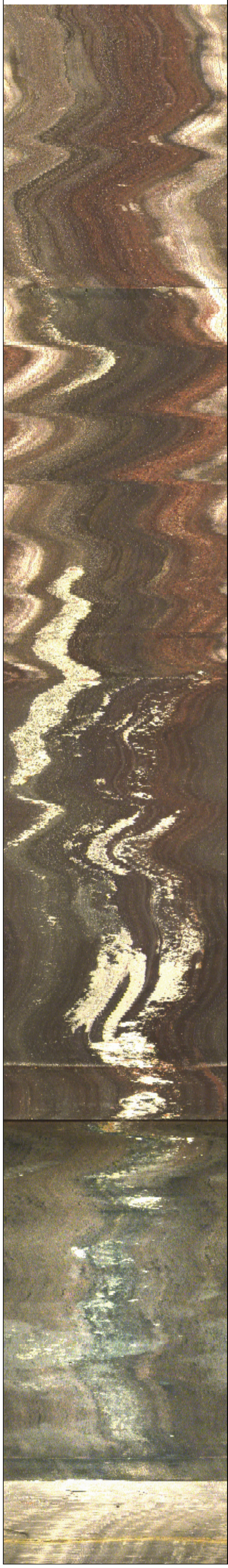
	3		
	4		
	5		



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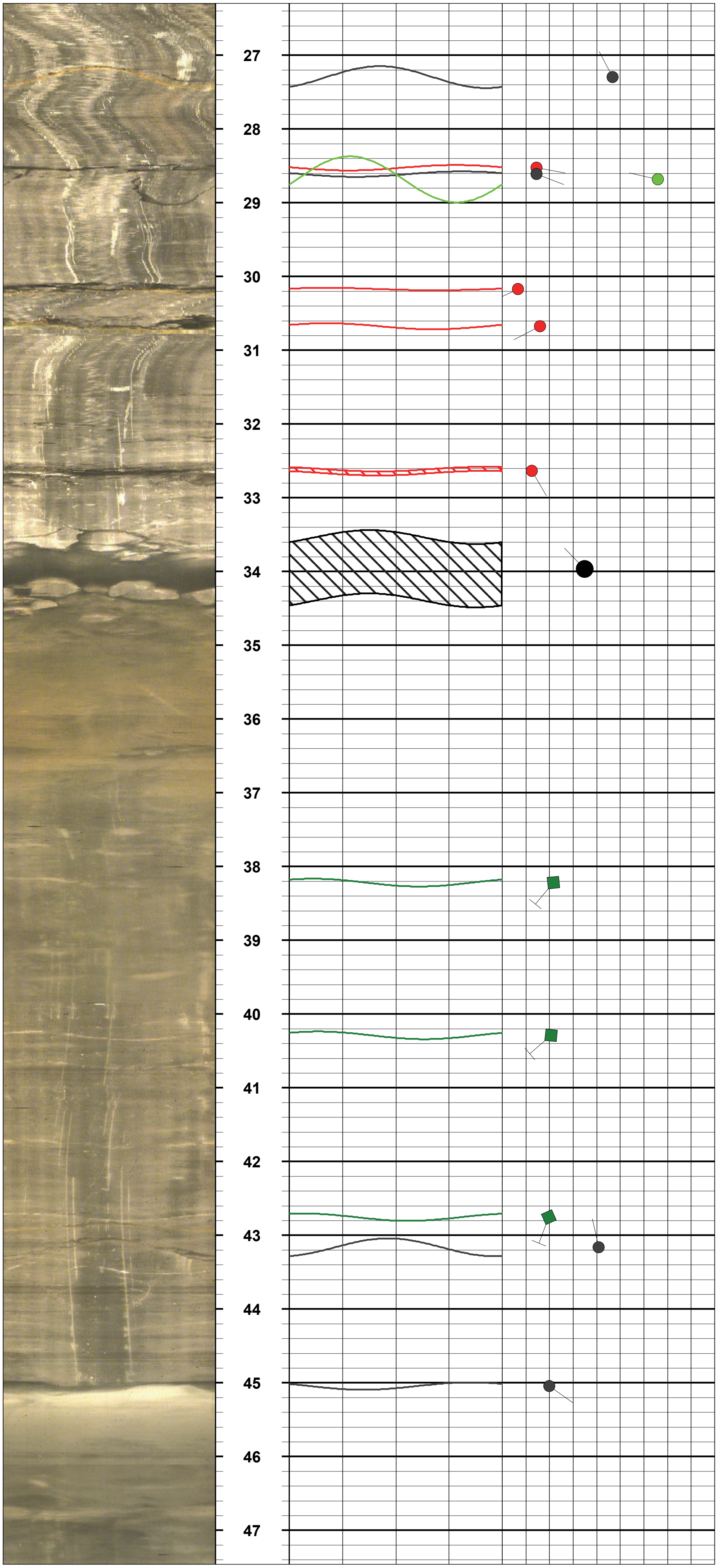
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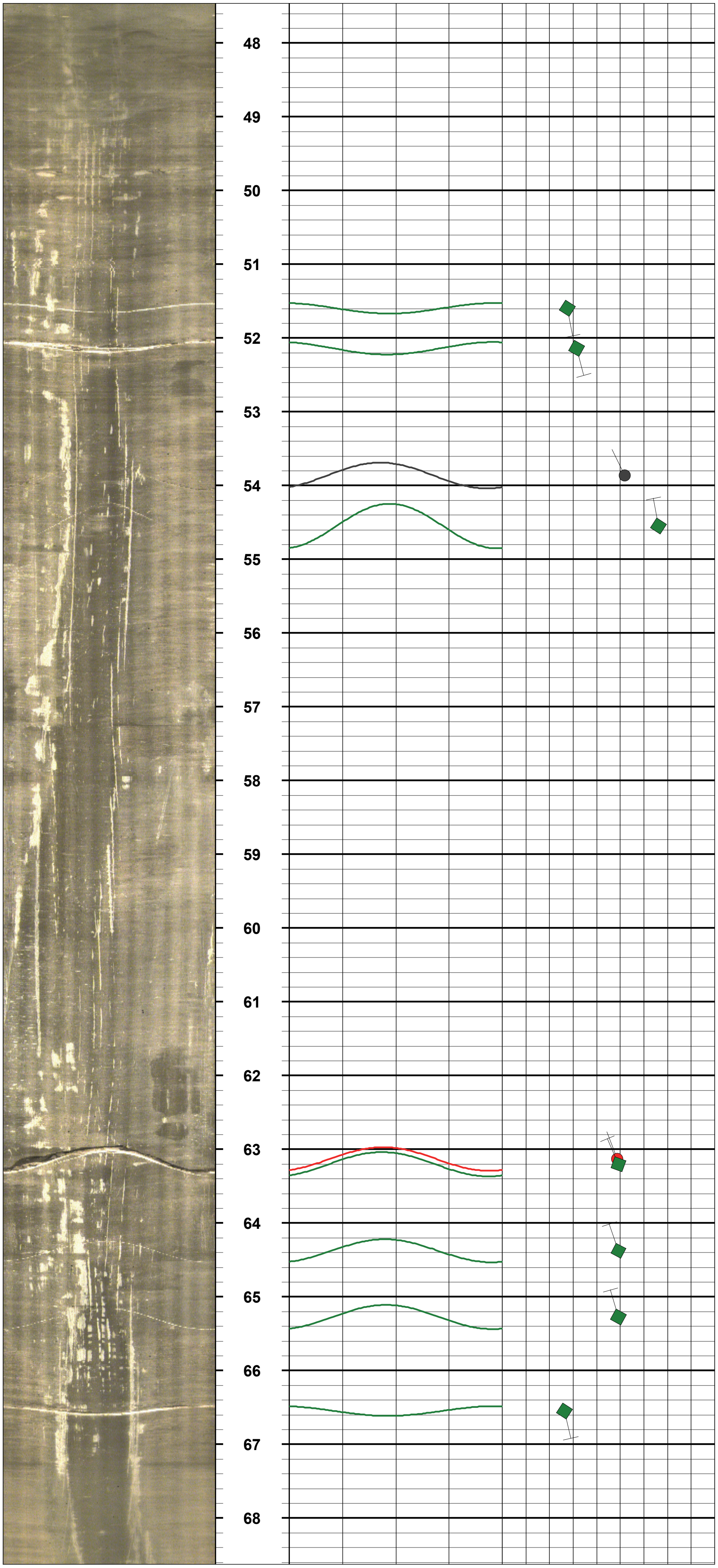
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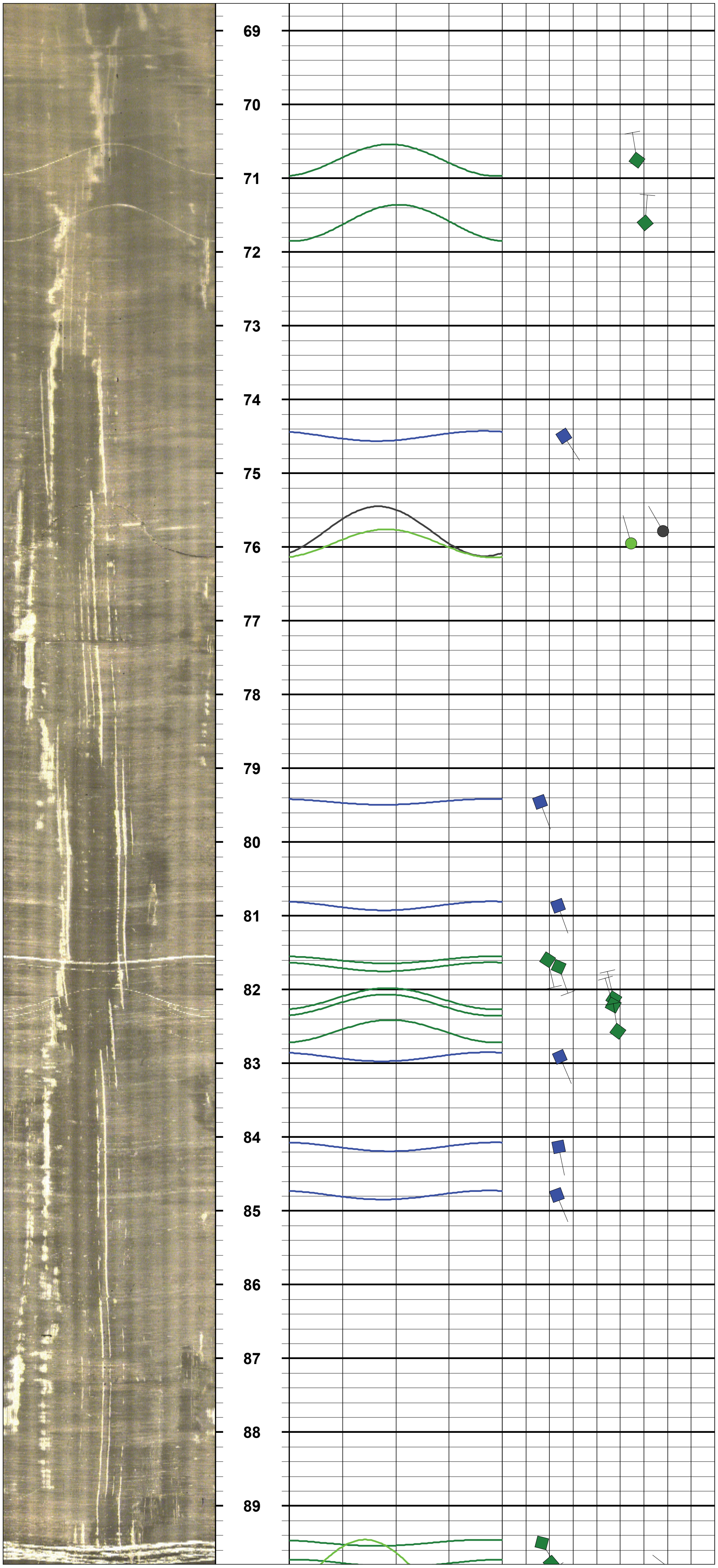
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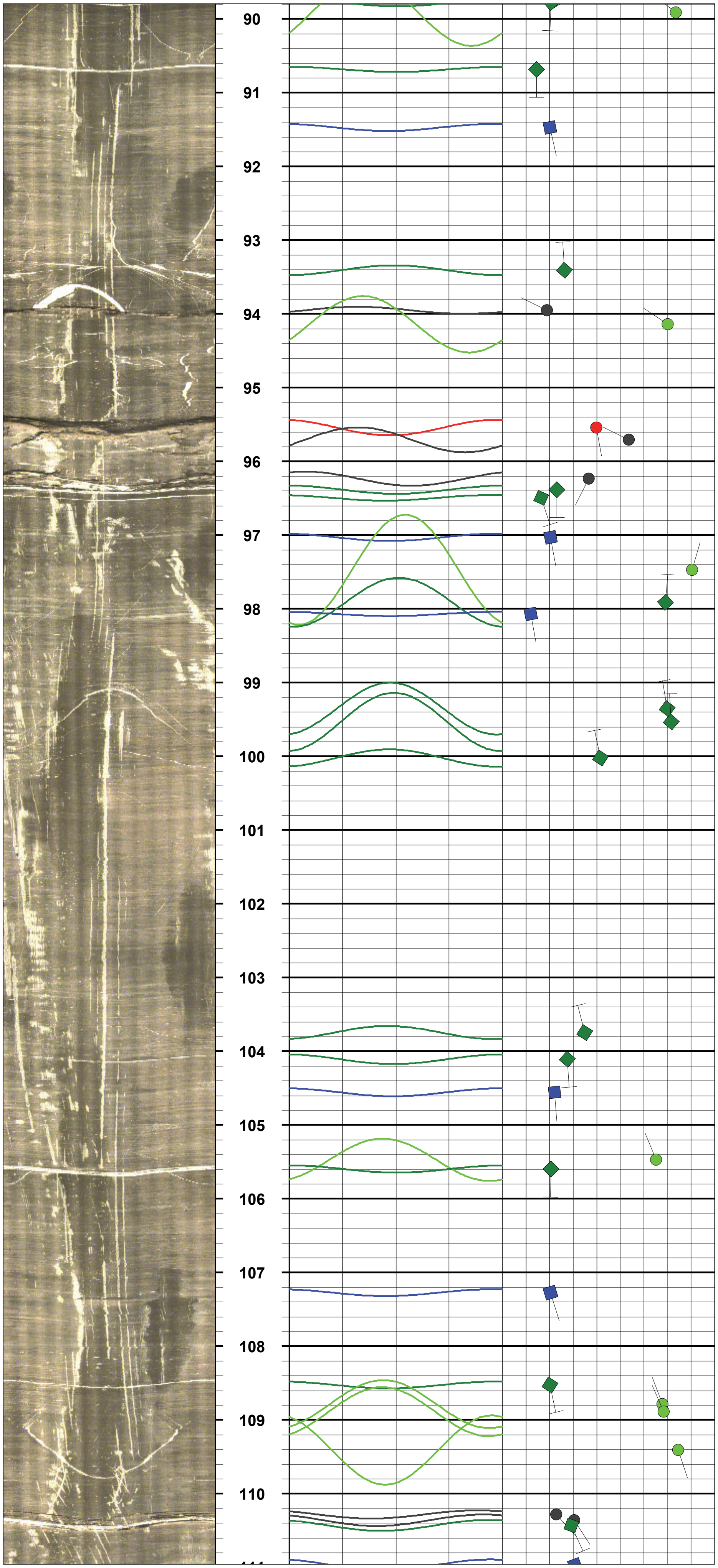
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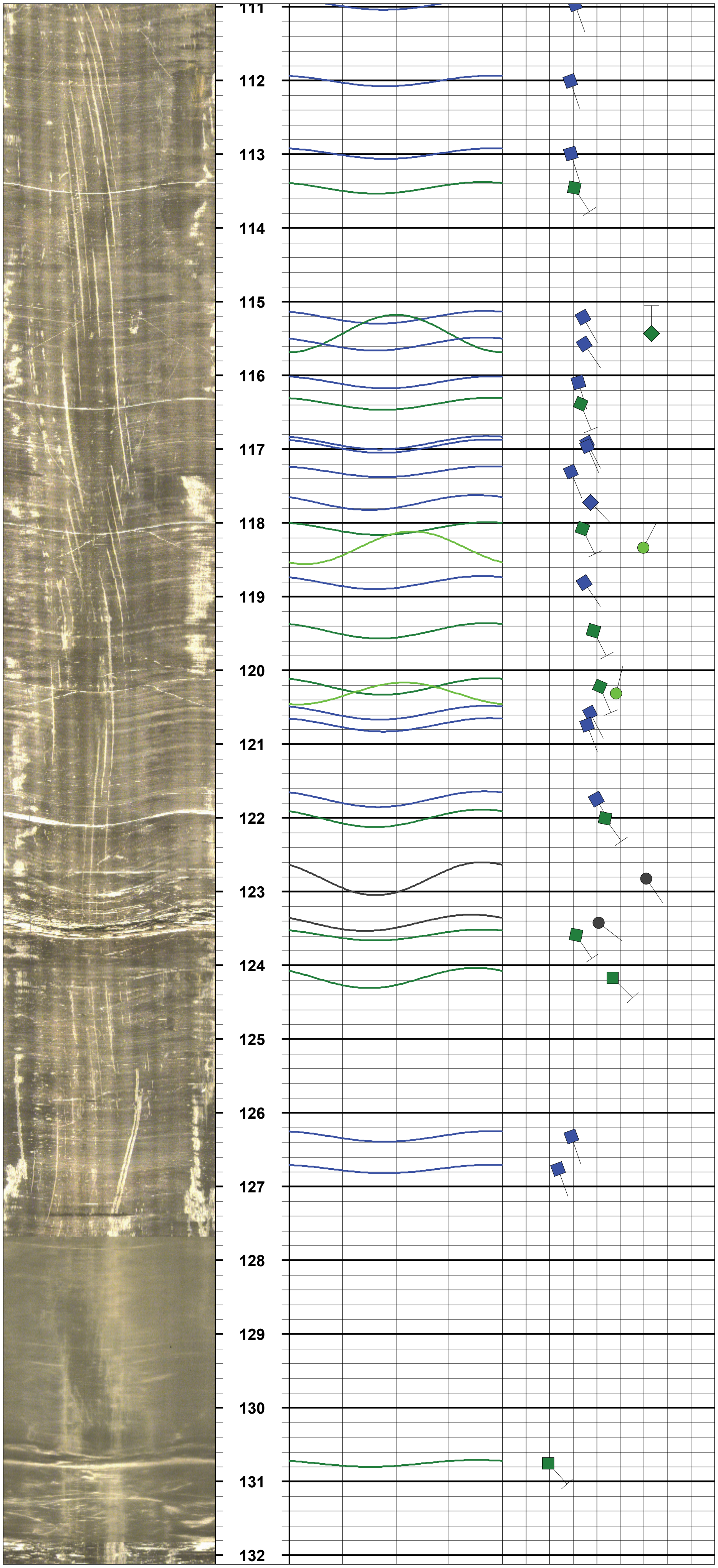
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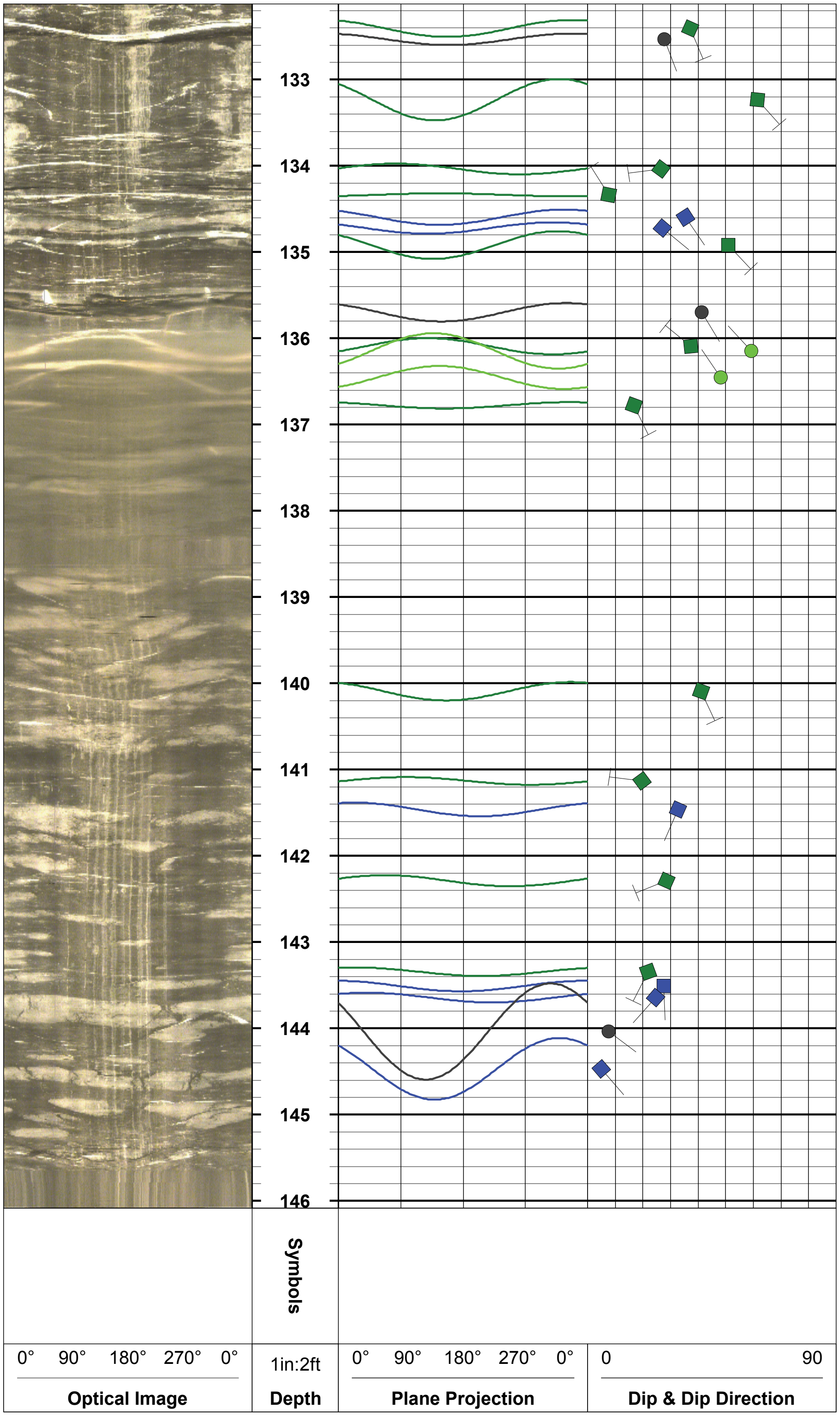
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Symbols
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Optical Image
1in:2ft
Depth
0° 90° 180° 270° 0°
Plane Projection
0
90
Dip & Dip Direction

Hydro Log

ARM GEOPHYSICS
Surface & Borehole Services

COMP	Stantec
WELL	JSF-200
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	180462
API	N/A

COMPANY: Stantec STATE: TN
WELL ID: JSF-200 ARM NO.: 180462
FIELD/SITE: Rogersville API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 0.3 G.L.

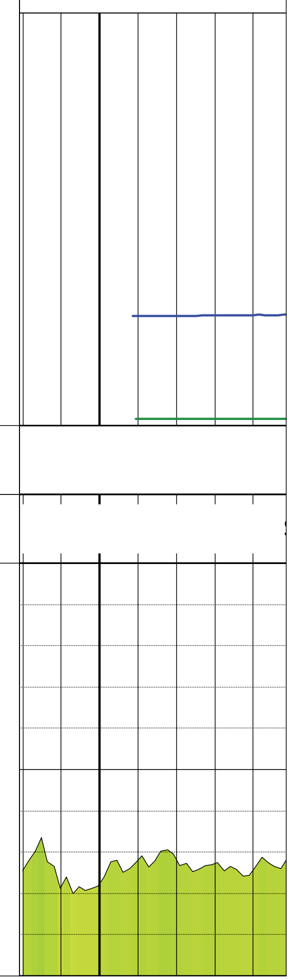
LOGGING DATE	08.30.2018	08.30.2018	08.30.2018	08.30.2018	
RUN NO	1	3	5	6	
TYPE LOG	FTC.GR	CAL	HPFM A	HPFM P	
DRILLER DEPTH (FT)	147.3	147.3	147.3	147.3	
ARM DEPTH (FT)	145.7	145.62	N/A	N/A	
BTM LOGGED INTERVAL (FT)	145.97	145.62	136.95	136.95	
TOP LOGGED INTERVAL (FT)	5.83	6.36	25	29.91	
CASING SIZE (IN)/DEPTH (FT)	3/25.5	3/25.5	3/25.5	3/25.5	
CASING ARM (FT)	25.22	25.22	25.22	25.22	
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	20.59				
MAG. DECLINATION (DEG)	6.57 W	6.57 W	6.57 W	6.57 W	
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	
WITNESSED BY					

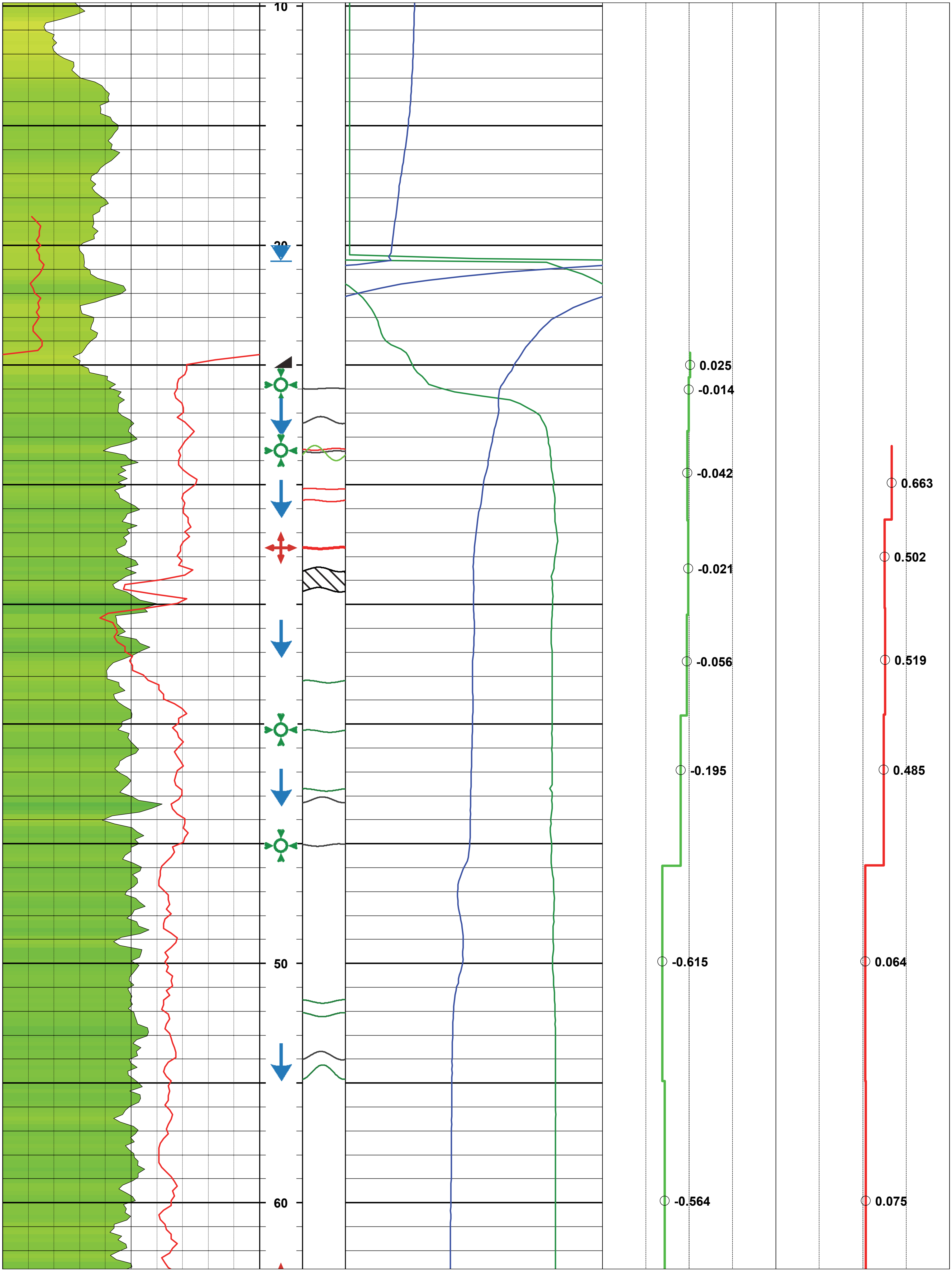
REMARKS:

Symbols

Bottom of Casing
Receiving Zone
Down Flow
Fluid Level
Producing Zone

Natural Gamma 0 CPS 200 / 3-Arm Caliper 2 in 4	Depth 1in:5ft / Symbols	Televiewer Fractures	Fluid Conductivity (25 'C) 400 uS/cm 600 / Fluid Temperature 14 'C 18	Vertical Flow: Ambient Gal/Min (Down, Up)	Vertical Flow: Pumping Gal/Min (Down, Up)

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-0.042
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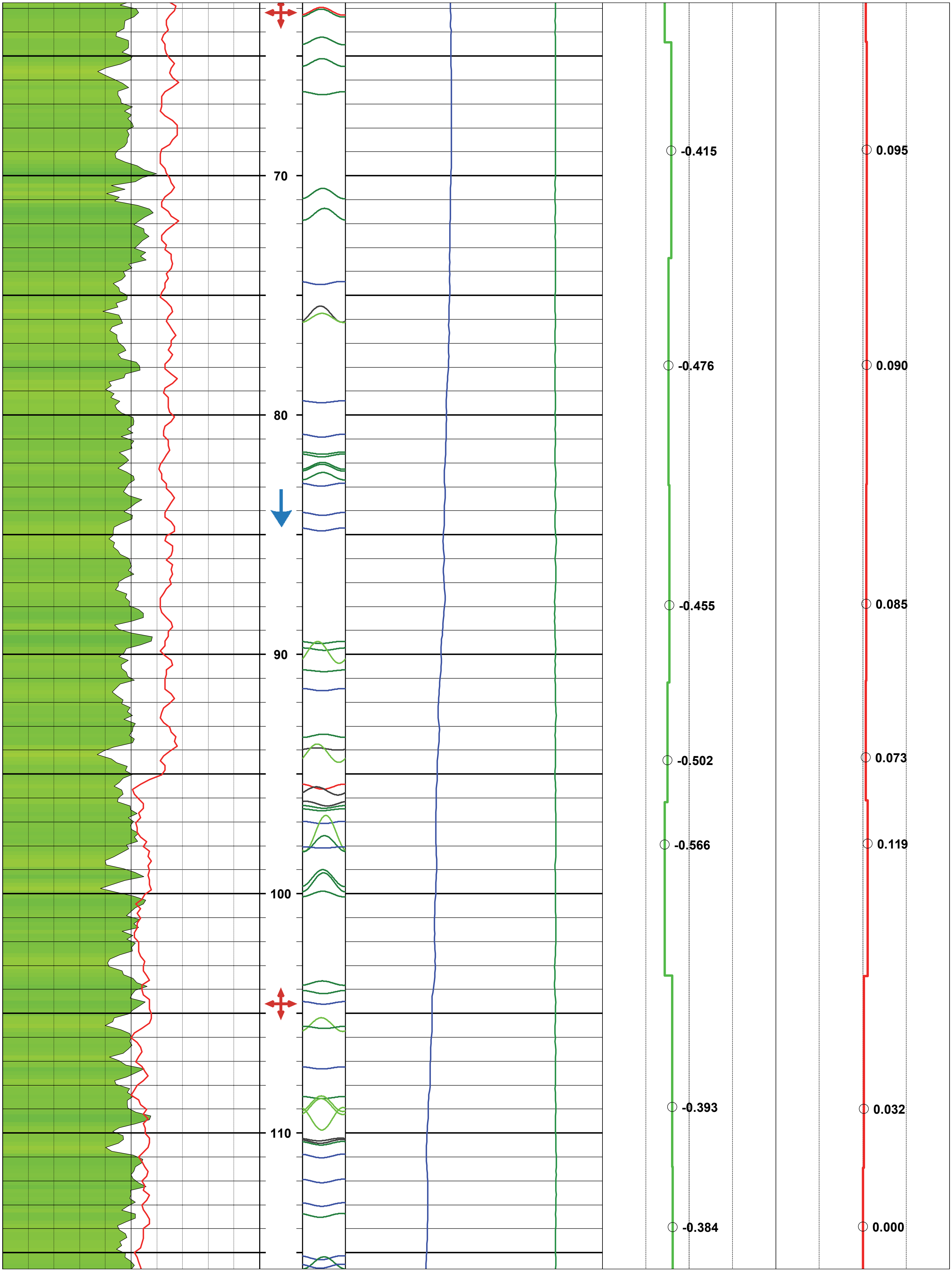
0.663
0.502
0.519
0.485
0.064
0.075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0.090
0.085
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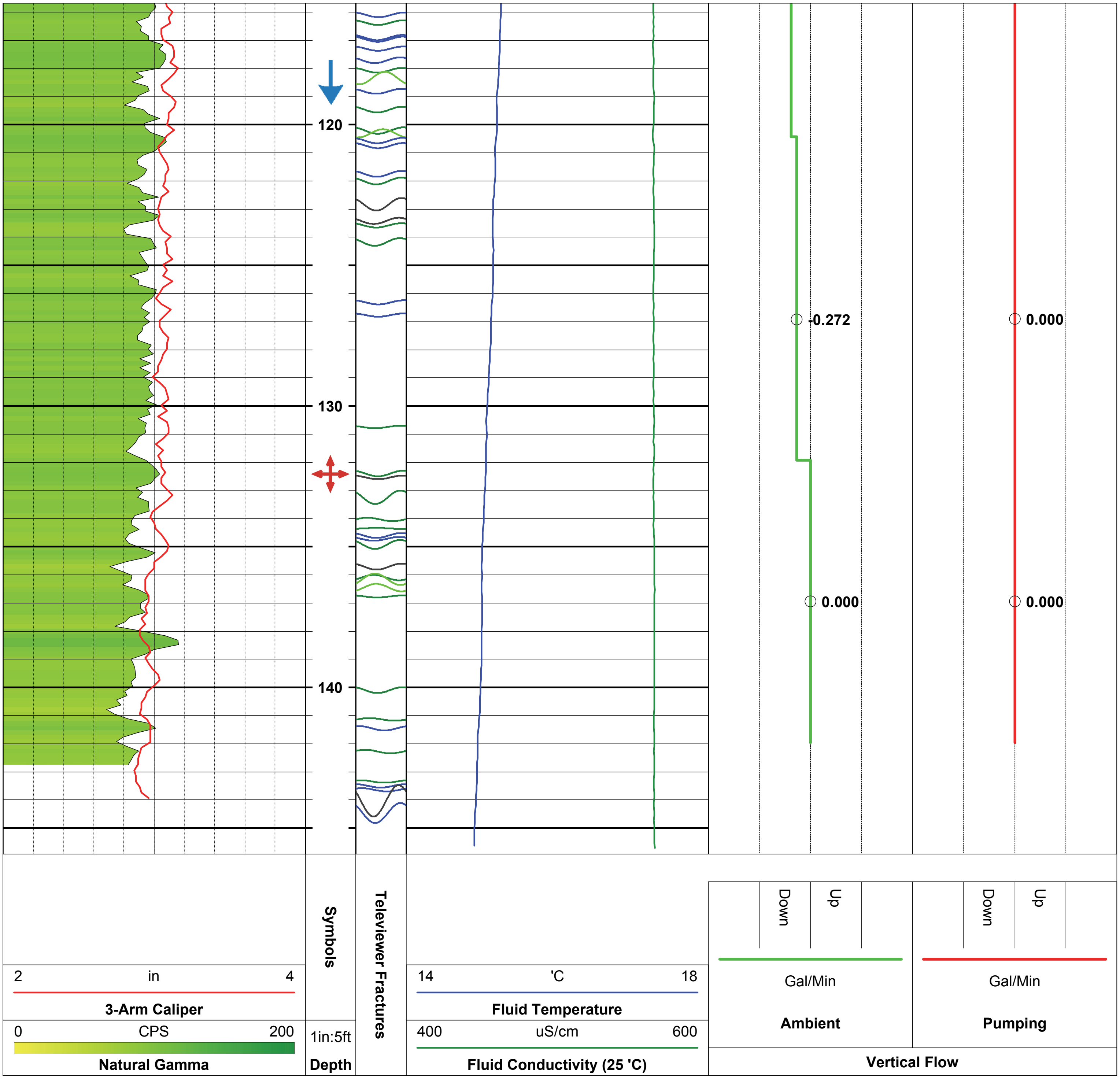
0.032
0.000



120
130
140
-0.272
0.000
0.000
0.000
Symbols
Televiewer Fractures
Down
Up
Down
Up
2
in
4
3-Arm Caliper
0
CPS
200
Natural Gamma
1in:5ft
Depth
14
'C
18
Fluid Temperature
400
uS/cm
600
Fluid Conductivity (25 'C)
Gal/Min
Ambient
Gal/Min
Pumping
Vertical Flow

Televiewer Logs

ARM GEOPHYSICS
Surface & Borehole Services

COMP	Stantec
WELL	JSF-201
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	180462
API	N/A

COMPANY: Stantec — STATE: TN
WELL ID: JSF-201 — ARM NO.: 180462
FIELD/SITE: Rogersville — API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface — ELEVATION: — K.B.
LOG MEASURED FROM: Ground Surface — ABOVE PERM. DATUM: — D.F.
DRILLING MEAS. FROM: — STICK UP: 0.8 — G.L.

LOGGING DATE	08.29.2018	08.29.2018			
RUN NO	2	4			
TYPE LOG	OTV.GR	ATV.GR			
DRILLER DEPTH (FT)	152.6	152.6			
ARM DEPTH (FT)	152.65	152.66			
BTM LOGGED INTERVAL (FT)	153.05	152.66			
TOP LOGGED INTERVAL (FT)	5.33	15			
CASING SIZE (IN)/DEPTH (FT)	3/22.9	3/22.9			
CASING ARM (FT)	22.73	22.73			
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	13.76				
MAG. DECLINATION (DEG)	6.57 W	6.57 W			
RECORDED BY	R. Gecelosky	R. Gecelosky			
WITNESSED BY					

REMARKS:

Symbols

Bottom of Casing
Fluid Level

Structure

Open Fracture
Bedding
Discontinuous Fract
Part. Open Fract
Filled Fracture
Broken/Void/Soft Zone

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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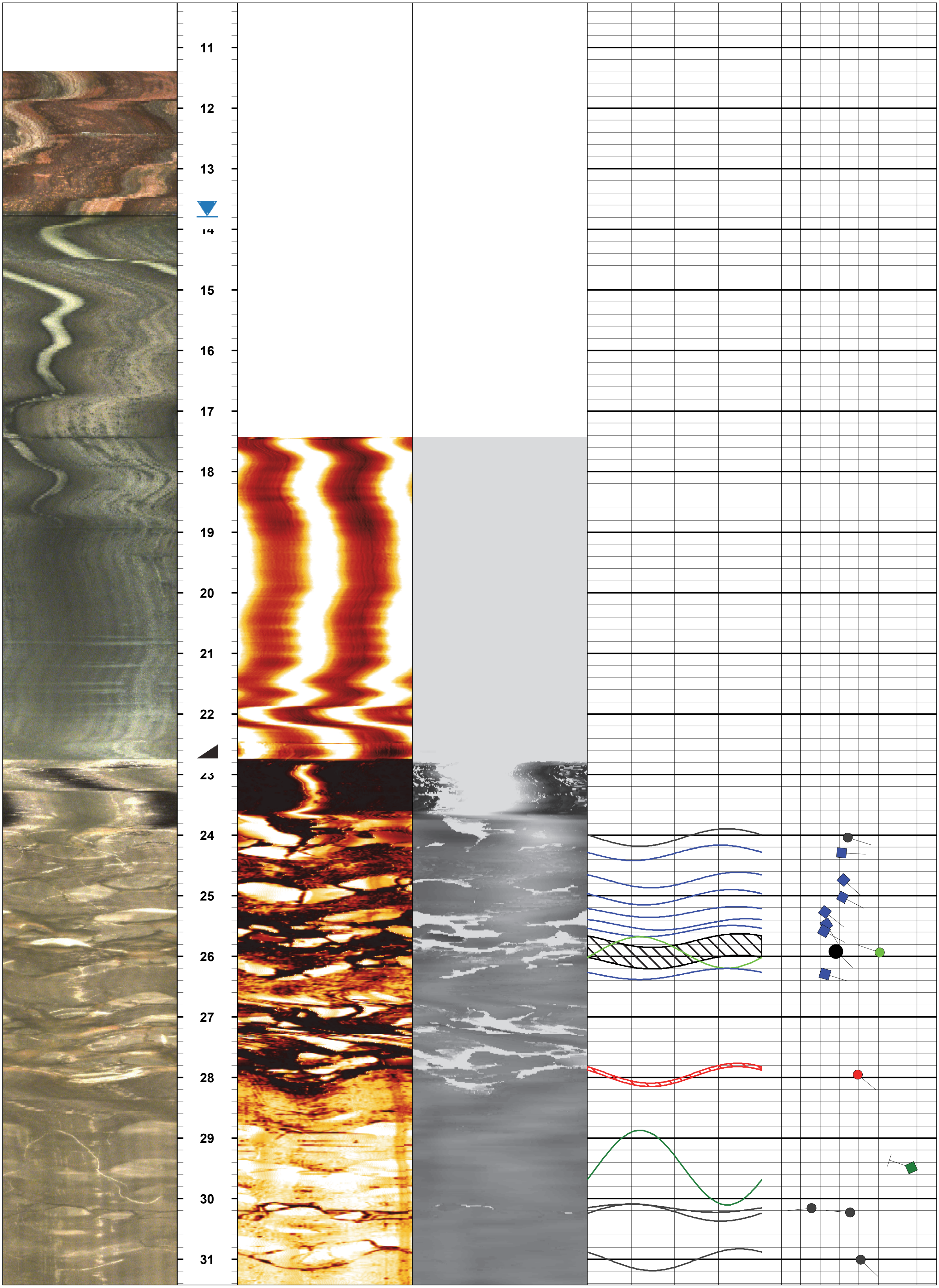
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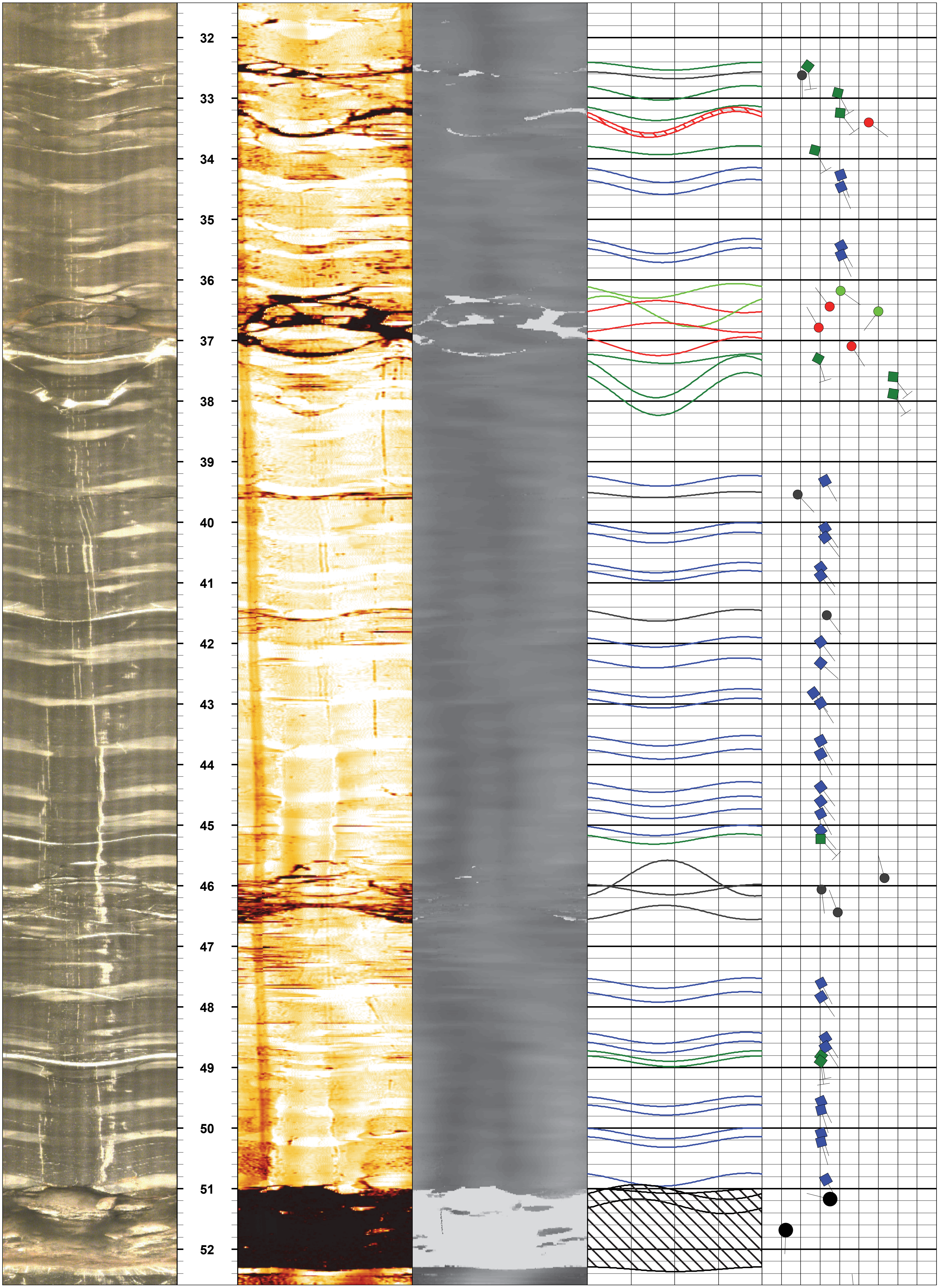
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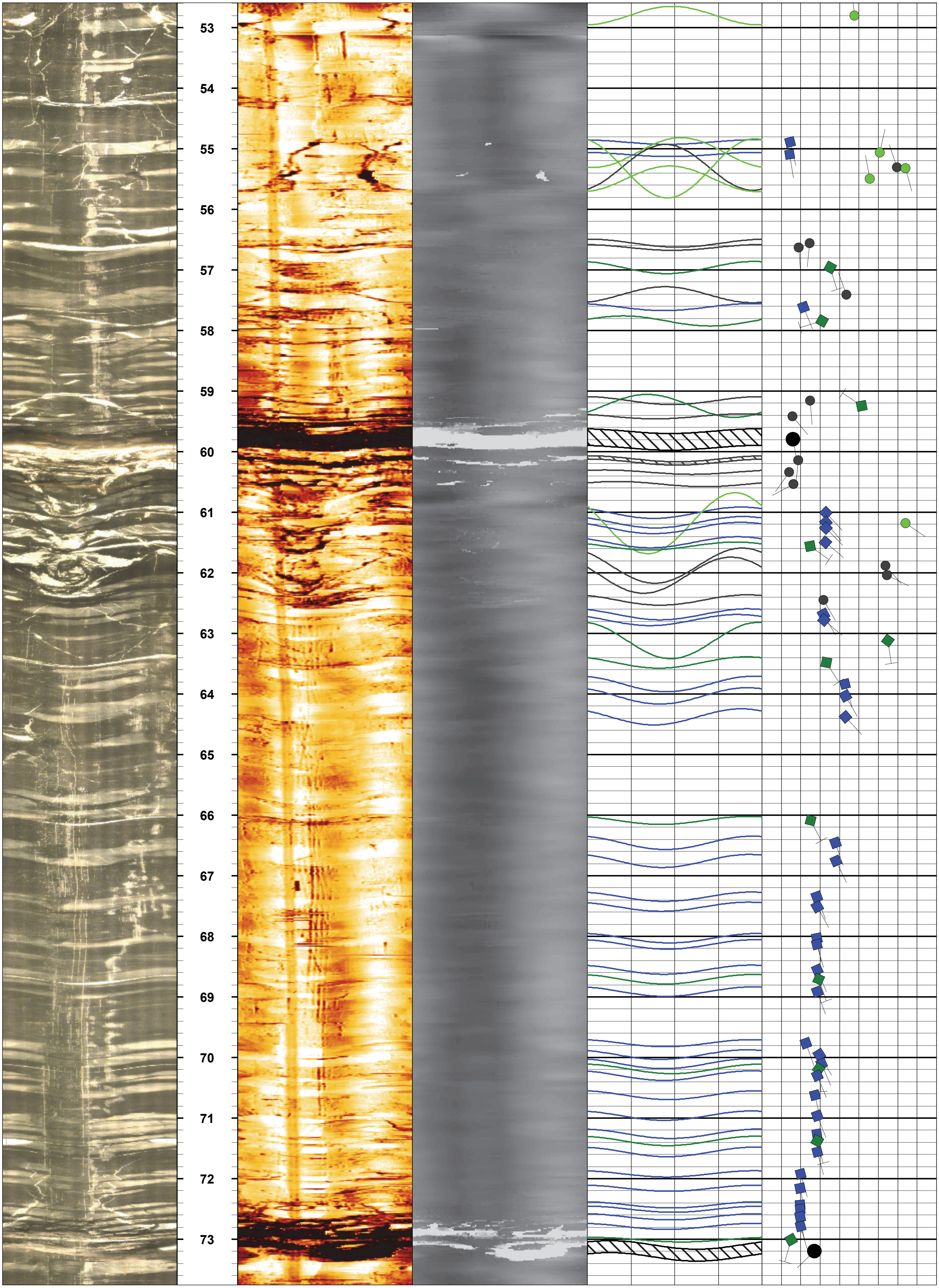
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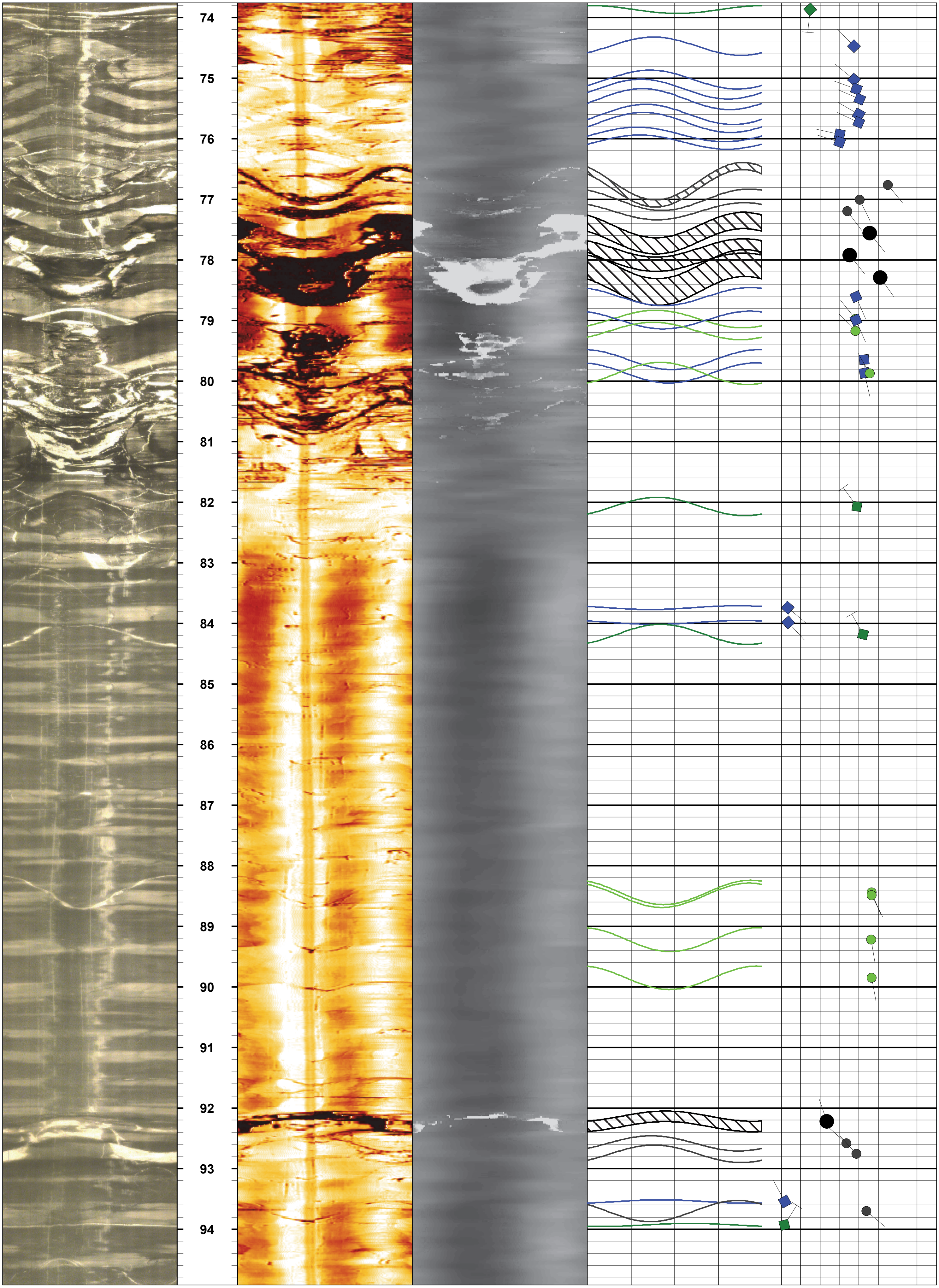
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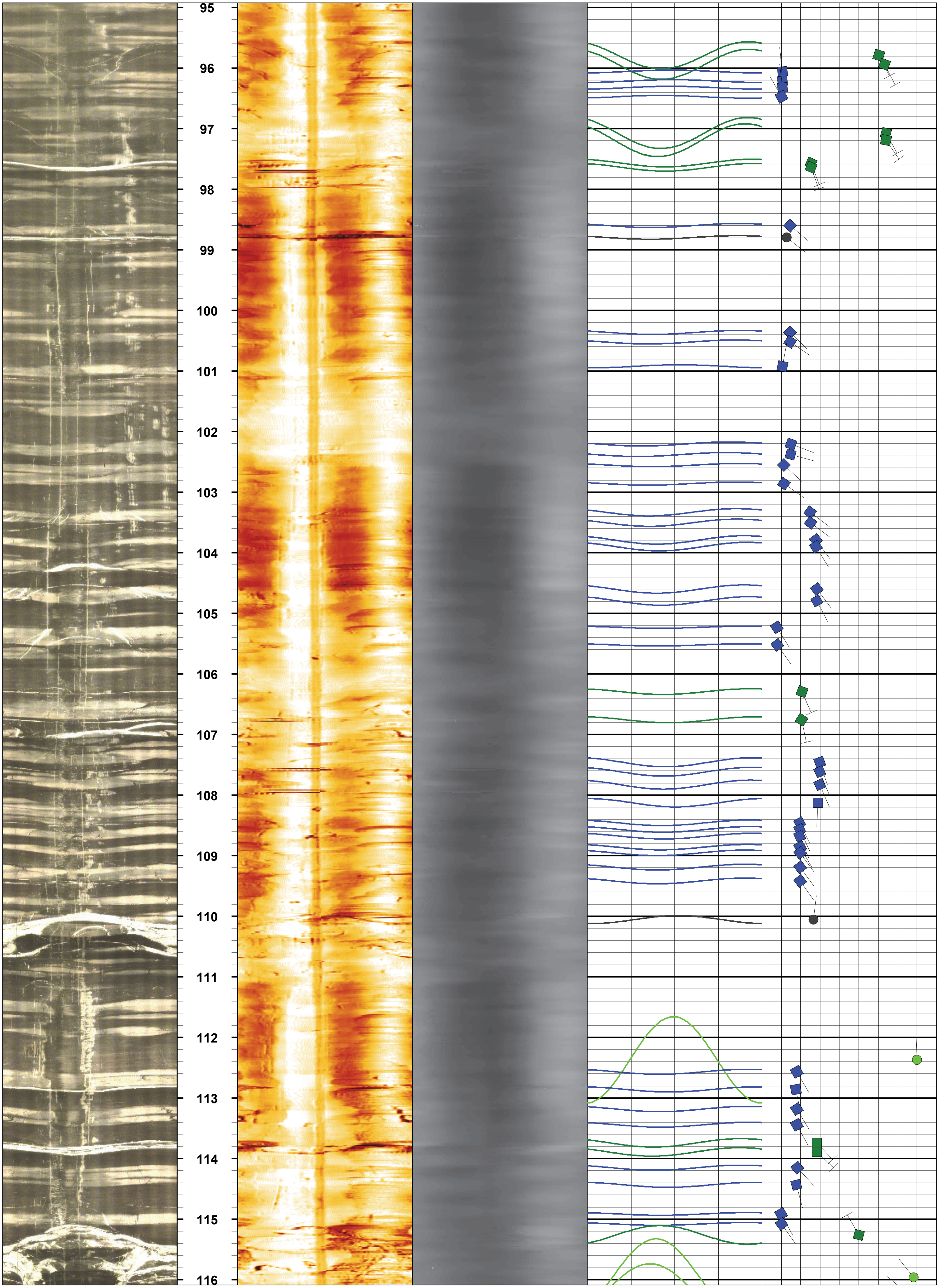
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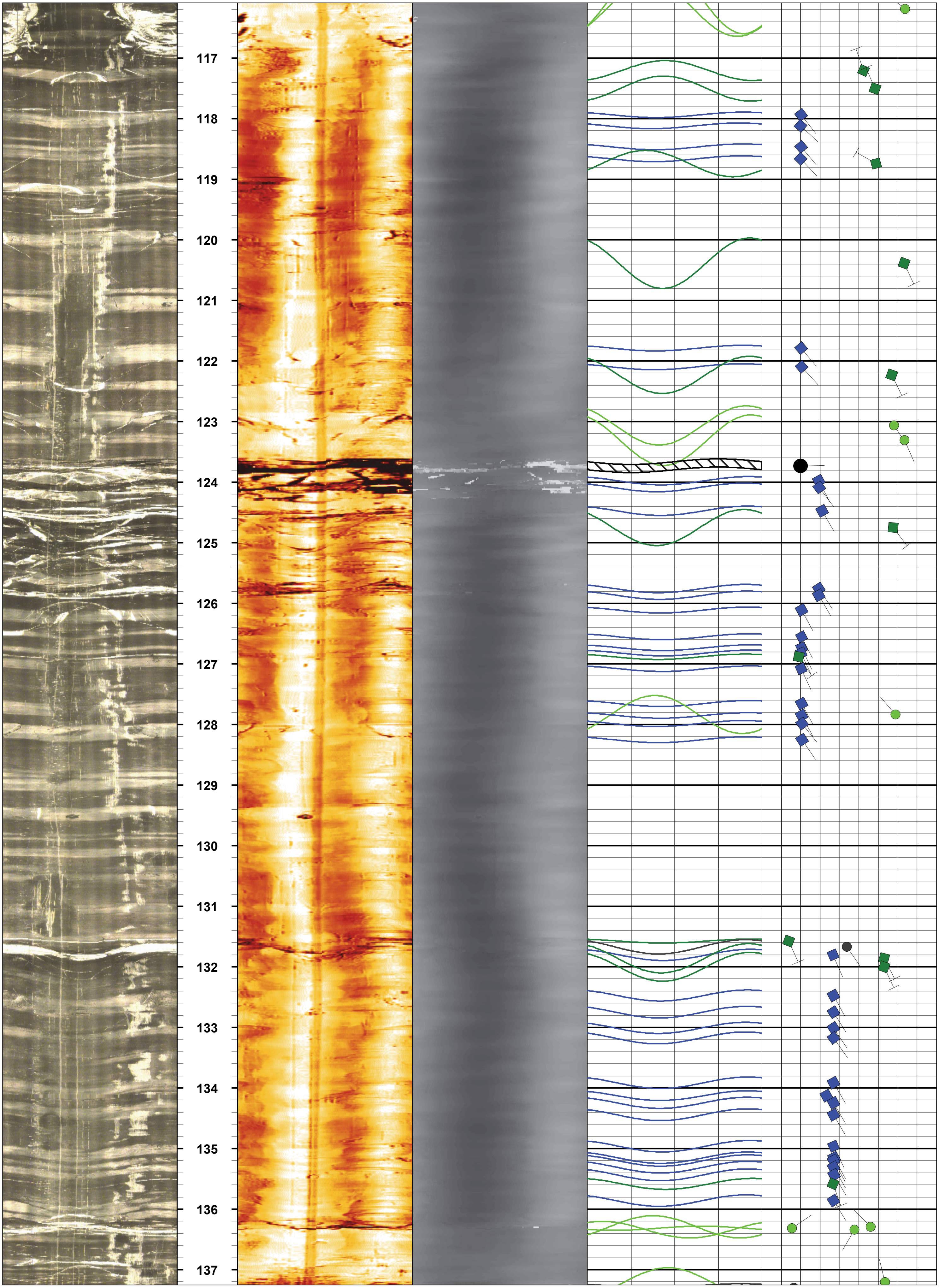
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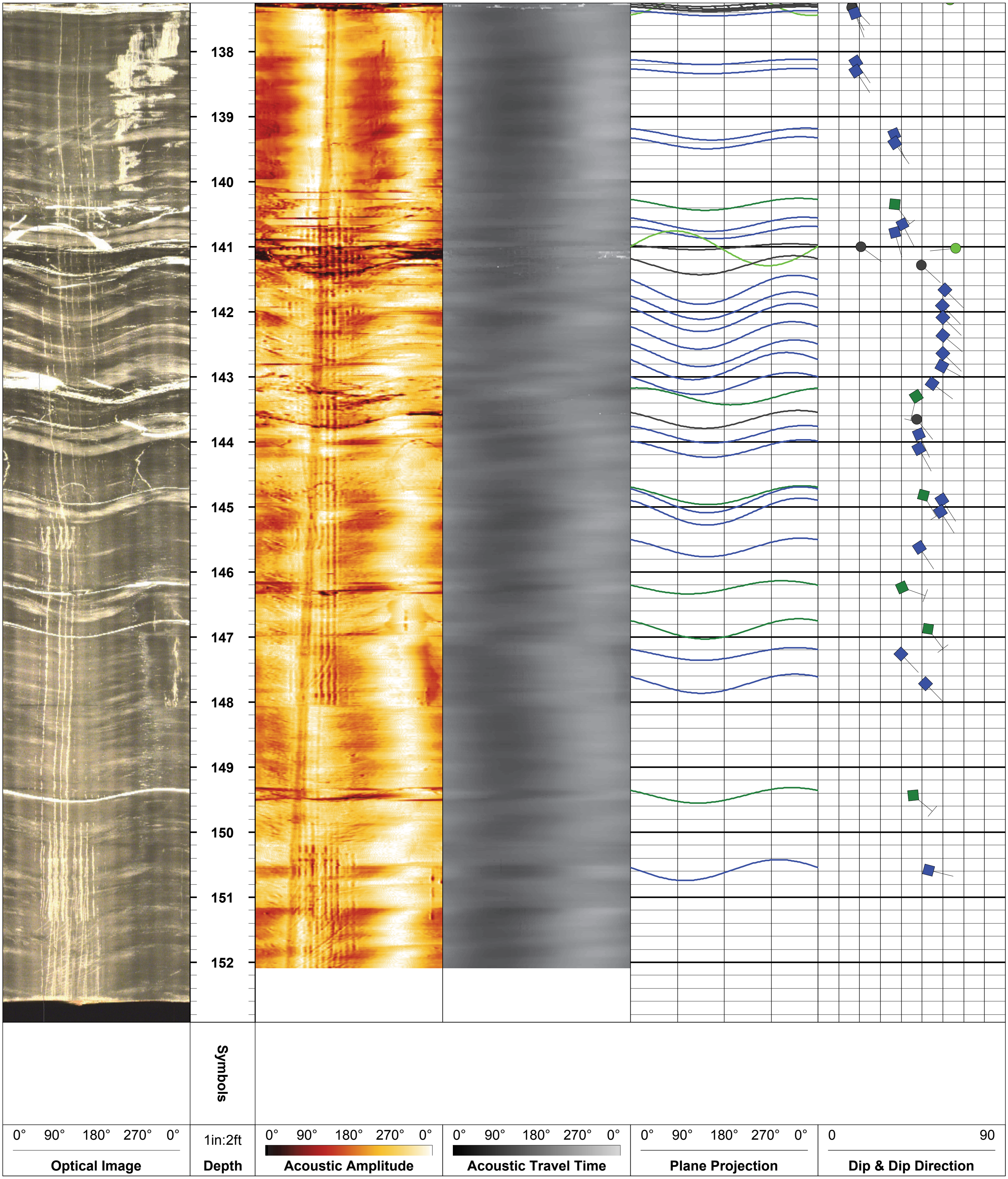

138
139
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142
143
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145
146
147
148
149
150
151
152
Symbols
0° 90° 180° 270° 0°
Optical Image
1in:2ft
Depth
0° 90° 180° 270° 0°
Acoustic Amplitude
0° 90° 180° 270° 0°
Acoustic Travel Time
0° 90° 180° 270° 0°
Plane Projection
0 90
Dip & Dip Direction

Hydro Log

ARM GEOPHYSICS
Surface & Borehole Services

COMP	**Stantec**
WELL	**JSF-201**
FLD	**Rogersville**
CNTY	**Hawkins**
STAT	**TN**
ARM	**180462**
API	**N/A**

COMPANY: Stantec — STATE: TN
WELL ID: JSF-201 — ARM NO.: 180462
FIELD/SITE: Rogersville — API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

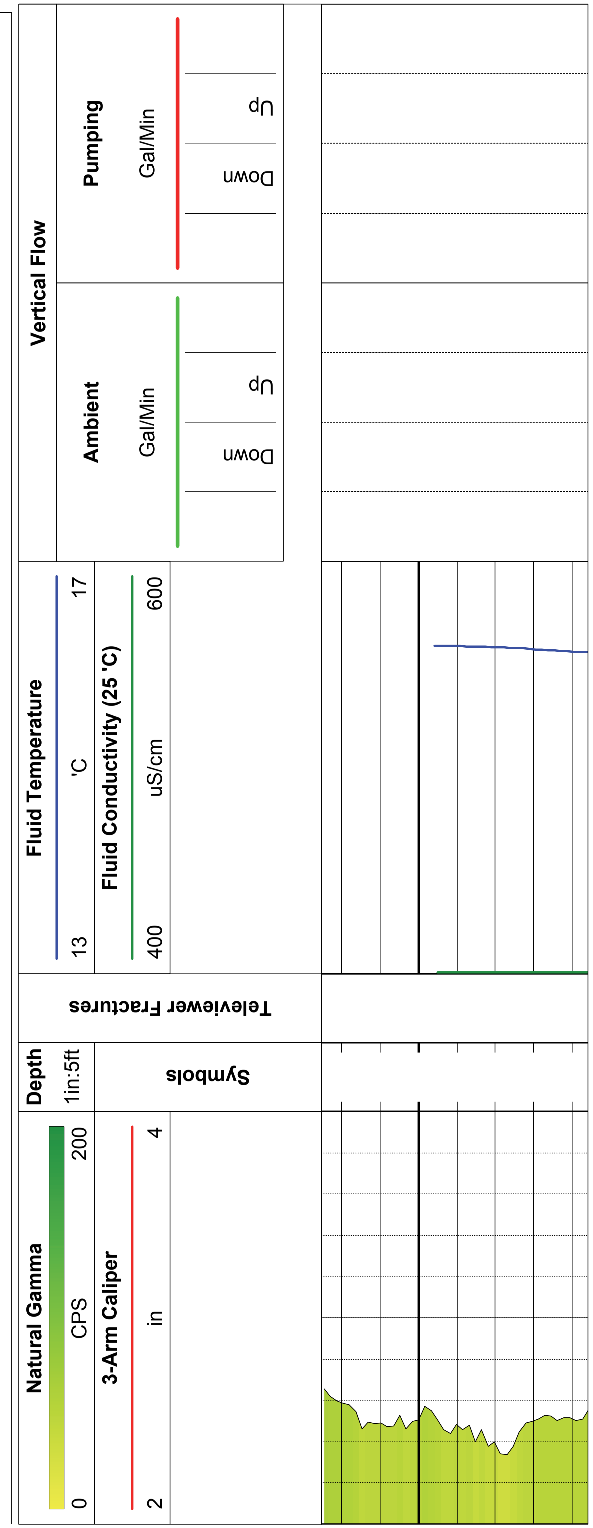
PERMANENT DATUM: Ground Surface — ELEVATION: — K.B.
LOG MEASURED FROM: Ground Surface — ABOVE PERM. DATUM: — D.F.
DRILLING MEAS. FROM: — STICK UP: 0.8 — G.L.

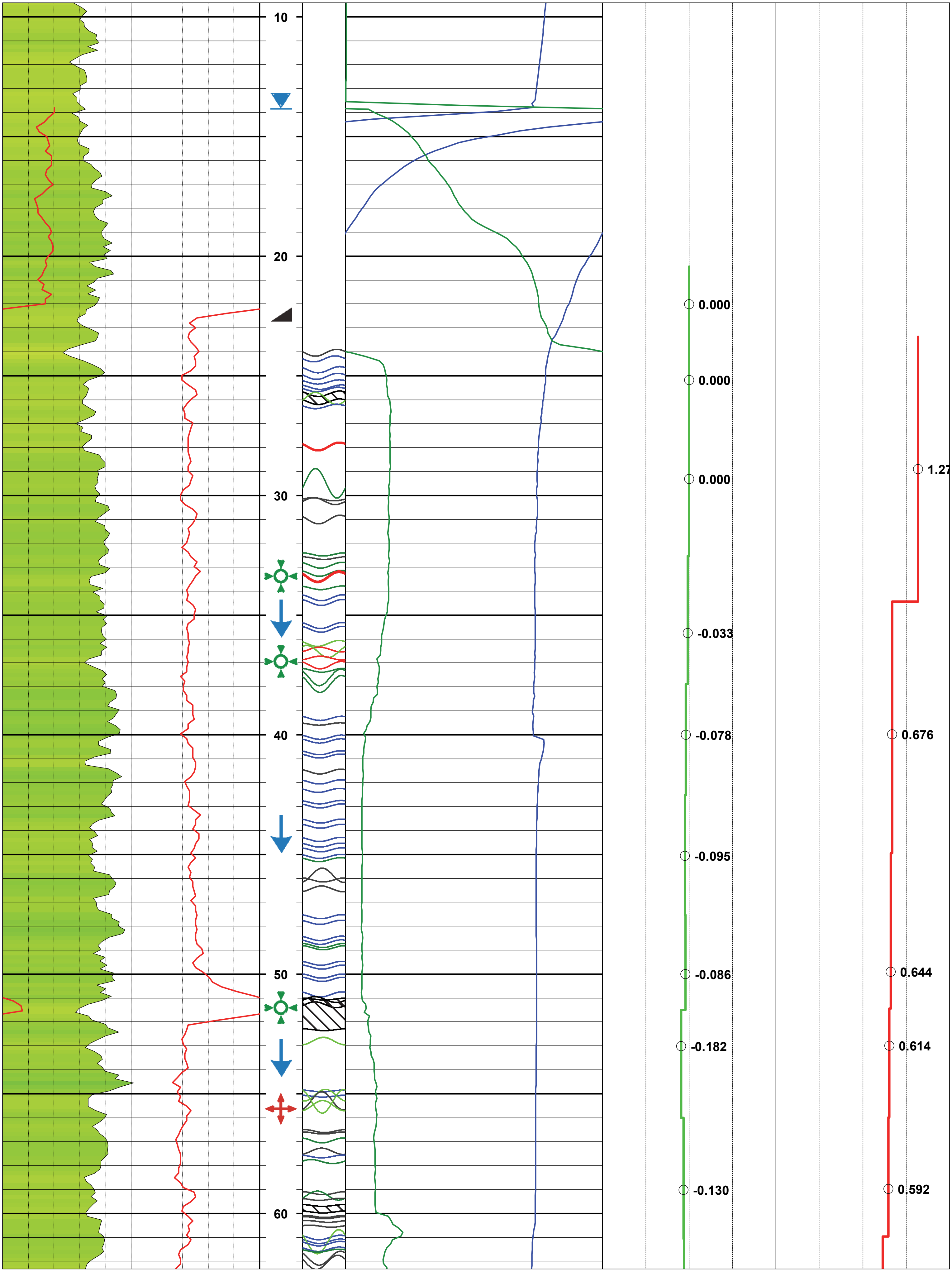
LOGGING DATE	08.29.2018	08.29.2018	08.29.2018	08.29.2018	
RUN NO	1	3	5	6	
TYPE LOG	FTC.GR	CAL	HPFM A	HPFM P	
DRILLER DEPTH (FT)	152.6	152.6	152.6	152.6	
ARM DEPTH (FT)	152.65	152.6	N/A	N/A	
BTM LOGGED INTERVAL (FT)	152.87	152.6	150.98	150.98	
TOP LOGGED INTERVAL (FT)	5.33	15	22.01	28.90	
CASING SIZE (IN)/DEPTH (FT)	3/22.9	3/22.9	3/22.9	3/22.9	
CASING ARM (FT)	22.73	22.73	22.73	22.73	
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	13.78				
MAG. DECLINATION (DEG)	6.57 W	6.57 W	6.57 W	6.57 W	
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	
WITNESSED BY					

REMARKS:

Symbols

- Bottom of Casing
- Receiving Zone
- Down Flow
- Fluid Level
- Producing Zone

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20
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50
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0.000
0.000
0.000
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-0.130
1.27
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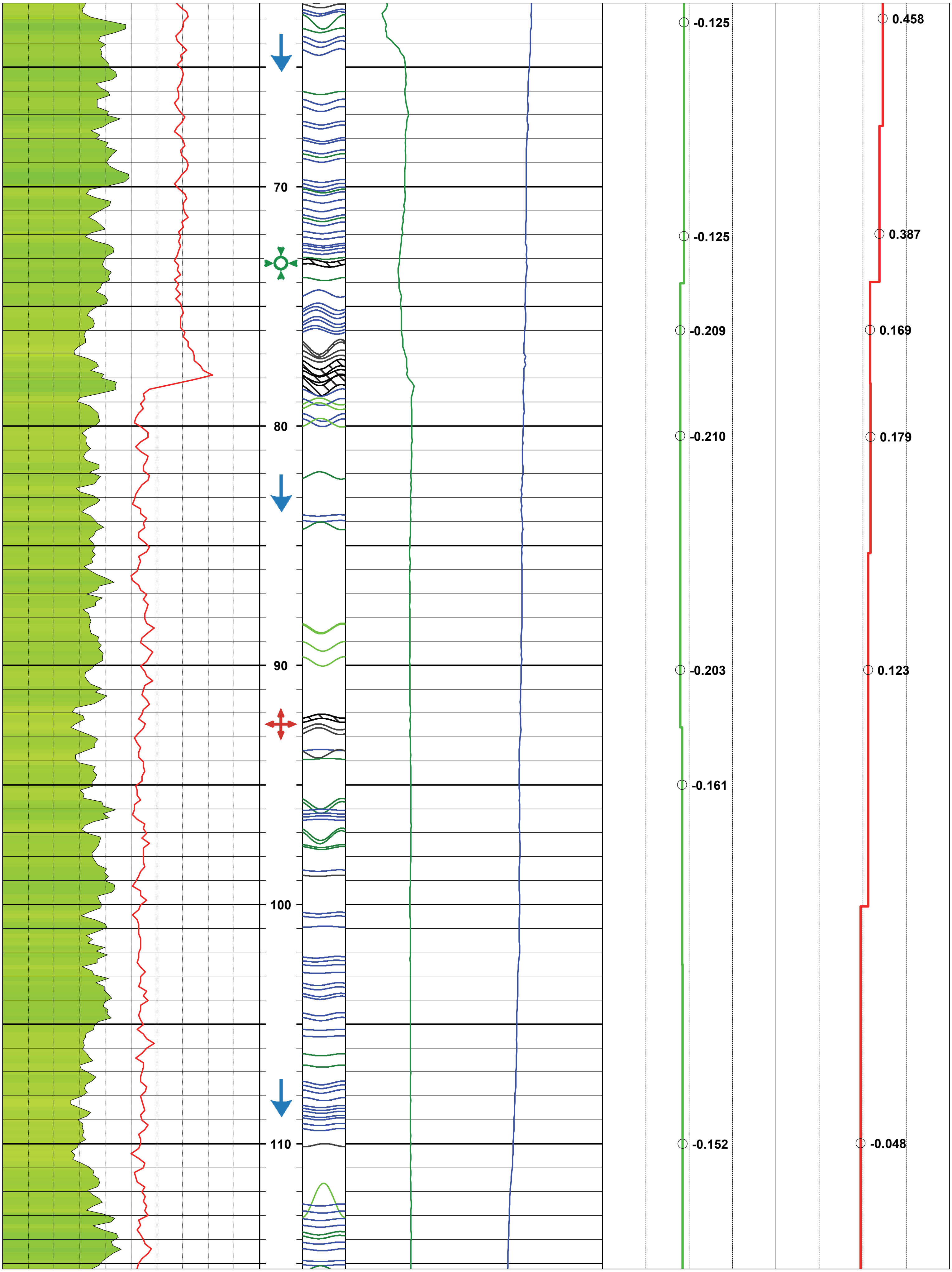
0.644
0.614
0.592



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-0.125
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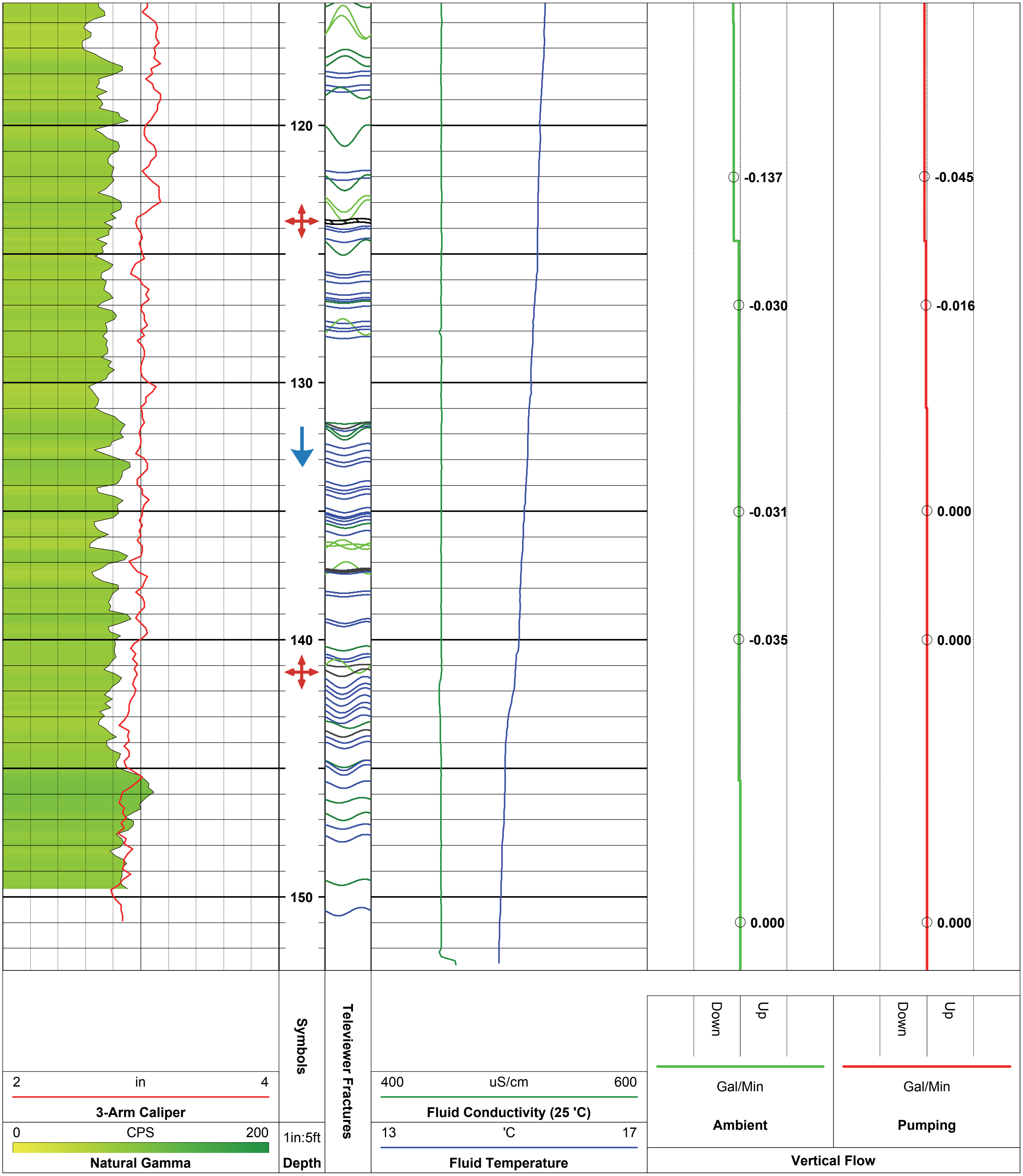
0.169
0.179
0.123
-0.048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-0.137
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-0.016
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0.000
0.000
Symbols
Televiewer Fractures
Down
Up
Down
Up
2 in 4
3-Arm Caliper
0 CPS 200
Natural Gamma
1in:5ft
Depth
400 uS/cm 600
Fluid Conductivity (25 'C)
13 'C 17
Fluid Temperature
Gal/Min
Ambient
Gal/Min
Pumping
Vertical Flow

Televiewer Logs

COMP	**Stantec**
WELL	**JSF-202**
FLD	**Rogersville**
CNTY	**Hawkins**
STAT	**TN**
ARM	**180462**
API	**N/A**

COMPANY: Stantec STATE: TN
WELL ID: JSF-202 ARM NO.: 180462
FIELD/SITE: Rogersville API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 0.7 G.L.

LOGGING DATE	08.29.2018	08.29.2018			
RUN NO	2	4			
TYPE LOG	OTV.GR	ATV.GR			
DRILLER DEPTH (FT)	147.4	147.4			
ARM DEPTH (FT)	147.78	147.74			
BTM LOGGED INTERVAL (FT)	148.04	147.74			
TOP LOGGED INTERVAL (FT)	5.96	11			
CASING SIZE (IN)/DEPTH (FT)	3/16.5	3/16.5			
CASING ARM (FT)	16.82	16.82			
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	8.84				
MAG. DECLINATION (DEG)	6.57 W	6.57 W			
RECORDED BY	R. Gecelosky	R. Gecelosky			
WITNESSED BY					

REMARKS:

Symbols

Bottom of Casing

Fluid Level

Structure

Bedding

Part. Open Fract

Filled Fracture

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				

2

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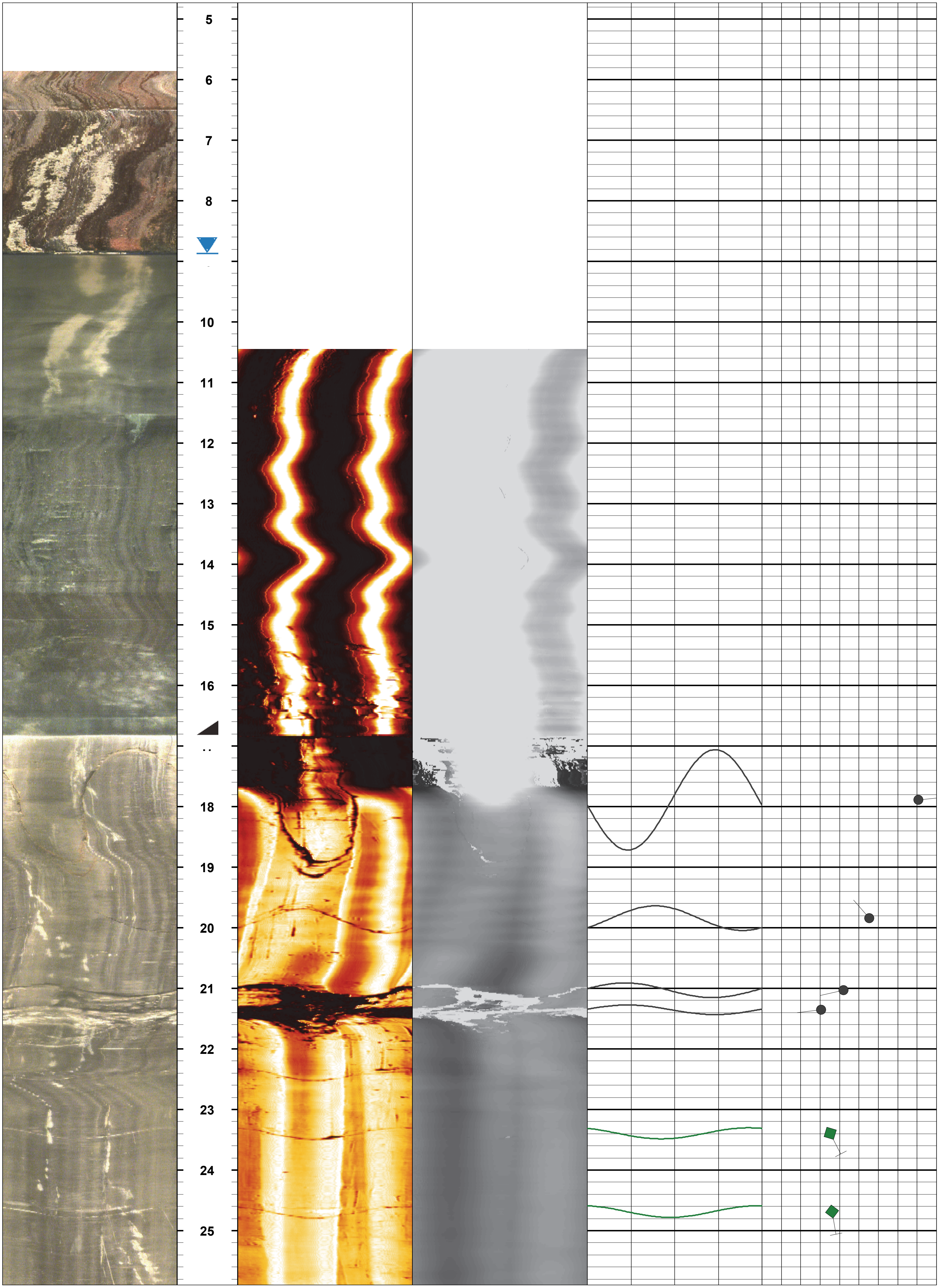
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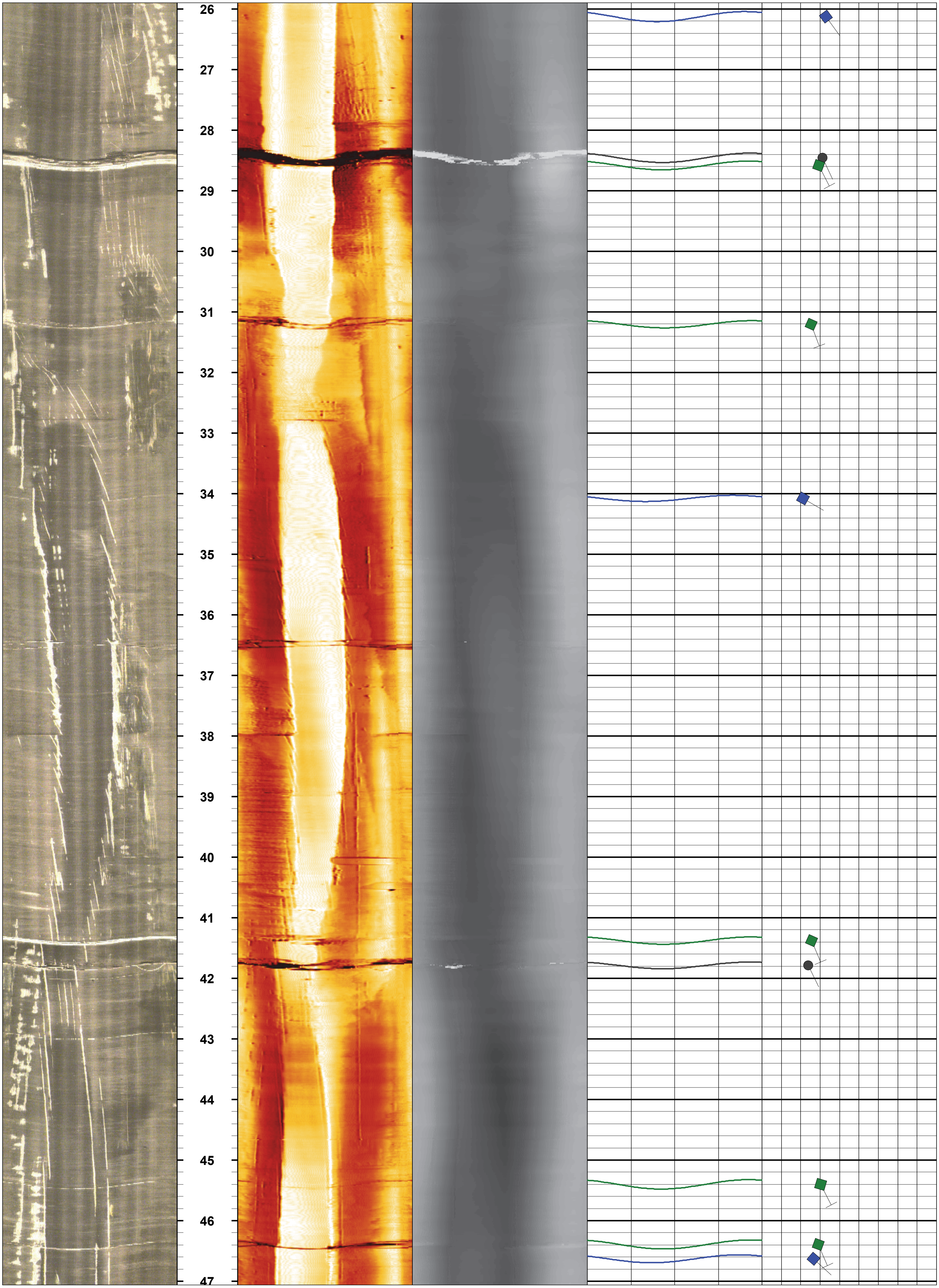
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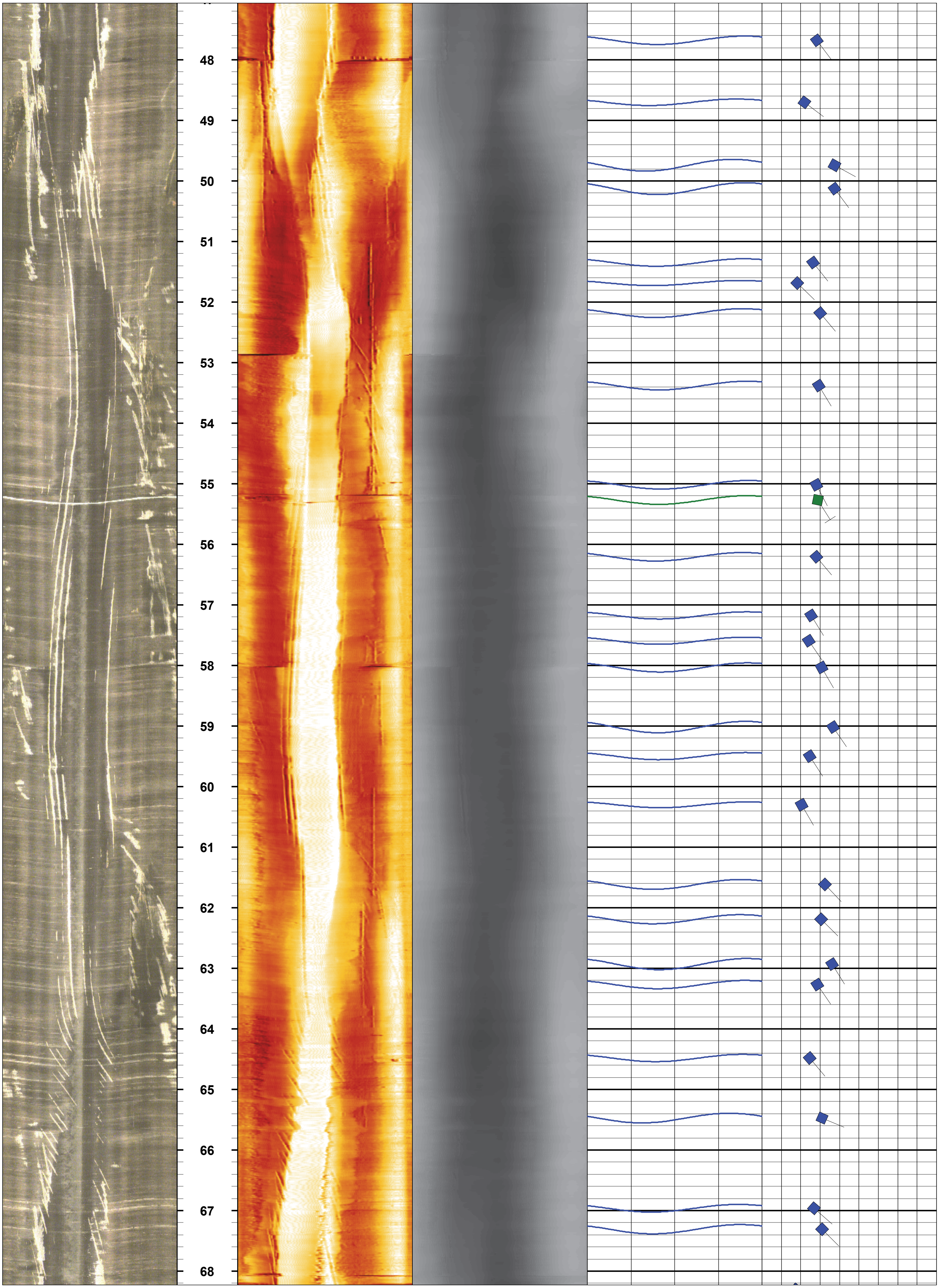
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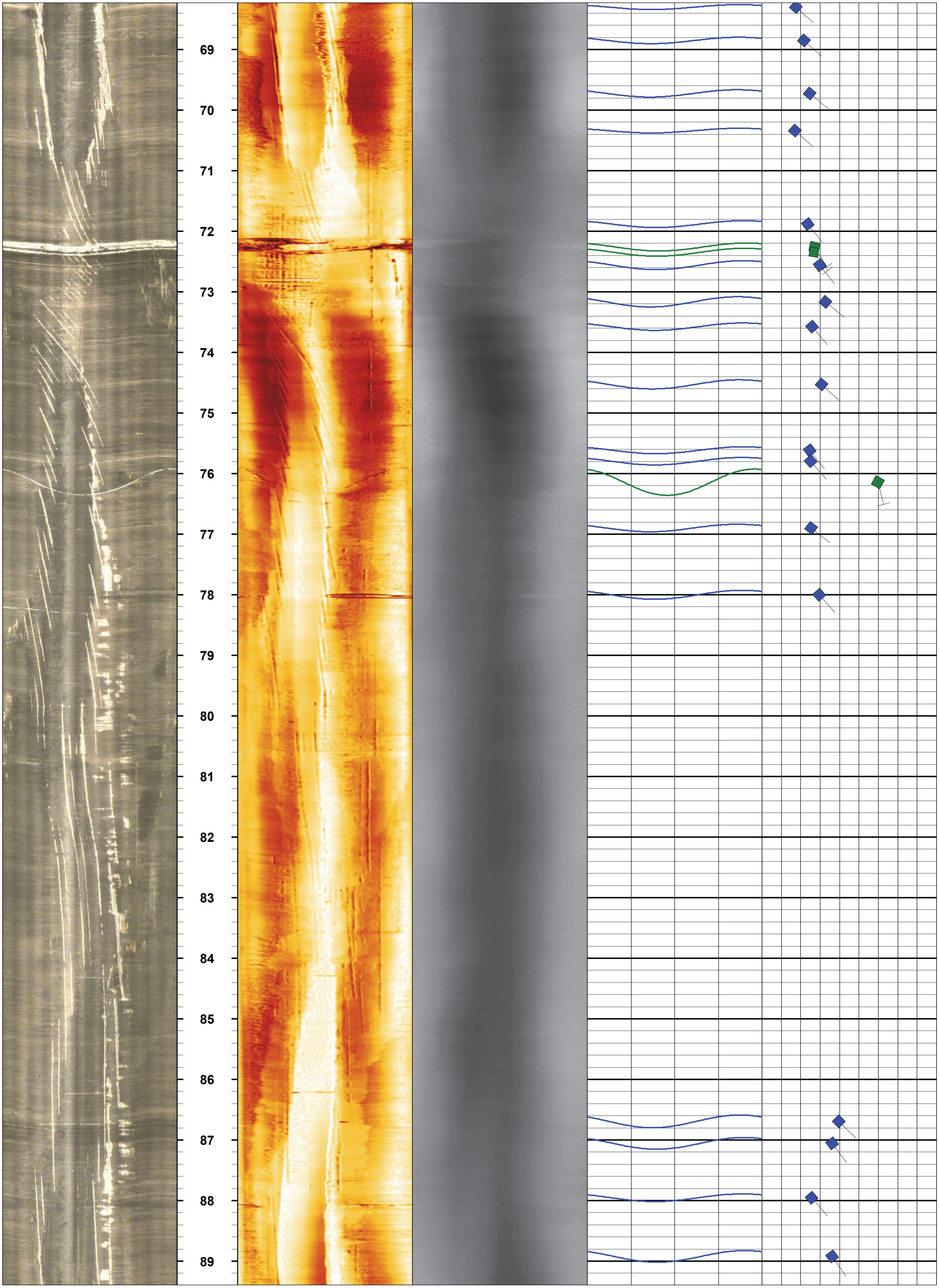
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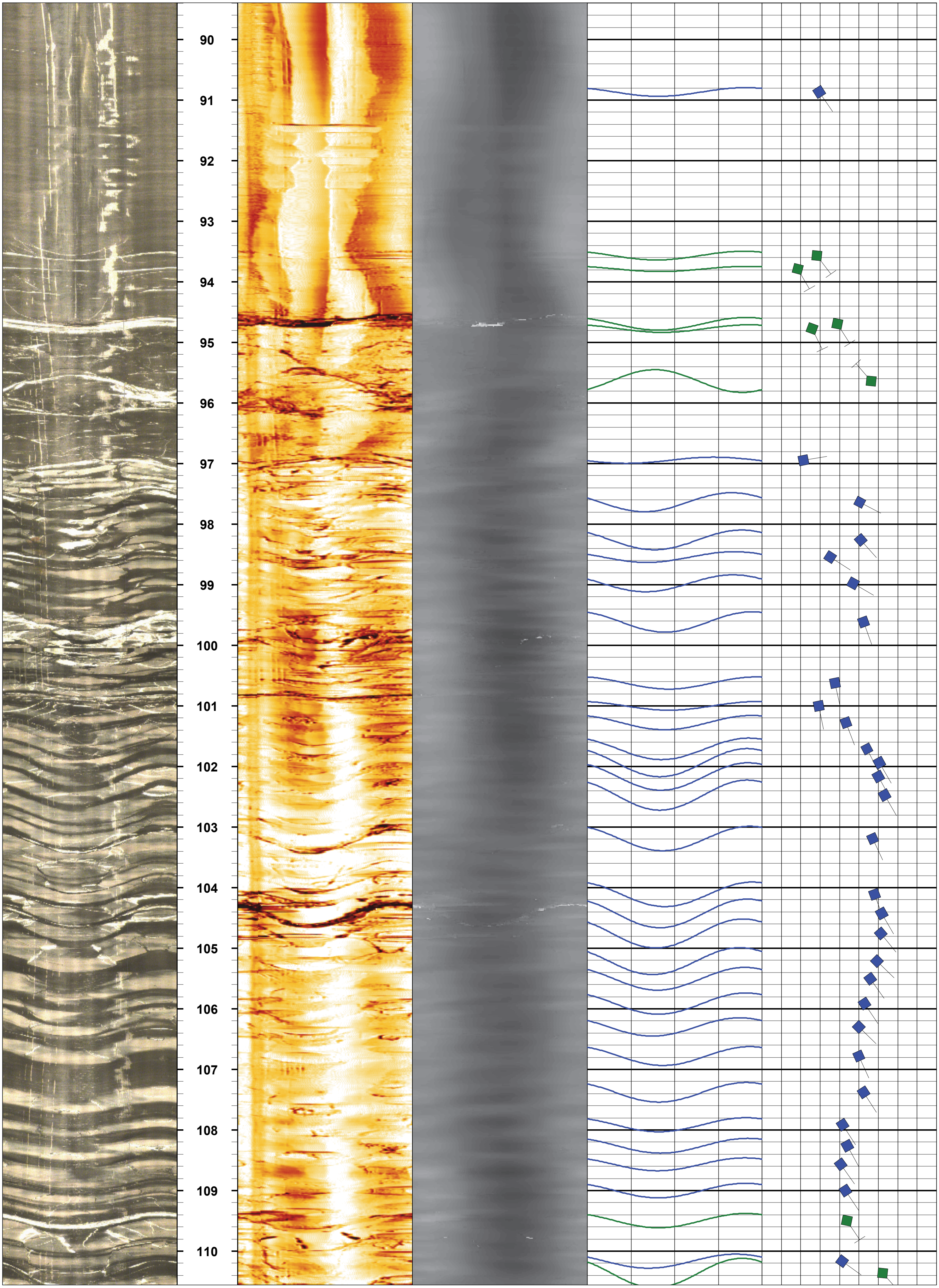
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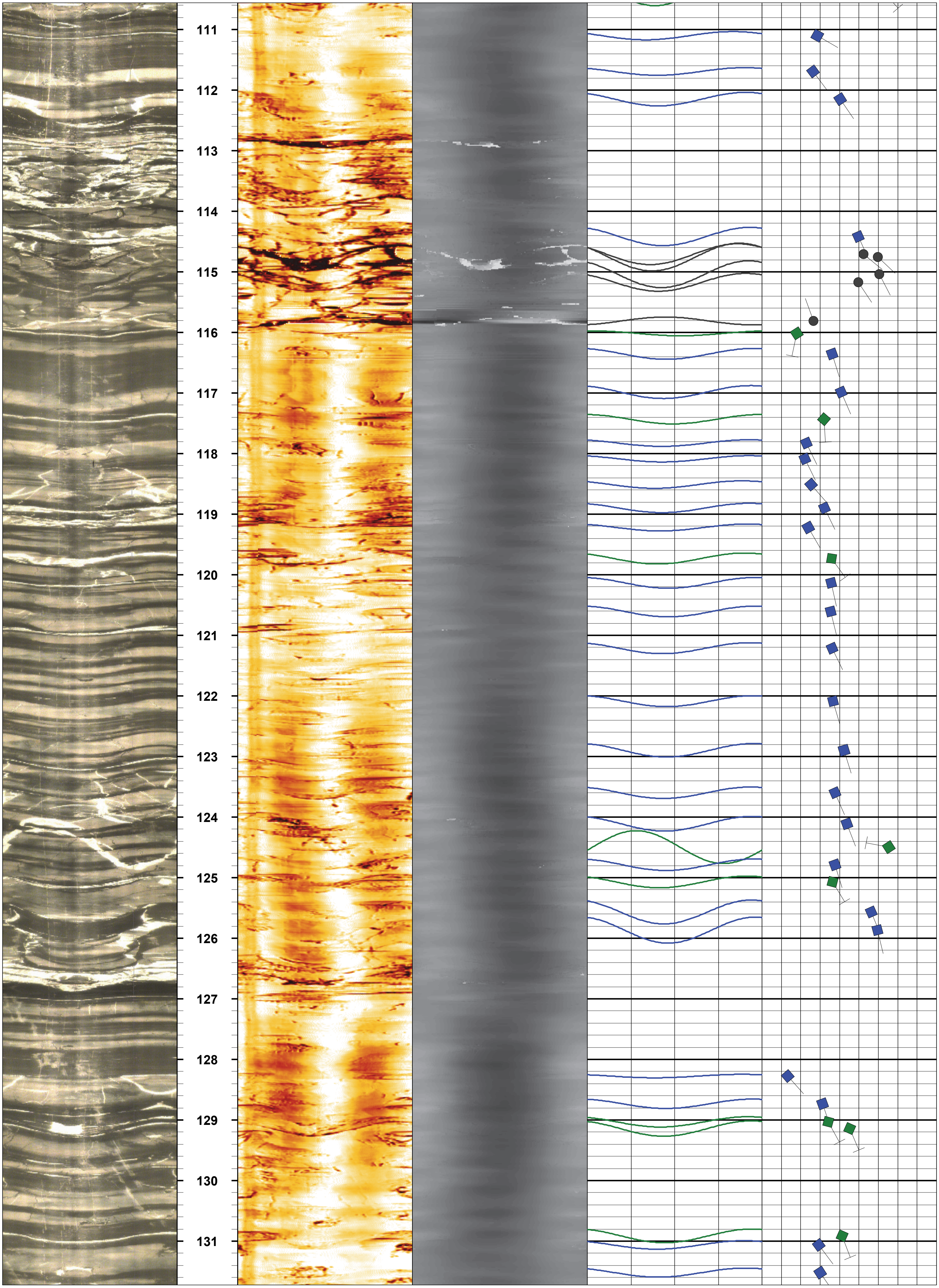
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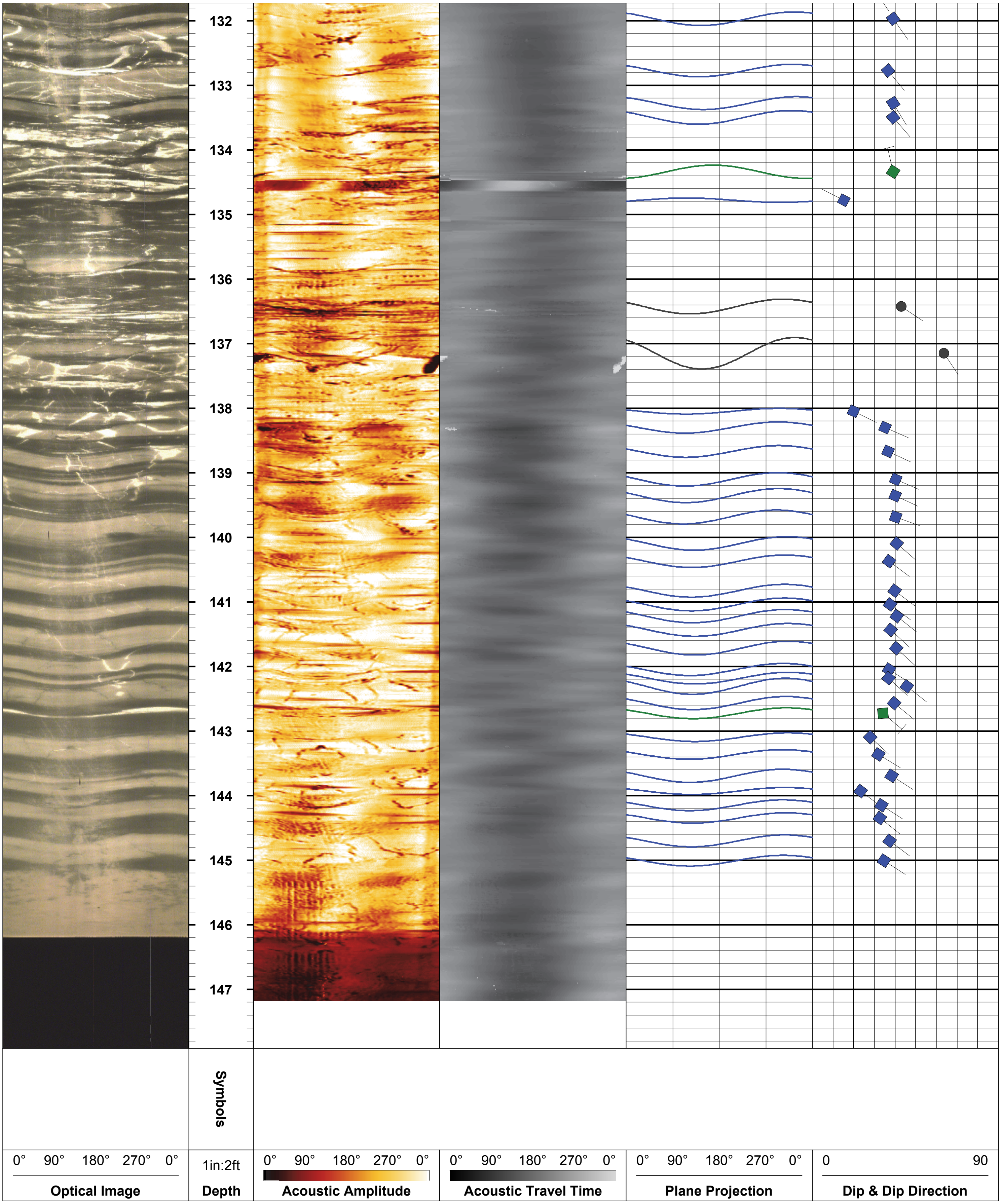
132
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142
143
144
145
146
147
Symbols
0° 90° 180° 270° 0°
Optical Image
1in:2ft
Depth
0° 90° 180° 270° 0°
Acoustic Amplitude
0° 90° 180° 270° 0°
Acoustic Travel Time
0° 90° 180° 270° 0°
Plane Projection
0 90
Dip & Dip Direction

Hydro Log

COMP	Stantec
WELL	JSF-202
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	180462
API	N/A

COMPANY: Stantec STATE: TN
WELL ID: JSF-202 ARM NO.: 180462
FIELD/SITE: Rogersville API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 0.7 G.L.

LOGGING DATE	08.29.2018	08.29.2018	08.29.2018	08.29.2018	
RUN NO	1	3	5	6	
TYPE LOG	FTC.GR	CAL	HPFM A	HPFM P	
DRILLER DEPTH (FT)	147.4	147.4	147.4	147.4	
ARM DEPTH (FT)	147.7	147.75	N/A	N/A	
BTM LOGGED INTERVAL (FT)	147.85	147.75	142	142.01	
TOP LOGGED INTERVAL (FT)	5.43	5.98	16.03	19	
CASING SIZE (IN)/DEPTH (FT)	3/16.5	3/16.5	3/16.5	3/16.5	
CASING ARM (FT)	16.82	16.82	16.82	16.82	
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	8.73				
MAG. DECLINATION (DEG)	6.57 W	6.57 W	6.57 W	6.57 W	
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	
WITNESSED BY					

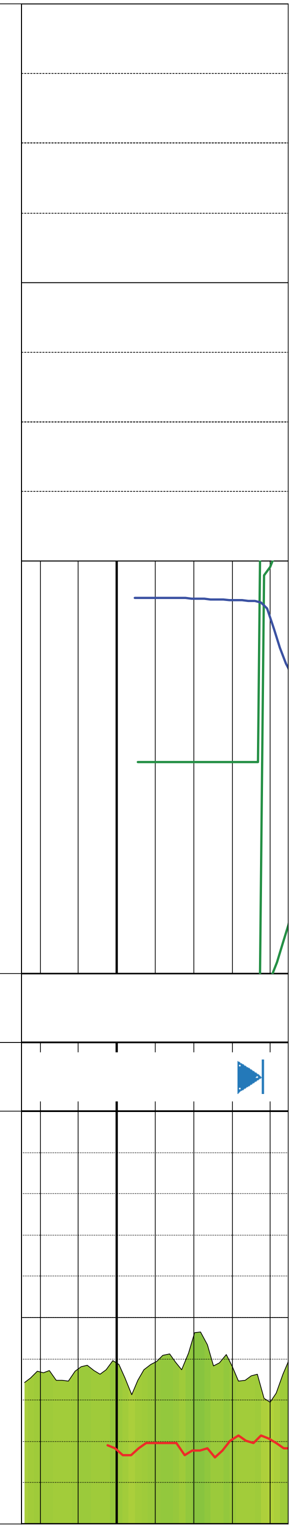
REMARKS:

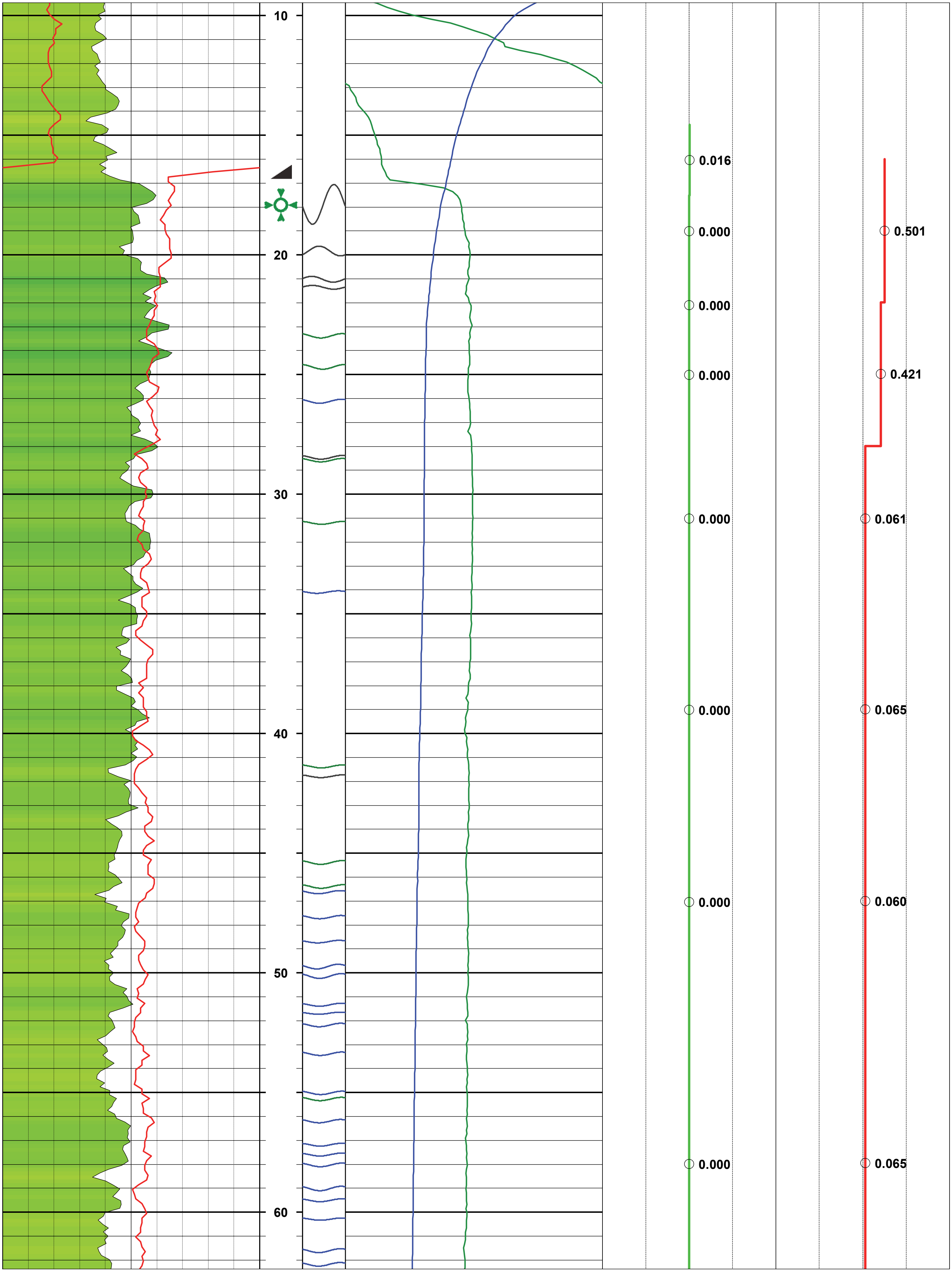
Symbols

Bottom of Casing Producing Zone

Fluid Level

Natural Gamma: 0 CPS 200
3-Arm Caliper: 2 in 4
Depth 1in:5ft
Symbols
Televiewer Fractures
Fluid Conductivity (25 'C): 700 uS/cm 900
Fluid Temperature: 12 'C 26
Vertical Flow
Ambient: Gal/Min, Down, Up
Pumping: Gal/Min, Down, Up





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0.016
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0.501
20
0.000
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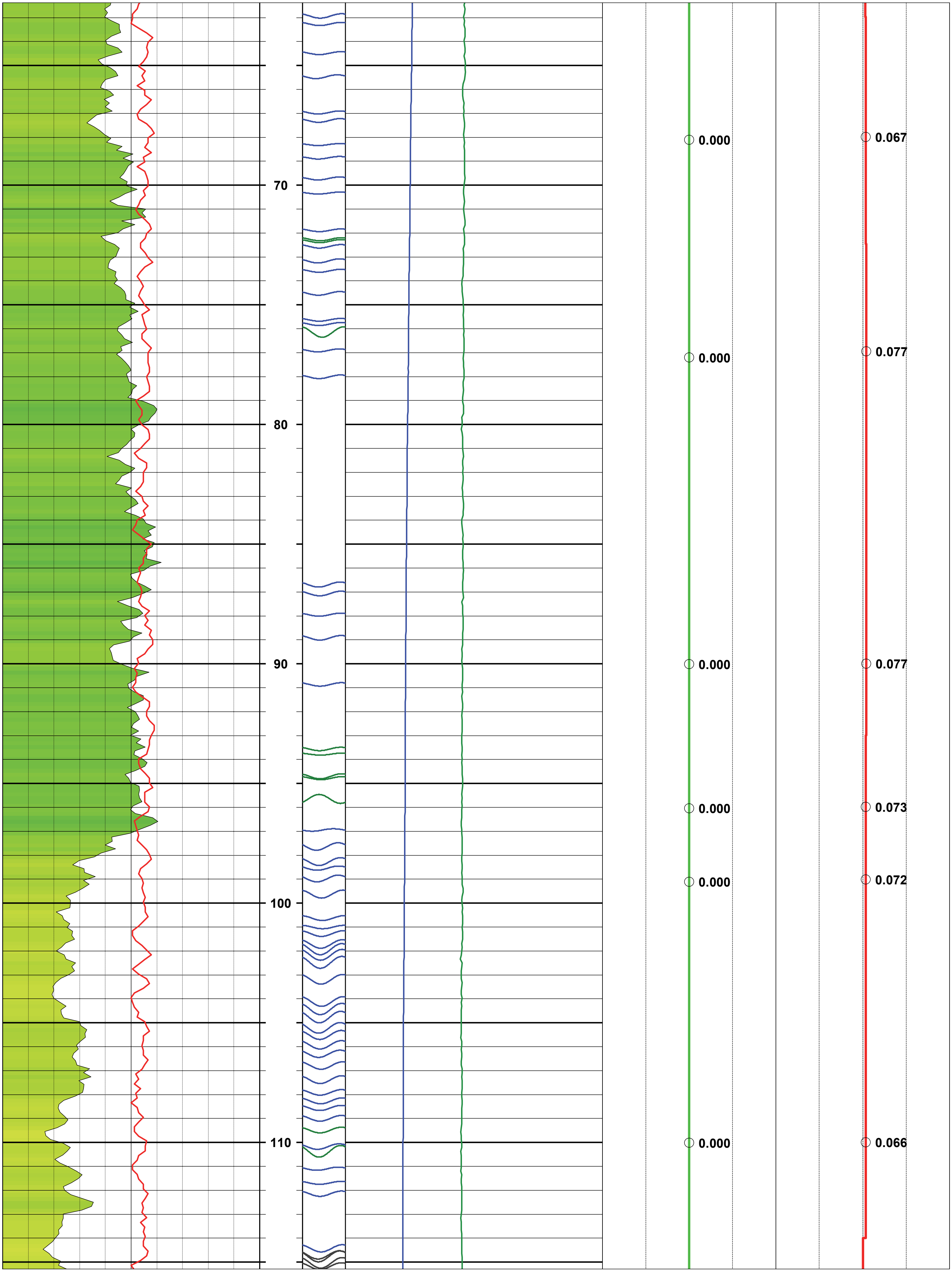
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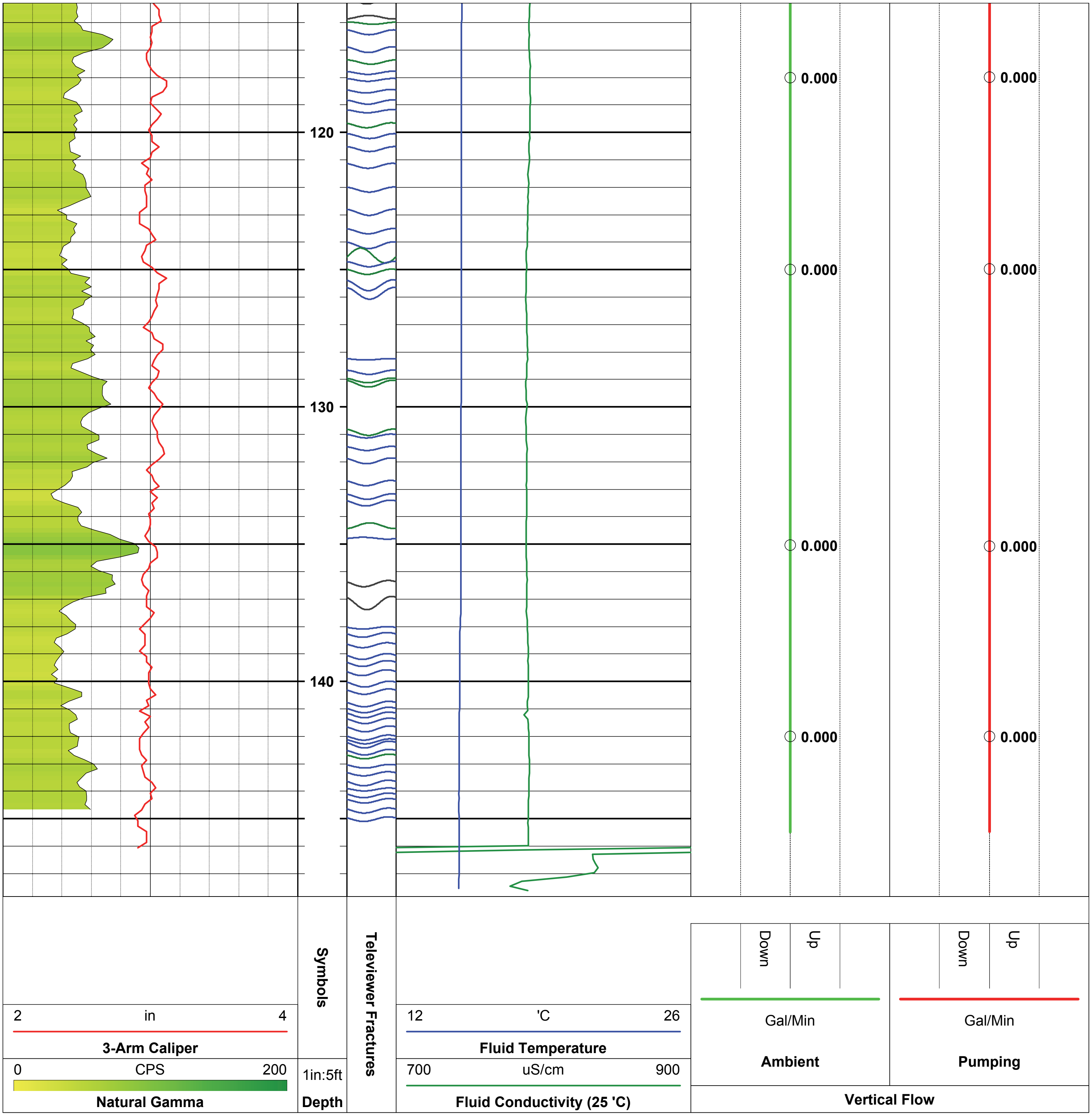

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Symbols
Televiewer Fractures
Down
Up
Down
Up
2
in
4
3-Arm Caliper
0
CPS
200
Natural Gamma
1in:5ft
Depth
12
'C
26
Fluid Temperature
700
uS/cm
900
Fluid Conductivity (25 'C)
Gal/Min
Ambient
Gal/Min
Pumping
Vertical Flow

ATTACHMENT C
TABULATED LISTING OF PLANE ORIENTATIONS

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-200	25.99	71	7.38	0	Part. Open Fract	N19W/7NE
JSF-200	27.3	332.71	46.61	0	Part. Open Fract	N63E/47NW
JSF-200	28.53	100.85	14.6	0	Open Fracture	N11E/15SE
JSF-200	28.61	111.09	14.59	0	Part. Open Fract	N21E/15SE
JSF-200	28.68	282.86	65.85	0	Discontinuous Fract	N13E/66NW
JSF-200	30.17	244.7	6.54	0	Open Fracture	N25W/7SW
JSF-200	30.67	243.09	16.04	0	Open Fracture	N27W/16SW
JSF-200	32.64	149.67	12.62	6.45	Open Fracture	N60E/13SE
JSF-200	33.96	315.25	34.97	84.22	Broken/Void/Soft Zone	N45E/35NW
JSF-200	38.22	219.54	21.58	0	Filled Fracture	N50W/22SW
JSF-200	40.29	228.58	20.68	0	Filled Fracture	N41W/21SW
JSF-200	42.75	200.96	19.72	0	Filled Fracture	N69W/20SW
JSF-200	43.16	347.16	40.76	0	Part. Open Fract	N77E/41NW
JSF-200	45.05	125.69	19.87	0	Part. Open Fract	N36E/20SE
JSF-200	51.6	168.65	27.43	0	Filled Fracture	N79E/27SE
JSF-200	52.13	164.89	31.56	0	Filled Fracture	N75E/32SE
JSF-200	53.86	333.83	51.9	0	Part. Open Fract	N64E/52NW
JSF-200	54.55	349.77	66.07	0	Filled Fracture	N80E/66NW
JSF-200	63.13	338.63	48.63	0	Open Fracture	N69E/49NW
JSF-200	63.2	336.61	49.29	0	Filled Fracture	N67E/49NW
JSF-200	64.37	341.52	49.27	0	Filled Fracture	N72E/49NW
JSF-200	65.27	343.54	49.2	0	Filled Fracture	N74E/49NW
JSF-200	66.55	166.86	26.22	0	Filled Fracture	N77E/26SE
JSF-200	70.75	350.24	57.02	0	Filled Fracture	N80E/57NW
JSF-200	71.6	5.16	60.43	0	Filled Fracture	N85W/60NE
JSF-200	74.49	147.46	26.1	0	Bedding	N57E/26SE
JSF-200	75.79	330.38	68.11	0	Part. Open Fract	N60E/68NW
JSF-200	75.95	344.09	54.64	0	Discontinuous Fract	N74E/55NW
JSF-200	79.45	158.76	15.87	0	Bedding	N69E/16SE
JSF-200	80.86	160.45	23.68	0	Bedding	N70E/24SE
JSF-200	81.59	165.85	19.25	0	Filled Fracture	N76E/19SE
JSF-200	81.69	160.4	23.78	0	Filled Fracture	N70E/24SE
JSF-200	82.12	346.86	47.1	0	Filled Fracture	N77E/47NW
JSF-200	82.21	343.88	47.07	0	Filled Fracture	N74E/47NW
JSF-200	82.56	350.48	48.89	0	Filled Fracture	N80E/49NW
JSF-200	82.91	155.83	24.42	0	Bedding	N66E/24SE
JSF-200	84.13	169.03	23.8	0	Bedding	N79E/24SE
JSF-200	84.78	158.2	23.23	0	Bedding	N68E/23SE
JSF-200	89.5	148.11	16.74	0	Filled Fracture	N58E/17SE
JSF-200	89.78	182.06	20.59	0	Filled Fracture	N88W/21SW
JSF-200	89.91	307.66	73.53	0	Discontinuous Fract	N38E/74NW
JSF-200	90.68	180.13	14.62	0	Filled Fracture	N90W/15SW
JSF-200	91.47	167.18	20.05	0	Bedding	N77E/20SE
JSF-200	93.41	357.03	26.26	0	Filled Fracture	N87E/26NW
JSF-200	93.95	296.09	18.94	0	Part. Open Fract	N26E/19NW
JSF-200	94.14	303.88	70.08	0	Discontinuous Fract	N34E/70NW
JSF-200	95.54	169.92	39.94	0	Open Fracture	N80E/40SE
JSF-200	95.71	296.33	53.56	0	Part. Open Fract	N26E/54NW
JSF-200	96.23	206.9	36.53	0	Part. Open Fract	N63W/37SW
JSF-200	96.38	180.15	23.23	0	Filled Fracture	N90W/23SW
JSF-200	96.49	161.32	16.52	0	Filled Fracture	N71E/17SE
JSF-200	97.02	169.42	20.44	0	Bedding	N79E/20SE
JSF-200	97.47	15.91	80.38	0	Discontinuous Fract	N74W/80NE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-200	97.91	5.1	69.18	0	Filled Fracture	N85W/69NE
JSF-200	98.07	169.58	12.06	0	Bedding	N80E/12SE
JSF-200	99.35	350.37	69.76	0	Filled Fracture	N80E/70NW
JSF-200	99.53	356.91	71.59	0	Filled Fracture	N87E/72NW
JSF-200	100.02	348.92	41.65	0	Filled Fracture	N79E/42NW
JSF-200	103.74	346.23	34.88	0	Filled Fracture	N76E/35NW
JSF-200	104.1	176.3	27.47	0	Filled Fracture	N86E/27SE
JSF-200	104.56	174.92	22.24	0	Bedding	N85E/22SE
JSF-200	105.47	337.99	65.15	0	Discontinuous Fract	N68E/65NW
JSF-200	105.59	181.23	20.74	0	Filled Fracture	N89W/21SW
JSF-200	107.27	162.76	20.38	0	Bedding	N73E/20SE
JSF-200	108.52	167.04	20.22	0	Filled Fracture	N77E/20SE
JSF-200	108.78	338.59	67.83	0	Discontinuous Fract	N69E/68NW
JSF-200	108.89	336.68	68.27	0	Discontinuous Fract	N67E/68NW
JSF-200	109.41	161.86	74.57	0	Discontinuous Fract	N72E/75SE
JSF-200	110.28	138.19	22.76	0	Part. Open Fract	N48E/23SE
JSF-200	110.36	147.53	30.61	0	Part. Open Fract	N58E/31SE
JSF-200	110.43	155.44	29.2	0	Filled Fracture	N65E/29SE
JSF-200	110.97	159.94	30.78	0	Bedding	N70E/31SE
JSF-200	112	161.51	28.86	0	Bedding	N72E/29SE
JSF-200	112.99	162.55	29.01	0	Bedding	N73E/29SE
JSF-200	113.45	147.56	30.4	0	Filled Fracture	N58E/30SE
JSF-200	115.21	150.66	34.26	0	Bedding	N61E/34SE
JSF-200	115.43	0.42	63.21	0	Filled Fracture	N90W/63NE
JSF-200	115.57	145.87	34.57	0	Bedding	N56E/35SE
JSF-200	116.09	162.81	32.16	0	Bedding	N73E/32SE
JSF-200	116.38	158.62	33.11	0	Filled Fracture	N69E/33SE
JSF-200	116.91	152.46	36	0	Bedding	N62E/36SE
JSF-200	116.96	156.04	35.9	0	Bedding	N66E/36SE
JSF-200	117.3	157.85	29.04	0	Bedding	N68E/29SE
JSF-200	117.72	135.31	37.4	0	Bedding	N45E/37SE
JSF-200	118.07	153.95	33.85	0	Filled Fracture	N64E/34SE
JSF-200	118.34	27.52	59.78	0	Discontinuous Fract	N62W/60NE
JSF-200	118.81	145.4	34.65	0	Bedding	N55E/35SE
JSF-200	119.46	152.57	38.64	0	Filled Fracture	N63E/39SE
JSF-200	120.21	157.31	41.29	0	Filled Fracture	N67E/41SE
JSF-200	120.32	14.02	48.21	0	Discontinuous Fract	N76W/48NE
JSF-200	120.57	152.4	37.14	0	Bedding	N62E/37SE
JSF-200	120.74	158.54	35.97	0	Bedding	N69E/36SE
JSF-200	121.74	149.89	39.84	0	Bedding	N60E/40SE
JSF-200	122	144.63	43.47	0	Filled Fracture	N55E/43SE
JSF-200	122.82	146.06	60.87	0	Part. Open Fract	N56E/61SE
JSF-200	123.42	127.77	40.9	0	Part. Open Fract	N38E/41SE
JSF-200	123.59	145.61	31.14	0	Filled Fracture	N56E/31SE
JSF-200	124.17	134.38	46.74	0	Filled Fracture	N44E/47SE
JSF-200	126.32	161	29.15	0	Bedding	N71E/29SE
JSF-200	126.76	160.57	23.54	0	Bedding	N71E/24SE
JSF-200	130.75	137.04	19.33	0	Filled Fracture	N47E/19SE
JSF-200	132.4	157.27	37.02	0	Filled Fracture	N67E/37SE
JSF-200	132.53	158.55	27.69	0	Part. Open Fract	N69E/28SE
JSF-200	133.24	138.68	61.37	0	Filled Fracture	N49E/61SE
JSF-200	134.04	262.91	26.51	0	Filled Fracture	N7W/27SW
JSF-200	134.34	327.19	7.67	0	Filled Fracture	N57E/8NW

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-200	134.6	145.76	35.29	0	Bedding	N56E/35SE
JSF-200	134.72	129.07	26.98	0	Bedding	N39E/27SE
JSF-200	134.92	136.5	50.84	0	Filled Fracture	N47E/51SE
JSF-200	135.7	148.65	41.27	0	Part. Open Fract	N59E/41SE
JSF-200	136.09	309.11	37.5	0	Filled Fracture	N39E/38NW
JSF-200	136.15	317.03	59.17	0	Discontinuous Fract	N47E/59NW
JSF-200	136.45	325.96	48.16	0	Discontinuous Fract	N56E/48NW
JSF-200	136.77	153.34	16.68	0	Filled Fracture	N63E/17SE
JSF-200	140.09	155.33	41.18	0	Filled Fracture	N65E/41SE
JSF-200	141.13	277.3	19.57	0	Filled Fracture	N7E/20NW
JSF-200	141.46	203.72	32.82	0	Bedding	N66W/33SW
JSF-200	142.28	247.61	28.58	0	Filled Fracture	N22W/29SW
JSF-200	143.34	206.34	21.86	0	Filled Fracture	N64W/22SW
JSF-200	143.51	177.24	27.47	0	Bedding	N87E/27SE
JSF-200	143.64	221.91	24.58	0	Bedding	N48W/25SW
JSF-200	144.03	126.24	7.62	0	Part. Open Fract	N36E/8SE
JSF-200	144.47	138.87	4.9	0	Bedding	N49E/5SE
JSF-201	24.04	107.6	44.38	0	Part. Open Fract	N18E/44SE
JSF-201	24.29	93.91	41.02	0	Bedding	N4E/41SE
JSF-201	24.74	131.42	42.02	0	Bedding	N41E/42SE
JSF-201	25.02	117.39	41.66	0	Bedding	N27E/42SE
JSF-201	25.27	128.24	32.53	0	Bedding	N38E/33SE
JSF-201	25.47	148.33	33.13	0	Bedding	N58E/33SE
JSF-201	25.58	118.79	31.92	0	Bedding	N29E/32SE
JSF-201	25.92	133.25	38.21	33.18	Broken/Void/Soft Zone	N43E/38SE
JSF-201	25.94	288.33	60.82	0	Discontinuous Fract	N18E/61NW
JSF-201	26.29	107.27	32.45	0	Bedding	N17E/32SE
JSF-201	27.96	129.67	49.33	4.31	Open Fracture	N40E/49SE
JSF-201	29.49	288.61	76.92	0	Filled Fracture	N19E/77NW
JSF-201	30.16	264.31	25.67	0	Part. Open Fract	N6W/26SW
JSF-201	30.23	274.95	45.44	0	Part. Open Fract	N5E/45NW
JSF-201	31.01	134.17	50.82	0	Part. Open Fract	N44E/51SE
JSF-201	32.47	172.51	23.5	0	Filled Fracture	N83E/24SE
JSF-201	32.62	179.39	20.55	0	Part. Open Fract	N89E/21SE
JSF-201	32.91	151.51	39.12	0	Filled Fracture	N62E/39SE
JSF-201	33.24	142.64	40.37	0	Filled Fracture	N53E/40SE
JSF-201	33.4	126.44	54.99	4.84	Open Fracture	N36E/55SE
JSF-201	33.86	151.45	27.26	0	Filled Fracture	N61E/27SE
JSF-201	34.27	158.48	40.62	0	Bedding	N68E/41SE
JSF-201	34.46	156.53	40.72	0	Bedding	N67E/41SE
JSF-201	35.44	151.61	40.72	0	Bedding	N62E/41SE
JSF-201	35.59	154.63	40.8	0	Bedding	N65E/41SE
JSF-201	36.18	125.58	40.62	0	Discontinuous Fract	N36E/41SE
JSF-201	36.44	323.31	34.91	0	Open Fracture	N53E/35NW
JSF-201	36.52	216.16	60.07	0	Discontinuous Fract	N54W/60SW
JSF-201	36.78	329.6	29.31	0	Open Fracture	N60E/29NW
JSF-201	37.09	146.79	46.31	0	Open Fracture	N57E/46SE
JSF-201	37.3	162.2	29	0	Filled Fracture	N72E/29SE
JSF-201	37.6	141.87	67.71	0	Filled Fracture	N52E/68SE
JSF-201	37.88	146.72	67.7	0	Filled Fracture	N57E/68SE
JSF-201	39.31	149.74	32.46	0	Bedding	N60E/32SE
JSF-201	39.55	137.57	18.56	0	Part. Open Fract	N48E/19SE
JSF-201	40.09	146.62	32.4	0	Bedding	N57E/32SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	40.25	143.57	32.45	0	Bedding	N54E/32SE
JSF-201	40.75	142.68	30.17	0	Bedding	N53E/30SE
JSF-201	40.88	142.74	30.14	0	Bedding	N53E/30SE
JSF-201	41.54	143.68	33.34	0	Part. Open Fract	N54E/33SE
JSF-201	41.98	142.61	30.24	0	Bedding	N53E/30SE
JSF-201	42.32	131.97	30.26	0	Bedding	N42E/30SE
JSF-201	42.82	142.75	26.64	0	Bedding	N53E/27SE
JSF-201	42.98	147.53	30.24	0	Bedding	N58E/30SE
JSF-201	43.61	149.49	30.25	0	Bedding	N59E/30SE
JSF-201	43.83	151.62	30.31	0	Bedding	N62E/30SE
JSF-201	44.37	143.75	30.29	0	Bedding	N54E/30SE
JSF-201	44.61	143.75	30.32	0	Bedding	N54E/30SE
JSF-201	44.81	152.43	30.3	0	Bedding	N62E/30SE
JSF-201	45.09	140.81	30.34	0	Bedding	N51E/30SE
JSF-201	45.23	136.87	30.33	0	Filled Fracture	N47E/30SE
JSF-201	45.87	344.97	63.26	0	Part. Open Fract	N75E/63NW
JSF-201	46.06	172.91	30.82	0	Part. Open Fract	N83E/31SE
JSF-201	46.44	339.45	39.18	0	Part. Open Fract	N69E/39NW
JSF-201	47.61	152.56	30.46	0	Bedding	N63E/30SE
JSF-201	47.83	145.6	30.41	0	Bedding	N56E/30SE
JSF-201	48.51	147.47	32.82	0	Bedding	N57E/33SE
JSF-201	48.66	147.61	32.78	0	Bedding	N58E/33SE
JSF-201	48.81	170.16	30.37	0	Filled Fracture	N80E/30SE
JSF-201	48.9	173.09	30.34	0	Filled Fracture	N83E/30SE
JSF-201	49.56	154.29	30.44	0	Bedding	N64E/30SE
JSF-201	49.7	163.13	30.43	0	Bedding	N73E/30SE
JSF-201	50.09	161.35	30.42	0	Bedding	N71E/30SE
JSF-201	50.23	163.32	30.42	0	Bedding	N73E/30SE
JSF-201	50.85	151.51	32.9	0	Bedding	N62E/33SE
JSF-201	51.17	283.83	35.23	23.07	Broken/Void/Soft Zone	N14E/35NW
JSF-201	51.69	182.42	12.37	151.4	Broken/Void/Soft Zone	N88W/12SW
JSF-201	52.8	354.6	47.65	0	Discontinuous Fract	N85E/48NW
JSF-201	54.89	166.56	14.4	0	Bedding	N77E/14SE
JSF-201	55.07	12.82	60.82	0	Discontinuous Fract	N77W/61NE
JSF-201	55.09	170.85	14.38	0	Bedding	N81E/14SE
JSF-201	55.3	341.01	69.68	0	Part. Open Fract	N71E/70NW
JSF-201	55.32	164.89	74.04	0	Discontinuous Fract	N75E/74SE
JSF-201	55.5	349.78	55.61	0	Discontinuous Fract	N80E/56NW
JSF-201	56.56	185.83	24.64	0	Part. Open Fract	N84W/25SW
JSF-201	56.63	175.03	18.86	0	Part. Open Fract	N85E/19SE
JSF-201	56.96	163.21	35.08	0	Filled Fracture	N73E/35SE
JSF-201	57.41	340	43.53	0	Part. Open Fract	N70E/44NW
JSF-201	57.61	158.1	21.44	0	Bedding	N68E/21SE
JSF-201	57.84	253.17	30.9	0	Filled Fracture	N17W/31SW
JSF-201	59.16	175.3	24.87	0	Part. Open Fract	N85E/25SE
JSF-201	59.25	303.47	51.49	0	Filled Fracture	N33E/51NW
JSF-201	59.42	140.25	15.78	0	Part. Open Fract	N50E/16SE
JSF-201	59.8	169.8	15.89	31.89	Broken/Void/Soft Zone	N80E/16SE
JSF-201	60.15	185.35	18.76	6.28	Part. Open Fract	N85W/19SW
JSF-201	60.34	215.86	13.95	0	Part. Open Fract	N54W/14SW
JSF-201	60.53	241.75	16.11	0	Part. Open Fract	N28W/16SW
JSF-201	61.01	136.89	32.88	0	Bedding	N47E/33SE
JSF-201	61.17	140.55	32.83	0	Bedding	N51E/33SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	61.18	124.33	73.96	0	Discontinuous Fract	N34E/74SE
JSF-201	61.26	135.89	32.87	0	Bedding	N46E/33SE
JSF-201	61.5	130.06	32.78	0	Bedding	N40E/33SE
JSF-201	61.56	125.38	24.8	0	Filled Fracture	N35E/25SE
JSF-201	61.88	139.01	63.74	0	Part. Open Fract	N49E/64SE
JSF-201	62.04	115.95	64.38	0	Part. Open Fract	N26E/64SE
JSF-201	62.45	150.28	31.69	0	Part. Open Fract	N60E/32SE
JSF-201	62.69	150.33	31.7	0	Bedding	N60E/32SE
JSF-201	62.78	129.72	31.86	0	Bedding	N40E/32SE
JSF-201	63.12	171.82	64.88	0	Filled Fracture	N82E/65SE
JSF-201	63.48	147.42	33.1	0	Filled Fracture	N57E/33SE
JSF-201	63.83	162.98	42.87	0	Bedding	N73E/43SE
JSF-201	64.03	149.37	42.99	0	Bedding	N59E/43SE
JSF-201	64.38	137.32	43.07	0	Bedding	N47E/43SE
JSF-201	66.09	151.72	24.99	0	Filled Fracture	N62E/25SE
JSF-201	66.46	160.87	37.97	0	Bedding	N71E/38SE
JSF-201	66.76	153.83	38.06	0	Bedding	N64E/38SE
JSF-201	67.35	158.68	28.35	0	Bedding	N69E/28SE
JSF-201	67.51	151.97	28.5	0	Bedding	N62E/29SE
JSF-201	68.03	169.21	28.25	0	Bedding	N79E/28SE
JSF-201	68.13	164.25	28.36	0	Bedding	N74E/28SE
JSF-201	68.55	157.55	28.42	0	Bedding	N68E/28SE
JSF-201	68.71	160.54	29.16	0	Filled Fracture	N71E/29SE
JSF-201	68.91	160.52	28.42	0	Bedding	N71E/28SE
JSF-201	69.76	160.13	22.64	0	Bedding	N70E/23SE
JSF-201	69.95	149.15	29.52	0	Bedding	N59E/30SE
JSF-201	70.1	157.58	30.76	0	Bedding	N68E/31SE
JSF-201	70.19	173.77	29.32	0	Filled Fracture	N84E/29SE
JSF-201	70.3	157.59	28.54	0	Bedding	N68E/29SE
JSF-201	70.62	166.94	27.29	0	Bedding	N77E/27SE
JSF-201	70.96	158.43	28.62	0	Bedding	N68E/29SE
JSF-201	71.26	170.93	28.4	0	Bedding	N81E/28SE
JSF-201	71.38	165	28.51	0	Filled Fracture	N75E/29SE
JSF-201	71.56	165	28.51	0	Bedding	N75E/29SE
JSF-201	71.92	164.07	19.88	0	Bedding	N74E/20SE
JSF-201	72.16	167.93	19.74	0	Bedding	N78E/20SE
JSF-201	72.43	172.68	19.69	0	Bedding	N83E/20SE
JSF-201	72.5	176.46	19.63	0	Bedding	N86E/20SE
JSF-201	72.63	169.83	19.72	0	Bedding	N80E/20SE
JSF-201	72.79	164.04	19.87	0	Bedding	N74E/20SE
JSF-201	73	195.07	14.91	0	Filled Fracture	N75W/15SW
JSF-201	73.19	225.59	26.95	21.03	Broken/Void/Soft Zone	N44W/27SW
JSF-201	73.87	185.46	24.85	0	Filled Fracture	N85W/25SW
JSF-201	74.48	316.12	47.37	0	Bedding	N46E/47NW
JSF-201	75.02	309.09	47.37	0	Bedding	N39E/47NW
JSF-201	75.18	290.12	48.79	0	Bedding	N20E/49NW
JSF-201	75.35	293.15	50.36	0	Bedding	N23E/50NW
JSF-201	75.6	299.87	49.8	0	Bedding	N30E/50NW
JSF-201	75.73	295.12	49.82	0	Bedding	N25E/50NW
JSF-201	75.93	282.82	40.04	0	Bedding	N13E/40NW
JSF-201	76.06	287.88	39.99	0	Bedding	N18E/40NW
JSF-201	76.76	140.42	64.93	5.93	Part. Open Fract	N50E/65SE
JSF-201	77.01	153.36	50.49	0	Part. Open Fract	N63E/50SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	77.2	143.63	43.9	0	Part. Open Fract	N54E/44SE
JSF-201	77.56	141.79	55.47	18.33	Broken/Void/Soft Zone	N52E/55SE
JSF-201	77.92	141.73	45.28	19.78	Broken/Void/Soft Zone	N52E/45SE
JSF-201	78.29	144.4	61.03	25.86	Broken/Void/Soft Zone	N54E/61SE
JSF-201	78.61	156.26	48.52	0	Bedding	N66E/49SE
JSF-201	78.98	321.07	48.16	0	Discontinuous Fract	N51E/48NW
JSF-201	78.99	156.21	48.51	0	Bedding	N66E/49SE
JSF-201	79.18	315.82	48.15	0	Discontinuous Fract	N46E/48NW
JSF-201	79.65	173.72	52.64	0	Bedding	N84E/53SE
JSF-201	79.87	167.79	52.87	0	Bedding	N78E/53SE
JSF-201	79.87	330.37	55.46	0	Discontinuous Fract	N60E/55NW
JSF-201	82.07	324.15	48.92	0	Filled Fracture	N54E/49NW
JSF-201	83.74	129.66	13.35	0	Bedding	N40E/13SE
JSF-201	83.98	137.78	13.43	0	Bedding	N48E/13SE
JSF-201	84.18	331.26	52.03	0	Filled Fracture	N61E/52NW
JSF-201	88.44	157.08	56.6	0	Discontinuous Fract	N67E/57SE
JSF-201	88.49	153.25	56.67	0	Discontinuous Fract	N63E/57SE
JSF-201	89.22	170.6	56.36	0	Discontinuous Fract	N81E/56SE
JSF-201	89.85	169.23	56.45	0	Discontinuous Fract	N79E/56SE
JSF-201	92.22	341.31	33.51	17.74	Broken/Void/Soft Zone	N71E/34NW
JSF-201	92.58	312.05	43.64	0	Part. Open Fract	N42E/44NW
JSF-201	92.75	317.32	48.76	0	Part. Open Fract	N47E/49NW
JSF-201	93.54	331.95	11.89	0	Bedding	N62E/12NW
JSF-201	93.7	129.99	53.83	0	Part. Open Fract	N40E/54SE
JSF-201	93.93	31.97	11.49	0	Filled Fracture	N58W/11NE
JSF-201	95.78	152.29	60.25	0	Filled Fracture	N62E/60SE
JSF-201	95.94	152.73	63.21	0	Filled Fracture	N63E/63SE
JSF-201	96.06	352.72	10.49	0	Bedding	N83E/10NW
JSF-201	96.21	354.84	10.52	0	Bedding	N85E/11NW
JSF-201	96.32	352.8	10.51	0	Bedding	N83E/11NW
JSF-201	96.47	330.64	10.11	0	Bedding	N61E/10NW
JSF-201	97.07	151.34	63.91	0	Filled Fracture	N61E/64SE
JSF-201	97.19	145.45	63.91	0	Filled Fracture	N55E/64SE
JSF-201	97.57	159.08	25.29	0	Filled Fracture	N69E/25SE
JSF-201	97.64	160.9	25.36	0	Filled Fracture	N71E/25SE
JSF-201	98.59	130.54	14.41	0	Bedding	N41E/14SE
JSF-201	98.8	128.93	12.85	0	Part. Open Fract	N39E/13SE
JSF-201	100.36	133.66	14.61	0	Bedding	N44E/15SE
JSF-201	100.52	124.63	14.49	0	Bedding	N35E/14SE
JSF-201	100.92	10.6	10.58	0	Bedding	N79W/11NE
JSF-201	102.2	111.45	14.96	0	Bedding	N21E/15SE
JSF-201	102.37	104.69	14.73	0	Bedding	N15E/15SE
JSF-201	102.55	133.09	11.24	0	Bedding	N43E/11SE
JSF-201	102.85	124.98	11.23	0	Bedding	N35E/11SE
JSF-201	103.33	127.47	24.86	0	Bedding	N37E/25SE
JSF-201	103.5	127.55	24.96	0	Bedding	N38E/25SE
JSF-201	103.79	143.19	27.7	0	Bedding	N53E/28SE
JSF-201	103.9	148.17	27.75	0	Bedding	N58E/28SE
JSF-201	104.6	142.91	28.33	0	Bedding	N53E/28SE
JSF-201	104.8	152.67	28.17	0	Bedding	N63E/28SE
JSF-201	105.23	148.07	7.73	0	Bedding	N58E/8SE
JSF-201	105.52	144.42	7.88	0	Bedding	N54E/8SE
JSF-201	106.29	156.16	20.62	0	Filled Fracture	N66E/21SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	106.76	167.21	20.36	0	Filled Fracture	N77E/20SE
JSF-201	107.46	160.9	29.67	0	Bedding	N71E/30SE
JSF-201	107.61	157.29	29.76	0	Bedding	N67E/30SE
JSF-201	107.83	156.4	29.78	0	Bedding	N66E/30SE
JSF-201	108.13	181.87	28.88	0	Bedding	N88W/29SW
JSF-201	108.46	153.38	19.49	0	Bedding	N63E/19SE
JSF-201	108.57	154.98	19.55	0	Bedding	N65E/20SE
JSF-201	108.68	157.66	19.5	0	Bedding	N68E/20SE
JSF-201	108.86	149.94	19.66	0	Bedding	N60E/20SE
JSF-201	108.95	143.96	19.74	0	Bedding	N54E/20SE
JSF-201	109.19	143.96	19.74	0	Bedding	N54E/20SE
JSF-201	109.42	144.17	19.76	0	Bedding	N54E/20SE
JSF-201	110.05	7.05	26.66	0	Part. Open Fract	N83W/27NE
JSF-201	112.37	357.55	79.82	0	Discontinuous Fract	N88E/80NW
JSF-201	112.57	149.47	18.04	0	Bedding	N59E/18SE
JSF-201	112.86	168.57	17.48	0	Bedding	N79E/17SE
JSF-201	113.18	148.69	18.06	0	Bedding	N59E/18SE
JSF-201	113.44	151.11	17.9	0	Bedding	N61E/18SE
JSF-201	113.74	135.81	28.38	0	Filled Fracture	N46E/28SE
JSF-201	113.89	133.04	28.38	0	Filled Fracture	N43E/28SE
JSF-201	114.15	137.92	18.29	0	Bedding	N48E/18SE
JSF-201	114.44	165.43	17.71	0	Bedding	N75E/18SE
JSF-201	114.91	151.05	9.9	0	Bedding	N61E/10SE
JSF-201	115.08	144.92	10.13	0	Bedding	N55E/10SE
JSF-201	115.26	330.25	50	0	Filled Fracture	N60E/50NW
JSF-201	115.96	321.6	78.21	0	Discontinuous Fract	N52E/78NW
JSF-201	116.19	309.1	73.86	0	Discontinuous Fract	N39E/74NW
JSF-201	117.2	340.3	52.34	0	Filled Fracture	N70E/52NW
JSF-201	117.5	336.88	58.25	0	Filled Fracture	N67E/58NW
JSF-201	117.94	141.66	20.08	0	Bedding	N52E/20SE
JSF-201	118.12	132.14	20.01	0	Bedding	N42E/20SE
JSF-201	118.46	139.98	20.09	0	Bedding	N50E/20SE
JSF-201	118.66	136.6	20.01	0	Bedding	N47E/20SE
JSF-201	118.74	299.91	58.87	0	Filled Fracture	N30E/59NW
JSF-201	120.39	154.68	73.27	0	Filled Fracture	N65E/73SE
JSF-201	121.79	139.75	20.29	0	Bedding	N50E/20SE
JSF-201	122.09	137.9	20.39	0	Bedding	N48E/20SE
JSF-201	122.23	154.14	66.87	0	Filled Fracture	N64E/67SE
JSF-201	123.06	147.58	68.13	0	Discontinuous Fract	N58E/68SE
JSF-201	123.31	156.91	73.51	0	Discontinuous Fract	N67E/74SE
JSF-201	123.73	89.13	19.98	15.32	Broken/Void/Soft Zone	N1W/20NE
JSF-201	123.98	152.19	29.3	0	Bedding	N62E/29SE
JSF-201	124.09	142.63	29.39	0	Bedding	N53E/29SE
JSF-201	124.47	149.7	31.01	0	Bedding	N60E/31SE
JSF-201	124.75	142.16	67.67	0	Filled Fracture	N52E/68SE
JSF-201	125.76	146.12	29.34	0	Bedding	N56E/29SE
JSF-201	125.87	149.5	29.25	0	Bedding	N60E/29SE
JSF-201	126.11	151.06	20.37	0	Bedding	N61E/20SE
JSF-201	126.55	152.92	20.35	0	Bedding	N63E/20SE
JSF-201	126.73	155.2	20.37	0	Bedding	N65E/20SE
JSF-201	126.82	155.32	20.28	0	Bedding	N65E/20SE
JSF-201	126.88	145.15	19.04	0	Filled Fracture	N55E/19SE
JSF-201	127.08	155.23	20.26	0	Bedding	N65E/20SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	127.65	151.25	20.39	0	Bedding	N61E/20SE
JSF-201	127.83	319.06	68.75	0	Discontinuous Fract	N49E/69NW
JSF-201	127.85	151.06	20.47	0	Bedding	N61E/20SE
JSF-201	127.98	141.19	20.65	0	Bedding	N51E/21SE
JSF-201	128.25	145.48	20.6	0	Bedding	N55E/21SE
JSF-201	131.57	155.39	13.72	0	Filled Fracture	N65E/14SE
JSF-201	131.67	146.08	43.67	0	Part. Open Fract	N56E/44SE
JSF-201	131.8	156.3	36.59	0	Bedding	N66E/37SE
JSF-201	131.86	152.02	62.9	0	Filled Fracture	N62E/63SE
JSF-201	132	155.06	62.83	0	Filled Fracture	N65E/63SE
JSF-201	132.47	150.83	36.82	0	Bedding	N61E/37SE
JSF-201	132.75	148.14	36.89	0	Bedding	N58E/37SE
JSF-201	133.01	146.39	36.93	0	Bedding	N56E/37SE
JSF-201	133.17	144.53	36.95	0	Bedding	N55E/37SE
JSF-201	133.91	149.94	36.95	0	Bedding	N60E/37SE
JSF-201	134.13	149.82	33.17	0	Bedding	N60E/33SE
JSF-201	134.24	149.94	36.95	0	Bedding	N60E/37SE
JSF-201	134.44	149.93	36.95	0	Bedding	N60E/37SE
JSF-201	134.96	154.36	36.92	0	Bedding	N64E/37SE
JSF-201	135.15	150.85	37.04	0	Bedding	N61E/37SE
JSF-201	135.2	150.86	36.94	0	Bedding	N61E/37SE
JSF-201	135.31	149.95	36.95	0	Bedding	N60E/37SE
JSF-201	135.43	149.97	37.06	0	Bedding	N60E/37SE
JSF-201	135.58	160.68	36.73	0	Filled Fracture	N71E/37SE
JSF-201	135.85	148.16	36.99	0	Bedding	N58E/37SE
JSF-201	136.29	315.08	55.99	0	Discontinuous Fract	N45E/56NW
JSF-201	136.32	55.8	15.6	0	Discontinuous Fract	N34W/16NE
JSF-201	136.34	210.66	47.83	0	Discontinuous Fract	N59W/48SW
JSF-201	137.21	345.78	63.39	0	Discontinuous Fract	N76E/63NW
JSF-201	137.3	136.47	16.47	6.46	Part. Open Fract	N46E/16SE
JSF-201	137.33	151.5	16.19	3.69	Part. Open Fract	N62E/16SE
JSF-201	137.41	159.02	17.76	0	Bedding	N69E/18SE
JSF-201	138.16	145.91	18.19	0	Bedding	N56E/18SE
JSF-201	138.3	147.45	18.15	0	Bedding	N57E/18SE
JSF-201	139.27	156.14	36.69	0	Bedding	N66E/37SE
JSF-201	139.4	145.87	36.94	0	Bedding	N56E/37SE
JSF-201	140.34	143.05	36.83	0	Filled Fracture	N53E/37SE
JSF-201	140.66	152.72	40.57	0	Bedding	N63E/41SE
JSF-201	140.78	163.2	36.78	0	Bedding	N73E/37SE
JSF-201	141	125.93	20.76	0	Part. Open Fract	N36E/21SE
JSF-201	141.02	263.92	66.03	0	Discontinuous Fract	N6W/66SW
JSF-201	141.29	132.84	49.78	0	Part. Open Fract	N43E/50SE
JSF-201	141.66	133.97	61.1	0	Bedding	N44E/61SE
JSF-201	141.91	135.88	59.84	0	Bedding	N46E/60SE
JSF-201	142.09	133.99	59.95	0	Bedding	N44E/60SE
JSF-201	142.36	130.05	59.94	0	Bedding	N40E/60SE
JSF-201	142.64	134.02	59.95	0	Bedding	N44E/60SE
JSF-201	142.83	118.99	59.41	0	Bedding	N29E/59SE
JSF-201	143.1	127.5	54.88	0	Bedding	N38E/55SE
JSF-201	143.3	192.67	47.17	0	Filled Fracture	N77W/47SW
JSF-201	143.65	141.23	47.51	0	Part. Open Fract	N51E/48SE
JSF-201	143.88	154.94	48.41	0	Bedding	N65E/48SE
JSF-201	144.1	151.26	48.42	0	Bedding	N61E/48SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-201	144.82	148.57	50.69	0	Filled Fracture	N59E/51SE
JSF-201	144.89	147.06	59.48	0	Bedding	N57E/59SE
JSF-201	145.07	147.06	58.84	0	Bedding	N57E/59SE
JSF-201	145.63	146.63	48.63	0	Bedding	N57E/49SE
JSF-201	146.23	109.67	40.43	0	Filled Fracture	N20E/40SE
JSF-201	146.88	143.13	52.97	0	Filled Fracture	N53E/53SE
JSF-201	147.26	136.42	39.85	0	Bedding	N46E/40SE
JSF-201	147.71	135.75	51.74	0	Bedding	N46E/52SE
JSF-201	149.43	129.45	45.72	0	Filled Fracture	N39E/46SE
JSF-201	150.58	104.36	53.12	0	Bedding	N14E/53SE
JSF-202	17.89	83.88	80.61	0	Part. Open Fract	N6W/81NE
JSF-202	19.84	319.37	55.4	0	Part. Open Fract	N49E/55NW
JSF-202	21.03	257.59	42.01	0	Part. Open Fract	N12W/42SW
JSF-202	21.35	263.13	30.56	0	Part. Open Fract	N7W/31SW
JSF-202	23.39	152.61	35.14	0	Filled Fracture	N63E/35SE
JSF-202	24.68	170.13	36.19	0	Filled Fracture	N80E/36SE
JSF-202	26.12	143.85	32.97	0	Bedding	N54E/33SE
JSF-202	28.46	154.66	31.15	0	Part. Open Fract	N65E/31SE
JSF-202	28.58	152.78	29.21	0	Filled Fracture	N63E/29SE
JSF-202	31.2	159.53	25.32	0	Filled Fracture	N70E/25SE
JSF-202	34.08	119.88	21.2	0	Bedding	N30E/21SE
JSF-202	41.37	157.29	25.67	0	Filled Fracture	N67E/26SE
JSF-202	41.79	154.44	23.93	0	Part. Open Fract	N64E/24SE
JSF-202	45.4	152.16	30.32	0	Filled Fracture	N62E/30SE
JSF-202	46.39	157.08	29.02	0	Filled Fracture	N67E/29SE
JSF-202	46.63	132.35	26.48	0	Bedding	N42E/26SE
JSF-202	47.67	143.77	28.23	0	Bedding	N54E/28SE
JSF-202	48.7	126.84	21.89	0	Bedding	N37E/22SE
JSF-202	49.74	119.29	37.45	0	Bedding	N29E/37SE
JSF-202	50.13	143.43	37.36	0	Bedding	N53E/37SE
JSF-202	51.34	141.7	26.33	0	Bedding	N52E/26SE
JSF-202	51.68	133.66	18.27	0	Bedding	N44E/18SE
JSF-202	52.18	139.68	30	0	Bedding	N50E/30SE
JSF-202	53.38	148.57	29.17	0	Bedding	N59E/29SE
JSF-202	55.02	152.3	28.02	0	Bedding	N62E/28SE
JSF-202	55.26	147.54	28.85	0	Filled Fracture	N58E/29SE
JSF-202	56.2	139.89	28.02	0	Bedding	N50E/28SE
JSF-202	57.18	148.16	25.42	0	Bedding	N58E/25SE
JSF-202	57.59	145.36	24.21	0	Bedding	N55E/24SE
JSF-202	58.03	149.97	30.76	0	Bedding	N60E/31SE
JSF-202	59.02	145.26	36.75	0	Bedding	N55E/37SE
JSF-202	59.5	147.26	24.55	0	Bedding	N57E/25SE
JSF-202	60.29	150.03	20.39	0	Bedding	N60E/20SE
JSF-202	61.61	136.73	32.55	0	Bedding	N47E/33SE
JSF-202	62.19	135.04	30.58	0	Bedding	N45E/31SE
JSF-202	62.93	148.03	36.09	0	Bedding	N58E/36SE
JSF-202	63.27	145.37	28.53	0	Bedding	N55E/29SE
JSF-202	64.48	139.8	24.58	0	Bedding	N50E/25SE
JSF-202	65.47	112.33	30.99	0	Bedding	N22E/31SE
JSF-202	66.96	131.34	26.68	0	Bedding	N41E/27SE
JSF-202	67.31	134.82	30.92	0	Bedding	N45E/31SE
JSF-202	68.29	131.9	17.58	0	Bedding	N42E/18SE
JSF-202	68.85	131.46	21.67	0	Bedding	N41E/22SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-202	69.72	129.49	24.5	0	Bedding	N39E/25SE
JSF-202	70.33	131.68	17.03	0	Bedding	N42E/17SE
JSF-202	71.89	141.51	23.65	0	Bedding	N52E/24SE
JSF-202	72.26	147.73	26.97	0	Filled Fracture	N58E/27SE
JSF-202	72.34	143.2	26.86	0	Filled Fracture	N53E/27SE
JSF-202	72.55	141.32	29.69	0	Bedding	N51E/30SE
JSF-202	73.16	129.22	32.72	0	Bedding	N39E/33SE
JSF-202	73.57	139.54	25.88	0	Bedding	N50E/26SE
JSF-202	74.53	132.91	30.84	0	Bedding	N43E/31SE
JSF-202	75.62	141.14	24.56	0	Bedding	N51E/25SE
JSF-202	75.79	139.35	25.11	0	Bedding	N49E/25SE
JSF-202	76.14	165.01	59.81	0	Filled Fracture	N75E/60SE
JSF-202	76.9	128.64	25.23	0	Bedding	N39E/25SE
JSF-202	78	138.5	29.55	0	Bedding	N49E/30SE
JSF-202	86.69	134.52	39.64	0	Bedding	N45E/40SE
JSF-202	87.05	142.84	36.07	0	Bedding	N53E/36SE
JSF-202	87.95	139.07	25.49	0	Bedding	N49E/25SE
JSF-202	88.92	144.49	36.16	0	Bedding	N54E/36SE
JSF-202	90.87	145.93	29.43	0	Bedding	N56E/29SE
JSF-202	93.57	142.68	28.32	0	Filled Fracture	N53E/28SE
JSF-202	93.78	149.69	18.4	0	Filled Fracture	N60E/18SE
JSF-202	94.69	147.25	38.77	0	Filled Fracture	N57E/39SE
JSF-202	94.77	153.77	25.92	0	Filled Fracture	N64E/26SE
JSF-202	95.64	319.08	56.28	0	Filled Fracture	N49E/56NW
JSF-202	96.94	80.24	21.39	0	Bedding	N10W/21NE
JSF-202	97.64	117.28	50.4	0	Bedding	N27E/50SE
JSF-202	98.26	137.99	50.81	0	Bedding	N48E/51SE
JSF-202	98.54	122.42	35.11	0	Bedding	N32E/35SE
JSF-202	98.97	120.17	46.85	0	Bedding	N30E/47SE
JSF-202	99.61	159.6	52.27	0	Bedding	N70E/52SE
JSF-202	100.62	167.16	37.66	0	Bedding	N77E/38SE
JSF-202	101	168.16	29.16	0	Bedding	N78E/29SE
JSF-202	101.27	159.22	43.2	0	Bedding	N69E/43SE
JSF-202	101.71	153.06	54.18	0	Bedding	N63E/54SE
JSF-202	101.93	149.38	60.6	0	Bedding	N59E/61SE
JSF-202	102.16	151.28	59.97	0	Bedding	N61E/60SE
JSF-202	102.47	149.45	63.28	0	Bedding	N59E/63SE
JSF-202	103.19	155.01	56.99	0	Bedding	N65E/57SE
JSF-202	104.11	159.88	57.99	0	Bedding	N70E/58SE
JSF-202	104.42	149.5	61.82	0	Bedding	N60E/62SE
JSF-202	104.75	140.88	61.29	0	Bedding	N51E/61SE
JSF-202	105.21	134.2	59.15	0	Bedding	N44E/59SE
JSF-202	105.5	144.6	55.75	0	Bedding	N55E/56SE
JSF-202	105.91	146.43	52.94	0	Bedding	N56E/53SE
JSF-202	106.3	134.19	49.82	0	Bedding	N44E/50SE
JSF-202	106.78	155.69	49.92	0	Bedding	N66E/50SE
JSF-202	107.38	147.31	52.35	0	Bedding	N57E/52SE
JSF-202	107.92	147.1	41.46	0	Bedding	N57E/41SE
JSF-202	108.26	150.72	43.98	0	Bedding	N61E/44SE
JSF-202	108.57	144.32	40.45	0	Bedding	N54E/40SE
JSF-202	109	146.18	43.05	0	Bedding	N56E/43SE
JSF-202	109.49	146.22	43.73	0	Filled Fracture	N56E/44SE
JSF-202	110.16	125.96	41.35	0	Bedding	N36E/41SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-202	110.37	138.89	62.32	0	Filled Fracture	N49E/62SE
JSF-202	111.11	120.33	28.54	0	Bedding	N30E/29SE
JSF-202	111.69	143.83	26.28	0	Bedding	N54E/26SE
JSF-202	112.15	146.06	40.26	0	Bedding	N56E/40SE
JSF-202	114.42	155.6	49.67	0	Bedding	N66E/50SE
JSF-202	114.71	129.52	52.37	0	Part. Open Fract	N40E/52SE
JSF-202	114.76	133.22	59.85	0	Part. Open Fract	N43E/60SE
JSF-202	115.03	152.16	60.51	0	Part. Open Fract	N62E/61SE
JSF-202	115.17	146.27	49.64	0	Part. Open Fract	N56E/50SE
JSF-202	115.81	340.26	26.52	0	Part. Open Fract	N70E/27NW
JSF-202	116.01	191.44	17.88	0	Filled Fracture	N79W/18SW
JSF-202	116.35	162.19	36.05	0	Bedding	N72E/36SE
JSF-202	116.98	157.02	40.76	0	Bedding	N67E/41SE
JSF-202	117.43	176.15	32.02	0	Filled Fracture	N86E/32SE
JSF-202	117.83	153.58	22.82	0	Bedding	N64E/23SE
JSF-202	118.09	153.64	22.11	0	Bedding	N64E/22SE
JSF-202	118.51	138.77	25.26	0	Bedding	N49E/25SE
JSF-202	118.89	153.76	32.26	0	Bedding	N64E/32SE
JSF-202	119.22	149.61	23.95	0	Bedding	N60E/24SE
JSF-202	119.73	144.28	35.88	0	Filled Fracture	N54E/36SE
JSF-202	120.13	166.81	35.74	0	Bedding	N77E/36SE
JSF-202	120.61	166.66	35.5	0	Bedding	N77E/36SE
JSF-202	121.21	154.22	36.18	0	Bedding	N64E/36SE
JSF-202	122.09	163.17	36.58	0	Bedding	N73E/37SE
JSF-202	122.9	162.67	42.33	0	Bedding	N73E/42SE
JSF-202	123.59	156.8	37.67	0	Bedding	N67E/38SE
JSF-202	124.11	158.96	43.86	0	Bedding	N69E/44SE
JSF-202	124.49	280.66	65.41	0	Filled Fracture	N11E/65NW
JSF-202	124.79	162.2	37.63	0	Bedding	N72E/38SE
JSF-202	125.07	148.63	36.33	0	Filled Fracture	N59E/36SE
JSF-202	125.57	157.72	56.35	0	Bedding	N68E/56SE
JSF-202	125.86	166.31	59.46	0	Bedding	N76E/59SE
JSF-202	128.27	138.41	13.17	0	Bedding	N48E/13SE
JSF-202	128.73	161.74	31.17	0	Bedding	N72E/31SE
JSF-202	129.03	150.53	34.12	0	Filled Fracture	N61E/34SE
JSF-202	129.14	157.36	45.21	0	Filled Fracture	N67E/45SE
JSF-202	130.92	158.94	41.41	0	Filled Fracture	N69E/41SE
JSF-202	131.06	142.61	29.28	0	Bedding	N53E/29SE
JSF-202	131.52	146.01	30.01	0	Bedding	N56E/30SE
JSF-202	131.96	144.4	39.04	0	Bedding	N54E/39SE
JSF-202	132.77	140.77	36.65	0	Bedding	N51E/37SE
JSF-202	133.27	148.79	39.09	0	Bedding	N59E/39SE
JSF-202	133.5	139	39.16	0	Bedding	N49E/39SE
JSF-202	134.33	347.85	39.16	0	Filled Fracture	N78E/39NW
JSF-202	134.77	296.88	15.35	0	Bedding	N27E/15NW
JSF-202	136.43	123.59	42.94	0	Part. Open Fract	N34E/43SE
JSF-202	137.15	146.6	63.69	0	Part. Open Fract	N57E/64SE
JSF-202	138.04	115.89	19.9	0	Bedding	N26E/20SE
JSF-202	138.29	113.39	35.25	0	Bedding	N23E/35SE
JSF-202	138.67	115.05	36.63	0	Bedding	N25E/37SE
JSF-202	139.1	113.03	40.38	0	Bedding	N23E/40SE
JSF-202	139.35	114.82	40.19	0	Bedding	N25E/40SE
JSF-202	139.68	110.17	40.39	0	Bedding	N20E/40SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-202	140.1	130.89	40.74	0	Bedding	N41E/41SE
JSF-202	140.37	126.67	37.24	0	Bedding	N37E/37SE
JSF-202	140.82	126.53	39.78	0	Bedding	N37E/40SE
JSF-202	141.04	126.63	37.68	0	Bedding	N37E/38SE
JSF-202	141.22	128.33	40.74	0	Bedding	N38E/41SE
JSF-202	141.43	132.84	37.86	0	Bedding	N43E/38SE
JSF-202	141.72	132.78	40.52	0	Bedding	N43E/41SE
JSF-202	142.05	123.13	37.05	0	Bedding	N33E/37SE
JSF-202	142.18	132.82	36.79	0	Bedding	N43E/37SE
JSF-202	142.3	128.06	45.74	0	Bedding	N38E/46SE
JSF-202	142.57	129.16	39.71	0	Bedding	N39E/40SE
JSF-202	142.72	129.38	34.29	0	Filled Fracture	N39E/34SE
JSF-202	143.09	132.99	28.02	0	Bedding	N43E/28SE
JSF-202	143.36	121.66	32.09	0	Bedding	N32E/32SE
JSF-202	143.69	122.99	38.41	0	Bedding	N33E/38SE
JSF-202	143.92	127.25	23.44	0	Bedding	N37E/23SE
JSF-202	144.15	123.28	33.49	0	Bedding	N33E/33SE
JSF-202	144.34	128.44	32.79	0	Bedding	N38E/33SE
JSF-202	144.7	126.41	37.38	0	Bedding	N36E/37SE
JSF-202	145.01	123.07	34.71	0	Bedding	N33E/35SE

ATTACHMENT H.1-C
HYDROGRAPHS

Instrument Name	Northing (TN STP NAD83)	Easting (TN STP NAD83)
JSF_PZ_BA11	755,376.79	2,860,567.51
JSF_PZ_BA15	754,707.17	2,860,649.95
JSF_PZ_BA16	755,237.07	2,860,585.27
JSF_PZ_BA17	755,007.34	2,860,613.66
JSF_PZ_BA18	755,187.87	2,861,085.06
JSF_PZ_BA19	755,351.07	2,861,497.79
JSF_PZ_BA2	755,624.29	2,862,206.94
JSF_PZ_BA3	755,333.38	2,861,798.15
JSF_PZ_BA8	755,341.02	2,860,078.25
JSF_PZ_JP03	754,877.28	2,855,485.60
JSF_PZ_JP04	754,717.44	2,854,904.59
JSF_PZ_JP05	754,073.22	2,854,557.04
JSF_PZ_JP06	754,256.95	2,855,038.26
JSF_PZ_JS10	758,271.68	2,861,293.67
JSF_PZ_JS23	757,957.13	2,860,163.70
JSF_PZ_JS28R	757,435.64	2,859,727.39
JSF_PZ_JS30	757,294.03	2,859,799.61
JSF_PZ_JS35R	756,935.23	2,859,204.41
JSF_PZ_JS37	756,823.47	2,859,296.38
JSF_PZ_JS42	756,104.96	2,859,806.51
JSF_PZ_JS47R	756,407.63	2,858,513.05
JSF_PZ_JS49	756,292.93	2,858,603.15
JSF_PZ_JS50	756,154.52	2,858,707.98
JSF_PZ_JS52	755,913.23	2,858,896.02
JSF_PZ_JS53R	756,130.16	2,858,093.93
JSF_PZ_JS58	755,616.58	2,858,070.58
JSF_PZ_JS59	755,441.35	2,857,714.12
JSF_PZ_JS61A	757,375.05	2,859,717.96
JSF_PZ_JS63B	756,382.16	2,858,534.69
JSF_PZ_JS73A	756,034.11	2,858,814.57
JSF_PZ_JS73B	756,034.11	2,858,814.57
JSF_PZ_JS73C	756,034.11	2,858,814.57
JSF_PZ_JS75A	756,422.67	2,859,600.82

Instrument Name	Northing (TN STP NAD83)	Easting (TN STP NAD83)
JSF_PZ_JS75B	756,422.67	2,859,600.82
JSF_PZ_JS34C	756,438.37	2,860,592.13
JSF-B02A	756,582.19	2,858,931.90
JSF-B02B	756,582.19	2,858,931.90
JSF-B02C	756,582.19	2,858,931.90
JSF-B08A	754,710.07	2,854,913.99
JSF-B08B	754,710.07	2,854,913.99
JSF-B09A	754,793.27	2,854,876.27
JSF-B09B	754,793.27	2,854,876.27
JSF-B10A	755,097.75	2,856,155.16
JSF-B10B	755,097.75	2,856,155.16
JSF-B11A	755,126.63	2,856,098.83
JSF-B11B	755,126.63	2,856,098.83
JSF-B12A	754,977.98	2,856,196.86
JSF-B12B	754,977.98	2,856,196.86
JSF-B12C	754,977.98	2,856,196.86
JSF-B13A	754,060.37	2,858,025.00
JSF-B13B	754,060.37	2,858,025.00
JSF-B14A	754,162.79	2,858,030.34
JSF-B15A	754,258.29	2,858,074.83
JSF-B16A	754,349.02	2,858,134.80
JSF-B17A	757,040.00	2,859,546.51
JSF-B17B	757,040.00	2,859,546.51
JSF-TW01	755,872.37	2,858,526.41
JSF-TW02	756,189.91	2,859,184.21
JSF-TW05	757,915.38	2,860,907.40
JSF-TW06	754,990.85	2,860,324.64
JSF-TW07	755,294.60	2,861,342.26
JSF-TW08	755,603.13	2,862,037.98
JSF-TW09	754,351.27	2,854,666.97
JSF-TW10	754,652.95	2,855,400.04
JSF-TW11	754,944.10	2,856,153.51
JSF-TW12	754,165.28	2,858,045.53

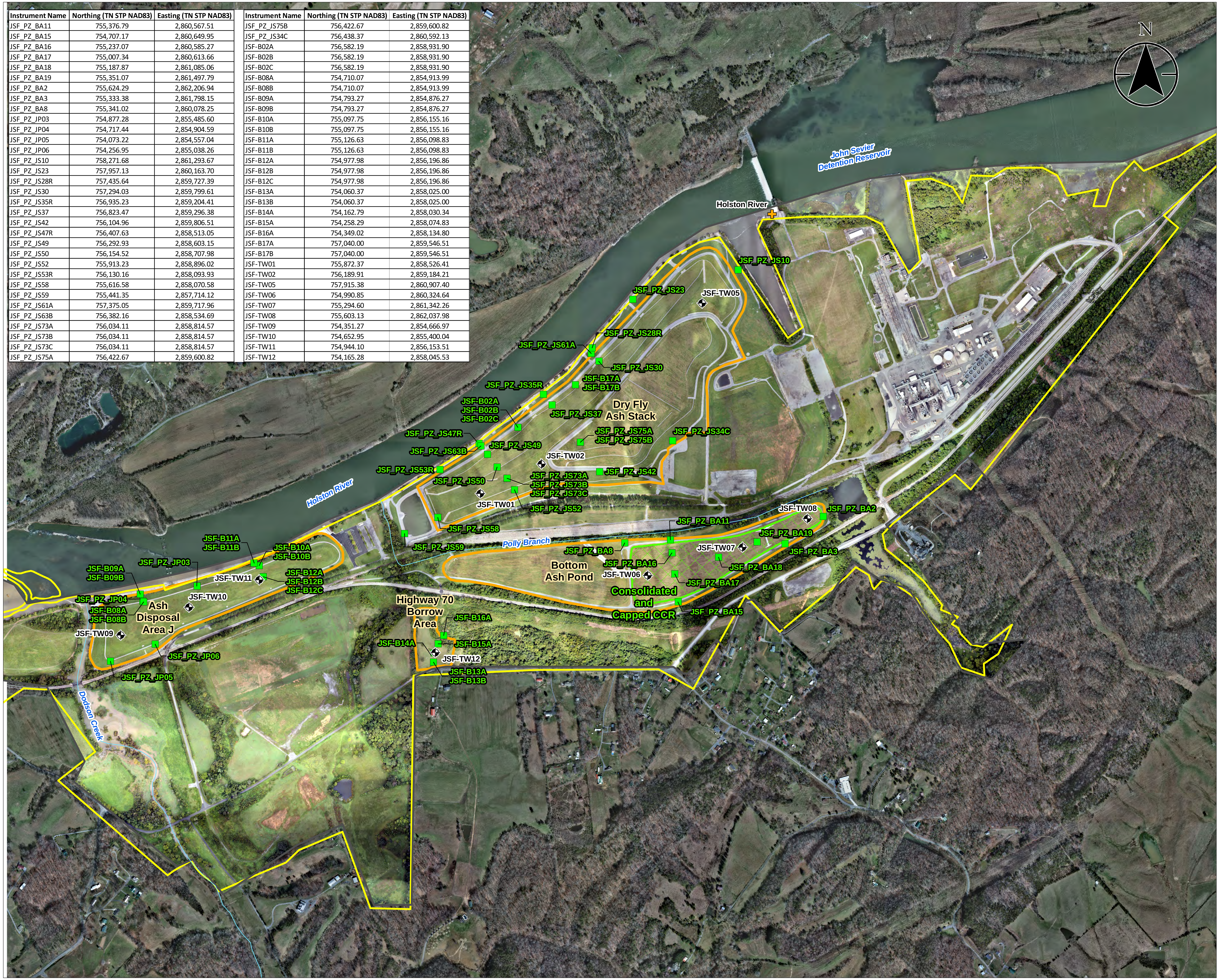


Exhibit No.

Attachment C

Title

JSF Instrumentation - Used for Surface Water/Pore Water/Groundwater Hydrograph Comparison

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2023-05-11
Technical Review by MD on 2023-05-11

0 500 1,000 1,500 2,000 Feet

1:6,000 (At original document size of 22x34)

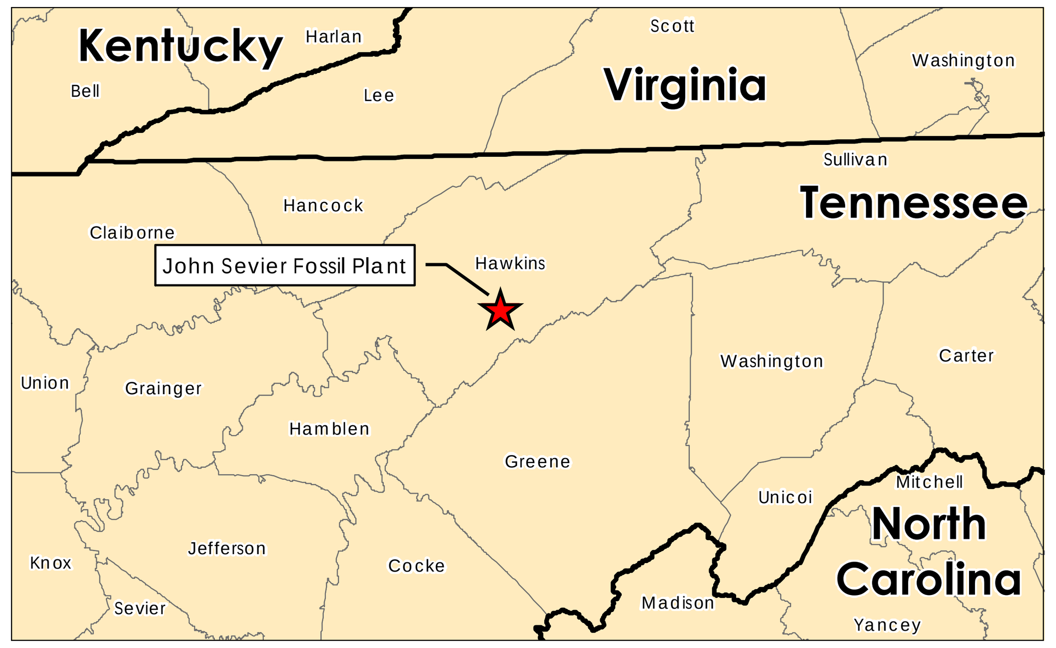
Legend

- Piezometer
- Temporary Well
- Holston River Gauge
- Stream Channel (Approximate)
- 2018 Imagery Boundary
- TVA Property Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

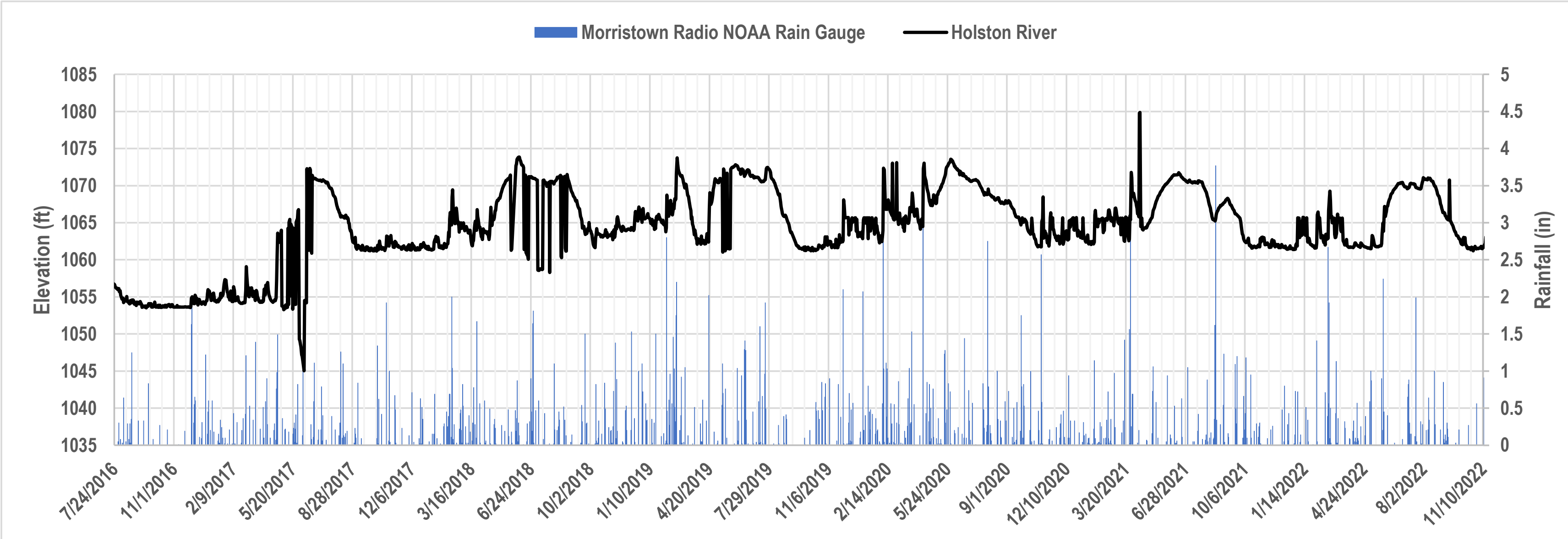
Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec TVA

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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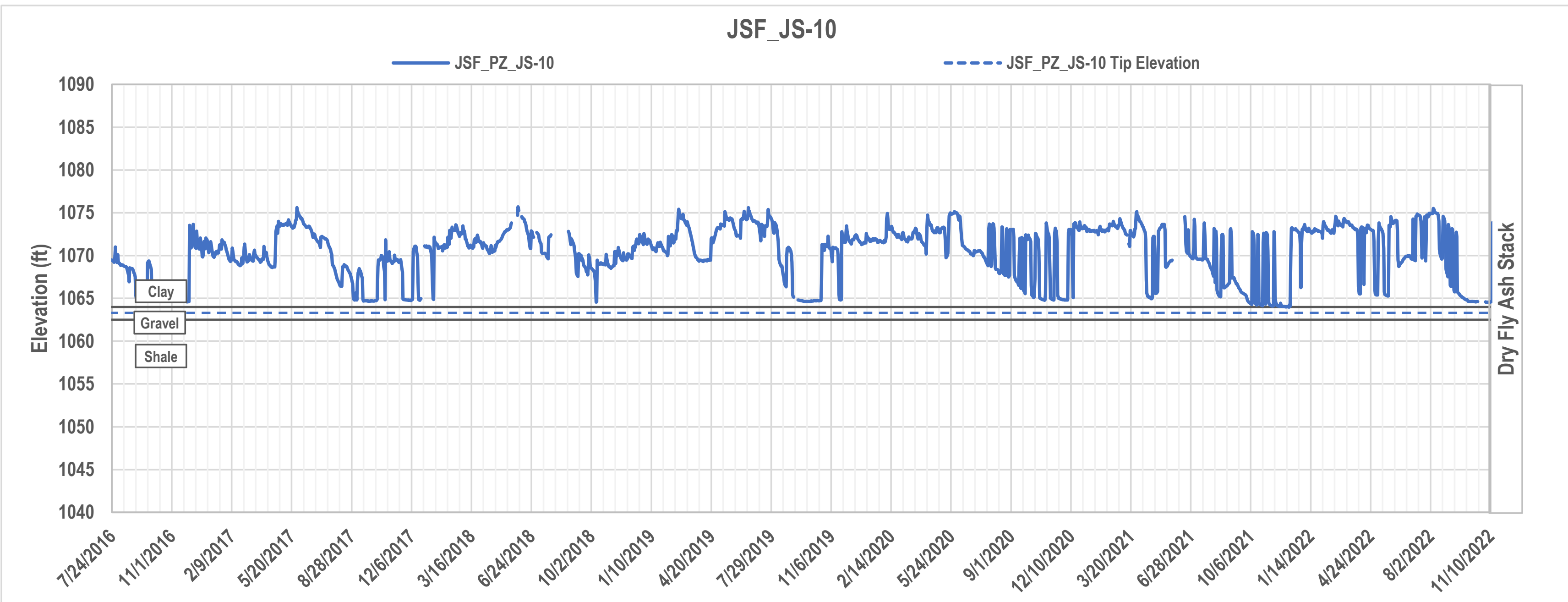
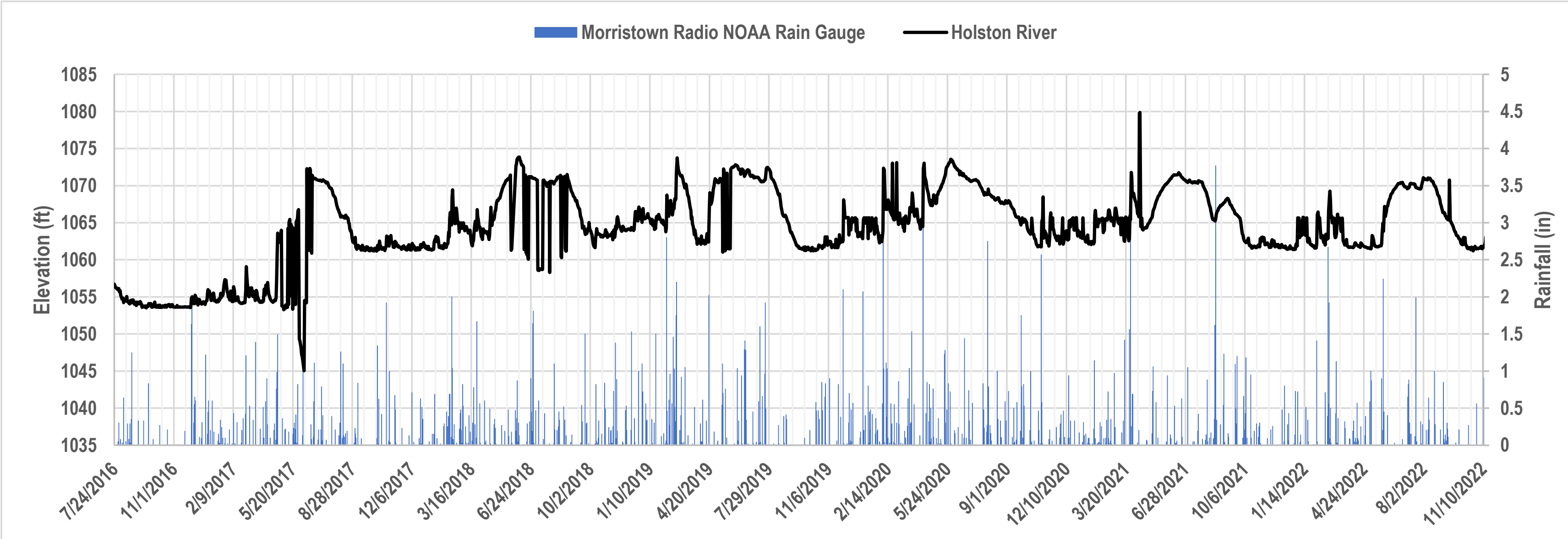
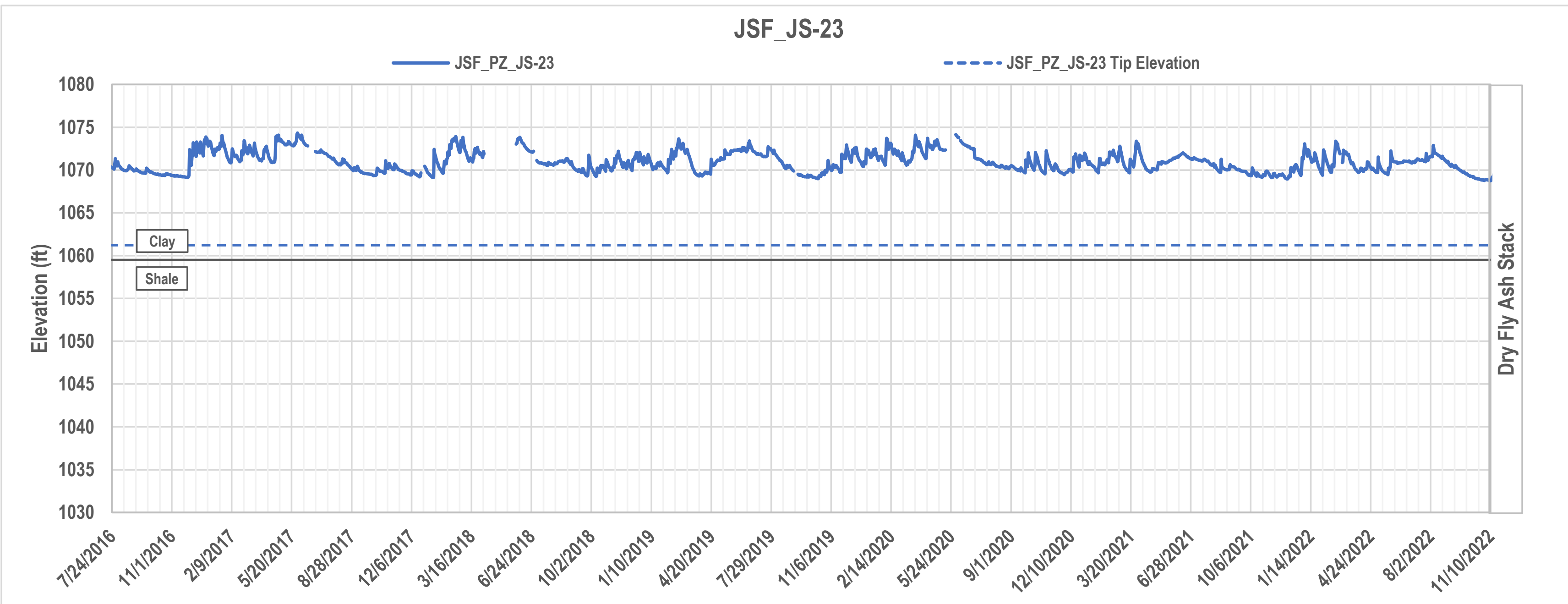
4/24/2022
8/2/2022
11/10/2022


JSF_JS-10
JSF_PZ_JS-10
JSF_PZ_JS-10 Tip Elevation
Elevation (ft)
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_JS-23
JSF_PZ_JS-23
JSF_PZ_JS-23 Tip Elevation
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
Clay
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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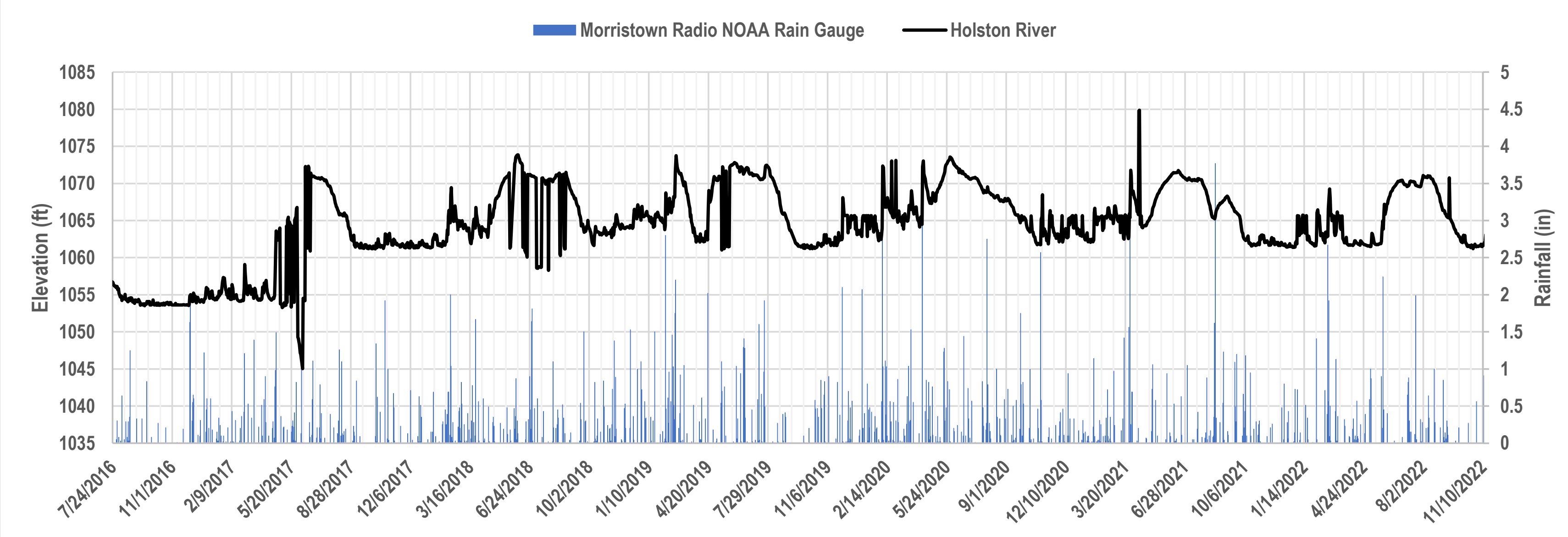
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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6/28/2021
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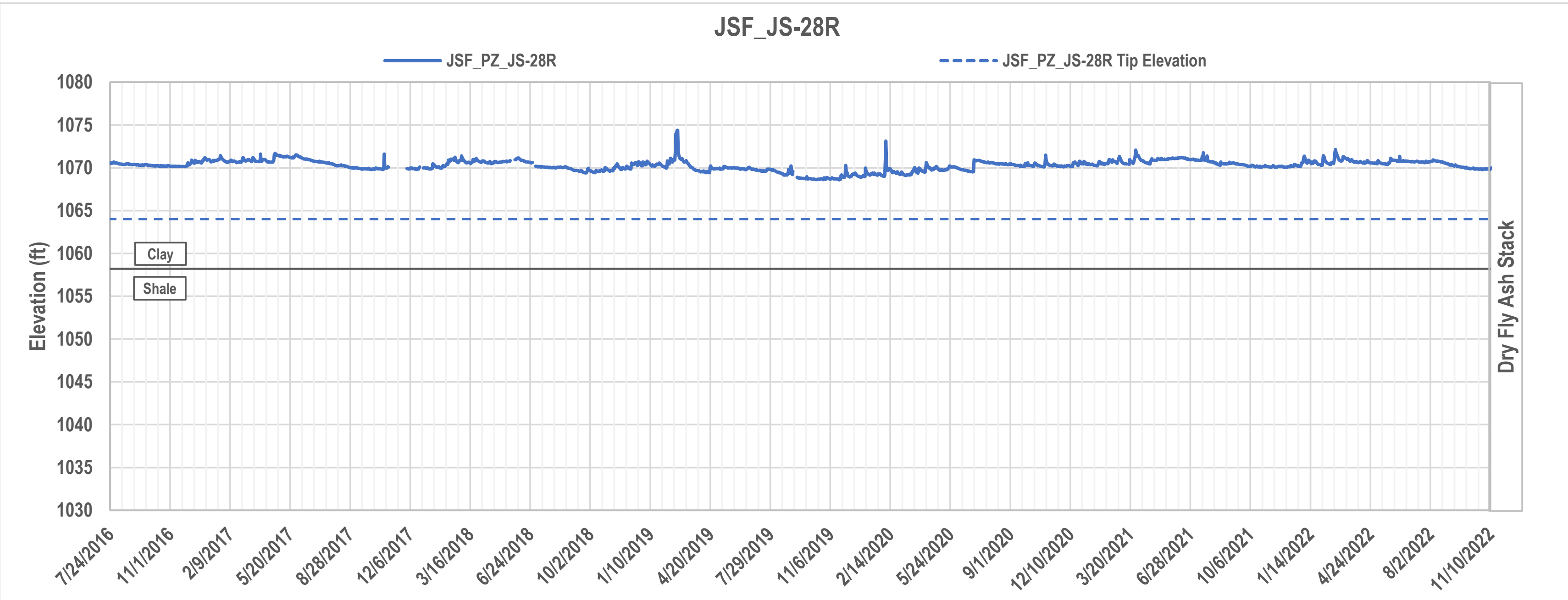
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_JS-28R
JSF_PZ_JS-28R
JSF_PZ_JS-28R Tip Elevation
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
Clay
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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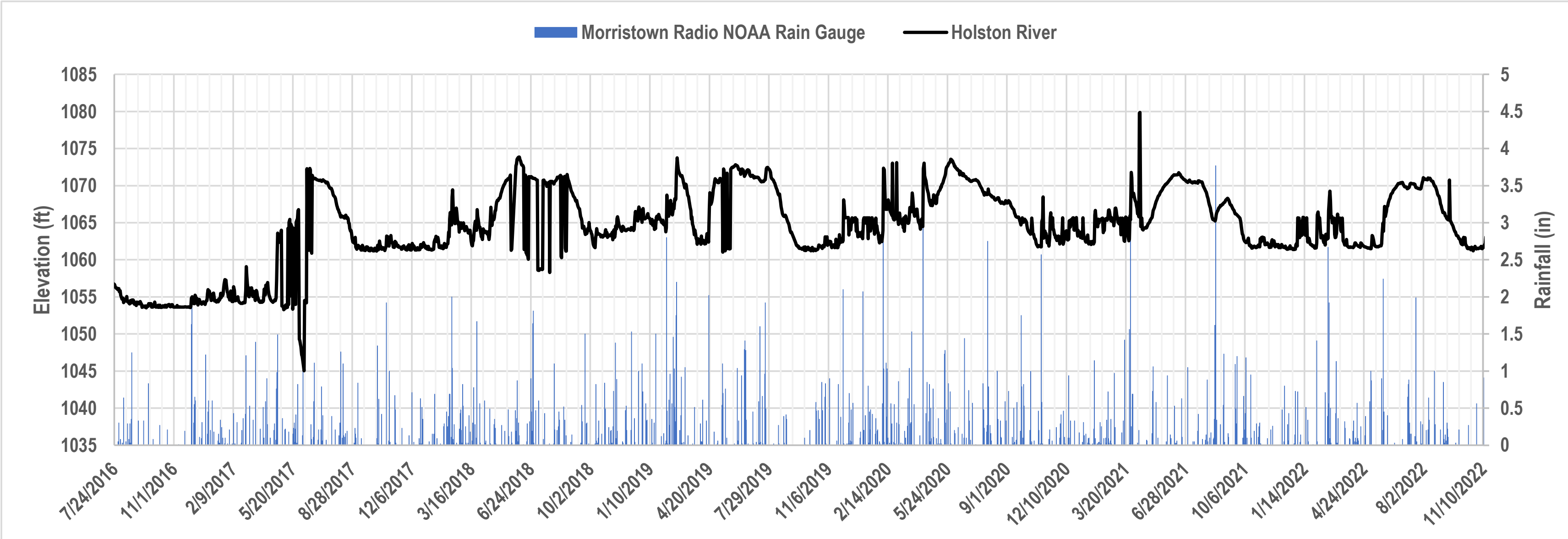
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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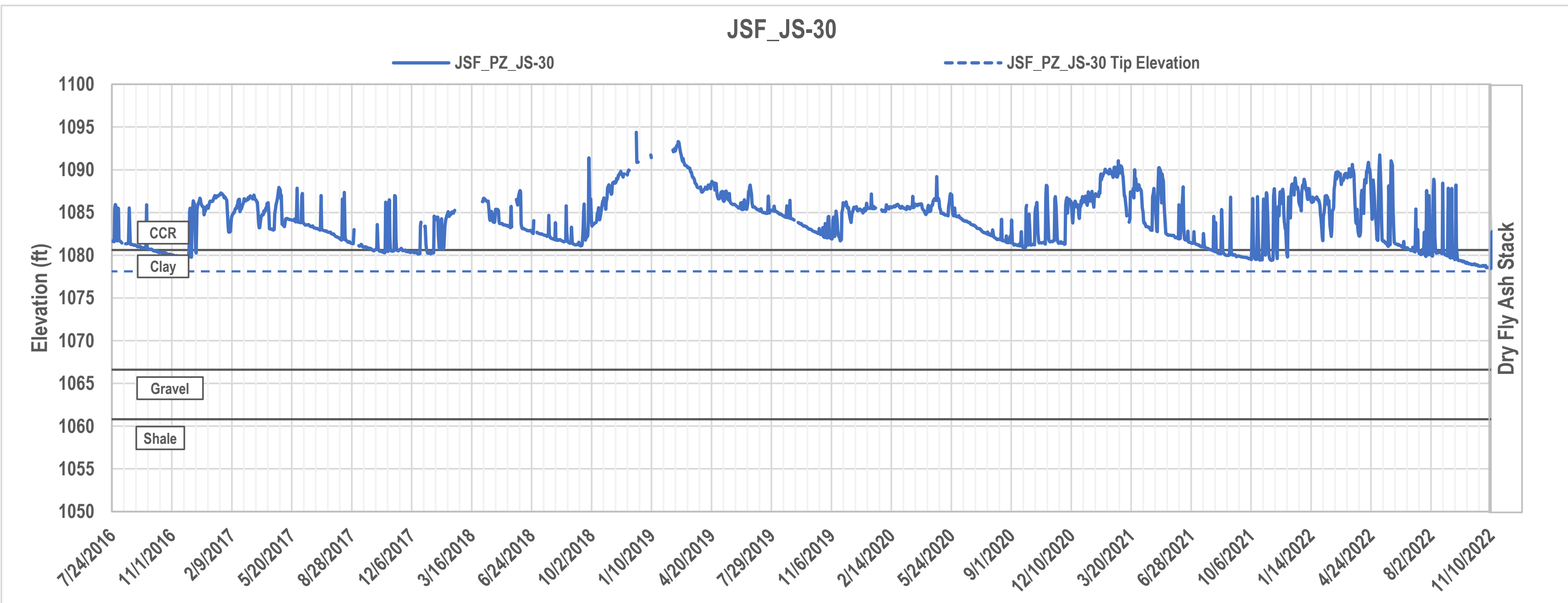
8/2/2022
11/10/2022



JSF_JS-30
JSF_PZ_JS-30
JSF_PZ_JS-30 Tip Elevation
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
CCR
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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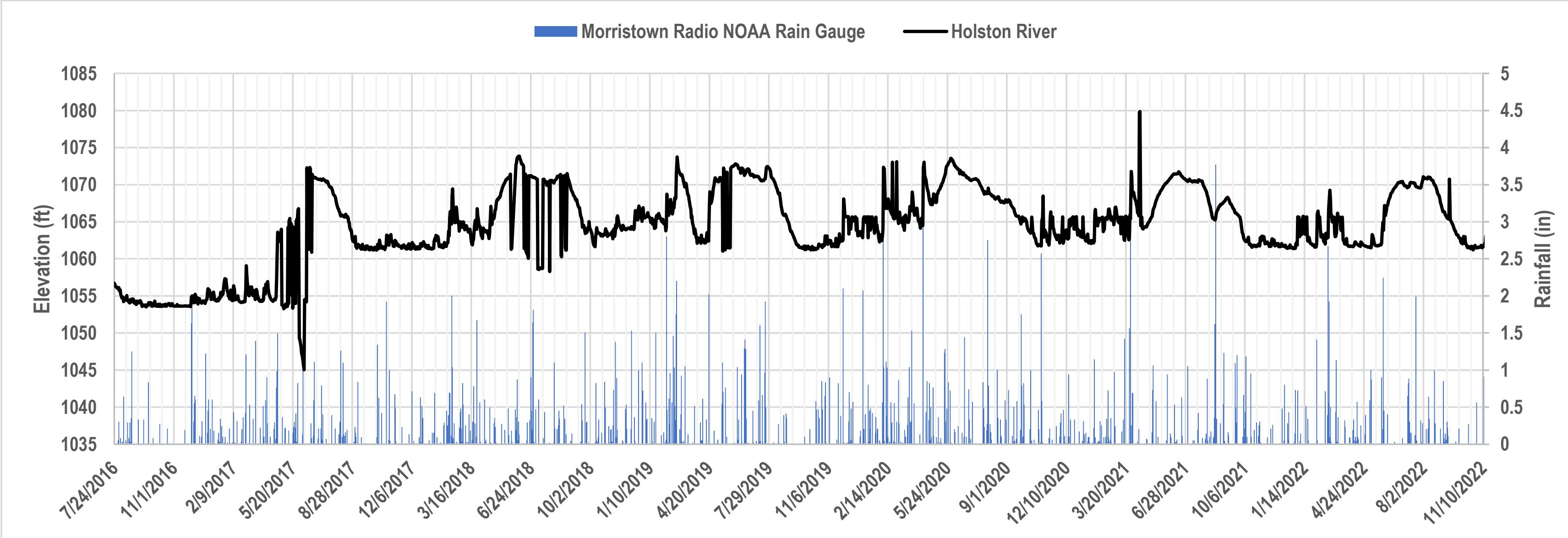
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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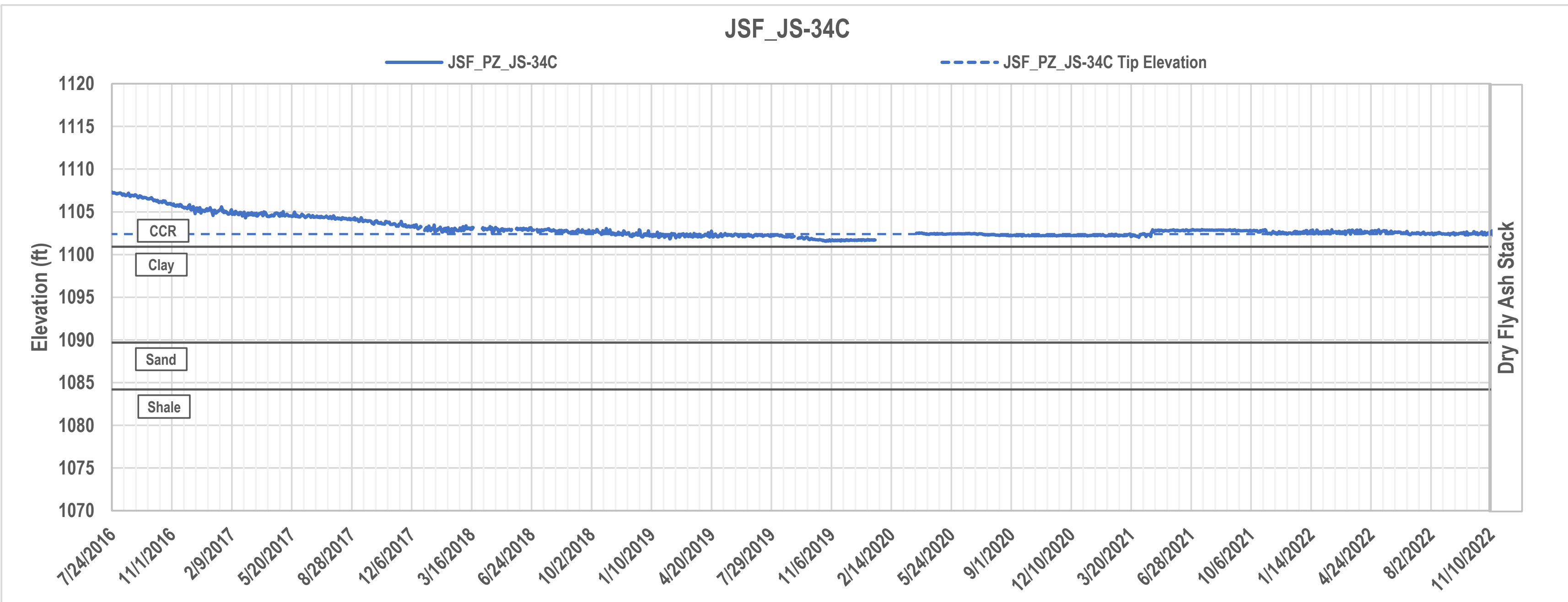
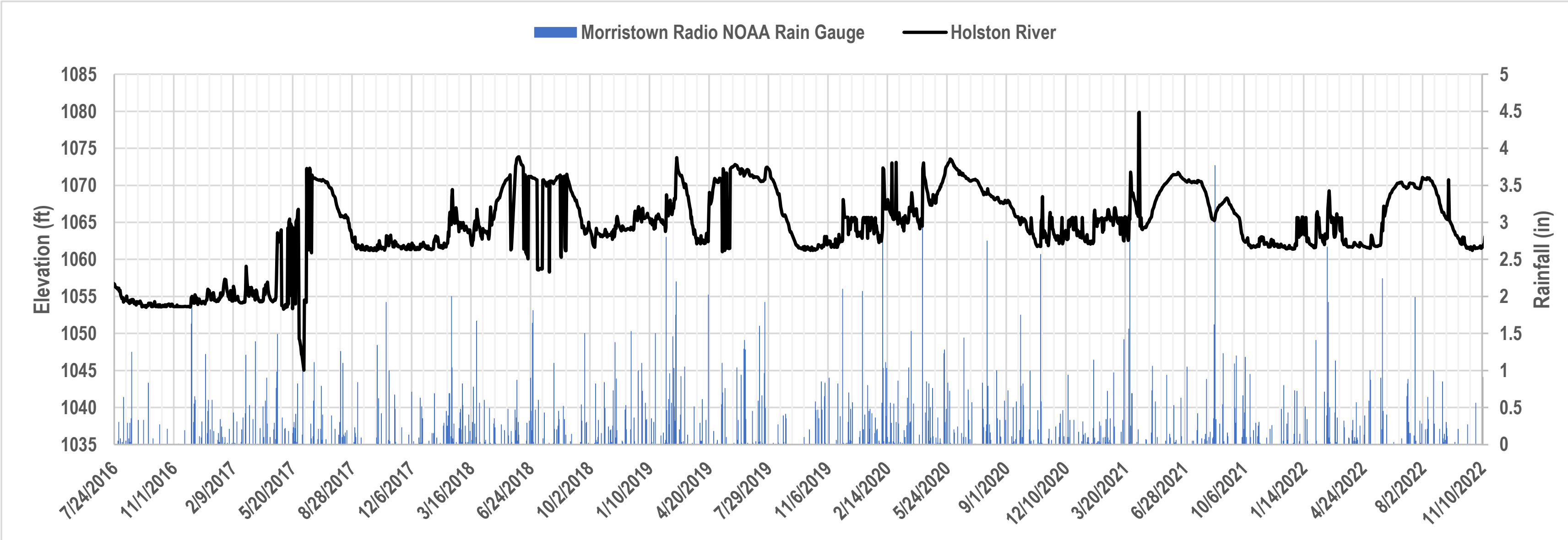
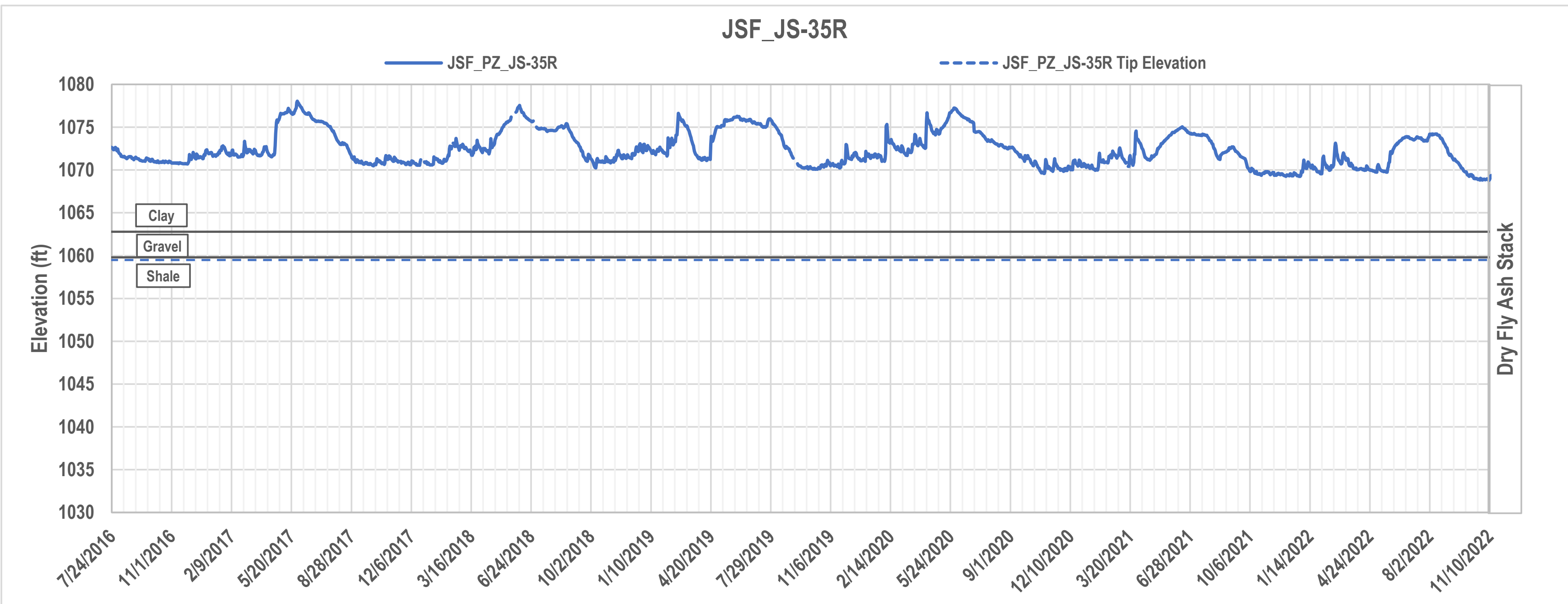
8/2/2022
11/10/2022

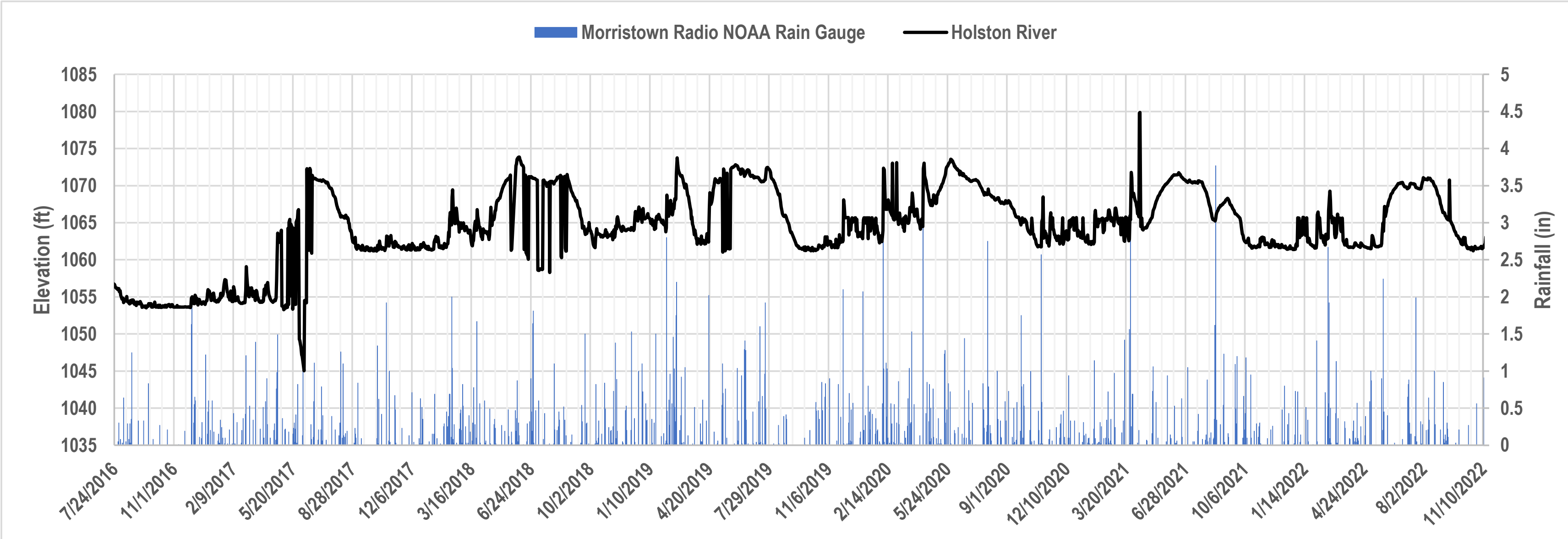

JSF_JS-34C
JSF_PZ_JS-34C
JSF_PZ_JS-34C Tip Elevation
Elevation (ft)
1120
1115
1110
1105
1100
1095
1090
1085
1080
1075
1070
CCR
Clay
Sand
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



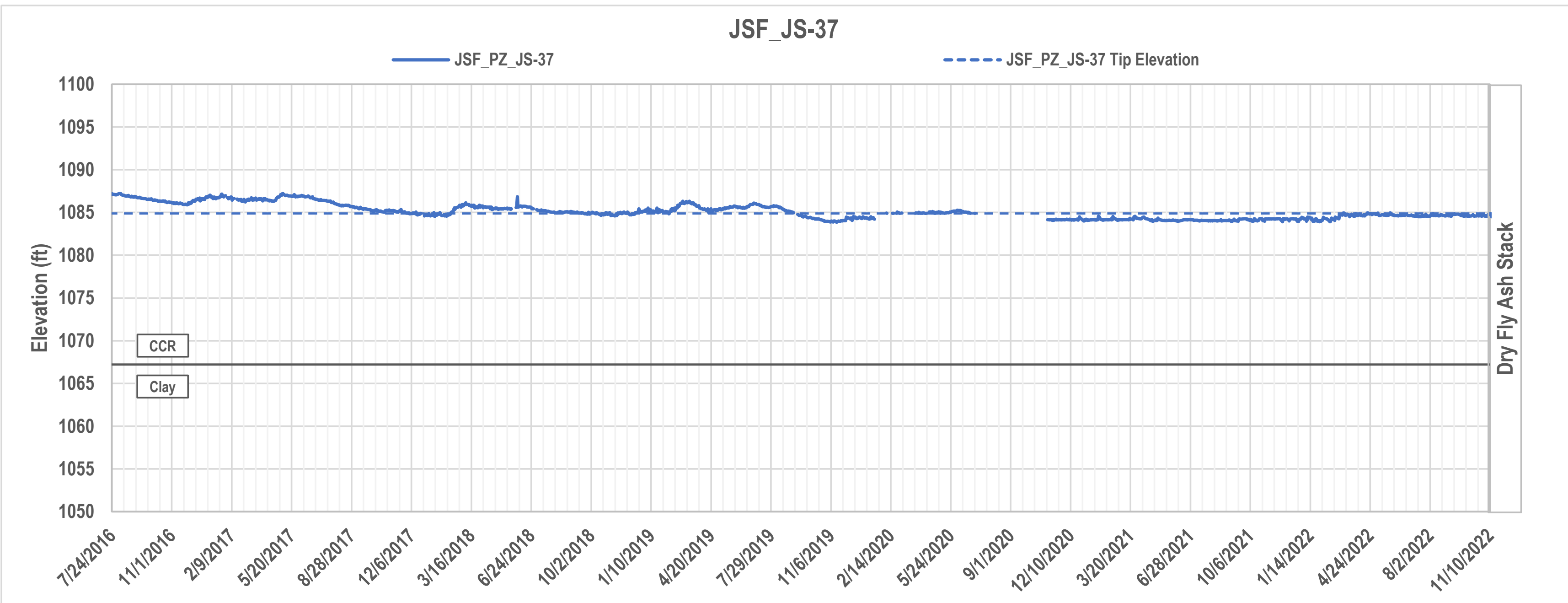
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



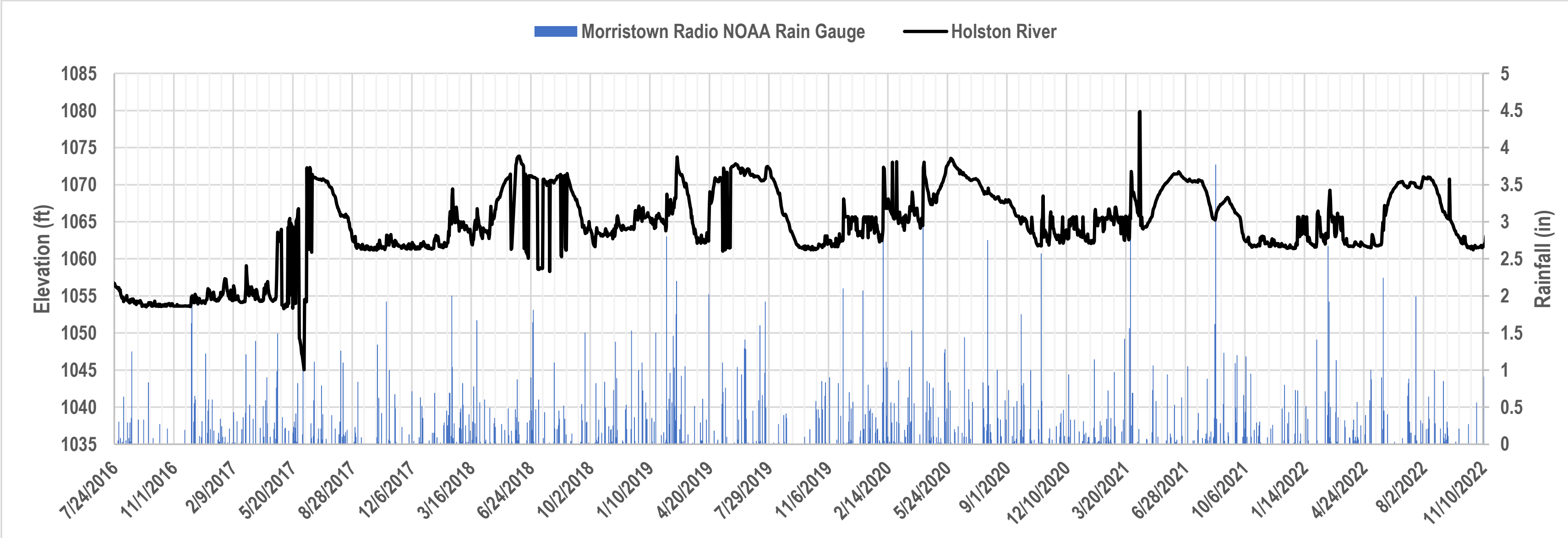
JSF_JS-35R
JSF_PZ_JS-35R
JSF_PZ_JS-35R Tip Elevation
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

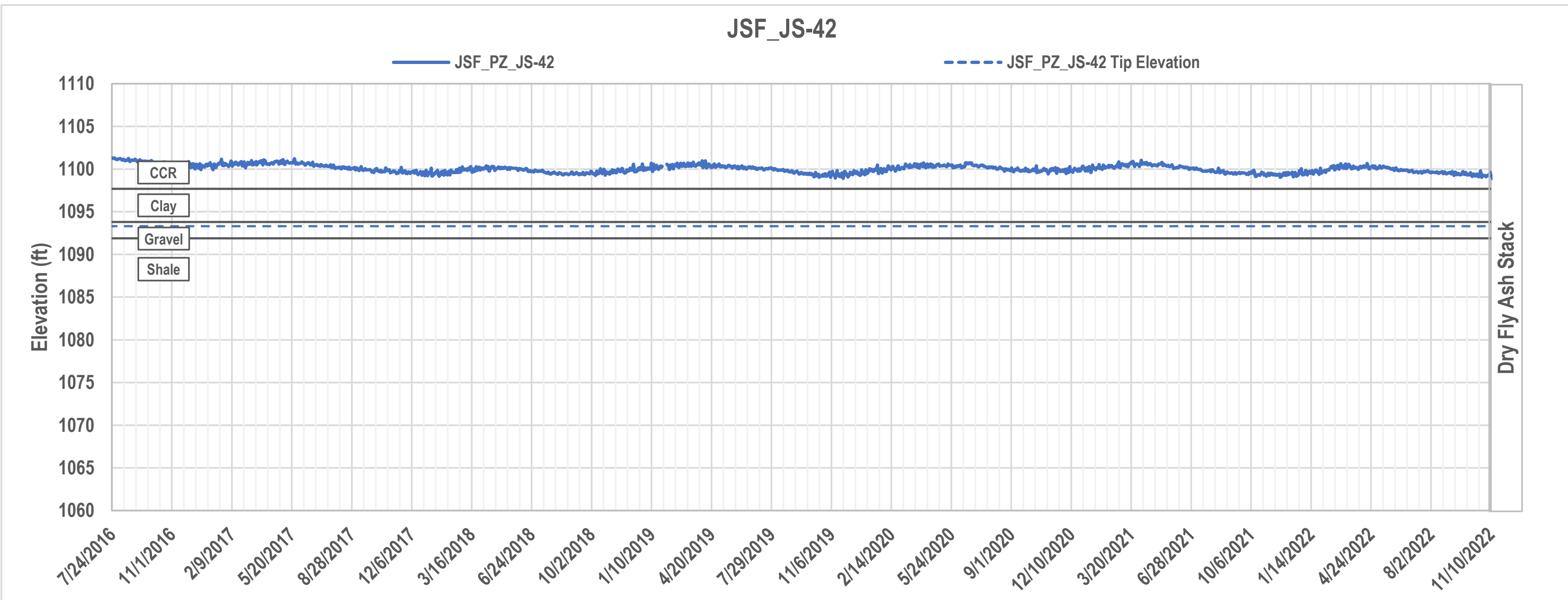


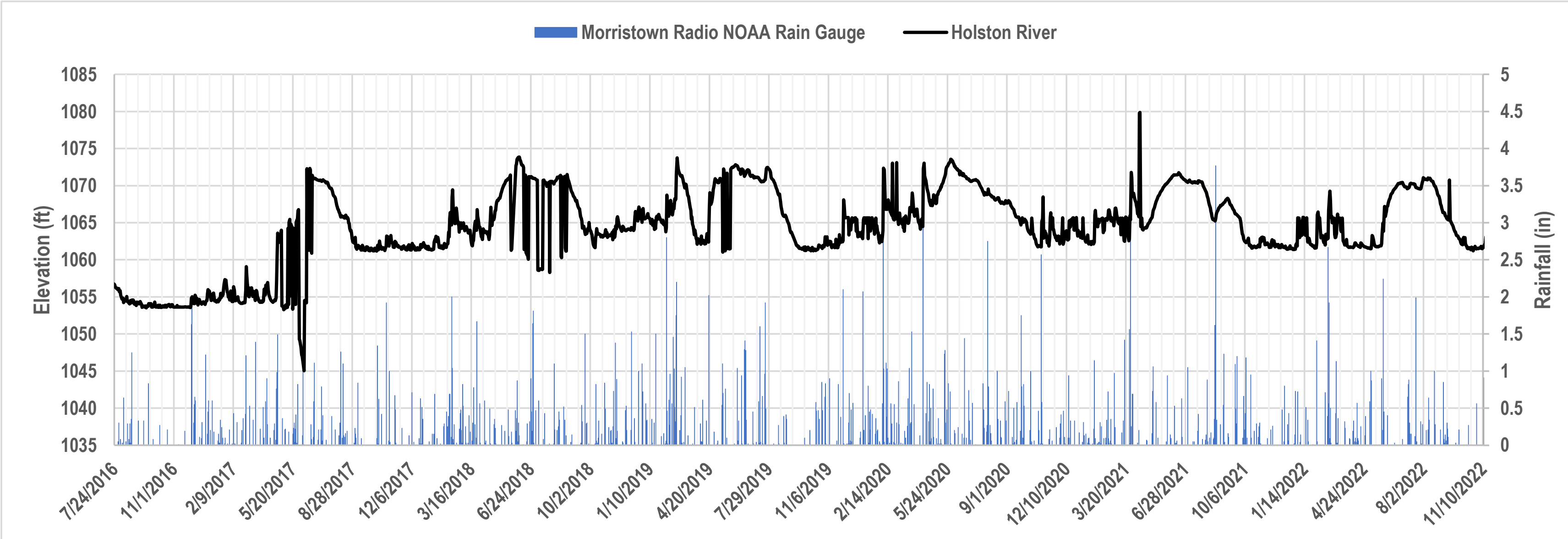
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



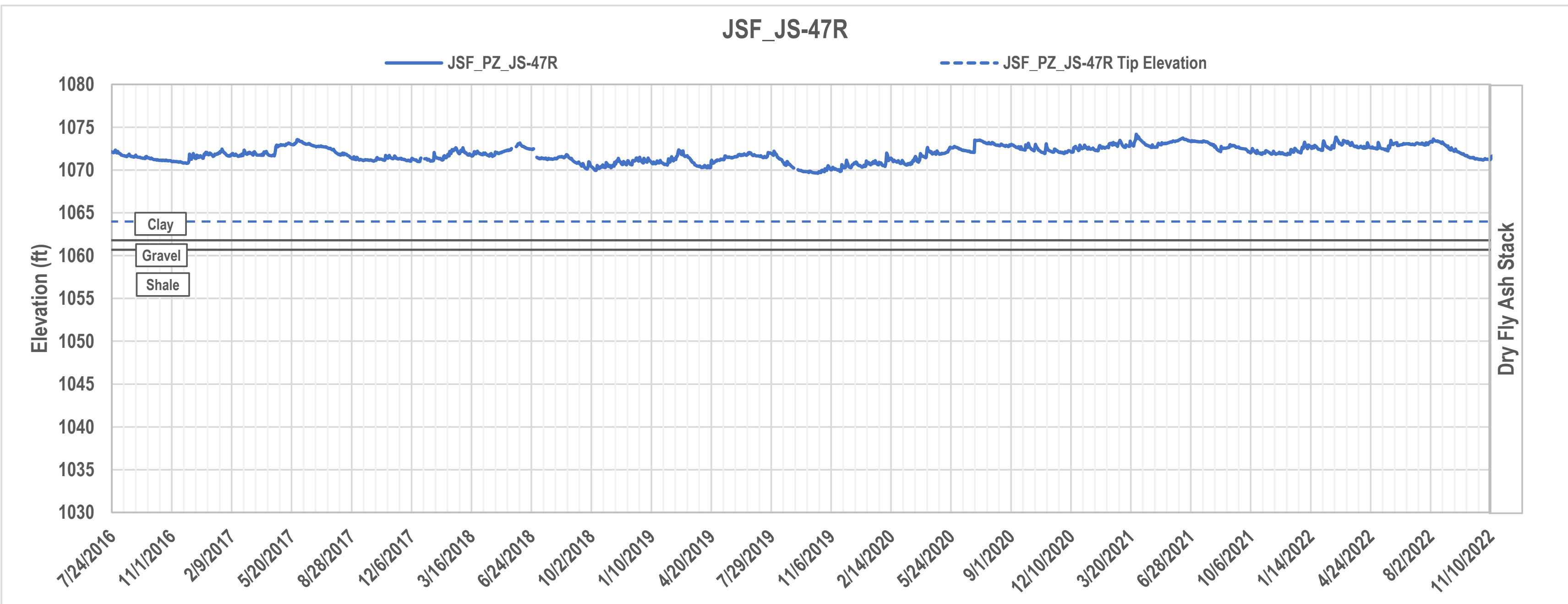
JSF_JS-37
JSF_PZ_JS-37
JSF_PZ_JS-37 Tip Elevation
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
CCR
Clay
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

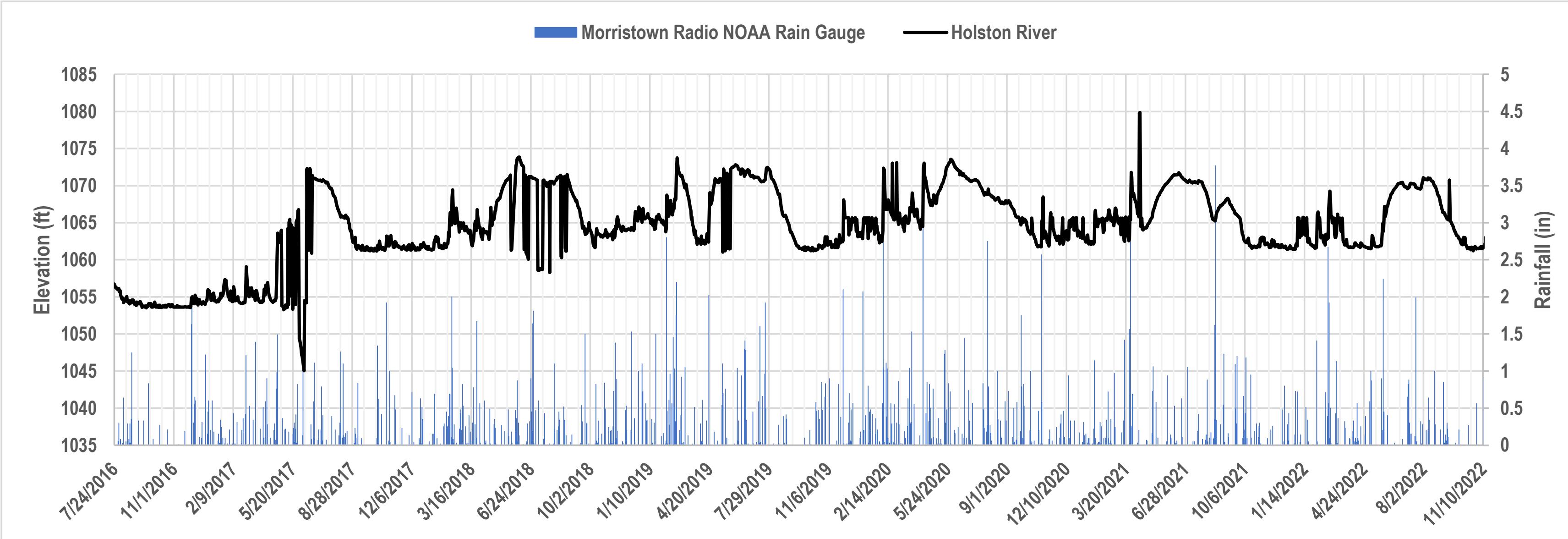

JSF_JS-42
JSF_PZ_JS-42
JSF_PZ_JS-42 Tip Elevation
Elevation (ft)
1110
1105
1100
1095
1090
1085
1080
1075
1070
1065
1060
CCR
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



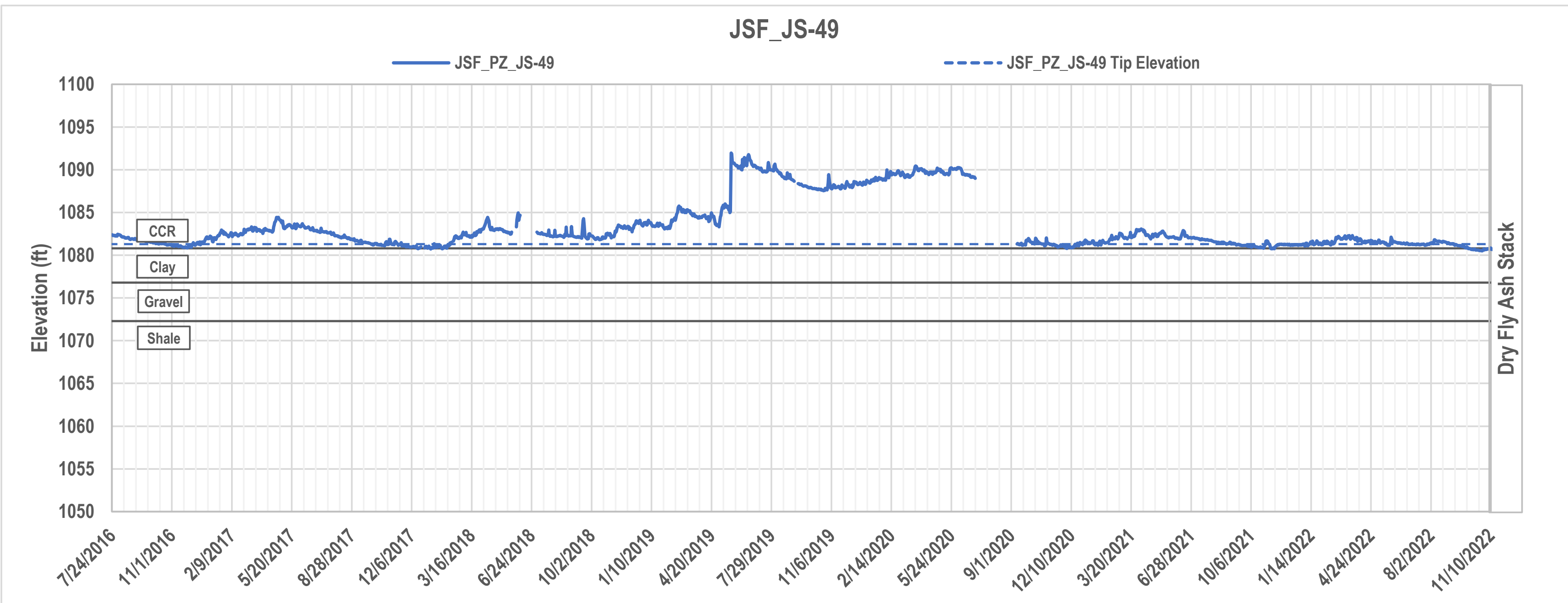
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



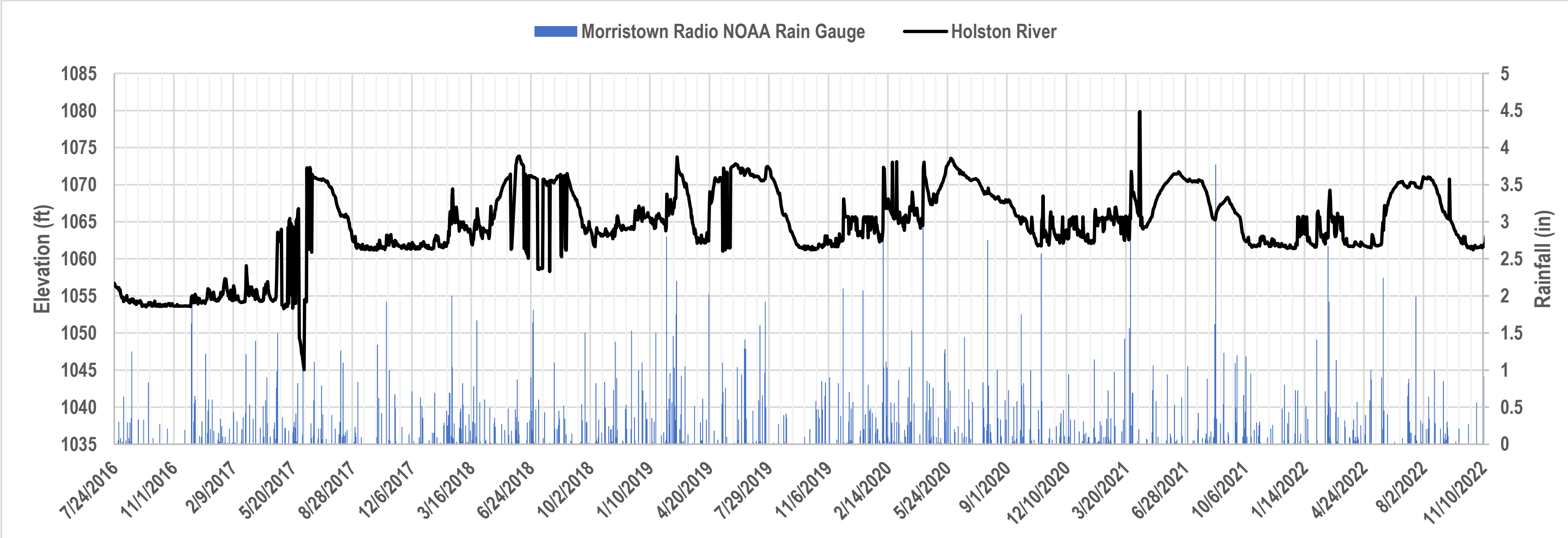
JSF_JS-47R
JSF_PZ_JS-47R
JSF_PZ_JS-47R Tip Elevation
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

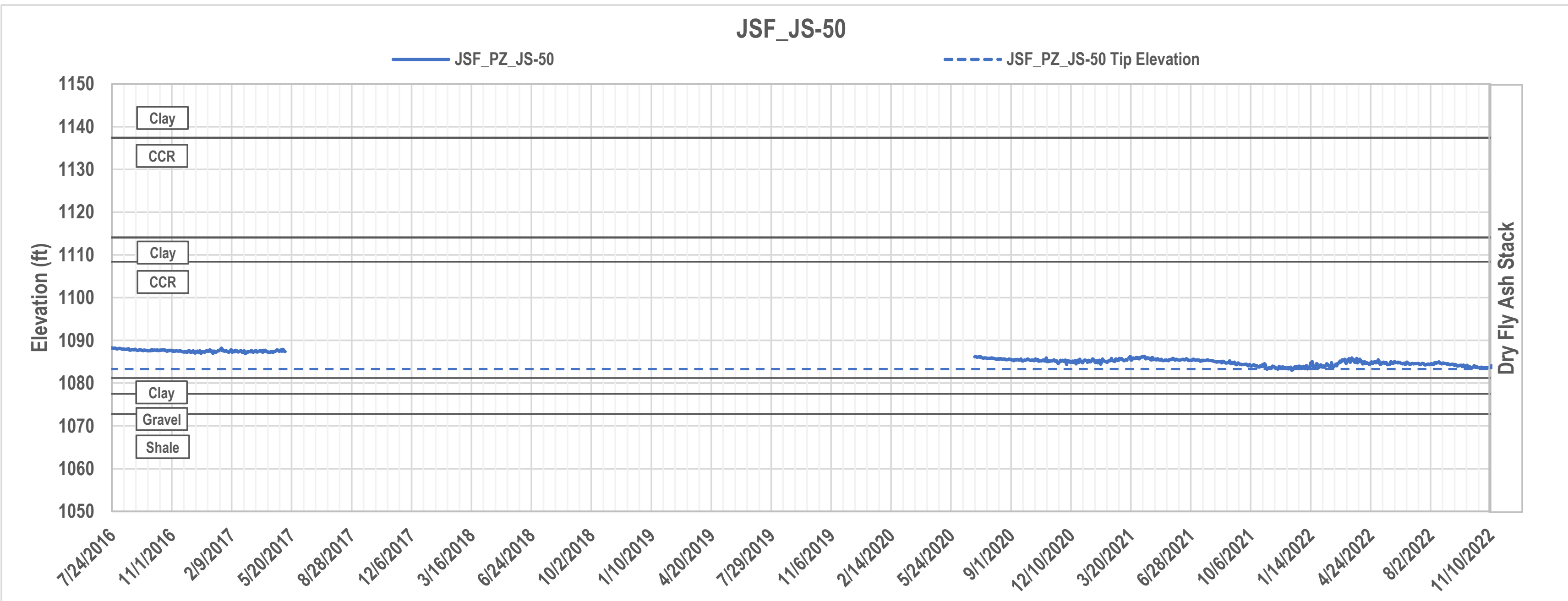


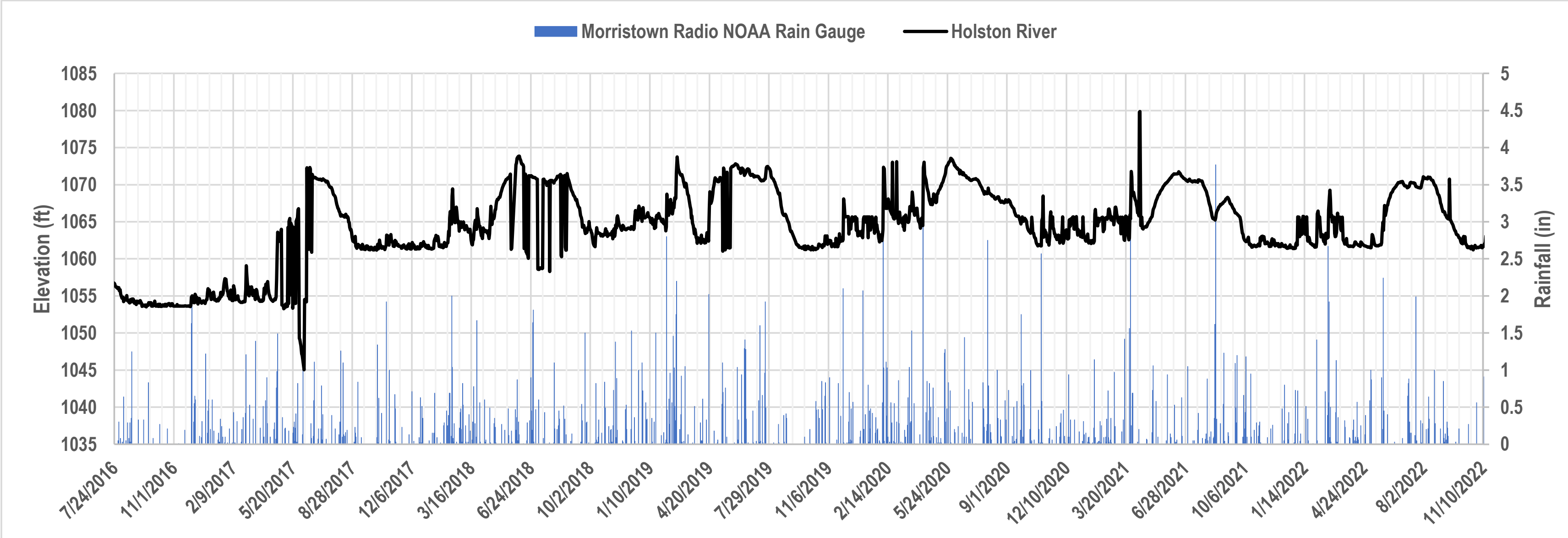
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

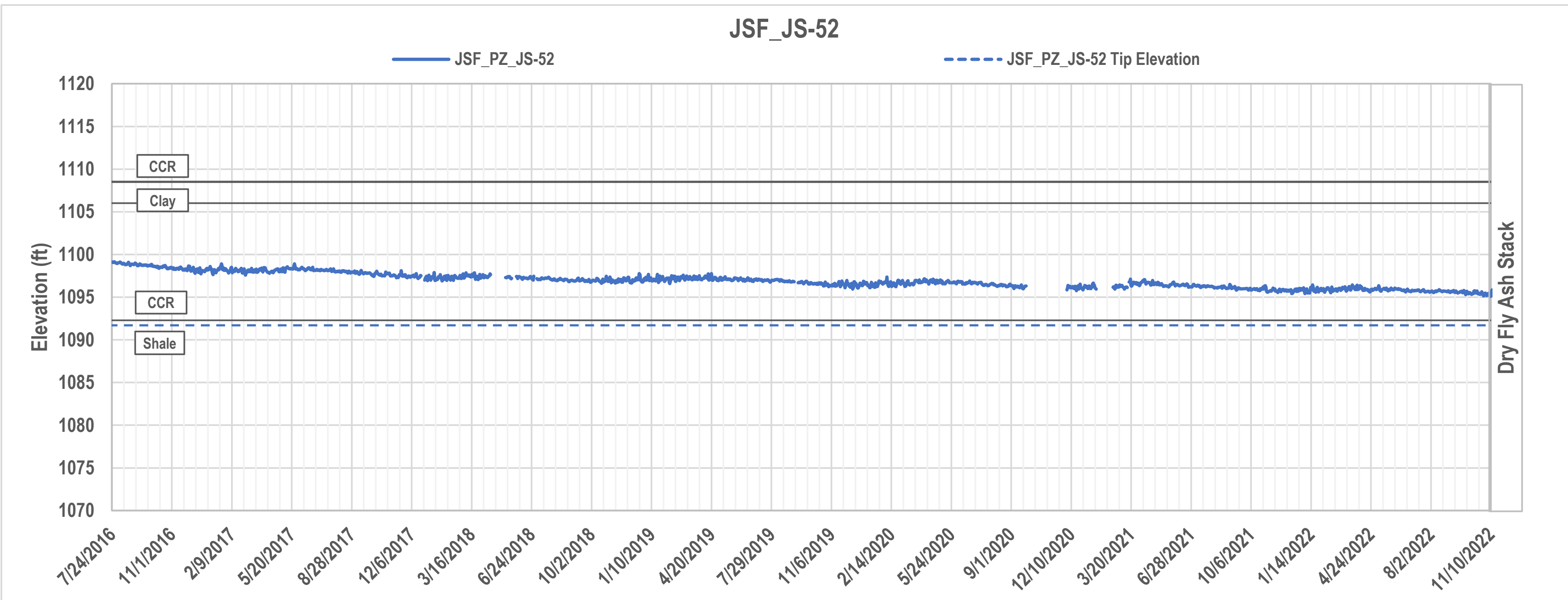


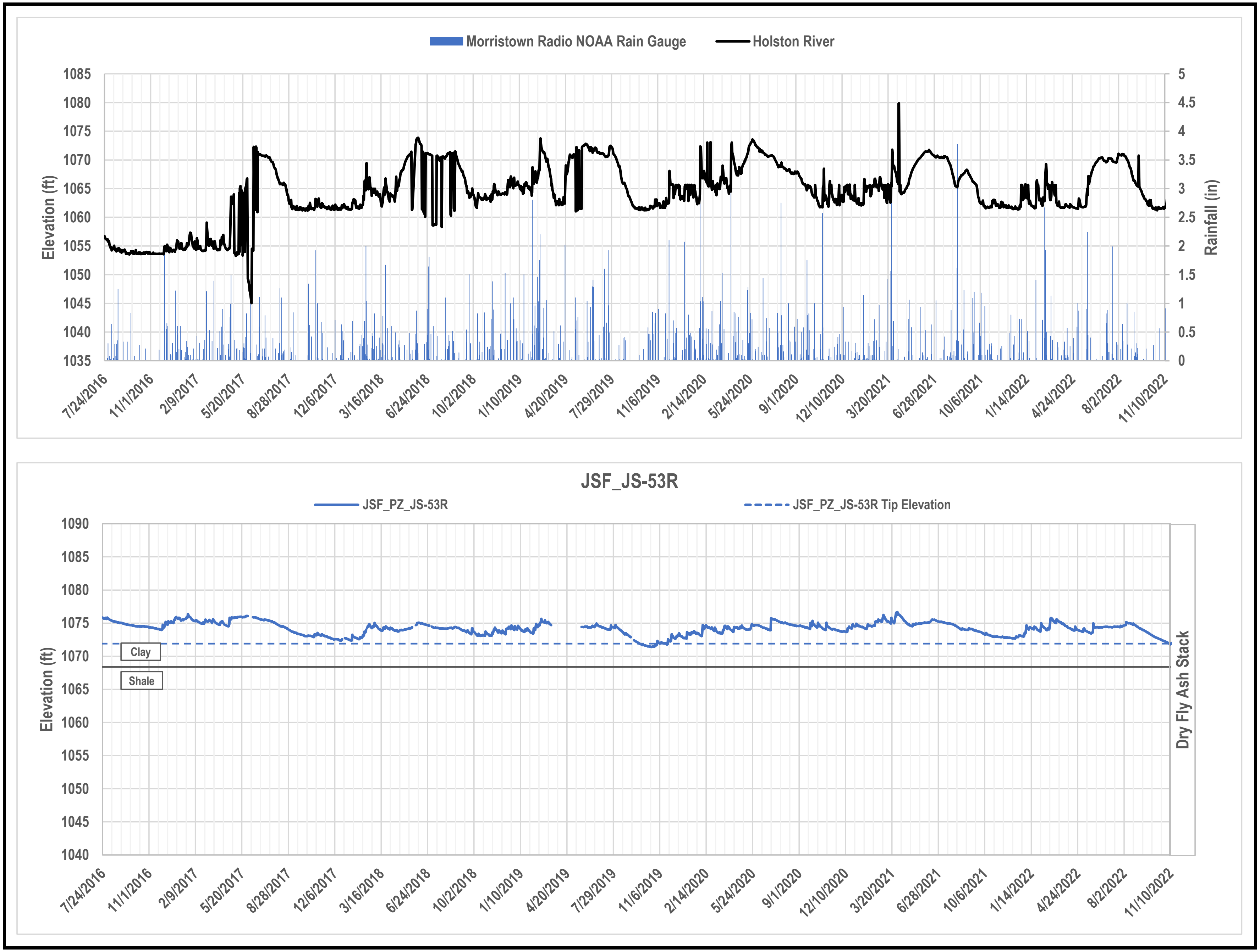
JSF_JS-49
JSF_PZ_JS-49
JSF_PZ_JS-49 Tip Elevation
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
CCR
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

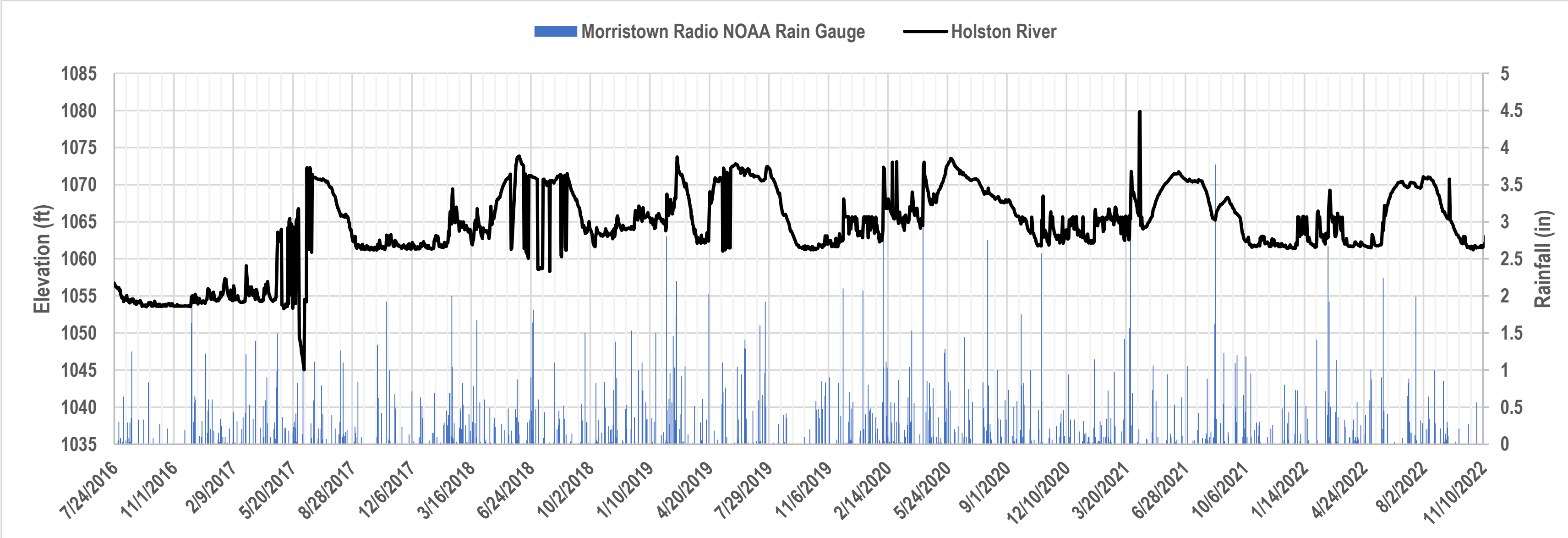

JSF_JS-50
JSF_PZ_JS-50
JSF_PZ_JS-50 Tip Elevation
Elevation (ft)
1150
1140
1130
1120
1110
1100
1090
1080
1070
1060
1050
Clay
CCR
Clay
CCR
Clay
Gravel
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

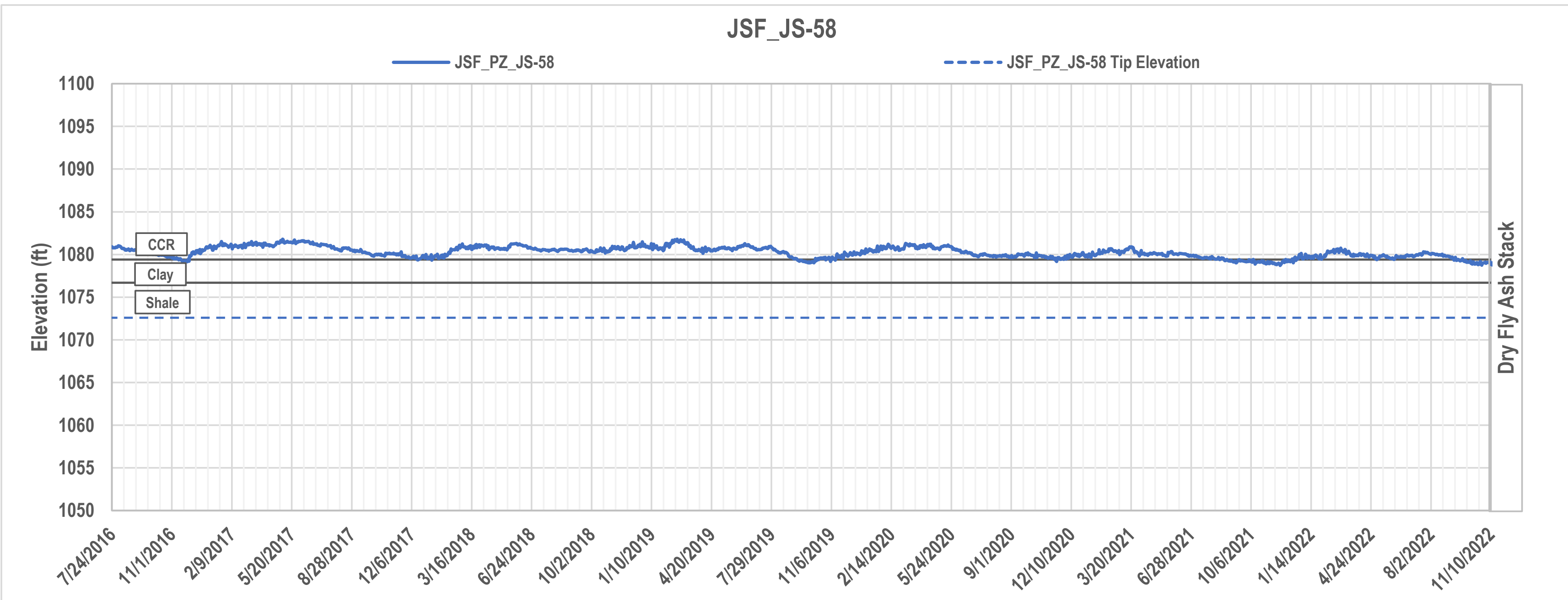

Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

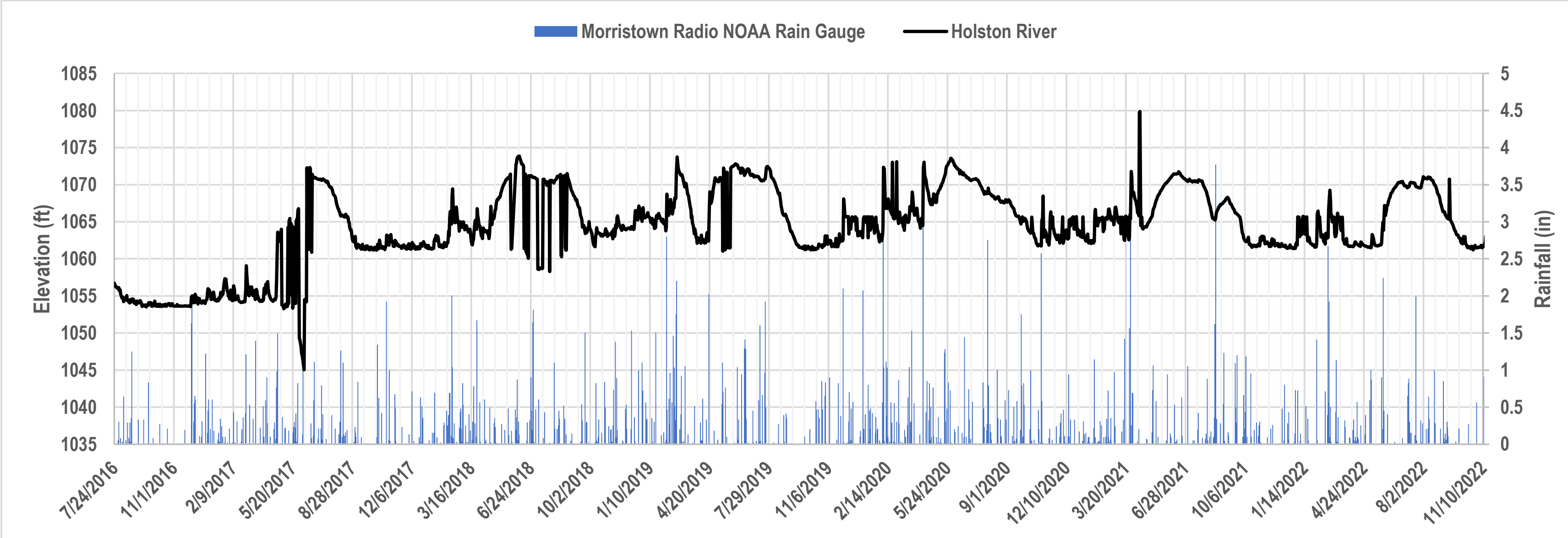

JSF_JS-52
JSF_PZ_JS-52
JSF_PZ_JS-52 Tip Elevation
Elevation (ft)
1120
1115
1110
1105
1100
1095
1090
1085
1080
1075
1070
CCR
Clay
CCR
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

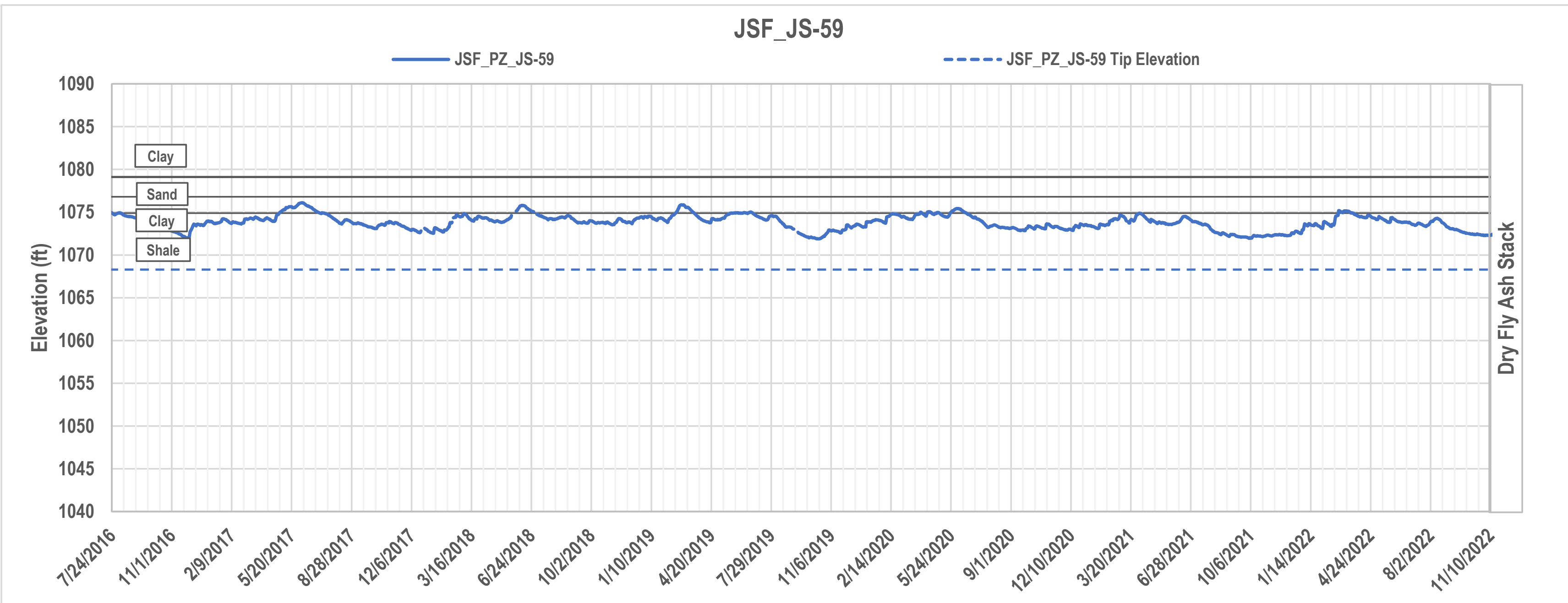


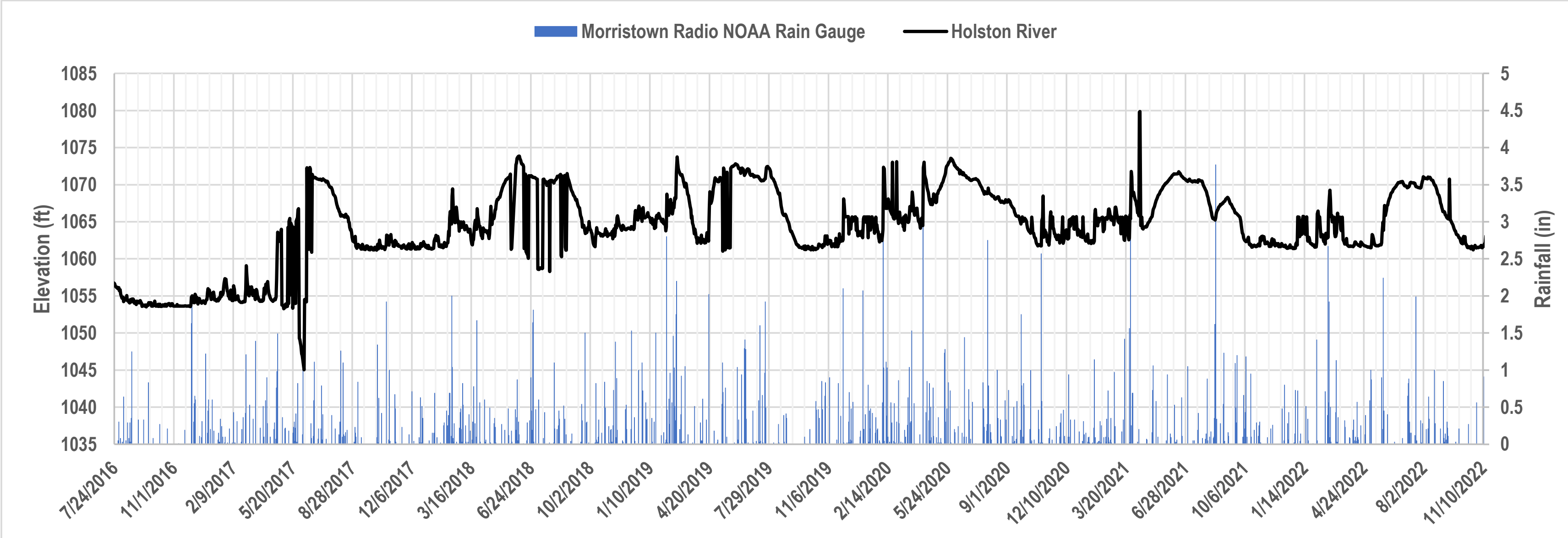
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022
JSF_JS-53R
JSF_PZ_JS-53R
JSF_PZ_JS-53R Tip Elevation
Elevation (ft)
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
Clay
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

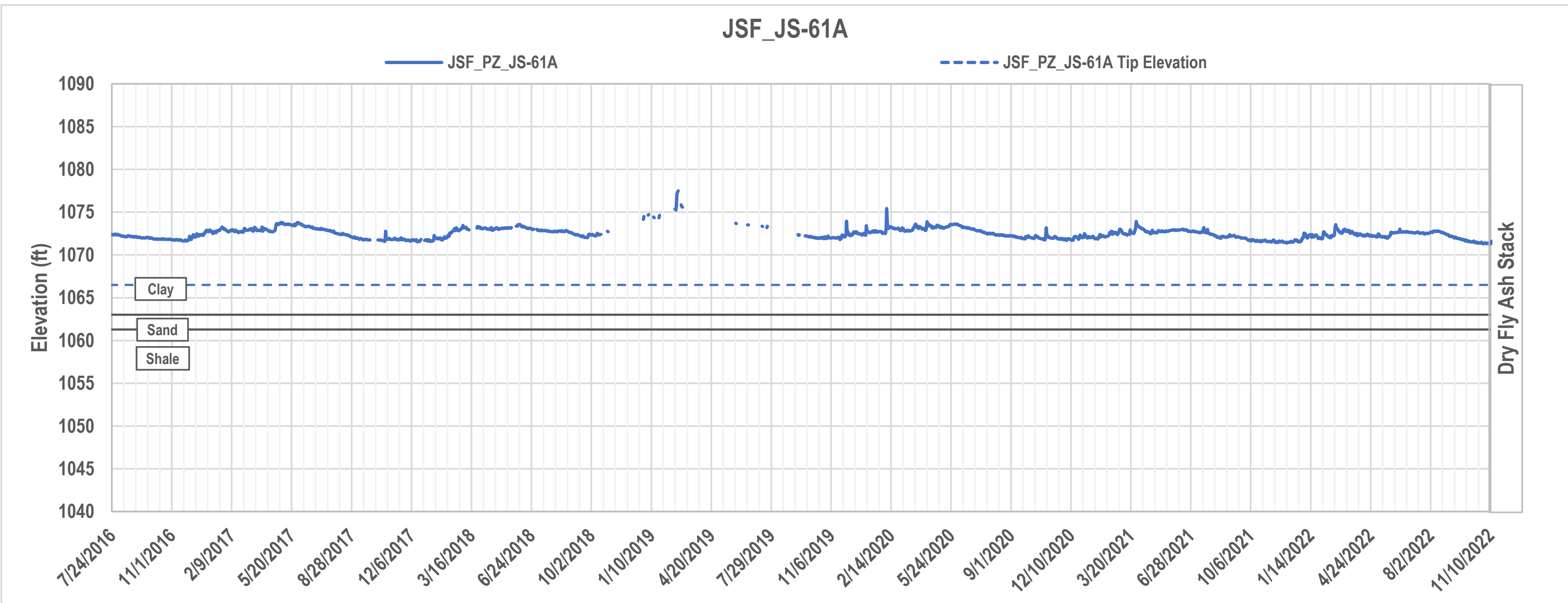

Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

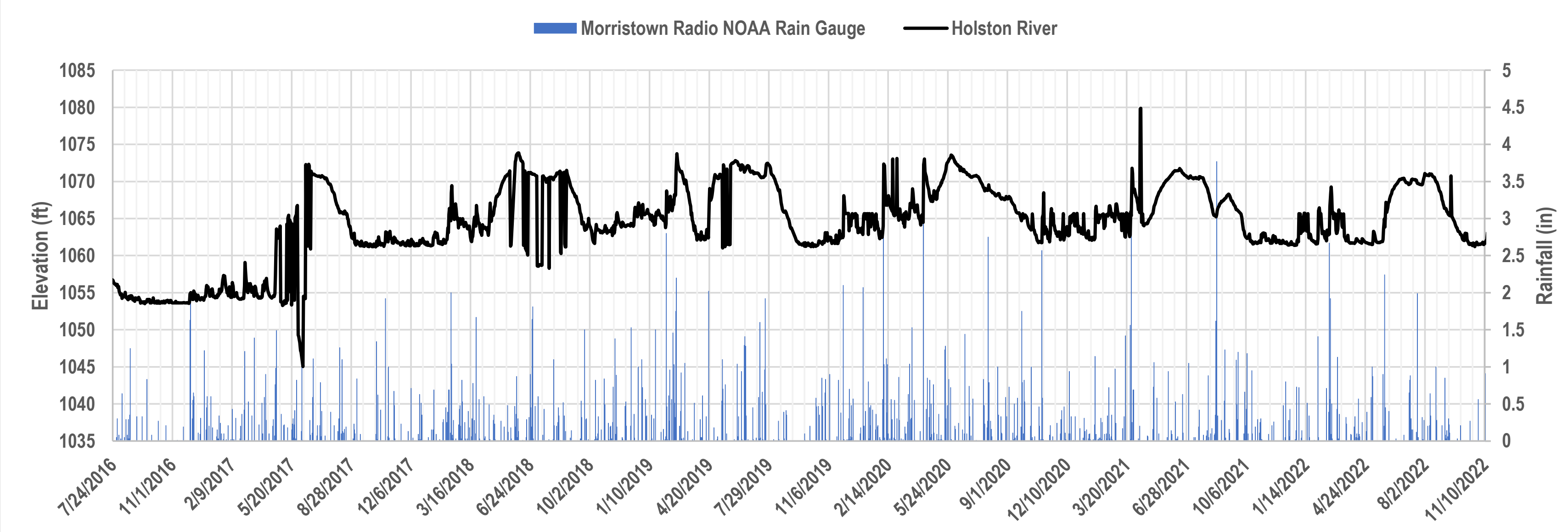

JSF_JS-58
JSF_PZ_JS-58
JSF_PZ_JS-58 Tip Elevation
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
CCR
Clay
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

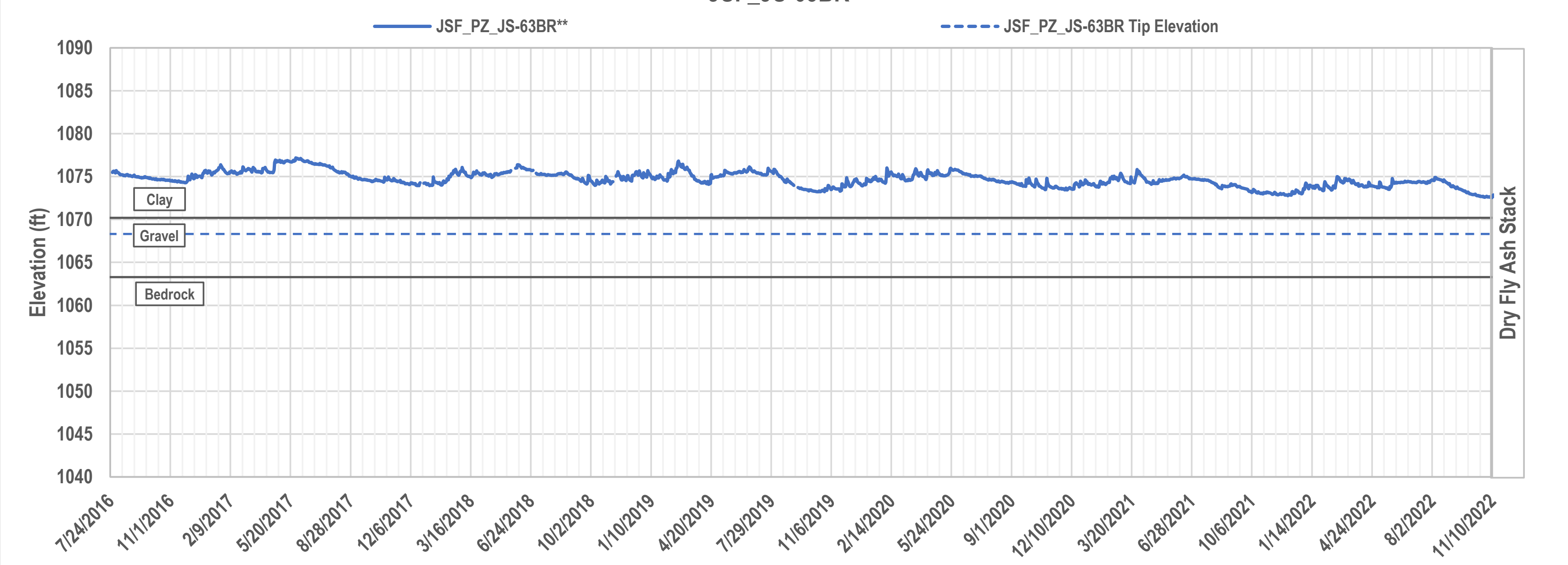

JSF_JS-59
JSF_PZ_JS-59
JSF_PZ_JS-59 Tip Elevation
Elevation (ft)
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
Clay
Sand
Clay
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

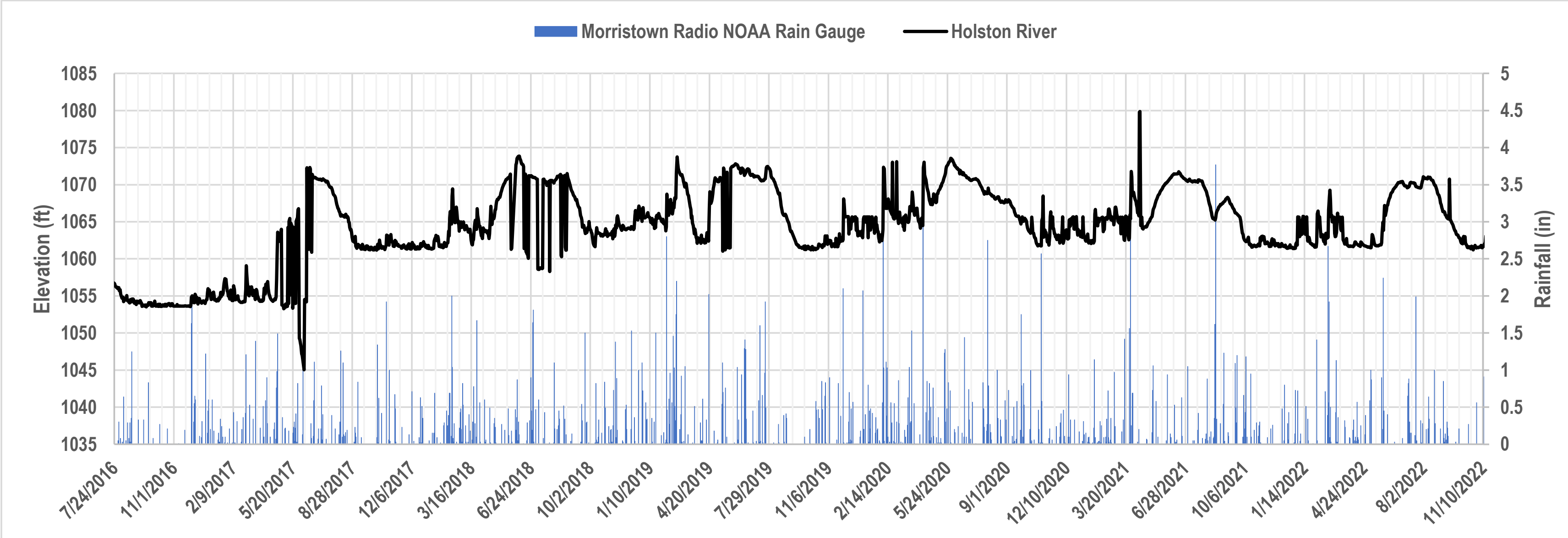

JSF_JS-61A
JSF_PZ_JS-61A
JSF_PZ_JS-61A Tip Elevation
Elevation (ft)
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
Clay
Sand
Shale
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

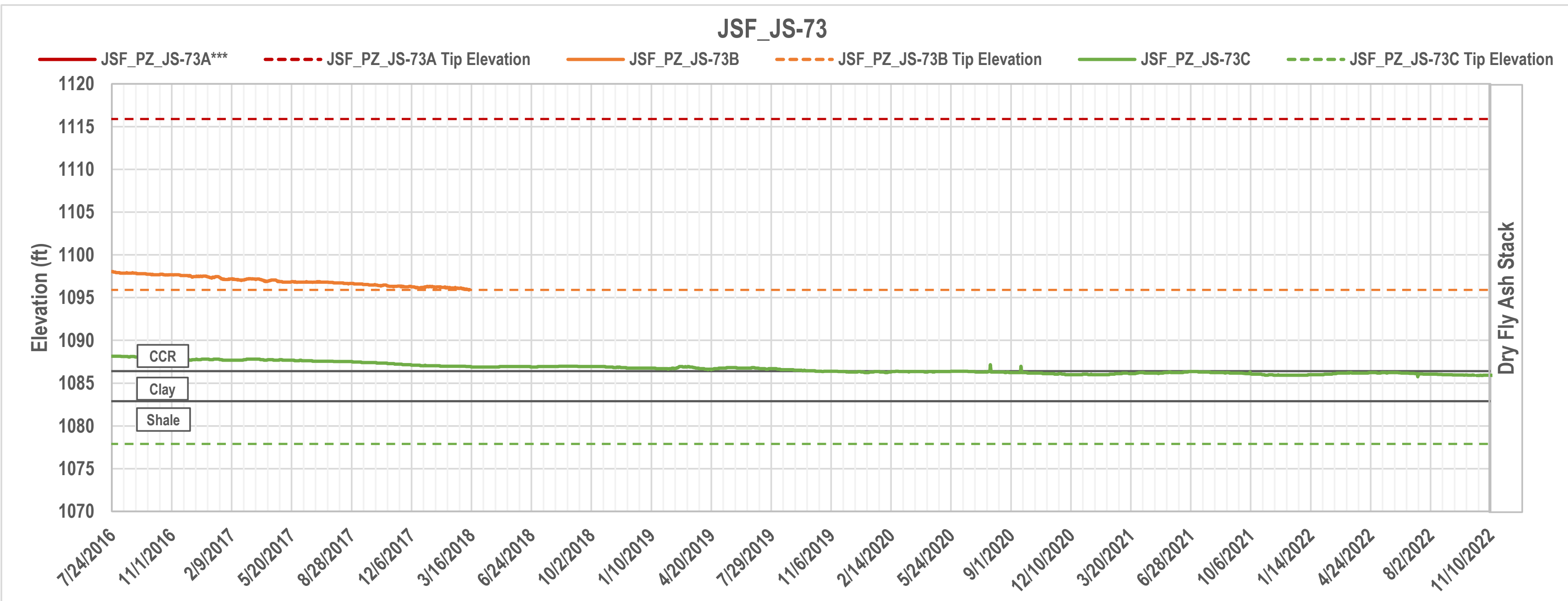


JSF_JS-63BR**

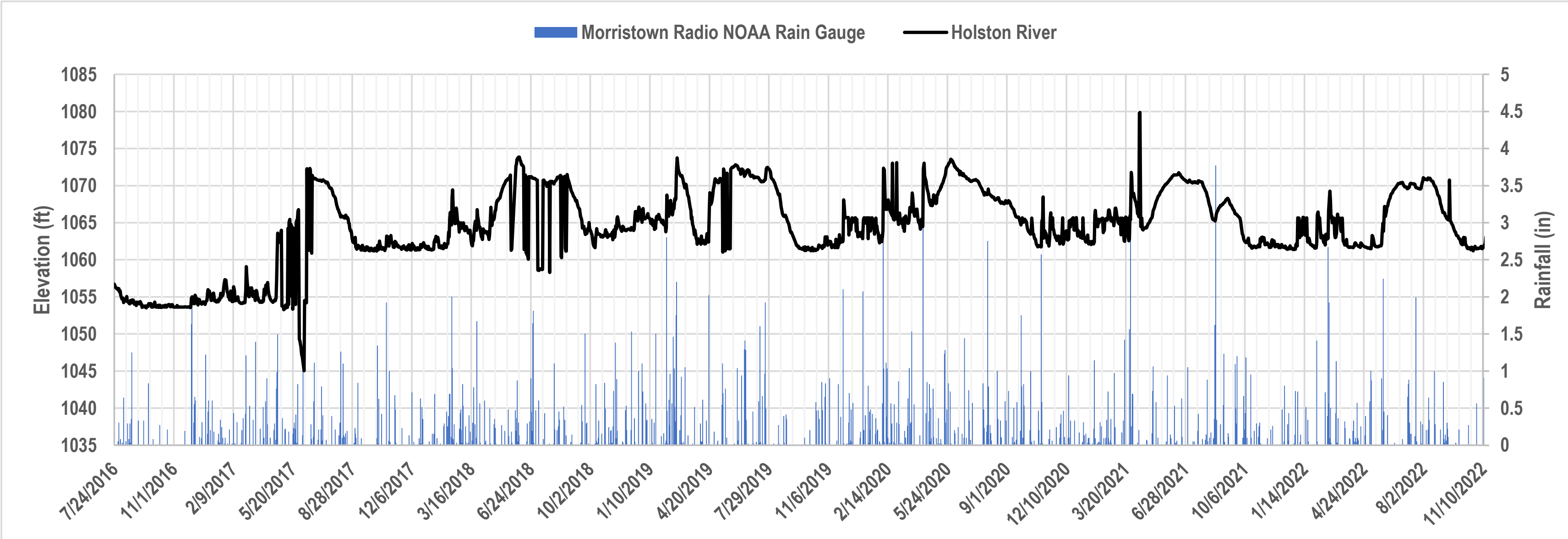


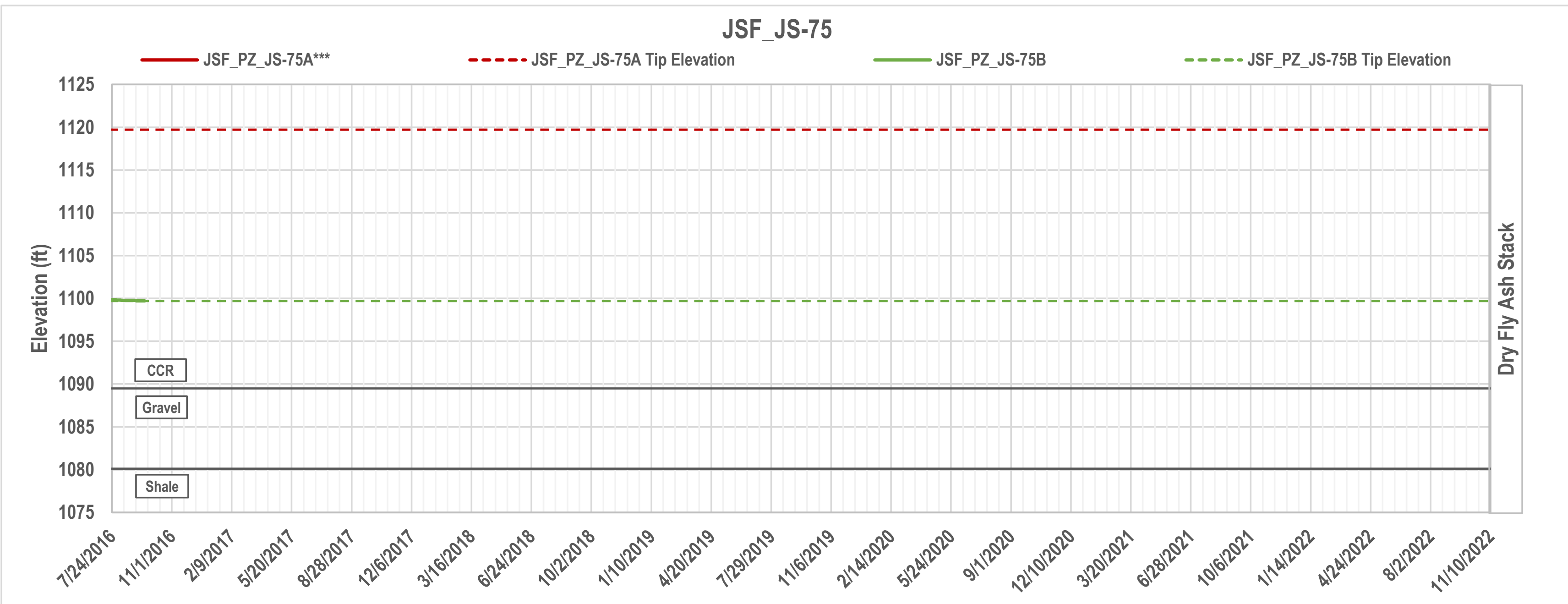
** Soil horizon is not available for this instrument. Where possible, a nearby boring log was substituted. JSF_JS-63BR uses the boring log of JSF_JS-63A.



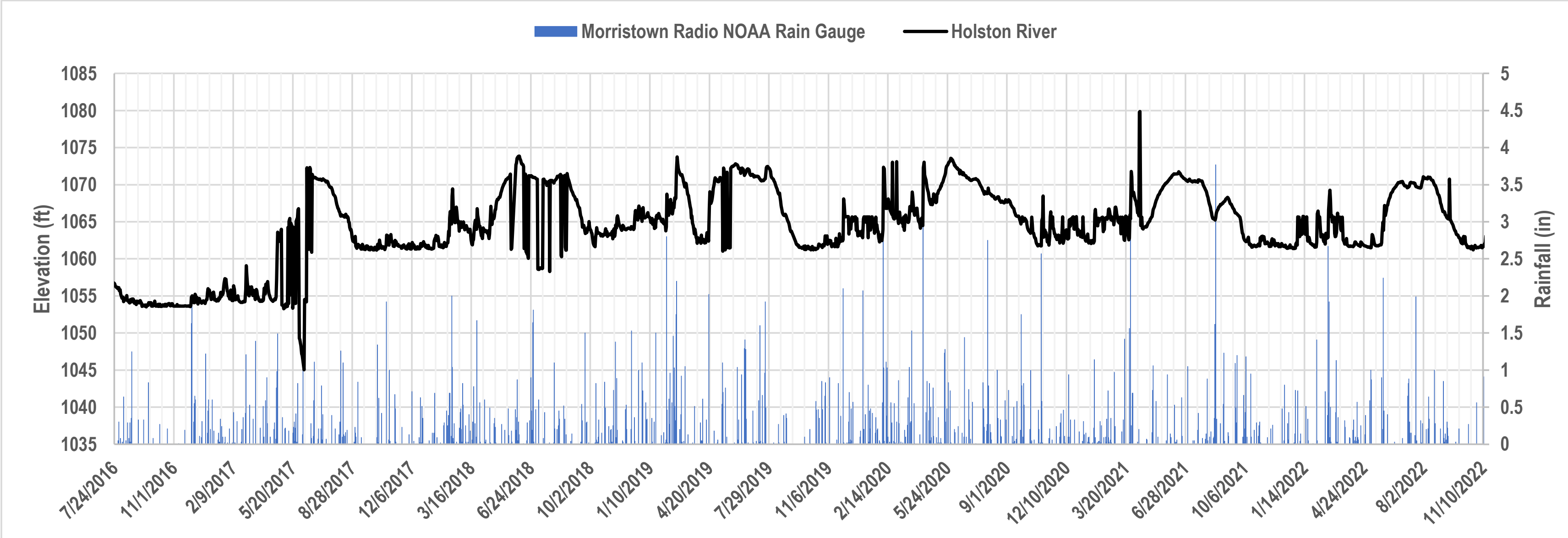


*** All readings from this instrument were below tip elevation.

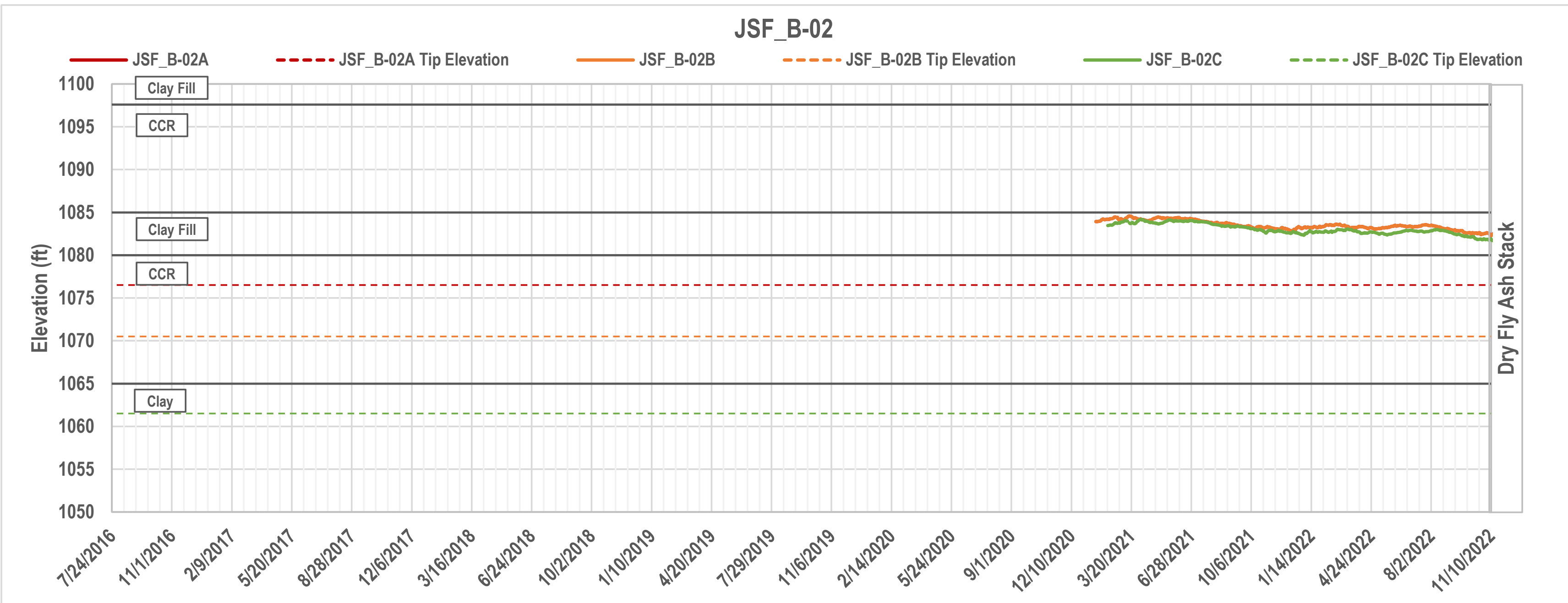




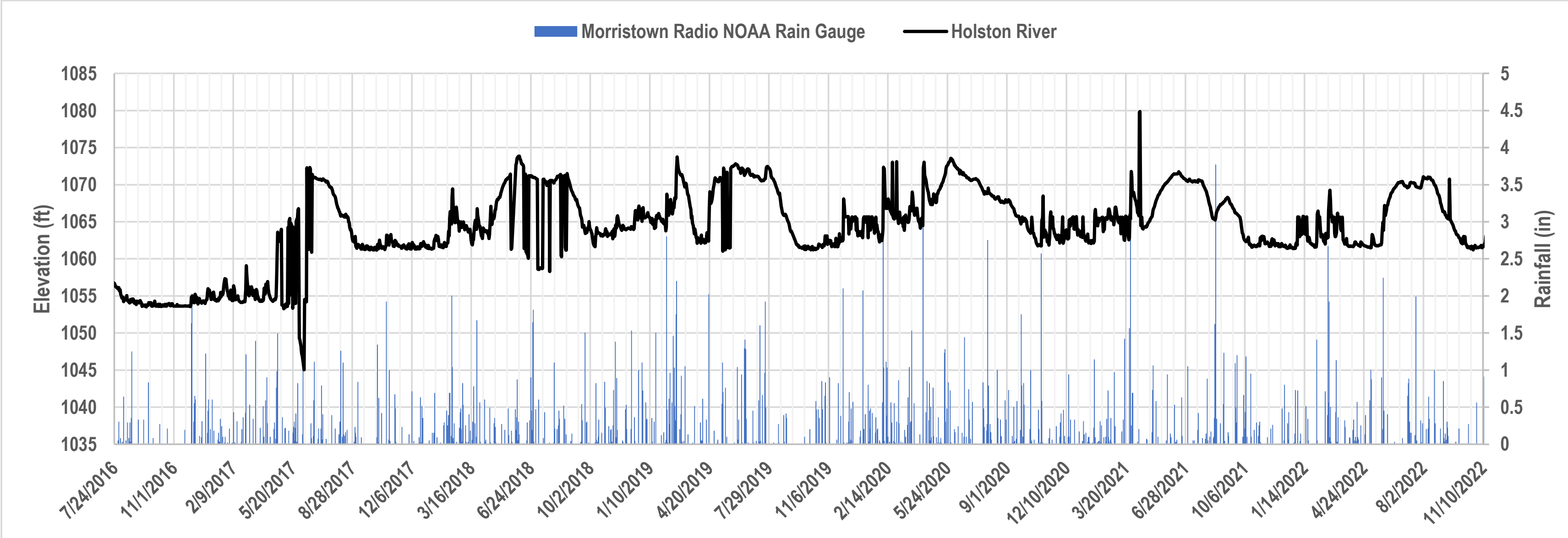
*** All readings from this instrument were below tip elevation.



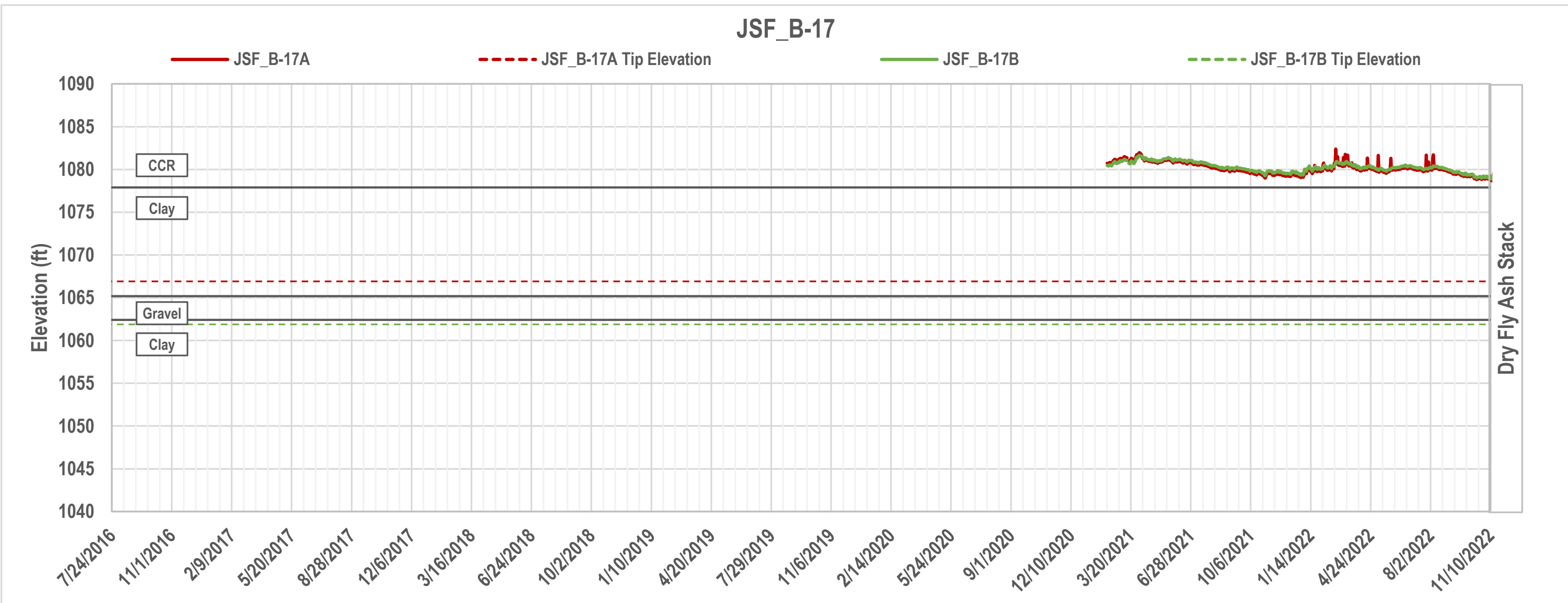
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)



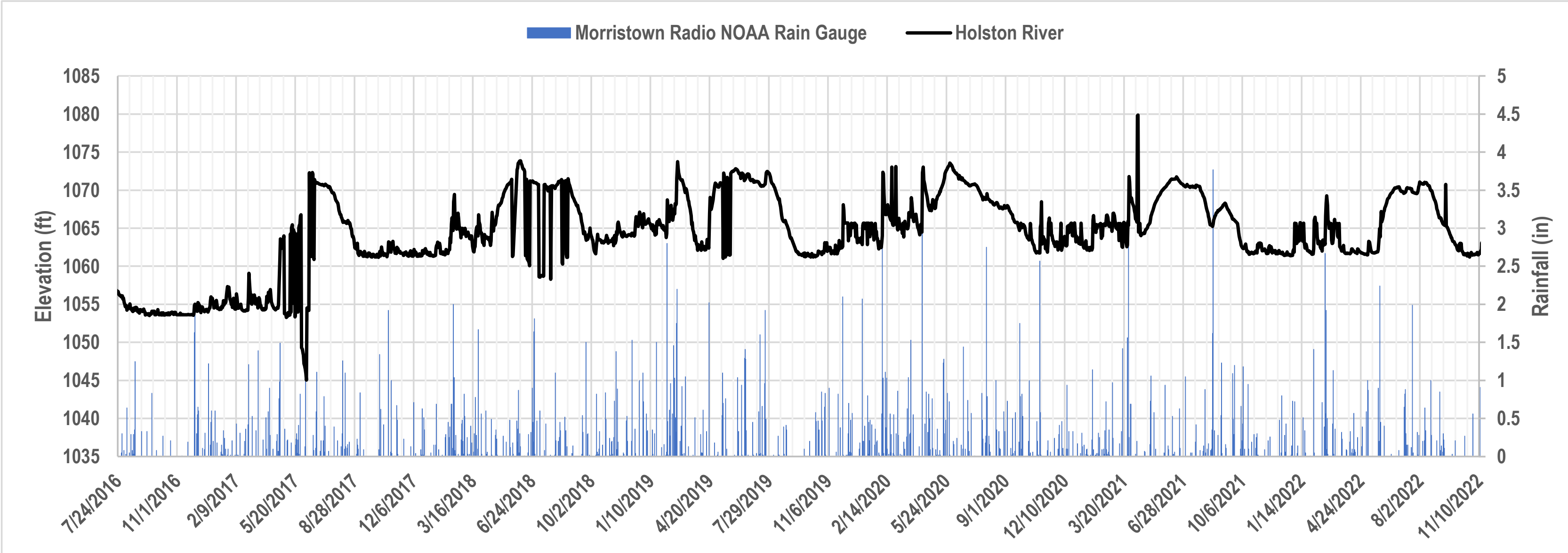
JSF_B-02
JSF_B-02A
JSF_B-02A Tip Elevation
JSF_B-02B
JSF_B-02B Tip Elevation
JSF_B-02C
JSF_B-02C Tip Elevation
Clay Fill
CCR
Clay Fill
CCR
Clay
Elevation (ft)
Dry Fly Ash Stack



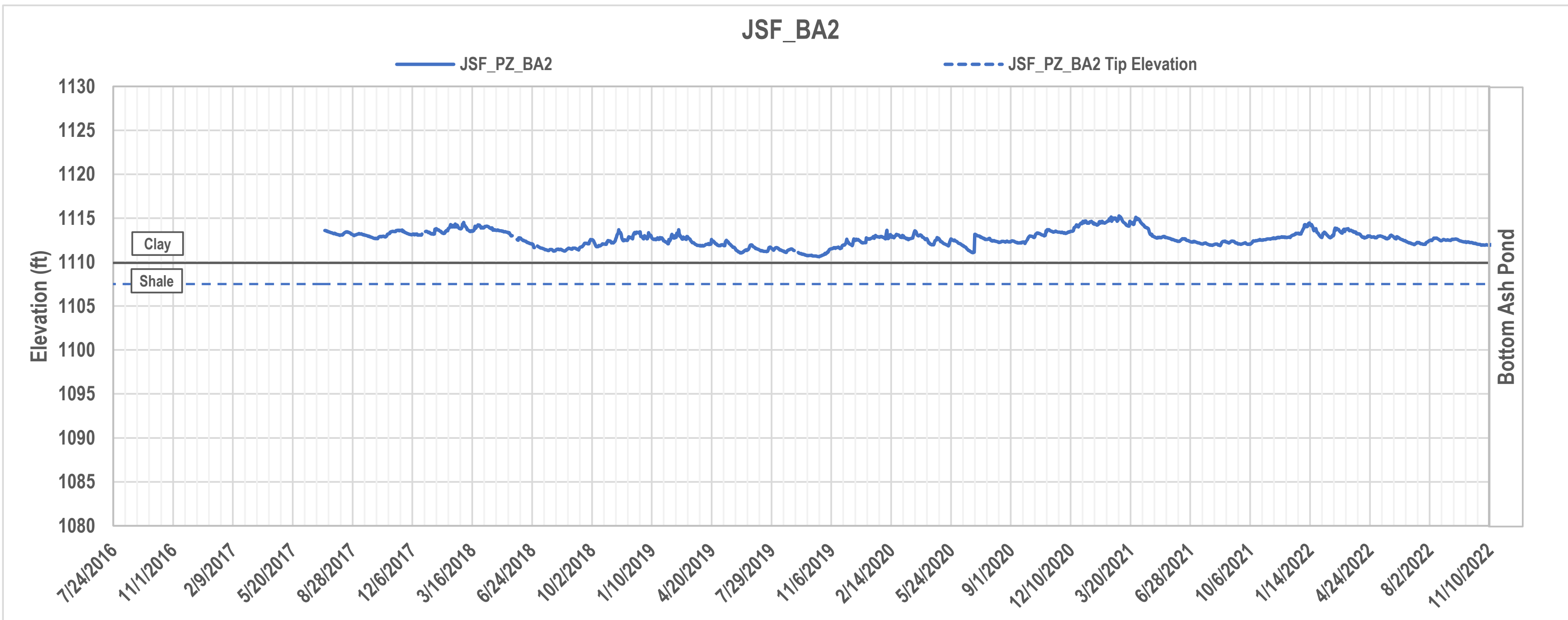
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



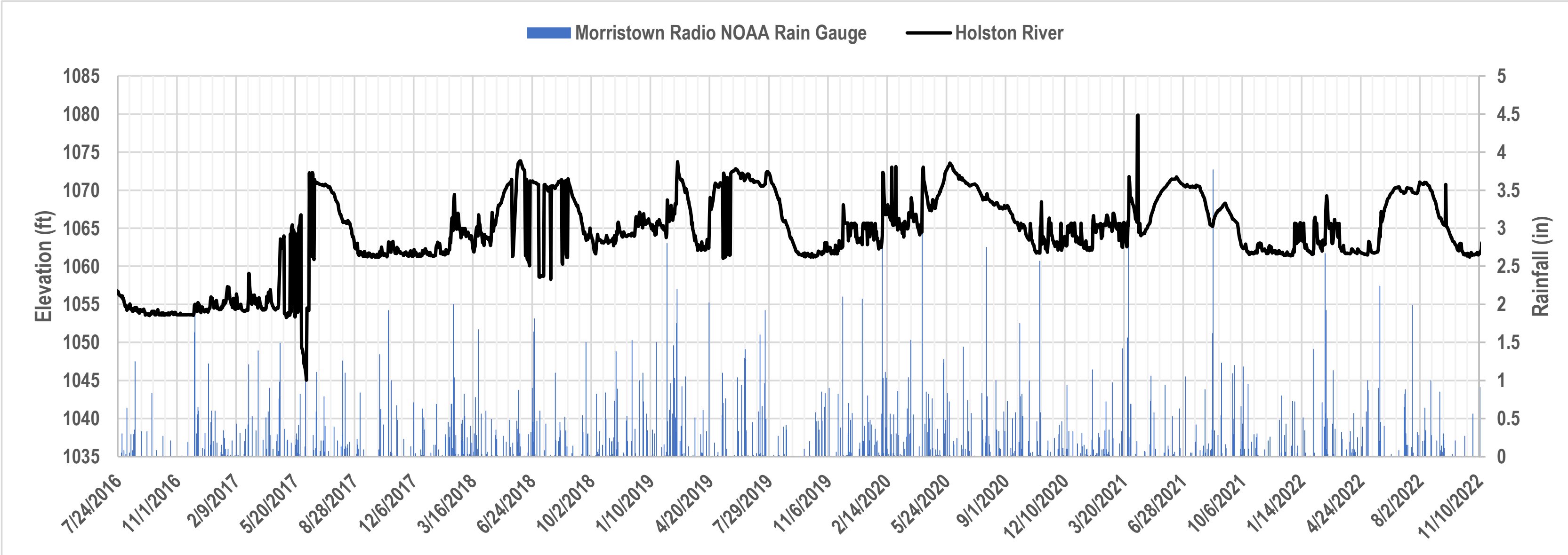
JSF_B-17
JSF_B-17A
JSF_B-17A Tip Elevation
JSF_B-17B
JSF_B-17B Tip Elevation
Elevation (ft)
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
CCR
Clay
Gravel
Clay
Dry Fly Ash Stack
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



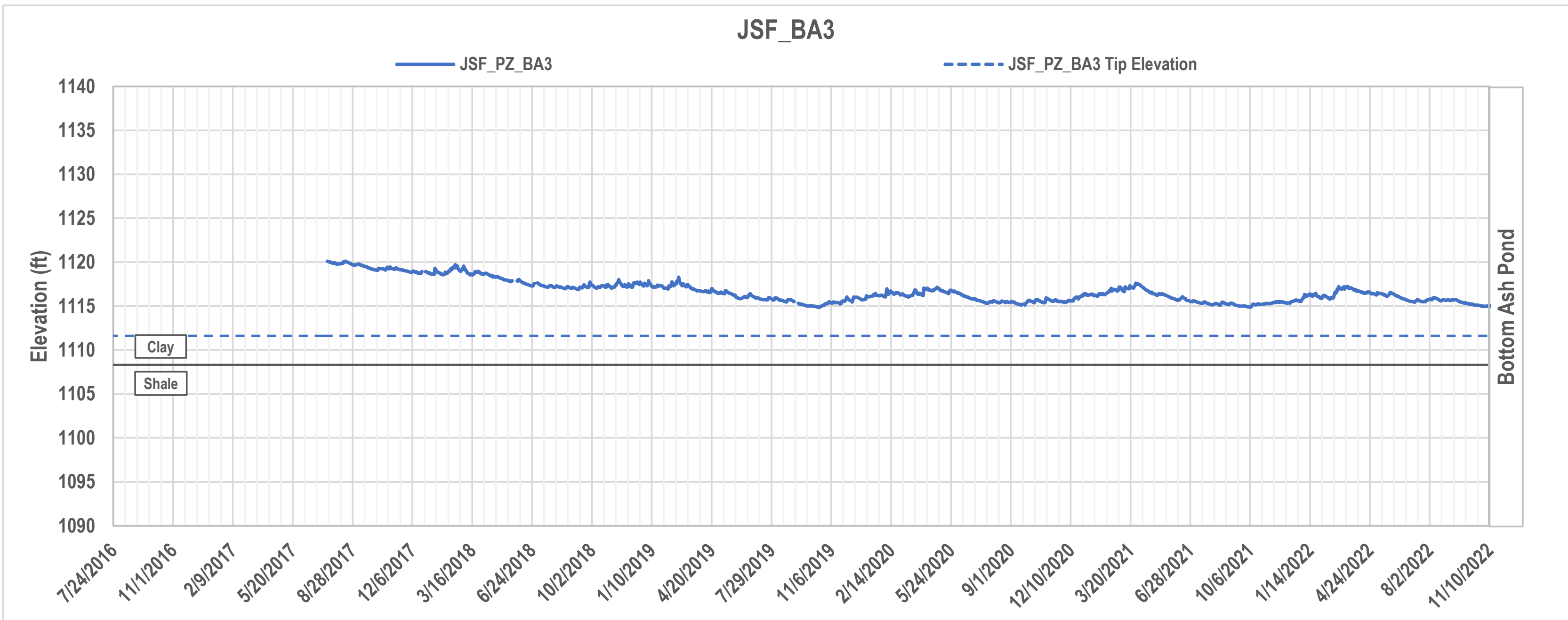
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



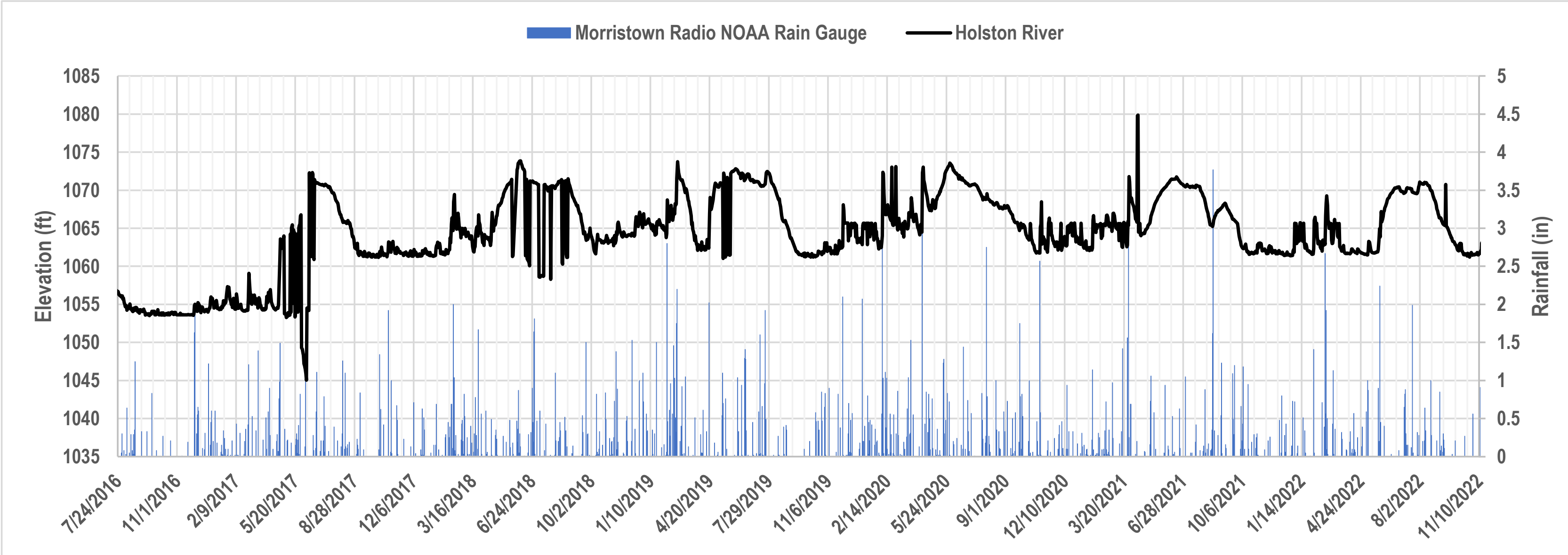
JSF_BA2
JSF_PZ_BA2
JSF_PZ_BA2 Tip Elevation
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
1095
1090
1085
1080
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



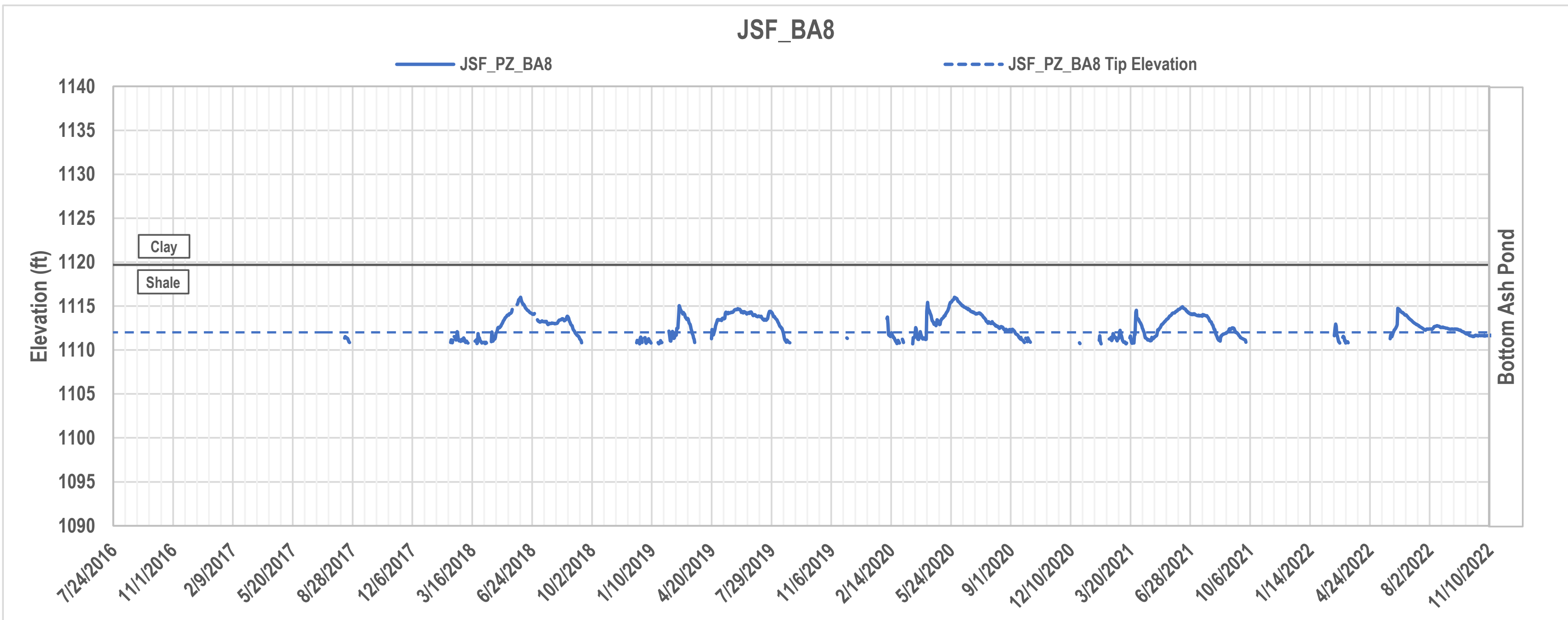
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



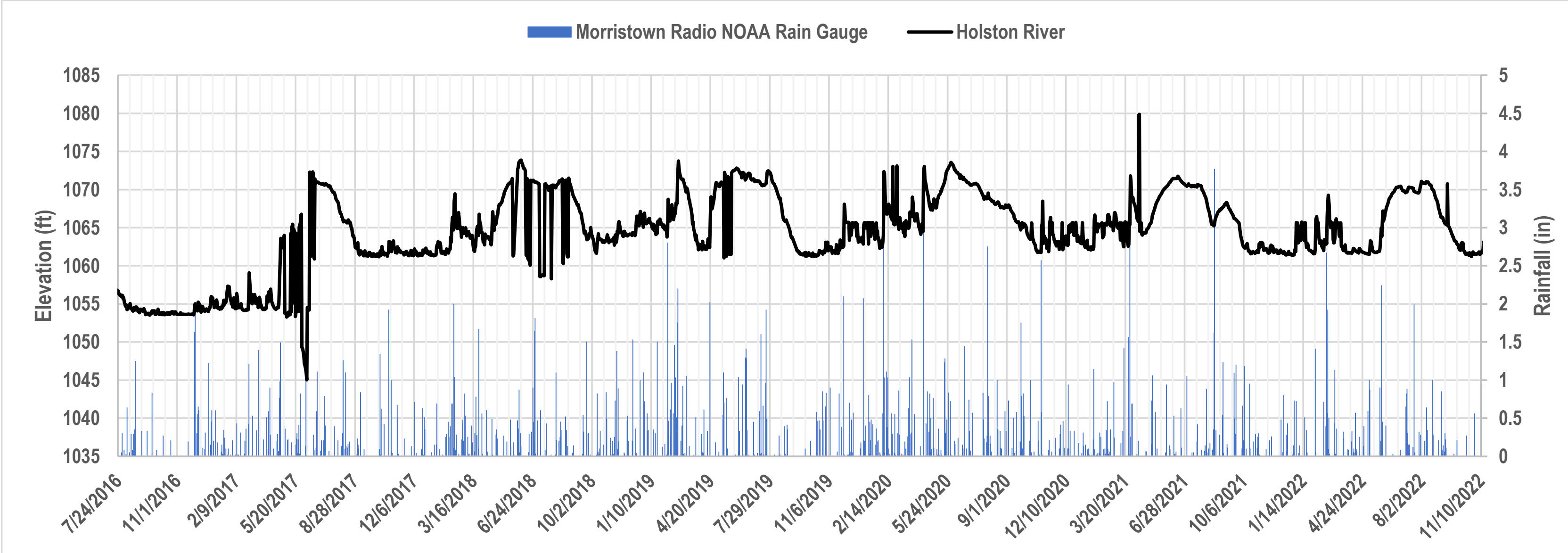
JSF_BA3
JSF_PZ_BA3
JSF_PZ_BA3 Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



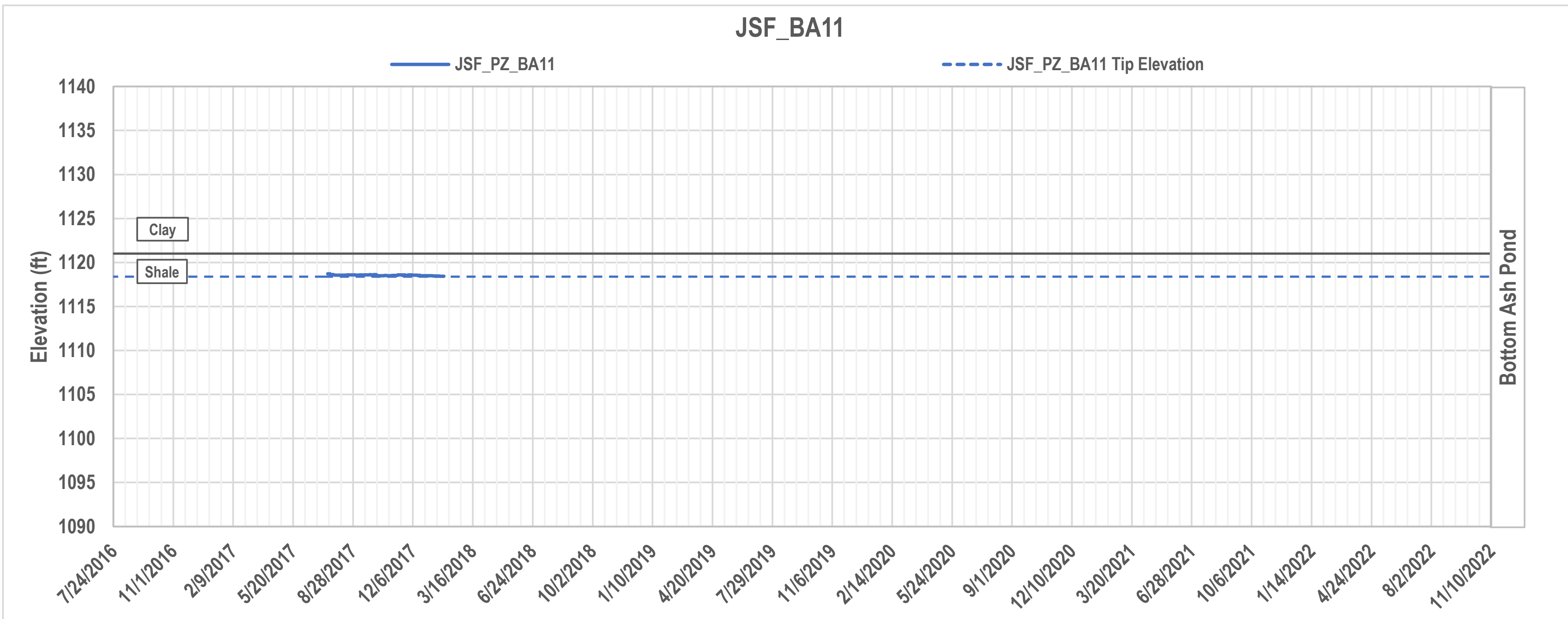
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



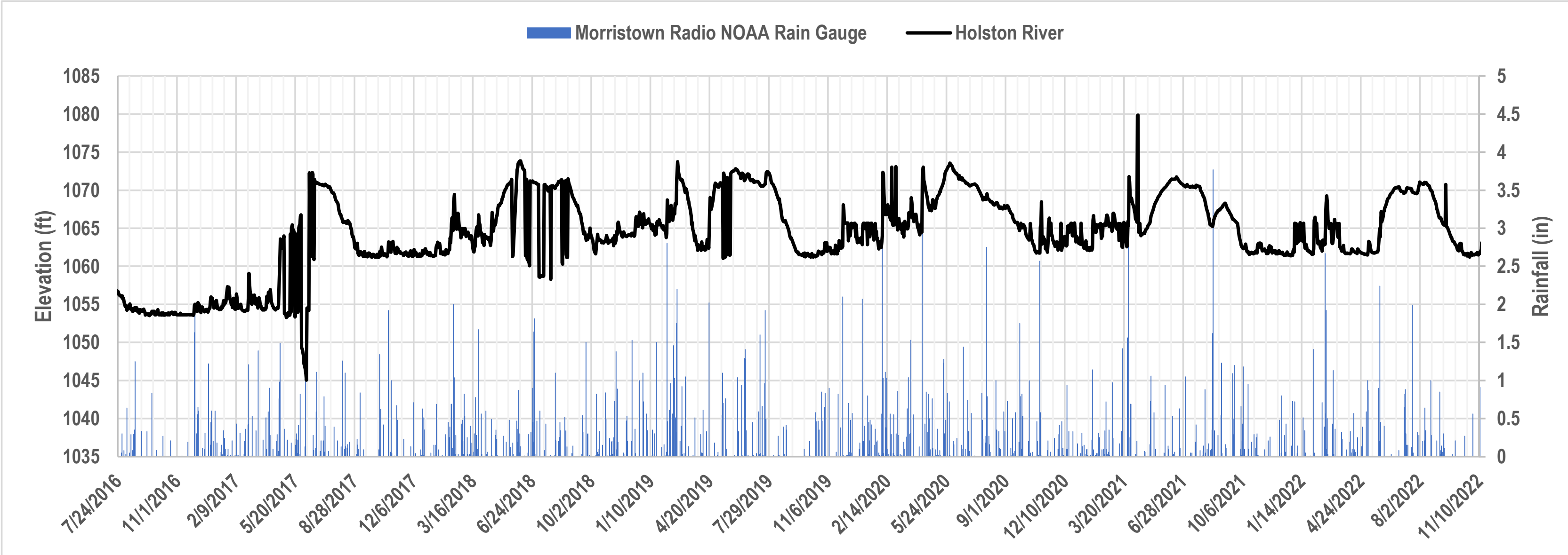
JSF_BA8
JSF_PZ_BA8
JSF_PZ_BA8 Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

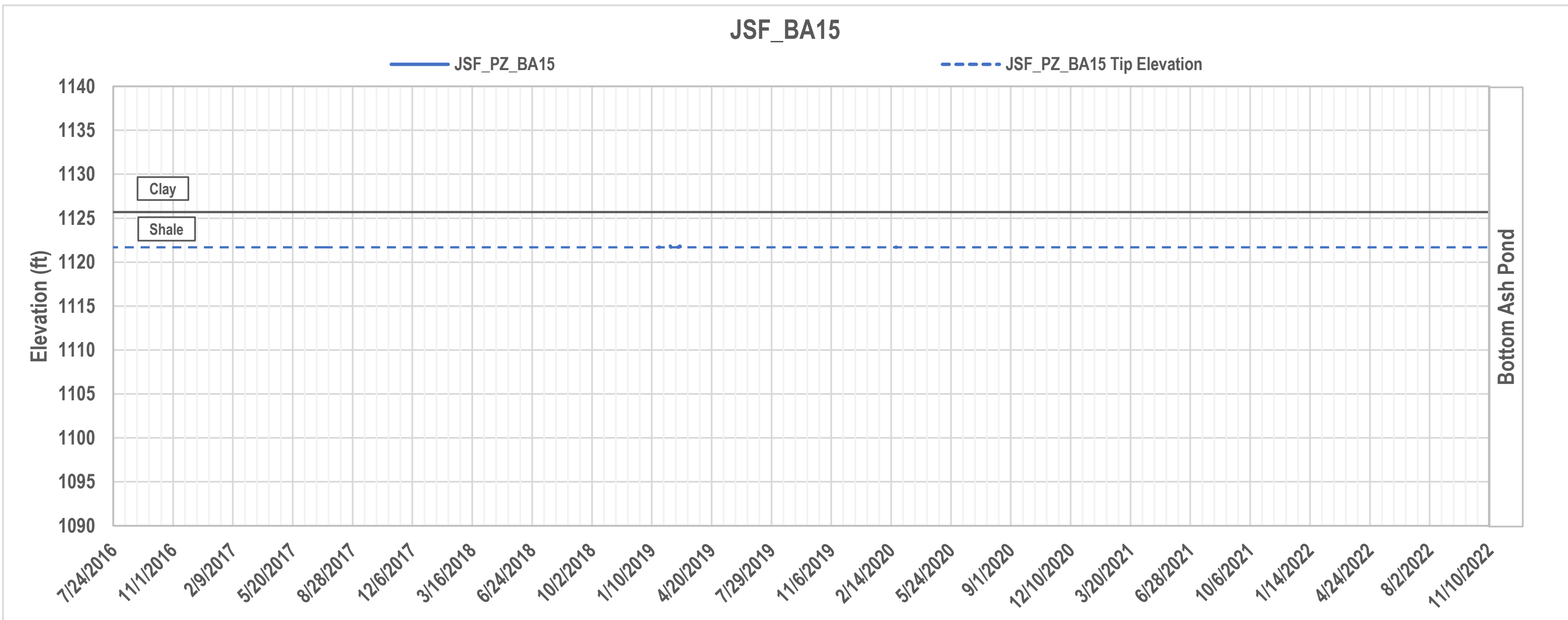


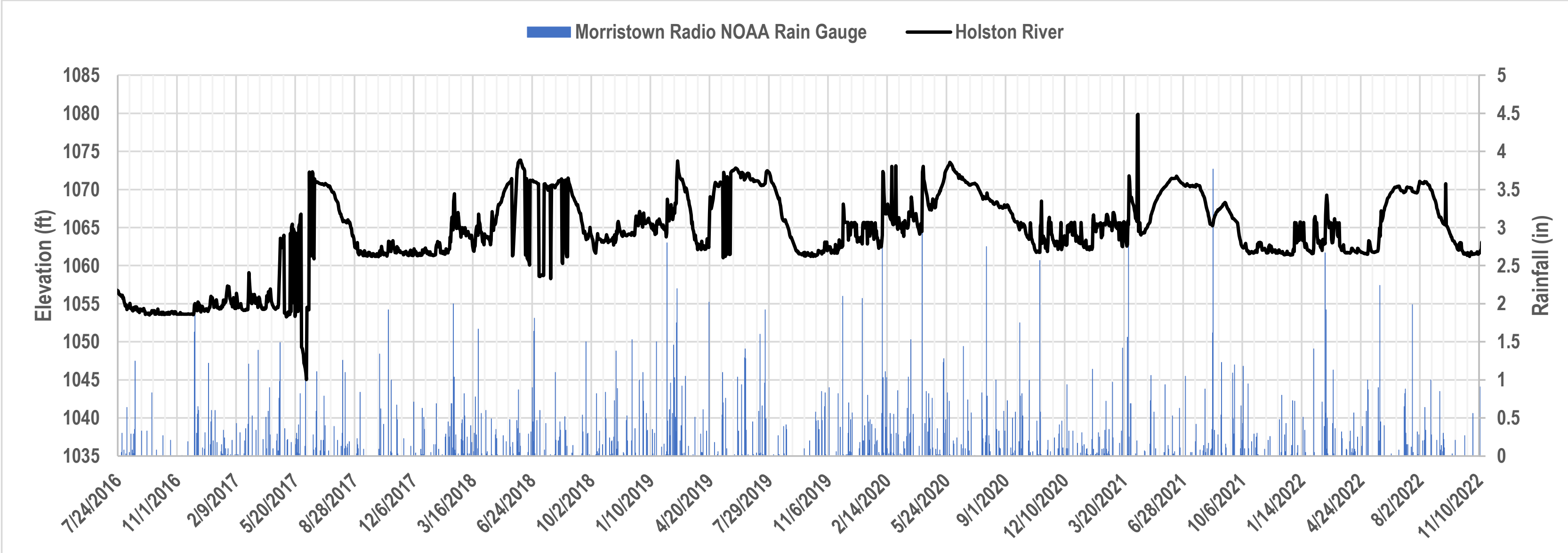
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



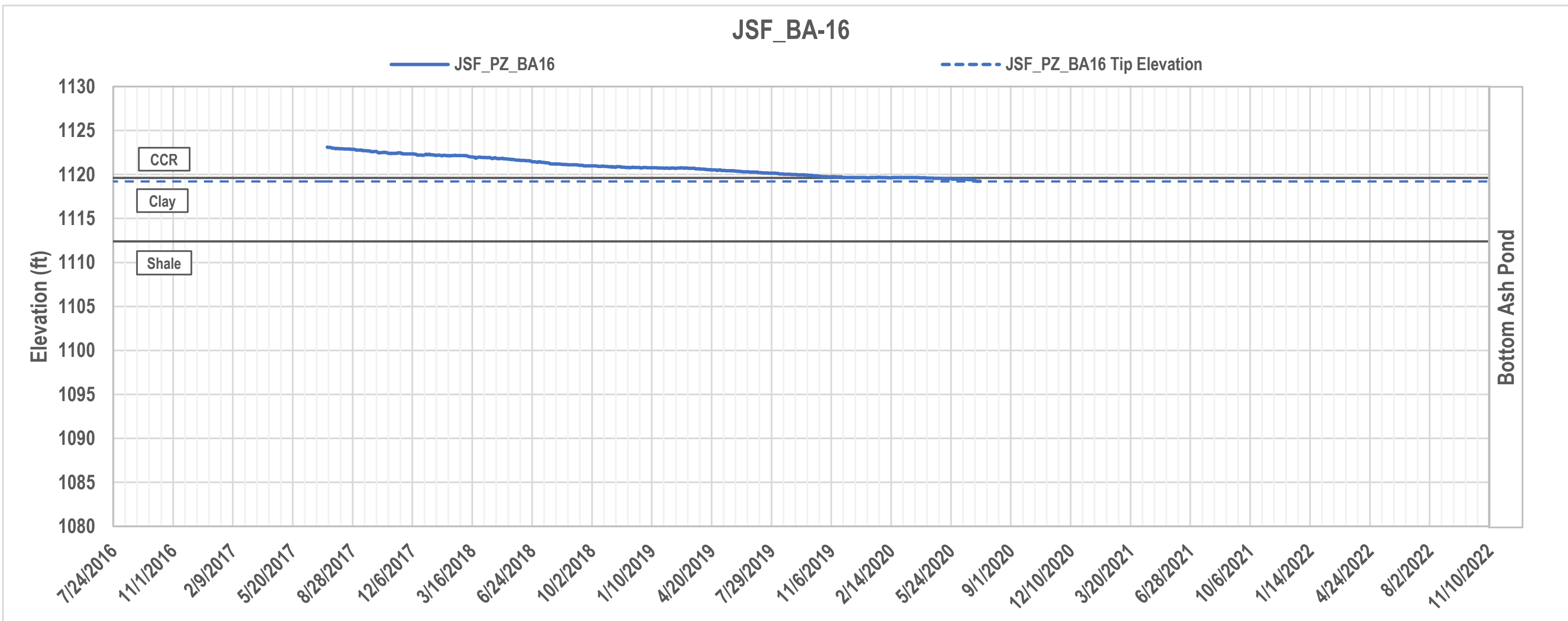
JSF_BA11
JSF_PZ_BA11
JSF_PZ_BA11 Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

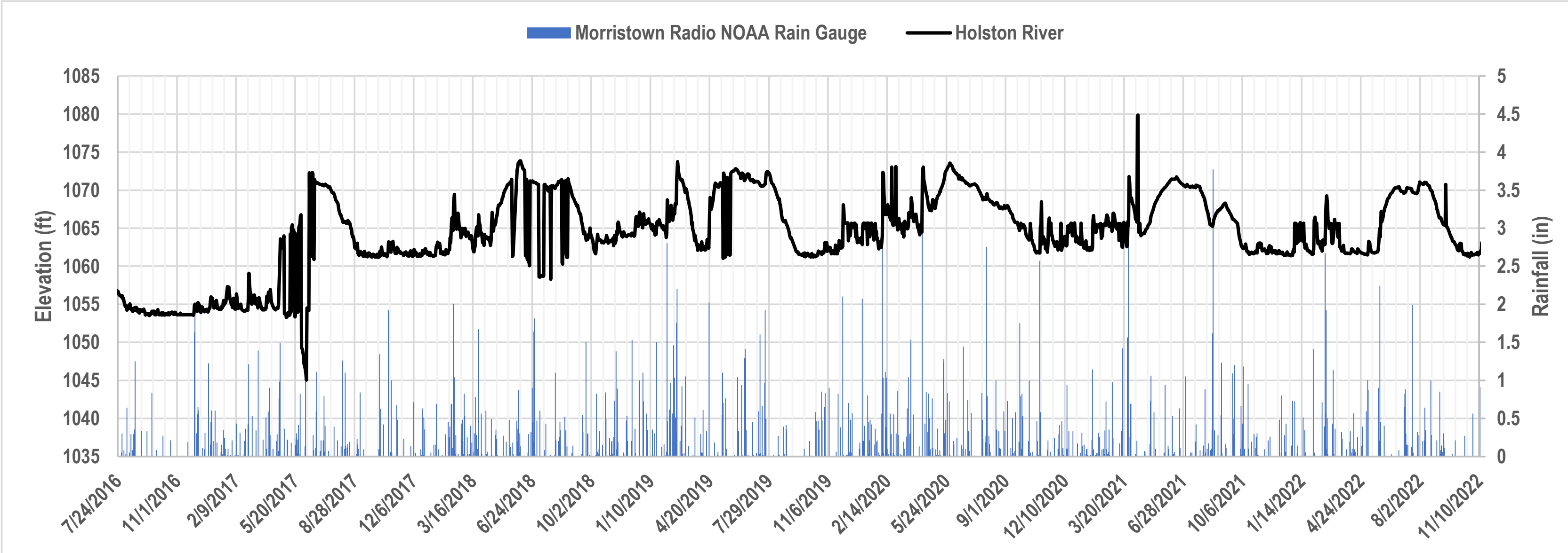

JSF_BA15
JSF_PZ_BA15
JSF_PZ_BA15 Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



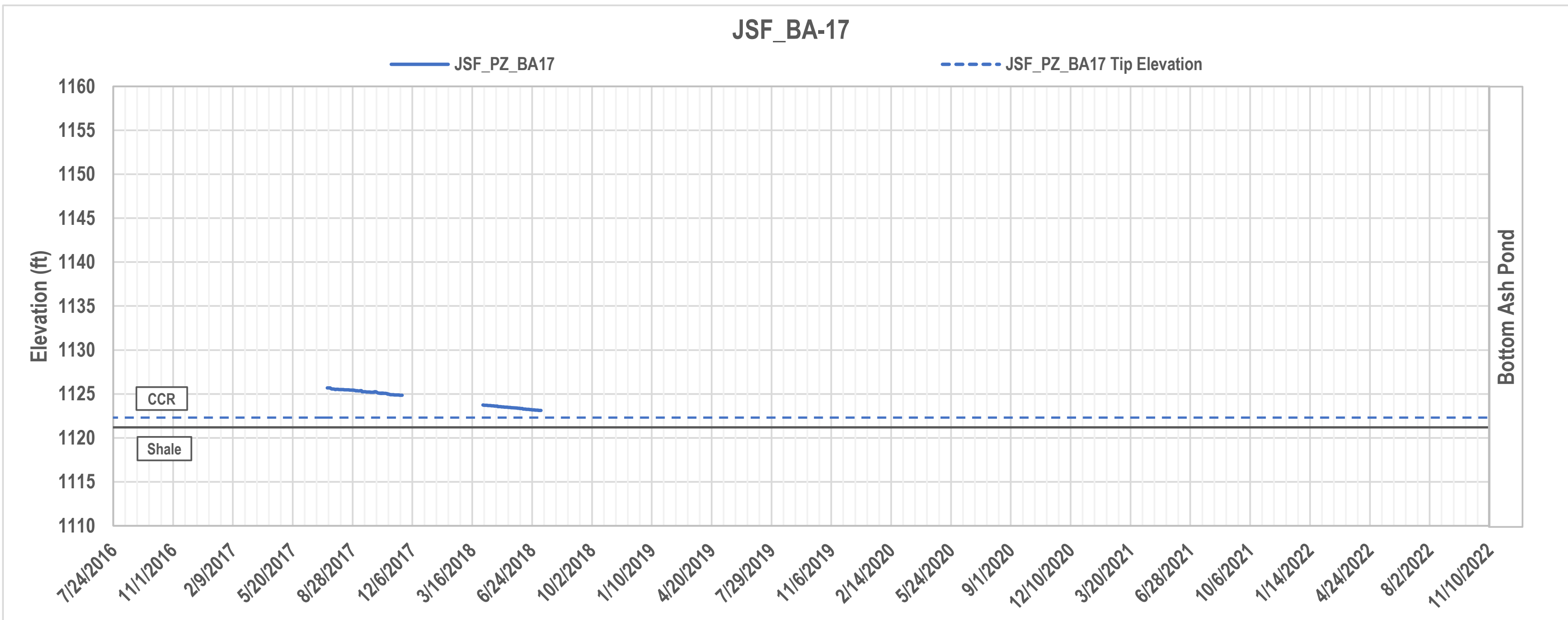
Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



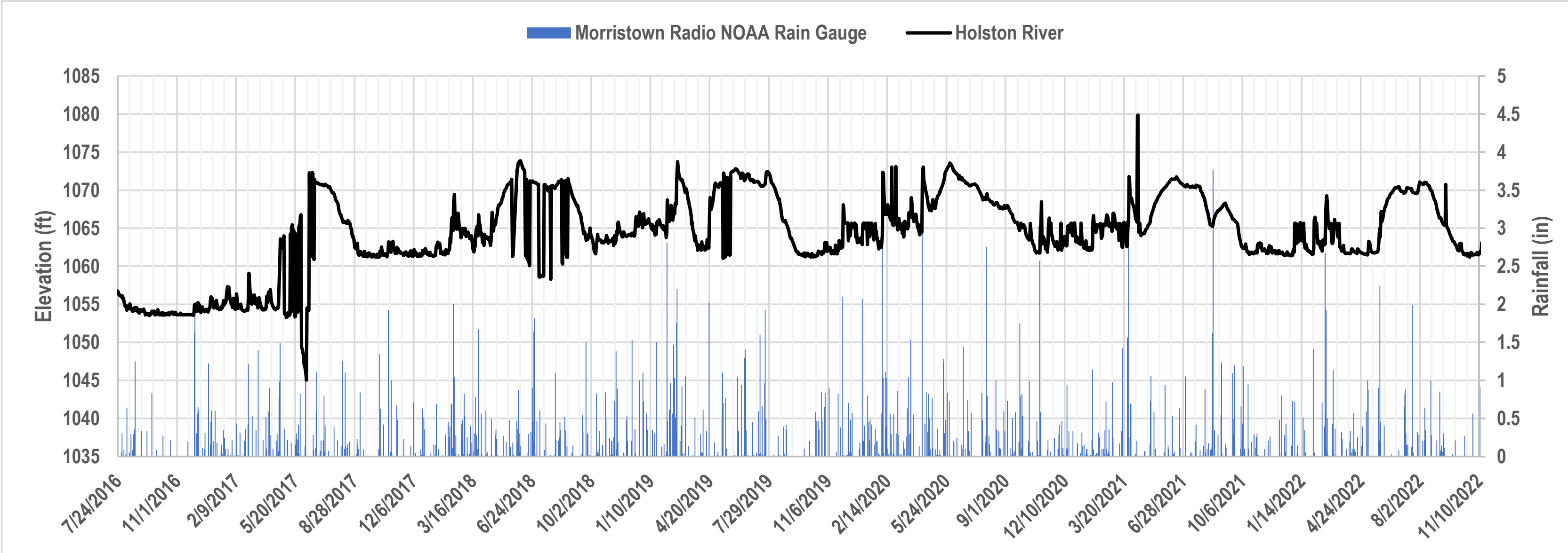
JSF_BA-16
JSF_PZ_BA16
JSF_PZ_BA16 Tip Elevation
CCR
Clay
Shale
Elevation (ft)
Bottom Ash Pond
1130
1125
1120
1115
1110
1105
1100
1095
1090
1085
1080
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

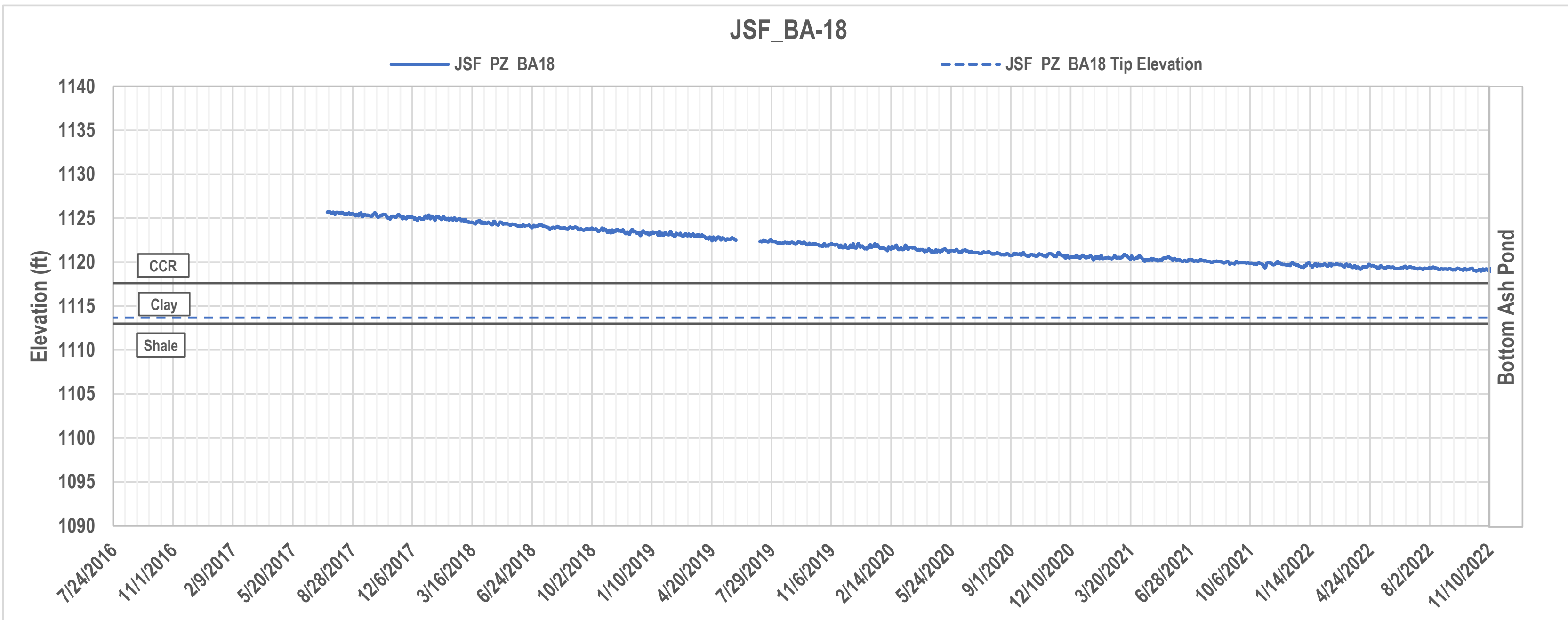


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_BA-17
JSF_PZ_BA17
JSF_PZ_BA17 Tip Elevation
Elevation (ft)
1160
1155
1150
1145
1140
1135
1130
1125
1120
1115
1110
CCR
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


JSF_BA-18
JSF_PZ_BA18
JSF_PZ_BA18 Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
CCR
Clay
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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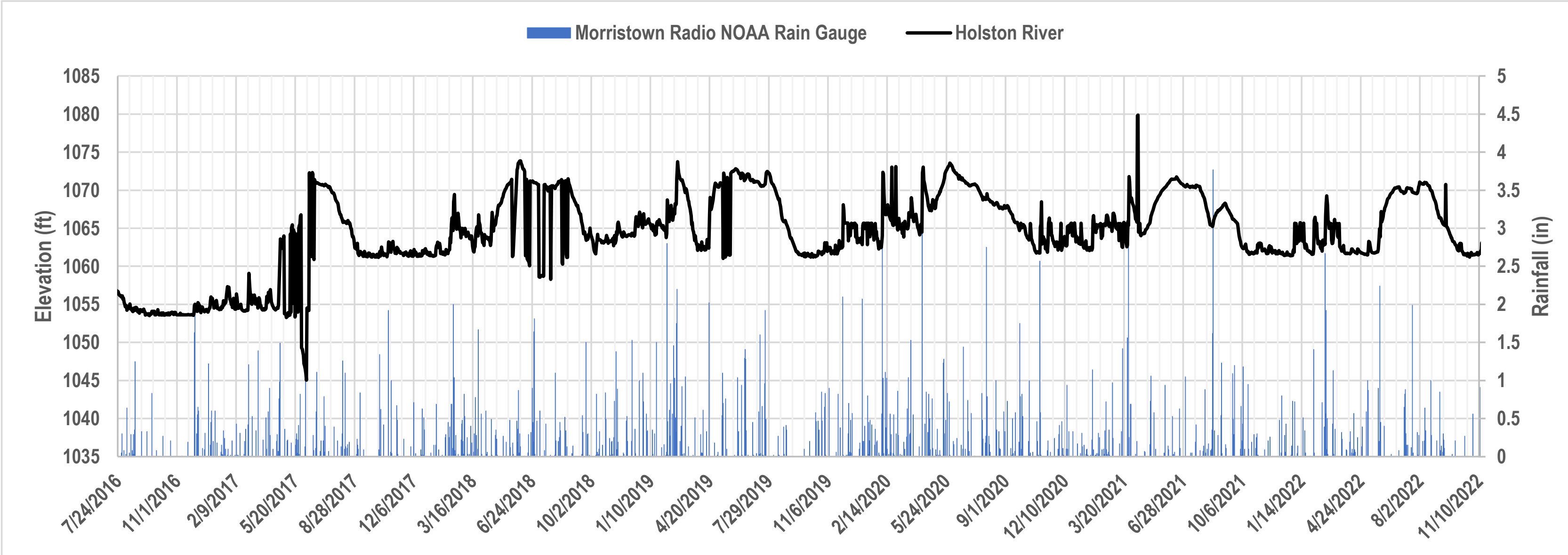
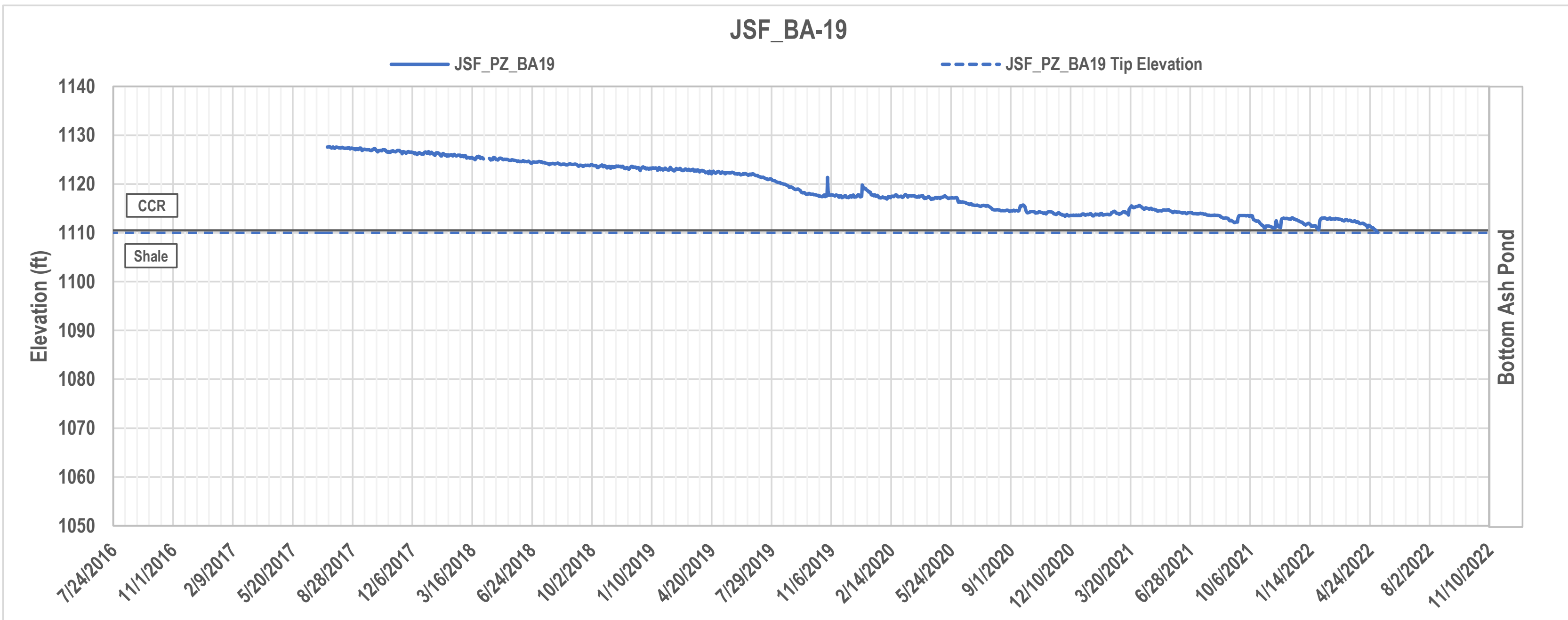
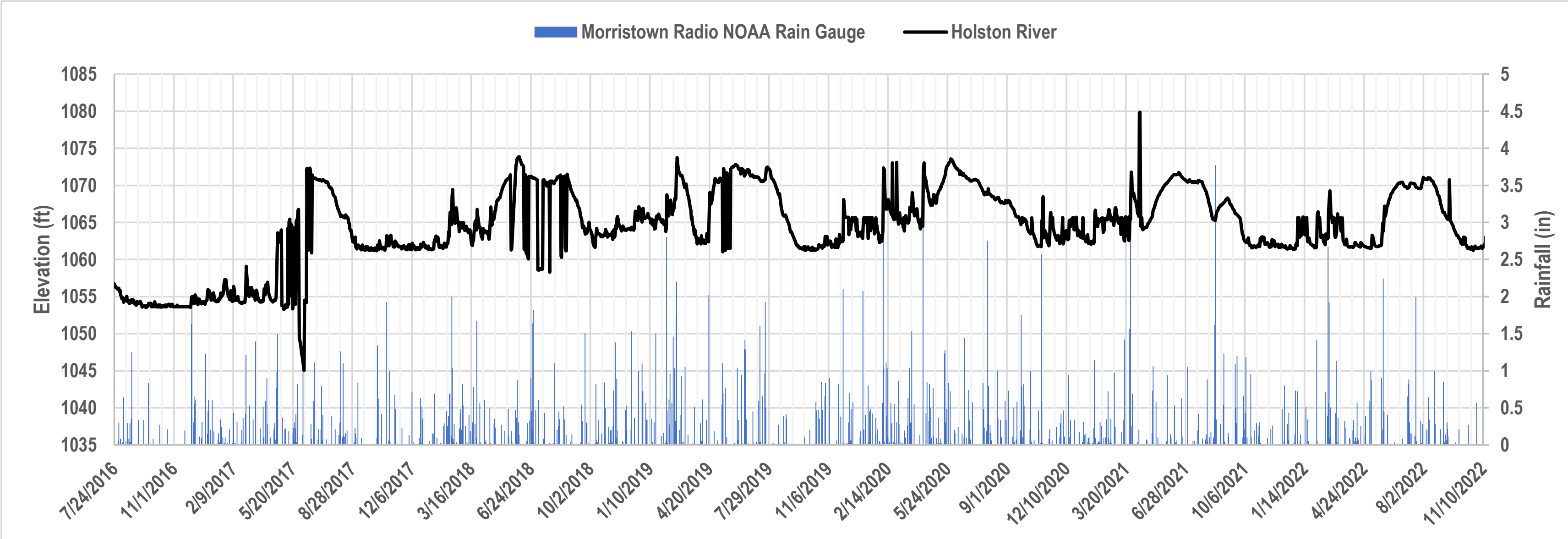
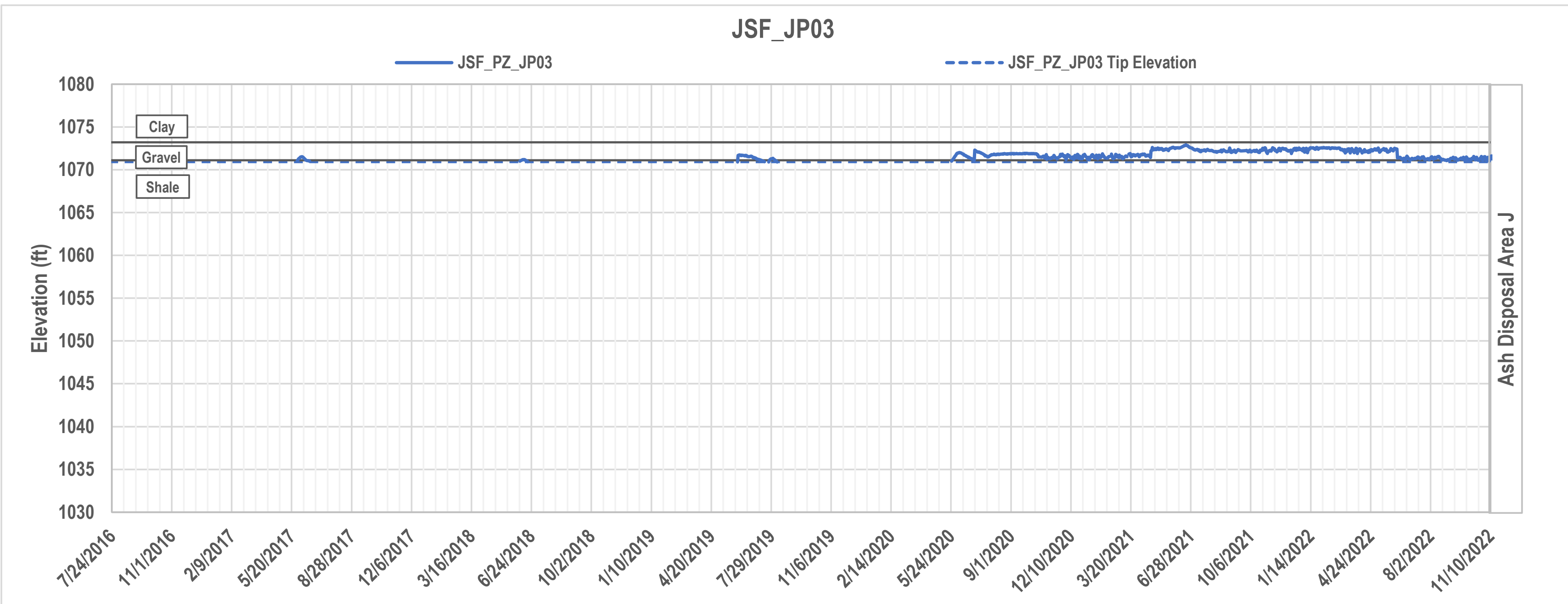
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

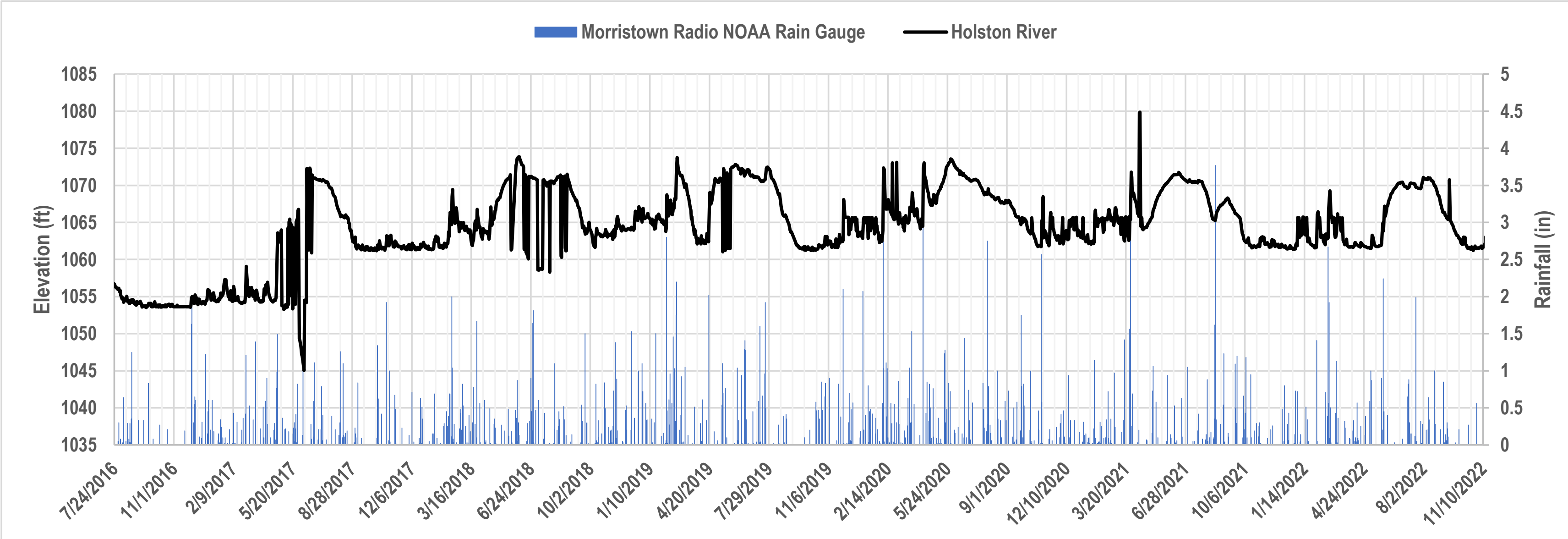

JSF_BA-19
JSF_PZ_BA19
JSF_PZ_BA19 Tip Elevation
Elevation (ft)
1140
1130
1120
1110
1100
1090
1080
1070
1060
1050
CCR
Shale
Bottom Ash Pond
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

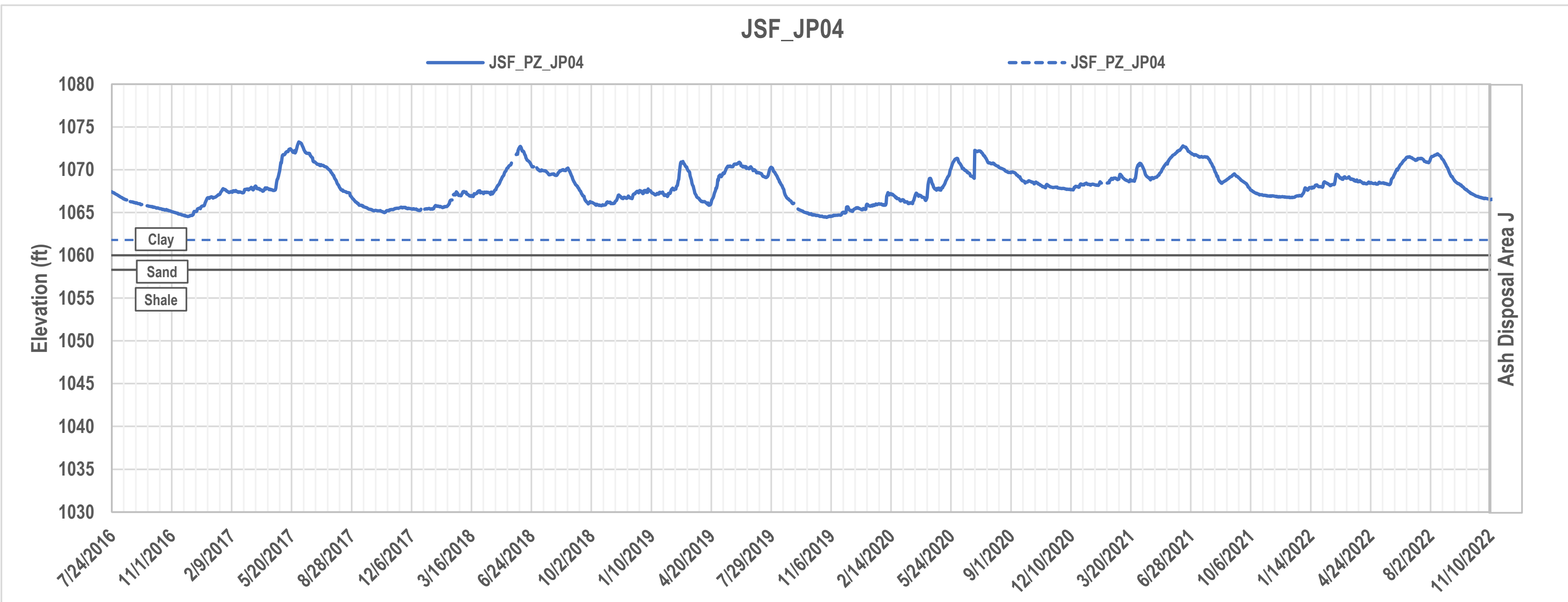


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_JP03
JSF_PZ_JP03
JSF_PZ_JP03 Tip Elevation
Clay
Gravel
Shale
Elevation (ft)
Ash Disposal Area J
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022


JSF_JP04
JSF_PZ_JP04
JSF_PZ_JP04
Elevation (ft)
Clay
Sand
Shale
Ash Disposal Area J
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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6/28/2021
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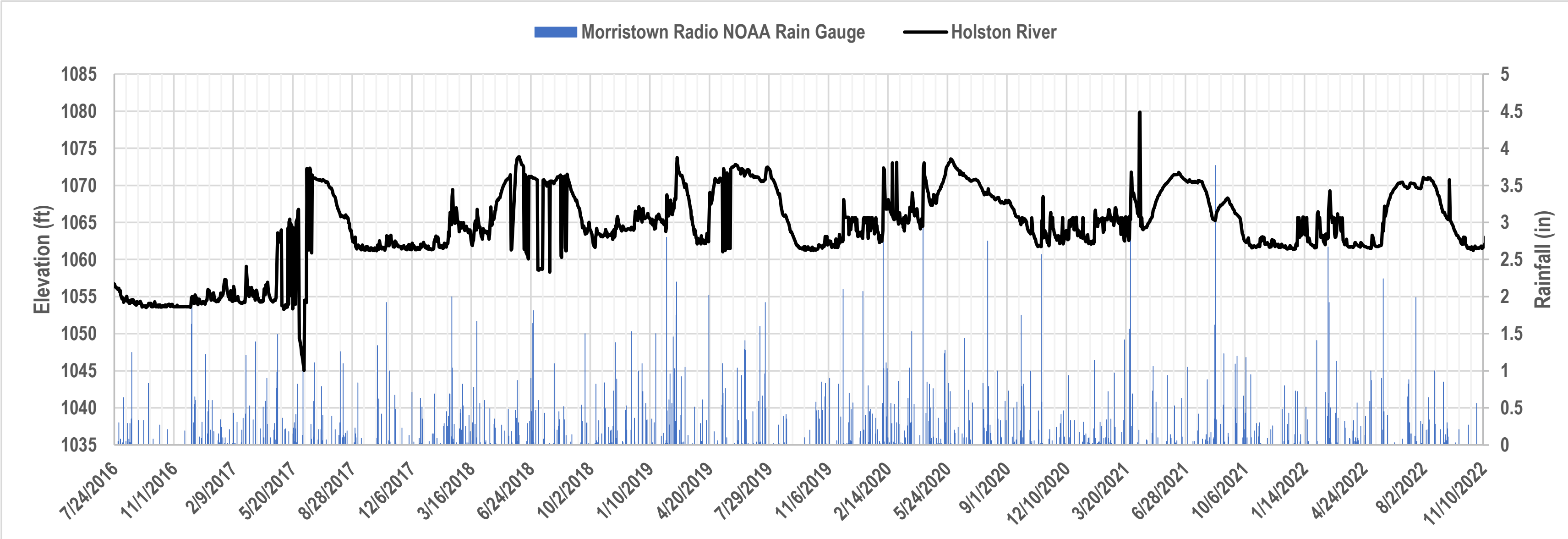
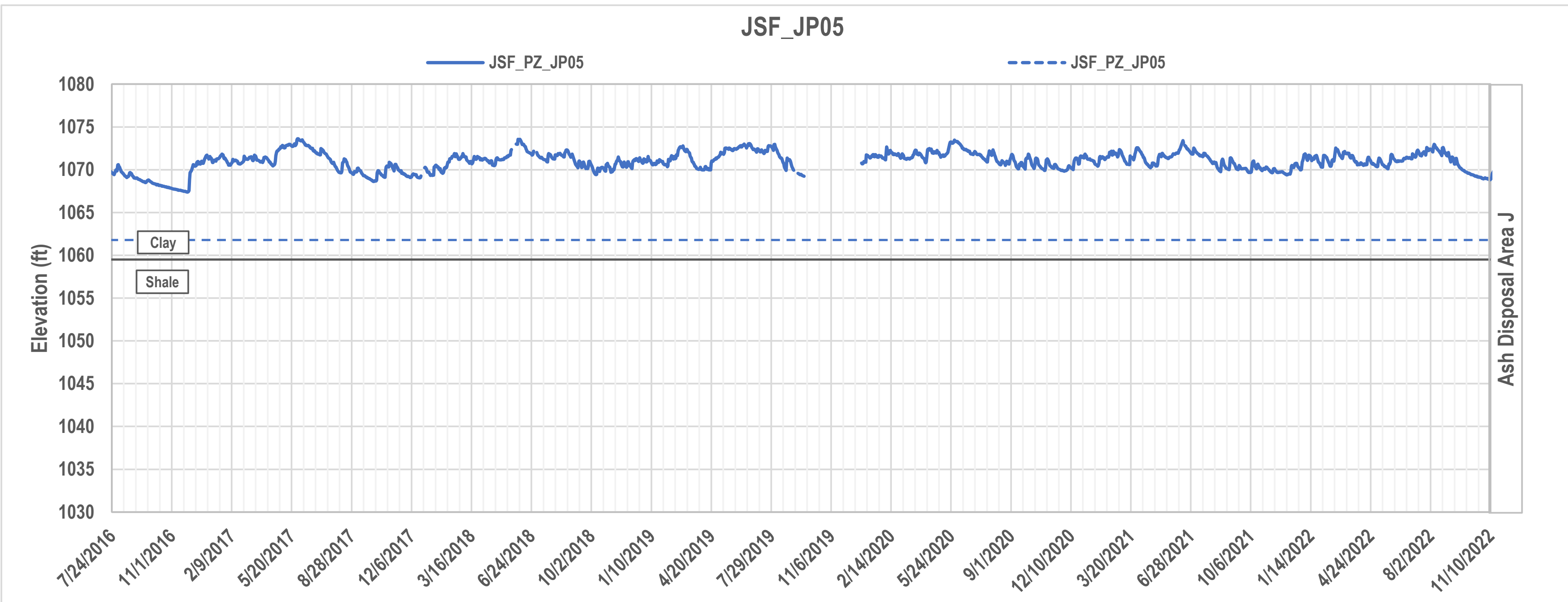
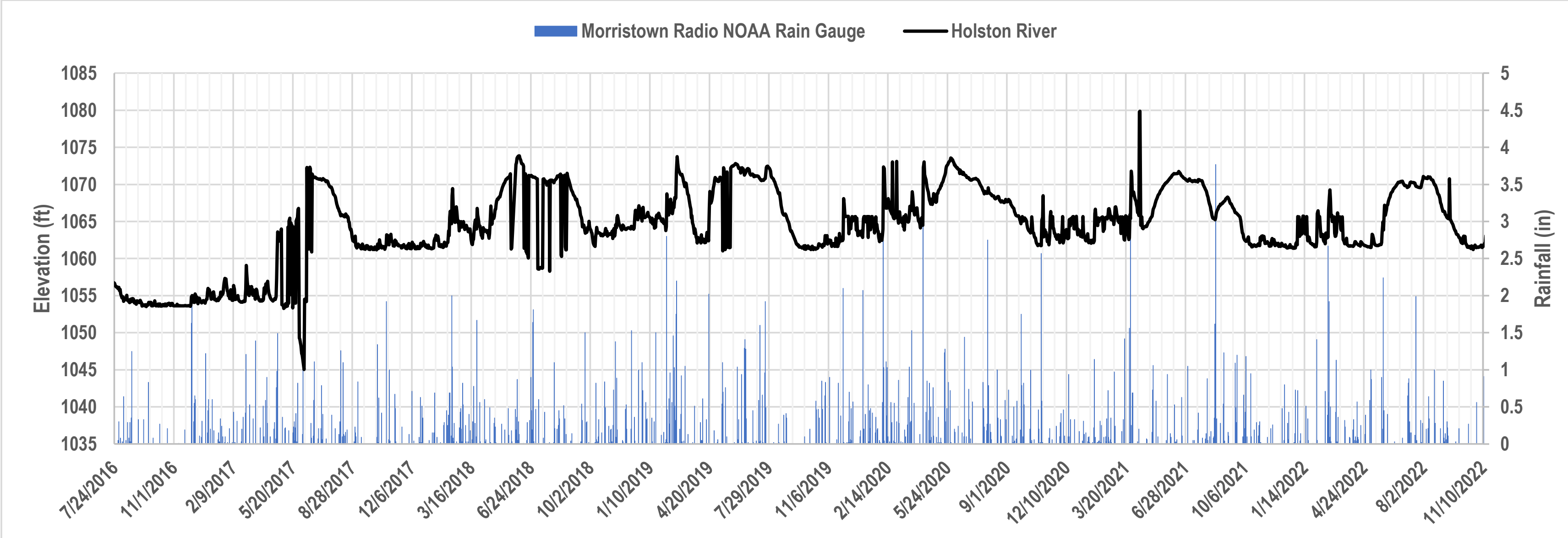
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_JP05
JSF_PZ_JP05
JSF_PZ_JP05
Elevation (ft)
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
Clay
Shale
Ash Disposal Area J
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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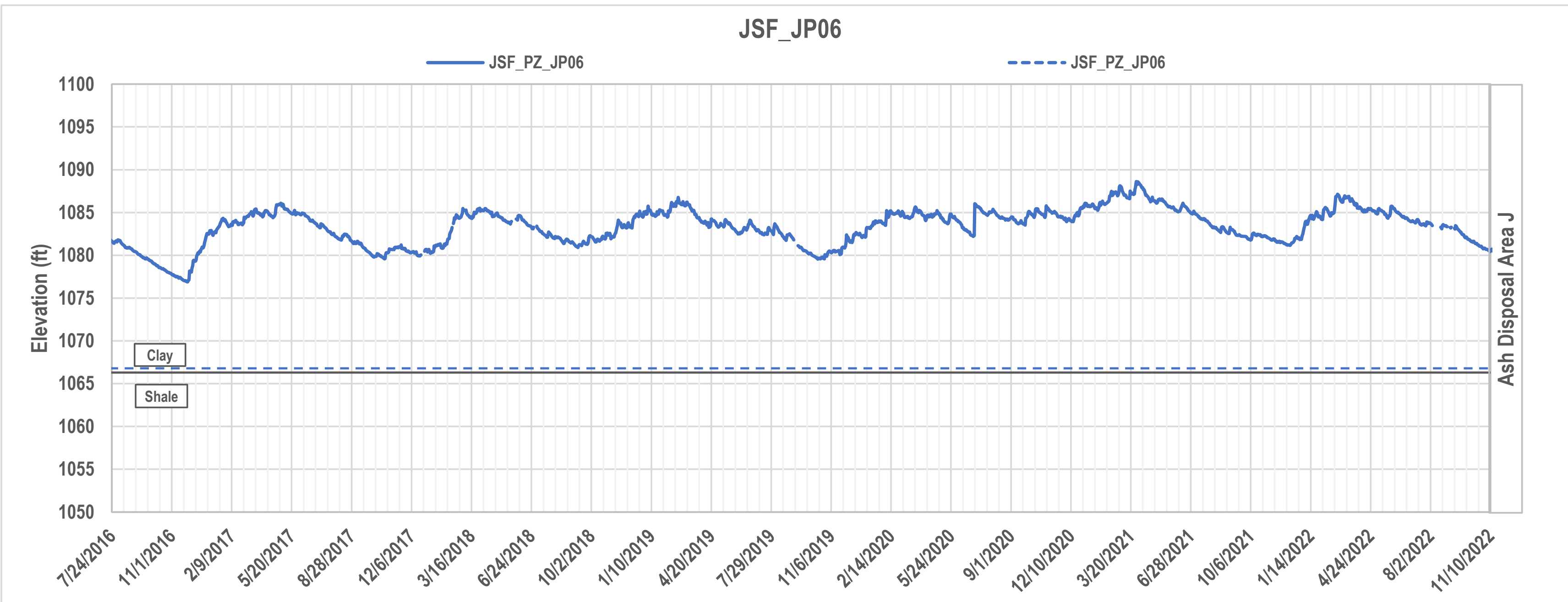
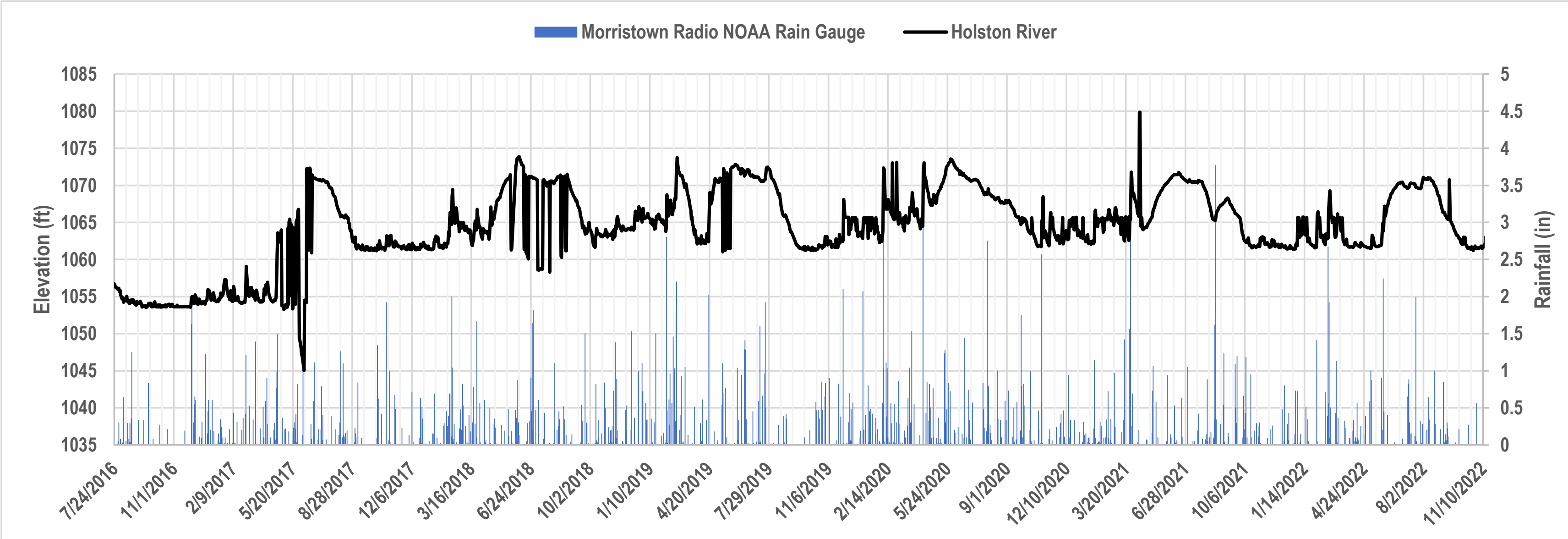
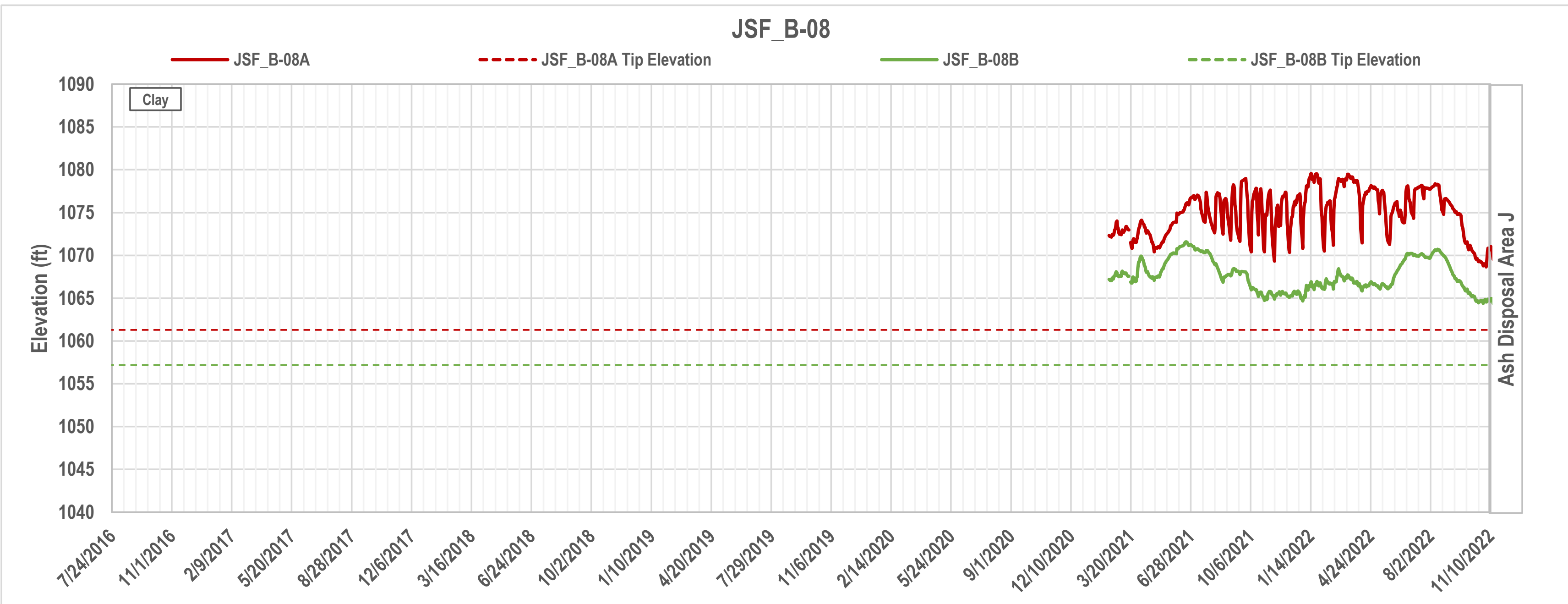
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



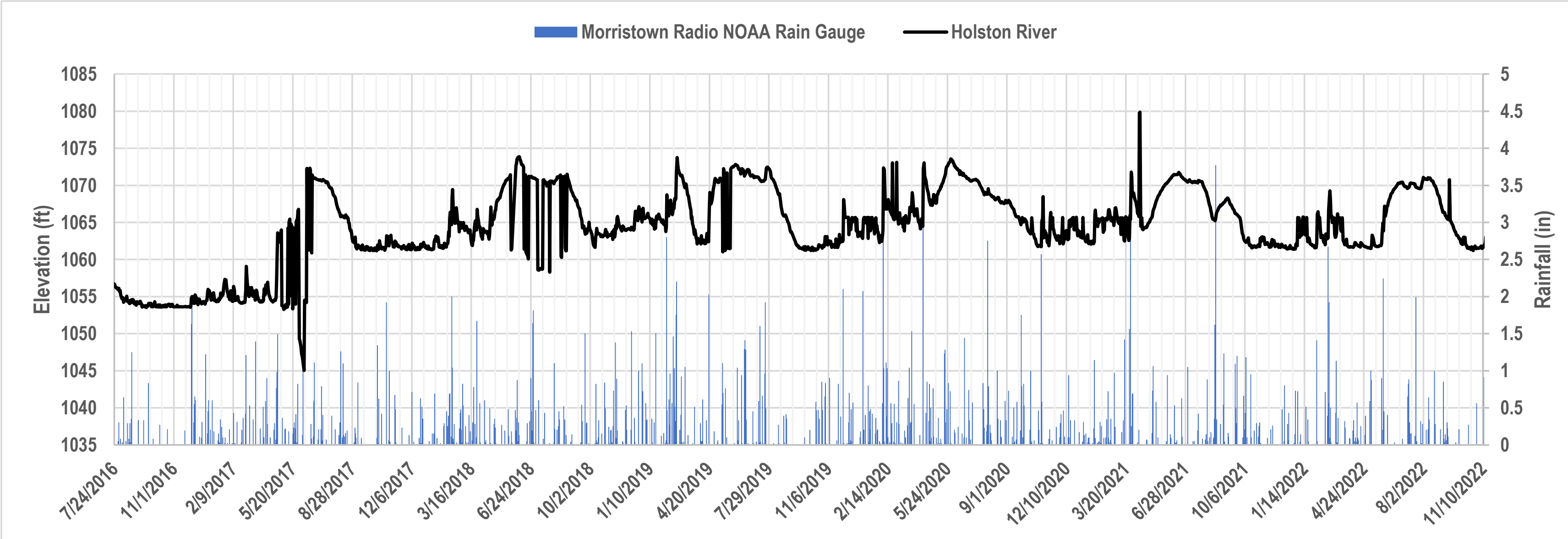
JSF_JP06
JSF_PZ_JP06
JSF_PZ_JP06
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
Clay
Shale
Ash Disposal Area J
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_B-08
JSF_B-08A
JSF_B-08A Tip Elevation
JSF_B-08B
JSF_B-08B Tip Elevation
Clay
Elevation (ft)
Ash Disposal Area J
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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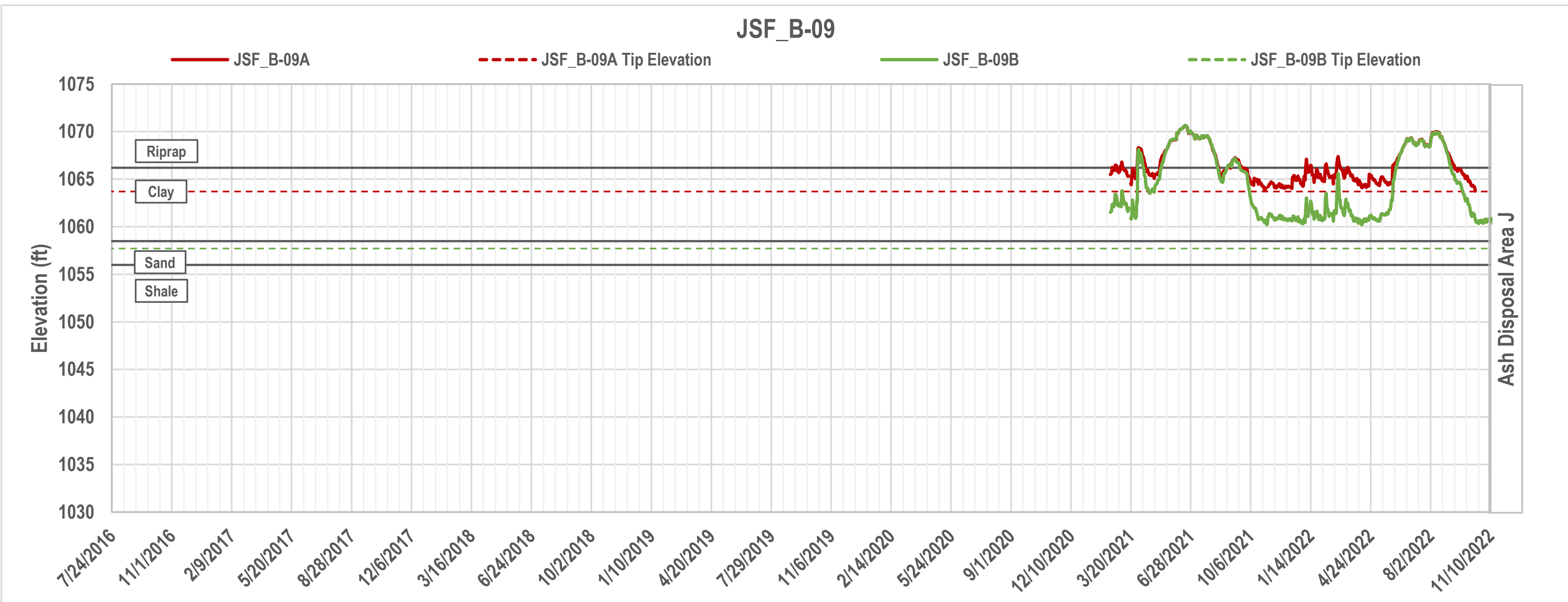
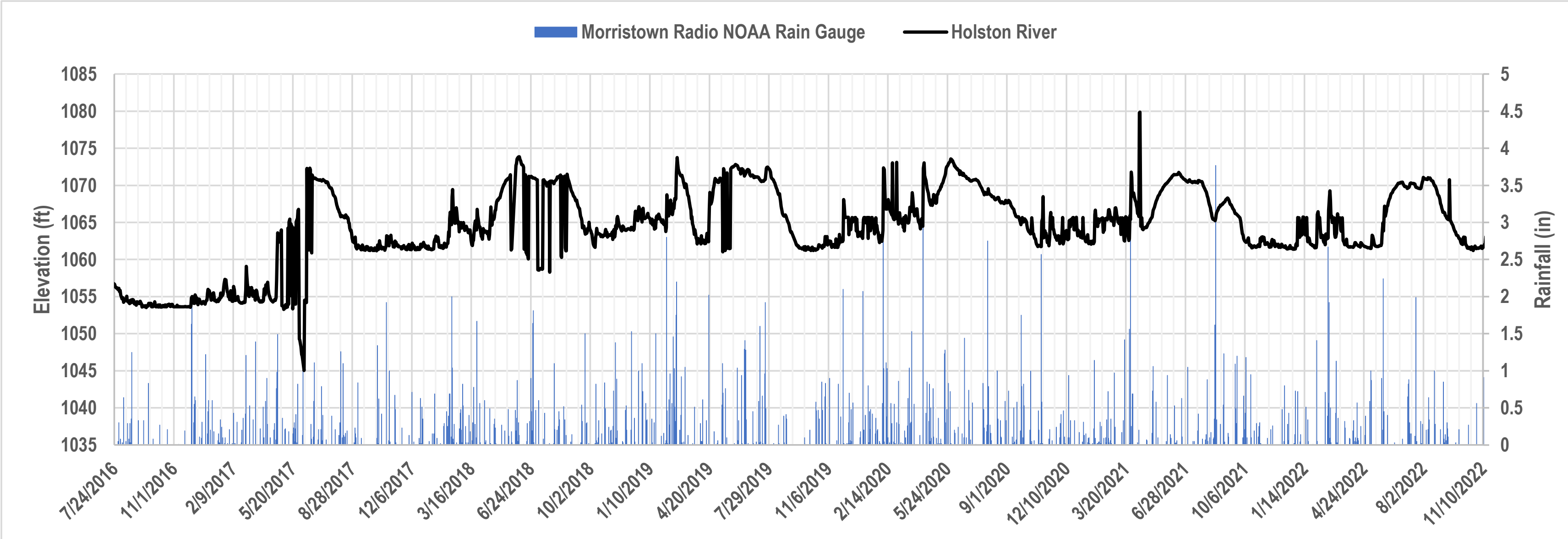
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_B-09
JSF_B-09A
JSF_B-09A Tip Elevation
JSF_B-09B
JSF_B-09B Tip Elevation
Riprap
Clay
Sand
Shale
Elevation (ft)
Ash Disposal Area J
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
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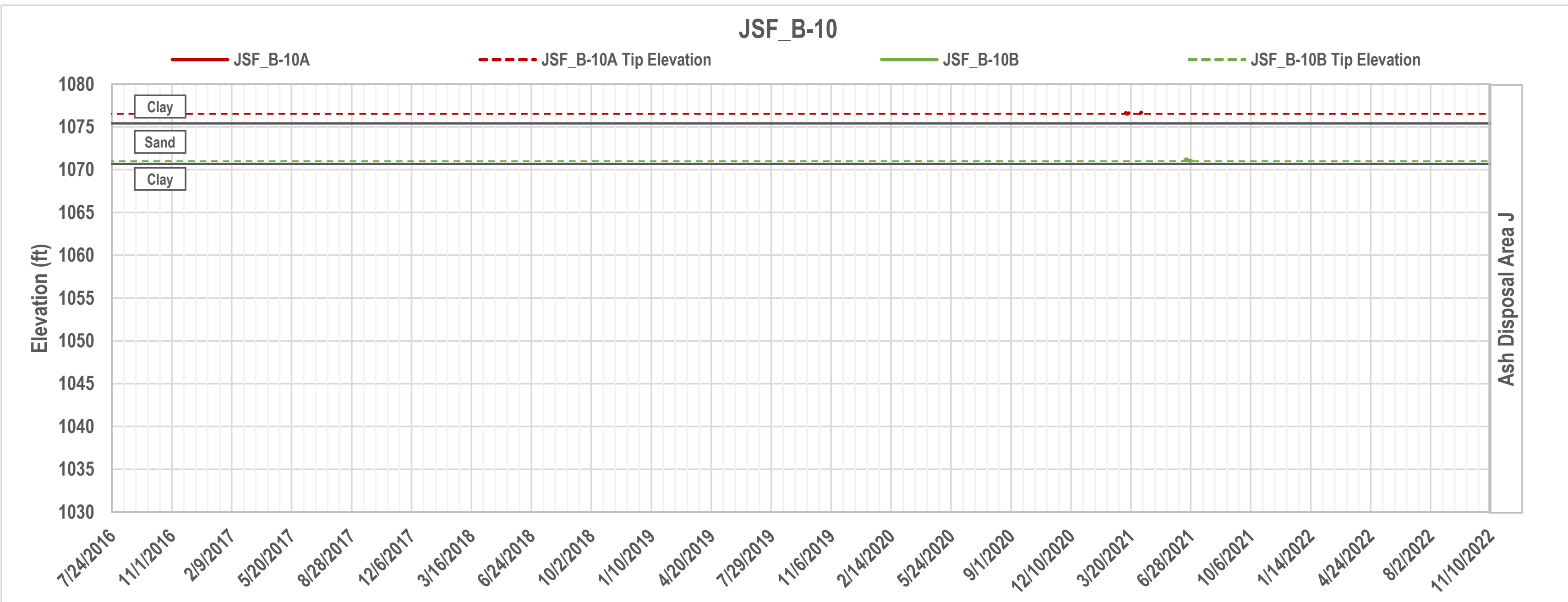
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_B-10
JSF_B-10A
JSF_B-10A Tip Elevation
JSF_B-10B
JSF_B-10B Tip Elevation
Clay
Sand
Clay
Elevation (ft)
Ash Disposal Area J
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
1030
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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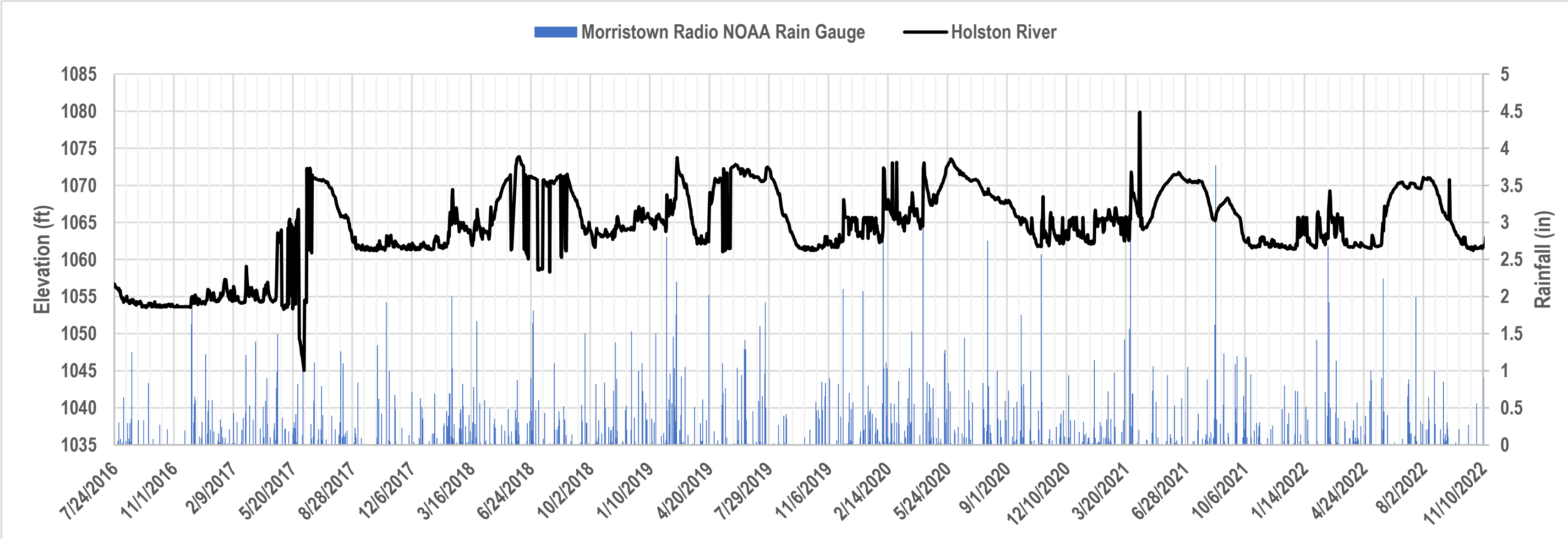
1/14/2022
4/24/2022
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
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7/29/2019
11/6/2019
2/14/2020
5/24/2020
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6/28/2021
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8/2/2022
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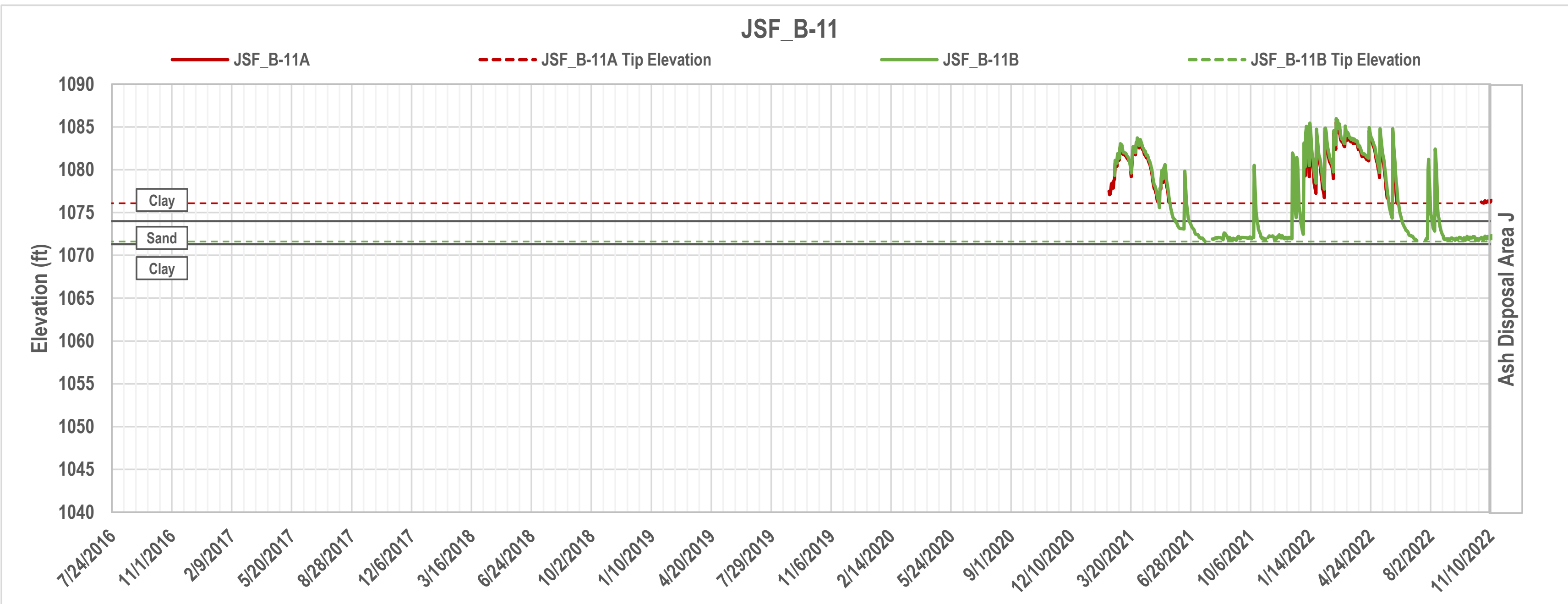

JSF_B-11
JSF_B-11A
JSF_B-11A Tip Elevation
JSF_B-11B
JSF_B-11B Tip Elevation
Elevation (ft)
Clay
Sand
Clay
Ash Disposal Area J
1090
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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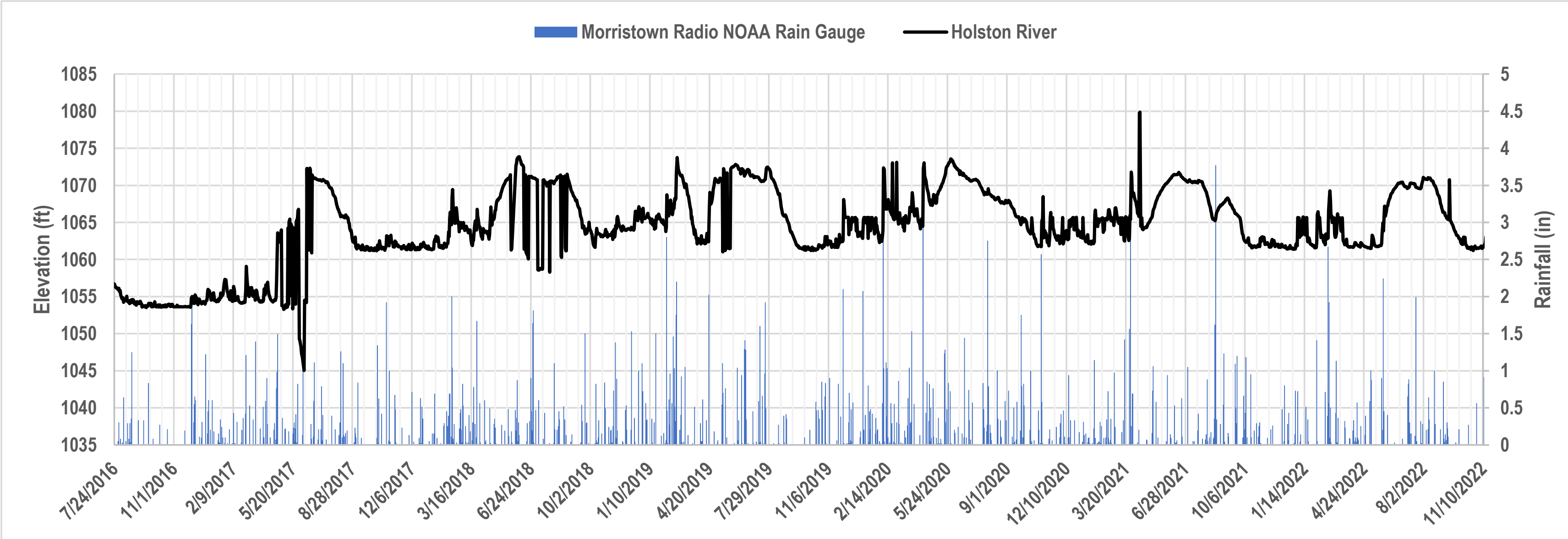
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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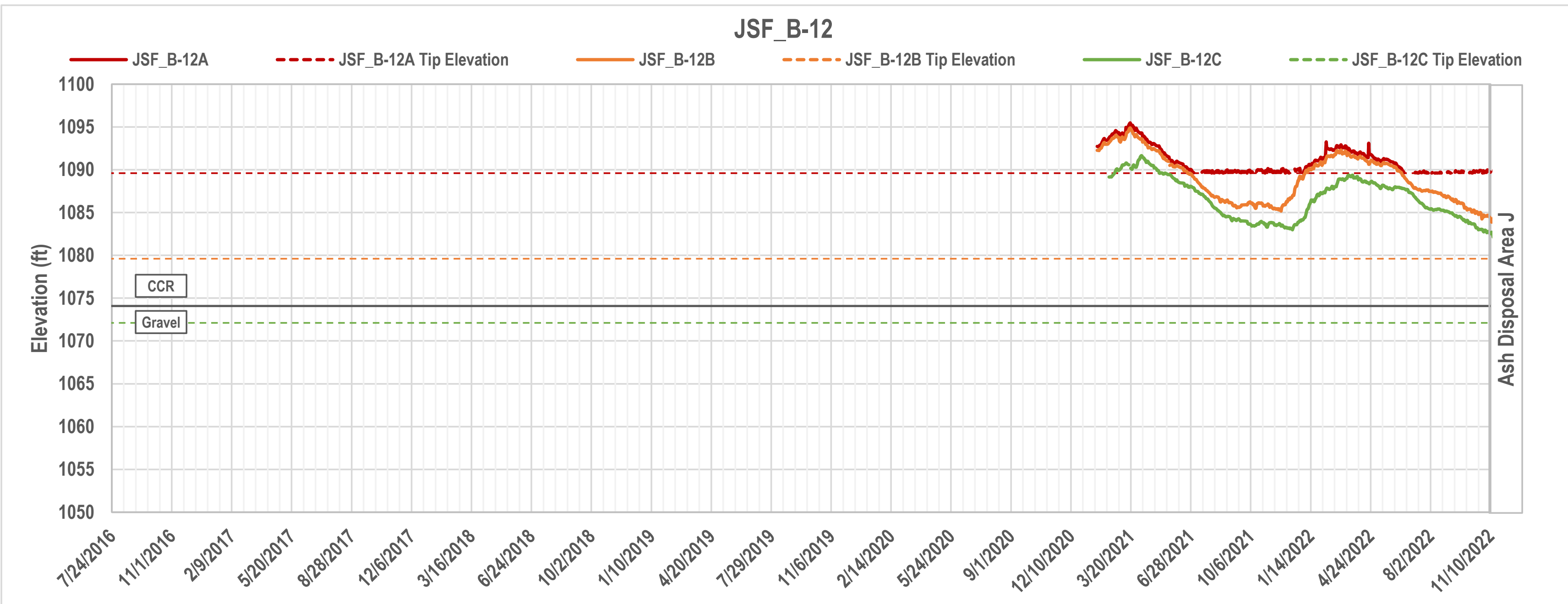
1/14/2022
4/24/2022
8/2/2022
11/10/2022



JSF_B-12
JSF_B-12A
JSF_B-12A Tip Elevation
JSF_B-12B
JSF_B-12B Tip Elevation
JSF_B-12C
JSF_B-12C Tip Elevation
Elevation (ft)
1100
1095
1090
1085
1080
1075
1070
1065
1060
1055
1050
CCR
Gravel
Ash Disposal Area J
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
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2/14/2020
5/24/2020
9/1/2020
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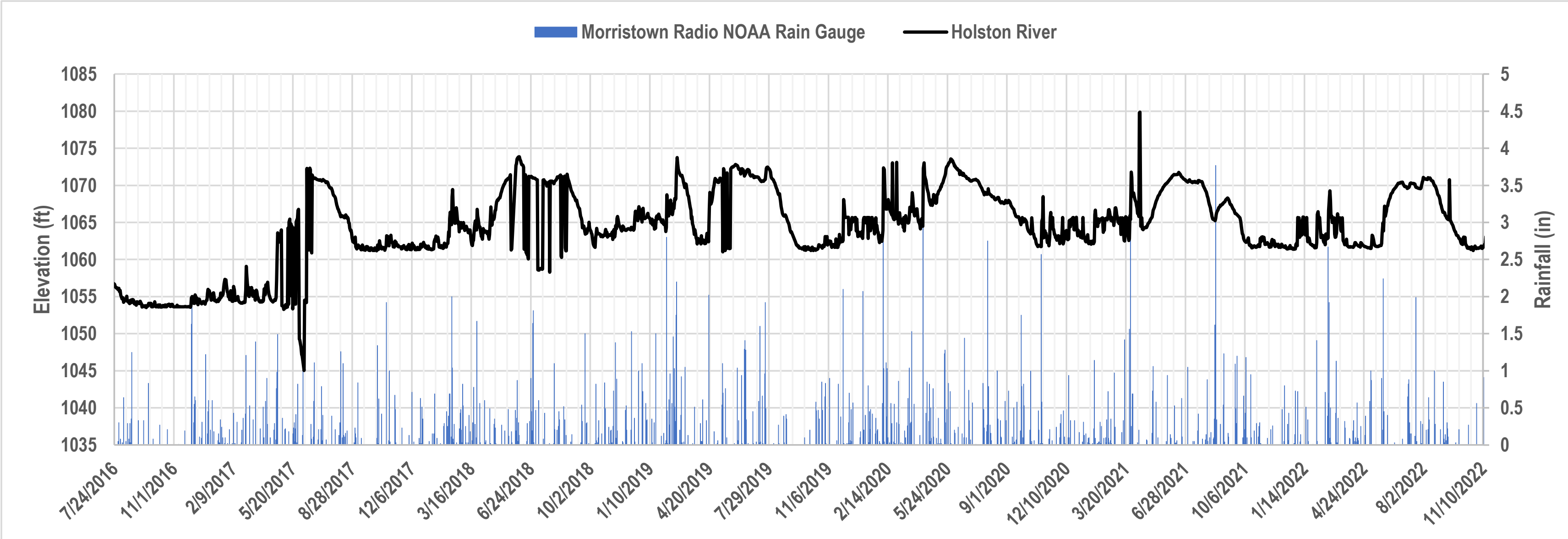
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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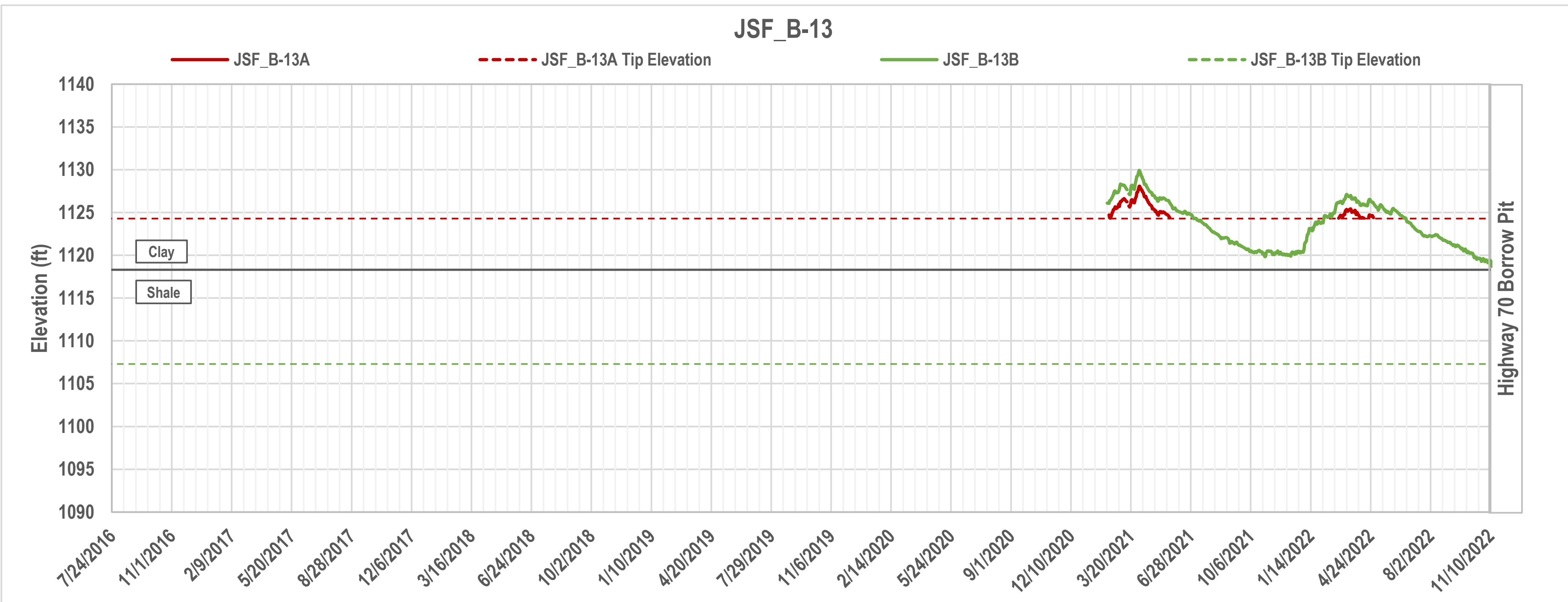
11/10/2022



JSF_B-13
JSF_B-13A
JSF_B-13A Tip Elevation
JSF_B-13B
JSF_B-13B Tip Elevation
Elevation (ft)
1140
1135
1130
1125
1120
1115
1110
1105
1100
1095
1090
Clay
Shale
Highway 70 Borrow Pit
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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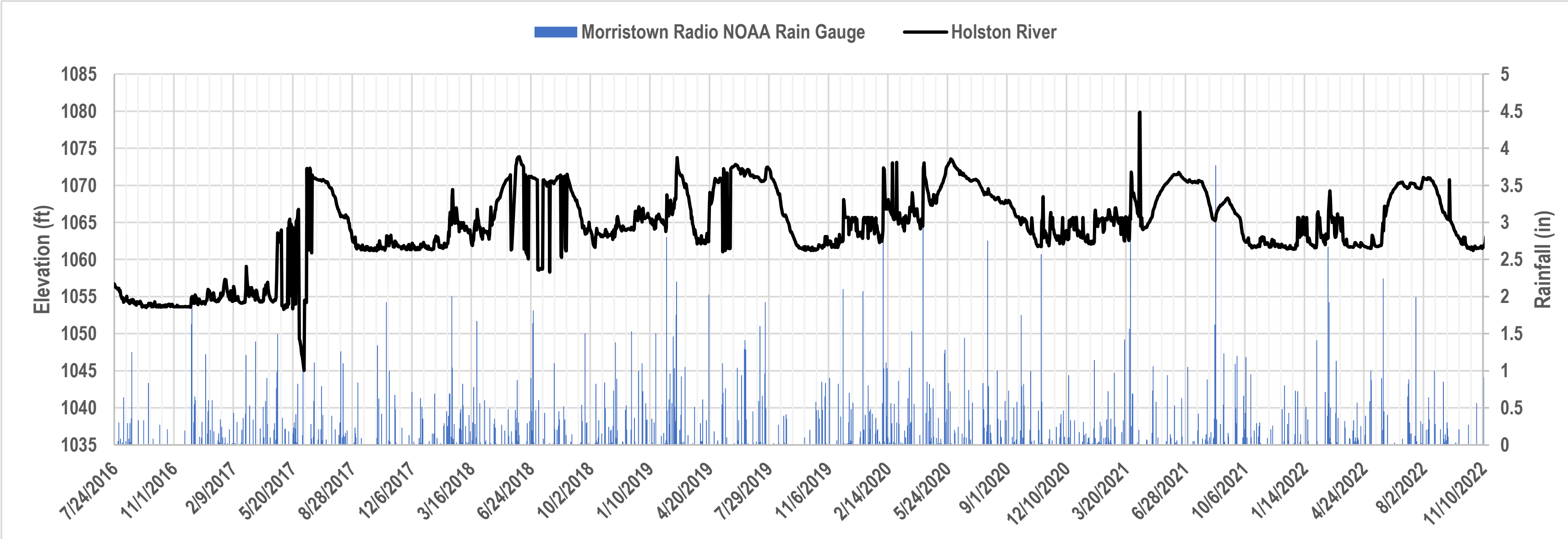
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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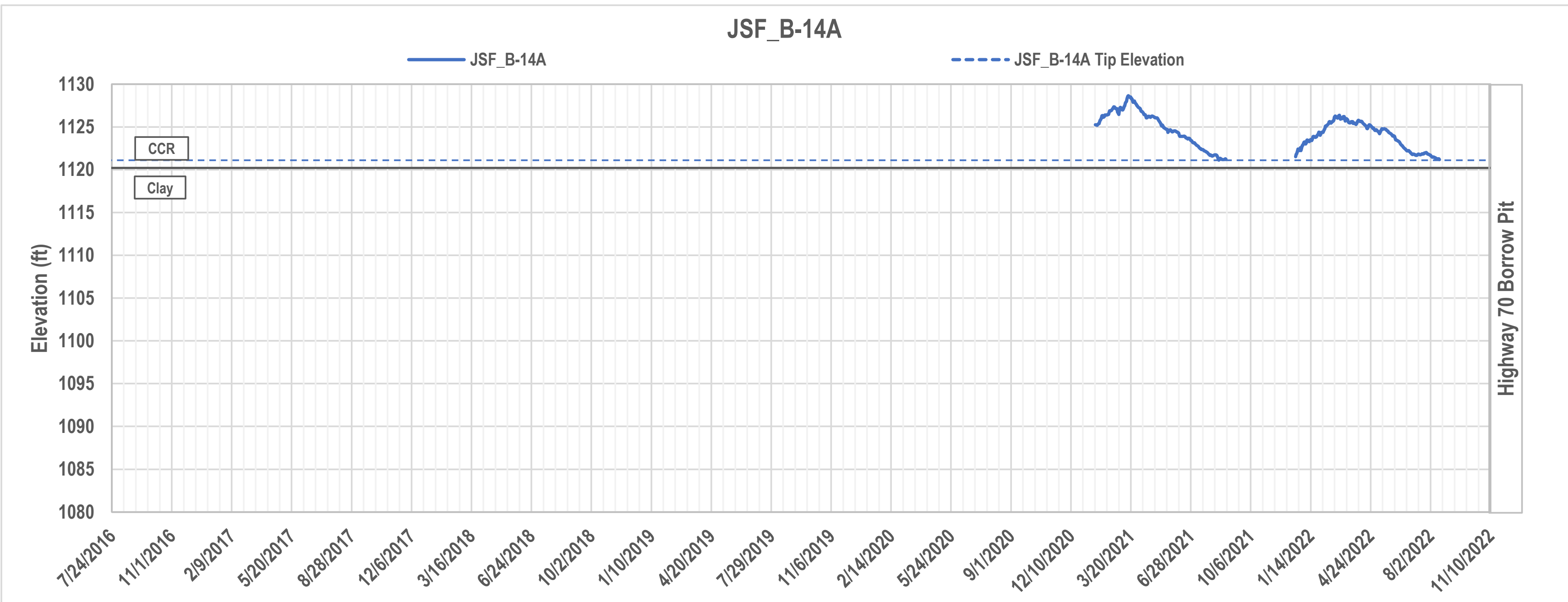
11/10/2022



JSF_B-14A
JSF_B-14A
JSF_B-14A Tip Elevation
Elevation (ft)
1130
1125
1120
1115
1110
1105
1100
1095
1090
1085
1080
CCR
Clay
Highway 70 Borrow Pit
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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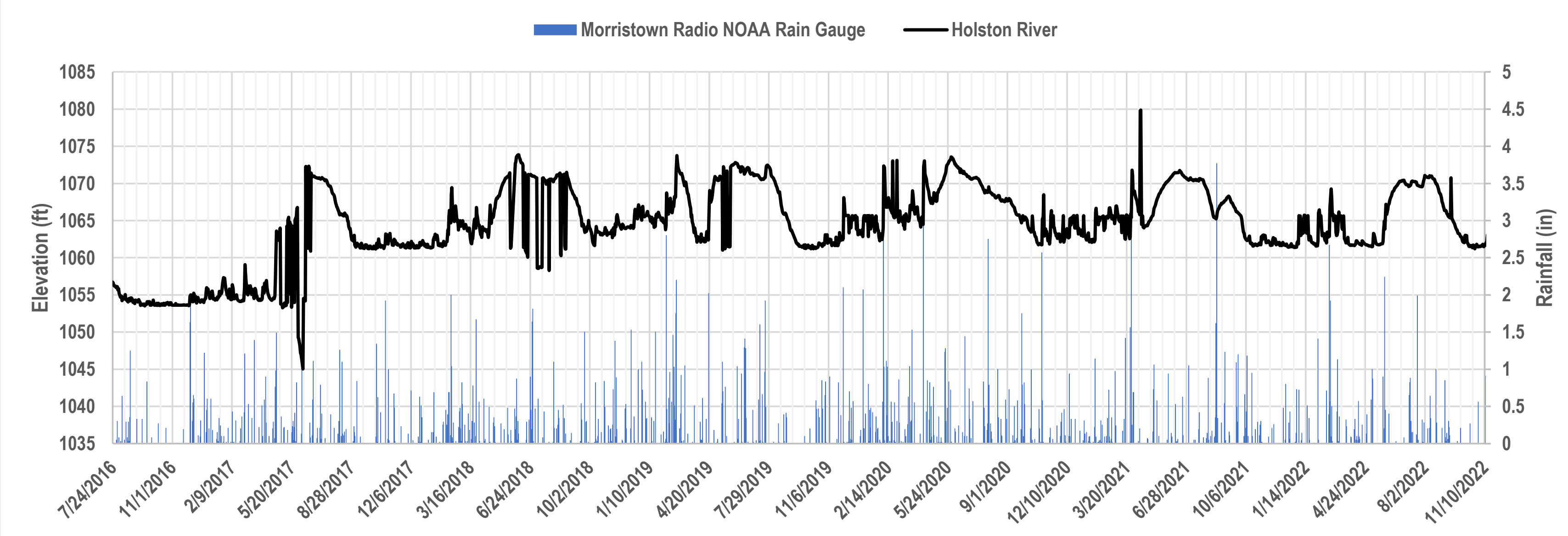
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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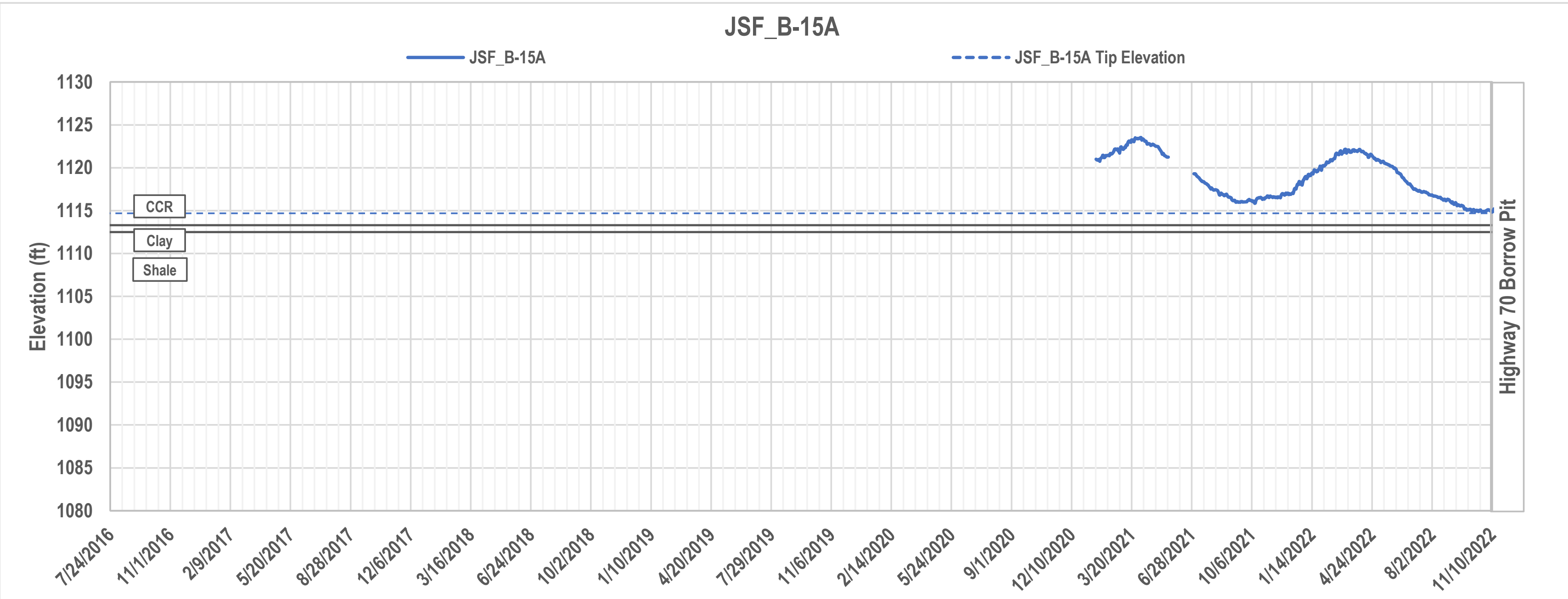

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JSF_B-15A
JSF_B-15A Tip Elevation
Elevation (ft)
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1125
1120
1115
1110
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1100
1095
1090
1085
1080
CCR
Clay
Shale
Highway 70 Borrow Pit
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
12/10/2020
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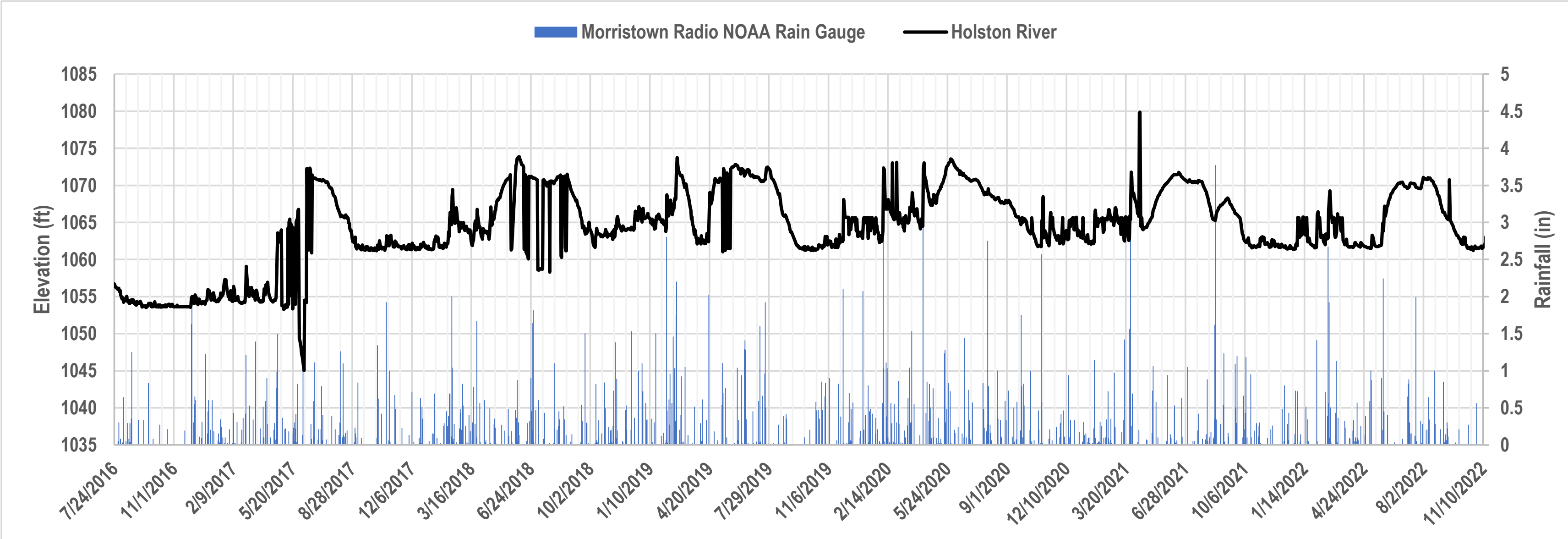
8/2/2022
11/10/2022



Morristown Radio NOAA Rain Gauge
Holston River
Elevation (ft)
Rainfall (in)
1085
1080
1075
1070
1065
1060
1055
1050
1045
1040
1035
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
4/20/2019
7/29/2019
11/6/2019
2/14/2020
5/24/2020
9/1/2020
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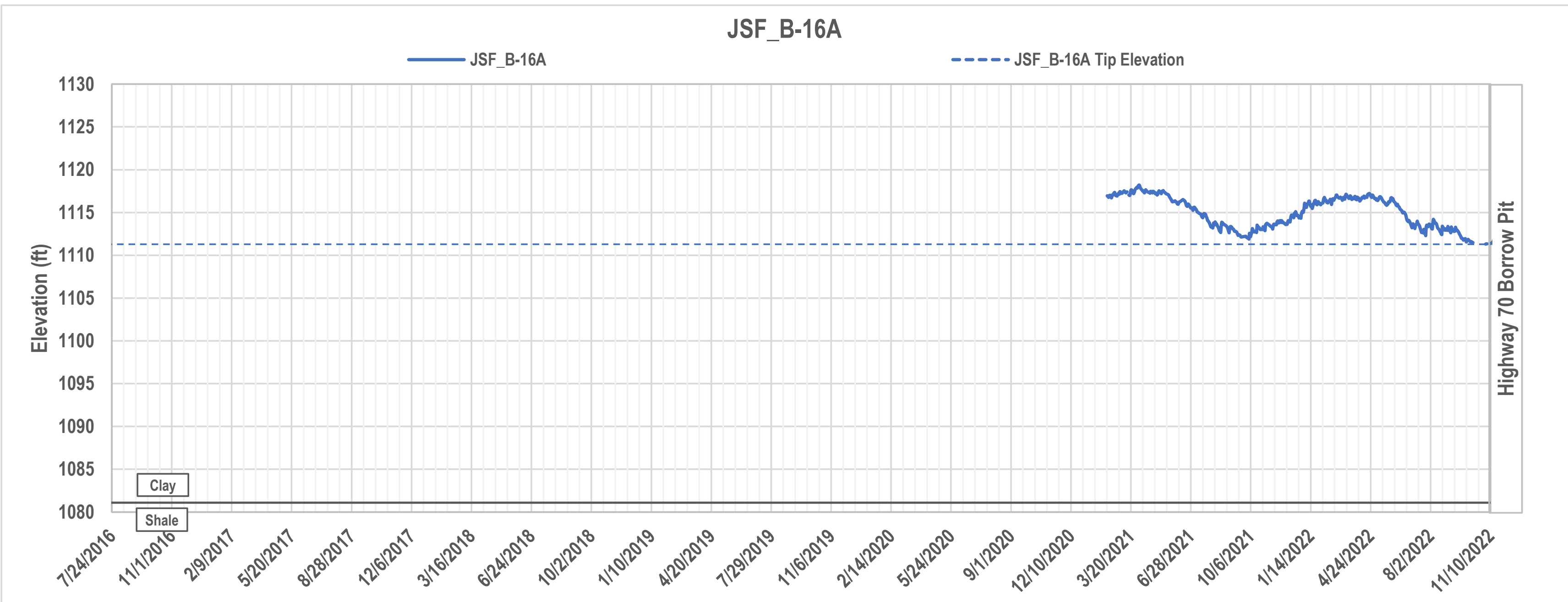
8/2/2022
11/10/2022



JSF_B-16A
JSF_B-16A
JSF_B-16A Tip Elevation
Elevation (ft)
1130
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1115
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1090
1085
1080
Clay
Shale
Highway 70 Borrow Pit
7/24/2016
11/1/2016
2/9/2017
5/20/2017
8/28/2017
12/6/2017
3/16/2018
6/24/2018
10/2/2018
1/10/2019
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5/24/2020
9/1/2020
12/10/2020
3/20/2021
6/28/2021
10/6/2021
1/14/2022
4/24/2022
8/2/2022
11/10/2022

ATTACHMENT H.1-D PIPER DIAGRAMS

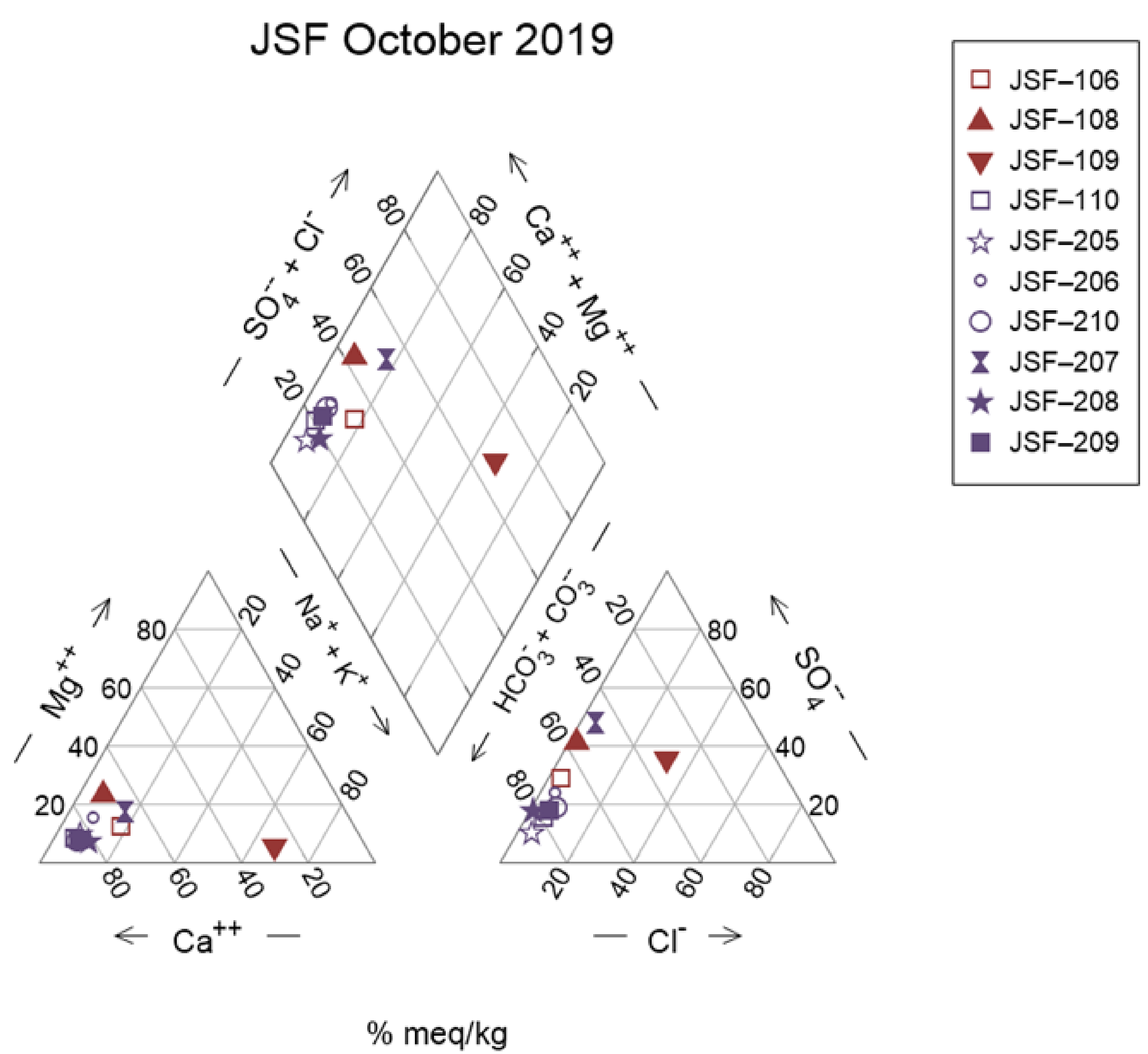

Figure No.

Title

Piper Diagram - October 2019

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by LMB on 2021-11-04
Technical Review by BL on 2021-11-04

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

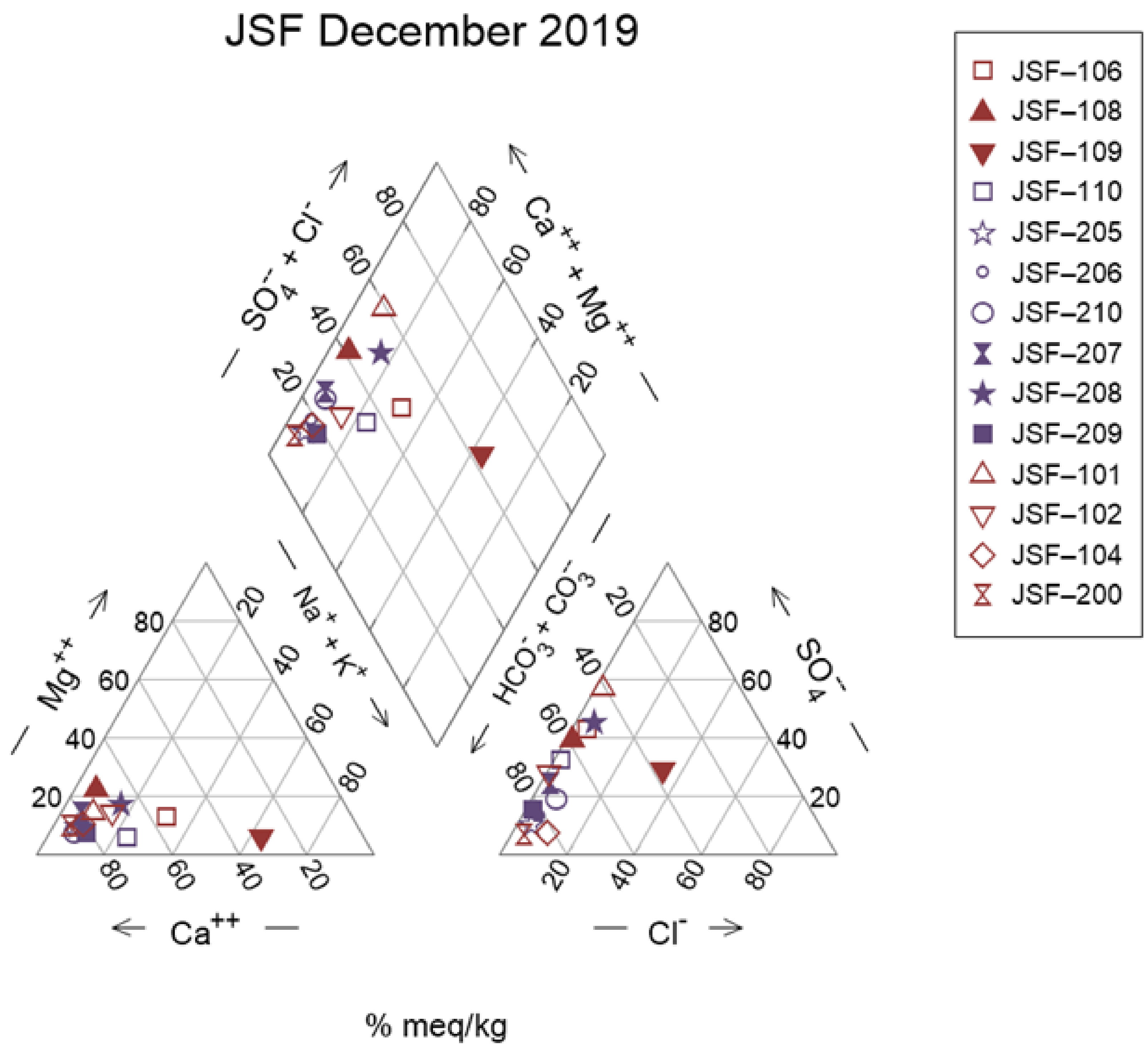

Figure No.

Title

Piper Diagram - December 2019

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by LMB on 2021-11-04
Technical Review by BL on 2021-11-04

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

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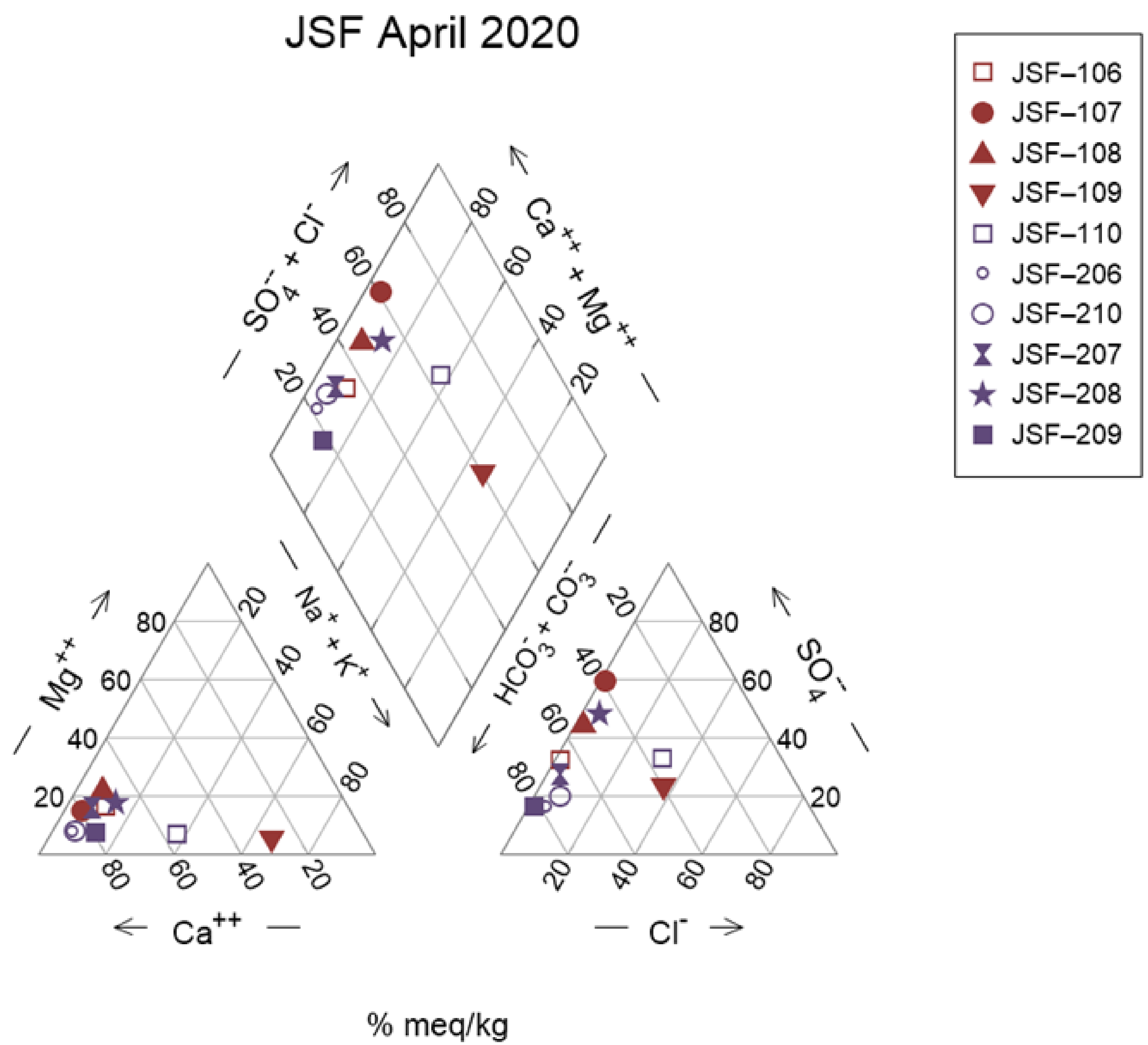

Figure No.

Title

Piper Diagram - April 2020

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by LMB on 2021-11-04
Technical Review by BL on 2021-11-04

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

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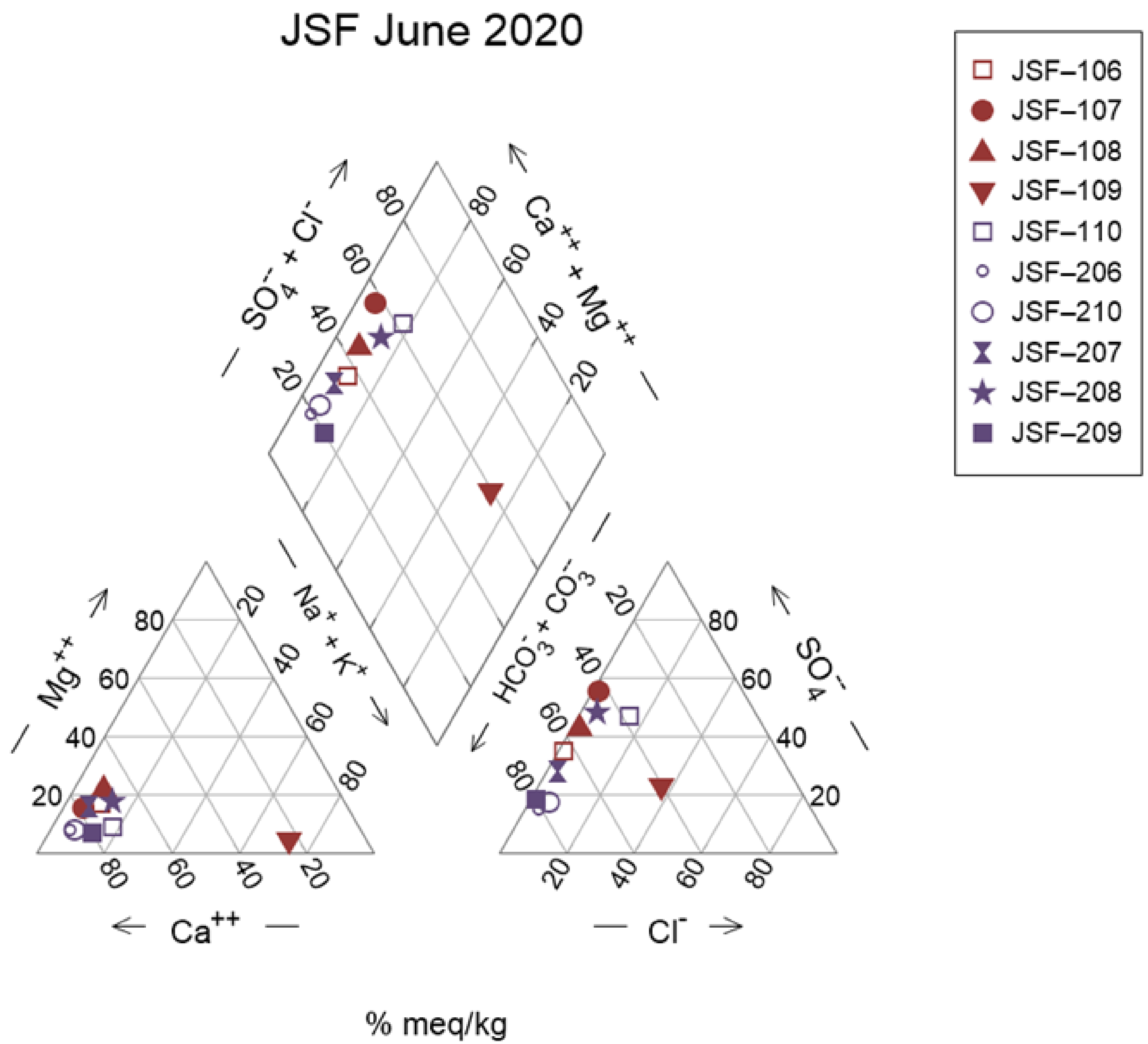

Figure No.

Title

Piper Diagram - June 2020

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

Prepared by LMB on 2021-11-04
Technical Review by BL on 2021-11-04

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\175568225_JSF_Phase2\gis\mxd\EAR\JSF_ExH.1-Bd_Piper_Jun2020.mxd Revised: 2021-11-04 By: lblackman

APPENDIX H.2

HYDROGEOLOGY INVESTIGATION SAMPLING AND ANALYSIS REPORT

Stantec

John Sevier Fossil Plant Hydrogeological Investigation Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

September 24, 2021

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

TVA

Prepared by:
Stantec Consulting Services Inc.
Lexington, Kentucky

Revision Record

Revision	Description	Date
0	Submittal to TDEC	April 9, 2021
1	Addresses May 11, 2021 TDEC Review Comments and Issued for TDEC	September 24, 2021

Sign-off Sheet

This document entitled John Sevier 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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APPENDIX A – EXHIBITS

APPENDIX B – TABLES

Abbreviations

ARM	ARM Group Inc.
ASTM	American Society for Testing and Materials
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
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
JSF Plant	John Sevier 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 John Servier Fossil (JSF) Plant located in Rogersville, Tennessee.

The purpose of the HGI was to install permanent monitoring wells to evaluate hydrogeological conditions at the JSF 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 JSF Plant. The evaluation of the results from this HGI will consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs, and be presented in the Environmental Assessment Report (EAR).

The HGI activities were performed in conjunction with the background soil investigation at the JSF Plant and 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)
- *Background Soil SAP* (Stantec 2018c)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The hydrogeological and background soil investigations were implemented in accordance with TVA- and TDEC-approved Programmatic- and Project-specific changes. Minor variations in scope and procedures from those outlined in the JSF Plant HGI SAP and Background Soil 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 JSF Plant in response to the TDEC Order. The activities conducted during the HGI support data collection for the groundwater and background soil investigations at the JSF Plant, including groundwater level measurements and groundwater and background soil 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 overburden and bedrock materials at the JSF Plant
- Use hollow-stem auger (HSA) and HQ3™ wireline or air rotary drilling techniques to collect soil and rock samples at staked locations approved by TDEC and considered suitable for the drilling rigs to safely drill
- Conduct pressure (packer) testing and downhole geophysics in pilot boreholes drilled into bedrock and measure groundwater quality field parameters to provide additional information regarding water bearing zones for well installation
- 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 and rock borings for geotechnical and lithologic information and installing piezometers to evaluate potential monitoring well locations
- Performing pressure testing and downhole geophysics in rock boreholes
- Collecting soil samples for analysis of geotechnical parameters (if deemed warranted). Rock core samples were collected for reference from JSF-206 and JSF-207
- Collecting soil samples for analysis of CCR-related constituents from the background monitoring well boring locations (as part of the Background Soil Investigation SAP)
- 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 JSF Plant. Soil sampling for CCR-related constituents was performed in accordance with the Background Soil SAP and reported in the JSF Plant Background Soil Investigation SAR.

3.0 FIELD ACTIVITIES

HGI field activities were conducted between January 22 and November 4, 2019 and consisted of: HSA drilling in overburden material, HQ3™ wireline with split barrel and surface set bit or air rotary drilling techniques in bedrock, pressure testing and downhole geophysics, monitoring well installation, well development, slug testing, pump installation, and well surveys. Prior to initiating field activities, TVA conducted environmental reviews, obtained 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, 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 12 borings for installation of six permanent monitoring wells and four background monitoring wells under the direction of a Stantec Professional Geologist (PG) licensed in the State of Tennessee
- Collected soil samples using a split-spoon sampler and rock core samples using a split barrel, and surface set bit to develop a continuous boring log/soil profile for each well boring and for potential analysis of geotechnical parameters (if deemed warranted)
- Collected two soil samples for analysis of CCR-related constituents from the screened interval depth ranges of two background monitoring well borings
- Performed pressure testing and downhole geophysics in two rock borings (JSF-206 and JSF-207)
- Installed temporary piezometers in three of the borings to determine if there was sufficient groundwater to install a monitoring well
- Developed each well and conducted slug tests in 10 wells to estimate hydraulic conductivity.

Following monitoring well installation, TVA constructed surface completions and Stantec or R.L.S Group surveyed each new permanent well.

3.1 WORK LOCATIONS

The HGI field activities were conducted at 12 soil boring/monitoring well locations at the JSF 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. Tables B.1 through B.7 in Appendix B provide data and information obtained at the HGI boring/monitoring well locations as described in Section 3.3.3. Subsurface logs for these locations are provided in Appendix C, and well installation details are provided in Appendix D.

3.1.1 Background Locations

Two of four background monitoring wells (JSF-106 and JSF-110) were installed in overburden materials, one background monitoring well (JSF-206) was installed in shallow bedrock, and one background monitoring well (JSF-210) was installed in deep bedrock to provide groundwater samples that have not been affected by the CCR units and to be representative of background conditions. Soil samples were collected from within the anticipated depth range for the well screened intervals at the two soil background monitoring well borings drilled in overburden as described in Section 3.3.2.2 and the Background Soil SAP.

3.1.2 Coal Combustion Residuals Unit Locations

Three permanent monitoring wells (JSF-107, JSF-108, JSF-109) were installed in overburden materials at locations anticipated to be downgradient of the CCR units to provide locations to evaluate groundwater flow and quality in these areas. As shown in Table 1, groundwater was not observed during the drilling and sampling of three downgradient borings (JSF-111, JSF-112Alt, and JSF-113Alt) where piezometers were installed to determine if groundwater was present in the overburden. Three bedrock monitoring wells (JSF-207, JSF-208 and JSF-209) were also installed to provide downgradient sampling locations.

Table 1. Summary of Boring and Monitoring Well Locations

Boring ID	Well ID	Location	Rationale
JSF-106	JSF-106	South of Ash Disposal Area J	To assess overburden groundwater flow and quality at a background location
JSF-107	JSF-107	Northeast of Ash Disposal Area J	To assess local overburden groundwater flow and quality downgradient of the CCR Units
JSF-108	JSF-108	Northwest of Ash Disposal Area J	To assess local overburden groundwater flow and quality downgradient of the CCR Units
JSF-109	NC	Between Ash Disposal Area J and the creek located west of Ash Disposal Area J	Boring JSF-109 was not completed as a monitoring well because CCR materials were encountered.
JSF-109Alt	NC	Between Ash Disposal Area J and the creek located west of Ash Disposal Area J	Boring JSF-109Alt was not completed as a monitoring well because CCR materials were encountered.
JSF-109Alt2	JSF-109	Between Ash Disposal Area J and the creek located west of Ash Disposal Area J	To assess local overburden groundwater flow and quality downgradient of the CCR Units

Table 1. Summary of Boring and Monitoring Well Locations (continued)

Boring ID	Well ID	Location	Rationale
JSF-110	JSF-110	Southeast of the Highway 70 Borrow Area	Co-located permanent monitoring wells to assess overburden (JSF-110), shallow bedrock (JSF-206) and deep bedrock (JSF-210) groundwater flow and quality at a background location
JSF-206S	JSF-206		
JSF-206	JSF-210		
JSF-111[(a)]	NC	Northeast of the Highway 70 Borrow Area	Temporary piezometer installed to assess local overburden groundwater flow and quality downgradient of the CCR Units. Groundwater not encountered in overburden. Piezometer replaced with bedrock well JSF-208.
JSF-208	JSF-208		Permanent monitoring well installed to assess bedrock groundwater flow and quality downgradient of the CCR Units.
JSF-112Alt[(a)]	NC	Northwest of the Highway 70 Borrow Area	Temporary piezometer installed to assess local overburden groundwater flow and quality downgradient of the CCR Units. Groundwater not encountered in overburden. Piezometer replaced with bedrock well JSF-207.
JSF-207	JSF-207		Permanent monitoring well installed to assess bedrock groundwater flow and quality downgradient of the CCR Units.
JSF-113Alt[(a)]	NC	West of the Highway 70 Borrow Area	Temporary piezometer installed to assess local overburden groundwater flow and quality downgradient of the CCR Units. Groundwater not encountered in overburden. Piezometer replaced with bedrock well JSF-209.
JSF-209	JSF-209		Permanent monitoring well installed to assess bedrock groundwater flow and quality downgradient of the CCR Units.

Notes:

(a) Boring was overdrilled for completion of bedrock well at the same location

CCR Coal Combustion Residuals
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. Field documentation for background soil sampling activities is described in the JSF Plant Background Soil Investigation SAR. 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*
- *Water Pressure Test Form*
- *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, TIs, or QAPP are summarized in the Variations section of this report.

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 Water Pressure Test Form

Stantec FSP completed a *Water Pressure Test Form* for each boring where downhole pressure testing and geophysics were performed. The form presented borehole name, water pressure test date, top and bottom of test section, gauge reading, time of test, interval of test, meter reading and total water volume. The water pressure test data were used to calculate hydraulic conductivity estimates, as summarized in Table B.1 in Appendix B.

3.2.1.4 Chain of Custody

Stantec FSP completed *COC* documentation for each geotechnical soil sample collected during the HGI. As described above, documentation of soil sample collection and analysis of CCR-related constituents for the background soil samples collected during the HGI are reported in the JSF Plant Background Soil Investigation SAR.

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 laboratory manager.

3.2.1.5 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.

3.2.1.6 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.

3.2.1.7 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.

3.2.1.8 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.

3.2.1.9 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 surface completions of installed monitoring wells 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. Additional information for drilling and sampling procedures at two background monitoring well locations installed in the overburden is provided in the Background Soil Investigation SAR. 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 using three drilling methods: HSA, HQ3™ wireline, and air rotary.

3.3.1.1 Hollow-Stem Auger

Eleven 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*. HSA borings were generally advanced 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 or 36 inches, to drive a standard size two-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. Following removal, the augers and split spoon samplers were decontaminated using a high-pressure steam cleaner and potable water after use at each boring.

Two HSA borings (JSF-109 and JSF-109Alt), drilled in overburden materials, encountered CCR material in soils recovered from depths of 15 to 21 feet below ground surface (ft bgs) and were not completed as permanent monitoring wells. These two borings were abandoned by backfilling the borings with 30% solids bentonite grout, and the boring was relocated to JSF-109Alt2.

Five HSA borings (JSF-106, JSF-107, JSF-108, JSF-109Alt2 and JSF-110) were completed as planned and finished with the installation of a permanent monitoring well in overburden materials. After reaching the targeted depth, the augers were withdrawn, and the borehole was overdrilled using an 8.25-inch inside diameter auger (resulting in approximately a 13-inch borehole diameter). Well installation procedures for the boreholes completed as permanent monitoring wells are described in Section 3.4.

Three HSA borings (JSF-111, JSF-112Alt, and JSF-113Alt) were completed with temporary piezometers to determine if there was sufficient groundwater in the overburden to install a monitoring well prior to drilling into bedrock. Groundwater was not encountered; therefore, the piezometers were removed and these borings were redrilled for completion as bedrock monitoring wells (JSF-208, JSF-207, and JSF-209, respectively), as described below in Sections 3.3.1.2 and 3.3.1.3.

3.3.1.2 HQ3™ Drilling

Two borings, which started as HSA borings (JSF-206 and JSF-207), were advanced by Stantec drillers licensed in Tennessee using HQ3™ wireline drilling techniques following procedures provided in ASTM D2113: *Practice for Rock Core Dilling and Sampling of Rock for Site Investigation*. After completion of overburden drilling, a four-inch flush-threaded steel casing was set in competent rock.Once the casing was set, the boring was advanced using HQ3™ (size) wireline tooling to retrieve bedrock cores in ten foot runs until the target depths were reached. Pressure testing was conducted in each borehole after retrieval of each ten foot run or after reaching the target depth as described in Section 3.3.3.1 below. Downhole geophysical testing was performed in each completed borehole as described in Section 3.3.3.2. Rock core samples were recovered for lithologic description, photographic documentation, and sample collection. Rock quality designation measurements followed ASTM D6032: *Test Method for Determining Rock Quality Designation (RQD) of Rock Core*. Following removal, the core rods and barrels were decontaminated using a high-pressure steam cleaner and potable water after use at each boring.

3.3.1.3 Air Rotary

Four bedrock borings (JSF-206 through JSF-209), which started as HSA borings in the overburden, were subsequently completed using air rotary drilling techniques. One bedrock boring (JSF-206, where bedrock well JSF-210 was installed) was completed using only air rotary drilling. Stantec utilized the subcontractor M&W Drilling for the air rotary portion of these borings, who provided a driller licensed in Tennessee to operate a truck-mounted air rotary drilling rig.

Air rotary techniques were used to ream out the boreholes to the intended depth in bedrock using an 8-inch diameter drill bit for installation of bedrock monitoring wells, as described in Section 3.4. Except for borings JSF-206 and JSF-207 (as described in Section 3.3.1.2), no bedrock samples were collected during drilling after completion of overburden drilling.

3.3.2 Soil Sampling

During advancement of each boring, the Stantec PG prepared field subsurface logs using a mobile data collection platform. 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 JSF Plant HGI are presented in Attachment C.1 in Appendix C.

Soil samples recovered from each boring were examined to provide lithologic information for a continuous boring log/soil profile and for analysis as described below.

3.3.2.1 Geotechnical Sampling

At HSA borings, following preparation of the subsurface logs, geotechnical soil samples were placed in laboratory-provided glass jars and labeled in general accordance with the HGI 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 3.2.1.4. The samples were temporarily placed in a secure storage unit onsite under custody protocols until transport and submittal to the geotechnical laboratory.

The recovered rock cores were placed in labeled wooden core boxes to measure the fractures and bedding plane orientation, note presence or absence of fracture filling and measure rock quality designation and core recovery. The core boxes were stacked and protected from the weather prior to transport to a storage facility.

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.

3.3.2.2 CCR Parameter Sampling

Soil samples were collected from two overburden background monitoring well boring locations (JSF-106 and JSF-110) for analysis of CCR-related constituents following procedures in the Background Soil SAP. Two soil samples were collected from the screened interval depth range of two background monitoring well borings and submitted for laboratory analysis:

- JSF-106 - one sample was collected (9.0 to 12.0 ft bgs)
- JSF-110 - one sample was collected (9.9 to 12.0 ft bgs).

As specified in the JSF Plant Background Soil SAP, the soil samples collected from the background monitoring well borings were analyzed for CCR-related constituents listed in Appendices III and IV of Title 40 of the Code of Federal Regulations (CFR) Part 257 (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 the 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 are hereafter referred to as “CCR Parameters.”

Background soil sampling investigation activities, including sampling procedures, laboratory information, and analytical results are presented in the JSF Plant Background Soil Investigation SAR.

3.3.3 Downhole Testing in Rock

To further characterize the bedrock hydrogeology, two borings (JSF-206 and JSF-207) were advanced into the Sevier Shale. At both boring locations, bedrock was encountered at approximately 17 ft bgs. Boring logs for JSF-206 and JSF-207 are included in Appendix C. As described in the HGI SAP, pressure testing, downhole geophysics, and groundwater quality field parameter measurements were conducted in the bedrock borings to provide additional information regarding water bearing zones for well installation. This information was discussed with TDEC and considered for bedrock well design, including the screened intervals, prior to well installation described in Section 3.4 below.

3.3.3.1 Pressure Testing

Pressure testing was conducted in two bedrock borings (JSF-206 and JSF-207) during drilling to provide estimates of the bedrock hydraulic conductivity. Potable water was pumped into the selected intervals at constant pressure for typically five minutes. The flow rate (i.e., volume of water lost into the bedrock formation) was measured using a flow meter at each selected depth interval, and estimates of hydraulic conductivity values were calculated from these field data based on the rate of flow into the formation at each location. For the pressure testing done for the JSF Plant HGI, the estimated hydraulic conductivity values were derived from the five pounds per square inch pressure reading summary. Table B.1 in Appendix B provides a summary of the estimated bedrock hydraulic conductivities from the bedrock boring intervals considered most likely to be productive based on borehole and geophysical data.

3.3.3.2 Downhole Geophysics

Downhole geophysical testing was performed by ARM Group Inc. (ARM), under contract to Stantec by completing the following borehole geophysical logs: natural gamma, fluid temperature, fluid resistivity, caliper, optical televiewer, acoustic televiewer, and heat pulse flowmeter (ambient and pumping). Downhole geoghysical logs are provided in Appendix E in the ARM geophysical testing report.

The geophysical logging information indicated that bedrock is comprised of fractured shale with the predominant strike of both the bedding planes and fractures oriented northeast/southwest. After the initial geophysical logging suite information was evaluated in the field, depths were chosen for the heat pulse flow meter logging to investigate groundwater producing intervals within the boreholes. Table B.2 in Appendix B presents the most likely groundwater producing intervals identified in the boreholes based on the heat pulse flow meter and other geophysical logging information.

3.3.3.3 Groundwater Quality Field Parameters Measurements

Groundwater quality field parameters were measured in the two bedrock borings since changes in these parameters might indicate the presence of different water-bearing zones. Water quality field parameter measurements for pH, temperature, specific conductance, and dissolved oxygen were conducted during bedrock drilling using a water quality meter (YSI ProPlus with flow-through cell) and recorded on field forms. The field parameters were measured by lowering the meter in 2.5-foot intervals and collecting a reading at each interval. A table is included in Appendix F summarizing this information.

Deflections in the water quality parameter readings from boring JSF-206 at approximately 38 to 48 feet bgs showed potentially different waters at this interval. Because of these observed deflections and the corresponding downhole geophysical test responses, a decision was made to install bedrock monitoring well JSF-210 in boring JSF-206 with the screened interval at approximately this depth.

3.4 MONITORING WELL INSTALLATION

3.4.1 Well Installation

Monitoring wells were installed 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.

One of the overburden borings (JSF-110) and three of the bedrock borings (JSF-207, JSF-208 and JSF-210) were backfilled with ¼-inch or 3/8-inch bentonite pellets placed in the lowest portion of the boring to a depth up to about two feet below the depth of the planned bottom of the well screen placement. The monitoring well was installed above the backfilled portion. Monitoring wells consisted of a four-inch diameter Schedule 40 polyvinyl chloride (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 logs and downhole testing results, where conducted, to identify the target stratum and varied from 4.9 to 10.0 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 (20/40 mesh) typically extending approximately two feet above andup to two feet below the screen. A bentonite pellet seal at least 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.3 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.4 in Appendix B.

3.4.3 Hydraulic Conductivity (Slug) Testing

After development, Stantec performed slug tests in the 10 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 four rising-head and up to four falling-head slug tests were performed at each well, as shown on Table B.5 in Appendix B. Falling head slug tests were not performed at wells JSF-107 and JSF-110 because there was not enough saturated water column to completely submerge the slug. 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 zero 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 JSF 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.5 in Appendix B, and the software output package is provided in Appendix G. The following assumptions and methods were utilized for the calculations:

- The analysis was completed using the Bouwer-Rice method. The solution was matched to the normalized plotted recovery data between 70-80% recovery, except as described below.
- Data from well JSF-108 indicated that the recovery was two-tailed. The early data from the April 2019 tests appear to recover too slowly to represent filter pack; therefore, the solution was conservatively matched to the later data. The well JSF-108 test that was conducted in October 2019 includes early data that does appear to represent filter pack (quicker recovery than April tests), so the solution was matched to later data.
- The recovery data at well JSF-209 also indicated a two-tailed recovery period; the steep initial recovery period was assumed to be filter pack, and the solution was matched to the later data.
- For the analysis of wells JSF-108 and JSF-109, two tests were completed during different events (April 2019 and October 2019); the measured depths to groundwater were not identical for the events, so the saturated thicknesses were based on the static groundwater level on the date of the test.

3.4.4 Pump Installation

A new, decontaminated, dedicated QED Environmental Systems, Inc. brand dedicated 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 Q*ED Well Wizard Dedicated Sampling Pump Installation Checklist* and the *Dedicated Pump Calibration Form*. Pump installation information is provided in Table B.6 in Appendix B.

3.4.5 Well Surveys

After the surface completions for each monitoring well were installed, the wells were professionally surveyed using a survey-grade GPS for horizontal and vertical control. Measurements were calculated relative to the coordinate systems used by the JSF Plant. Well survey information is provided in Table B.7 in Appendix B.

3.5 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during the HGI included:

- Soil cuttings
- Used calibration fluids
- 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*; the HGI SAP; the JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW were coordinated with the JSF Plant facility management. Soil cuttings, used calibration fluids, decontamination fluids, and well development water were managed as authorized by JSF 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 JSF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Proposed borings JSF-111, JSF-112 and JSF-113 were relocated as approved by TDEC because of access restrictions.
- Select geotechnical samples were not analyzed as specified in the SAP as part of the TDEC order because sufficient lithologic and geotechnical information were available from other EIP drilling activities to meet the objectives of the HGI.
- Borings JSF-110, JSF-111, JSF-112 and JSF-113 did not encounter groundwater within the overburden even after temporary piezometers were installed to monitor over a longer period.

Therefore, after receiving TDEC approval, bedrock borings were drilled at each of these locations and permanant wells installed.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- The original boring location for JSF-109 was relocated as JSF-109Alt and then as JSF-109Alt2 because CCR materials were encountered in JSF-109 and JSF-109Alt. Although adjusted, the final location of boring JSF-109 was drilled about 20 feet west of the planned location, achieving the intent of HGI SAP.
- Falling head slug tests were not performed at wells JSF-107 and JSF-110 because there was not enough saturated water column to completely submerge the slug.
- Well JSF-106 was only completed to a total depth of 14.0 ft bgs; therefore, the sand filter pack extended 1.6 feet above the screen instead of the minimum two feet, and the overlying bentonite seal extended one foot above the filter pack instead of the minimum two feet as required in the SAP. Sufficient filter pack and seal are present above the screened interval for representative groundwater sampling.
- During the first day of development activities at well JSF-107, field parameters were inadvertently not measured. When development activities resumed the following day, field parameters were measured during the entirety of the purging activities until stabilization criteria were met.

4.0 SUMMARY

The data presented in this report are from the HGI at the JSF Plant. Ten permanent monitoring wells were installed during the HGI to support data collection for the groundwater and background soil investigations at the JSF Plant, including groundwater level measurements, and groundwater and background soil sample collection for analysis of CCR Parameters. The scope of work for the HGI included:

- Drilled 12 soil borings for installation of six permanent monitoring wells and installation of four background monitoring wells at the JSF Plant
- Collected soil samples or rock core to develop a continuous boring log/soil or rock profile for each overburden well boring and two bedrock well borings
- Collected two soil samples for analysis of CCR Parameters from the screened interval depth range of two overburden background monitoring well borings
- Collected pressure testing and downhole geophysics in two bedrock boreholes
- Installed permanent monitoring wells in 10 of the borings and constructed surface completions
- Developed each new monitoring well
- Conducted slug testing in the 10 wells to estimate hydraulic conductivity
- Surveyed each new permanent well.

A summary of boring and monitoring well locations is presented in Table 1. Hydraulic conductivity estimates derived from pressure testing, borehole producing/receiving zones derived from downhole geophysics methods, monitoring well construction specifications, well development, hydraulic testing results, pump installation details, and survey information are presented in Tables B.1 through B.7, respectively. Background soil sampling information and analytical results are reported in the Background Soil Investigation SAR, and groundwater level measurement and sampling analytical results are reported in a series of Groundwater Investigation SARs for the JSF Plant.

Stantec has completed an HGI at the JSF Plant in Rogersville, 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 background soil investigation and 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). ASTM. D1586: *Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils*.

ASTM. D2113: *Practice for Rock Core Drilling and Sampling of Rock for Site Investigation*.

ASTM. D4044: *Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers*.

ASTM. D6032: *Test Method for Determining Rock Quality Designation (RQD) of Rock Core.*

ASTM. D6151: *Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling.*

Environmental Standards, Inc. 2018. Quality Assurance Project Plan for the Tennessee Valley Authority John Sevier Fossil Plant Environmental Investigation. Revision 2. Prepared for Tennessee Valley Authority. October 2018.

Munsell Color. 2009. Munsell Soil Color Book.

Stantec Consulting Services Inc. (Stantec). 2018a. *Hydrogeological Investigation Sampling and Analysis Plan (SAP), John Servier Fossil Plant.* Revision 3 Final. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant.* Revision 3 Final. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018c. Background Soil Sampling and Analysis Plan, John Servier Fossil Plant. Revision 3 Final. Prepared for Tennessee Valley Authority. October 19, 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
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2020-06-18
Technical Review by MT on 2020-06-18

0 200 400 600 800 Feet

1:2,400 (At original document size of 22x34)

Legend

- Monitoring Well (Survey 4/11/2019 and 8/7/2019) — Well Name / Boring Name
- Drilled and Abandoned Borehole — Boring Name
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)

Stantec

TVA

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APPENDIX B - TABLES

Table B.1 - Summary of Hydraulic Conductivity Estimates Derived from Pressure Testing
John Sevier Fossil Plant
May 2019

Boring ID	Depth Interval (ft)		Test Length (ft)	Flow Rate (gal/min)	Total Head (ft)	Hydraulic Conductivity (cm/sec)
JSF-206	19.0	26.1	7.1	8.90	40.2	1.3E-03
JSF-206	25.1	36.1	11.0	3.07	48.3	2.6E-04
JSF-206	38.1	46.1	8.0	1.57	59.8	1.4E-04
JSF-206	46.1	55.0	8.9	0.90	68.2	6.4E-05
JSF-207	21.5	26.9	5.4	1.64	41.9	2.7E-04
JSF-207	30.4	36.7	6.3	2.76	51.2	3.4E-04
JSF-207	36.7	46.7	10.0	2.09	59.4	1.6E-04
JSF-207	46.7	56.7	10.0	1.12	69.4	7.1E-05

Notes:

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

1. At well JSF-206 the packer test failed at depth interval 19.0-26.1 feet due to packer breach.

Table B.2 - Summary of Borehole Producing/Receiving Zones
John Sevier Fossil Plant
May 2019

Boring ID	Producing/Receiving Zones (ft bgs) Ambient Conditions	Producing/Receiving Zones (ft bgs) Pumping Conditions
JSF-206	20-22 (R)	---
JSF-206	35-36 (R)	35-36 (R)
JSF-206	43-45 (P)	43-45 (P)
JSF-206	---	48-49 (P)
JSF-206	53-55 (P)	53-55 (P)
JSF-207	33-35 (R)	33-35 (P)
JSF-207	43-45 (P)	43-45 (P)
JSF-207	49-51 (P)	49-51 (P)

Notes:

1	Producing and receiving zones based on heat pulse flow meter borehole logging and other geophysical data presented in Appendix E.
ID	Identification
R	Receiving Zone
P	Producing Zone
ft	Feet
bgs	Below Ground Surface
---	No Response

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Table B.3 - Summary of Monitoring Well Construction Specifications
John Sevier Fossil Plant
January-June 2019

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
JSF-106	3.4	1,098.21	14.0	17.4	1,080.8	8.7	13.6	12.1	17.0	1086.1	1081.2
JSF-107	3.4	1,109.75	35.6	39.0	1,070.7	25.4	35.2	28.8	38.6	1081.0	1071.2
JSF-108	3.5	1,109.41	48.4	51.9	1,057.5	38.0	48.0	41.5	51.5	1067.9	1057.9
JSF-109	3.5	1,104.72	42.9	46.4	1,058.3	32.7	42.5	36.2	46.0	1068.5	1058.7
JSF-110	3.4	1,142.44	15.2	18.6	1,123.8	9.9	14.8	13.3	18.2	1129.1	1124.2
JSF-206	4.2	1,142.73	29.7	33.9	1,108.8	19.5	29.3	23.7	33.5	1119.0	1109.2
JSF-207	3.6	1,112.71	39.3	42.9	1,069.8	29.1	38.9	32.7	42.5	1080.0	1070.2
JSF-208	4.8	1,112.22	41.5	46.3	1,065.9	31.3	41.1	36.1	45.9	1076.1	1066.3
JSF-209	4.0	1,140.39	33.9	37.9	1,102.5	23.7	33.5	27.7	37.5	1112.7	1102.9
JSF-210	3.7	1,142.75	48.1	51.8	1,091.0	37.9	47.7	41.6	51.4	1101.2	1091.4

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 April 11, August 7 and November 4, 2019

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Table B.4 - Summary of Well Development Data
John Sevier Fossil Plant
April-August 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
JSF-106	5.99	6.07	25.2	7.05	358	357	14.4	14.0
JSF-107	6.27	6.27	1.23	0.92	502	505	15.4	15.3
JSF-108	6.69	6.58	35.0	6.16	1,230	1,240	16.3	17.4
JSF-109	6.69	6.69	11.8	2.68	940	850	21.3	21.2
JSF-110	4.77	4.87	14.7	4.94	54	54	13.0	12.9
JSF-206	7.29	7.33	>1,000	9.10	499.4	486.7	16.5	18.1
JSF-207	7.82	7.50	>1,000	9.69	538	519	16.7	17.2
JSF-208	7.14	7.01	>1,000	9.61	1,141	1,010	17.0	17.8
JSF-209	7.05	6.98	>1,000	4.98	576.1	663	17.2	18.5
JSF-210	6.93	7.02	>1,000	8.79	660	604	16.7	17.5

Notes:

>	result greater than
DEG C	degrees Celsius
ID	identification
NTU	Nephelometric Turbidity Unit
uS/cm	microSiemens per centimeter

1.During the first day of development activities at well JSF-107, field parameter measurements were inadvertently not measured. The values presented in this table reflect initial and final field parameter measurements made during the second and final day of development at this well.

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Table B.5 - Summary of Hydraulic Conductivity Testing Results Derived from Slug Testing
JSF Fossil Plant
April and October 2019

Well ID	Saturated Thickness	Number of Tests		Average Hydraulic Conductivity	Average Hydraulic Conductivity
		Falling Head	Rising Head		
	ft			ft/day	cm/s
JSF-106	8.55	4	3	0.8053	2.8E-04
JSF-107	1.56	0	3	0.9265	3.3E-04
JSF-108	8.33 and 7.35	3	3	0.0417	1.5E-05
JSF-109	6.11 and 5.27	1	2	0.0245	8.6E-06
JSF-110	2.84	0	3	8.2740	2.9E-03
JSF-206	12.7	3	2	4.2404	1.5E-03
JSF-207	20.86	3	3	2.6342	9.3E-04
JSF-208	31.39	1	1	0.0403	1.4E-05
JSF-209	12.28	4	4	0.7053	2.5E-04
JSF-210	31.14	2	3	1.4514	5.1E-04

Notes:

cm/s centimeters per second
ft feet
ID identification

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Table B.6 - Summary of Pump Installation Details
John Sevier Fossil Plant
January-June 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
JSF-106	1,098.21	17.4	1,080.8	7.61	1,090.60	16.0	1,082.2	8.4
JSF-107	1,109.75	39.0	1,070.8	36.42	1073.33	37.5	1,072.2	1.1
JSF-108	1,109.41	51.9	1,057.5	37.55	1071.86	50.0	1,059.4	12.5
JSF-109	1,104.72	46.4	1,058.3	33.75	1070.97	45.0	1,059.7	11.3
JSF-110	1,142.44	18.6	1,123.8	15.70	1126.74	17.0	1,125.4	1.3
JSF-206	1,142.73	33.9	1,108.8	17.80	1124.93	28.5	1,114.2	10.7
JSF-207	1,112.71	42.9	1,069.8	19.90	1092.81	36.5	1,076.2	16.6
JSF-208	1,112.22	46.3	1,065.9	27.05	1085.17	40.5	1,071.7	13.5
JSF-209	1,140.39	37.9	1,102.5	21.83	1118.56	32.5	1,107.9	10.7
JSF-210	1,142.75	51.8	1,090.0	16.83	1125.92	46.5	1,096.3	29.7

Notes:

btoc	below top of casing
ft	feet
ID	identification
NGVD29	National Geodetic Vertical Datum of 1929

1. Wells were installed from January 12, 2019 through June 28, 2019.
2. Depth data are from *QED Well Wizard Dedicated Sampling Pump Installation Checklists* dated August 1-13, 2019. Depth to groundwater level was measured prior to pump insertion. Pump intake and water column above intake rounded to nearest 0.1 foot.

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Table B.7 - Summary of Monitoring Well Survey Data
John Sevier Fossil Plant
April-August 2019

Well ID	TN State Plane Northing	TN State Plane Easting	Latitude	Longitude	Ground Surface Elevation
	ft NAD27 Plant	ft NAD27 Plant	DMS NAD27 Plant	DMS NAD27 Plant	ft NGVD29
JSF-106	733,018.92	2,887,105.85	N36°22'05.56"	W82°59'11.83"	1,094.8
JSF-107	733,849.62	2,887,998.51	N36°22'13.50"	W82°59'00.61"	1,106.3
JSF-108	733,309.62	2,886,321.05	N36°22'08.67"	W82°59'21.31"	1,106.0
JSF-109	732,996.05	2,885,961.58	N36°22'05.68"	W82°59'25.82"	1,101.2
JST-110	732,649.53	2,889,835.21	N36°22'01.07"	W82°58'38.61"	1,139.0
JSF-206	732,659.08	2,889,831.52	N36°22'01.17"	W82°58'38.66"	1,138.6
JSF-207	733,197.04	2,889,257.88	N36°22'06.66"	W82°58'45.46"	1,109.1
JSF-208	733,186.14	2,889,595.83	N36°22'06.45"	W82°58'41.34"	1,107.4
JSF-209	732,777.44	2,889,195.49	N36°22'02.53"	W82°58'46.38"	1,136.4
JSF-210	732,667.53	2,889,831.36	N36°22'01.25"	W82°58'38.65"	1,139.0

Notes:

DMS	Degrees, Minutes, Seconds
ft	feet
ID	identification
NAD27	North American Datum of 1927
NGVD29	National Geodetic Vertical Datum of 1929
TN	Tennessee

1. Wells were surveyed on April 11, 2019, August 7, 2019 and November 4, 2019. Coordinates are for the top of well casing, except ground surface elevation which is adjacent to the concrete well pad. Plant Local 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.

Client Borehole ID	N/A	Stantec Boring No.	**JSF-106**
Client	Tennessee Valley Authority	Boring Location	733,018.92 N; 2,887,105.85 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1094.8 ft; Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	1/23/19; Completed 1/24/19
Project Location	Hawkins Co, Rogersville, Tennessee	Depth to Water	7.5 ft; Date/Time 1/23/19 16:00
Inspector	C. Sexton; Logger C. Sexton	Depth to Water	5.6 ft; Date/Time 1/24/19 08:30
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 Depth 15.0 ft

Sampler Hammer Type Automatic — Weight 140 lb — Drop 30" — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans — Approved By P. Dunne

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	1094.8		Top of Hole				
0.5	1094.3		Topsoil				
3.0	1091.8		SILTY LEAN CLAY, CL, 10YR 5/3 (brown) and 10YR 6/8 (brownish yellow), low plasticity, soft to medium stiff, dry to moist Trace Mn nodules from 0.5' to 2.5' Color change to 10YR 5/4 (yellowish brown) at 1.5'	SS01G	0.0 - 1.5	1.5	WH-3-4
				SS02G	1.5 - 3.0	1.5	3-5-4
6.0	1088.8		SILTY LEAN CLAY, CL, 10YR 6/4 (light yellowish brown), medium plasticity, soft, dry to moist, trace Mn nodules	SS03G	3.0 - 4.5	1.0	2-1-2
			Low to medium plasticity, stiff at 4.5'	SS04G	4.5 - 6.0	1.5	3-5-5
			SILTY LEAN CLAY, CL, 10YR 6/4 (light yellowish brown) and 10YR 7/1 (light gray), medium plasticity, medium stiff, dry to moist, mottled	SS05G	6.0 - 7.5	1.5	3-3-4
			Color change to 10YR 6/6 (brownish yellow) and 10YR 7/1 (light gray), low to medium plasticity, moist at 7.5'	SS06G	7.5 - 9.0	1.3	2-3-3
			Color change to 10YR 5/8 (yellowish brown) and 10YR 7/1 (light gray), trace Mn nodules at 9.0'	SS07E	9.0 - 10.5	1.5	2-2-4

Client Borehole ID	N/A	Stantec Boring No.	**JSF-106**
Client	Tennessee Valley Authority	Boring Location	733,018.92 N; 2,887,105.85 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1094.8 ft — Elevation Datum NGVD29

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] / RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
10.5	1084.3		9.0/12.0-20190124				
10.8	1084.0		SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 6/4 (light yellowish brown) with 10YR 7/1 (light gray), low to medium plasticity, soft, moist	SS08E	10.5 - 12.0	1.5	2-1-3
			SILTY LEAN CLAY, CL, 10YR 5/6 (yellowish brown) and 10Y 7/1 (light greenish gray), non-plastic, stiff, dry, thinly laminated weathered shale, high angle laminations Color change to 10YR 6/4 (light yellowish brown) and 10Y 7/1 (light gray), low to medium plasticity, soft, moist, mottled; 0.3' dry brittle brown silty clay at 12.0' Color change to 10YR 5/3 (brown) and 10YR 6/1 (gray) at 13.5'	SS09G	12.0 - 13.5	1.5	2-1-3
14.2	1080.6		SILTY LEAN CLAY, CL, 10YR 4/2 (dark grayish brown) and 10YR 4/1 (dark gray), low to medium plasticity, stiff, dry, thinly laminated	SS10G	13.5 - 15.0	1.5	2-6-40
14.9	1079.9		Shale, dry				
15.0	1079.8		Refusal / Bottom of Hole at 15.0 Ft.				

Top of Rock = 14.9 Ft.
Top of Rock Elevation = 1079.9 Ft.

See installation log for permanent well JSF-106 for backfill information.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 11/4/20

SUBSURFACE LOG

Client Borehole ID N/A
Stantec Boring No. **JSF-107**
Client Tennessee Valley Authority
Boring Location 733,849.62 N; 2,887,998.51 E NAD27 Plant Local
Project Number 175568225
Surface Elevation 1106.3 ft
Elevation Datum NGVD29
Project Name JSF TDEC Order
Date Started 2/26/19
Completed 2/27/19
Project Location Hawkins Co, Rogersville, 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 Stantec Consulting Services Inc.
Drill Rig Type and ID CME 55T#2, #711
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 Depth 35.5 ft
Sampler Hammer Type Automatic
Weight 140 lb
Drop 30"
Efficiency N/A
Borehole Azimuth N/A
Borehole Inclination (from Vertical) N/A
Reviewed By B. Evans
Approved By P. Dunne

Lithology Depth Ft[3]	Lithology Elevation	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	1106.3	Top of Hole				
0.8	1105.5	Rock Fill	SS01G	0.0 - 1.5	1.4	5-5-6
		SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), medium plasticity, soft to medium stiff, dry to moist, mottled, fragments of gray shale, [FILL]	SS02G	1.5 - 3.0	1.3	3-4-4
			SS03G	3.0 - 4.5	1.4	2-6-8
			SS04G	4.5 - 6.0	1.5	4-5-7
			SS05G	6.0 - 7.5	1.2	7-13-12
			SS06G	7.5 - 9.0	1.5	4-6-9
			SS07G	9.0 - 10.5	1.4	4-8-12
			SS08G	10.5 - 12.0	1.2	4-8-11
			SS09G	12.0 - 13.5	1.5	4-7-11

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-107**
Client	Tennessee Valley Authority	Boring Location	733,849.62 N; 2,887,998.51 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1106.3 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. %
			SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), medium plasticity, soft to medium stiff, dry to moist, mottled, fragments of gray shale, [FILL] *(Continued)*	SS10G	13.5 - 15.0	1.5	4-7-9
				SS11G	15.0 - 16.5	1.5	5-9-12
				SS12G	16.5 - 18.0	0.9	10-15-18
18.3	1088.0		LEAN CLAY, CL, 10YR 4/3 (brown) to 10YR 5/1 (gray), medium plasticity, medium stiff to stiff, dry, laminated	SS13G	18.0 - 19.5	1.5	5-7-8
				SS14G	19.5 - 21.0	1.4	4-6-11
				SS15G	21.0 - 22.5	1.3	11-16-14
				SS16G	22.5 - 24.0	1.4	3-5-9
				SS17G	24.0 - 25.5	1.3	3-10-15
				SS18G	25.5 - 27.0	1.5	5-11-16
26.6	1079.7		SANDY LEAN CLAY WITH GRAVEL, CL, 7.5YR 5/6 (strong brown), fine, low to medium plasticity, loose to stiff, moist, iron oxide staining, organics	SS19G	27.0 - 28.5	1.5	4-8-10
				SS20G	28.5 - 30.0	1.5	3-6-7
			Gravel at 30.8'	SS21G	30.0 - 31.5	1.3	2-7-16
				SS22G	31.5 - 33.0	1.2	17-20-17

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

Client Borehole ID	N/A	Stantec Boring No.	**JSF-107**
Client	Tennessee Valley Authority	Boring Location	733,849.62 N; 2,887,998.51 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1106.3 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. %
34.3	1072.0		SANDY LEAN CLAY WITH GRAVEL, CL, 7.5YR 5/6 (strong brown), fine, low to medium plasticity, loose to stiff, moist, iron oxide staining, organics *(Continued)* Wet at ~34'		SS23G	33.0 - 34.5	1.0	3-8-17
36.3	1070.0		LEAN CLAY, CL, 10YR 4/3 (brown) to 10YR 7/1 (light gray), low to medium plasticity, stiff to very hard, dry to moist, iron oxide staining, laminated, residuum, Mn staining		SS24G	34.5 - 36.0	1.5	3-9-23
36.6	1069.7		Dry shale from 36.3' to 36.6'		SS25G	36.0 - 36.6	0.6	50-50/1"

Refusal /
Bottom of Hole at 36.6 Ft.

Top of Rock = 36.3 Ft.
Top of Rock Elevation = 1070.0 Ft.

See installation log for permanent well JSF-107 for backfill information.

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.	**JSF-108**
Client	Tennessee Valley Authority	Boring Location	733,309.62 N; 2,886,321.05 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1106.0 ft — Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	2/13/19 — Completed 2/14/19
Project Location	Hawkins Co, Rogersville, Tennessee	Depth to Water	40.5 ft — Date/Time 2/13/19 15:02
Inspector	C. Sexton — Logger C. Sexton	Depth to Water	N/A — Date/Time N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 Depth 48.4 ft

Sampler Hammer Type Automatic — Weight 140 lb — Drop 30" — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans — Approved By P. Dunne

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] (Overburden) / RQD % (Rock Core)	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
0.0	1106.0		Top of Hole				
0.9	1105.1		Rock Fill	SS01G	0.0 - 1.5	1.1	4-4-6
			SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), medium plasticity, soft to medium stiff, dry to moist, mottled, fragments of gray shale, [FILL]	SS02G	1.5 - 3.0	1.2	3-4-6
				SS03G	3.0 - 4.5	0.8	3-2-14
				SS04G	4.5 - 6.0	1.5	3-5-7
				SS05G	6.0 - 7.5	1.3	6-8-9
				SS06G	7.5 - 9.0	1.2	3-5-9
				SS07G	9.0 - 10.5	1.5	3-5-8
				SS08G	10.5 - 12.0	1.5	4-4-10
				SS09G	12.0 - 13.5	1.5	4-6-10
				SS10G	13.5 - 15.0	1.4	3-4-8
				SS11G	15.0 - 16.5	1.5	3-6-9
				SS12G	16.5 - 18.0	1.5	7-11-18

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 7/14/20

Client Borehole ID N/A | Stantec Boring No. **JSF-108**

Client Tennessee Valley Authority | Boring Location 733,309.62 N; 2,886,321.05 E NAD27 Plant Local

Project Number 175568225 | Surface Elevation 1106.0 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. %
			SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), medium plasticity, soft to medium stiff, dry to moist, mottled, fragments of gray shale, [FILL] *(Continued)*		SS13G	18.0 - 19.5	1.5	5-6-13
					SS14G	19.5 - 21.0	0.7	4-11-17
					SS15G	21.0 - 22.5	1.5	6-10-12
					SS16G	22.5 - 24.0	1.3	4-11-17
24.4	1081.6		LEAN CLAY, CL, 10YR 4/3 (brown) to 10YR 5/1 (gray), medium plasticity, medium stiff to stiff, dry to moist		SS17G	24.0 - 25.5	1.2	6-7-14
					SS18G	25.5 - 27.0	1.5	9-10-14
					SS19G	27.0 - 28.5	1.5	6-9-15
					SS20G	28.5 - 30.0	1.5	4-7-13
					SS21G	30.0 - 31.5	1.5	8-9-13
					SS22G	31.5 - 33.0	1.4	11-15-16
					SS23G	33.0 - 34.5	1.5	4-5-9
34.6	1071.4		FAT CLAY, CH, 10YR 4/4 (dark yellowish brown) with 10YR 4/2 (dark grayish brown), medium to high plasticity, soft to medium stiff, moist, organics, root traces		SS24G	34.5 - 36.0	1.5	3-4-7
					SS25G	36.0 - 37.5	1.5	3-4-5
					SS26G	37.5 - 39.0	1.5	4-2-3
					SS27G	39.0 - 40.5	1.5	1-4-7
					SS28G	40.5 - 42.0	1.5	2-5-8

Depth scale: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 7/14/20

Client Borehole ID	N/A	Stantec Boring No.	**JSF-108**
Client	Tennessee Valley Authority	Boring Location	733,309.62 N; 2,886,321.05 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1106.0 ft
		Elevation Datum	NGVD29

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, 10YR 4/4 (dark yellowish brown) with 10YR 4/2 (dark grayish brown), medium to high plasticity, soft to medium stiff, moist, organics, root traces *(Continued)*	SS29G	42.0 - 43.5	1.5	3-5-7
				SS30G	43.5 - 45.0	1.5	2-5-7
45.2	1060.8		SANDY LEAN CLAY, CL, 10YR 4/4 (dark yellowish brown), medium plasticity, soft, moist	SS31G	45.0 - 46.5	1.5	3-3-5
47.3	1058.7			SS32aG	46.5 - 47.3	1.4	5-16-50+/5"
47.8	1058.2		LEAN CLAY, CL, 10YR 4/3 (brown), iron oxide staining, residuum	SS32bG	47.3 - 47.9		
48.4	1057.6		Shale				

Refusal /
Bottom of Hole at 48.4 Ft.

Top of Rock = 47.8 Ft.
Top of Rock Elevation = 1058.2 Ft.

See installation log for permanent well JSF-108 for backfill information.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 7/14/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-109**
Client	Tennessee Valley Authority	Boring Location	732,983.25 N; 2,885,991.09 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1105.1 ft; Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	2/6/19; Completed 2/6/19
Project Location	Hawkins Co, Rogersville, Tennessee	Depth to Water	17.5 ft; Date/Time 2/11/19
Inspector	C. Sexton; Logger C. Sexton	Depth to Water	6.6 ft; Date/Time 2/7/19 13:43
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 lb — Drop: 30" — Efficiency: N/A

Borehole Azimuth: N/A — Borehole Inclination (from Vertical): N/A

Reviewed By: B. Evans — Approved By: P. Dunne

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	1105.1		Top of Hole				
0.3	1104.8		Rock Fill				
			LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), low to medium plasticity, medium stiff to stiff, dry to moist, iron oxide staining, mottled, [FILL]	SS01G	0.0 - 1.5	1.2	3-7-7
				SS02G	1.5 - 3.0	1.4	2-2-3
				SS03G	3.0 - 4.5	0.4	3-6-7
				SS04G	4.5 - 6.0	1.2	3-4-7
				SS05G	6.0 - 7.5	1.5	11-14-13
				SS06G	7.5 - 9.0	1.5	4-7-9
9.7	1095.4		SANDY LEAN CLAY, CL, 10YR 7/1 (light gray) with 5YR 5/8 (yellowish red), low to medium plasticity, medium stiff to stiff, dry to moist, [FILL]	SS07G	9.0 - 10.5	1.2	6-5-9
11.0	1094.1		LEAN CLAY TRACE GRAVEL, CL, 10YR 5/4 (yellowish brown) to 10YR 5/3 (brown), medium plasticity, medium stiff to stiff, dry to moist, slightly blocky, organics, [FILL]	SS08G	10.5 - 12.0	1.3	4-5-8
				SS09G	12.0 - 13.5	1.2	2-5-12
				SS10G	13.5 - 15.0	0.5	3-7-10
15.7	1089.4		SILTY LEAN CLAY SOME SAND, CL, 7.5YR 2.5/2 (very dark brown), low plasticity, soft, moist, fine grained sand, [CCR]	SS11G	15.0 - 16.5	1.5	4-15-23
				SS12G	16.5 - 18.0	1.4	6-16-29

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/20/20

Client Borehole ID	N/A	Stantec Boring No.	**JSF-109**
Client	Tennessee Valley Authority	Boring Location	732,983.25 N; 2,885,991.09 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1105.1 ft
		Elevation Datum	NGVD29

Lithology Depth Ft[3]	Lithology Elevation	Lithology Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Overburden: Depth Ft[3] / Rock Core: Run Ft	Overburden: Rec. Ft / Rock Core: Rec. Ft	Overburden: Blows/PSI / Rock Core: Rec. %
21.0	1084.1		SILTY LEAN CLAY SOME SAND, CL, 7.5YR 2.5/2 (very dark brown), low plasticity, soft, moist, fine grained sand, [CCR] *(Continued)*	SS13G	18.0 - 19.5	1.5	9-23-27
				SS14G	19.5 - 21.0	1.5	17-22-20

Depth scale: 18, 19, 20, 21

No Refusal /
Bottom of Hole at 21.0 Ft.

Boring backfilled with 30% solids bentonite grout.

As-drilled boring location not surveyed. Horizontal coordinates shown based on field measurements. Vertical coordinates based on approximate survey data.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/20/20

SUBSURFACE LOG

Client Borehole ID N/A

Stantec Boring No. **JSF-109Alt**

Client Tennessee Valley Authority

Boring Location 732,976.45 N; 2,885,989.99 E NAD27 Plant Local

Project Number 175568225

Surface Elevation 1105.1 ft Elevation Datum NGVD29

Project Name JSF TDEC Order

Date Started 2/7/19 Completed 2/11/19

Project Location Hawkins Co, Rogersville, Tennessee

Depth to Water 13.7 ft Date/Time 2/11/19 12:00

Inspector C. Sexton Logger C. Sexton

Depth to Water N/A Date/Time N/A

Drilling Contractor Stantec Consulting Services Inc.

Drill Rig Type and ID CME 55T#2, #711

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 lb Drop 30" Efficiency N/A

Borehole Azimuth N/A

Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans

Approved By P. Dunne

Lithology Depth Ft[3]	Lithology Elevation	Graphic	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Overburden: Depth Ft[3] / Rock Core: Run Ft	Overburden: Rec. Ft / Rock Core: Rec. Ft	Overburden: Blows/PSI / Rock Core: Rec. %
0.0	1105.1		Top of Hole				
			Overburden, no recovery	SS01	0.0 - 1.5	0.0	2-3-3
				SS02	1.5 - 3.0	0.7	3-5-6
3.4	1101.7		LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), low to medium plasticity, medium stiff to stiff, dry to moist, iron oxide staining, mottled, [FILL]	SS03G	3.0 - 4.5	1.1	6-6-5
				SS04G	4.5 - 6.0	1.1	6-5-8
				SS05G	6.0 - 7.5	1.3	6-8-11
				SS06G	7.5 - 9.0	1.5	4-7-9
				SS07G	9.0 - 10.5	1.4	3-5-7
				SS08	10.5 - 12.0	0.0	5-7-8
				SS09G	12.0 - 13.5	1.4	4-5-11
				SS10	13.5 - 15.0	0.2	8-9-10
15.8	1089.3		WELL GRADED SAND WITH SILT, SW-SM, 10YR 3/1 (very dark gray), medium dense, moist, [CCR]	SS11G	15.0 - 16.5	1.5	6-15-17
				SS12G	16.5 - 18.0	0.8	4-5-11

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/2/21

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No. **JSF-109Alt**
Client: Tennessee Valley Authority
Boring Location: 732,976.45 N; 2,885,989.99 E NAD27 Plant Local
Project Number: 175568225
Surface Elevation: 1105.1 ft
Elevation Datum: NGVD29

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] / RQD %	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
20.8	1084.3		WELL GRADED SAND WITH SILT, SW-SM, 10YR 3/1 (very dark gray), medium dense, moist, [CCR] *(Continued)*	SS13G	18.0 - 19.5	1.5	2-13-21
				SS14G	19.5 - 21.0	1.5	6-14-12
23.8	1081.3		FAT CLAY LITTLE GRAVEL, CH, 10YR 5/8 (yellowish brown) and 10Y 8/1 (light greenish gray), medium stiff, wet, iron oxide staining, [FILL]	SS15G	21.0 - 22.5	1.0	6-6-9
				SS16G	22.5 - 24.0	1.3	4-5-7
30.8	1074.3		LEAN CLAY TRACE GRAVEL, CL, 7.5YR 6/6 (reddish yellow), medium to high plasticity, medium stiff to stiff, moist, slight chemical odor, organics	SS17G	24.0 - 25.5	1.5	3-3-5
				SS18G	25.5 - 27.0	1.0	3-8-4
				SS19G	27.0 - 28.5	0.5	4-9-9
				SS20G	28.5 - 30.0	1.2	4-6-11
				SS21G	30.0 - 31.5	1.5	5-9-13
34.5	1070.6		SILTY LEAN CLAY TRACE SAND AND GRAVEL, CL, 10YR 3/1 (very dark gray) and 10YR 4/6 (dark yellowish brown), medium plasticity, medium stiff to stiff, dry to moist	SS22G	31.5 - 33.0	1.1	5-12-14
				SS23	33.0 - 34.5	0.0	7-14-18
			LEAN CLAY, CL, 10YR 3/1 (very dark gray) to 10YR 3/2 (very dark grayish brown), medium to high plasticity, medium stiff to stiff, dry to moist	SS24G	34.5 - 36.0	1.5	6-7-12
				SS25G	36.0 - 37.5	0.5	6-9-16
				SS26	37.5 - 39.0	0.5	4-5-7
				SS27G	39.0 - 40.5	1.3	5-8-12
				SS28G	40.5 - 42.0	1.4	5-6-8

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/2/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-109Alt**
Client	Tennessee Valley Authority	Boring Location	732,976.45 N; 2,885,989.99 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1105.1 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. %
42.3 - 46.2	1062.8 - 1058.9		SANDY LEAN CLAY, CL, 10YR 4/6 (dark yellowish brown), fine to medium, medium to high plasticity, moist, iron oxide staining	SS29G	42.0 - 43.5	1.5	4-4-6
				SS30G	43.5 - 45.0	1.4	4-8-11
				SS31G	45.0 - 46.5	1.5	5-4-9
46.2 - 47.6	1058.9 - 1057.5		LEAN CLAY, CL, 10YR 4/3 (brown), medium stiff to very hard, moist, laminated Shale residuum at 47.0'	SS32G	46.5 - 47.6	1.1	6-4-50/1"

Refusal /
Bottom of Hole at 47.6 Ft.

Top of Rock = 47.6 Ft.
Top of Rock Elevation = 1057.5 Ft.

Boring backfilled with 30% solids bentonite grout.

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.	**JSF-109Alt2**
Client	Tennessee Valley Authority	Boring Location	732,996.05 N; 2,885,961.58 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1101.2 ft; Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	2/28/19; Completed 3/4/19
Project Location	Hawkins Co, Rogersville, Tennessee	Depth to Water	31.7 ft; Date/Time 3/4/19 16:05
Inspector	C. Sexton; Logger C. Sexton	Depth to Water	N/A; Date/Time N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 Depth 42.5 ft

Sampler Hammer Type Automatic; Weight 140 lb; Drop 30"; Efficiency N/A

Borehole Azimuth N/A; Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans; Approved By P. Dunne

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	1101.2		Top of Hole				
			Rock Fill, no recovery				
4.0	1097.2		SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), low to medium plasticity, medium stiff to stiff, dry to moist, iron oxide staining, mottled, [FILL]	SS01G	3.5 - 5.0	1.5	5-4-5
				SS02G	5.0 - 6.5	1.0	4-5-7
				SS03G	6.5 - 8.0	0.5	4-6-7
				SS04G	8.0 - 9.5	1.5	4-2-4
				SS05G	9.5 - 11.0	1.3	4-2-5
				SS06G	11.0 - 12.5	1.2	5-7-7
				SS07G	12.5 - 14.0	1.4	3-6-8
				SS08G	14.0 - 15.5	1.1	4-5-7
				SS09G	15.5 - 17.0	1.5	4-6-9
				SS10G	17.0 - 18.5	1.5	4-5-9

Client Borehole ID	N/A	Stantec Boring No.	**JSF-109Alt2**
Client	Tennessee Valley Authority	Boring Location	732,996.05 N; 2,885,961.58 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1101.2 ft
		Elevation Datum	NGVD29

Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] (Overburden) / RQD % (Rock Core)	Depth Ft[3] / Run Ft	Rec. Ft	Blows/PSI / Rec. %
			SILTY LEAN CLAY TRACE GRAVEL, CL, 10YR 5/6 (yellowish brown) with 10Y 7/1 (light greenish gray), low to medium plasticity, medium stiff to stiff, dry to moist, iron oxide staining, mottled, [FILL] *(Continued)*	SS11G	18.5 - 20.0	1.3	3-2-6
				SS12G	20.0 - 21.5	1.4	4-5-6
				SS13G	21.5 - 23.0	1.3	5-10-11
				SS14G	23.0 - 24.5	1.5	4-4-7
				SS15G	24.5 - 26.0	1.5	5-8-11
				SS16G	26.0 - 27.5	1.5	5-10-13
28.5	1072.7			SS17G	27.5 - 29.0	1.3	3-6-10
			SILTY LEAN CLAY TRACE SAND AND GRAVEL, CL, 10YR 3/1 (very dark gray) and 10YR 4/6 (dark yellowish brown), medium plasticity, medium stiff to stiff, dry to moist	SS18G	29.0 - 30.5	1.5	8-12-15
				SS19G	30.5 - 32.0	1.5	6-9-10
				SS20G	32.0 - 33.5	1.5	5-7-9
34.0	1067.2			SS21G	33.5 - 35.0	1.4	4-6-5
			LEAN CLAY, CL, 10YR 3/1 (very dark gray) to 10YR 3/2 (very dark grayish brown), medium to high plasticity, medium stiff to stiff, dry to moist	SS22G	35.0 - 36.5	1.5	4-7-9
				SS23G	36.5 - 38.0	1.5	4-6-7
39.0	1062.2			SS24G	38.0 - 39.5	1.1	2-2-4
			SANDY LEAN CLAY, CL, 10YR 4/6 (dark yellowish brown), fine to medium, medium to high plasticity, moist, iron oxide staining	SS25G	39.5 - 41.0	0.9	3-4-6
41.7	1059.5			SS26aG	41.0 - 41.7	1.5	12-9-11

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-109Alt2**
Client	Tennessee Valley Authority	Boring Location	732,996.05 N; 2,885,961.58 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1101.2 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. %
43 43.9	1057.3		LEAN CLAY, CL, 10YR 4/3 (brown), medium stiff to very hard, moist, laminated *(Continued)*		SS26bG SS27G	41.7 - 42.5 42.5 - 43.9	1.0	10-29-50/5"

Refusal /
Bottom of Hole at 43.9 Ft.

Top of Rock = 43.9 Ft.
Top of Rock Elevation = 1057.3 Ft.

See installation log for permanent well JSF-109 for backfill

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Stantec TVA

Client Borehole ID	N/A	Stantec Boring No.	**JSF-110**
Client	Tennessee Valley Authority	Boring Location	732,649.53 N; 2,889,835.21 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1139.0 ft — Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	1/28/19 — Completed 1/30/19
Project Location	Hawkins Co, Rogersville, Tennessee	Depth to Water	10.2 ft — Date/Time 1/29/19 11:28
Inspector	C. Sexton — Logger C. Sexton	Depth to Water	N/A — Date/Time N/A
Drilling Contractor	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

Overburden Drilling and Sampling Tools (Type and Size) 4-1/4" HSA, 2" and 3" SS w/o liners
Rock Drilling and Sampling Tools (Type and Size) N/A
Overdrill Tooling (Type and Size) 8-1/4" HSA — Overdrill Depth 17.2 ft
Sampler Hammer Type Automatic — Weight 140 lb — Drop 30" — Efficiency N/A
Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A
Reviewed By B. Evans — Approved By P. Dunne

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	1139.0		Top of Hole				
0.8	1138.2		Topsoil	SS01G	0.0 - 1.5	1.5	1-1-4
9.9	1129.1		SILTY LEAN CLAY, CL, 10YR 6/4 (light yellowish brown), low plasticity, soft to medium stiff, dry to moist Color change to 10Y 6/4 (pale olive) and 10Y 7/1 (light greenish gray) low to medium plasticity, medium stiff to stiff, with trace gravel at 1.5' Color change to 10YR 6/6 (brownish yellow), medium stiff at 3.0' Root blocking recovery in SS03 Color change to 10YR 6/4 (light yellowish brown) and 10Y 7/1 (light greenish gray), very stiff, with sand at 4.5' Color change to 10YR 6/6 (brownish yellow), soft to medium stiff, dry at 5.0' Stiff, dry to moist, with trace gravel at 6.0' With trace gravel at 7.5' 3-inch SS used from 7.5' to refusal Medium stiff with trace gravel at 9.0'	SS02G	1.5 - 3.0	1.5	4-6-6
				SS03G	3.0 - 4.5	1.0	3-5-8
				SS04G	4.5 - 6.0	1.5	4-6-10
				SS05G	6.0 - 7.5	0.5	2-2-7
				SS06G	7.5 - 9.0	1.1	6-11-13
				SS07aG	9.0 - 9.9	1.2	4-6-11
12.0	1127.0		CLAYEY SAND SOME GRAVEL, SC, 10YR 5/6 (yellowish brown), medium, loose, dry to moist Gravel is coarse to very coarse, rounded Loose to medium dense at 10.5'	SS07bE	9.9 - 10.5		
				SS08E	10.5 - 12.0	0.9	4-7-10
			LEAN CLAY, CL, 10YR 6/6 (brownish yellow), low plasticity, very stiff, dry to moist, Mn staining	SS09G	12.0 - 13.5	1.5	10-7-12

9.9/12.0-20190129

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/2/21

Client Borehole ID	N/A	Stantec Boring No.	**JSF-110**
Client	Tennessee Valley Authority	Boring Location	732,649.53 N; 2,889,835.21 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1139.0 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. %
15.0	1124.0		LEAN CLAY, CL, 10YR 6/6 (brownish yellow), low plasticity, very stiff, dry to moist, Mn staining *(Continued)*	SS10	13.5 - 15.0	0.0	4-7-10
			LEAN CLAY, CL, 10YR 6/4 (light yellowish brown), low plasticity, stiff to very stiff, dry to moist, laminated, Mn staining	SS11G	15.0 - 16.5	1.5	9-9-18
17.6	1121.4		Color change to 10G 5/1 (greenish gray), low to medium plasticity, stiff with gravel at 16.5'	SS12G	16.5 - 18.0	0.2	6-50+-10
18.0	1121.0		Shale, dark gray				

Refusal /
Bottom of Hole at 18.0 Ft.

Top of Rock = 17.6 Ft.
Top of Rock Elevation = 1121.4 Ft.

See well installation log for permanent well JSF-110 for backfill information.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/2/21

SUBSURFACE LOG

Stantec TVA

Client Borehole ID	N/A	Stantec Boring No.	**JSF-111**
Client	Tennessee Valley Authority	Boring Location	733,186.14 N; 2,889,595.83 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1107.4 ft; Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	2/5/19; Completed 2/5/19
Project Location	Hawkins Co, Rogersville, 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	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 lb; Drop 30"; Efficiency N/A

Borehole Azimuth N/A; Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans; Approved By P. Dunne

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	1107.4		Top of Hole				
			Rock blocked auger; no sampling to 2.2'				
2.2	1105.2		LEAN CLAY, CL, 10YR 5/4 (yellowish brown), low to medium plasticity, medium stiff to stiff, dry to moist	SS01G	2.0 - 3.5	1.5	4-7-9
			Color change to 10YR 5/6 (yellowish brown) with 2.5YR 5/8 (red), medium plasticity, stiff, Mn staining, with organic matter at 3.5'	SS02G	3.5 - 5.0	1.2	4-7-7
			Color change to 10YR 5/8 (yellowish brown) with 5GY 8/1 (light greenish gray), laminated at 5.0'	SS03G	5.0 - 6.5	1.4	3-4-7
				SS04G	6.5 - 8.0	1.5	6-9-7
			Color change to 10YR 4/3 (brown) with 10YR 3/3 (dark brown), medium stiff to stiff, moist, with iron oxide staining at 7.6'	SS05G	8.0 - 9.5	1.5	3-3-6
				SS06G	9.5 - 11.0	NR	3-3-5
11.5	1095.9			SS07G	11.0 - 11.7	0.7	3-50/2"
11.7	1095.7		Shale				

Refusal /
Bottom of Hole at 11.7 Ft.

Top of Rock = 11.5 Ft.
Top of Rock Elevation = 1095.9 Ft.

Temporary 1" piezometer JSF-111ALT installed in boring JSF-111. Piezometer removed on 6/27/19 and JSF-111 boring overdrilled during installation of permanent bedrock monitoring well JSF-208.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/2/21

SUBSURFACE LOG

Client Borehole ID: N/A
Stantec Boring No.: **JSF-112Alt**
Client: Tennessee Valley Authority
Boring Location: 733,197.04 N; 2,889,257.88 E NAD27 Plant Local
Project Number: 175568225
Surface Elevation: 1109.1 ft
Elevation Datum: NGVD29
Project Name: JSF TDEC Order
Date Started: 1/30/19
Completed: 2/5/19
Project Location: Hawkins Co, Rogersville, Tennessee
Depth to Water: 14.5 ft
Date/Time: 1/31/19 08:39
Inspector: C. Sexton
Logger: C. Sexton
Depth to Water: N/A
Date/Time: N/A
Drilling Contractor: Stantec Consulting Services Inc.
Drill Rig Type and ID: CME 55T#2, #711
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 lb
Drop: 30"
Efficiency: N/A
Borehole Azimuth: N/A
Borehole Inclination (from Vertical): N/A
Reviewed By: B. Evans
Approved By: P. Dunne

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	1109.1		Top of Hole				
0.5	1108.6		Topsoil				
			SILTY LEAN CLAY, CL, 7.5YR 7/8 (reddish yellow), medium plasticity, medium stiff, dry to moist	SS01G	0.0 - 1.5	1.1	1-2-3
			Color change to 7.5YR 6/8 (reddish yellow) with 10Y 7/1 (light greenish gray), low to medium plasticity, stiff, blocky, with organic matter at 1.5'	SS02G	1.5 - 3.0	1.2	3-5-7
			Color change to 7.5YR 6/8 (reddish yellow) with 10GY 7/1 (light greenish gray), medium plasticity, medium stiff, Mn staining at 3.0'	SS03G	3.0 - 4.5	1.2	4-4-6
			Color change to 7.5YR 6/8 (reddish yellow), low to medium plasticity, stiff to very stiff, laminated, at 4.5'	SS04G	4.5 - 6.0	1.5	4-5-7
			Color change to 10YR 6/8 (yellowish brown), medium stiff to stiff at 6.0'	SS05G	6.0 - 7.5	1.5	4-7-8
				SS06G	7.5 - 9.0	1.5	4-3-11
			Color change to 10YR 4/4 (dark yellowish brown), medium plasticity, soft to stiff at 9.0'	SS07G	9.0 - 10.5	1.5	3-7-9
				SS08G	10.5 - 12.0	1.5	6-9-12
			Wet from 12.9' to 13.3'	SS09G	12.0 - 13.5	1.5	11-4-7
			Wet from 14.2' to 14.4'	SS10G	13.5 - 15.0	1.5	4-4-5

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/20/20

Client Borehole ID	N/A	Stantec Boring No.	**JSF-112Alt**
Client	Tennessee Valley Authority	Boring Location	733,197.04 N; 2,889,257.88 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1109.1 ft
		Elevation Datum	NGVD29

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. %
15 16 16.5	1092.6		SILTY LEAN CLAY, CL, 7.5YR 7/8 (reddish yellow), medium plasticity, medium stiff, dry to moist *(Continued)* Very stiff at 15.0'	SS11G	15.0 - 16.5	1.2	5-11-7
16.7	1092.4		Weathered Shale	SS12	16.5 - 16.7	0.2	50+/2"

Refusal /
Bottom of Hole at 16.7 Ft.

Top of Rock = 16.5 Ft.
Top of Rock Elevation = 1092.6 Ft.

Temporary 1" piezometer JSF-112ALT installed in boring JSF-112ALT. Piezometer removed on 5/15/2019 and JSF-112ALT boring overdrilled during advancement of boring JSF-207.

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.	**JSF-113Alt**
Client	Tennessee Valley Authority	Boring Location	732,777.44 N; 2,889,195.49 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1136.4 ft — Elevation Datum: NGVD29
Project Name	JSF TDEC Order	Date Started	2/1/19 — Completed: 2/4/19
Project Location	Hawkins Co, Rogersville, 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	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 55T#2, #711

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 lb — Drop: 30" — Efficiency: N/A

Borehole Azimuth: N/A — Borehole Inclination (from Vertical): N/A

Reviewed By: B. Evans — Approved By: P. Dunne

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	1136.4		Top of Hole				
0.6	1135.8		Topsoil	SS01G	0.0 - 1.5	1.5	1-WH-WH
2.3	1134.1		LEAN CLAY, CL, 10YR 5/4 (yellowish brown), medium plasticity, soft, moist	SS02G	1.5 - 3.0	1.5	2-4-7
9.5	1126.9		SILTY LEAN CLAY, CL, 10YR 6/4 (light yellowish brown) and 10Y 7/1 (light greenish gray), low to medium plasticity, medium stiff to stiff, dry to moist, iron oxide staining, mottled Color change to 7.5YR 5/6 (strong brown), medium plasticity, medium stiff at 3.4' Low to medium plasticity, medium stiff to stiff at 4.5' Color change to 7.5YR 5/6 (strong brown) with 7.5YR 7/2 (pinkish gray), soft to medium stiff, organic staining, with trace sand and gravel at 6.0' Color change to 10YR 5/6 (yellowish brown), with trace organics at 7.5' Color change to 10YR 6/6 (brownish yellow to 10YR 7/4 (very pale brown), medium stiff, with organics at 9.0'	SS03G SS04G SS05G SS06G	3.0 - 4.5 4.5 - 6.0 6.0 - 7.5 7.5 - 9.0	1.5 1.5 1.5 1.5	4-4-6 4-7-8 5-8-9 3-3-6
11.2	1125.2		CLAYEY SAND, SC, 10YR 6/3 (pale brown), fine to medium, loose to medium dense, moist, gravel rounded and coarse to very coarse Color change to 10YR 7/4 (very pale brown), medium plasticity at 10.5'	SS07G SS08G	9.0 - 10.5 10.5 - 12.0	1.5 1.5	4-8-21 10-22-11
			LEAN CLAY, CL, 10YR 6/6 (brownish yellow), low to medium plasticity, stiff to very stiff, dry to moist, trace organics Color change to 10YR 5/6 (yellowish brown), Mn staining, at 12.0' Color change to 10YR 5/6 (yellowish brown) with 10Y 8/1 (light greenish gray) at 13.5' Color change to 10YR 5/4 (yellowish brown), laminated, at 15.0' Color change to 10YR 5/4 (yellowish brown) and 10YR 4/2 (dark grayish brown) at 16.5'	SS09G SS10G SS11G SS12G	12.0 - 13.5 13.5 - 15.0 15.0 - 16.5 16.5 - 18.0	1.5 1.5 1.5 1.5	5-8-12 8-12-15 9-14-21 9-18-27

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

Client Borehole ID	N/A	Stantec Boring No.	**JSF-113Alt**
Client	Tennessee Valley Authority	Boring Location	732,777.44 N; 2,889,195.49 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1136.4 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. %
18.7	1117.7				SS13G	18.0 - 18.9	0.6	9-50/5"
18.9	1117.5		Shale					

Refusal /
Bottom of Hole at 18.9 Ft.

Top of Rock = 18.7 Ft.
Top of Rock Elevation = 1117.7 Ft.

Temporary 1" piezometer JSF-113ALT installed in boring JSF-113ALT. Piezometer removed on 6/24/19 and JSF-113ALT boring overdrilled during installation of permanent bedrock monitoring well JSF-209.

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.: **JSF-206**
Client: Tennessee Valley Authority
Boring Location: 732,667.53 N; 2,889,831.36 E NAD27 Plant Local
Project Number: 175568225
Surface Elevation: 1139.0 ft
Elevation Datum: NGVD29
Project Name: JSF TDEC Order
Date Started: 5/21/19
Completed: 5/22/19
Project Location: Hawkins Co, Rogersville, 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: 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): HQ-3 Wireline, Split Barrel, Surface Set Bit
Overdrill Tooling (Type and Size): 8" Air Rotary
Overdrill Depth: 50.0 ft
Sampler Hammer Type: N/A
Weight: N/A
Drop: N/A
Efficiency: N/A
Borehole Azimuth: N/A
Borehole Inclination (from Vertical): N/A
Reviewed By: B. Evans
Approved By: P. Dunne

Lithology Depth Ft[3]	Lithology Elevation	Description	Overburden: Sample[1,2] / Rock Core: RQD %	Overburden: Depth Ft[3] / Rock Core: Run Ft	Overburden: Rec. Ft / Rock Core: Rec. Ft	Overburden: Blows/PSI / Rock Core: Rec. %
0.0	1139.0	Top of Hole				
3.3	1135.7	SILTY LEAN CLAY, CL, 10YR 6/4 (light yellowish brown) to 2.5YR 6/4 (light reddish brown), medium plasticity, soft to medium stiff, moist	SS01	0.0 - 1.5	N/A	N/A
			SS02	1.5 - 3.0	N/A	N/A
8.3	1130.7	SANDY LEAN CLAY WITH SILT, CL, 7.5YR 5/8 (strong brown), low plasticity, stiff, dry to moist	SS03	3.0 - 4.5	N/A	N/A
			SS04	4.5 - 6.0	N/A	N/A
			SS05	6.0 - 7.5	N/A	N/A
			SS06	7.5 - 9.0	N/A	N/A
13.5	1125.5	SILTY SAND SOME CLAY, SM, 7.5YR 5/6 (strong brown), medium to coarse, loose, moist, iron oxide staining	SS07	9.0 - 10.5	N/A	N/A
			SS08	10.5 - 12.0	N/A	N/A
			SS09	12.0 - 13.5	N/A	N/A
17.2	1121.8	SILTY LEAN CLAY, CL, 7.5YR 5/6 (strong brown), low to medium plasticity, medium stiff to stiff, moist	SS10	13.5 - 15.0	N/A	N/A
			SS11	15.0 - 16.5	N/A	N/A
			SS12	16.5 - 17.2	N/A	N/A Began Core

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-206**
Client	Tennessee Valley Authority	Boring Location	732,667.53 N; 2,889,831.36 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1139.0 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. %
18–26.1			Shale, very finely crystalline, hard, massive bedded, 30° to 60° bedding angle *(Continued)* (First 0.2' of 17.2' - 21.6' core run was pulverized setting core bit; material not recoverable in core barrel)	94	17.2 - 26.1 8.9	8.6	97
26.1–31.0				100	26.1 - 31.0 4.9	4.9	100
31.0–36.1				88	31.0 - 36.1 5.1	5.1	100
36.1–42				94	36.1 - 46.1 10.0	10.0	100

Depth scale: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42

Core run labels: 17.2 - 26.1; 26.1 - 31.0; 31.0 - 36.1; 36.1 - 46.1

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-206**
Client	Tennessee Valley Authority	Boring Location	732,667.53 N; 2,889,831.36 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1139.0 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. %
43–54			Shale, very finely crystalline, hard, massive bedded, 30° to 60° bedding angle *(Continued)*	76	46.1 - 55.0 8.9	46.1 - 55.0	7.8	88
55.0	1084.0							

Bottom of Hole at 55.0 Ft.

Top of Rock = 17.2 Ft.
Top of Rock Elevation = 1121.8 Ft.
Begin Core = 17.2 Ft.

Monitoring Well JSF-210 was installed in boring JSF-206 on 6/25/19. Refer to the JSF-210 well installation detail for construction details.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-206S**
Client	Tennessee Valley Authority	Boring Location	732,659.08 N; 2,889,831.52 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1138.6 ft
		Elevation Datum	NGVD29
Project Name	JSF TDEC Order	Date Started	6/26/19
		Completed	6/26/19
Project Location	Hawkins Co, Rogersville, 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	M&W Drilling, LLC	Drill Rig Type and ID	Schramm T450WS Rotodrill
Overburden Drilling and Sampling Tools (Type and Size)	8" Air Rotary		
Rock Drilling and Sampling Tools (Type and Size)	N/A		
Overdrill Tooling (Type and Size)	8" Air Rotary	Overdrill Depth	N/A
Sampler Hammer Type	N/A	Weight	N/A
Drop	N/A	Efficiency	N/A
Borehole Azimuth	N/A	Borehole Inclination (from Vertical)	N/A
Reviewed By	B. Evans	Approved By	P. Dunne

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	1138.6		Top of Hole				
			Boring blind drilled from surface to a targeted monitoring well (JSF-206) total depth of 32' bgs using air rotary drilling methods. No soil or bedrock samples recovered for visual logging; refer to adjacent soil boring JSF-206 for location lithology.				
17.0	1121.6		Approximate soil/bedrock interface				

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-206S**
Client	Tennessee Valley Authority	Boring Location	732,659.08 N; 2,889,831.52 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1138.6 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. %
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32.0 (32)	1106.6							

No Refusal /
Bottom of Hole at 32.0 Ft.

Monitoring Well JSF-206 was installed in boring JSF-206S on 6/26/19. Refer to the JSF-206 well installation detail for construction details.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 3/1/21

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-207**
Client	Tennessee Valley Authority	Boring Location	733,197.04 N; 2,889,257.88 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1109.1 ft — Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	5/15/19 — Completed 5/21/19
Project Location	Hawkins Co, Rogersville, 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	Stantec Consulting Services Inc.	Drill Rig Type and ID	CME 850XR, #953

Overburden Drilling and Sampling Tools (Type and Size) 4-1/4" HSA

Rock Drilling and Sampling Tools (Type and Size) HQ-3 Wireline, Split Barrel, Surface Set Bit

Overdrill Tooling (Type and Size) 8" Air Rotary — Overdrill Depth 40.0 ft

Sampler Hammer Type N/A — Weight N/A — Drop N/A — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans — Approved By P. Dunne

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	1109.1		Top of Hole				
			JSF-207 boring advanced into bedrock by removing temporary overburden piezometer JSF-112Alt via overdrilling with 4 1/4" HSA; advanced augers then used to facilitate placement of 4" temporary casing for bedrock coring. No overburden sampling conducted. See JSF-112Alt boring log for overburden soil descriptions at boring JSF-207.				
17.3	1091.8						Began Core

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Client Borehole ID	N/A	Stantec Boring No.	**JSF-207**
Client	Tennessee Valley Authority	Boring Location	733,197.04 N; 2,889,257.88 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1109.1 ft
		Elevation Datum	NGVD29

Lithology: Depth Ft[3]	Elevation	Graphic	Description	Sample[1,2] (Overburden) / RQD % (Rock Core)	Depth Ft[3] / Run Ft		Rec. Ft / Rec. Ft	Blows/PSI / Rec. %
18–21			Shale, medium crystalline, hard, massive bedded, slightly weathered, iron oxide staining, 30° to 60° bedding angle *(Continued)* Induced fracture, 30°, calcite coating, calcite infilling, planar, smooth, matte surface, at 20.0'					
22				46	17.5 - 26.9 9.4	17.5 - 26.9	8.5	90
32				42	26.9 - 36.7 9.8	26.9 - 36.7	6.4	65
42				77	36.7 - 46.7	36.7 - 46.7	9.0	90

Client Borehole ID	N/A	Stantec Boring No.	**JSF-207**
Client	Tennessee Valley Authority	Boring Location	733,197.04 N; 2,889,257.88 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1109.1 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. %
			Shale, medium crystalline, hard, massive bedded, slightly weathered, iron oxide staining, 30° to 60° bedding angle *(Continued)*		10.0		
				72	46.7 - 56.7 10.0	9.5	95
56.7	1052.4						

Depth scale: 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56

46.7 - 56.7

Bottom of Hole at 56.7 Ft.
Begin Core = 17.5 Ft.

Monitoring Well JSF-207 was installed in boring JSF-207 on 6/27/19. Refer to the JSF-207 well installation detail for construction details.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 11/6/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-208**
Client	Tennessee Valley Authority	Boring Location	733,186.14 N; 2,889,595.83 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1107.4 ft — Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	6/27/19 — Completed 6/28/19
Project Location	Hawkins Co, Rogersville, 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	M&W Drilling, LLC	Drill Rig Type and ID	Schramm T450WS Rotodrill

Overburden Drilling and Sampling Tools (Type and Size) See boring log for JSF-111 dated 2/5/19

Rock Drilling and Sampling Tools (Type and Size) 8" Air Rotary; blind drill

Overdrill Tooling (Type and Size) 8" Air Rotary — Overdrill Depth N/A

Sampler Hammer Type N/A — Weight N/A — Drop N/A — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans — Approved By P. Dunne

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	1107.4		Top of Hole				
			Boring JSF-208 was advanced by overdilling the JSF-111 boring. The JSF-111 boring was advanced to the bedrock contact and a temporary piezometer installed in the overburden. Refer to the JSF-111 boring log dated 02/05/2019 for overburden (soil) lithology and sample run details at this location. When insufficient groundwater was found in the overburden, the JSF-111 temporary piezometer was removed, the JSF-111 boring was overdrilled to bedrock, and the boring re-designated bedrock boring JSF-208.				
11.7	1095.7		Boring JSF-208 blind drilled from bedrock interface to 50.0' bgs on 06/27/2019 using 8-inch diameter, air-rotary drilling methods. No samples were recovered for visual logging.				

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/17/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-208**
Client	Tennessee Valley Authority	Boring Location	733,186.14 N; 2,889,595.83 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1107.4 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. %
18–42			Boring JSF-208 blind drilled from bedrock interface to 50.0' bgs on 06/27/2019 using 8-inch diameter, air-rotary drilling methods. No samples were recovered for visual logging. *(Continued)*					

Depth scale: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-208**
Client	Tennessee Valley Authority	Boring Location	733,186.14 N; 2,889,595.83 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1107.4 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. %
43–50			Boring JSF-208 blind drilled from bedrock interface to 50.0' bgs on 06/27/2019 using 8-inch diameter, air-rotary drilling methods. No samples were recovered for visual logging. *(Continued)*				
50.0	1057.4						

Refusal /
Bottom of Hole at 50.0 Ft.

Top of Rock = 11.7 Ft.
Top of Rock Elevation = 1095.7 Ft.

Monitoring Well JSF-208 was installed in boring JSF-208 on 6/28/19. Refer to the JSF-208 well installation detail for construction details.

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 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/17/20

Client Borehole ID	N/A	Stantec Boring No.	**JSF-209**
Client	Tennessee Valley Authority	Boring Location	732,777.44 N; 2,889,195.49 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1136.4 ft — Elevation Datum NGVD29
Project Name	JSF TDEC Order	Date Started	6/24/19 — Completed 6/24/19
Project Location	Hawkins Co, Rogersville, 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	M&W Drilling, LLC	Drill Rig Type and ID	Schramm T450WS Rotodrill

Overburden Drilling and Sampling Tools (Type and Size) See boring log for JSF-113Alt dated 2/1/19

Rock Drilling and Sampling Tools (Type and Size) 8" Air Rotary; blind drill

Overdrill Tooling (Type and Size) 8" Air Hammer — Overdrill Depth 35.0 ft

Sampler Hammer Type N/A — Weight N/A — Drop N/A — Efficiency N/A

Borehole Azimuth N/A — Borehole Inclination (from Vertical) N/A

Reviewed By B. Evans — Approved By P. Dunne

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. %
0.0	1136.4		Top of Hole					
			Boring JSF-209 was advanced by overdrilling boring JSF-113Alt. The temporary PZ was removed prior to over-drilling. See boring log for JSF-113Alt dated 02/01/2019 for soil descriptions from surface to bedrock interface.					

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

TVA EIP BORING LOG 175568225 - JSF TDEC ORDER.GPJ TDEC SUBSURF DT 20190530.GDT 4/17/20

SUBSURFACE LOG

Client Borehole ID	N/A	Stantec Boring No.	**JSF-209**
Client	Tennessee Valley Authority	Boring Location	732,777.44 N; 2,889,195.49 E NAD27 Plant Local
Project Number	175568225	Surface Elevation	1136.4 ft
		Elevation Datum	NGVD29

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. %
18.7	1117.7		Boring JSF-209 blind drilled from bedrock interface to 35.0' bgs on 06/24/2019 using air-rotary drilling methods. No samples were recovered for visual logging.				
35.0	1101.4						

Depth scale: 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35

No Refusal /
Bottom of Hole at 35.0 Ft.

Top of Rock = 18.7 Ft.
Top of Rock Elevation = 1117.7 Ft.

Monitoring Well JSF-209 was installed in boring JSF-209 on 6/24/19. Refer to the JSF-209 well installation detail for construction details.

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

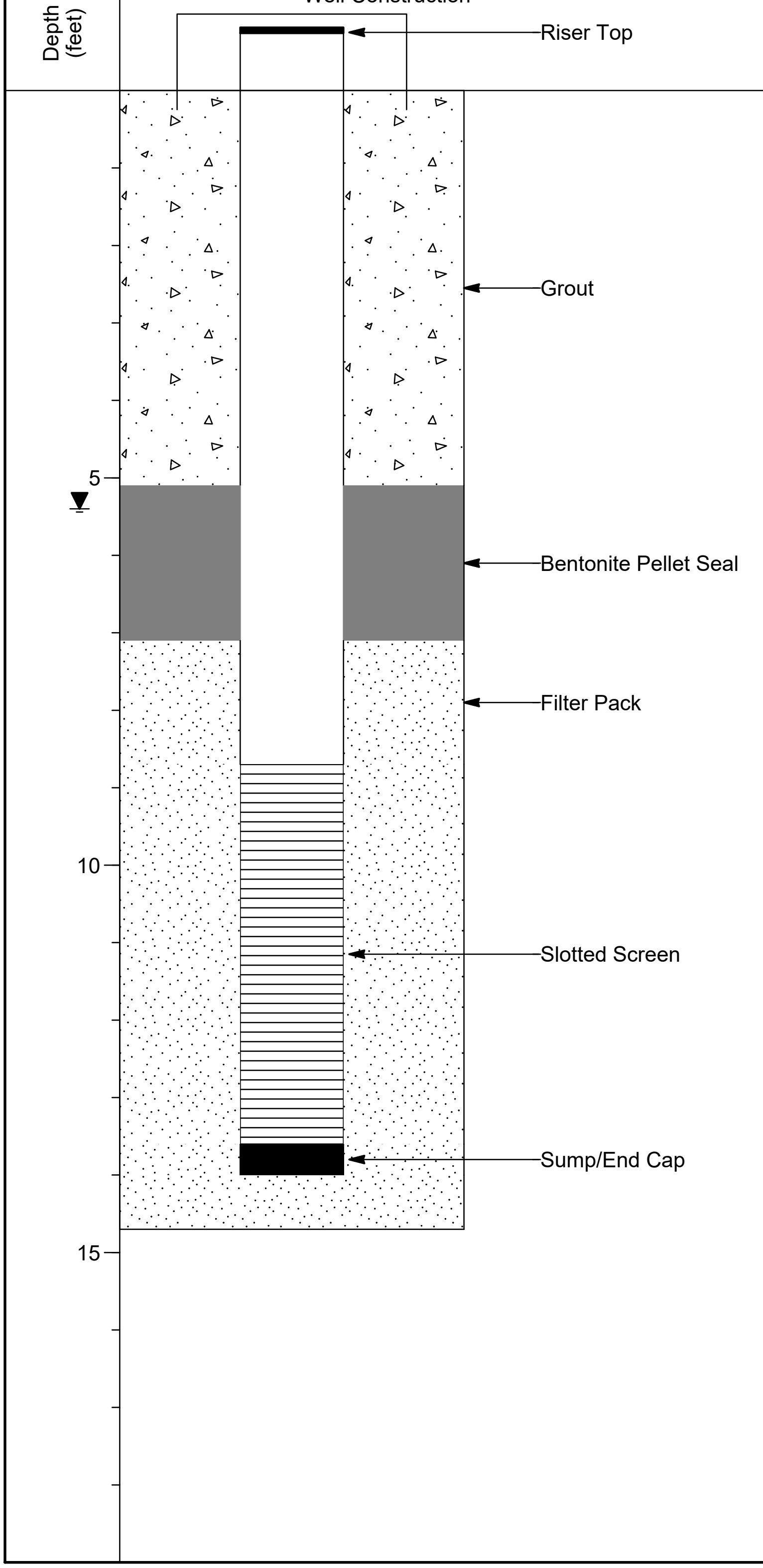
Well Installation Details

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-106** (Boring JSF-106)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **1/23/19** COMPLETED: **1/25/19**
PROJECT NUMBER: **175568225**	LOCATION: **733,018.92 N; 2,887,105.85 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **Ash Disposal Area J, Upgradient**
DRILLING EQUIPMENT: **CME 55T#2, #711**	LATITUDE: **36° 22' 5.56"** LONGITUDE: **-82° 59' 11.83"**
DRILLING METHOD: **8-1/4" HSA**	GROUND ELEV (ft): **1094.8** TOC ELEV (ft): **1098.21**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners,**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **14.0**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **5.4**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **13.3** WELL DIA. (in): **4.0**

Depth (feet) | Well Construction



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**	
RISER: TOP (AGS): **3.4 ft**	BOTTOM (BGS): **8.7 ft**
SCREEN TYPE: **5"ID x 4"ID U-Pack**	
SCREEN SLOT SIZE (in): **0.010**	
SCREEN: TOP (BGS): **8.7 ft**	BOTTOM (BGS): **13.6 ft**
END CAP: TOP (BGS): **13.6 ft**	BOTTOM (BGS): **14.0 ft**
GROUT QUANTITY: **28 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.0 ft**	BOTTOM (BGS): **5.1 ft**
GROUT DENSITY: INITIAL (lbs/gal): **10.2**	RETURN (lbs/gal): **10.2**
BENTONITE TYPE: **1/4" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **5.1 ft**	BOTTOM (BGS): **7.1 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **7.1 ft**	BOTTOM (BGS): **14.7 ft**

NOTES:

1) 4-1/4" HSA exploratory boring advanced to 15.0 ft bgs (15.6 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.

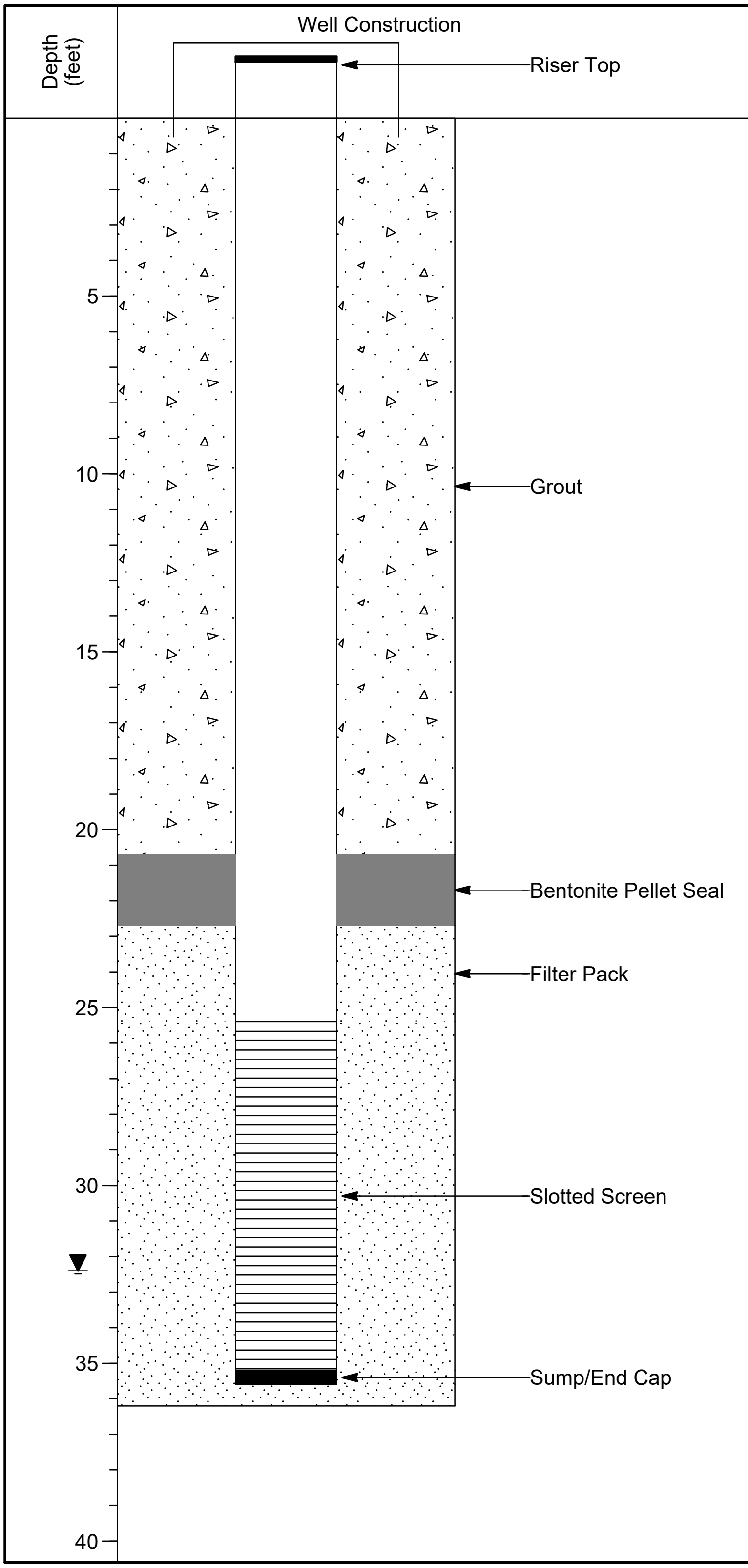
2) Final, as built well depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For JSF-106, the finished grade surveyed elevation was approximately 0.6' 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: **JSF-107** (Boring JSF-107)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **2/27/19** COMPLETED: **2/28/19**
PROJECT NUMBER: **175568225**	LOCATION: **733,849.62 N; 2,887,998.51 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **Ash Disposal Area J, Northeast**
DRILLING EQUIPMENT: **CME 55T#2, #711**	LATITUDE: **36° 22' 13.50"** LONGITUDE: **-82° 59' 0.61"**
DRILLING METHOD: **8-1/4" HSA**	GROUND ELEV (ft): **1106.3** TOC ELEV (ft): **1109.75**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **35.6**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **32.4**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **13.3** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.4 ft** BOTTOM (BGS): **25.4 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **25.4 ft** BOTTOM (BGS): **35.2 ft**

END CAP: TOP (BGS): **35.2 ft** BOTTOM (BGS): **35.6 ft**

GROUT QUANTITY: **132 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.0 ft** BOTTOM (BGS): **20.7 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.2** RETURN (lbs/gal): **10.2**

BENTONITE TYPE: **1/4" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **20.7 ft** BOTTOM (BGS): **22.7 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **22.7 ft** BOTTOM (BGS): **36.2 ft**

NOTES:
1) 4-1/4" HSA exploratory boring advanced to 36.6 ft bgs. Boring subsequently overdrilled with 8-1/4" HSA to 35.5 ft bgs (36.2 ft bgs 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.

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 JSF-107 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)

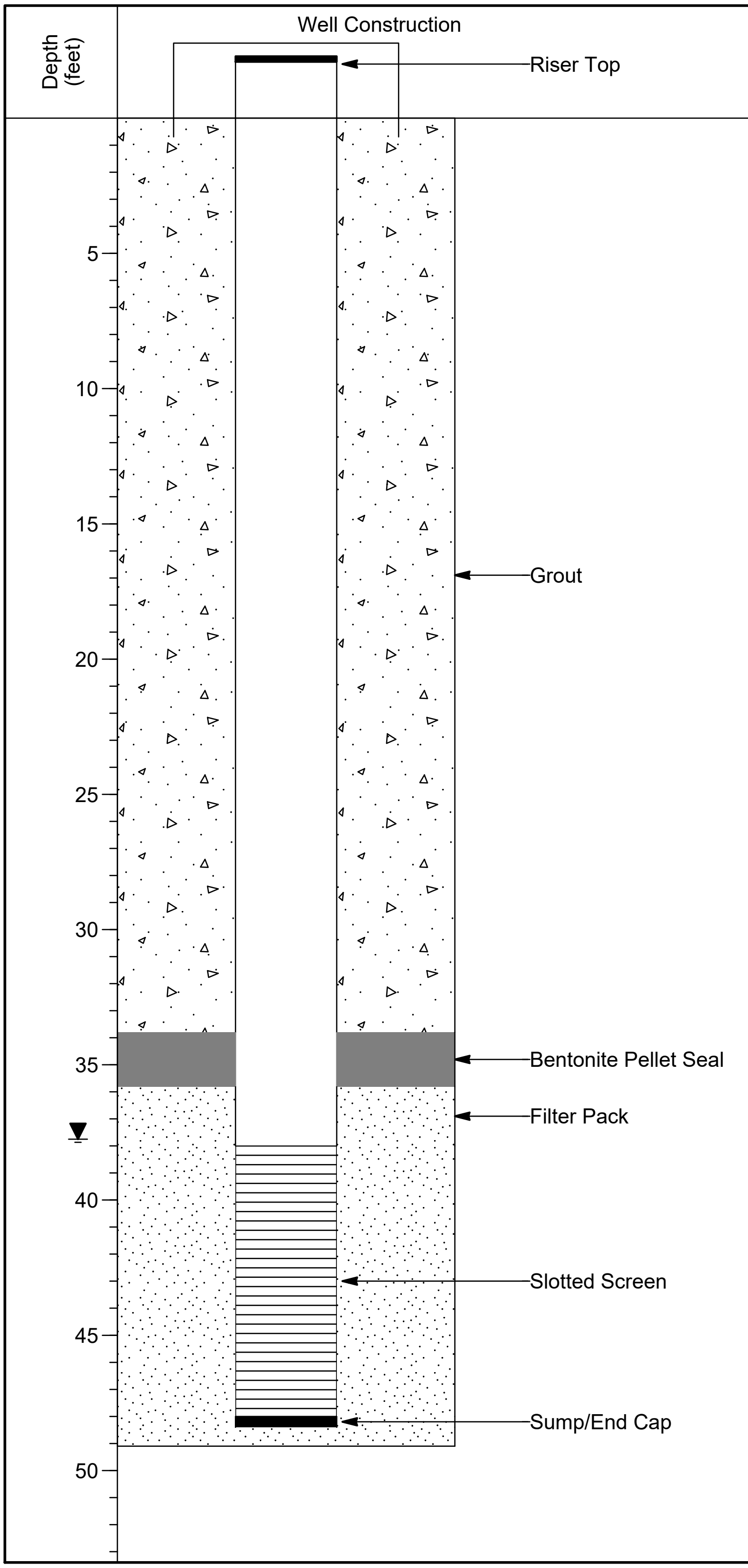
WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-108** (Boring JSF-108)

PROJECT: **JSF TDEC Order**
PROJECT NUMBER: **175568225**
DRILLING COMPANY: **Stantec Consulting Services Inc.**
DRILLING EQUIPMENT: **CME 55T#2, #711**
DRILLING METHOD: **8-1/4" HSA**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners,**
OBSERVED BY: **C. Sexton**
REVIEWED BY: **C. Kocka**
APPROVED BY: **P. Dunne**

INSTALLATION: STARTED: **2/13/19** COMPLETED: **2/15/19**
LOCATION: **733,309.62 N; 2,886,321.05 E** DATUM: **NAD27 Plant Local**
LOC. DESCRIP: **Ash Disposal Area J, North**
LATITUDE: **36° 22' 8.67"** LONGITUDE: **-82° 59' 21.31"**
GROUND ELEV (ft): **1106.0** TOC ELEV (ft): **1109.41**
ELEVATION DATUM: **NGVD29**
WELL DEPTH (ft, bgs): **48.4**
DTW AT COMPLETION (ft, bgs): **37.8**
BOREHOLE DIA. (in): **13.3** WELL DIA. (in): **4.0**

Well Construction



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.5 ft** BOTTOM (BGS): **38.0 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **38.0 ft** BOTTOM (BGS): **48.0 ft**

END CAP: TOP (BGS): **48.0 ft** BOTTOM (BGS): **48.4 ft**

GROUT QUANTITY: **215 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.0 ft** BOTTOM (BGS): **33.8 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.8** RETURN (lbs/gal): **10.8**

BENTONITE TYPE: **1/4" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **33.8 ft** BOTTOM (BGS): **35.8 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **35.8 ft** BOTTOM (BGS): **49.1 ft**

NOTES:
0.10' knock out plug at bottom of boring.

1) 4-1/4" HSA exploratory boring advanced to 48.4 ft bgs (49.2 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 well 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 JSF-108, the finished grade surveyed elevation was approximately 0.8' 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.

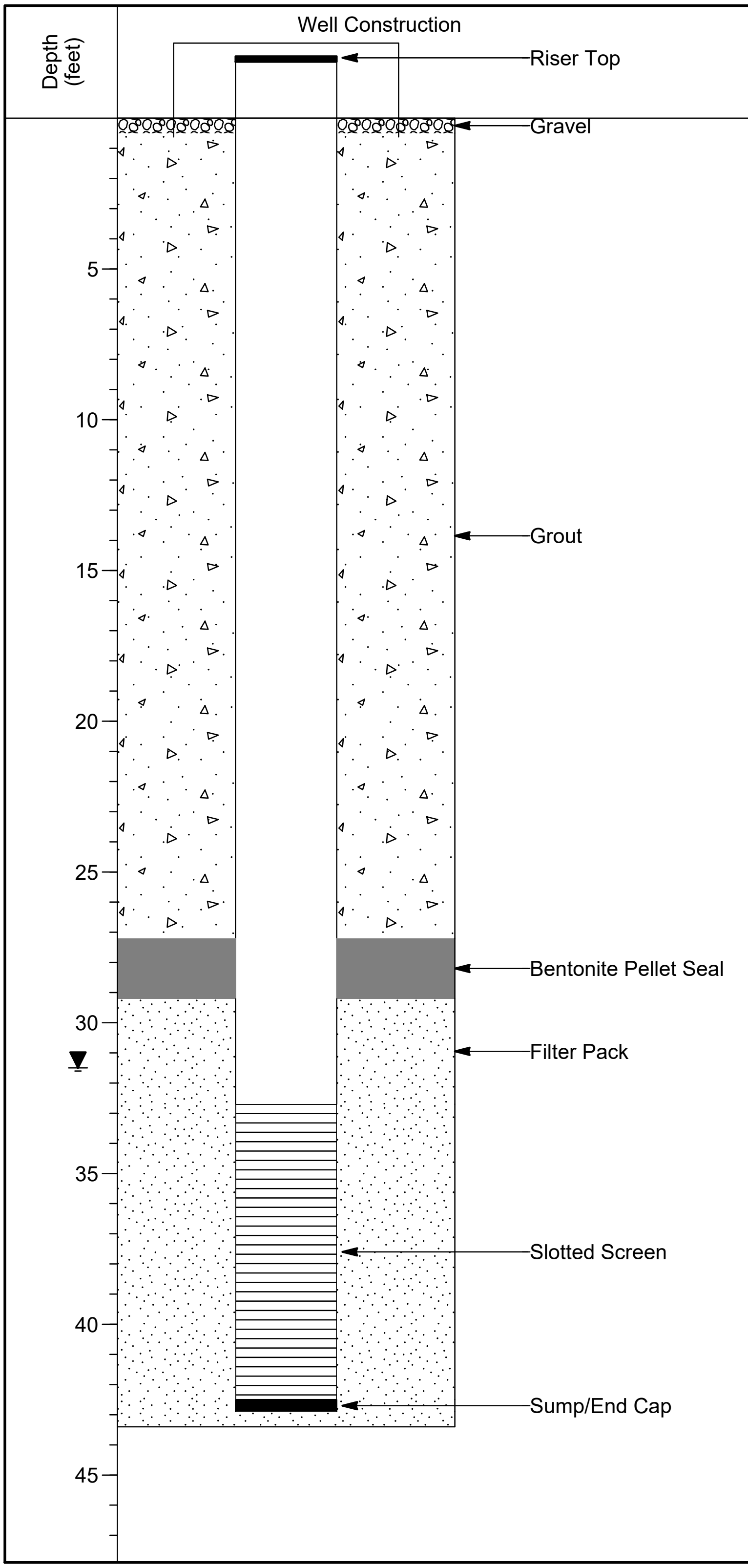
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-109** (Boring JSF-109Alt2)

PROJECT: **JSF TDEC Order**
PROJECT NUMBER: **175568225**
DRILLING COMPANY: **Stantec Consulting Services Inc.**
DRILLING EQUIPMENT: **CME 55T#2, #711**
DRILLING METHOD: **8-1/4" HSA**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners**
OBSERVED BY: **C. Sexton**
REVIEWED BY: **C. Kocka**
APPROVED BY: **P. Dunne**

INSTALLATION: STARTED: **3/5/19** COMPLETED: **3/5/19**
LOCATION: **732,996.05 N; 2,885,961.58 E** DATUM: **NAD27 Plant Local**
LOC. DESCRIP: **Ash Disposal Area J, West downhill**
LATITUDE: **36° 22' 5.68"** LONGITUDE: **-82° 59' 25.82'**
GROUND ELEV (ft): **1101.2** TOC ELEV (ft): **1104.72**
ELEVATION DATUM: **NGVD29**
WELL DEPTH (ft, bgs): **42.9**
DTW AT COMPLETION (ft, bgs): **31.5**
BOREHOLE DIA. (in): **13.3** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.5 ft** BOTTOM (BGS): **32.7 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **32.7 ft** BOTTOM (BGS): **42.5 ft**

END CAP: TOP (BGS): **42.5 ft** BOTTOM (BGS): **42.9 ft**

GROUT QUANTITY: **178.5 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.5 ft** BOTTOM (BGS): **27.2 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.5** RETURN (lbs/gal): **10.5**

BENTONITE TYPE: **1/4" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **27.2 ft** BOTTOM (BGS): **29.2 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **29.2 ft** BOTTOM (BGS): **43.4 ft**

NOTES:
0.10' knock out plug.

1) 4-1/4" HSA exploratory boring advanced to 43.9 ft bgs (44.6 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.

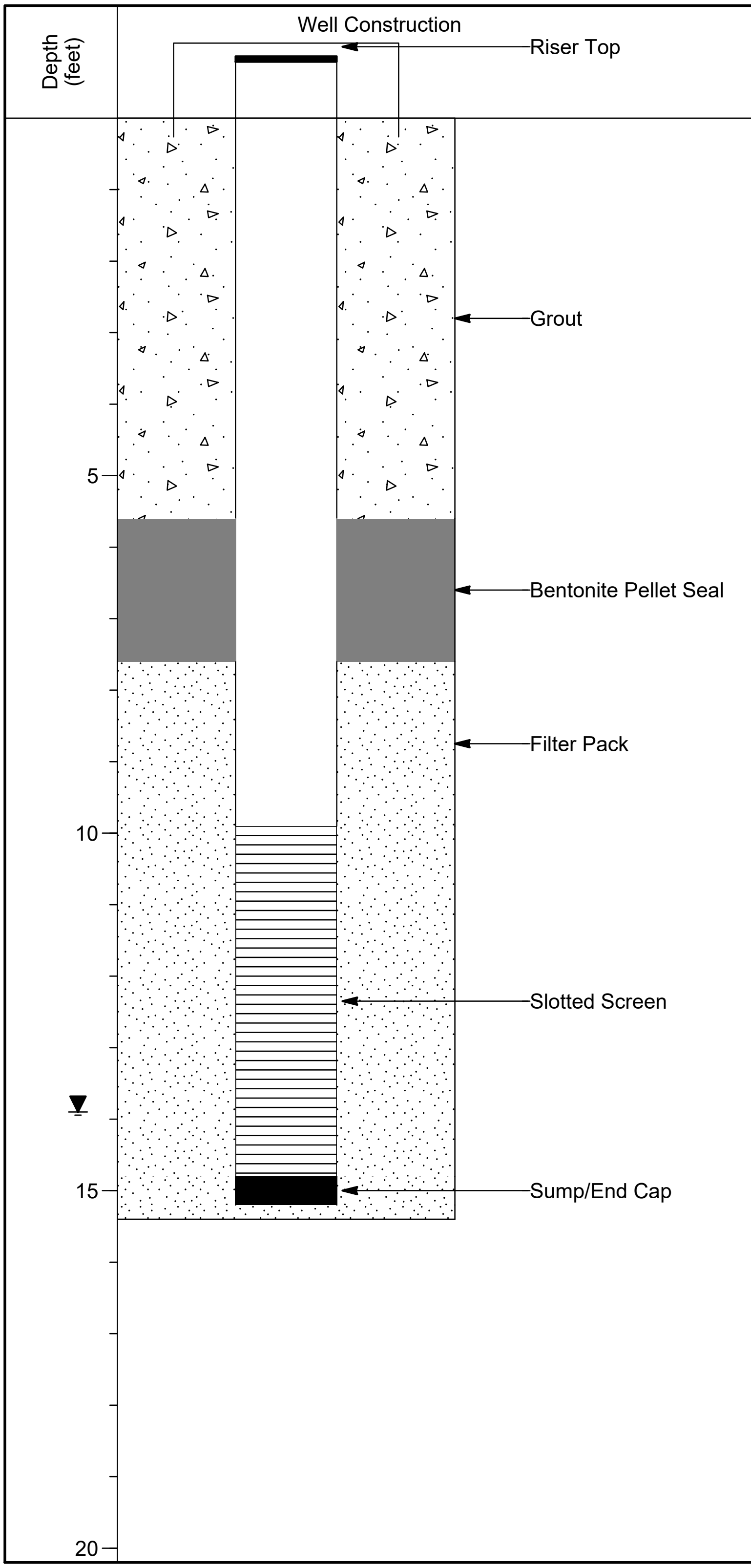
2) Final, as built well depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For JSF-109Alt2, the finished grade surveyed 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: **JSF-110** (Boring JSF-110)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **1/29/19** COMPLETED: **1/30/19**
PROJECT NUMBER: **175568225**	LOCATION: **732,649.53 N; 2,889,835.21 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **Highway 70 Borrow Area, AE corner**
DRILLING EQUIPMENT: **CME 55T#2, #711**	LATITUDE: **36° 22' 1.07"** LONGITUDE: **-82° 58' 38.61"**
DRILLING METHOD: **8-1/4" HSA**	GROUND ELEV (ft): **1139.0** TOC ELEV (ft): **1142.44**
SAMPLING METHOD: **4-1/4" HSA, 2" and 3" SS w/o liners**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **15.2**
REVIEWED BY: **C. Kocka**	DTW AT COMPLETION (ft, bgs): **13.9**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **13.3** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**	
RISER: TOP (AGS): **3.4 ft**	BOTTOM (BGS): **9.9 ft**
SCREEN TYPE: **5"ID x 4"ID U-Pack**	
SCREEN SLOT SIZE (in): **0.010**	
SCREEN: TOP (BGS): **9.9 ft**	BOTTOM (BGS): **14.8 ft**
END CAP: TOP (BGS): **14.8 ft**	BOTTOM (BGS): **15.2 ft**
GROUT QUANTITY: **32 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.0 ft**	BOTTOM (BGS): **5.6 ft**
GROUT DENSITY: INITIAL (lbs/gal): **10.3**	RETURN (lbs/gal): **10.3**
BENTONITE TYPE: **1/4" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **5.6 ft**	BOTTOM (BGS): **7.6 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **7.6 ft**	BOTTOM (BGS): **15.4 ft**

NOTES:

1) Backfilled from 17.8' to 15.4' with pel-plug 1/4" TR30 bentonite pellets.

2)Total depth of boring and depth of screened interval revised based on post-grouting depth measurement.

3) 4-1/4" HSA exploratory boring advanced to 18.0 ft bgs (18.6 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.

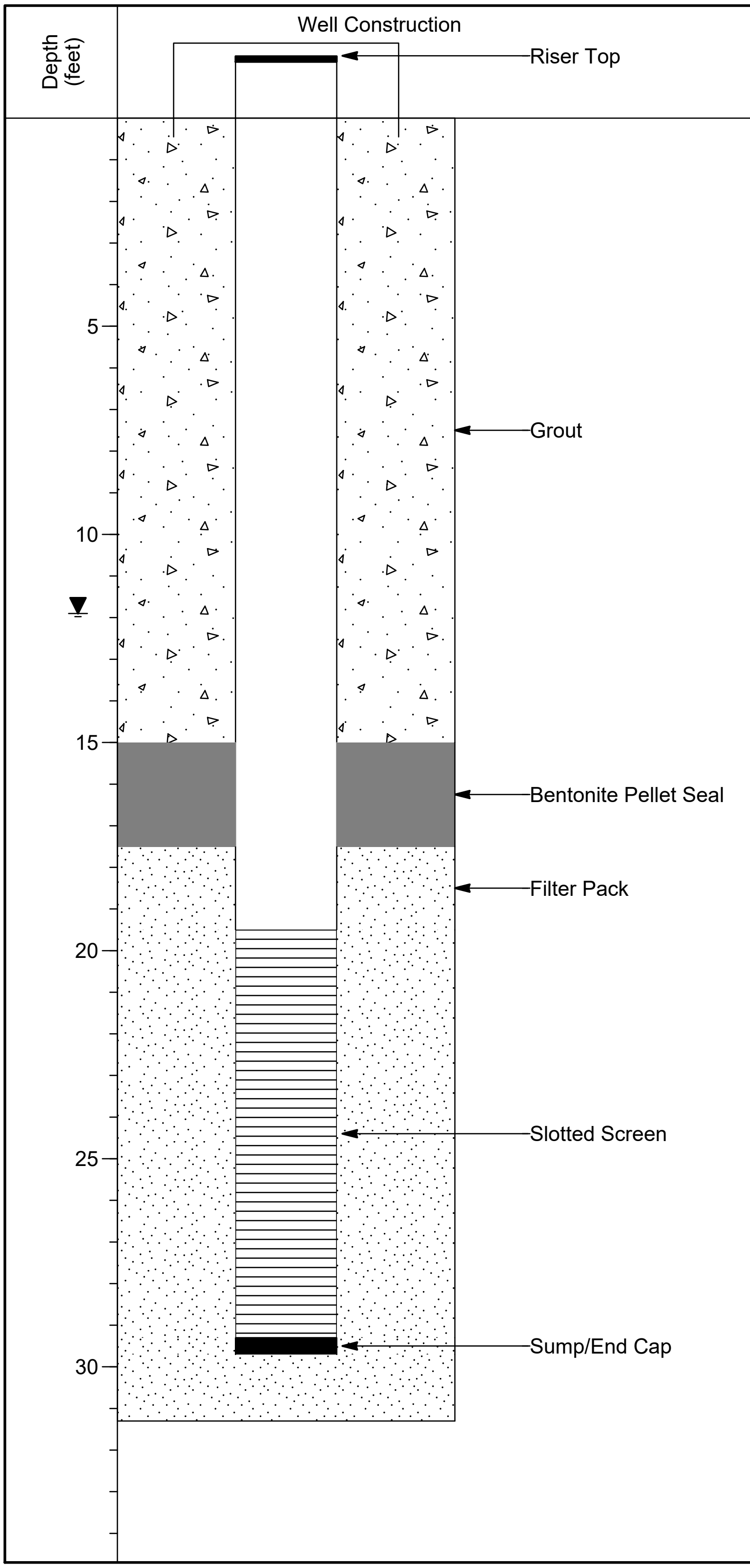
4) Final, as built well depths are listed. These corrected depths use the surveyed ground surface (GS) elevation following pad placement as the reference datum and may differ from the unknown elevation of the GS reference point used during well installation. For JSF-110, the finished grade surveyed elevation was approximately 0.6' 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: **JSF-206** (Boring JSF-206S)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **6/26/19** COMPLETED: **6/26/19**
PROJECT NUMBER: **175568225**	LOCATION: **732,659.08 N; 2,889,831.52 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **SE Corner of Highway 70 Borrow Area**
DRILLING EQUIPMENT: **Schramm T450WS Rotodrill**	LATITUDE: **36° 22' 1.17"** LONGITUDE: **-82° 58' 38.66"**
DRILLING METHOD: **8" Air Rotary**	GROUND ELEV (ft): **1138.6** TOC ELEV (ft): **1142.73**
SAMPLING METHOD: **8" Air Rotary**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **29.7**
REVIEWED BY: **B. Evans**	DTW AT COMPLETION (ft, bgs): **11.9**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**	
RISER: TOP (AGS): **4.2 ft**	BOTTOM (BGS): **19.5 ft**
SCREEN TYPE: **5"ID x 4"ID U-Pack**	
SCREEN SLOT SIZE (in): **0.010**	
SCREEN: TOP (BGS): **19.5 ft**	BOTTOM (BGS): **29.3 ft**
END CAP: TOP (BGS): **29.3 ft**	BOTTOM (BGS): **29.7 ft**
GROUT QUANTITY: **85 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.0 ft**	BOTTOM (BGS): **15.0 ft**
GROUT DENSITY: INITIAL (lbs/gal): **10.1**	RETURN (lbs/gal): **10.0**
BENTONITE TYPE: **3/8" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **15.0 ft**	BOTTOM (BGS): **17.5 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **17.5 ft**	BOTTOM (BGS): **31.3 ft**

NOTES:

1) Final, as built well detail depths measured from final surface grade (ft bgs) are listed. TVA surface pad installation activities may result in changes to the final surface grade and well riser stick-up length. As built depths are therefore corrected to reflect these changes based on the final surveyed ground surface elevation, top of casing elevation, and measured depth of the well following pad placement.

2) For JSF-206, pad placement activities resulted in an approximate 0.5' net “decrease” in the original length (depth) of the well when measured from the new final surface grade (i.e., the total length of well pipe below the new, final surface grade is less than it was when measured from the ground surface during well installation). While the final, corrected depths (ft bgs) may differ from those originally measured during well construction, the original, as installed elevations of the various well components have not changed as a result of surface pad installation activities.

3) Well blind drilled with air rotary to target depth of 32.0 ft bgs (31.5 ft bgs corrected). rock debris from drilling from 32.0 to 31.8 ft bgs (31.5 to 31.3 ft bgs corrected).

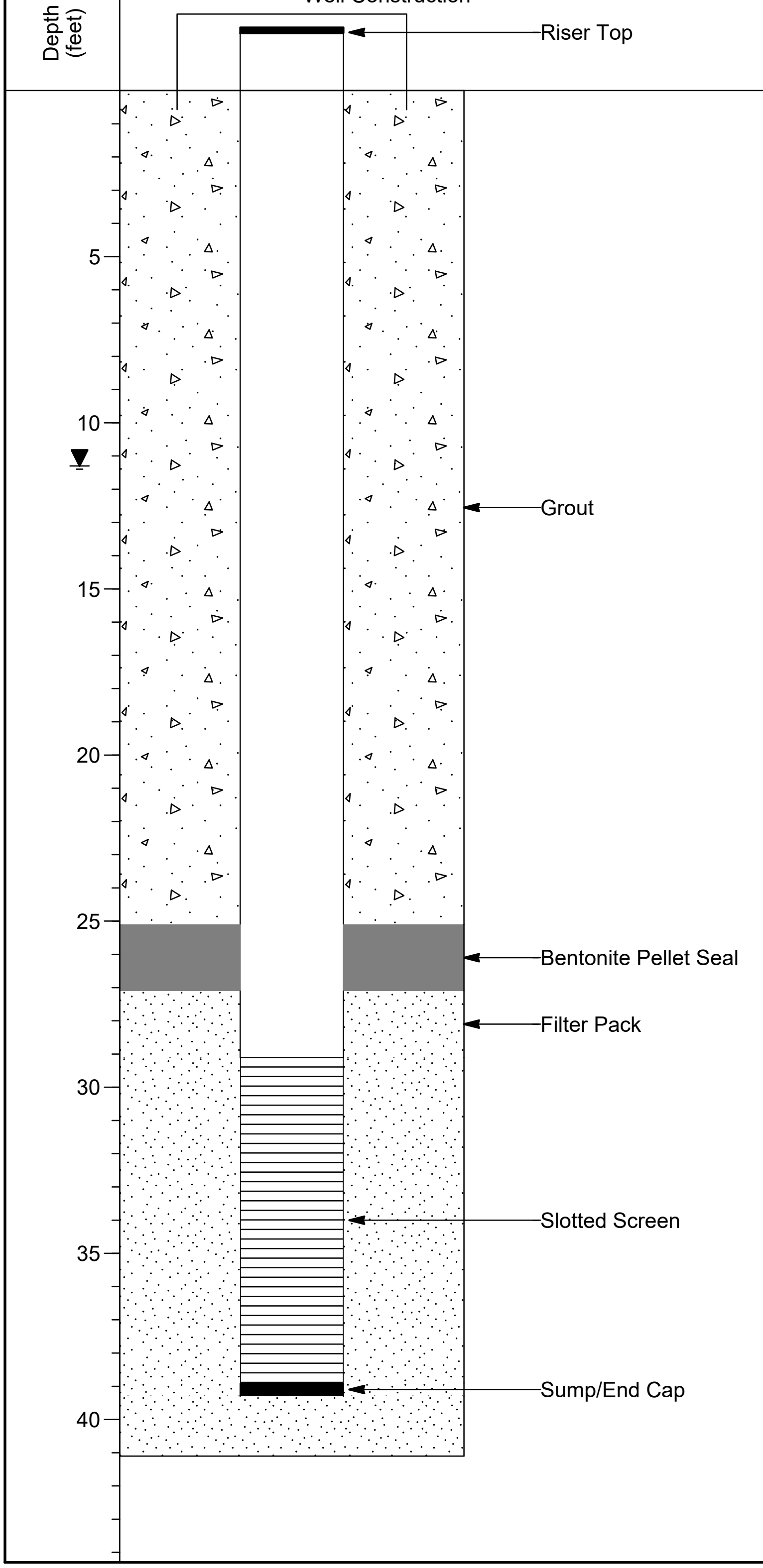
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-207** (Boring JSF-207)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **6/27/19** COMPLETED: **6/28/19**
PROJECT NUMBER: **175568225**	LOCATION: **733,197.04 N; 2,889,257.88 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **NW corner of hwy 70 borrow area**
DRILLING EQUIPMENT: **CME 850XR, #953**	LATITUDE: **36° 22' 6.66"** LONGITUDE: **-82° 58' 45.46"**
DRILLING METHOD: **8" Air Rotary**	GROUND ELEV (ft): **1109.1** TOC ELEV (ft): **1112.71**
SAMPLING METHOD: **4-1/4" HSA**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **39.3**
REVIEWED BY: **B. Evans**	DTW AT COMPLETION (ft, bgs): **11.3**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **8.0** 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): **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): **38.9 ft**
END CAP: TOP (BGS): **38.9 ft**	BOTTOM (BGS): **39.3 ft**
GROUT QUANTITY: **34 gal**	
GROUT TYPE: **30% Solids Bentonite Grout**	
GROUT: TOP (BGS): **0.0 ft**	BOTTOM (BGS): **25.1 ft**
GROUT DENSITY: INITIAL (lbs/gal): **10.1**	RETURN (lbs/gal): **10.0**
BENTONITE TYPE: **3/8" PDS TR30 pellets**	
BENTONITE SEAL: TOP (BGS): **25.1 ft**	BOTTOM (BGS): **27.1 ft**
FILTER PACK - PRE-PACK AND ANNULAR SPACE: TYPE: **20/40 Mesh (Global #7)**	
FILTER PACK: TOP (BGS): **27.1 ft**	BOTTOM (BGS): **41.1 ft**

NOTES:

1) Final, as built well detail depths measured from final surface grade (ft bgs) are listed. TVA surface pad installation activities may result in changes to the final surface grade and well riser stick-up length. As built depths are therefore corrected to reflect these changes based on the final surveyed ground surface elevation, top of casing elevation, and measured depth of the well following pad placement.

2) For JSF-207, pad placement activities resulted in an approximate 1.1' net "increase" in the original depth of the well when measured from the new final surface grade (i.e., the total length of well pipe below the new, final surface grade is greater than it was when measured from the ground surface during well installation). While the final, corrected depths (ft bgs) may differ from those originally measured during well construction, the original, as installed elevations of the various well components have not changed as a result of surface pad installation activities.

3) JSF-207 exploratory boring (TD: 56.7 ft bgs (57.8 ft bgs corrected)) over drilled with 8" OD air rotary to 40.0 ft bgs (41.1 ft bgs corrected). Bentonite pellets placed below sand pack from 40.0 to 56.7 ft bgs (41.1 to 57.8 ft bgs corrected).

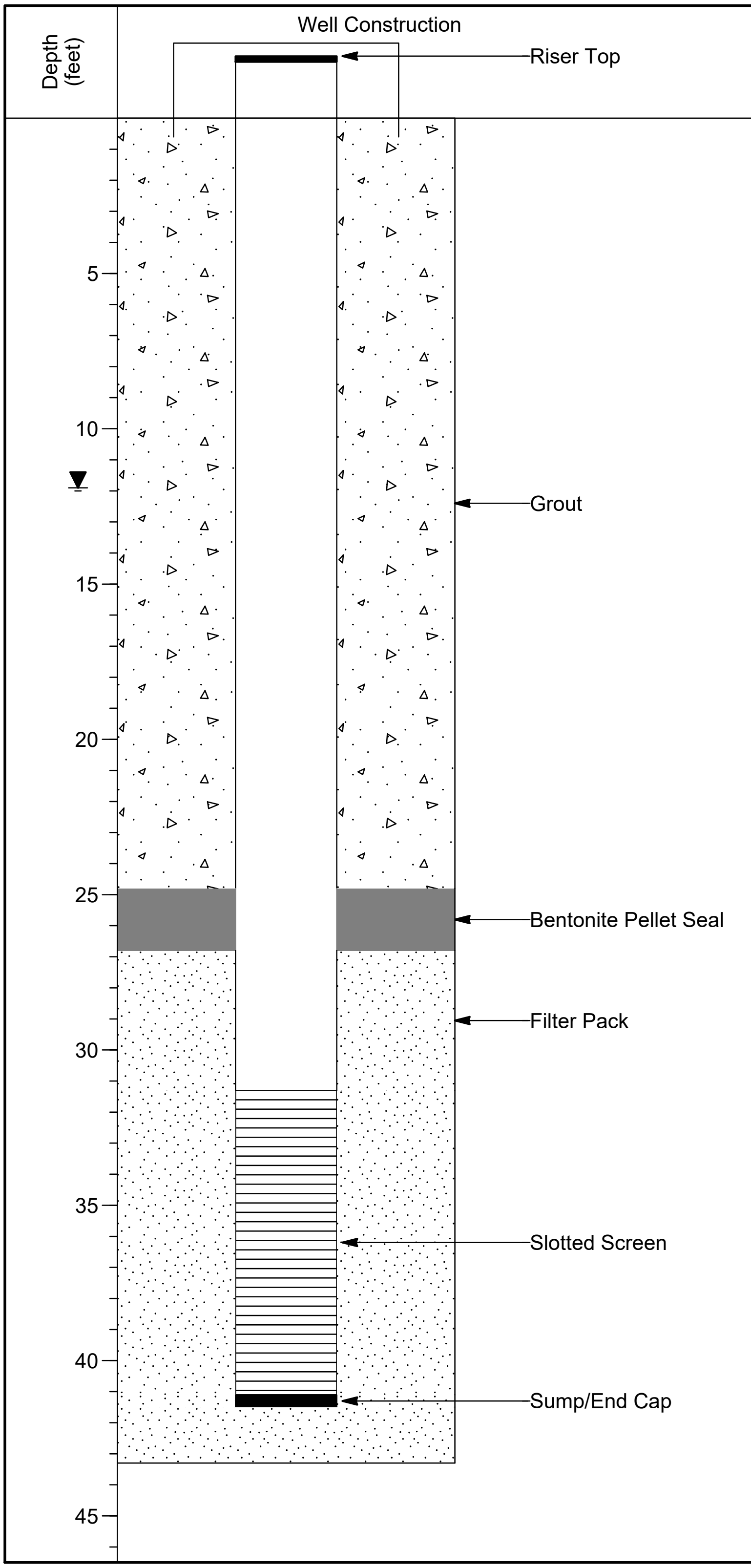
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-208** (Boring JSF-208)

PROJECT: **JSF TDEC Order**
PROJECT NUMBER: **175568225**
DRILLING COMPANY: **Stantec Consulting Services Inc.**
DRILLING EQUIPMENT: **Schramm T450WS Rotodrill**
DRILLING METHOD: **8" Air Rotary**
SAMPLING METHOD: **See boring log for JSF-111 dated 2/5/19**
OBSERVED BY: **C. Sexton**
REVIEWED BY: **B. Evans**
APPROVED BY: **P. Dunne**

INSTALLATION: STARTED: **6/28/19** COMPLETED: **6/28/19**
LOCATION: **733,186.14 N; 2,889,595.83 E** DATUM: **NAD27 Plant Local**
LOC. DESCRIP: **NE Corner of Highway 70 Borrow Area**
LATITUDE: **36° 22' 6.45"** LONGITUDE: **-82° 58' 41.34"**
GROUND ELEV (ft): **1107.4** TOC ELEV (ft): **1112.22**
ELEVATION DATUM: **NGVD29**
WELL DEPTH (ft, bgs): **41.5**
DTW AT COMPLETION (ft, bgs): **11.9**
BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **4.8 ft** BOTTOM (BGS): **31.3 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **31.3 ft** BOTTOM (BGS): **41.1 ft**

END CAP: TOP (BGS): **41.1 ft** BOTTOM (BGS): **41.5 ft**

GROUT QUANTITY: **68 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.0 ft** BOTTOM (BGS): **24.8 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.1** RETURN (lbs/gal): **10.0**

BENTONITE TYPE: **3/8" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **24.8 ft** BOTTOM (BGS): **26.8 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **26.8 ft** BOTTOM (BGS): **43.3 ft**

NOTES:

1) Final, as built well detail depths measured from final surface grade (ft bgs) are listed. TVA surface pad installation activities may result in changes to the final surface grade and well riser stick-up length. As built depths are therefore corrected to reflect these changes based on the final surveyed ground surface elevation, top of casing elevation, and measured depth of the well following pad placement.

2) At JSF-208, pad placement activities resulted in an approximate 0.7' net “decrease” in the original length depth in ft bgs of the well when measured from the new final surface grade (i.e., the total length of well pipe below the new, final surface grade is shorter than it was when measured from the ground surface during well installation). While the final, corrected depths (ft bgs) may differ from those originally measured during well construction, the original, as installed elevations of the various well components have not changed as a result of surface pad installation activities.

3) Well blind drilled with 8" OD air rotary through overburden boring JSF-111 to target depth of 50.0 ft bgs (49.3 ft bgs corrected). Bentonite pellets used to backfill boring up to to 44.0 ft bgs (43.3 ft bgs corrected).

VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

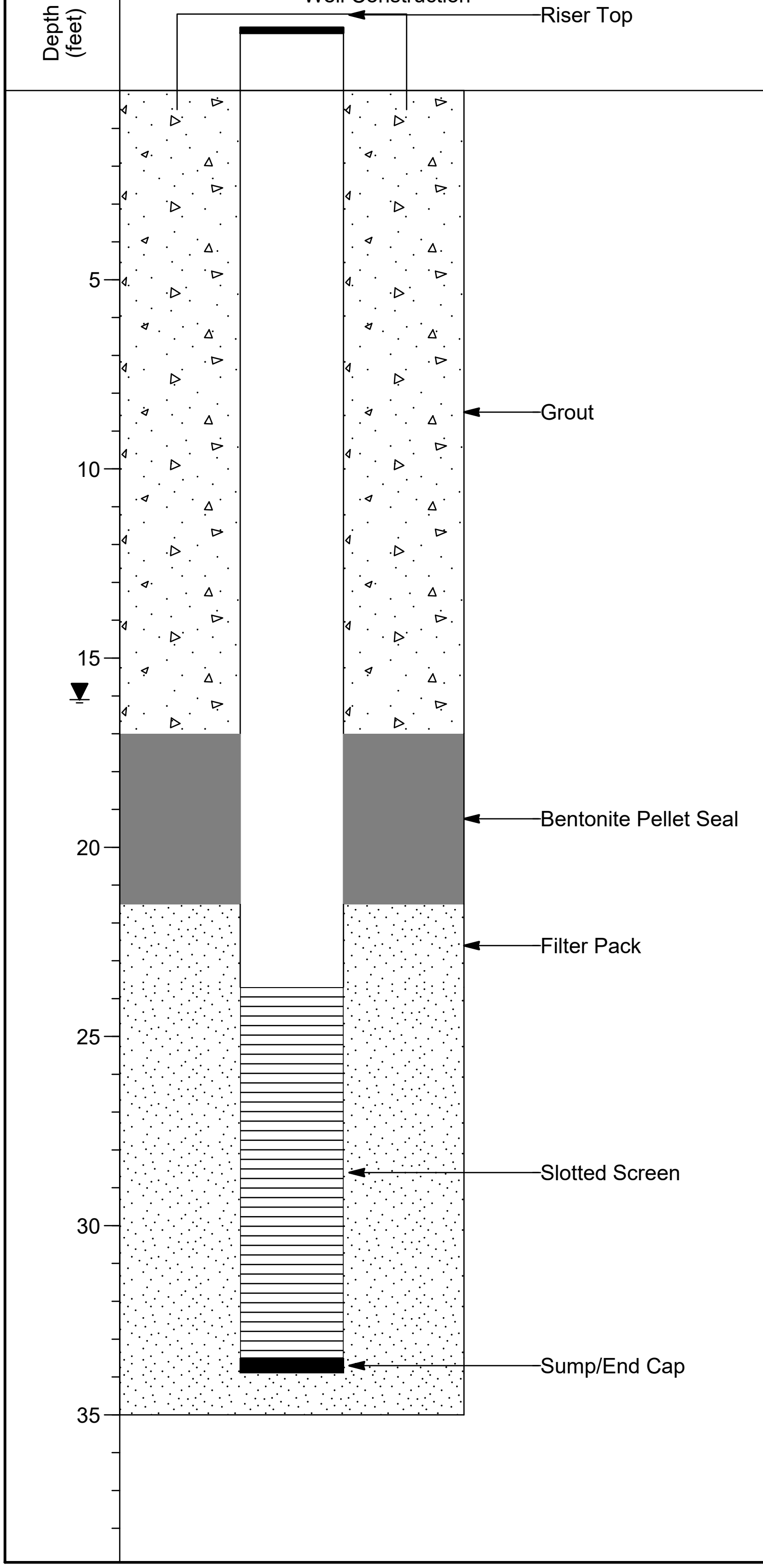
WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: PAGE 1 OF 1

JSF-209 (Boring JSF-209)

PROJECT: **JSF TDEC Order**	INSTALLATION: STARTED: **6/24/19** COMPLETED: **6/26/19**
PROJECT NUMBER: **175568225**	LOCATION: **732,777.44 N; 2,889,195.49 E** DATUM: **NAD27 Plant Local**
DRILLING COMPANY: **Stantec Consulting Services Inc.**	LOC. DESCRIP: **West Side of Highway 70 Borrow Area**
DRILLING EQUIPMENT: **Schramm T450WS Rotodrill**	LATITUDE: **36° 22' 2.53"** LONGITUDE: **-82° 58' 46.38"**
DRILLING METHOD: **8" Air Hammer**	GROUND ELEV (ft): **1136.4** TOC ELEV (ft): **1140.39**
SAMPLING METHOD: **See boring log for JSF-113Alt dated 2/1/19**	ELEVATION DATUM: **NGVD29**
OBSERVED BY: **C. Sexton**	WELL DEPTH (ft, bgs): **33.9**
REVIEWED BY: **B. Evans**	DTW AT COMPLETION (ft, bgs): **16.1**
APPROVED BY: **P. Dunne**	BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**

Depth (feet) | Well Construction



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **4.0 ft** BOTTOM (BGS): **23.7 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **23.7 ft** BOTTOM (BGS): **33.5 ft**

END CAP: TOP (BGS): **33.5 ft** BOTTOM (BGS): **33.9 ft**

GROUT QUANTITY: **68 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.0 ft** BOTTOM (BGS): **17.0 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.0** RETURN (lbs/gal): **10.0**

BENTONITE TYPE: **3/8" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **17.0 ft** BOTTOM (BGS): **21.5 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **21.5 ft** BOTTOM (BGS): **35.0 ft**

NOTES:

1) Final, as built well detail depths measured from final surface grade (ft bgs) are listed. TVA surface pad installation activities may result in changes to the final surface grade and well riser stick-up length. As built depths are therefore corrected to reflect these changes based on the final surveyed ground surface elevation, top of casing elevation, and measured depth of the well following pad placement.

2) At JSF-209, pad placement activities resulted in no change in the original depth in ft bgs of the well when measured from the new, final surface grade. No corrections as a result of pad installations were required.

3) JSF-209 Well boring blind drilled through overburden boring JSF-113Alt with air rotary to target depth of 35.0 ft bgs. Approximately 1.1 feet of filter pack placed below bottom of well cap prior to well screen assembly installation.

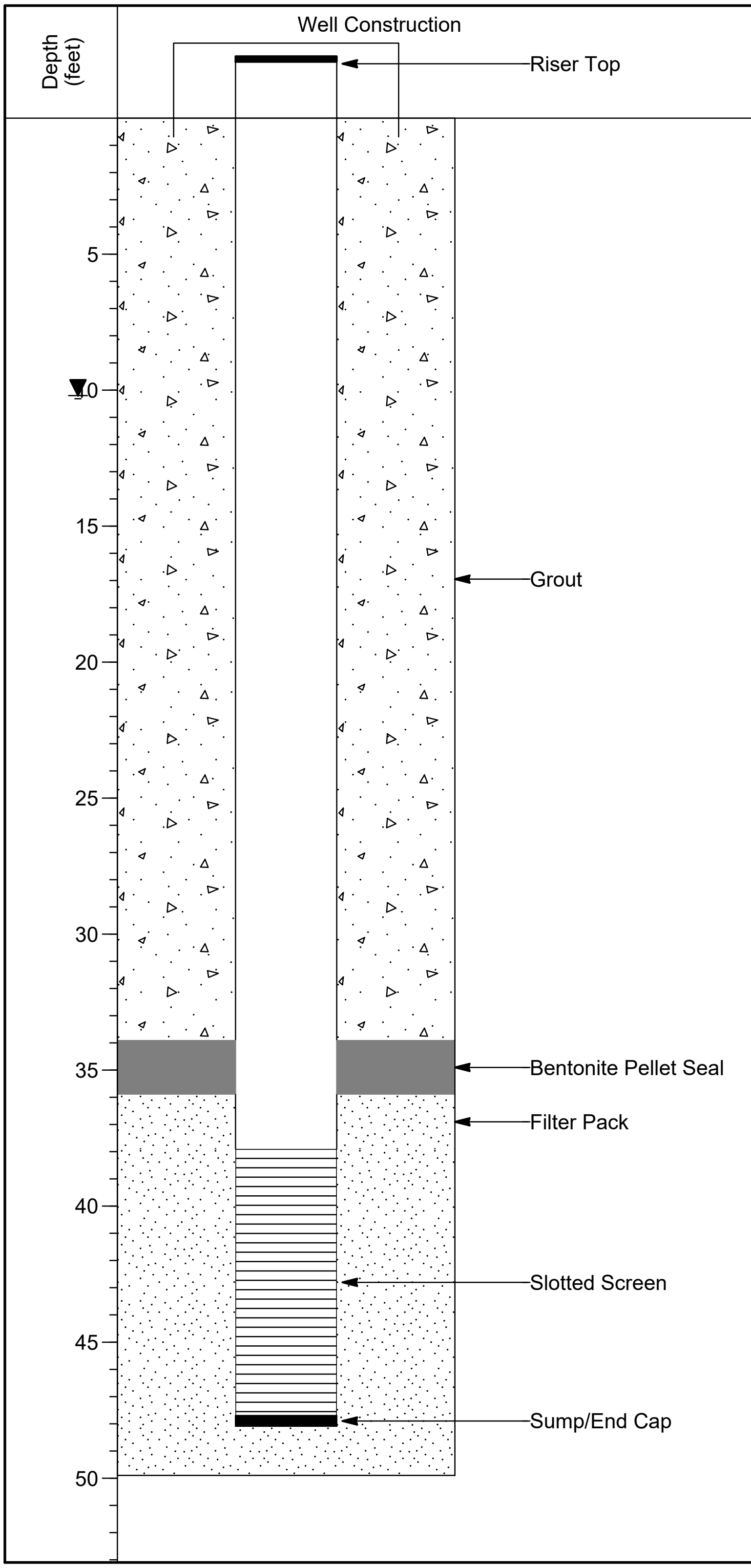
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

WELL INSTALLATION DETAIL

WELL / PROBEHOLE / BOREHOLE NO: **JSF-210** (Boring JSF-206)

PROJECT: **JSF TDEC Order**
PROJECT NUMBER: **175568225**
DRILLING COMPANY: **Stantec Consulting Services Inc.**
DRILLING EQUIPMENT: **CME 850XR, #953**
DRILLING METHOD: **8" Air Rotary**
SAMPLING METHOD: **4-1/4" HSA, 2" SS w/o liners, 3" Shelby Tubes**
OBSERVED BY: **C. Sexton**
REVIEWED BY: **B. Evans**
APPROVED BY: **P. Dunne**

INSTALLATION: STARTED: **6/25/19** COMPLETED: **6/28/19**
LOCATION: **732,667.53 N; 2,889,831.36 E** DATUM: **NAD27 Plant Local**
LOC. DESCRIP: **South east corner of hwy 70 borrow area**
LATITUDE: **36° 22' 1.25"** LONGITUDE: **-82° 58' 38.65"**
GROUND ELEV (ft): **1139.0** TOC ELEV (ft): **1142.75**
ELEVATION DATUM: **NGVD29**
WELL DEPTH (ft, bgs): **48.1**
DTW AT COMPLETION (ft, bgs): **10.2**
BOREHOLE DIA. (in): **8.0** WELL DIA. (in): **4.0**



Materials Inventory

RISER TYPE: **4" Sch 40 PVC Riser**

RISER: TOP (AGS): **3.7 ft** BOTTOM (BGS): **37.9 ft**

SCREEN TYPE: **5"ID x 4"ID U-Pack**

SCREEN SLOT SIZE (in): **0.010**

SCREEN: TOP (BGS): **37.9 ft** BOTTOM (BGS): **47.7 ft**

END CAP: TOP (BGS): **47.7 ft** BOTTOM (BGS): **48.1 ft**

GROUT QUANTITY: **60 gal**

GROUT TYPE: **30% Solids Bentonite Grout**

GROUT: TOP (BGS): **0.0 ft** BOTTOM (BGS): **33.9 ft**

GROUT DENSITY:
INITIAL (lbs/gal): **10.0** RETURN (lbs/gal): **10.0**

BENTONITE TYPE: **3/8" PDS TR30 pellets**

BENTONITE SEAL:
TOP (BGS): **33.9 ft** BOTTOM (BGS): **35.9 ft**

FILTER PACK - PRE-PACK AND ANNULAR SPACE:
TYPE: **20/40 Mesh (Global #7)**

FILTER PACK: TOP (BGS): **35.9 ft** BOTTOM (BGS): **49.9 ft**

NOTES:
1) Final, as built well detail depths measured from final surface grade (ft bgs) are listed. TVA surface pad installation activities may result in changes to the final surface grade and well riser stick-up length. As built depths are therefore corrected to reflect these changes based on the final surveyed ground surface elevation, top of casing elevation, and measured depth of the well following pad placement.

2) At JSF-210, pad placement activities resulted in an approximate 0.1' net “decrease” in the original length (depth in ft bgs) of the well when measured from the new final surface grade (i.e., the total length of well pipe below the new, final surface grade is shorter than it was when measured from the ground surface during well installation). While the final, corrected depths (ft bgs) may differ from those originally measured during well construction, the original, as installed elevations of the various well components have not changed as a result of surface pad installation activities.

3) JSF-210 Well boring created by overdrilling existing boring JSF-206 with air rotary to target depth of 55.0 ft bgs (54.9 ft bgs corrected). Boring backfilled with bentonite pellets up to 50 ft bgs (49.9 ft bgs corrected).

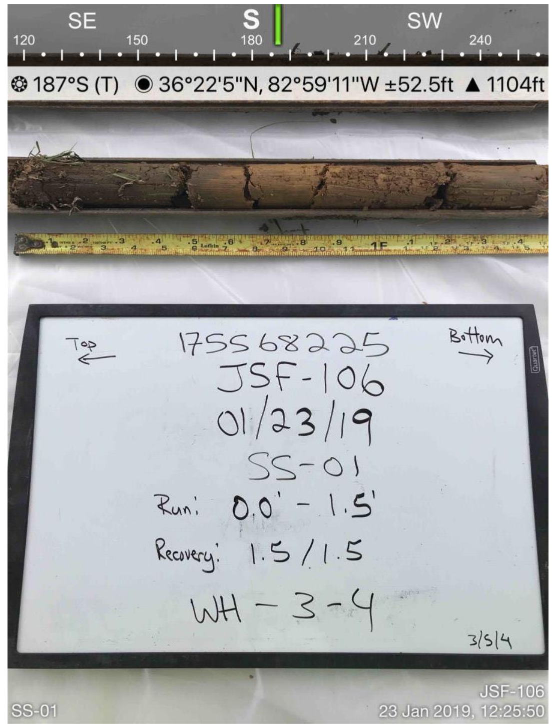
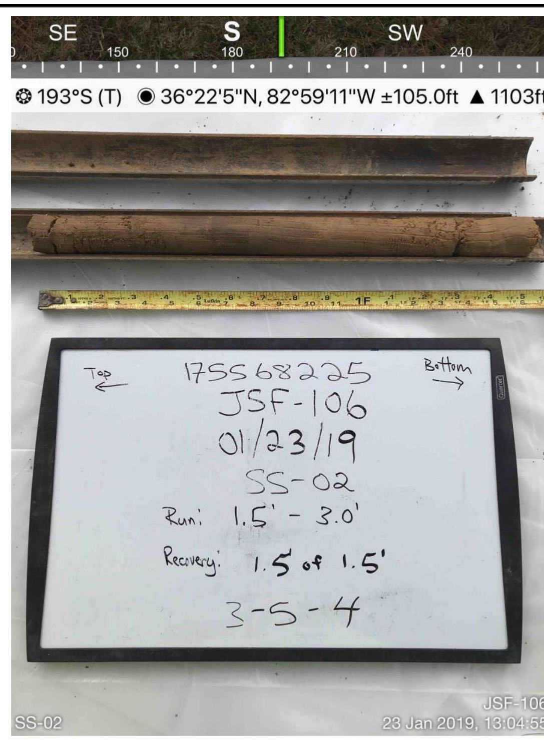
VERTICAL SCALE: AS SHOWN. HORIZONTAL SCALE: NOT TO SCALE (EXAGGERATED TO SHOW DETAIL)

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:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 1 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Interval (0.0-1.5 feet).	
Photograph ID: 2 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Interval (1.5-3.0 feet).	

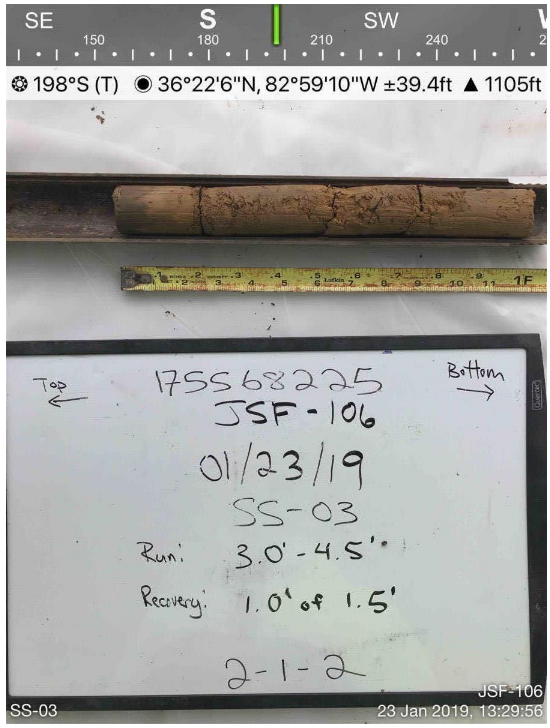
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 3

Photo Location:
JSF-106

Photo Date:
1/23/2019

Comments:
Interval (3.0-4.5 feet).

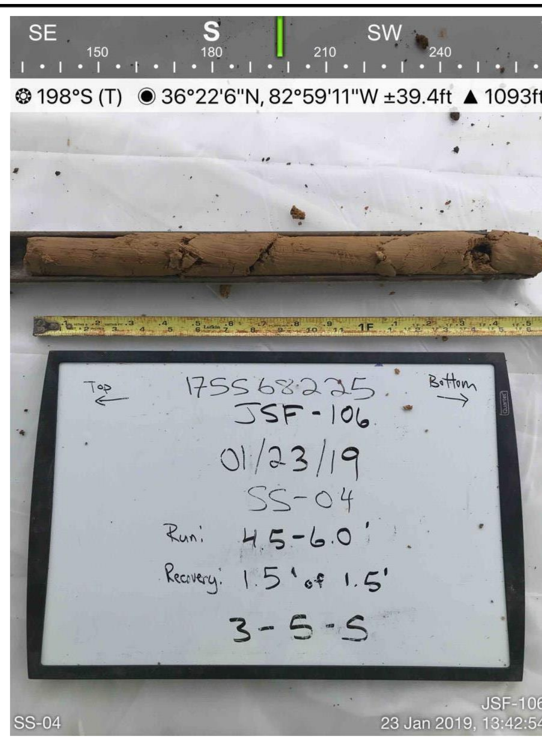


Photograph ID: 4

Photo Location:
JSF-106

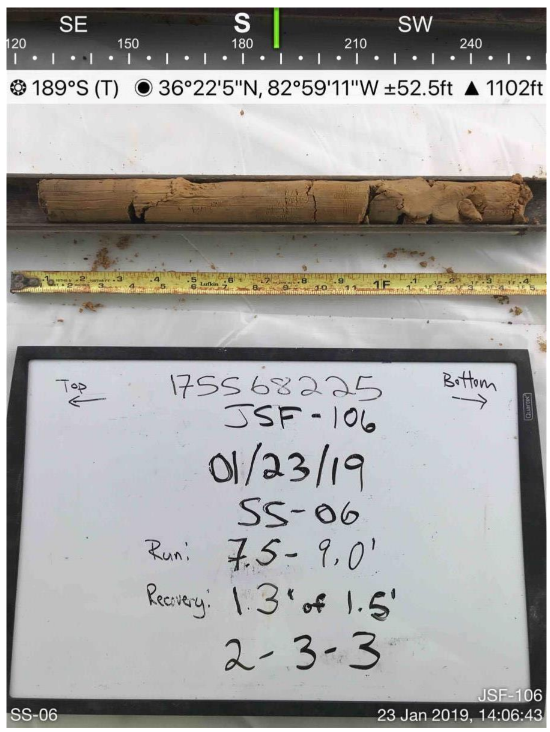
Photo Date:
1/23/2019

Comments:
Interval (4.5-6.0 feet).



Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 5 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Photo of interval (6.0-7.5 feet) unavailable.	No Photo Applicable
Photograph ID: 6 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Interval (7.5-9.0 feet).	

Stantec

Photographic Log

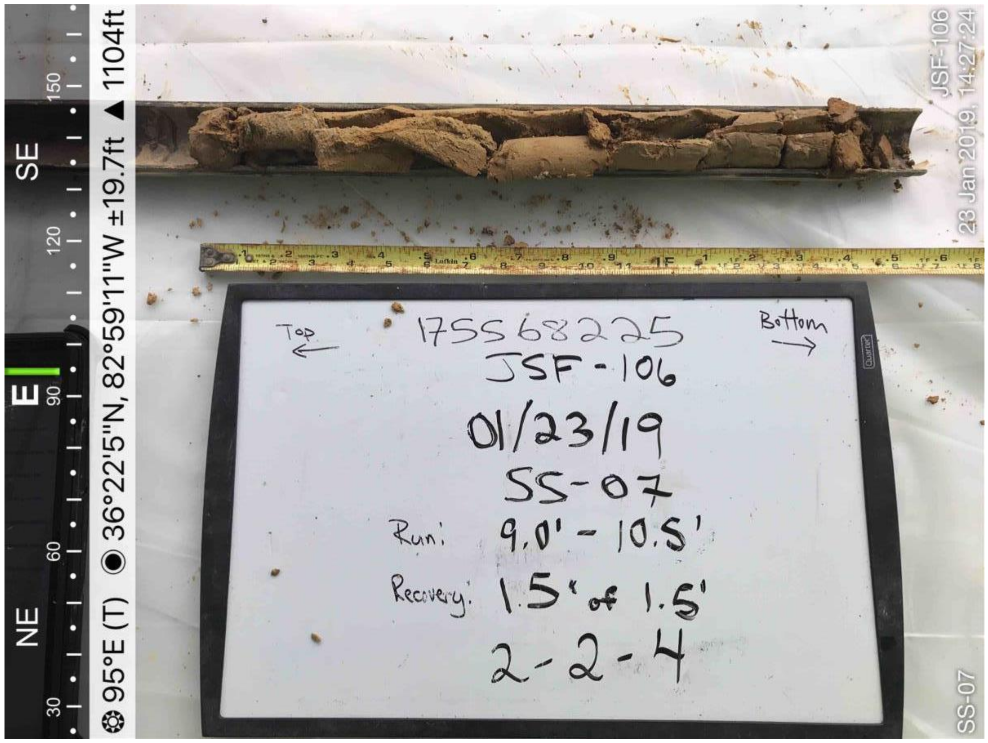
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 7

Photo Location:
JSF-106

Photo Date:
1/23/2019

Comments:
Interval (9.0-10.5 feet).

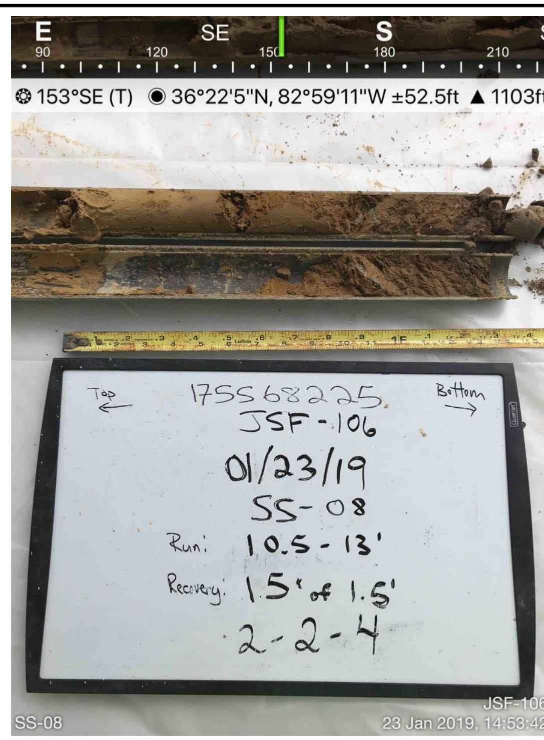


Photograph ID: 8

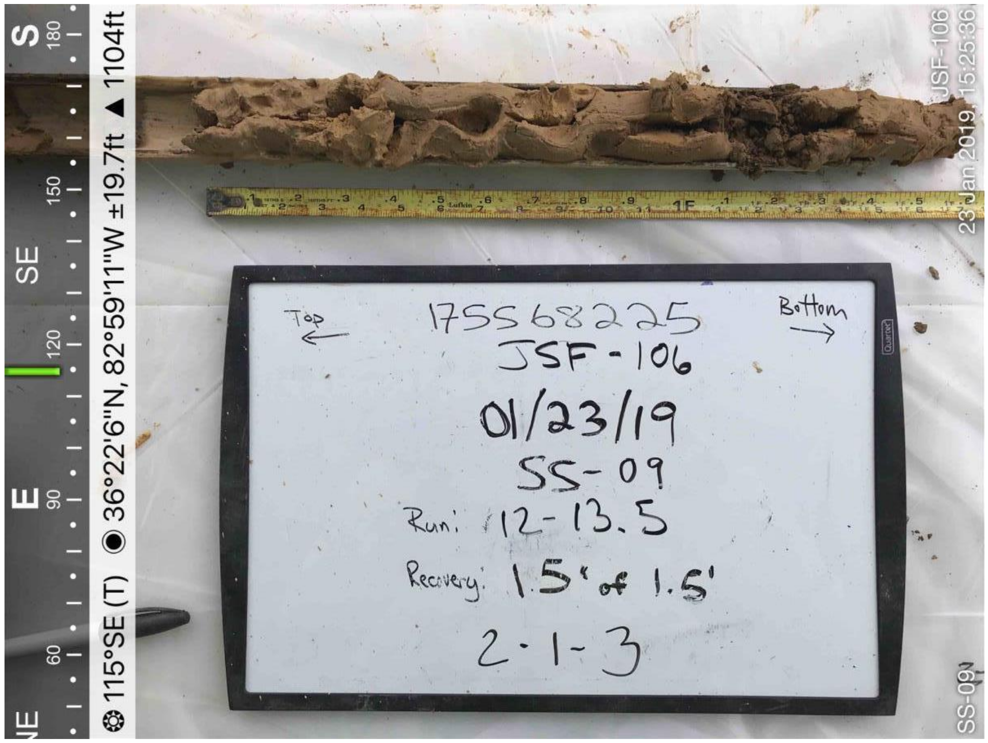
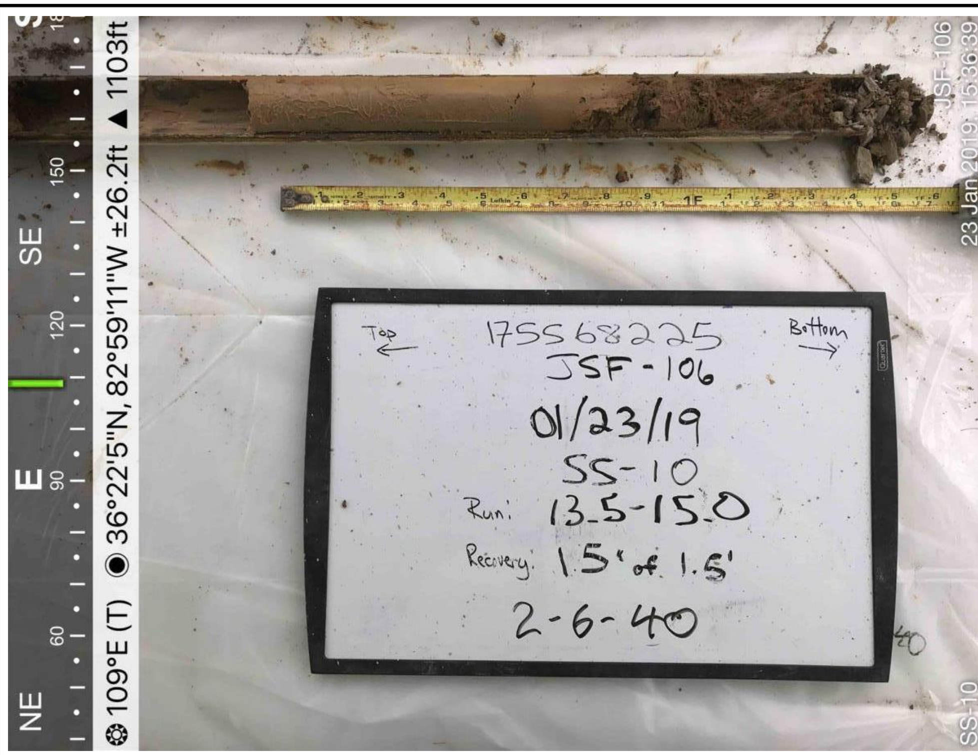
Photo Location:
JSF-106

Photo Date:
1/23/2019

Comments:
Interval (10.5-12.0 feet).
Interval shown on white board should be 10.5-12.0.
Blow counts shown on white board should be 2-1-3.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 9 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Interval (12.0-13.5 feet).	
Photograph ID: 10 **Photo Location:** JSF-106 **Photo Date:** 1/23/2019 **Comments:** Interval (13.5-15.0 feet).	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 11

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (0.0-1.5 feet).

Photograph ID: 12

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (1.5-3.0 feet).

Photographic Log

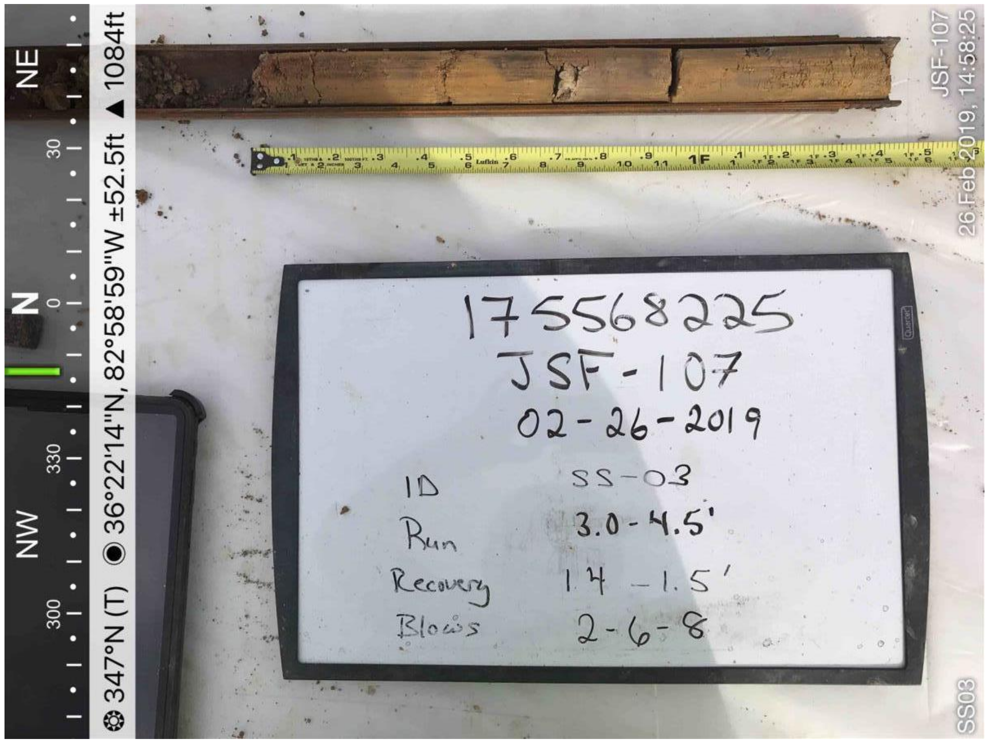
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 13

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (3.0-4.5 feet).

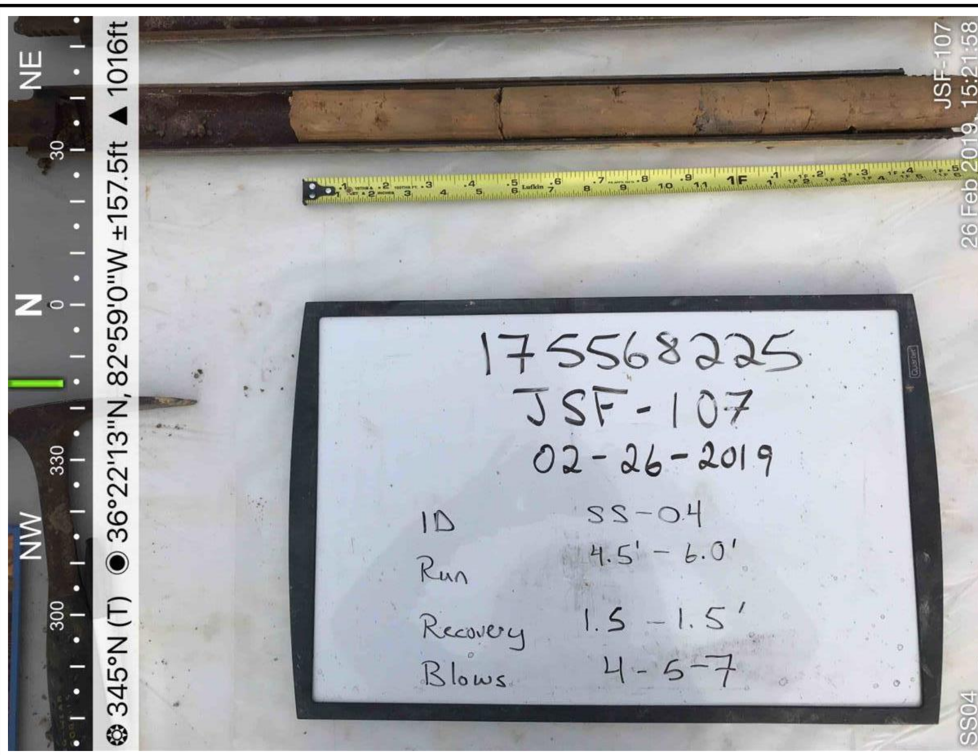


Photograph ID: 14

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (4.5-6.0 feet).



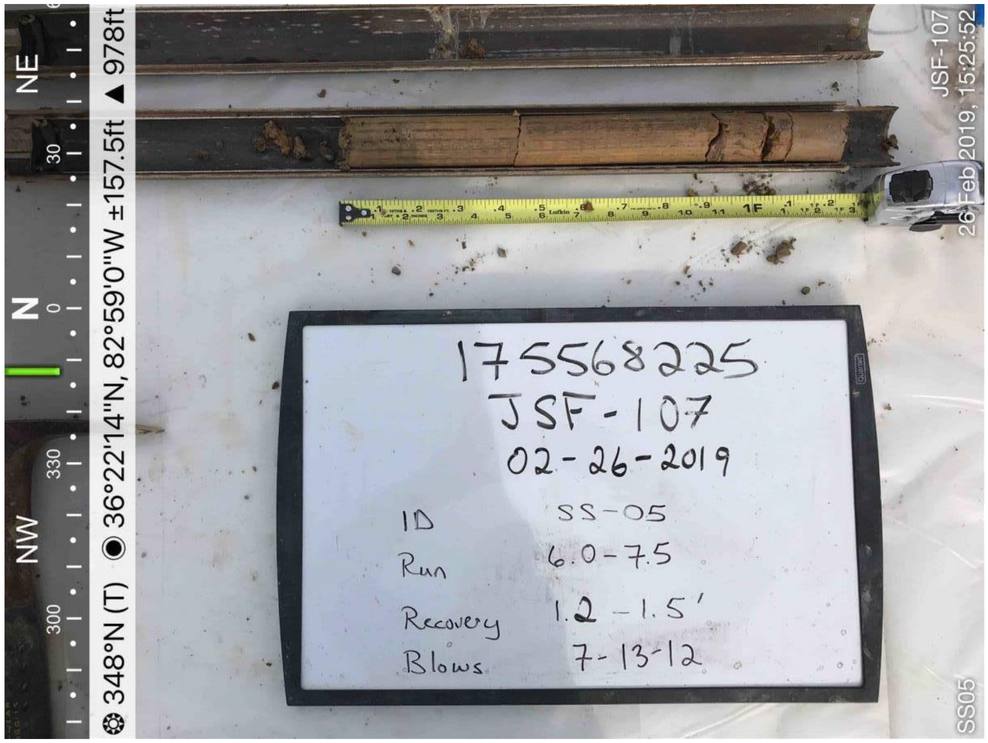
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 15

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (6.0-7.5 feet).

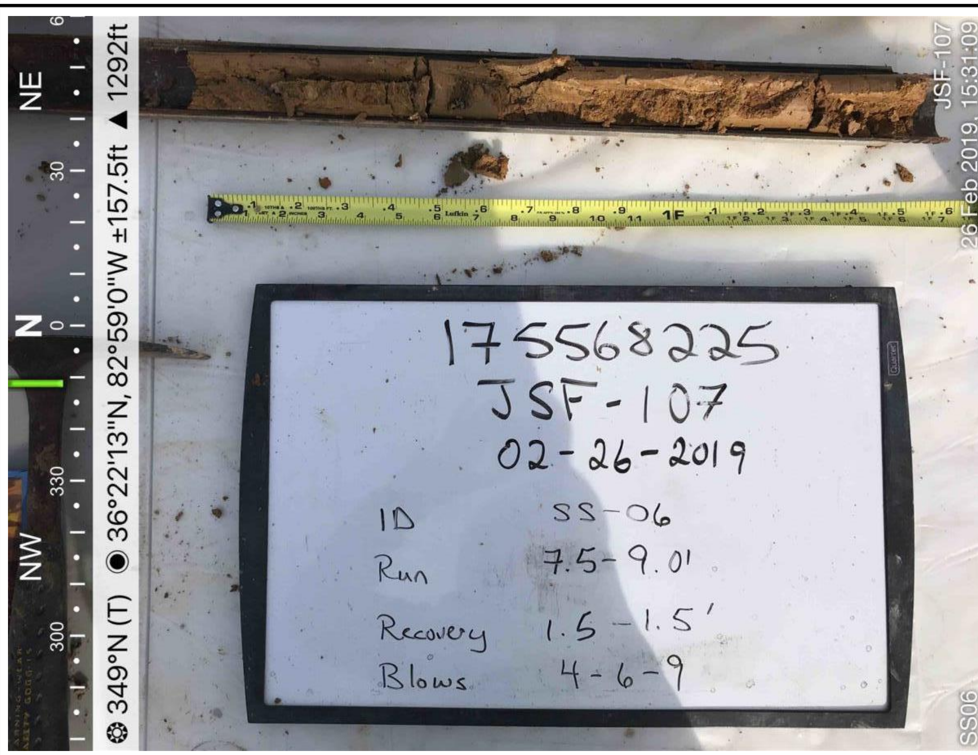


Photograph ID: 16

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (7.5-9.0 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 17

Photo Location:
JSF-107

Photo Date:
2/26/2019

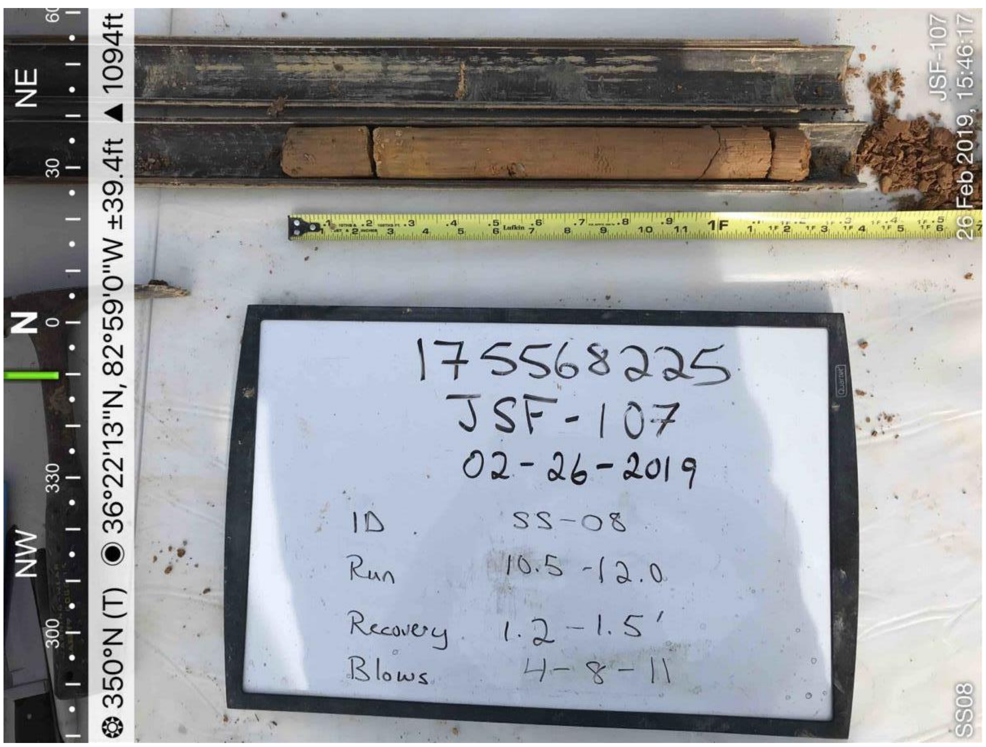
Comments:
Interval (9.0-10.5 feet).

Photograph ID: 18

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (10.5-12.0 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 19

Photo Location:
JSF-107

Photo Date:
2/26/2019

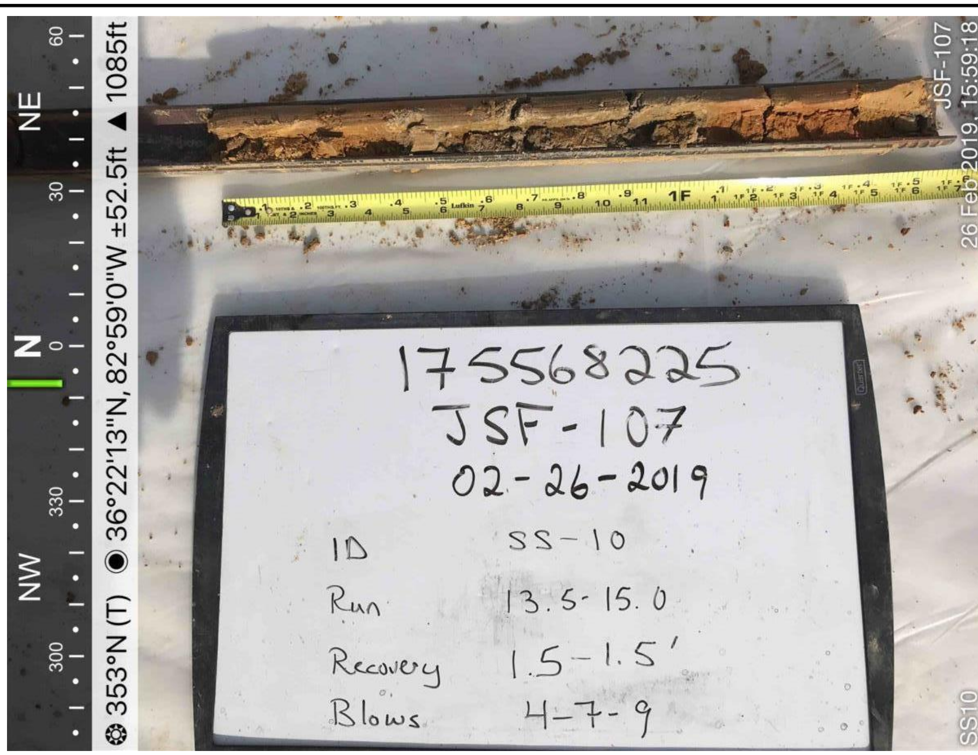
Comments:
Interval (12.0-13.5 feet).

Photograph ID: 20

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (13.5-15.0 feet).



Stantec

Photographic Log

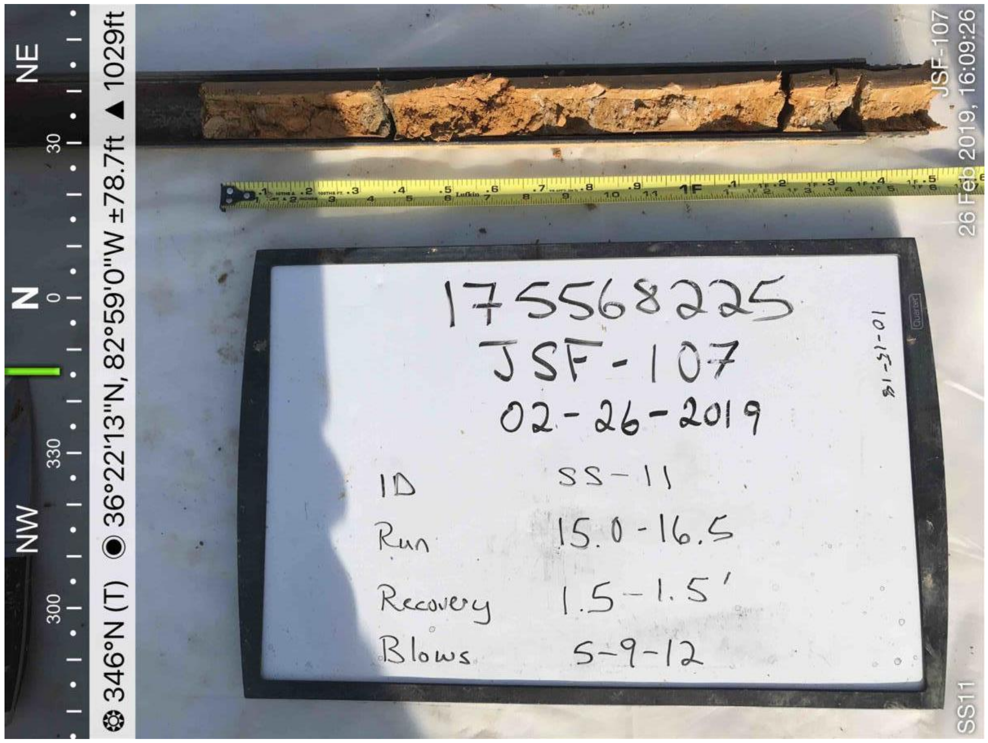
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 21

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (15.0-16.5 feet).

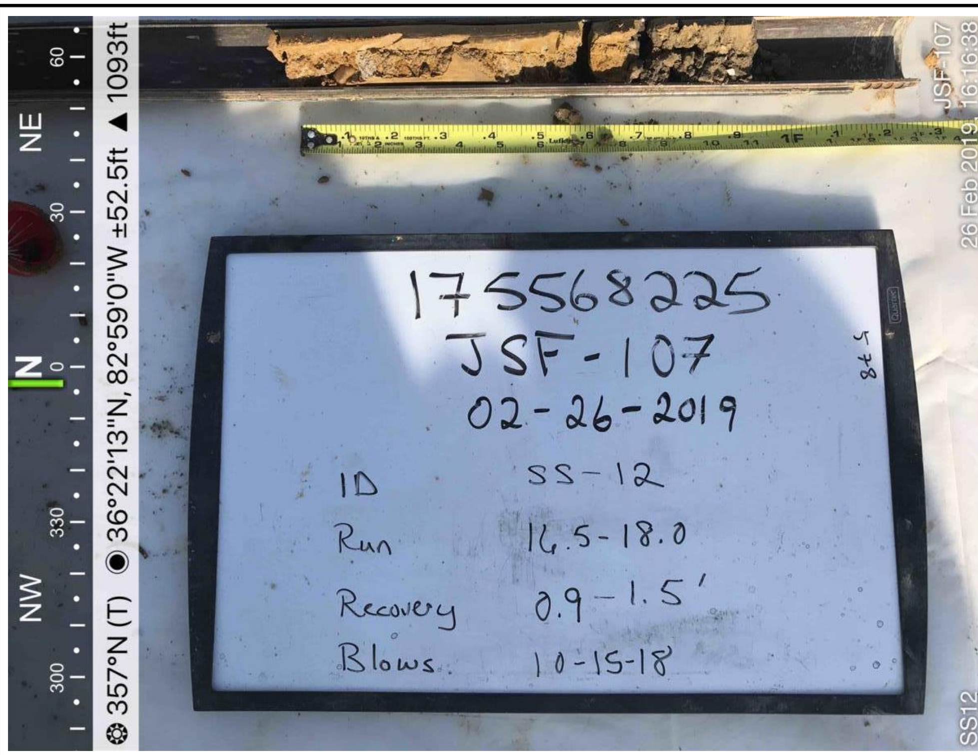


Photograph ID: 22

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (16.5-18.0 feet).



Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 23

Photo Location:
JSF-107

Photo Date:
2/26/2019

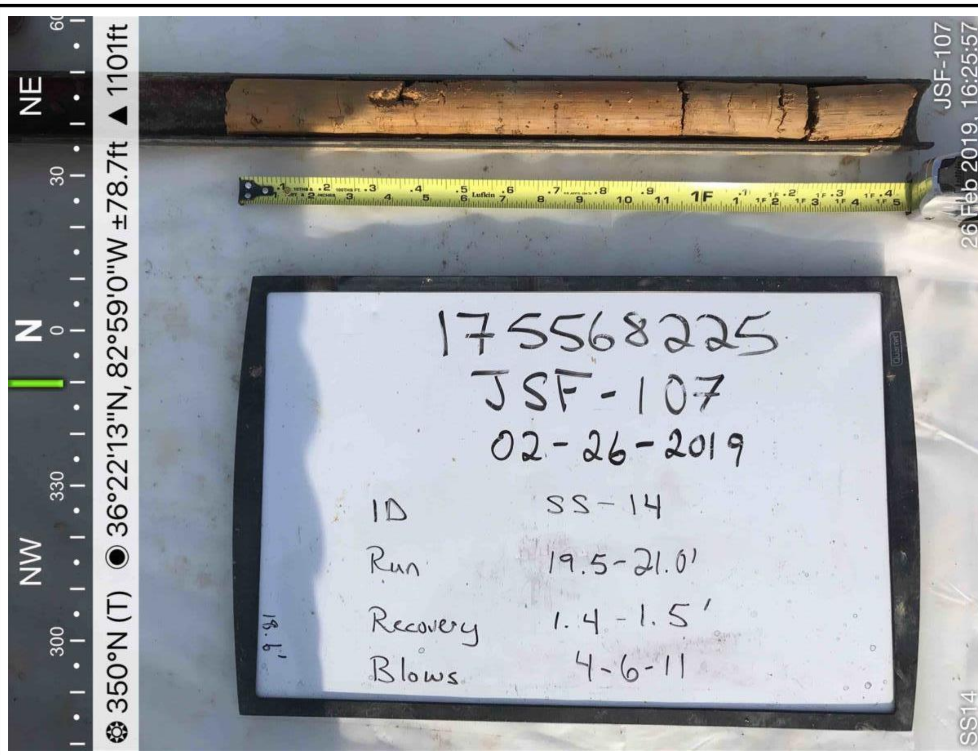
Comments:
Interval (18.0-19.5 feet).

Photograph ID: 24

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (19.5-21.0 feet).



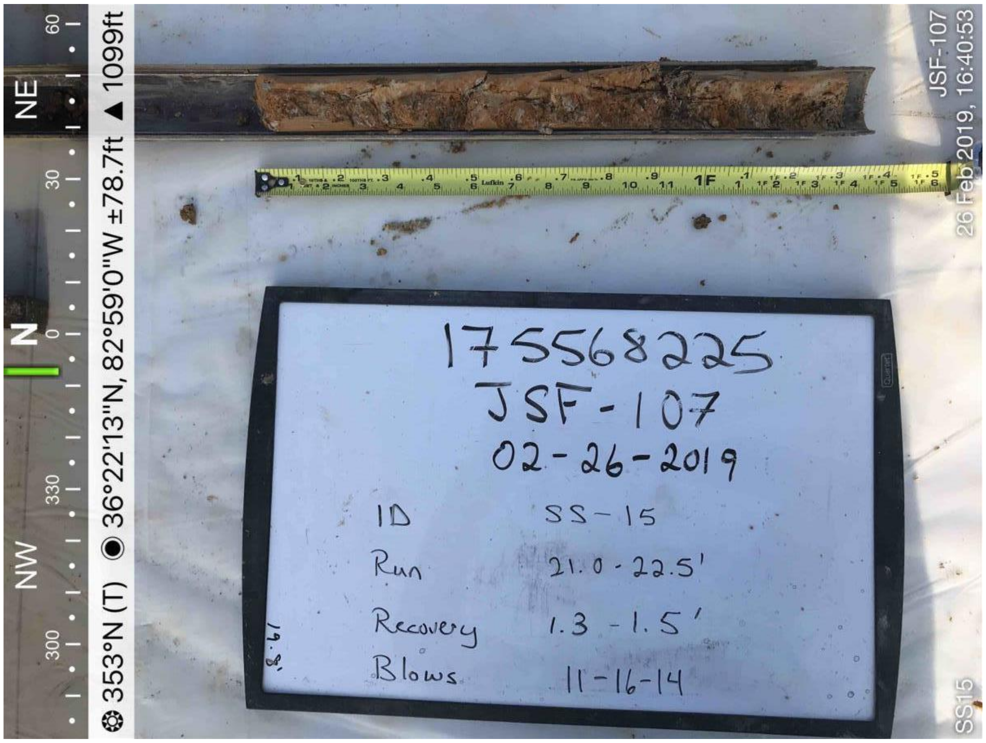
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 25

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (21.0-22.5 feet).



Photograph ID: 26

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (22.5-24.0 feet).

Stantec

Photographic Log

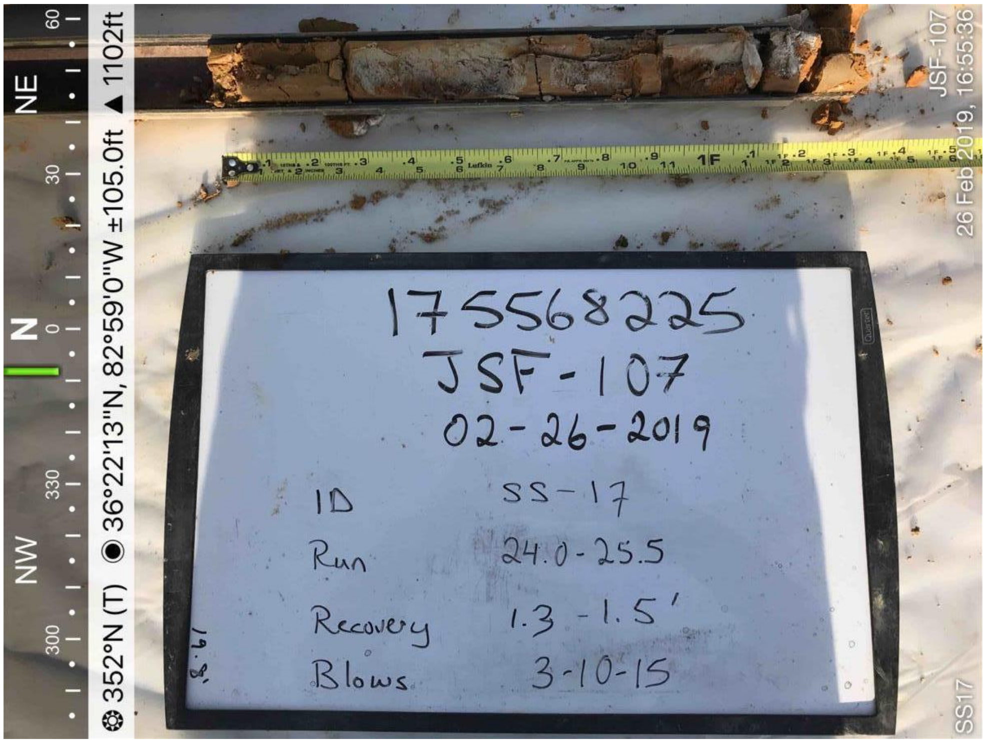
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 27

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (24.0-25.5 feet).



Photograph ID: 28

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (25.5-27.0 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 29

Photo Location:
JSF-107

Photo Date:
2/26/2019

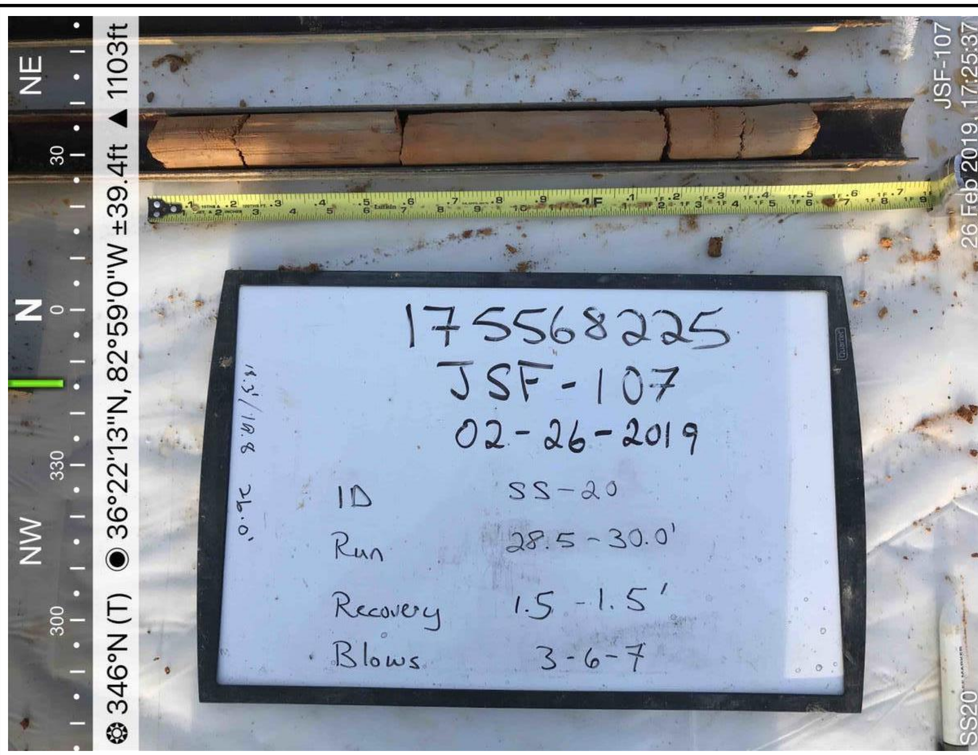
Comments:
Interval (27.0-28.5 feet).

Photograph ID: 30

Photo Location:
JSF-107

Photo Date:
2/26/2019

Comments:
Interval (28.5-30.0 feet).



Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 31

Photo Location:
JSF-107

Photo Date:
2/27/2019

Comments:
Interval (30.0-31.5 feet).

Photograph ID: 32

Photo Location:
JSF-107

Photo Date:
2/27/2019

Comments:
Interval (31.5-33.0 feet).

Stantec

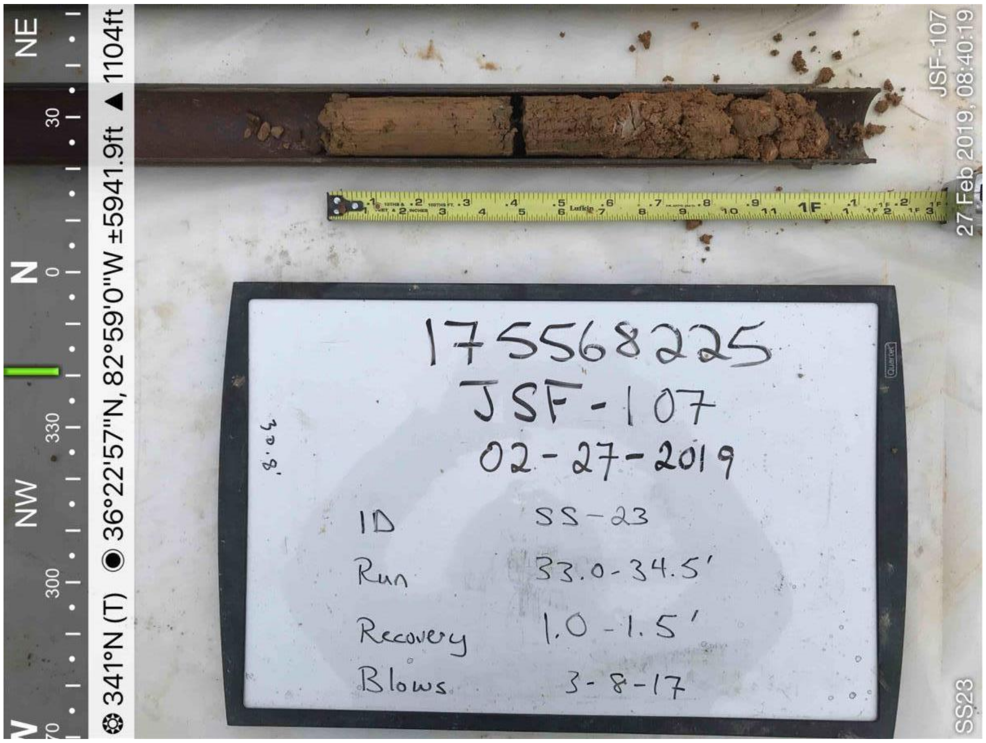
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 33

Photo Location:
JSF-107

Photo Date:
2/27/2019

Comments:
Interval (33.0-34.5 feet).

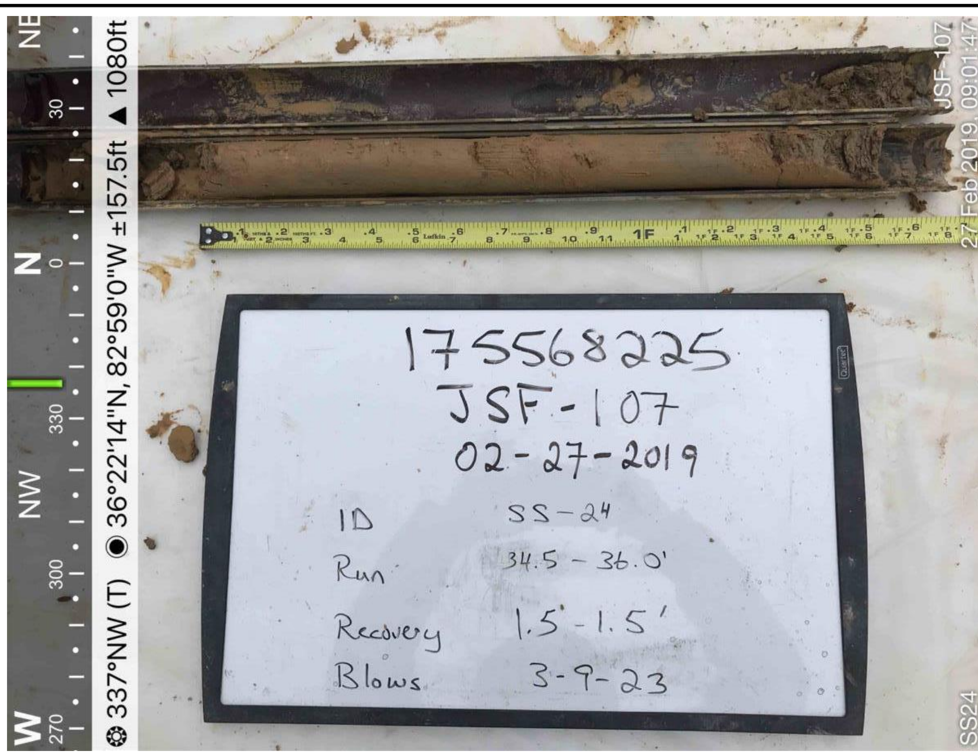


Photograph ID: 34

Photo Location:
JSF-107

Photo Date:
2/27/2019

Comments:
Interval (34.5-36.0 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 35

Photo Location:
JSF-107

Photo Date:
2/27/2019

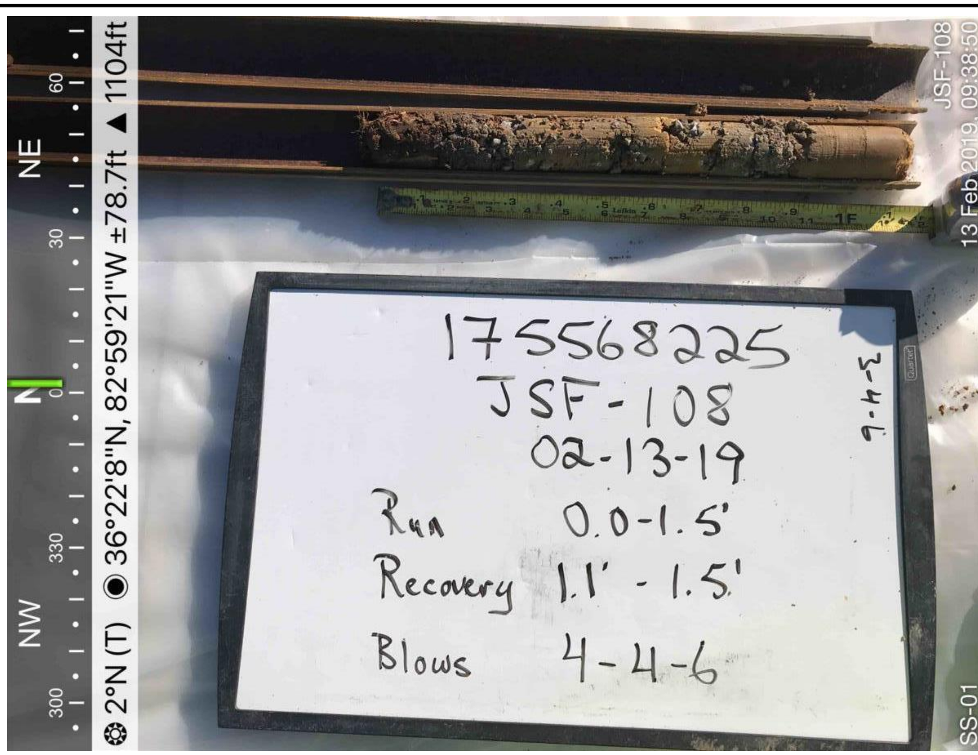
Comments:
Interval (36.0-36.6 feet). Blow count on white board should be 50-50/0.1'

Photograph ID: 36

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (0.0-1.5 feet).



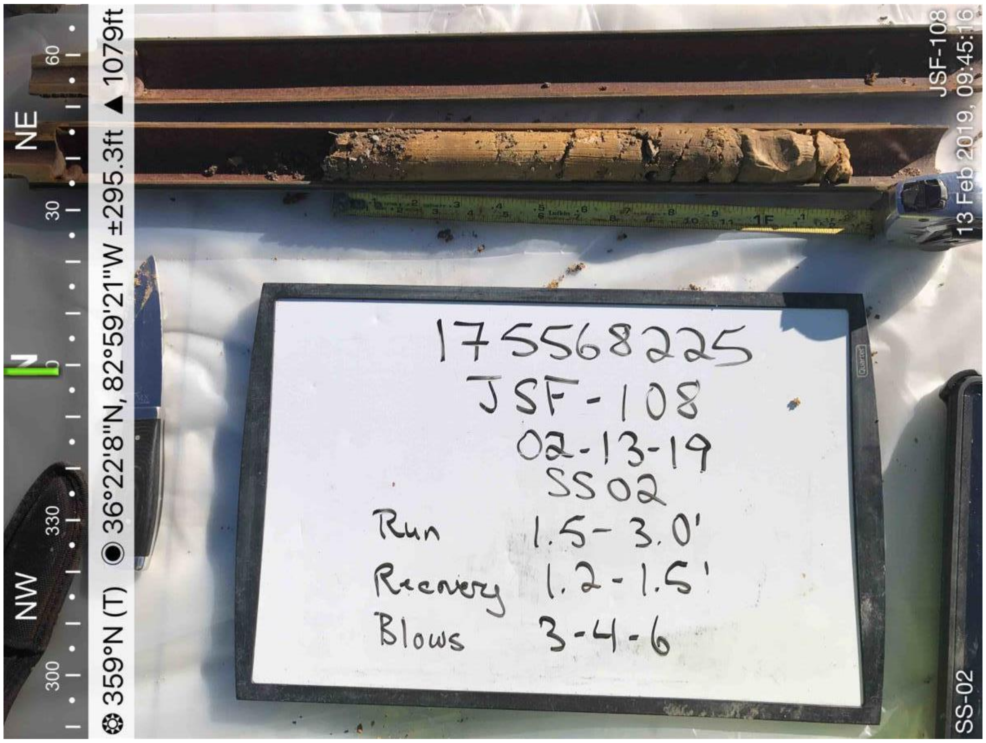
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 37

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (1.5-3.0 feet).

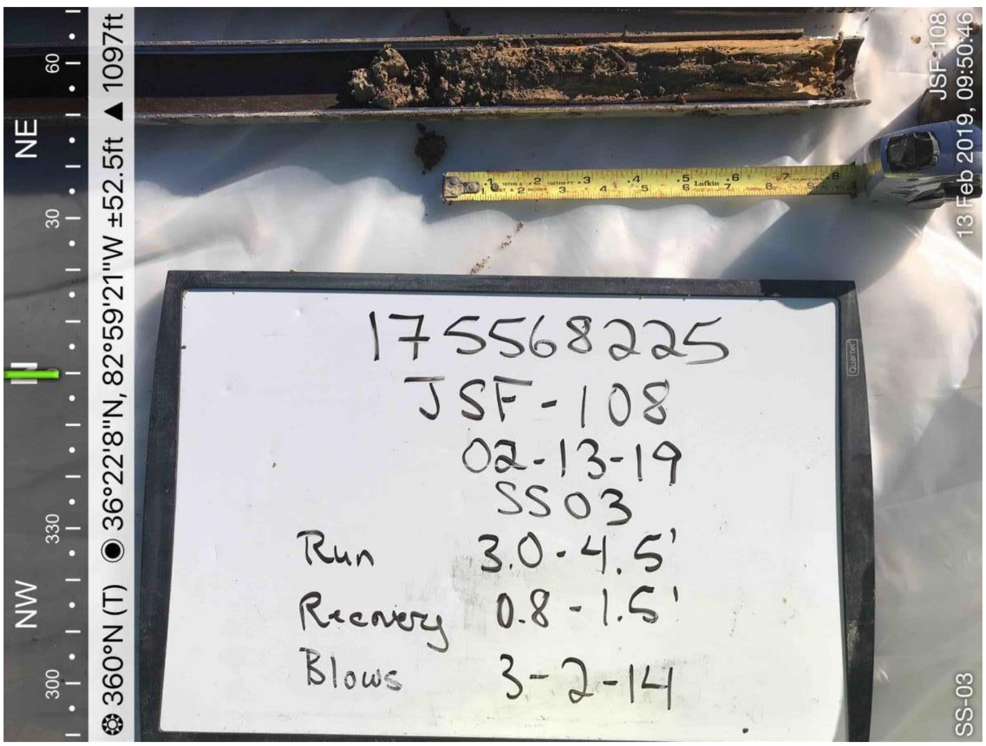


Photograph ID: 38

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (3.0-4.5 feet).



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 39

Photo Location:
JSF-108

Photo Date:
2/13/2019

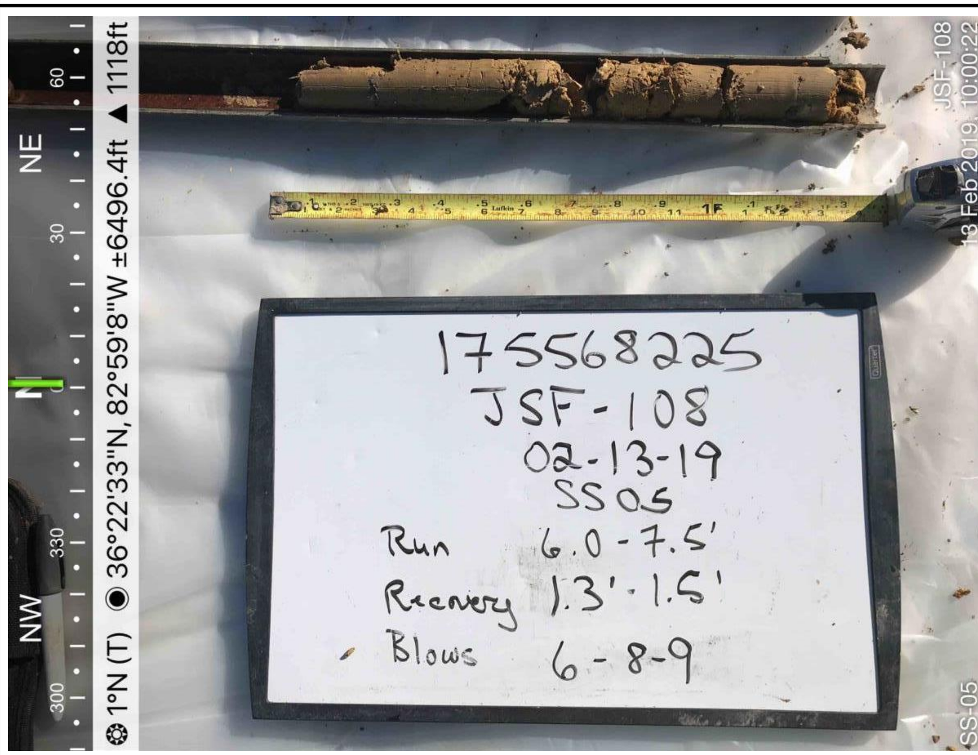
Comments:
Interval (4.5-6.0 feet).

Photograph ID: 40

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (6.0-7.5 feet).



Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 41

Photo Location:
JSF-108

Photo Date:
2/13/2019

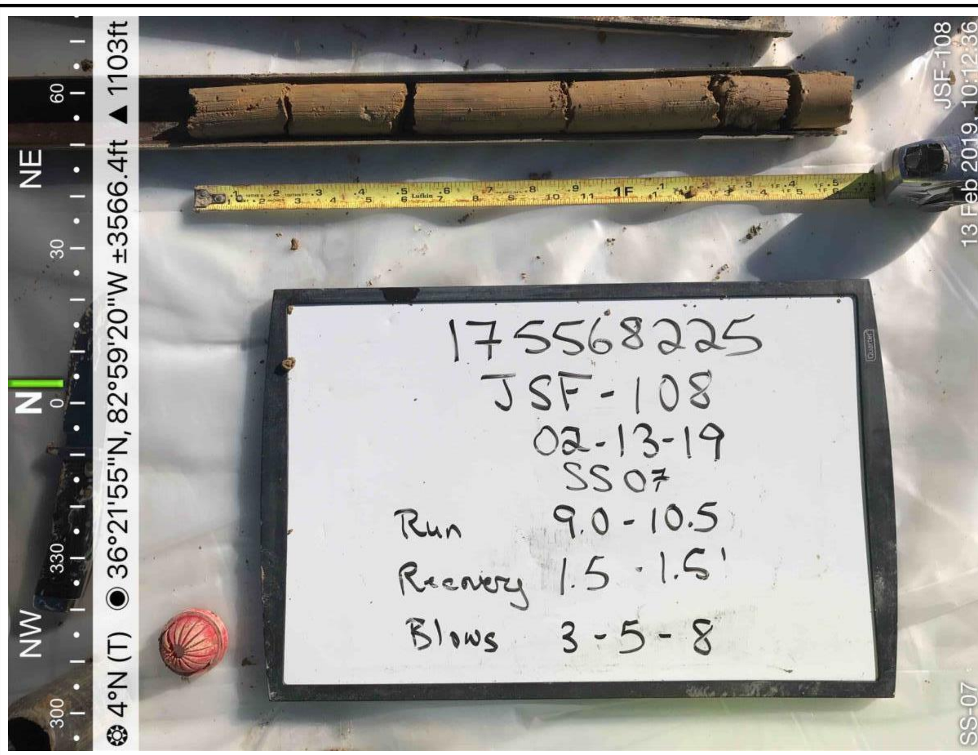
Comments:
Interval (7.5-9.0 feet).

Photograph ID: 42

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (9.0-10.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 43

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Photo of interval (10.5-12.0 feet) unavailable.

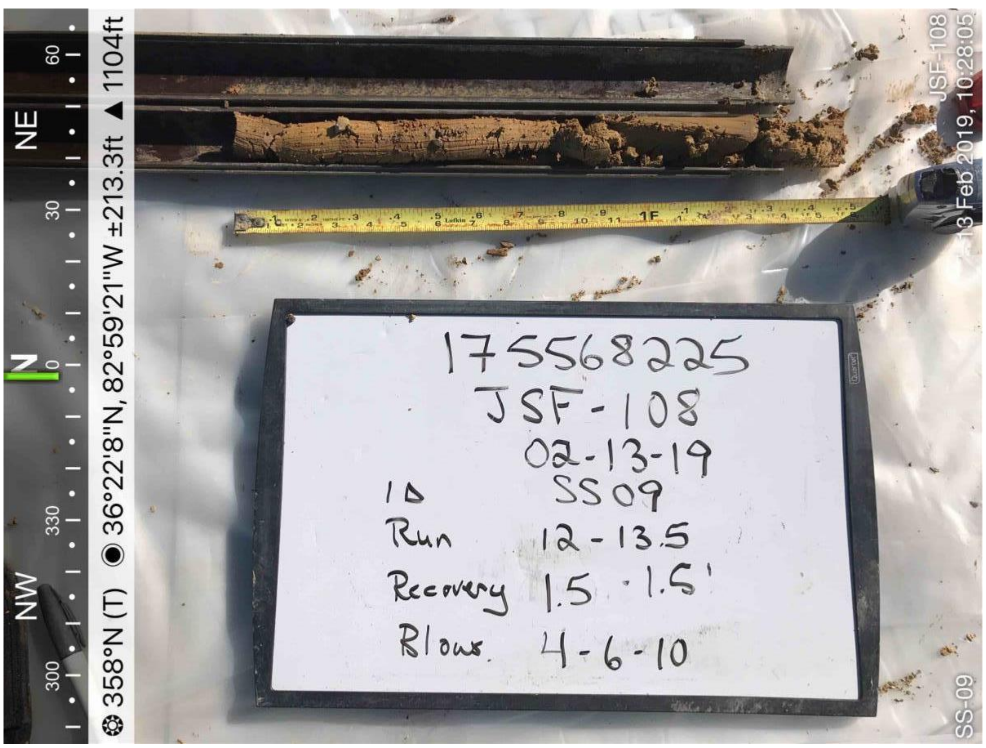
No Photo Applicable

Photograph ID: 44

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (12.0-13.5 feet). Depth interval shown on white board should be 12.0-13.5.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 45

Photo Location:
JSF-108

Photo Date:
2/13/2019

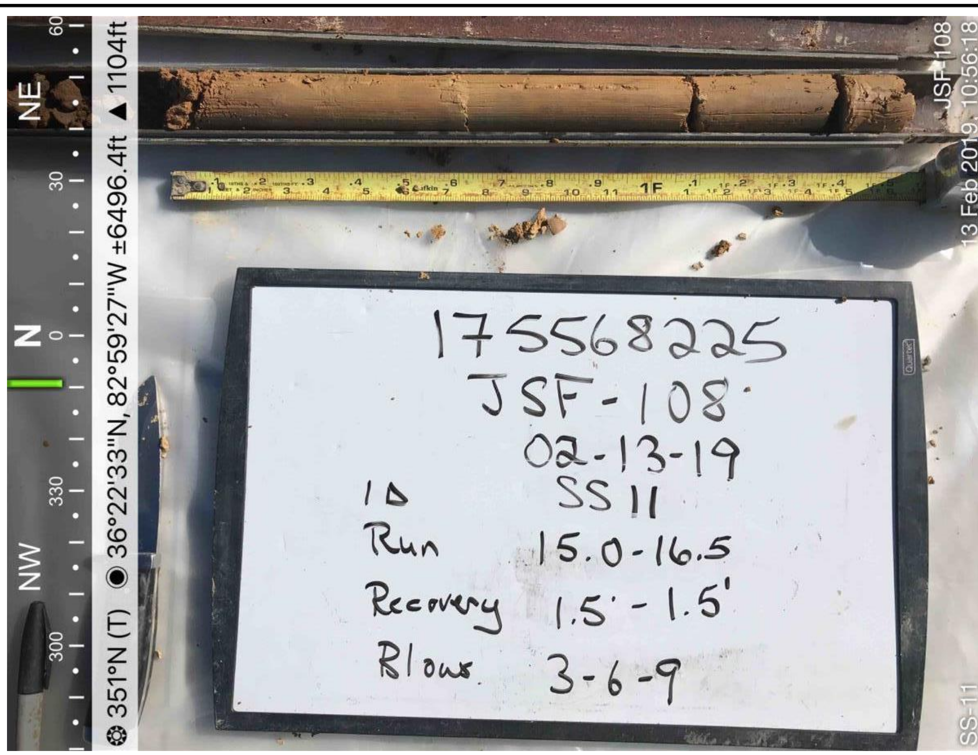
Comments:
Interval (13.5-15.0 feet).

Photograph ID: 46

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (15.0-16.5 feet).



Stantec

Photographic Log

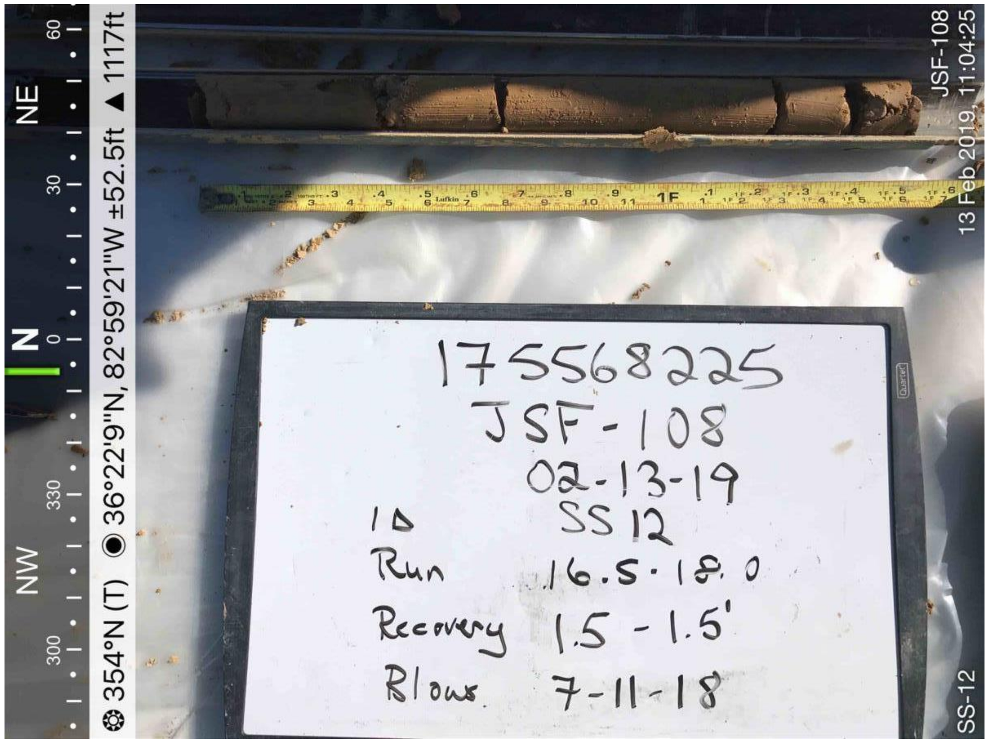
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 47

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (16.5-18.0 feet).

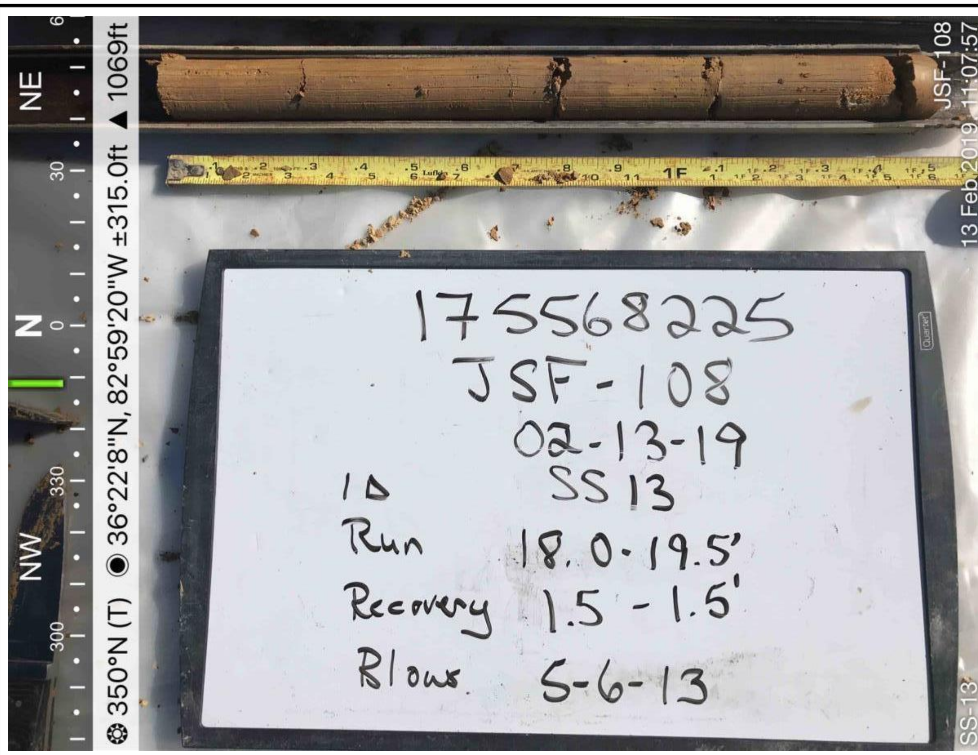


Photograph ID: 48

Photo Location:
JSF-108

Photo Date:
2/13/2019

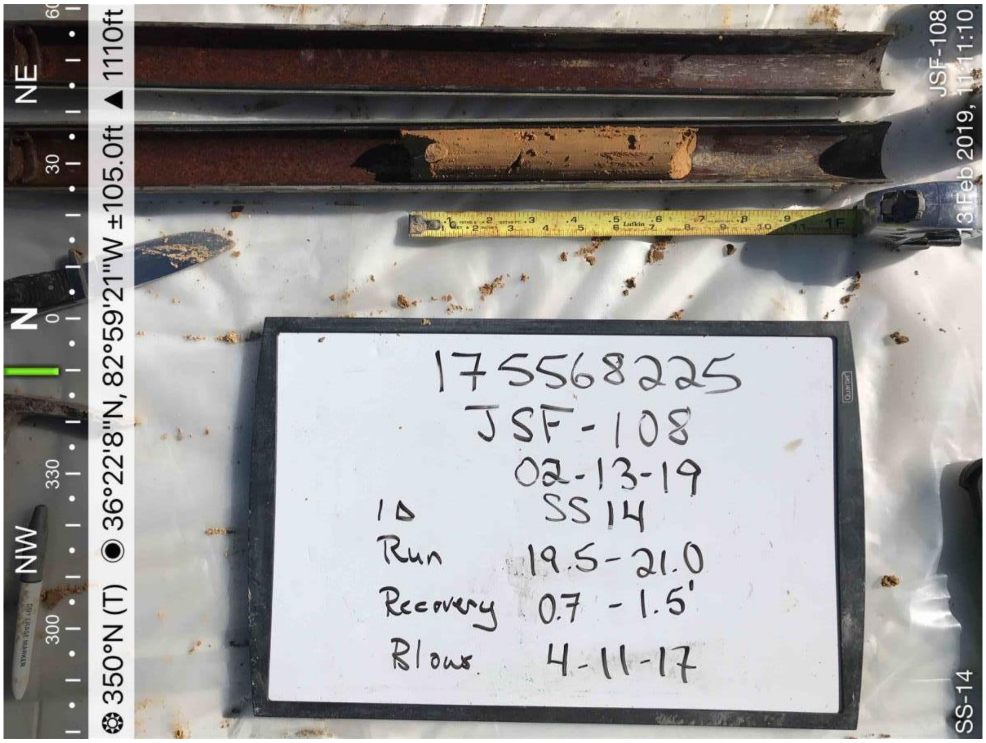
Comments:
Interval (18.0-19.5 feet).

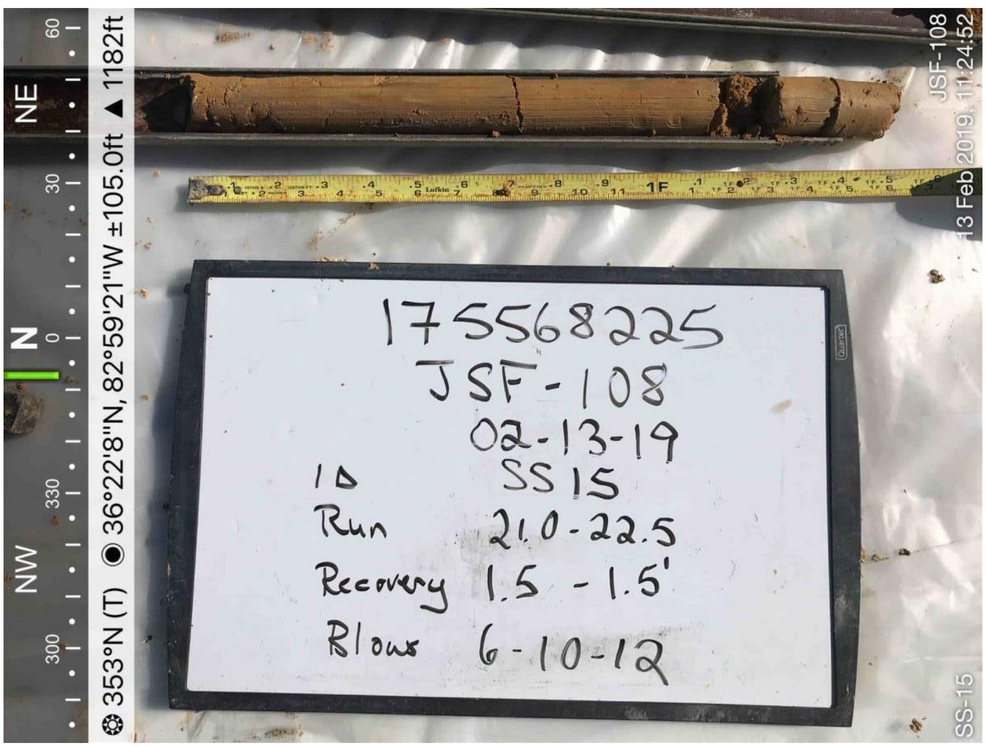


Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 49	
Photo Location: JSF-108	
Photo Date: 2/13/2019	
Comments: Interval (19.5-21.0 feet).	

Photograph ID: 50	
Photo Location: JSF-108	
Photo Date: 2/13/2019	
Comments: Interval (21.0-22.5 feet).	

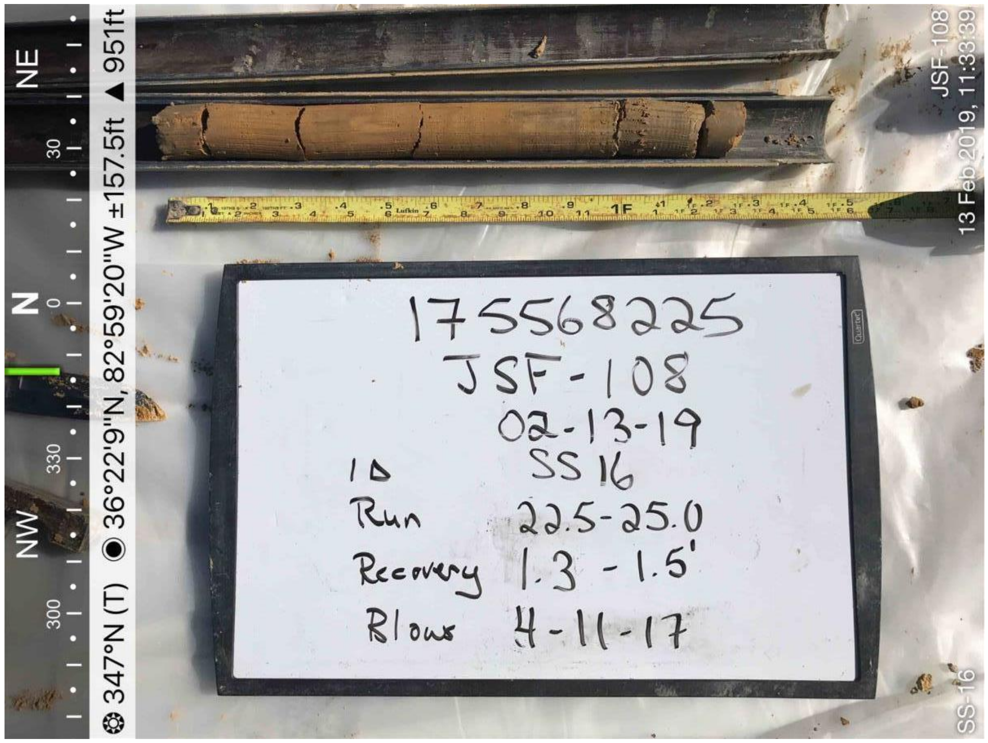
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 51

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (22.5-24.0 feet). Interval shown on white board should be 22.5-24.0.

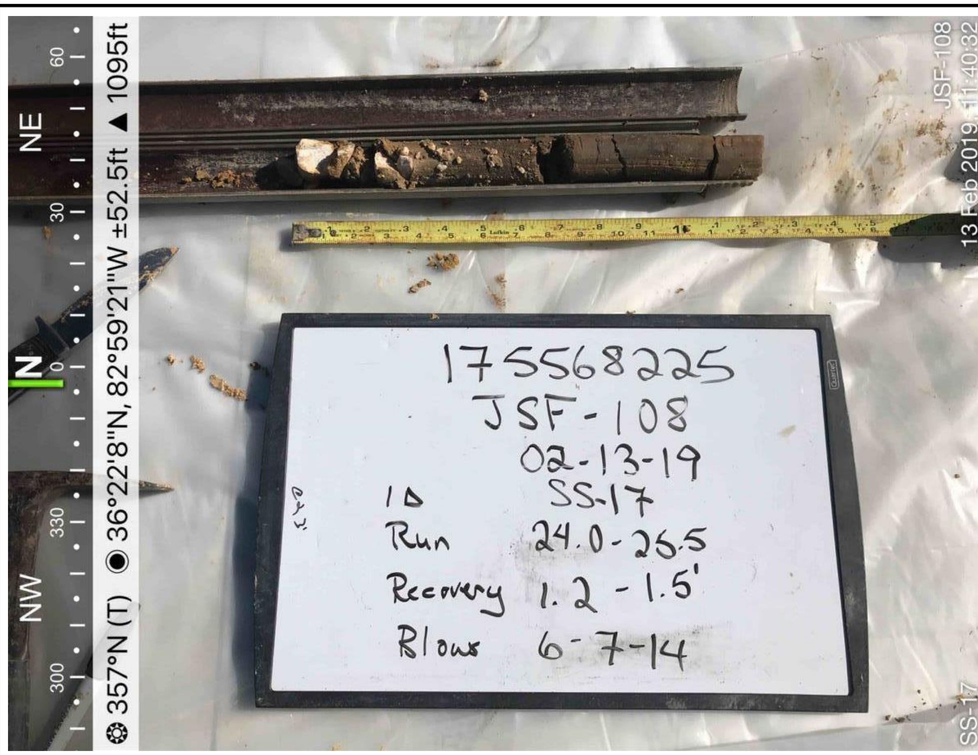


Photograph ID: 52

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (24.0-25.5 feet).



Stantec

Photographic Log

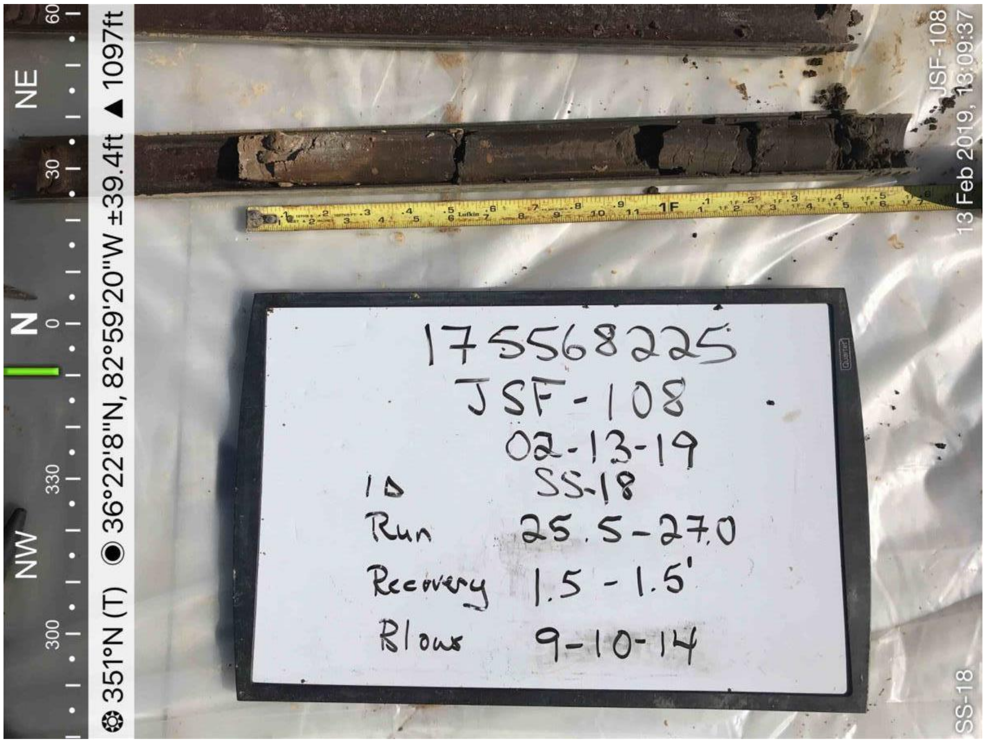
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 53

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (25.5-27.0 feet).



Photograph ID: 54

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (27.0-28.5 feet).

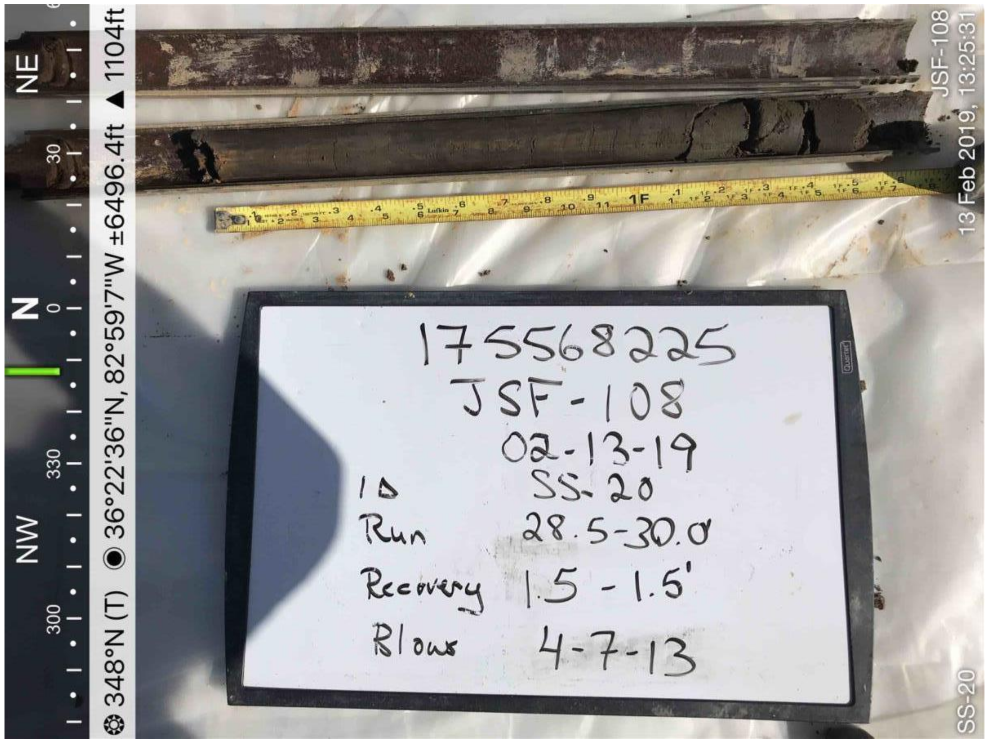
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 55

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (28.5-30.0 feet).

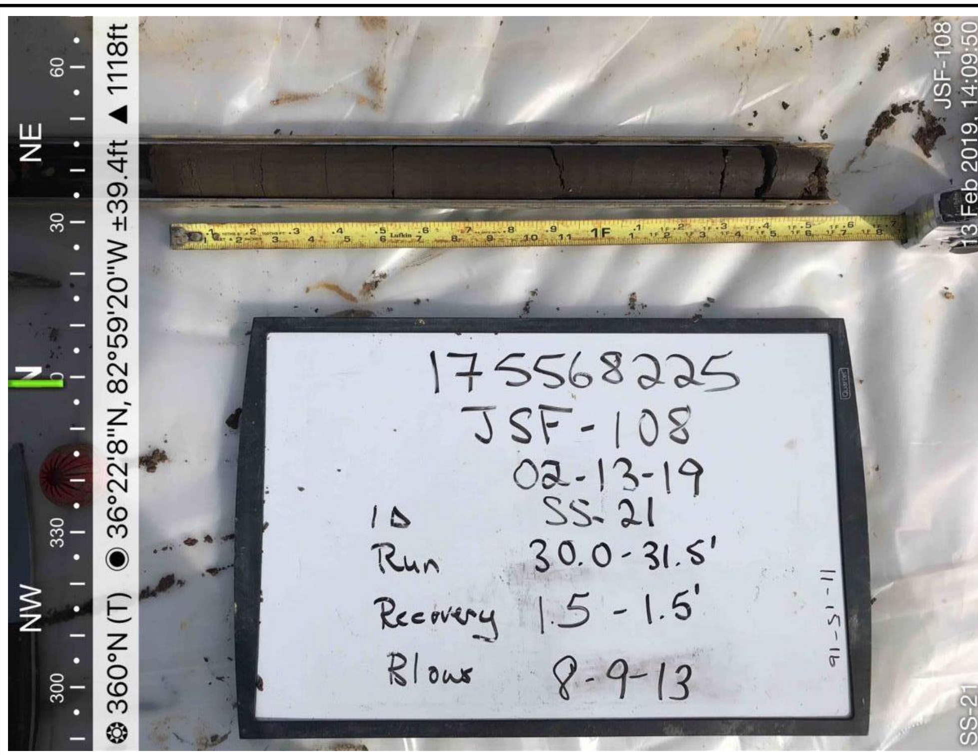


Photograph ID: 56

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (30.0-31.5 feet).



Stantec

Photographic Log

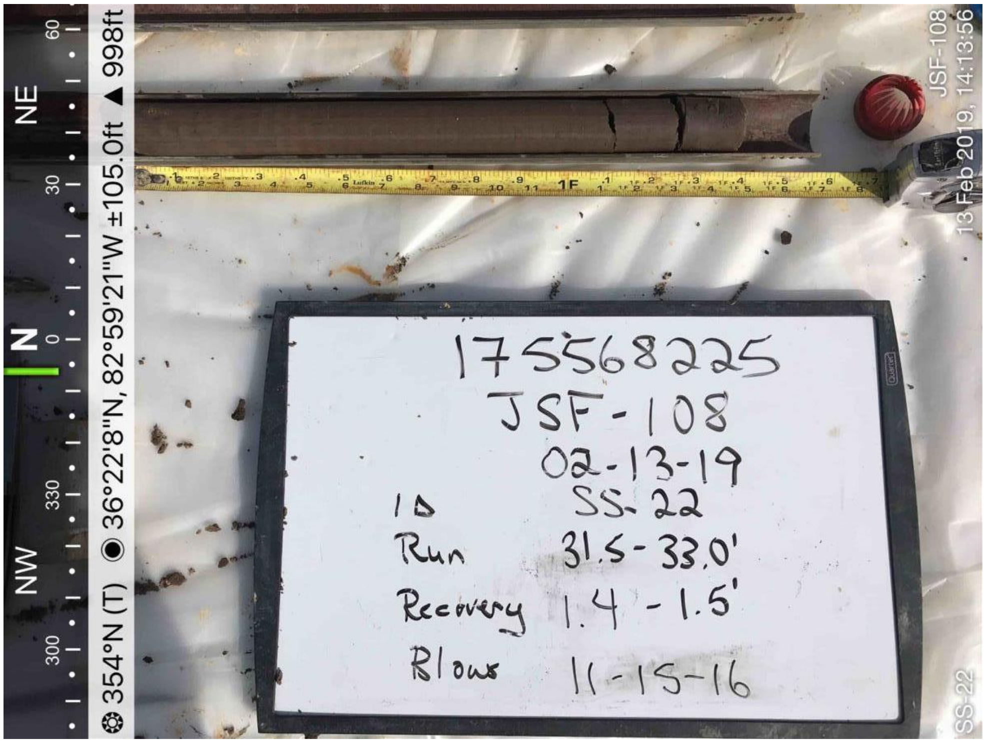
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 57

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (31.5-33.0 feet).

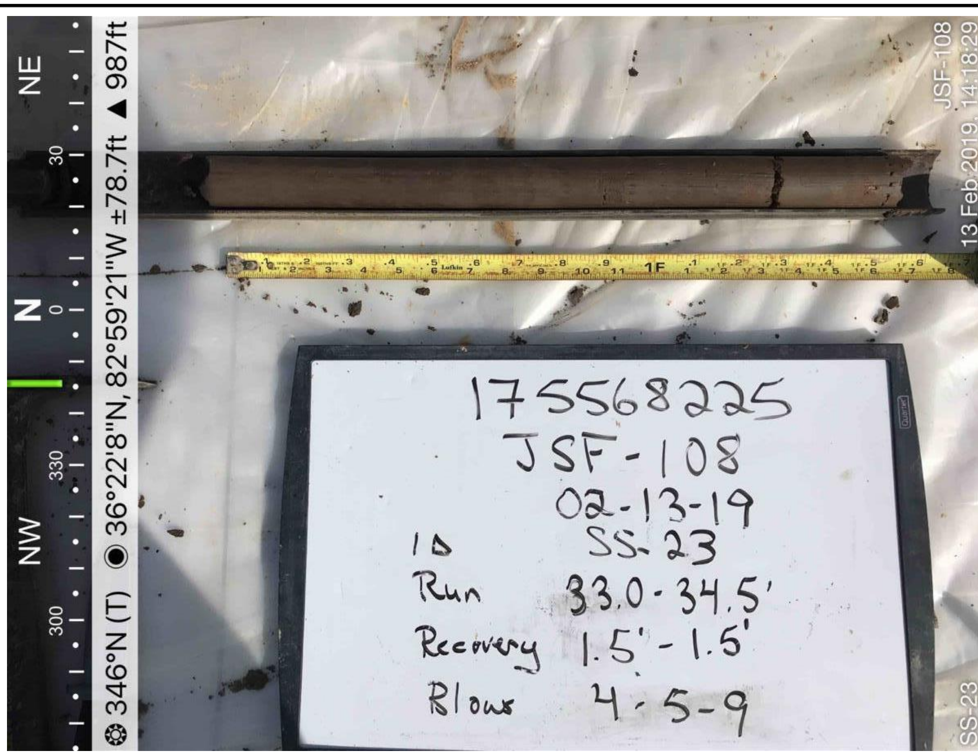


Photograph ID: 58

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (33.0-34.5 feet).



Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 59

Photo Location:
JSF-108

Photo Date:
2/13/2019

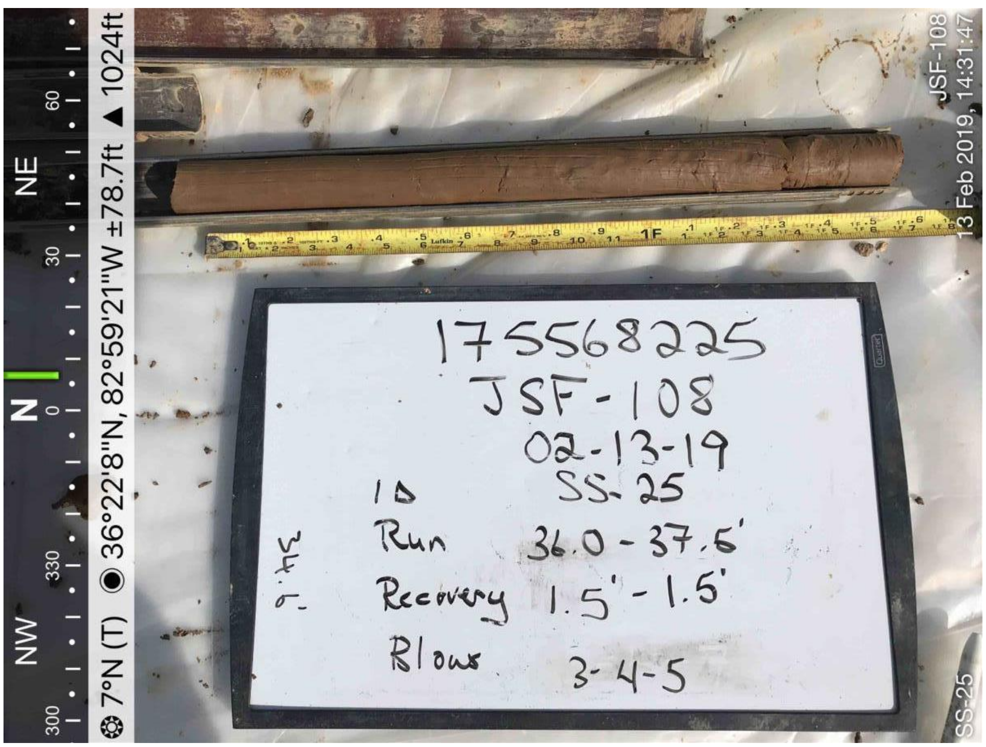
Comments:
Interval (34.5-36.0 feet).

Photograph ID: 60

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (36.0-37.5 feet).



Stantec

Photographic Log

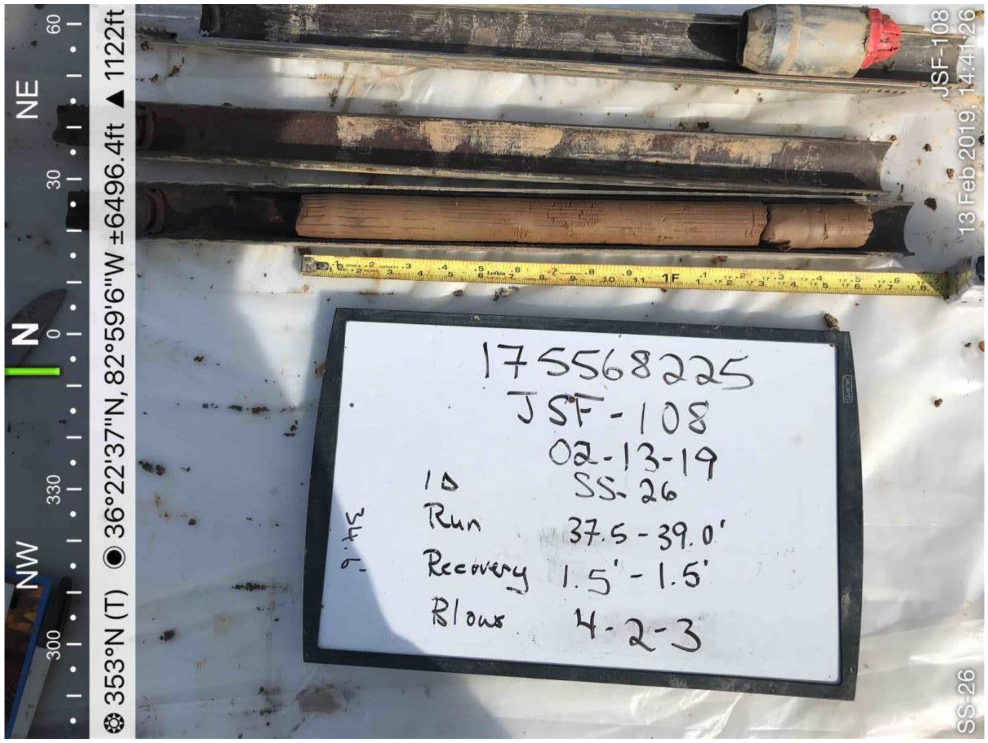
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 61

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (37.5-39.0 feet).

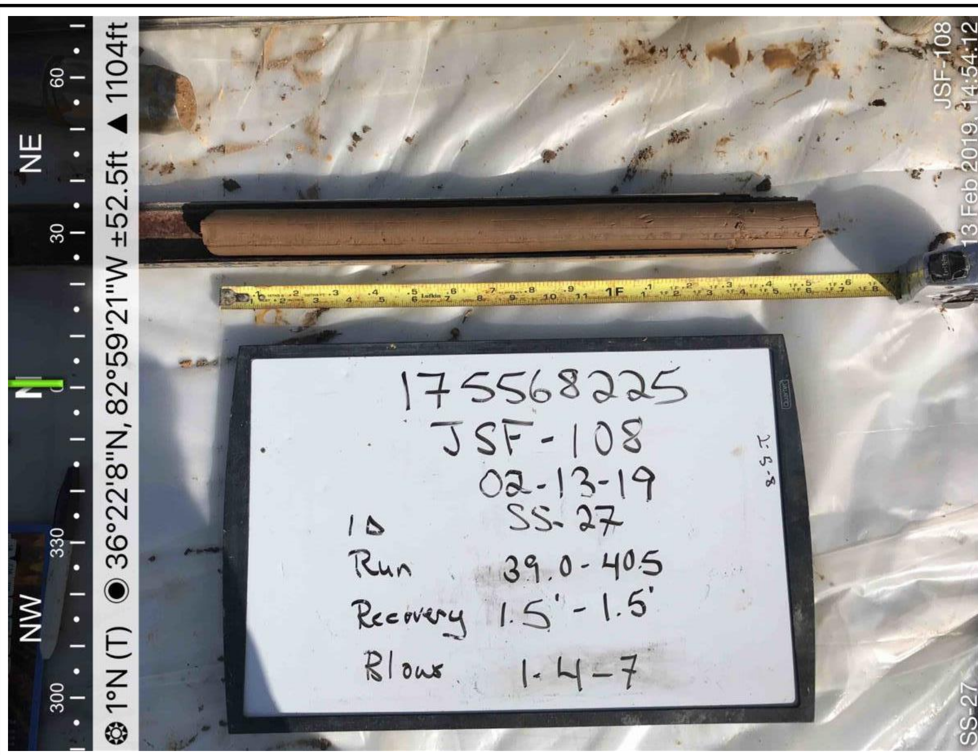


Photograph ID: 62

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (39.0-40.5 feet).



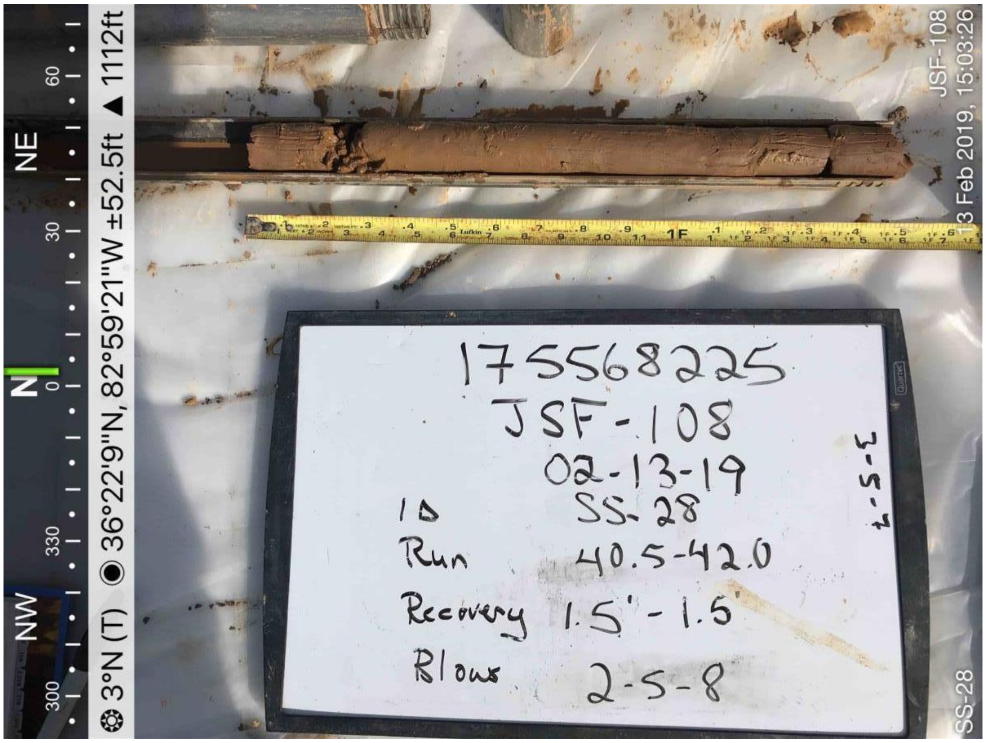
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 63

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (40.5-42.0 feet).

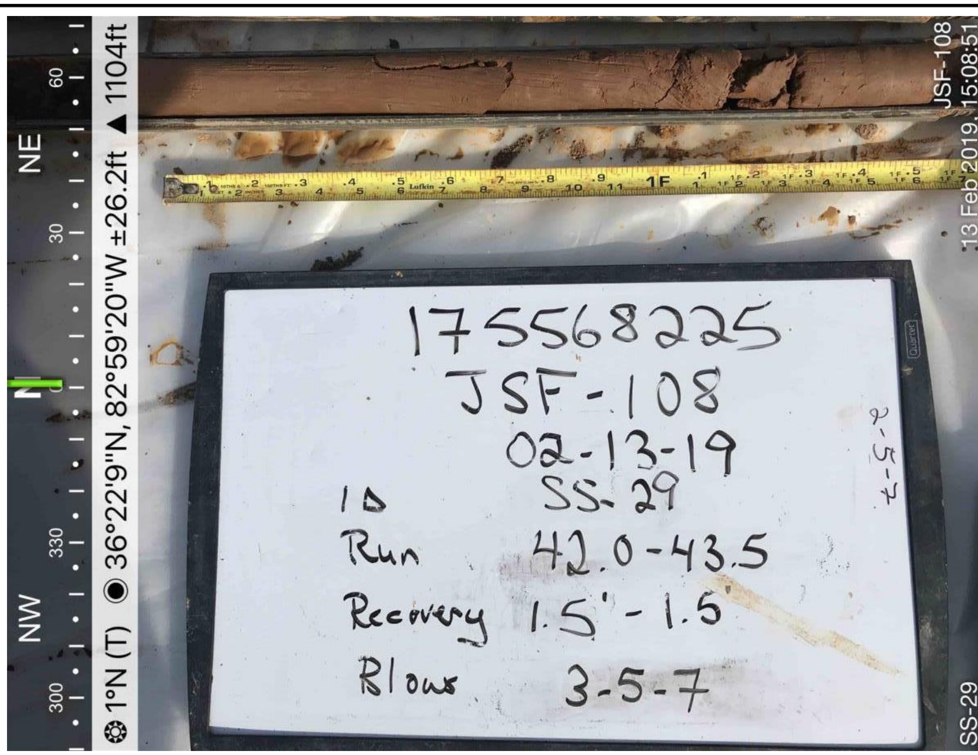


Photograph ID: 64

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (42.0-43.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 65

Photo Location:
JSF-108

Photo Date:
2/13/2019

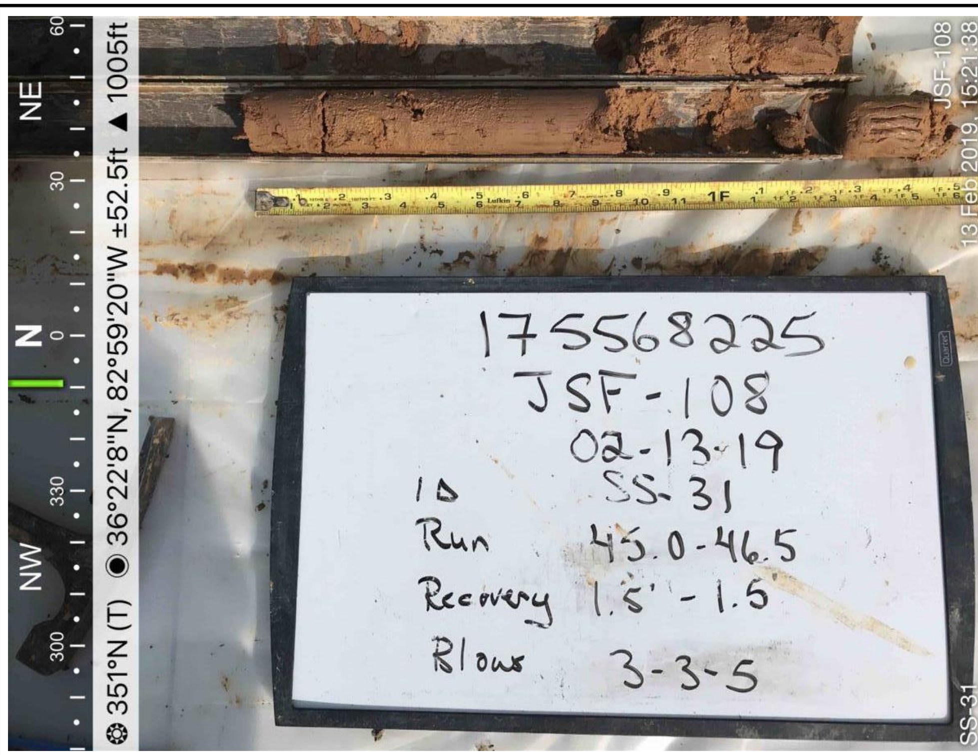
Comments:
Interval (43.5-45.0 feet).

Photograph ID: 66

Photo Location:
JSF-108

Photo Date:
2/13/2019

Comments:
Interval (45.0-46.5 feet).



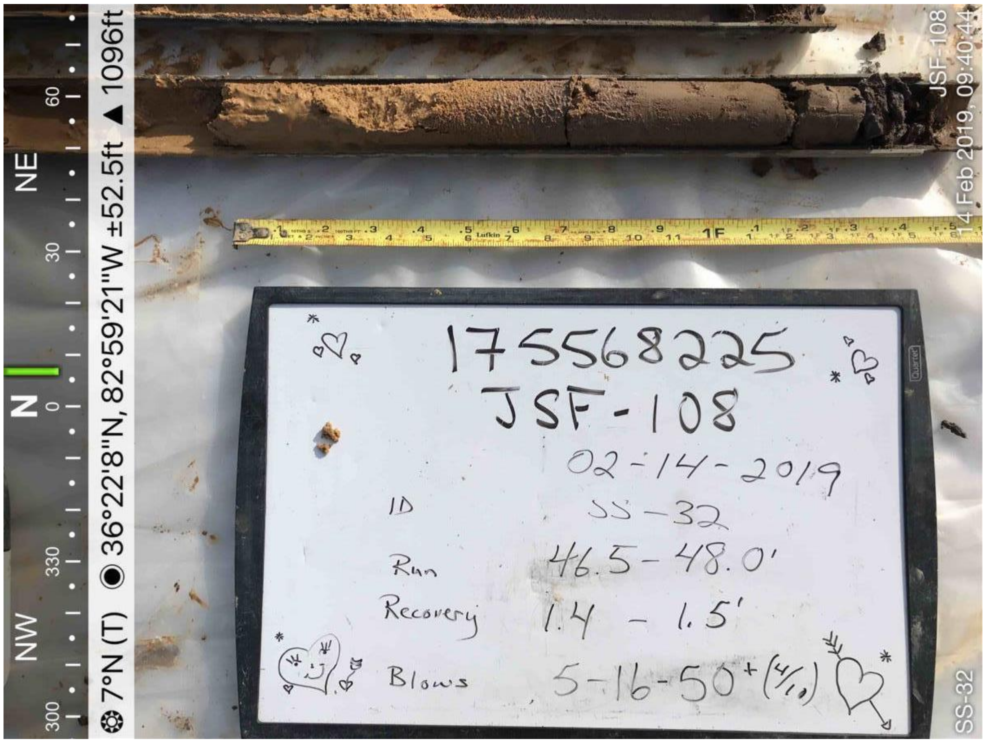
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 67

Photo Location:
JSF-108

Photo Date:
2/14/2019

Comments:
Interval (46.5-47.9 feet). Interval shown on white board should be 46.5-47.9.

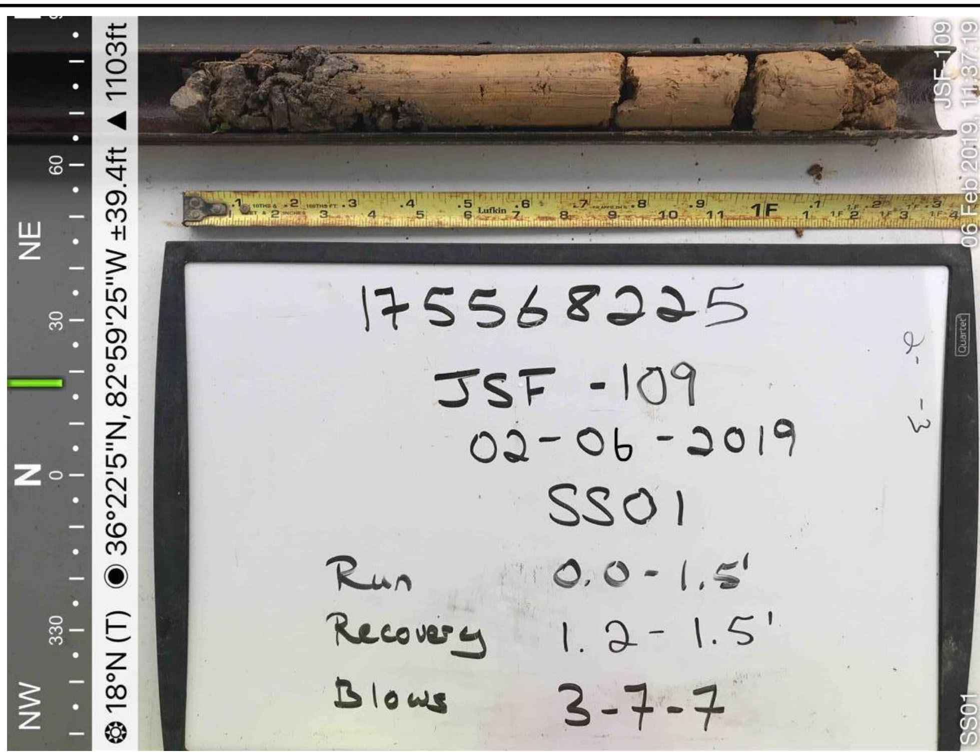


Photograph ID: 68

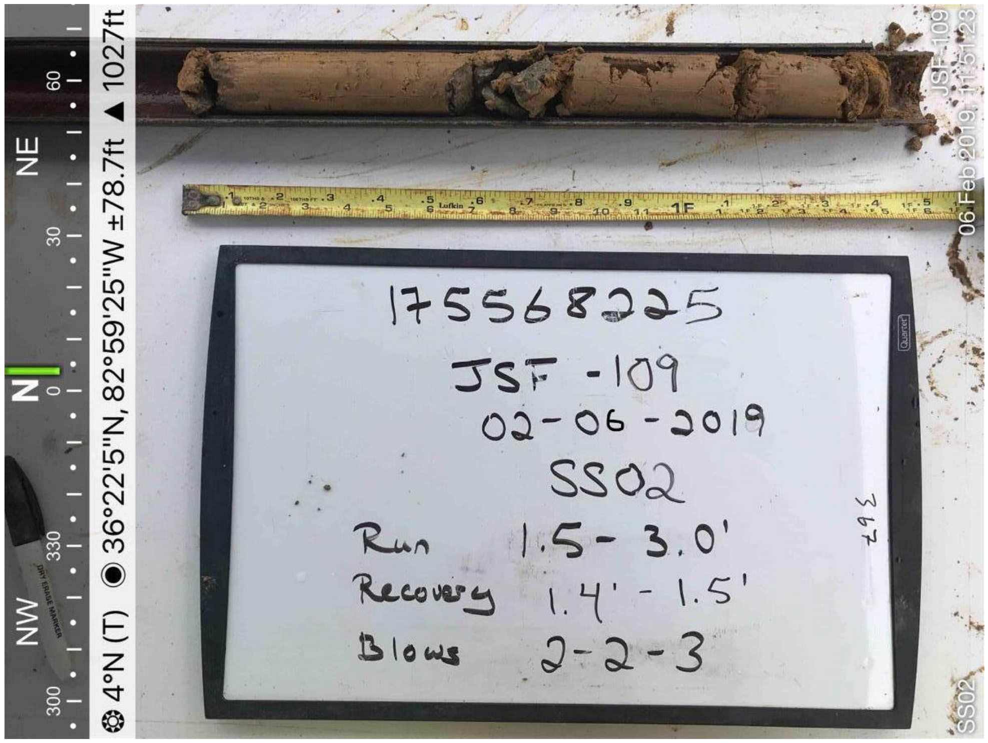
Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (0.0-1.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 69 **Photo Location:** JSF-109 **Photo Date:** 2/6/2019 **Comments:** First boring location interval (1.5-3.0 feet).	
Photograph ID: 70 **Photo Location:** JSF-109 **Photo Date:** 2/6/2019 **Comments:** Photo of first boring location interval (3.0-4.5 feet) unavailable.	No Photo Applicable

Stantec **Photographic Log**

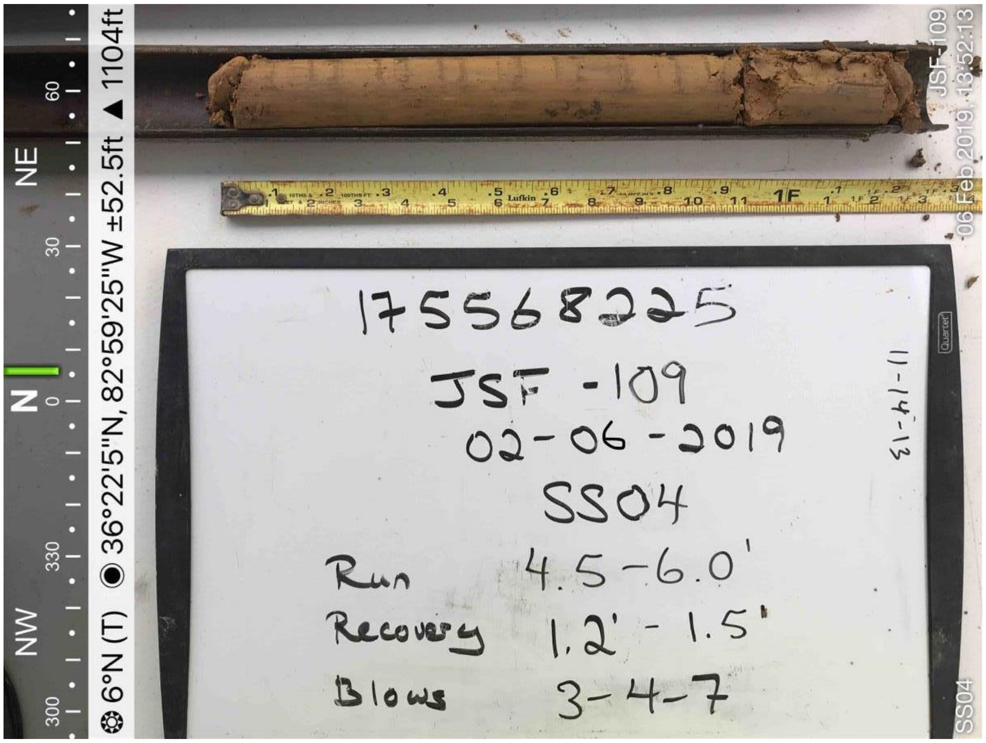
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 71

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (4.5-6.0 feet).

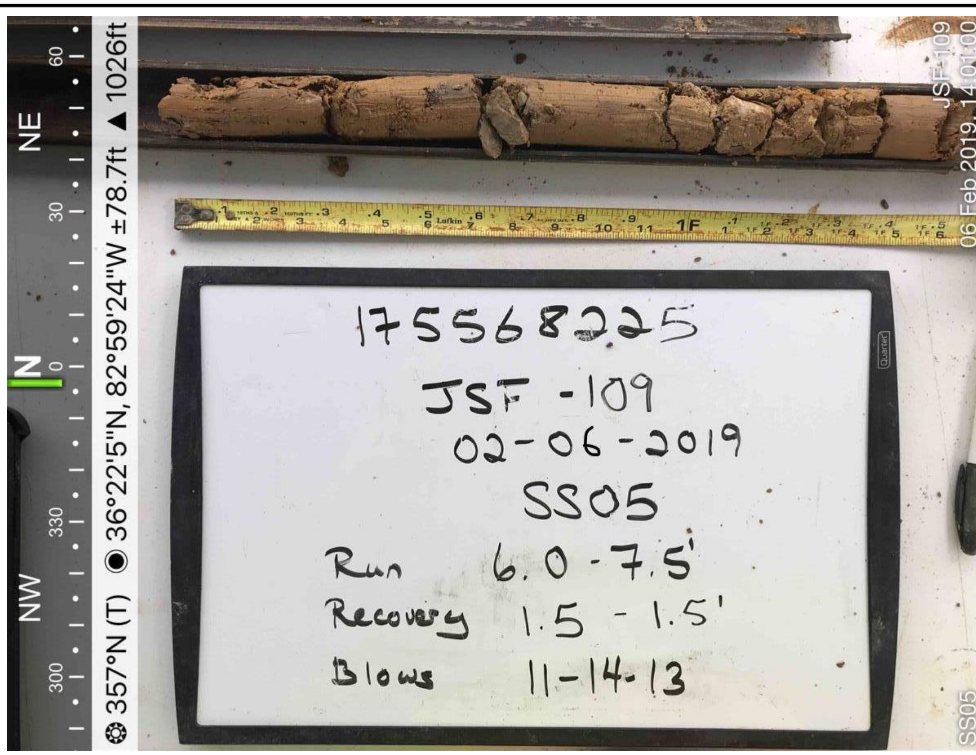


Photograph ID: 72

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (6.0-7.5 feet).



Stantec **Photographic Log**

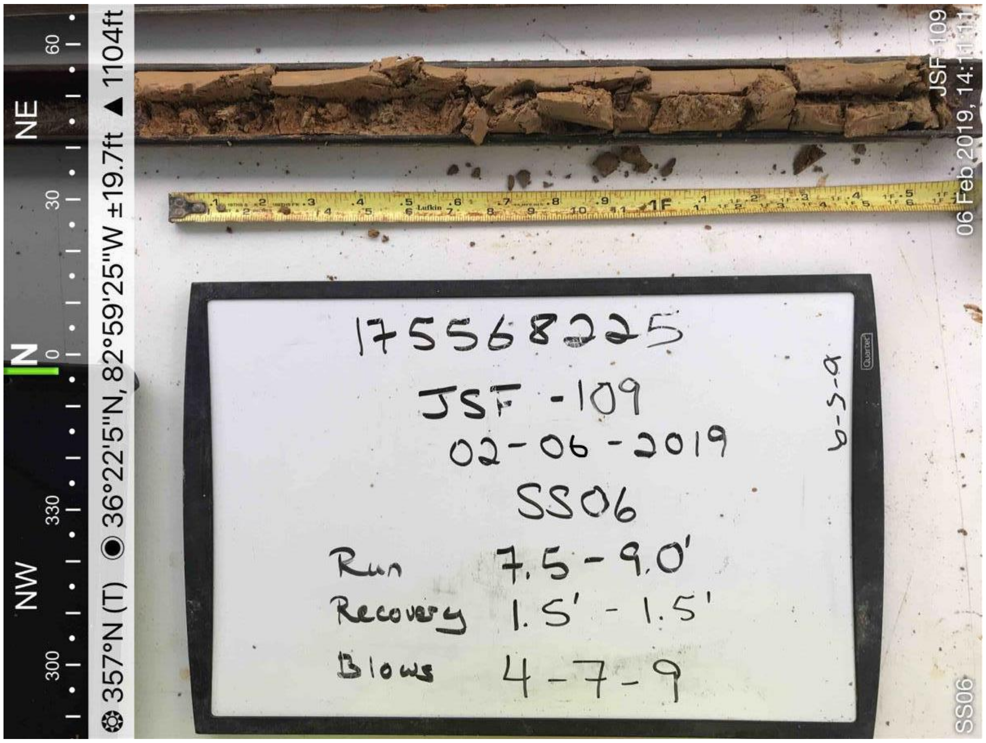
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 73

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (7.5-9.0 feet).

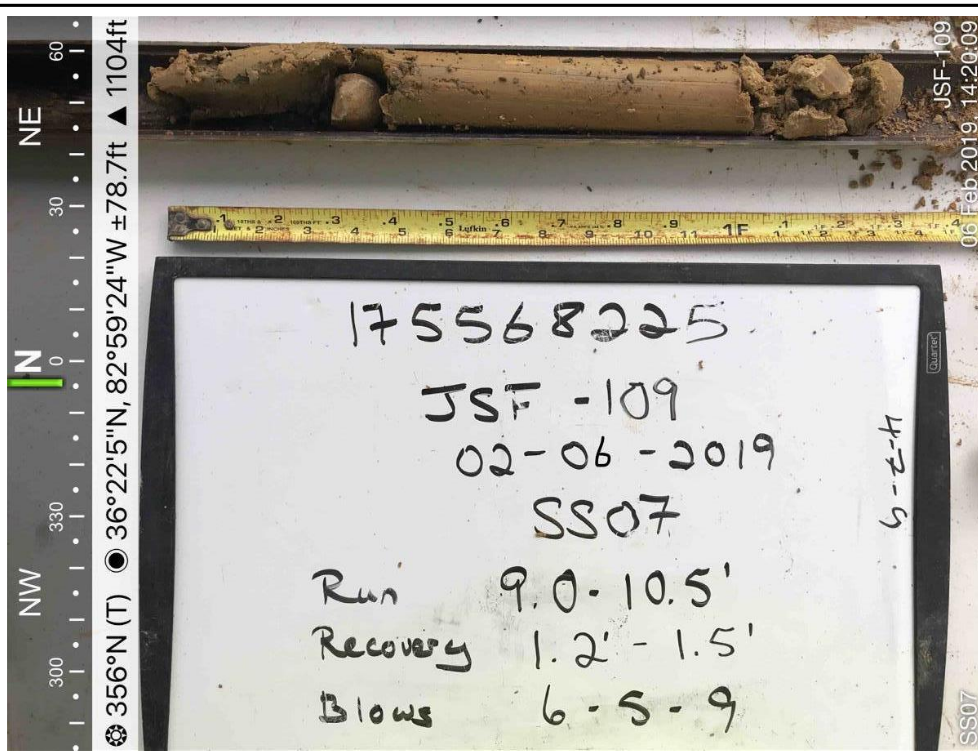


Photograph ID: 74

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (9.0-10.5 feet).



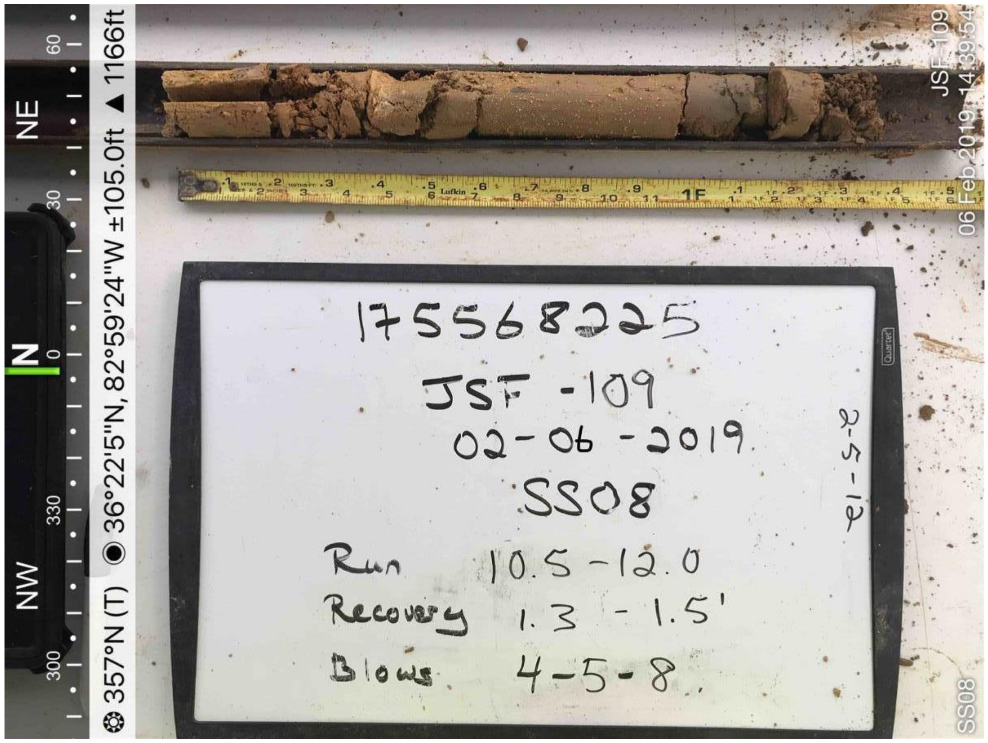
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 75

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (10.5-12.0 feet).

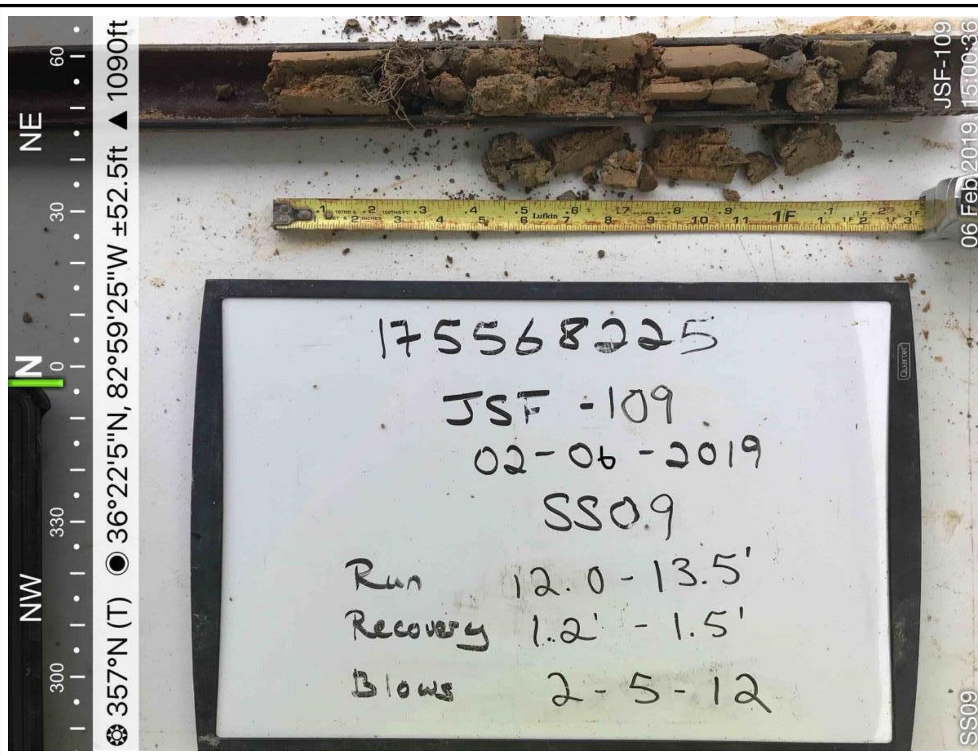


Photograph ID: 76

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (12.0-13.5 feet).



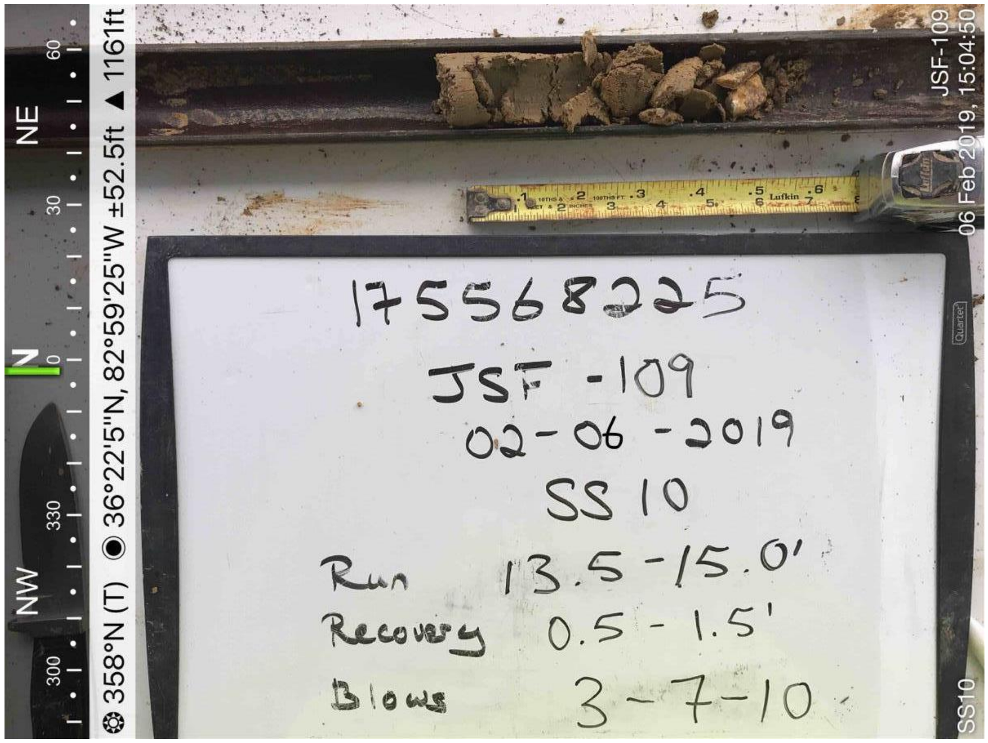
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 77

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (13.5-15.0 feet).

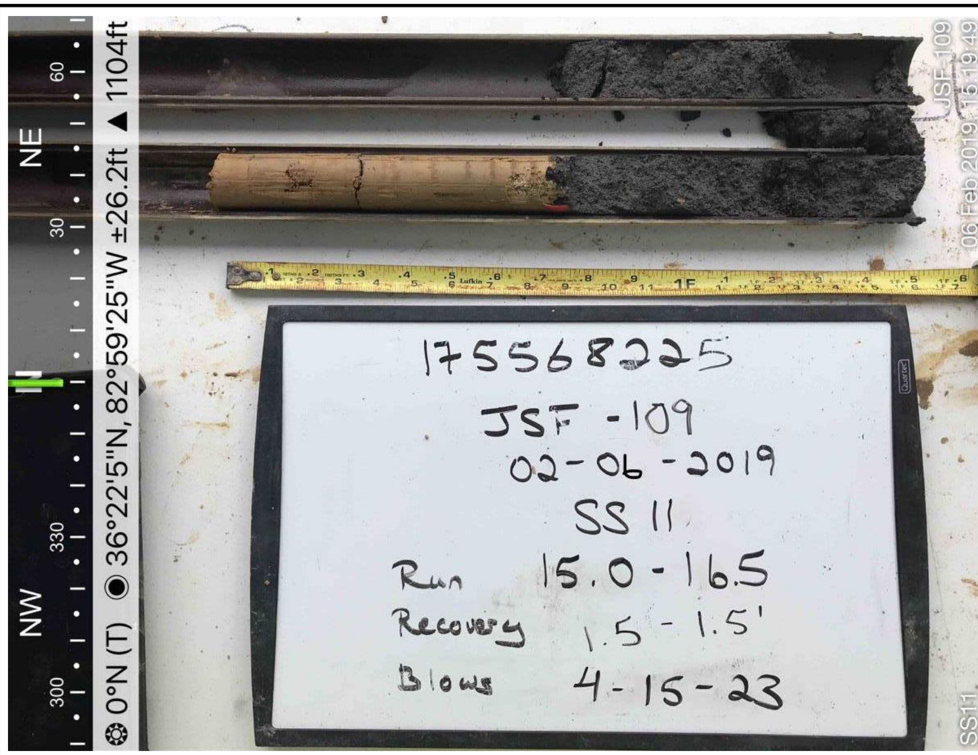


Photograph ID: 78

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (15.0-16.5 feet).



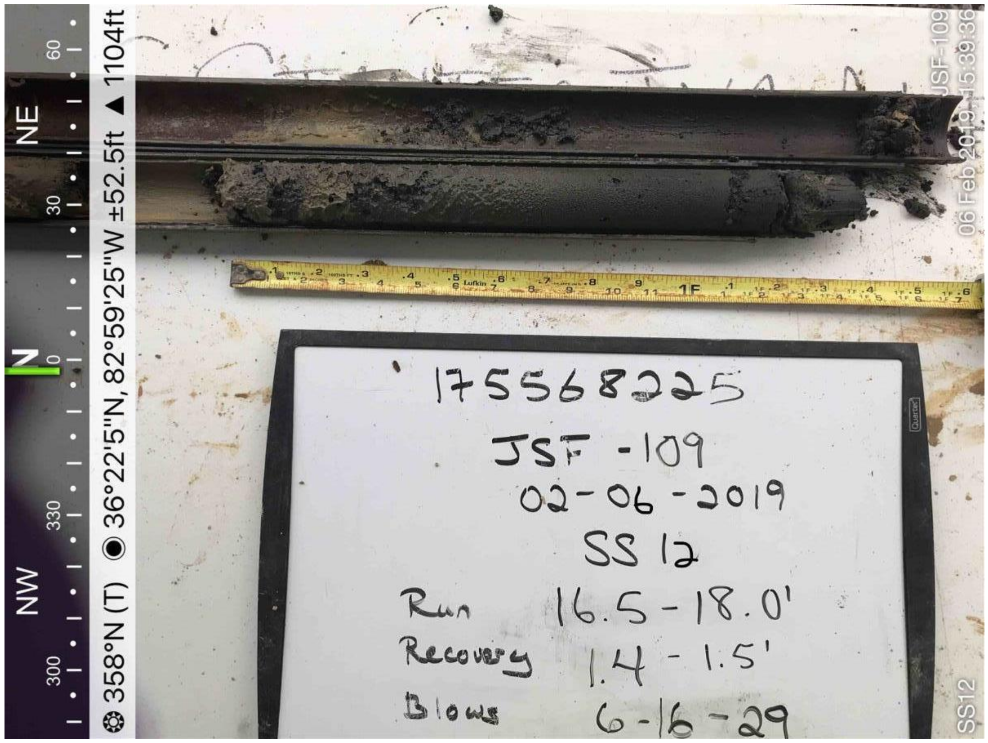
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 79

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (16.5-18.0 feet).

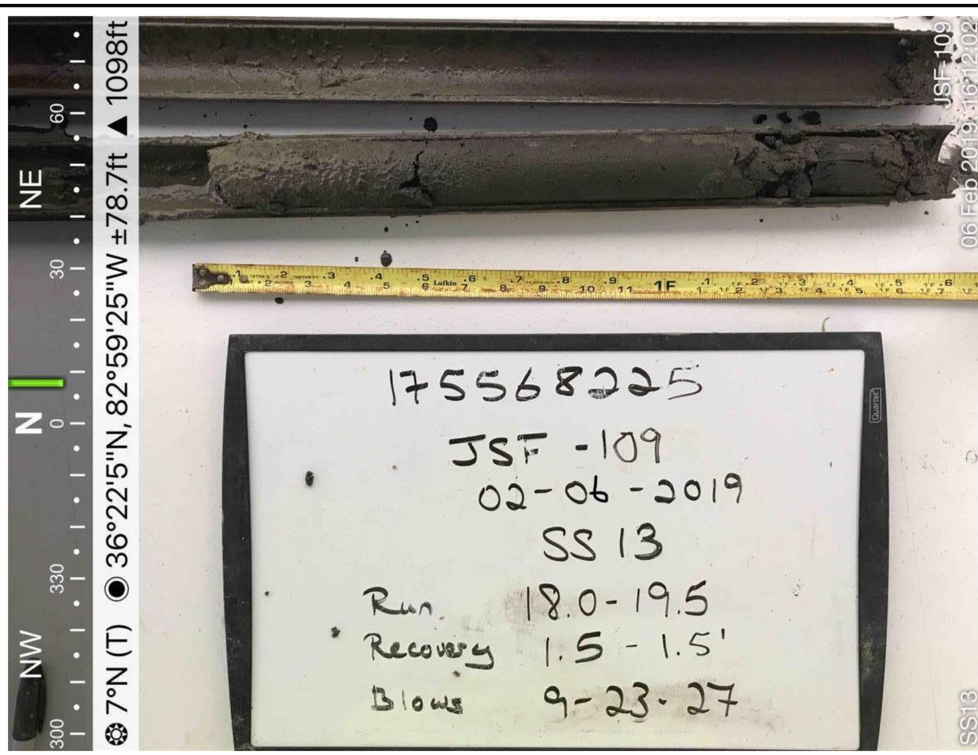


Photograph ID: 80

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (18.0-19.5 feet).



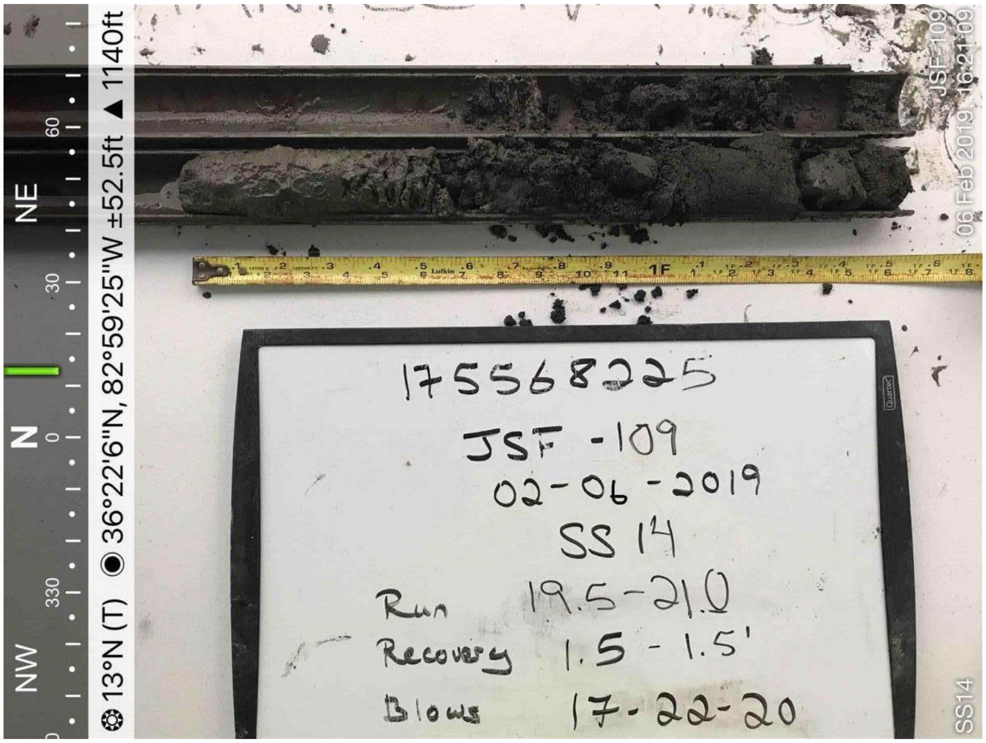
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 81

Photo Location:
JSF-109

Photo Date:
2/6/2019

Comments:
First boring location interval (19.5-21.0 feet). Boring first encountered CCR at 15.7 feet.

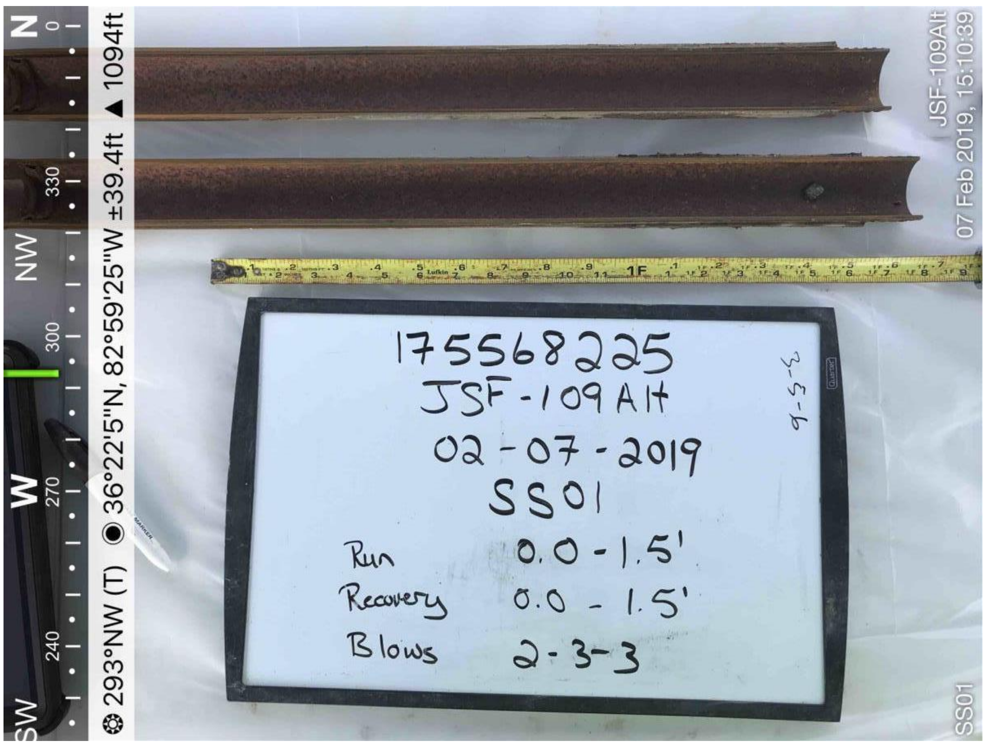


Photograph ID: 82

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (0.0-1.5 feet). Offset 10 feet to the south of the first boring.



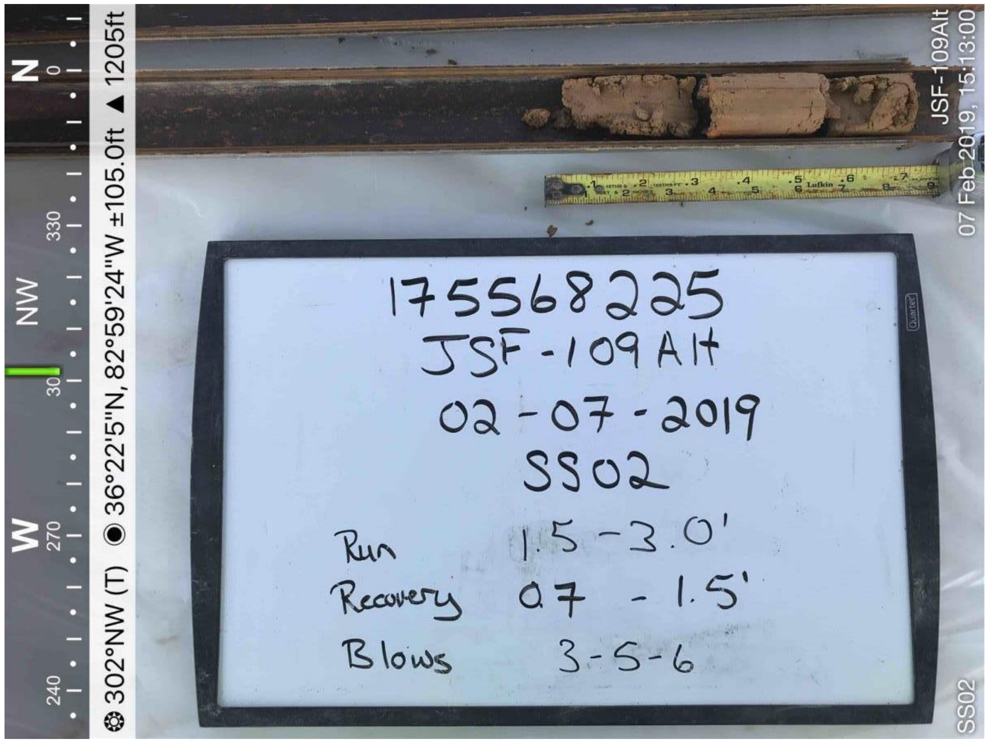
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 83

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (1.5-3.0 feet).

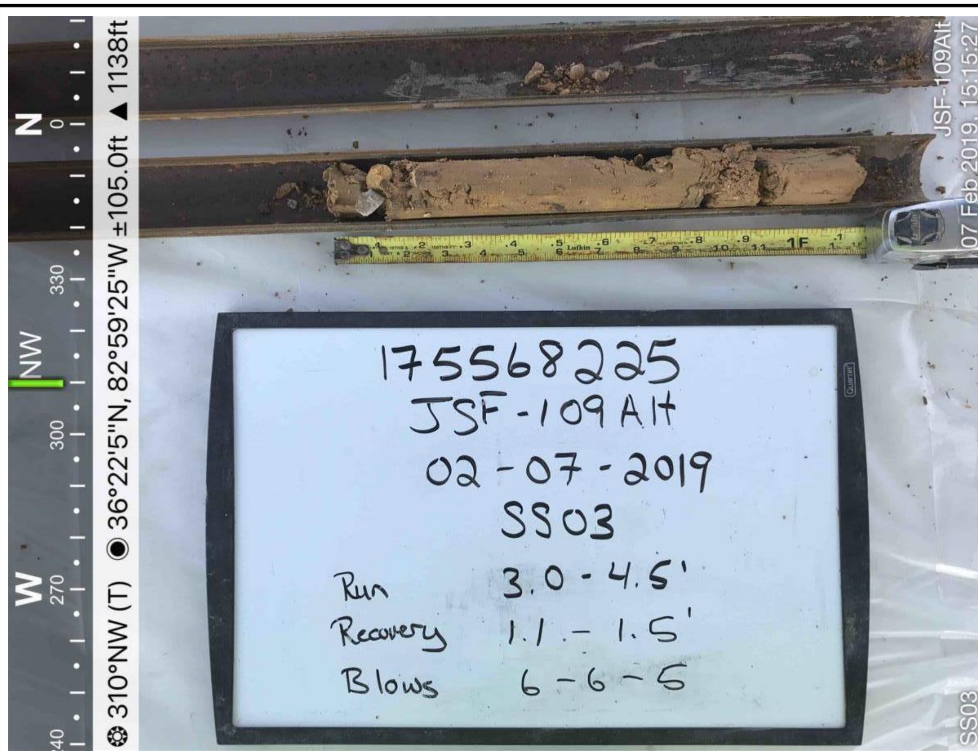


Photograph ID: 84

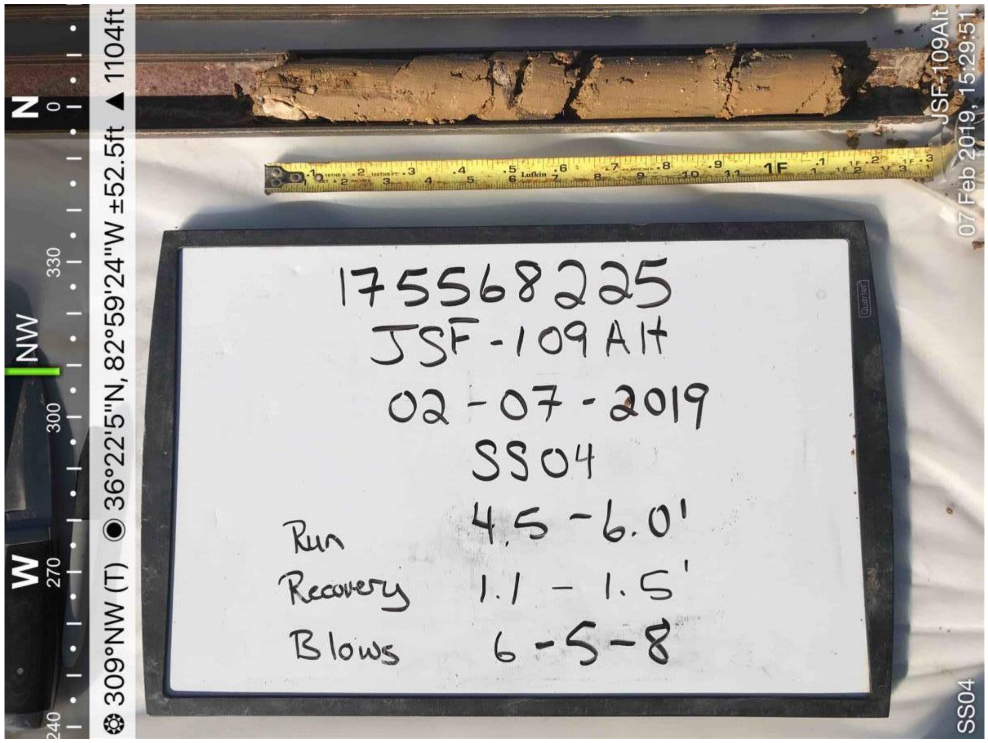
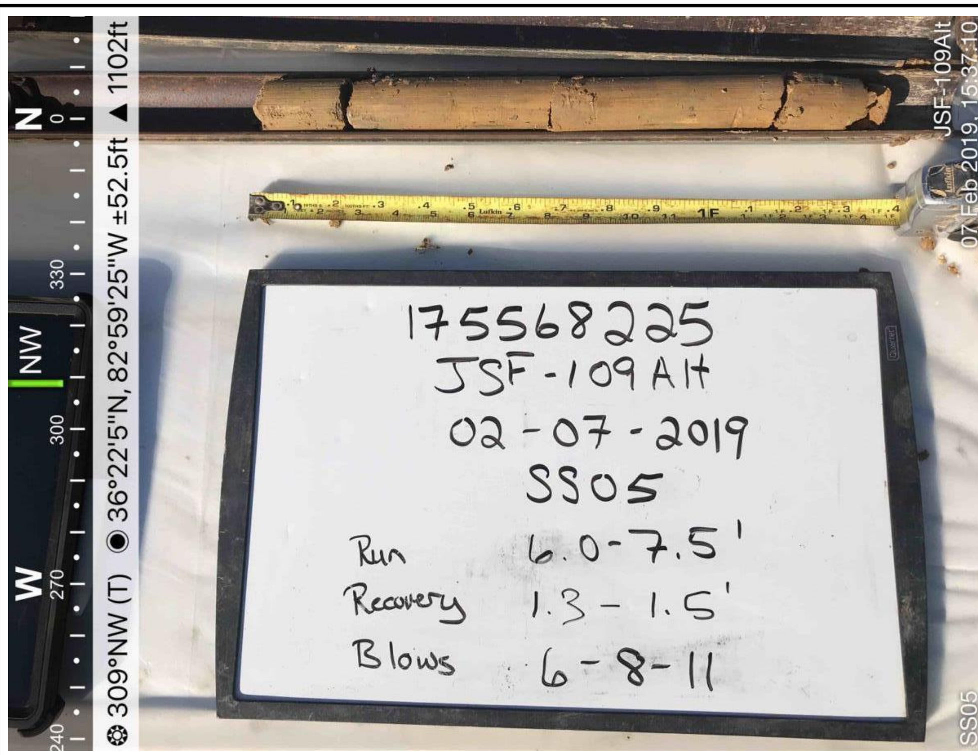
Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (3.0-4.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 85 **Photo Location:** JSF-109Alt **Photo Date:** 2/7/2019 **Comments:** Second boring location interval (4.5-6.0 feet).	
Photograph ID: 86 **Photo Location:** JSF-109Alt **Photo Date:** 2/7/2019 **Comments:** Second boring location interval (6.0-7.5 feet).	

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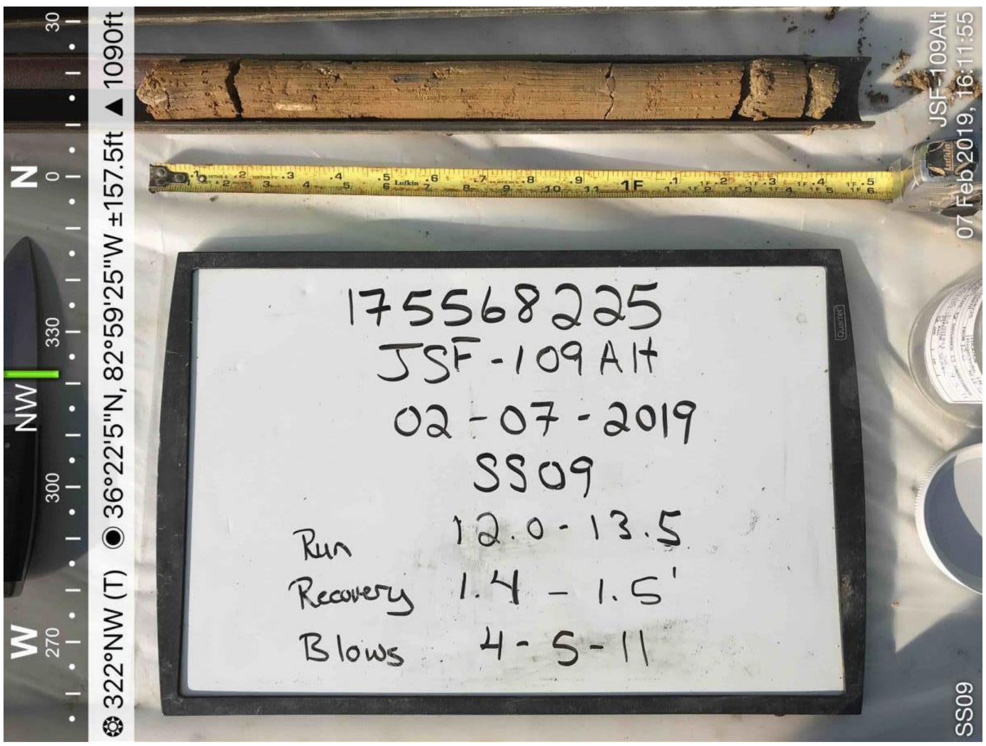
Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 87	No Photo Applicable
Photo Location: JSF-109Alt	
Photo Date: 2/7/2019	
Comments: Photo of second boring location interval (7.5-9.0 feet) unavailable	

Photograph ID: 88	No Photo Applicable
Photo Location: JSF-109Alt	
Photo Date: 2/7/2019	
Comments: Photo of second boring location interval (9.0-10.5 feet) unavailable.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 89 **Photo Location:** JSF-109Alt **Photo Date:** 2/7/2019 **Comments:** Photo of second boring location interval (10.5-12.0 feet) unavailable.	No Photo Applicable
Photograph ID: 90 **Photo Location:** JSF-109Alt **Photo Date:** 2/7/2019 **Comments:** Second boring location interval (12.0-13.5 feet).	

Stantec

Photographic Log

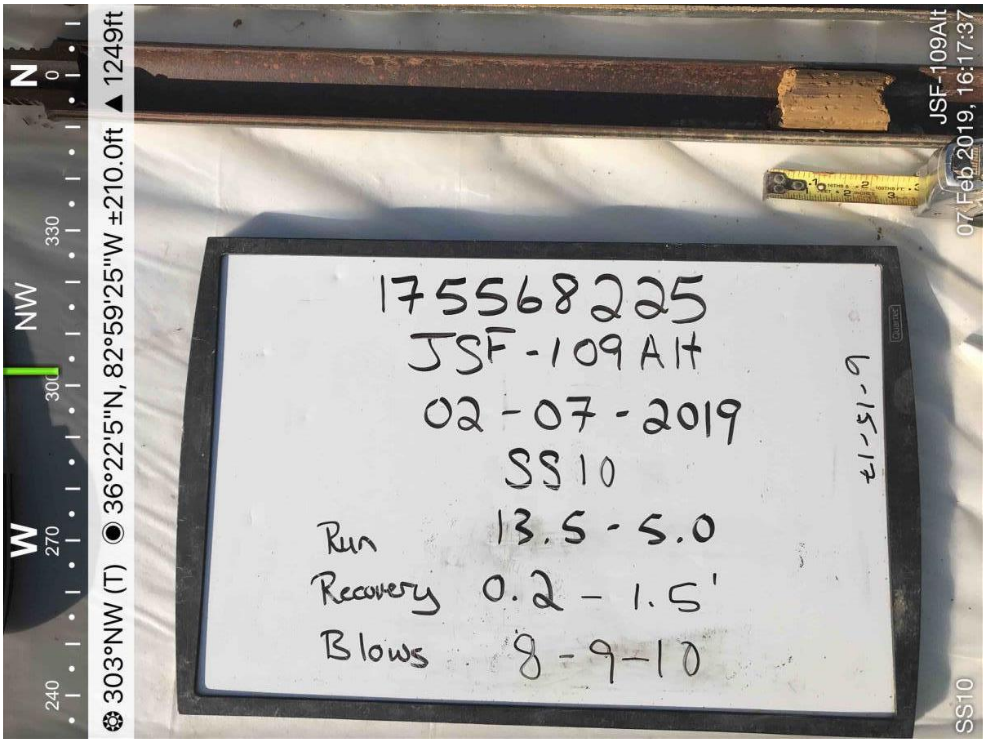
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 91

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (13.5-15.0 feet). Interval shown on white board should be 13.5-15.0.

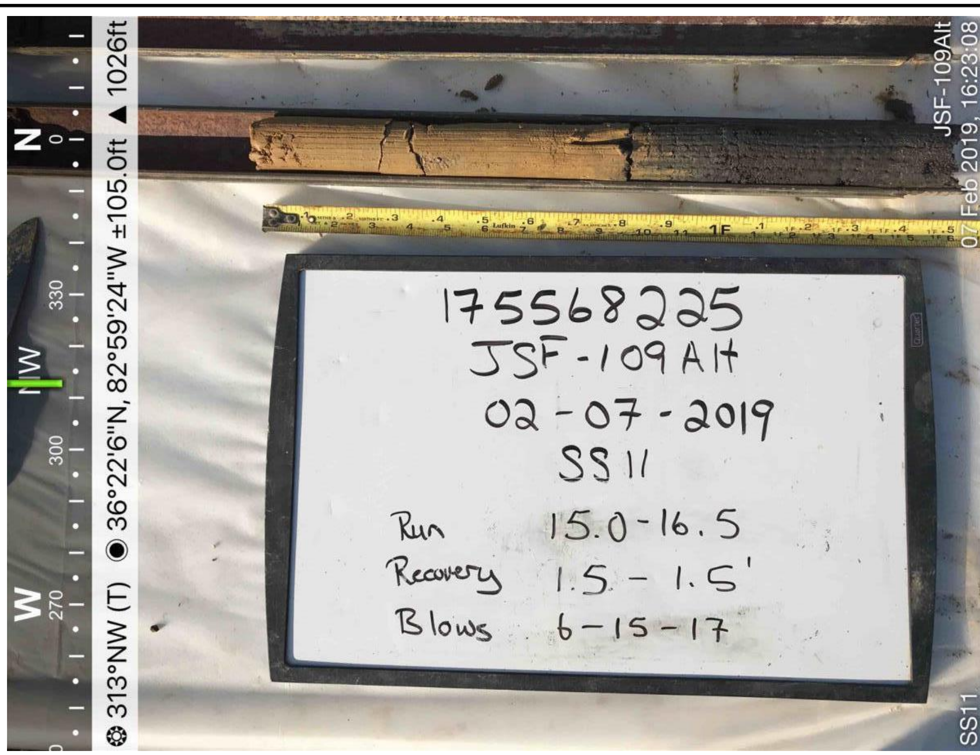


Photograph ID: 92

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (15.0-16.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 93

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

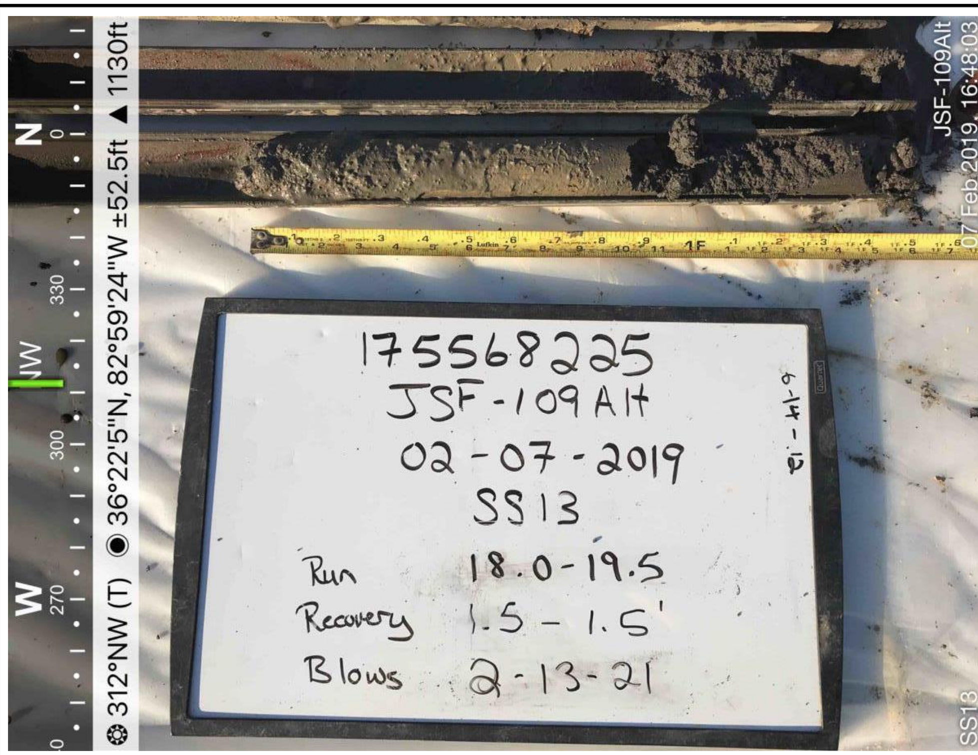
Comments:
Second boring location interval (16.5-18.0 feet).

Photograph ID: 94

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

Comments:
Second boring location interval (18.0-19.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 95

Photo Location:
JSF-109Alt

Photo Date:
2/7/2019

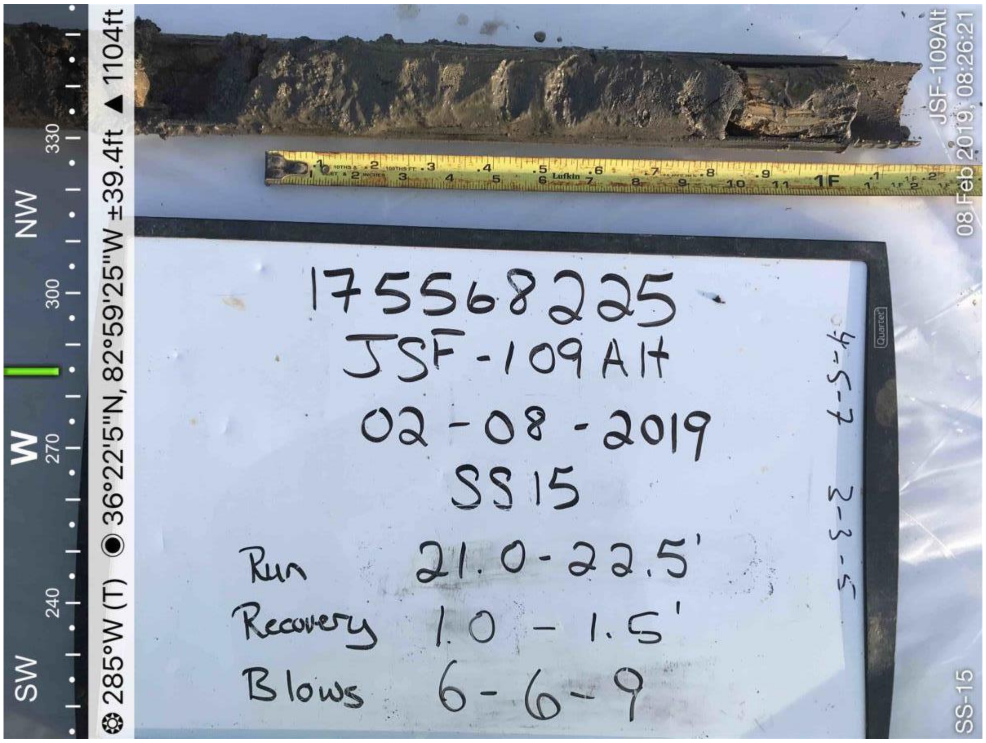
Comments:
Second boring location interval (19.5-21.0 feet).

Photograph ID: 96

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (21.0-22.5 feet).



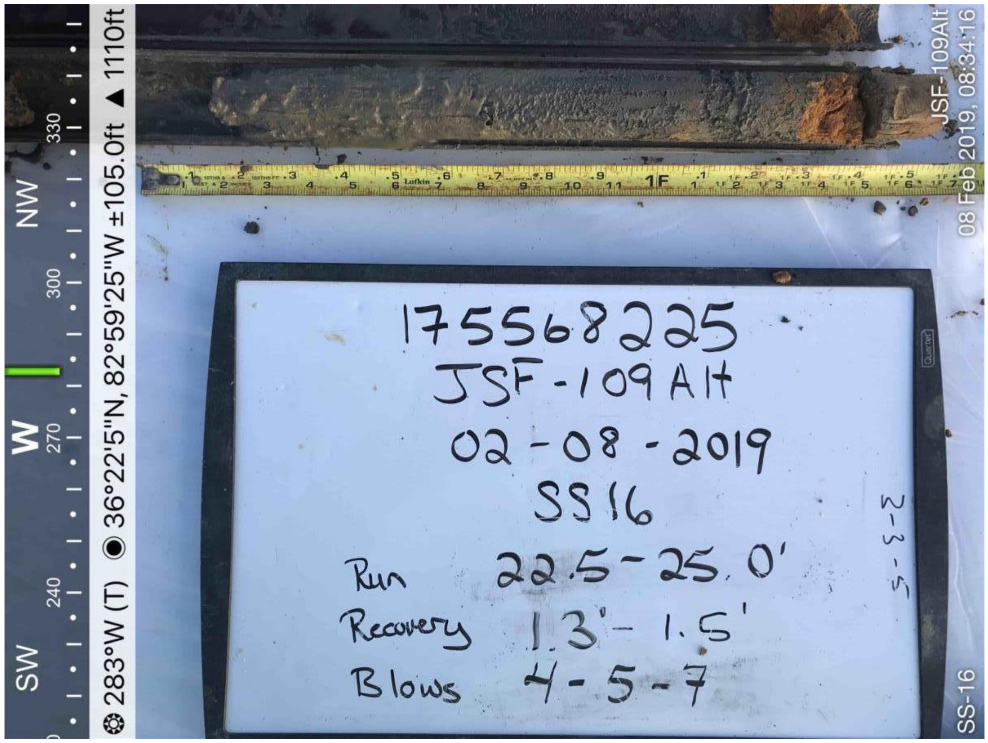
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 97

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (22.5-24.0 feet). Interval shown on white board should be 22.5-24.0.

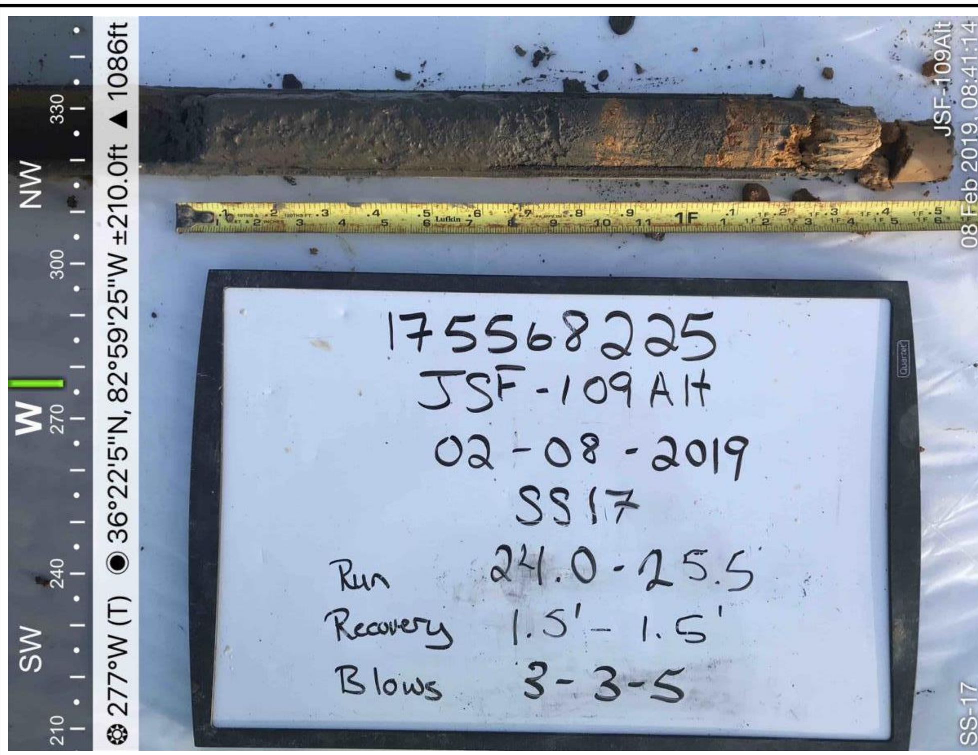


Photograph ID: 98

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (24.0-25.5 feet).



Stantec

Photographic Log

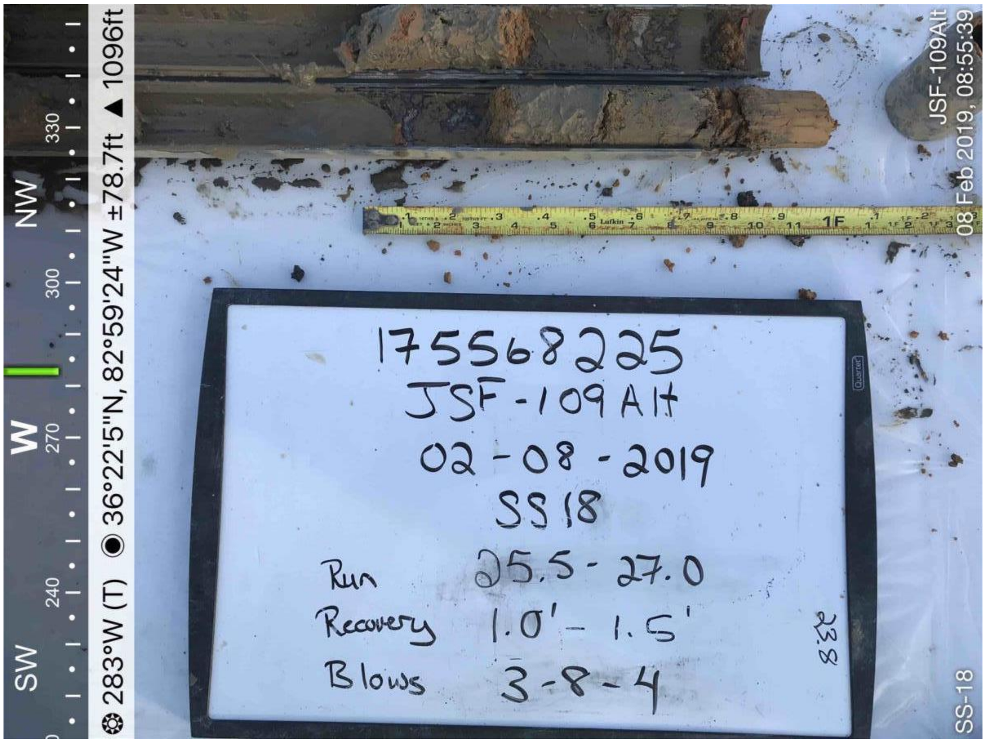
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 99

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (25.5-27.0 feet).

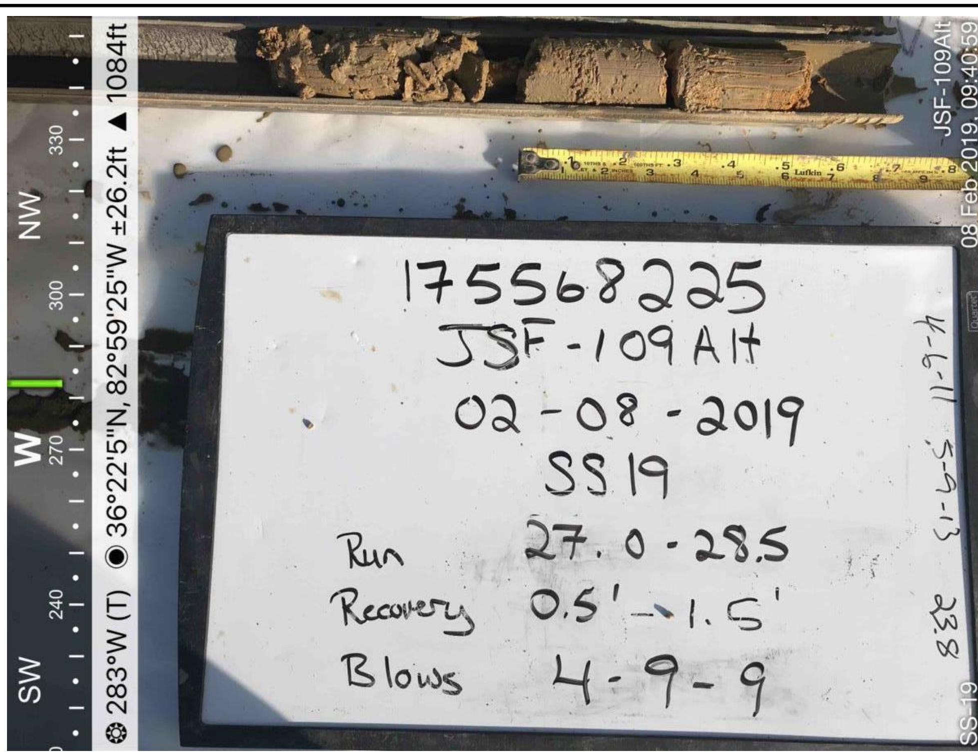


Photograph ID: 100

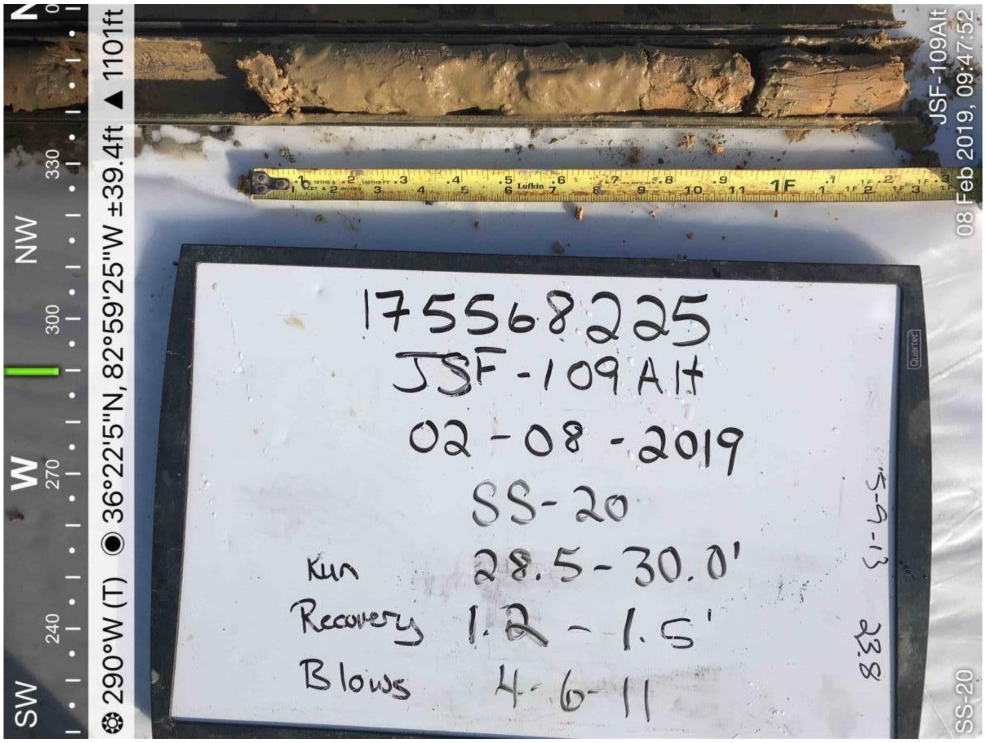
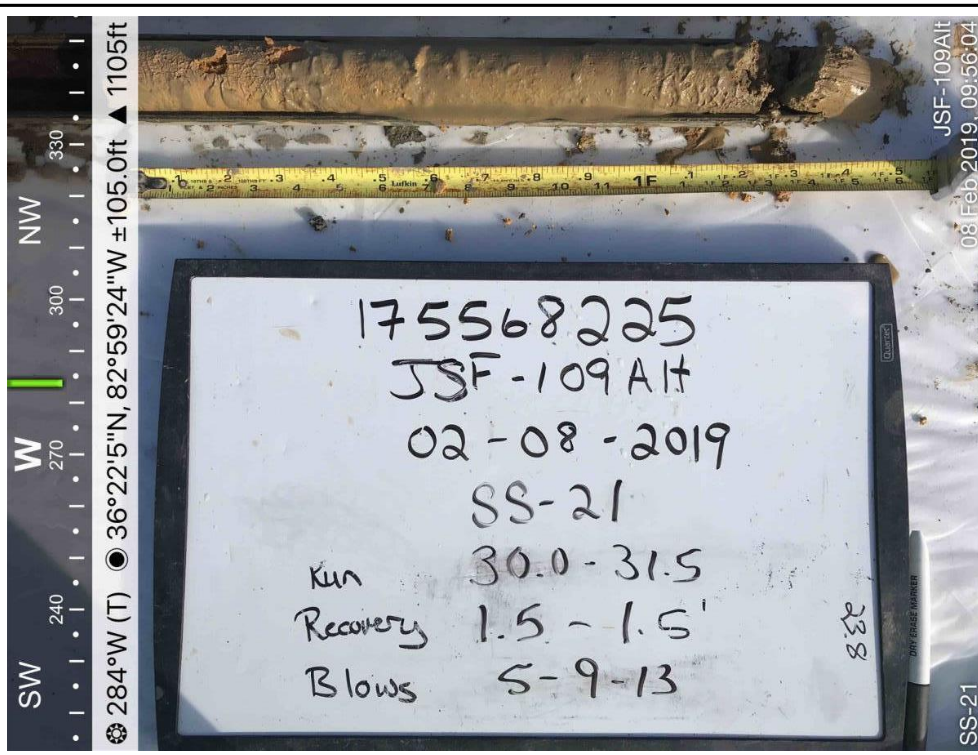
Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (27.0-28.5 feet).



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 101 **Photo Location:** JSF-109Alt **Photo Date:** 2/8/2019 **Comments:** Second boring location interval (28.5-30.0 feet).	
Photograph ID: 102 **Photo Location:** JSF-109Alt **Photo Date:** 2/8/2019 **Comments:** Second boring location interval (30.0-31.5 feet).	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 103

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Second boring location interval (31.5-33.0 feet).

Photograph ID: 104

Photo Location:
JSF-109Alt

Photo Date:
2/8/2019

Comments:
Photo of second boring location interval (33.0-34.5 feet) unavailable.

No Photo Applicable

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 105

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Photo of second boring location interval (34.5-36.0 feet) unavailable.

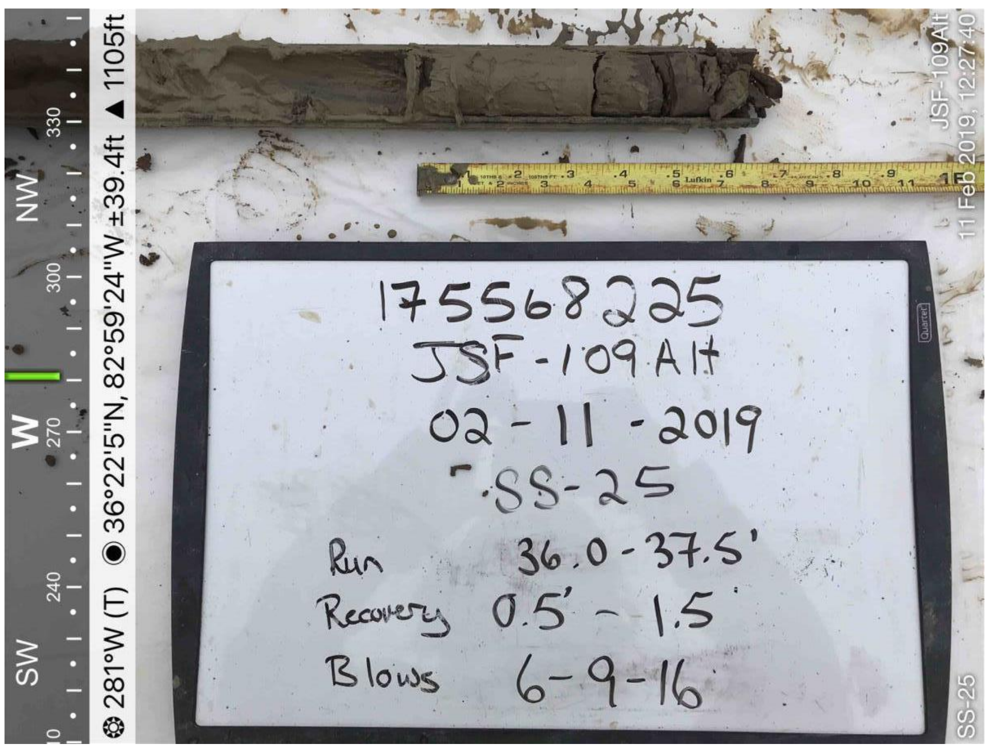
No Photo Applicable

Photograph ID: 106

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (36.0-37.5 feet).



Stantec

Photographic Log

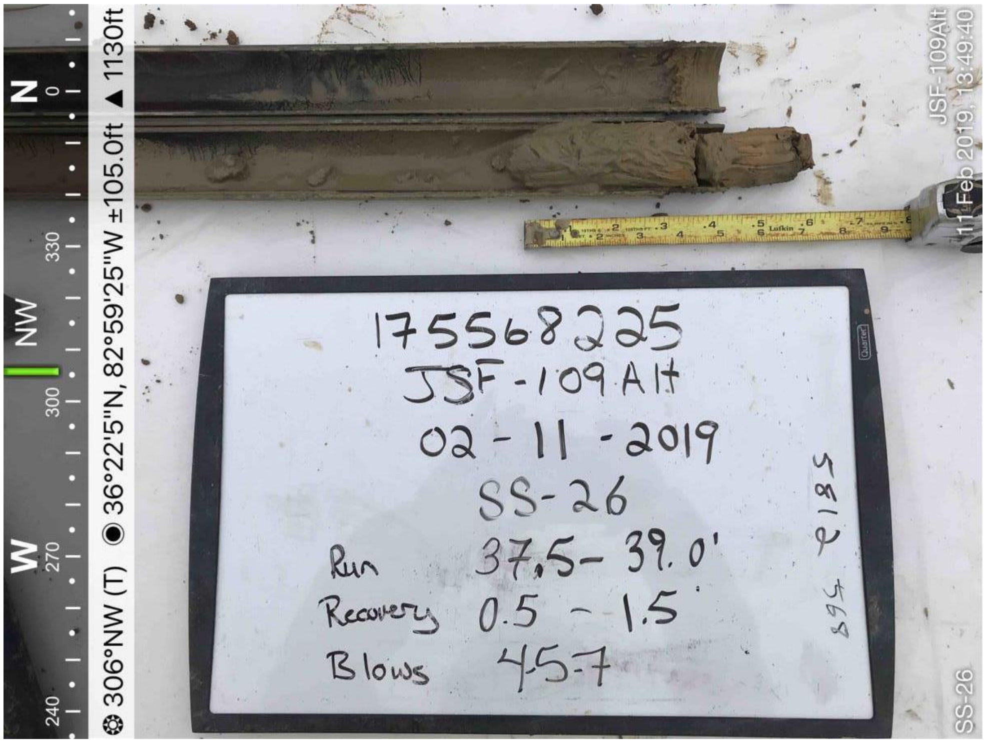
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 107

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (37.5-39.0 feet).

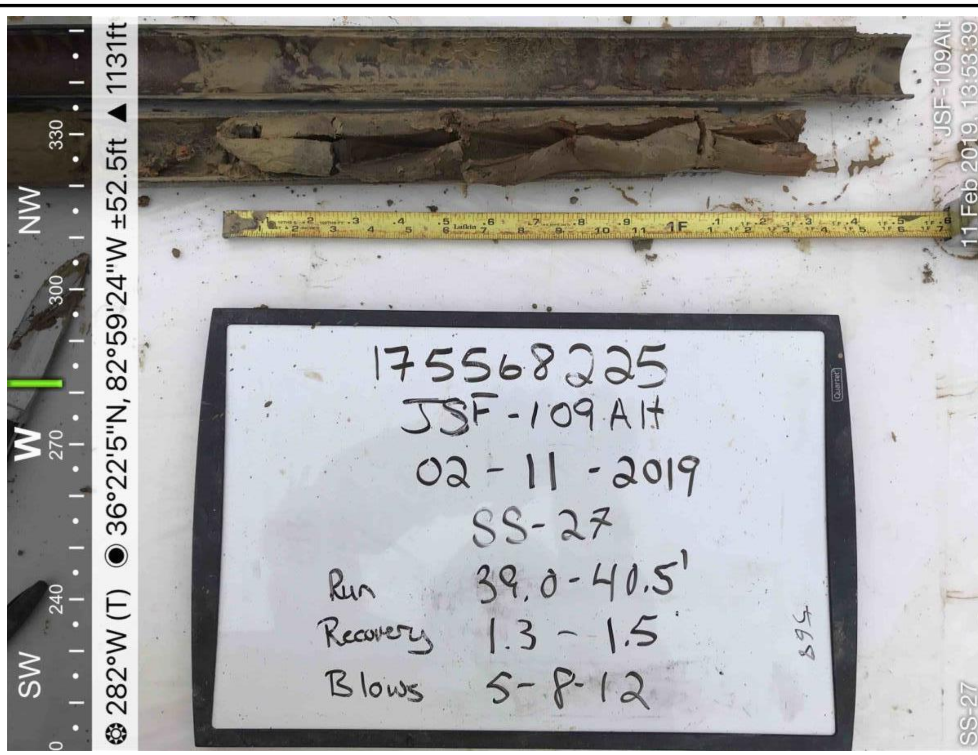


Photograph ID: 108

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (39.0-40.5 feet).



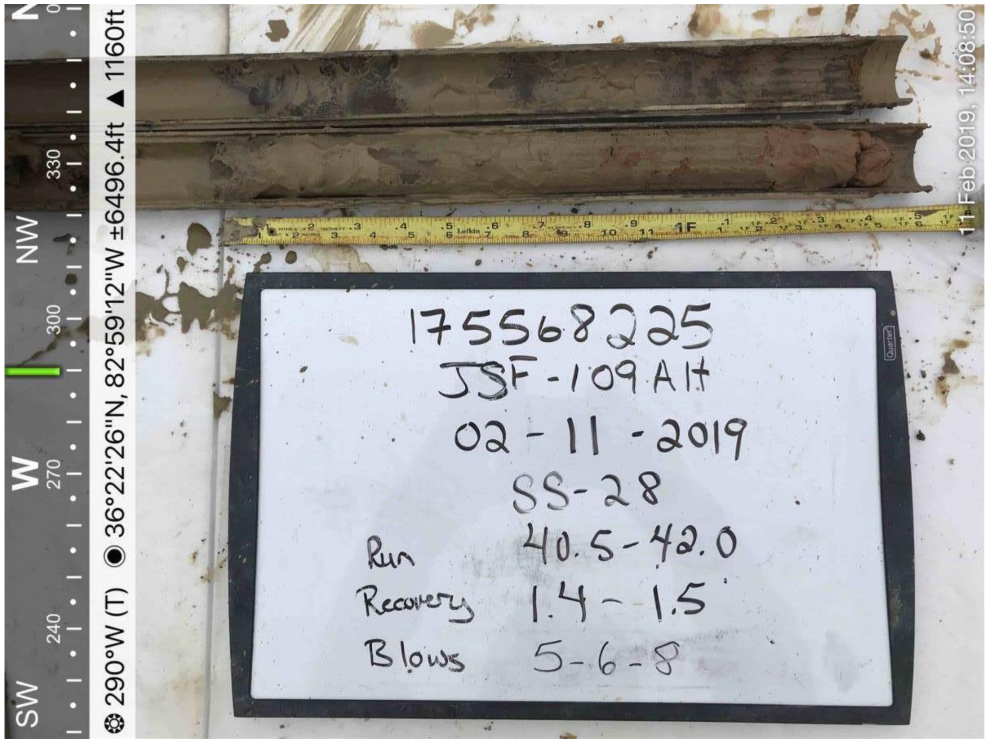
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 109

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (40.5-42.0 feet).

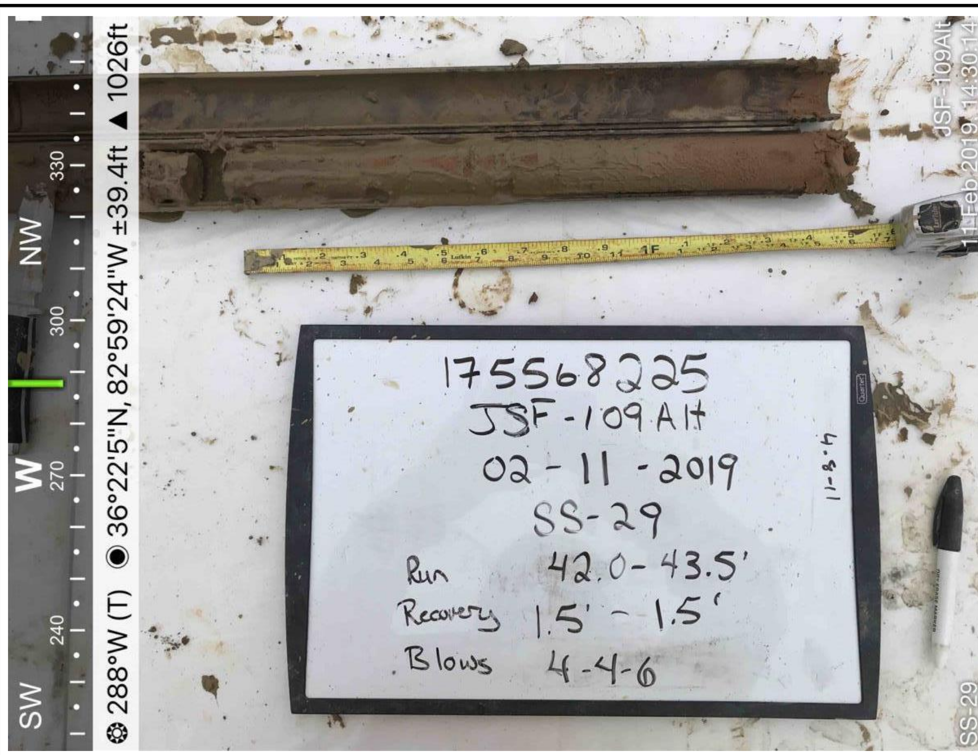


Photograph ID: 110

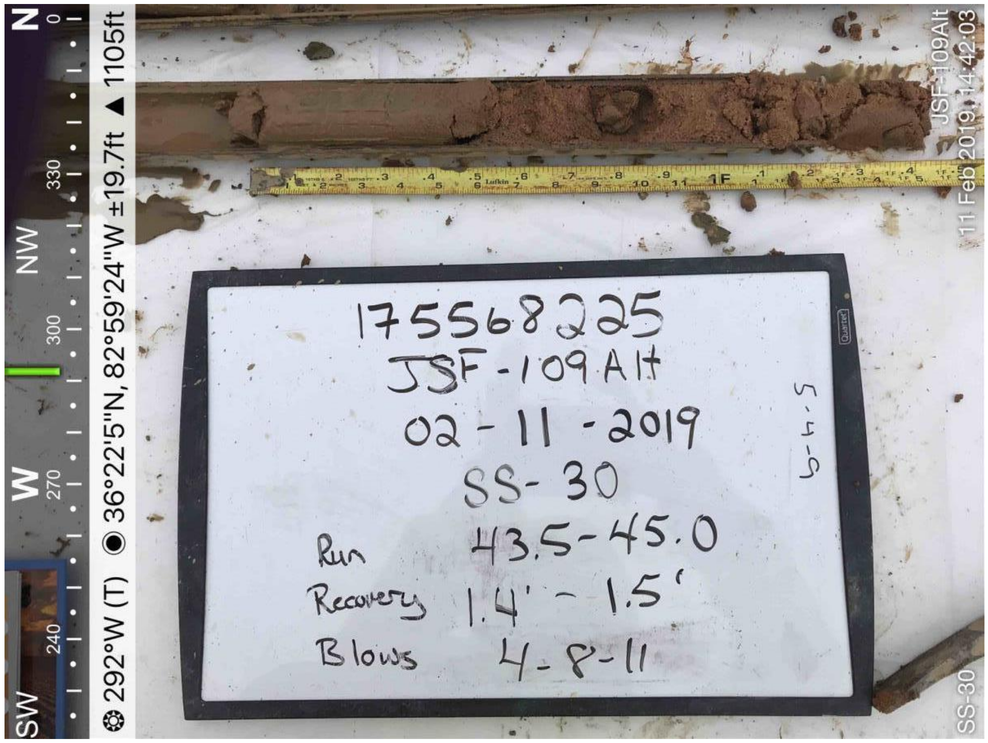
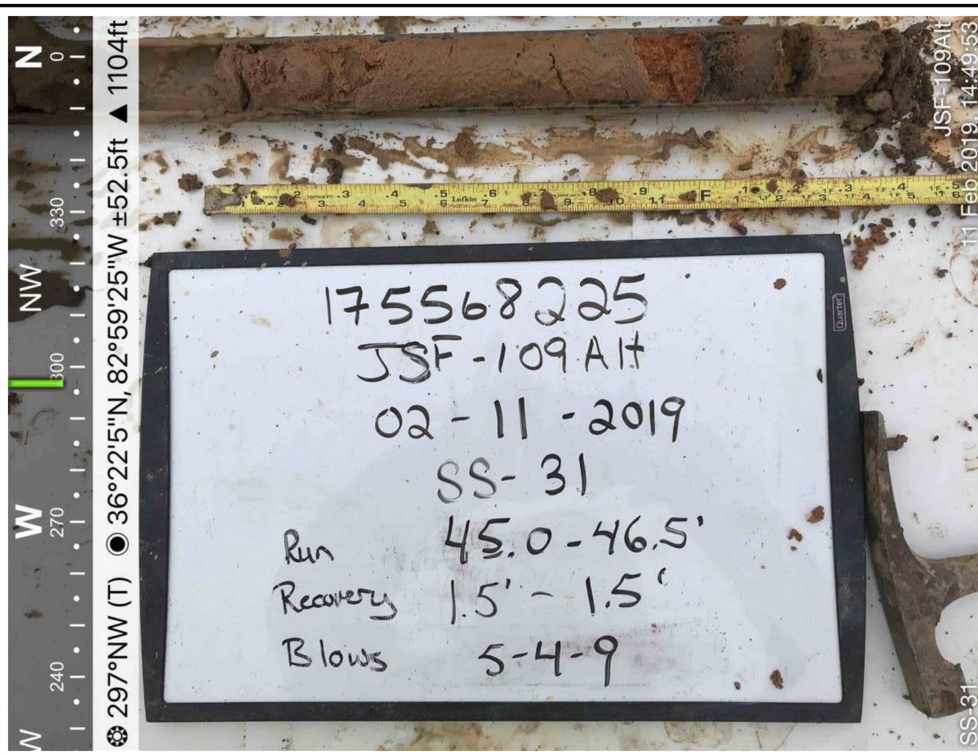
Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (42.0-43.5 feet).



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 111 **Photo Location:** JSF-109Alt **Photo Date:** 2/11/2019 **Comments:** Second boring location interval (43.5-45.0 feet).	
Photograph ID: 112 **Photo Location:** JSF-109Alt **Photo Date:** 2/11/2019 **Comments:** Second boring location interval (45.0-46.5 feet).	

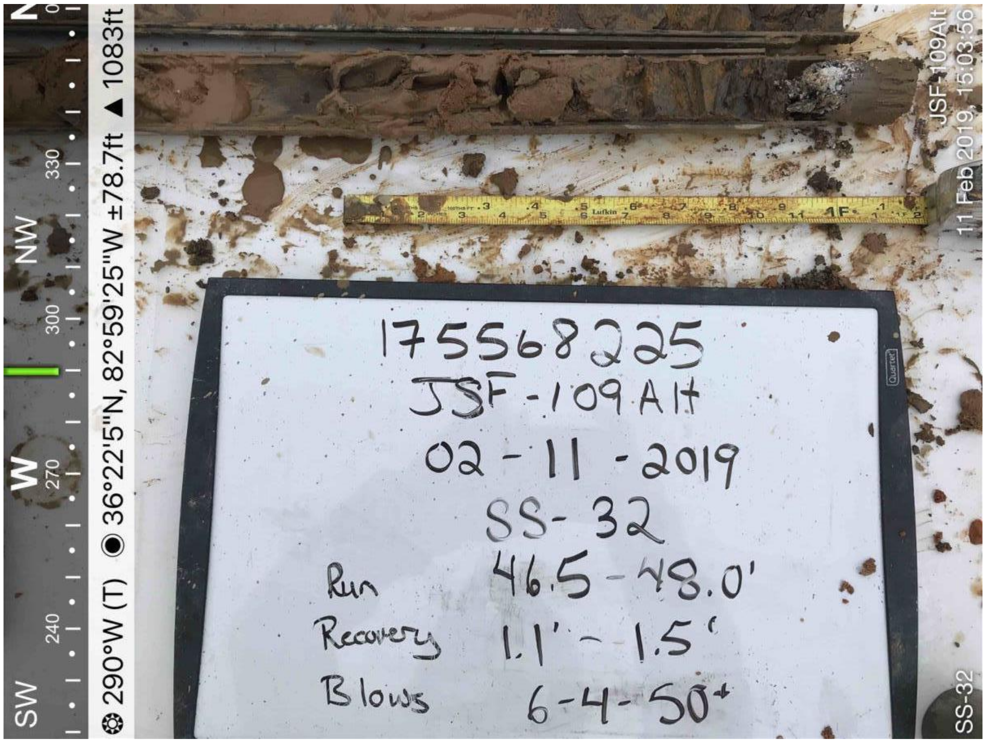
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 113

Photo Location:
JSF-109Alt

Photo Date:
2/11/2019

Comments:
Second boring location interval (46.5-47.6 feet). Boring first encountered CCR at 15.8 feet. Boring refusal at 47.6 feet. Interval shown on white board should be 46.5-47.6. Blow count on white board should be 6-4-50/0.1'

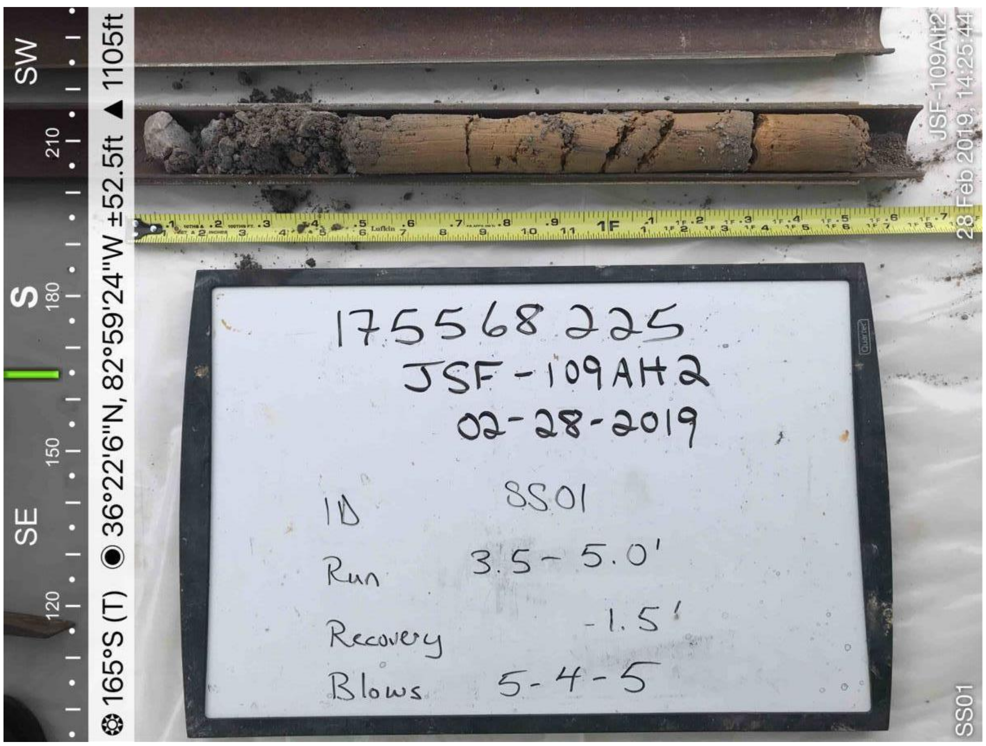


Photograph ID: 114

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (3.5-5.0 feet). Offset 35 feet to the northwest of the second boring. Recovery shown on white board should be 1.5.



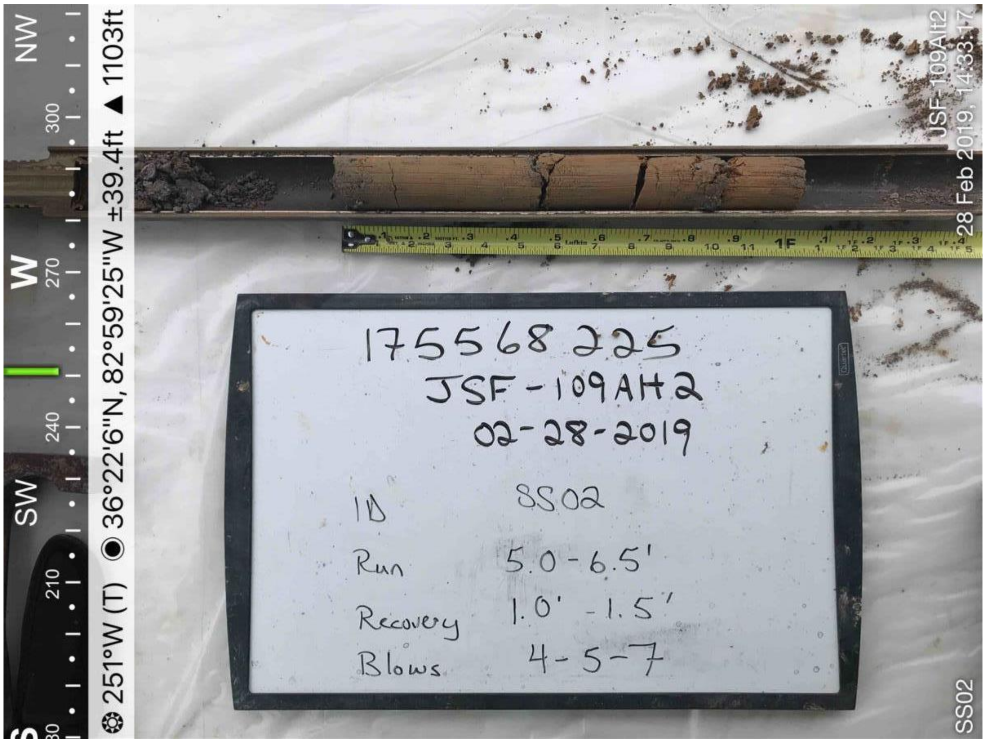
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 115

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (5.0-6.5 feet).

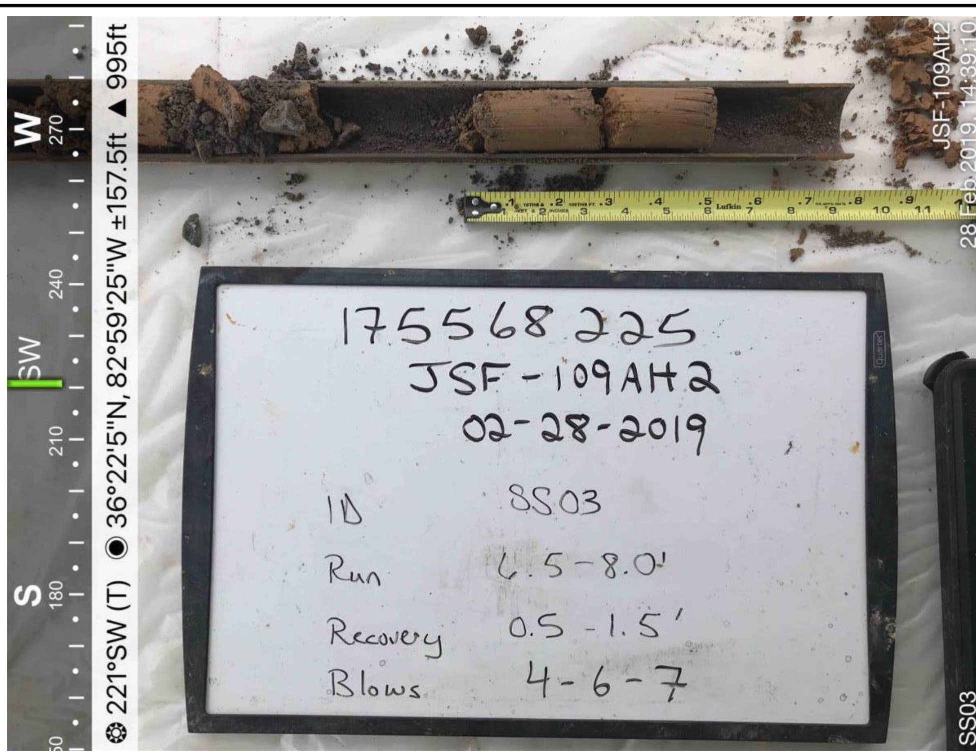


Photograph ID: 116

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (6.5-8.0 feet).



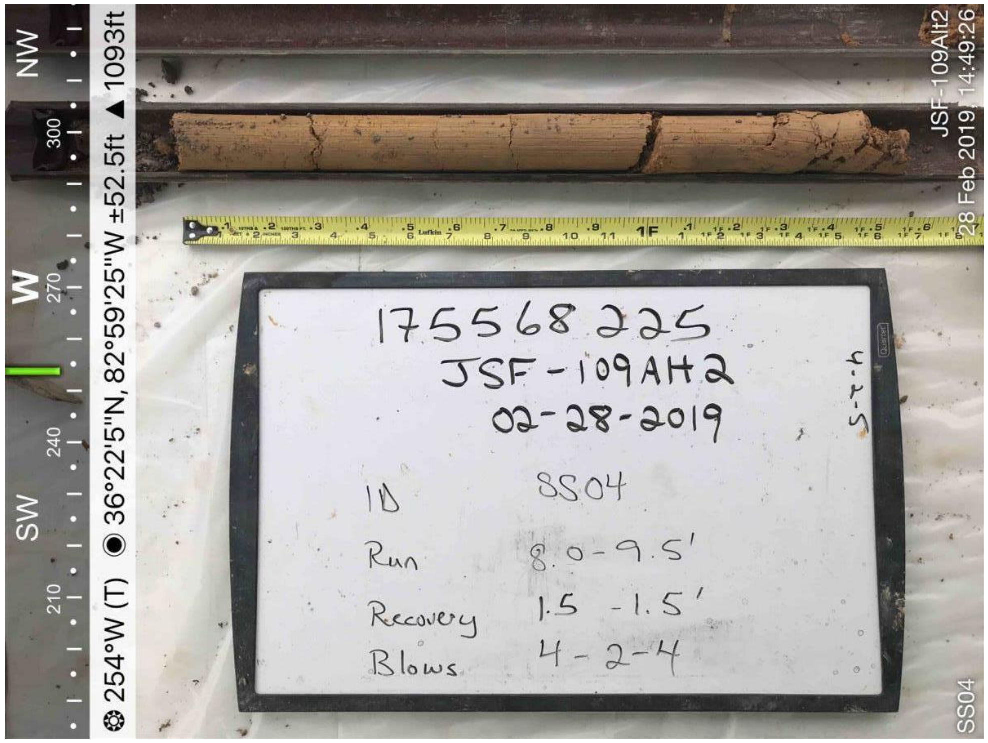
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 117

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (8.0-9.5 feet).

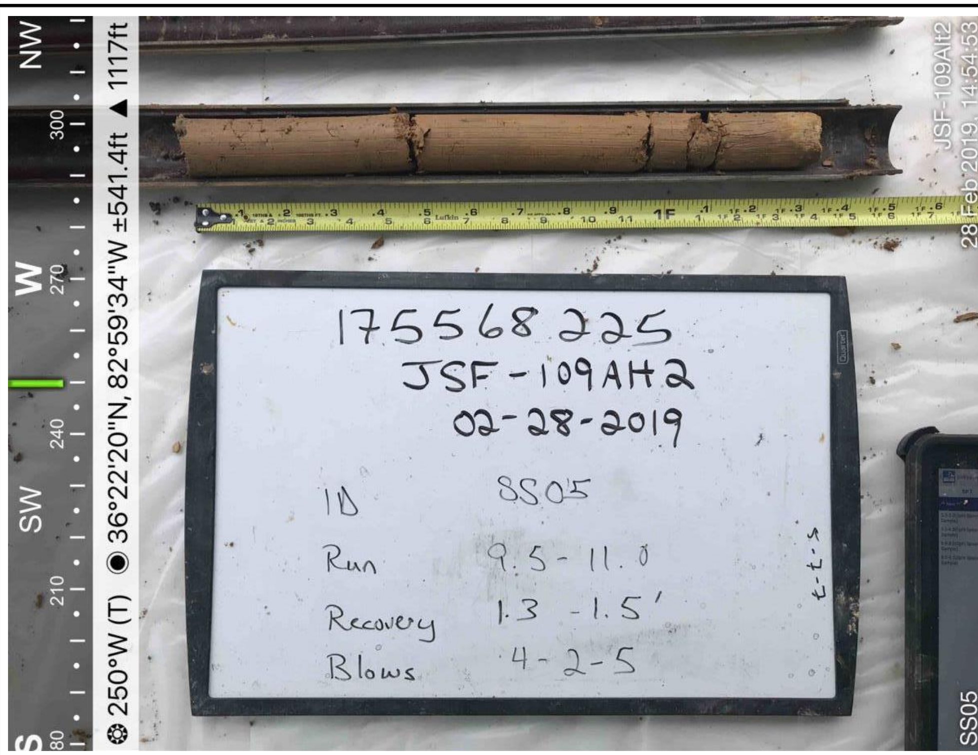


Photograph ID: 118

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (9.5-11.0 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 119

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Photo of third boring location interval (11.0-12.5 feet) unavailable.

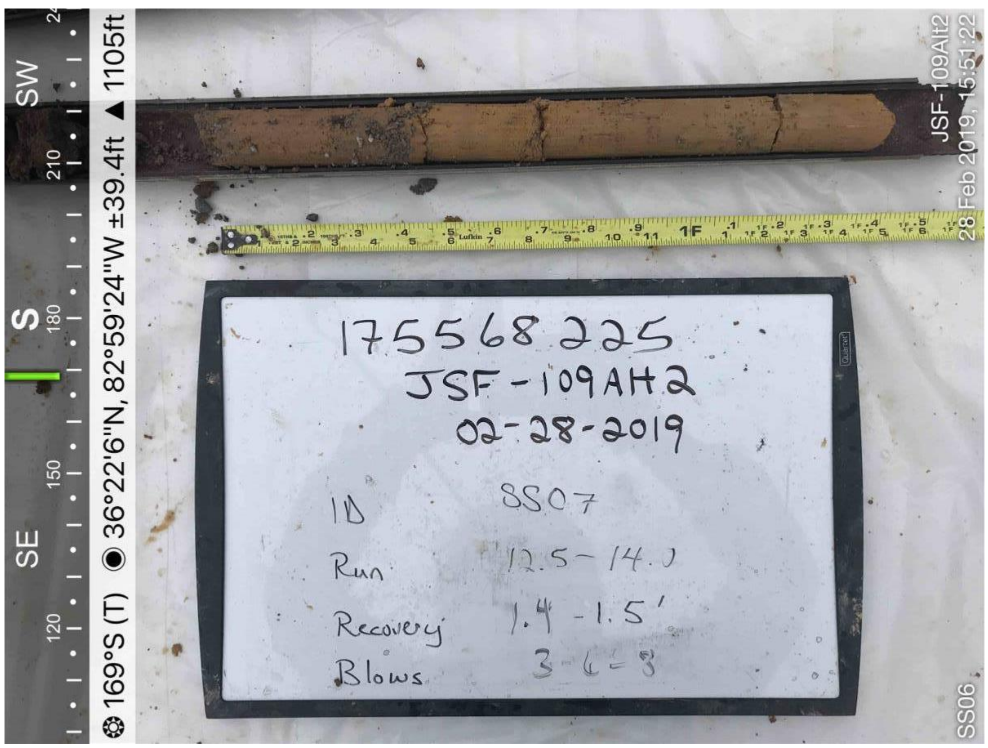
No Photo Applicable

Photograph ID: 120

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (12.5-14.0 feet). Metadata split spoon should be SS07.



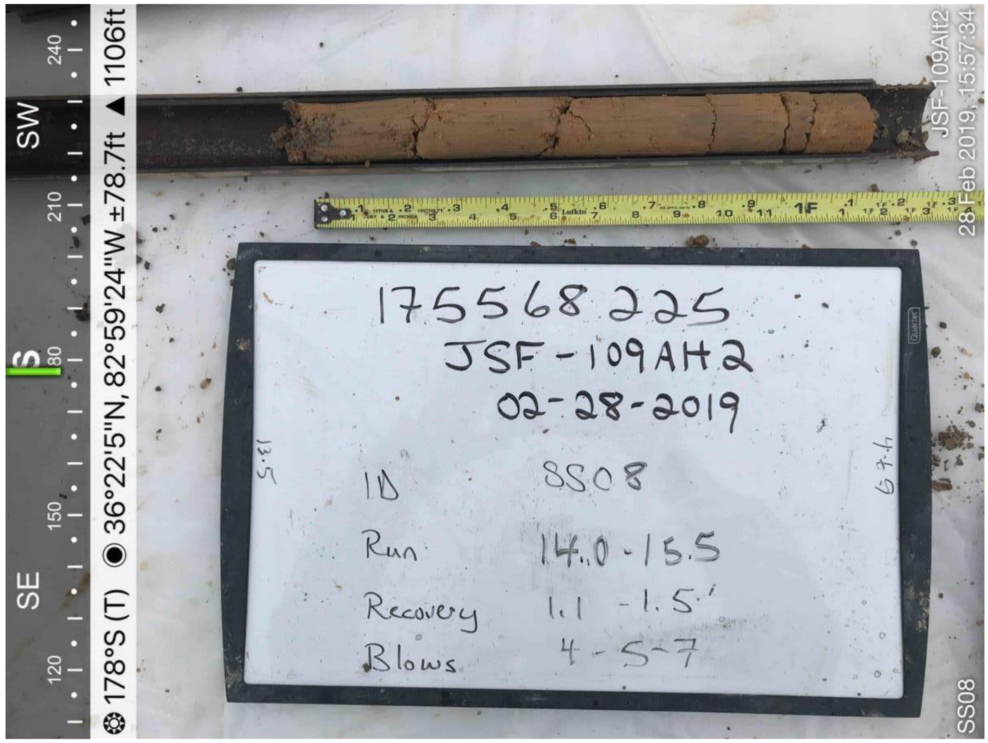
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 121

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (14.0-15.5 feet).

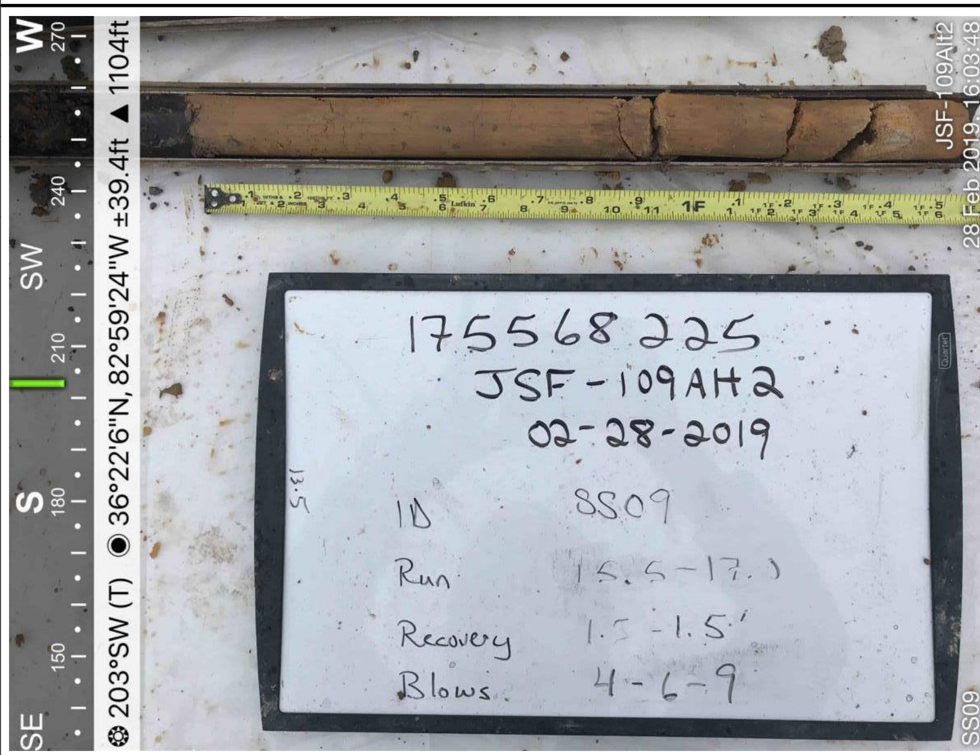


Photograph ID: 122

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (15.5-17.0 feet).



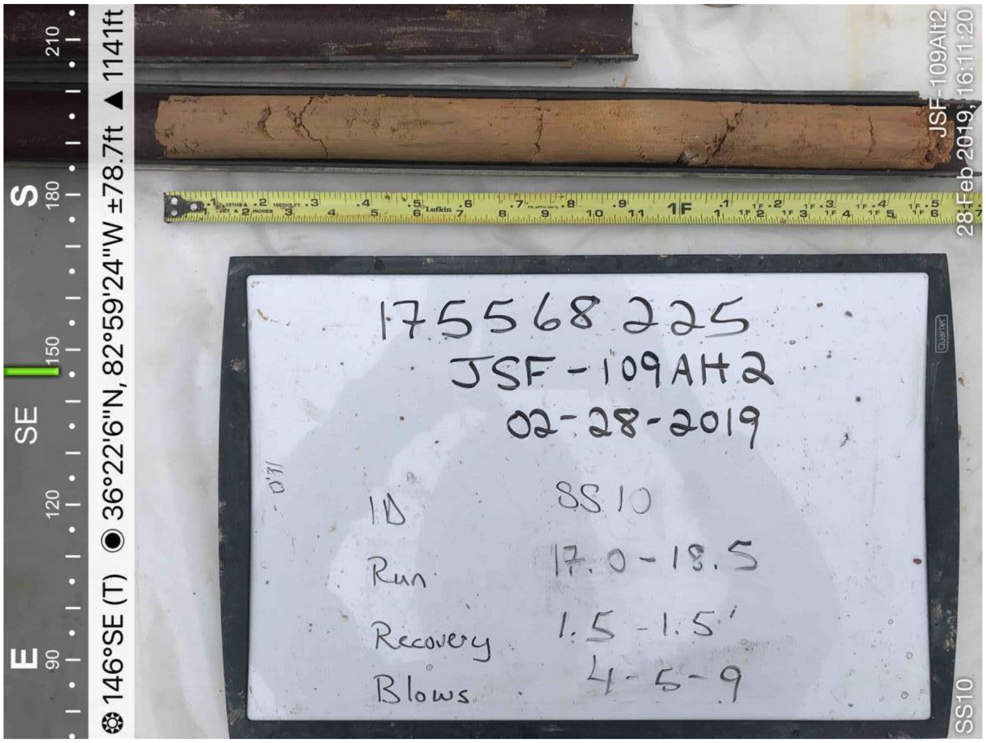
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 123

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (17.0-18.5 feet).

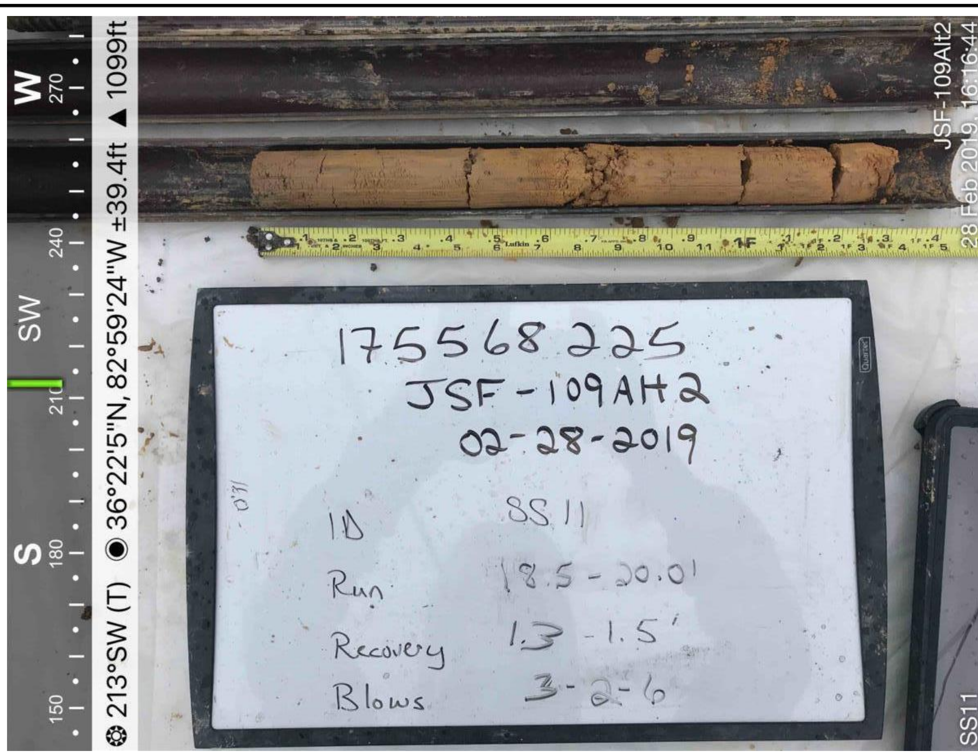


Photograph ID: 124

Photo Location:
JSF-109Alt2

Photo Date:
2/28/2019

Comments:
Third boring location interval (18.5-20.0 feet).



Stantec

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 125

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

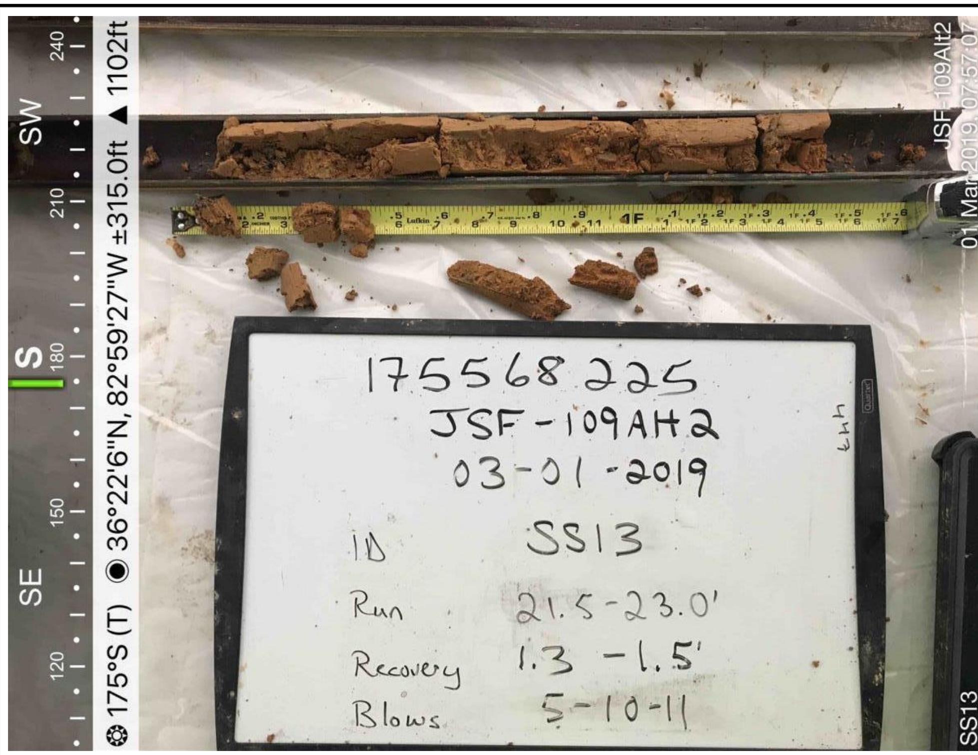
Comments:
Third boring location interval (20.0-21.5 feet).

Photograph ID: 126

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (21.5-23.0 feet).



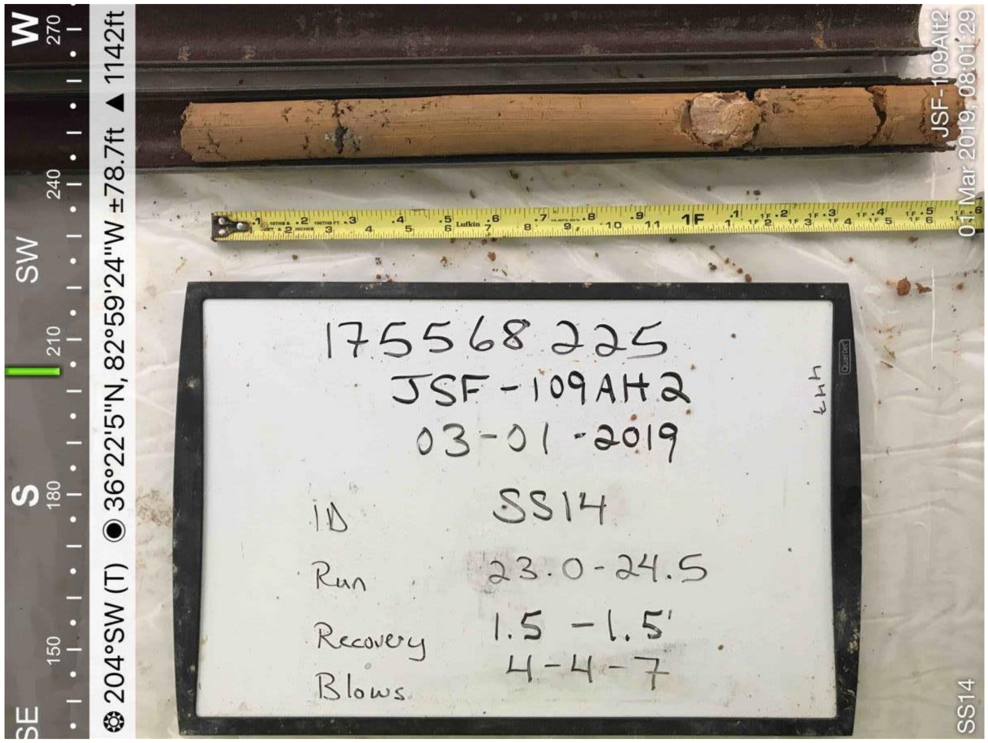
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 127

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (23.0-24.5 feet).

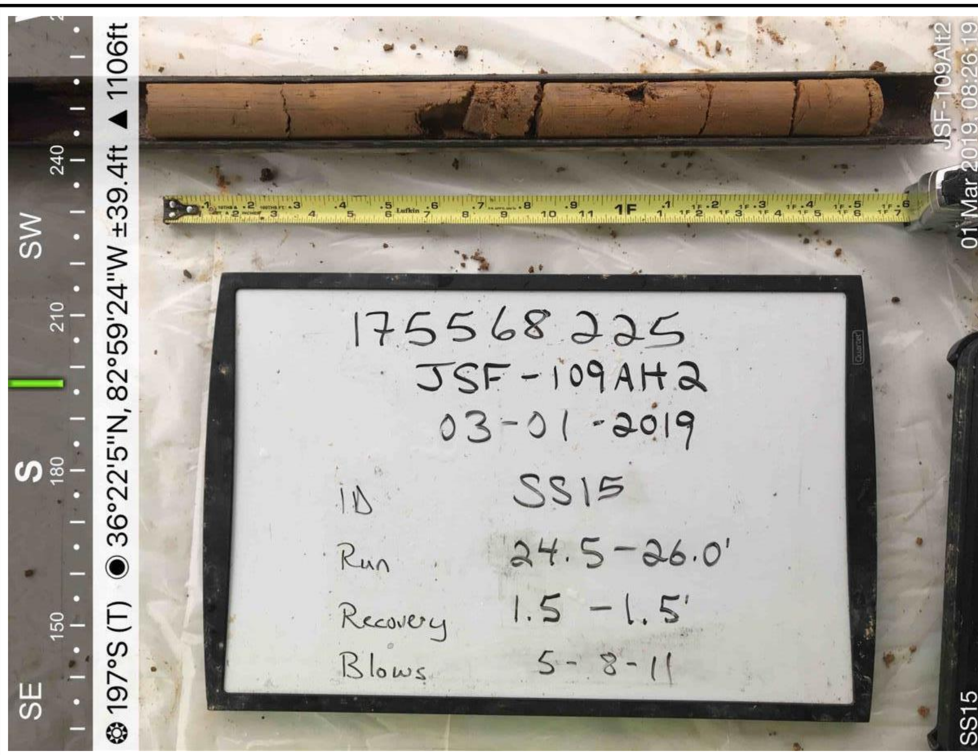


Photograph ID: 128

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (24.5-26.0 feet).



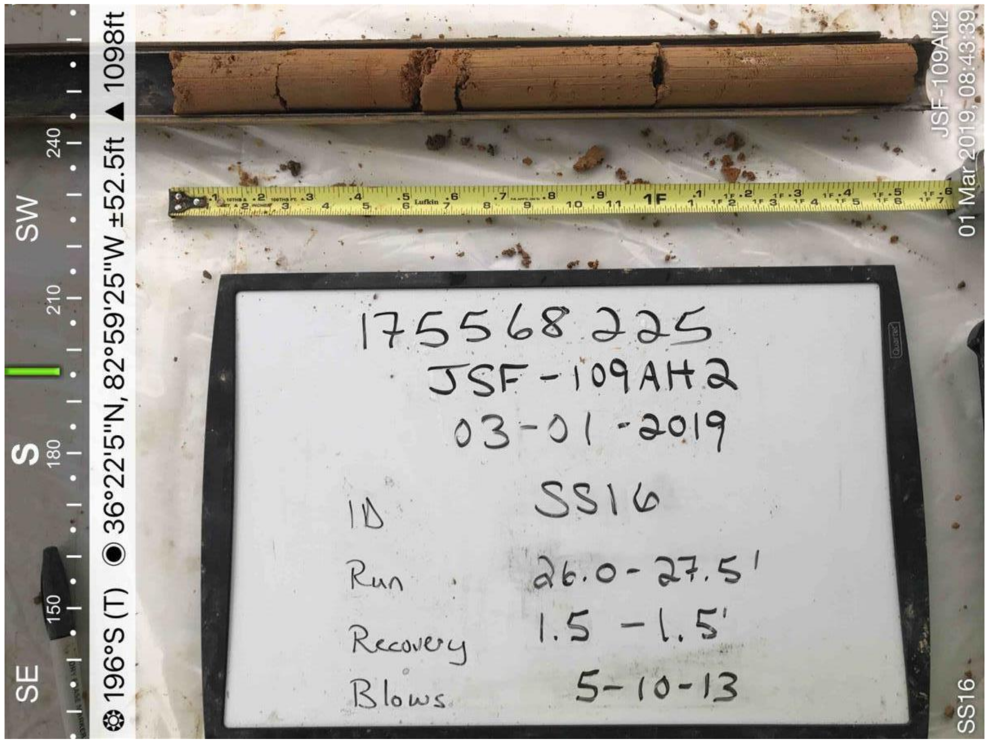
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 129

Photo Location: JSF-109Alt2

Photo Date: 3/1/2019

Comments: Third boring location interval (26.0-27.5 feet).

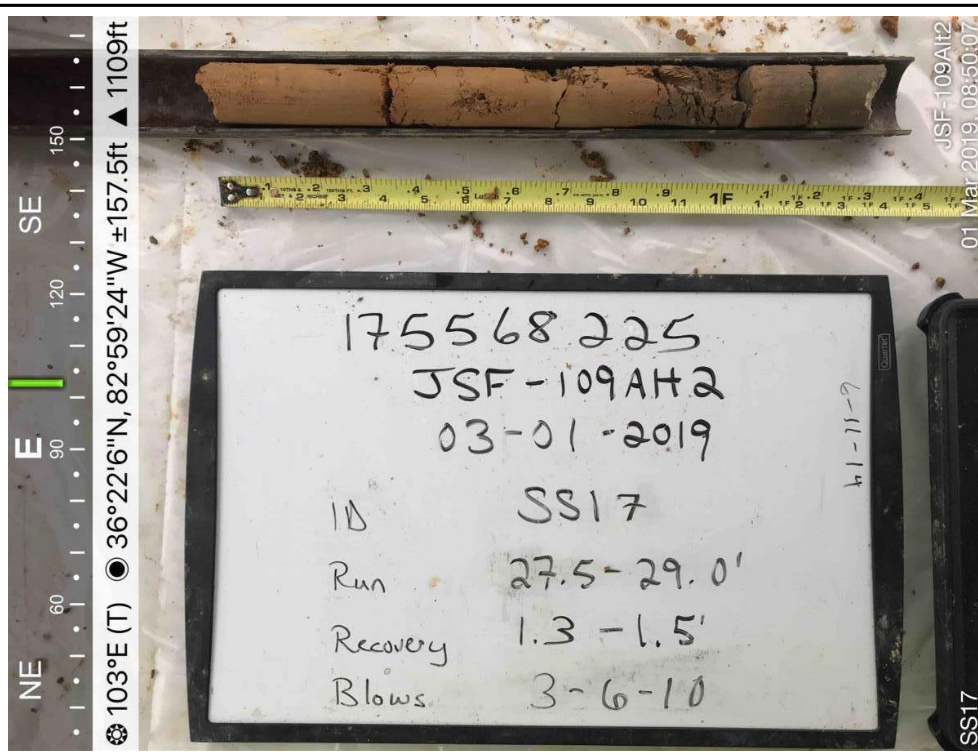


Photograph ID: 130

Photo Location: JSF-109Alt2

Photo Date: 3/1/2019

Comments: Third boring location interval (27.5-29.0 feet).



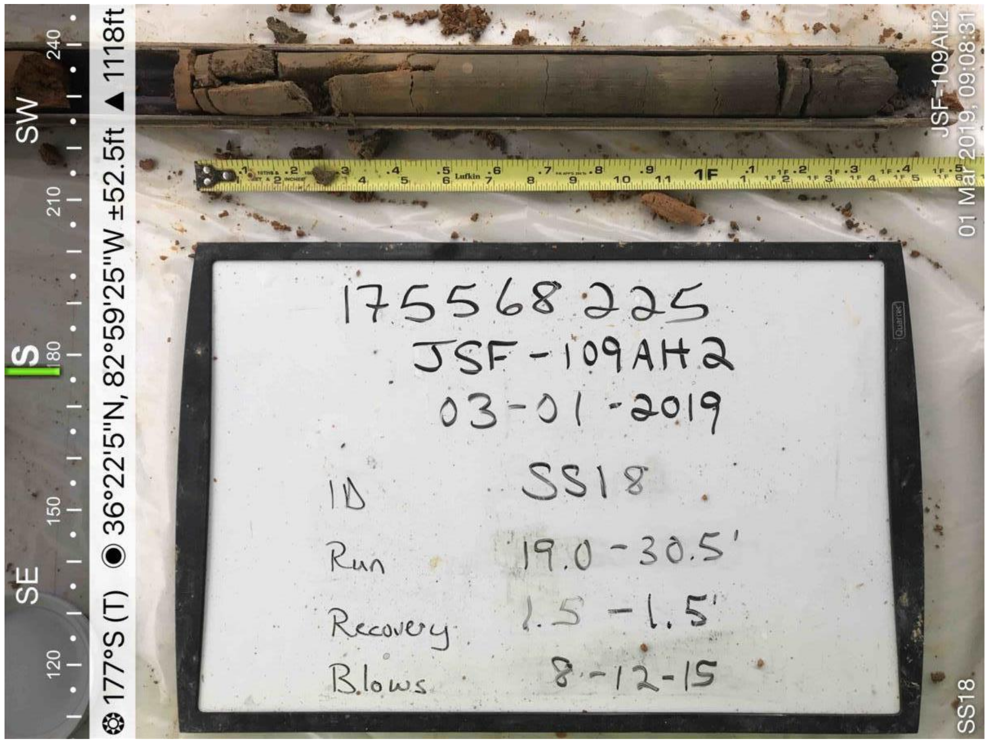
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 131

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (29.0-30.5 feet). Interval shown on white board should be 29.0-30.5.

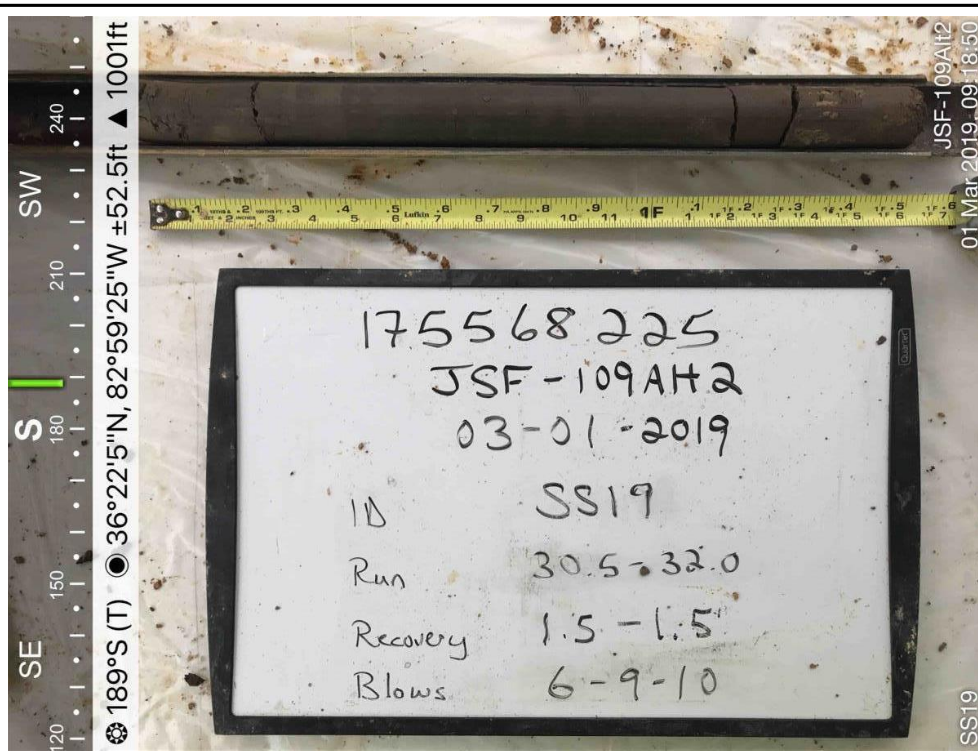


Photograph ID: 132

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (30.5-32.0 feet).



Stantec

Photographic Log

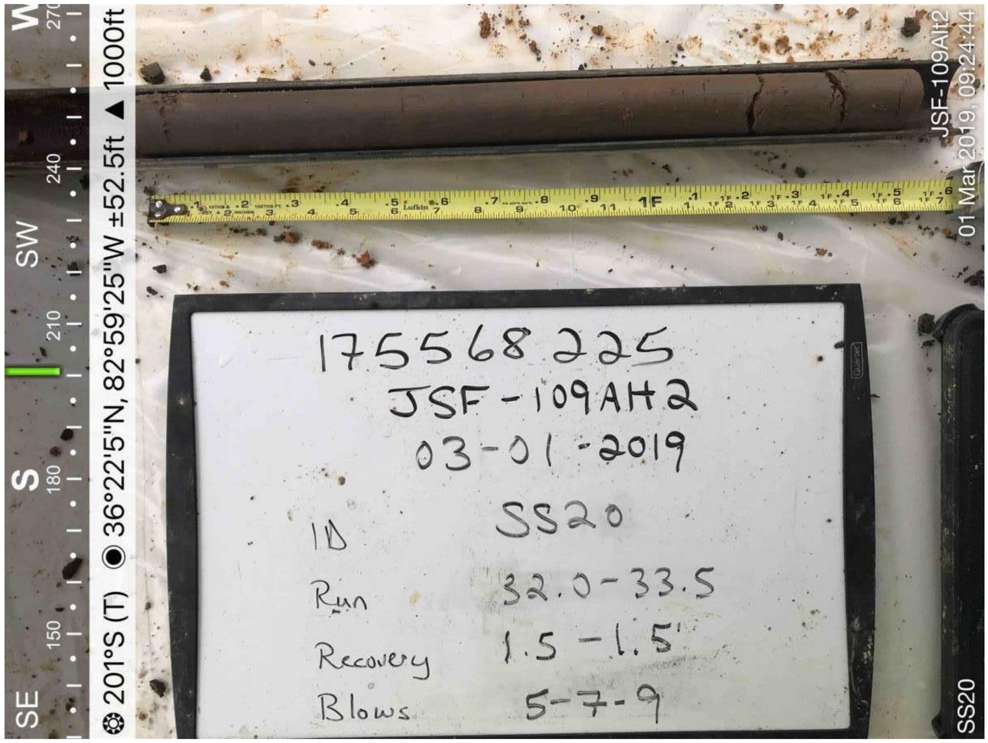
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 133

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Third boring location interval (32.0-33.5 feet).

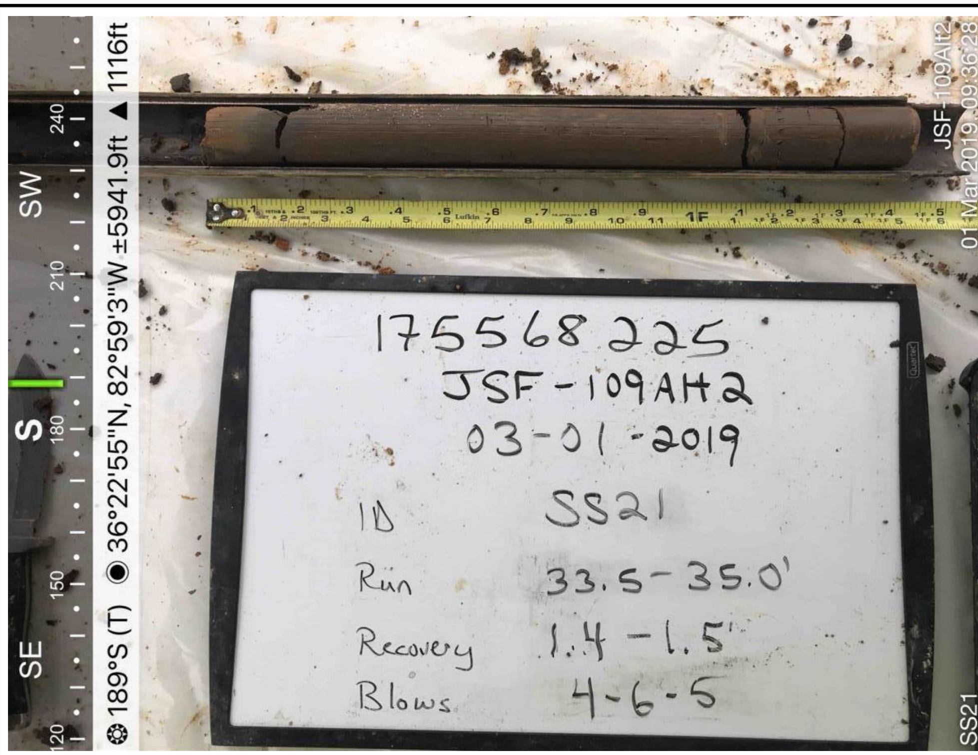


Photograph ID: 134

Photo Location:
JSF-109Alt2

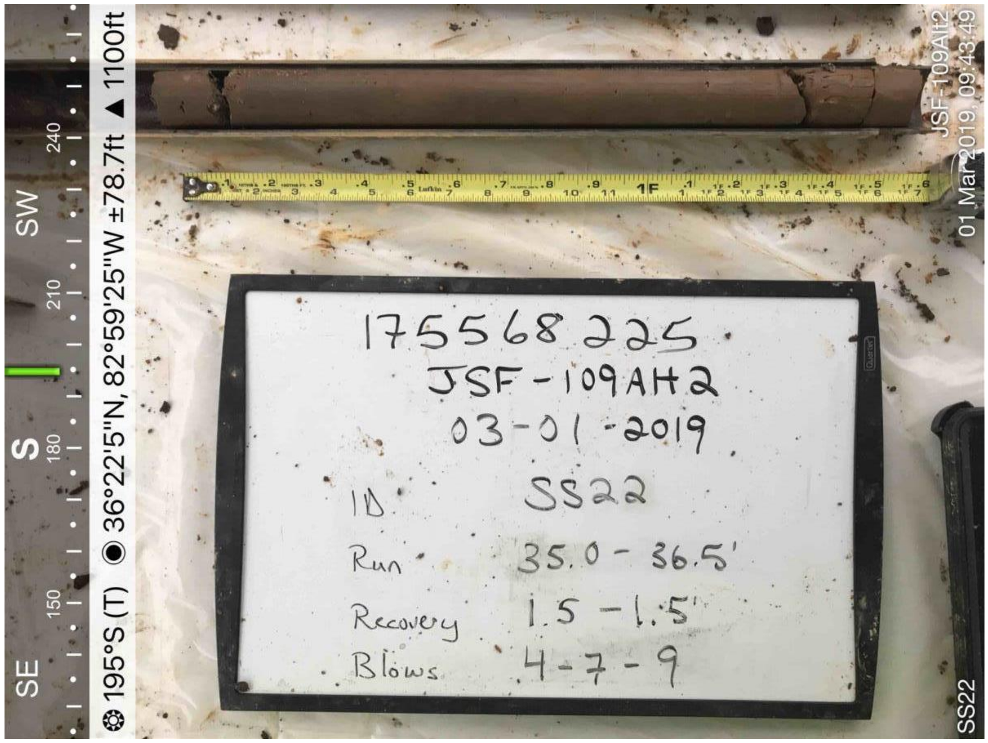
Photo Date:
3/1/2019

Comments:
Third boring location interval (33.5-35.0 feet).



Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 135 **Photo Location:** JSF-109Alt2 **Photo Date:** 3/1/2019 **Comments:** Third boring location interval (35.0-36.5 feet).	
Photograph ID: 136 **Photo Location:** JSF-109Alt2 **Photo Date:** 3/1/2019 **Comments:** Photo of third boring location interval (36.5-38.0 feet) unavailable.	No Photo Applicable

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 137

Photo Location:
JSF-109Alt2

Photo Date:
3/1/2019

Comments:
Photo of third boring location interval (38.0-39.5 feet) unavailable.

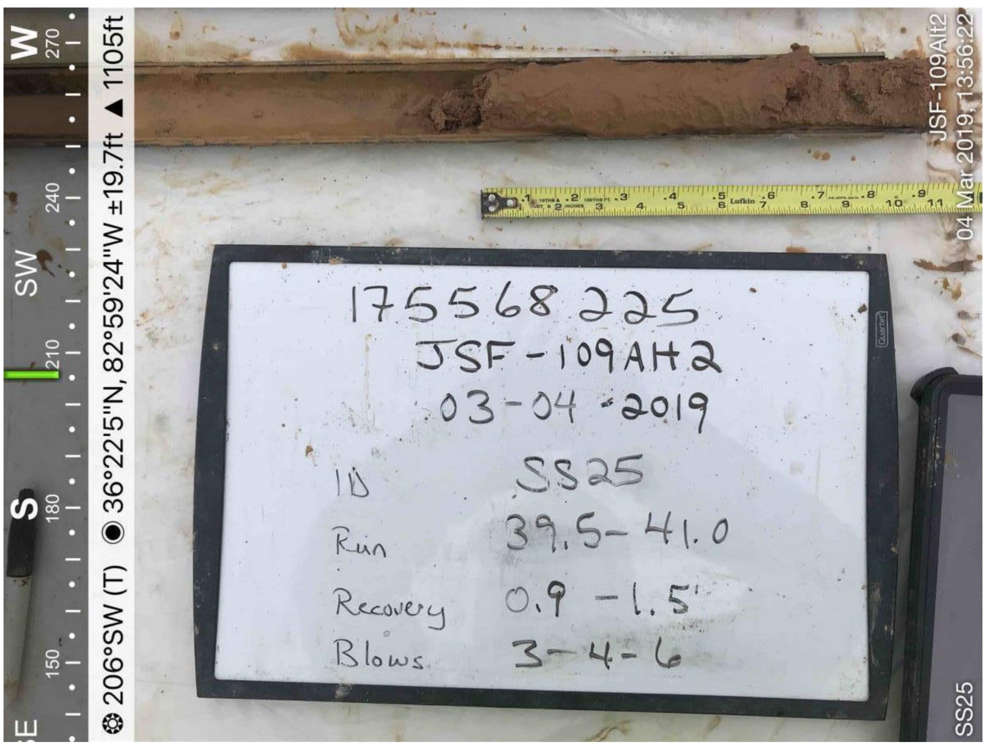
No Photo Applicable

Photograph ID: 138

Photo Location:
JSF-109Alt2

Photo Date:
3/4/2019

Comments:
Third boring location interval (39.5-41.0 feet).



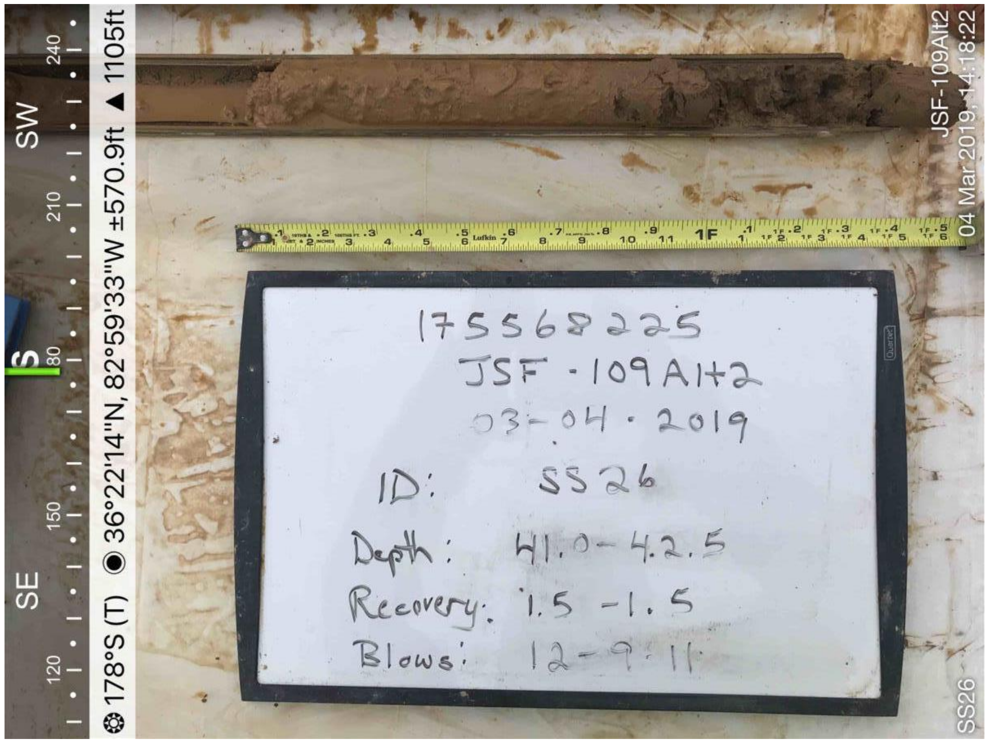
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 139

Photo Location:
JSF-109Alt2

Photo Date:
3/4/2019

Comments:
Third boring location interval (41.0-42.5 feet).

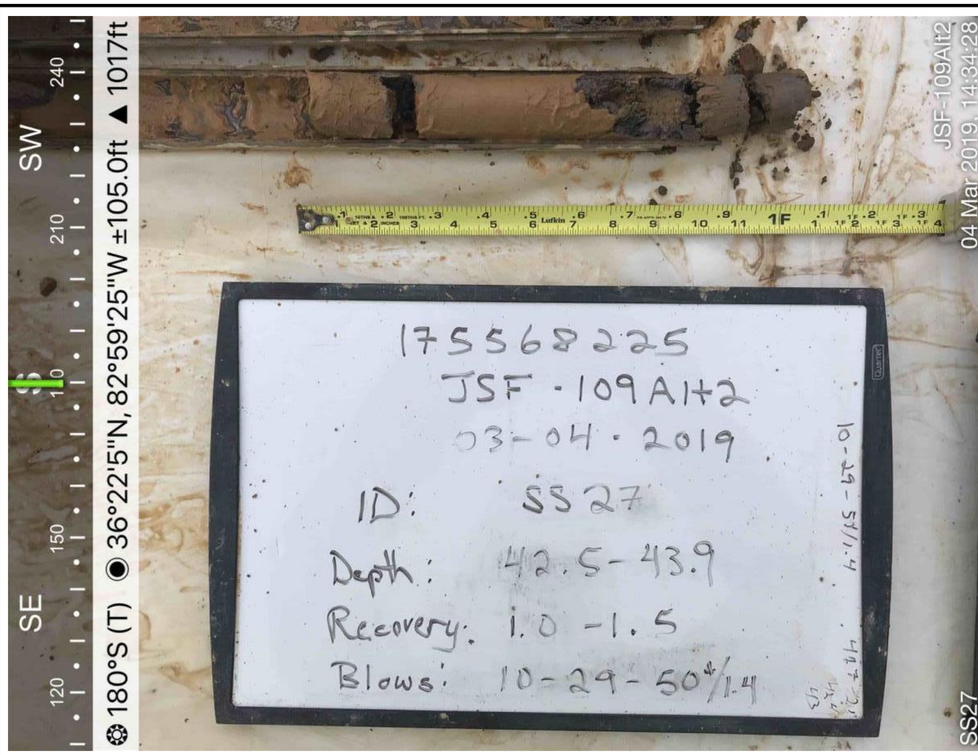


Photograph ID: 140

Photo Location:
JSF-109Alt2

Photo Date:
3/4/2019

Comments:
Third boring location interval (42.5-43.9 feet). Blow count on white board should be 10-29-50/0.4'



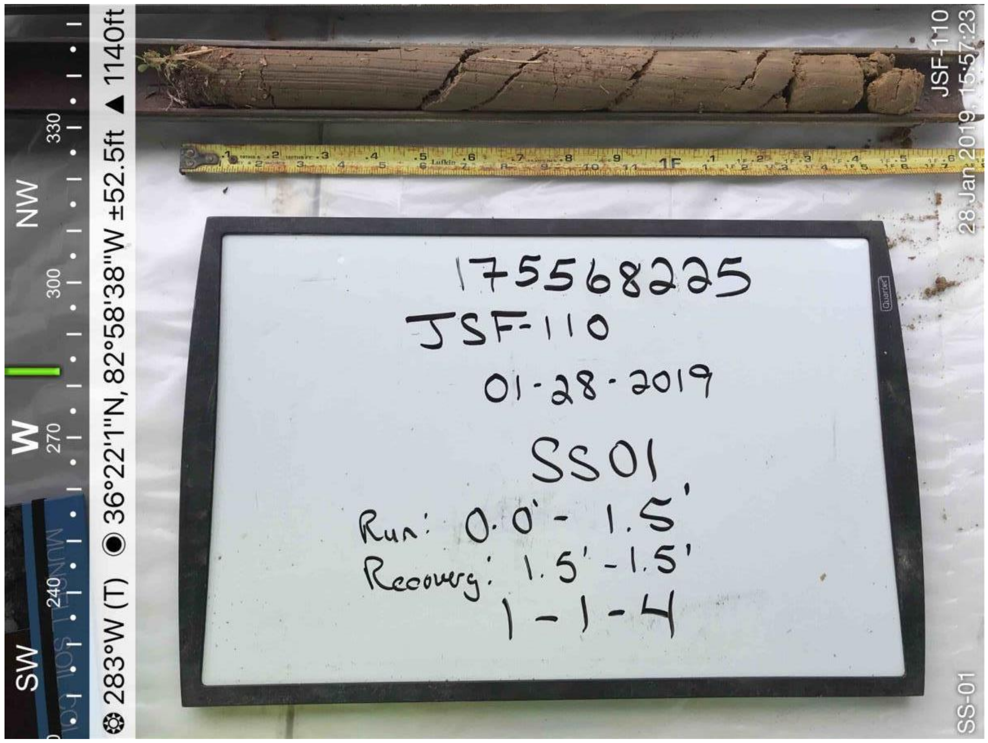
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 141

Photo Location:
JSF-110

Photo Date:
1/28/2019

Comments:
Interval (0.0-1.5 feet).

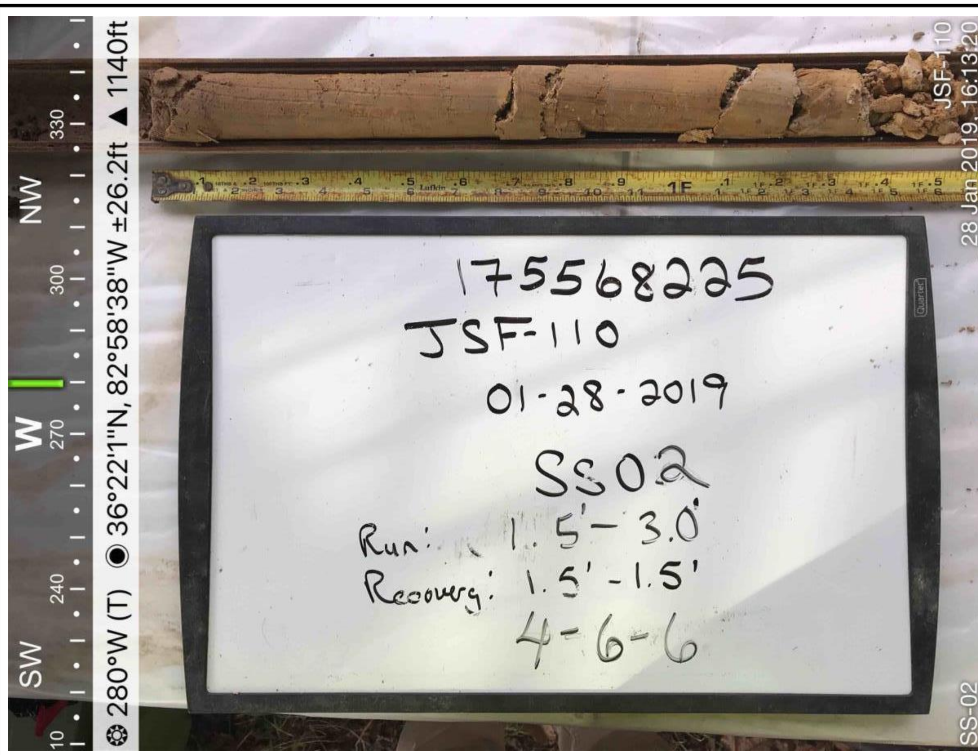


Photograph ID: 142

Photo Location:
JSF-110

Photo Date:
1/28/2019

Comments:
Interval (1.5-3.0 feet).



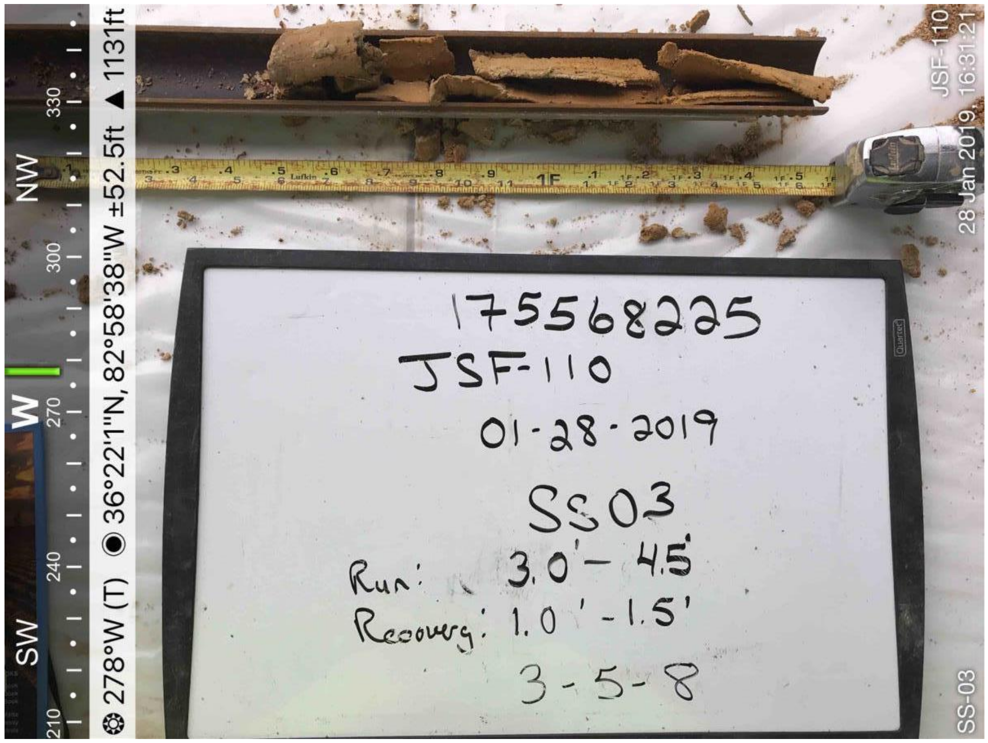
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 143

Photo Location:
JSF-110

Photo Date:
1/28/2019

Comments:
Interval (3.0-4.5 feet).

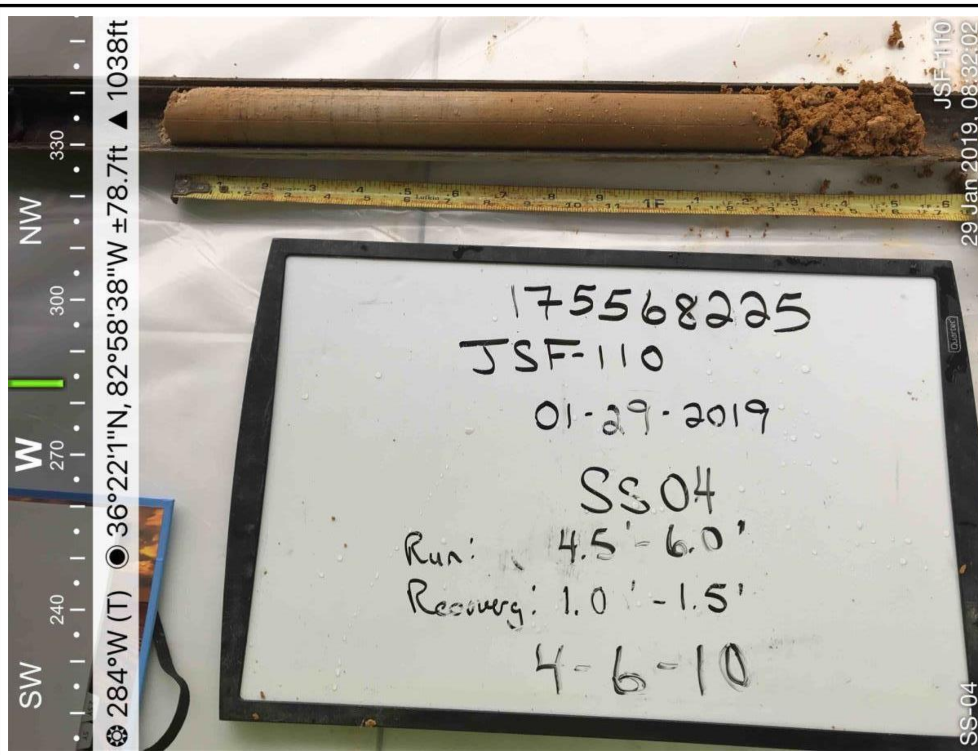


Photograph ID: 144

Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Interval (4.5-6.0 feet). Recovery shown on white board should be 1.5 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 145

Photo Location:
JSF-110

Photo Date:
1/29/2019

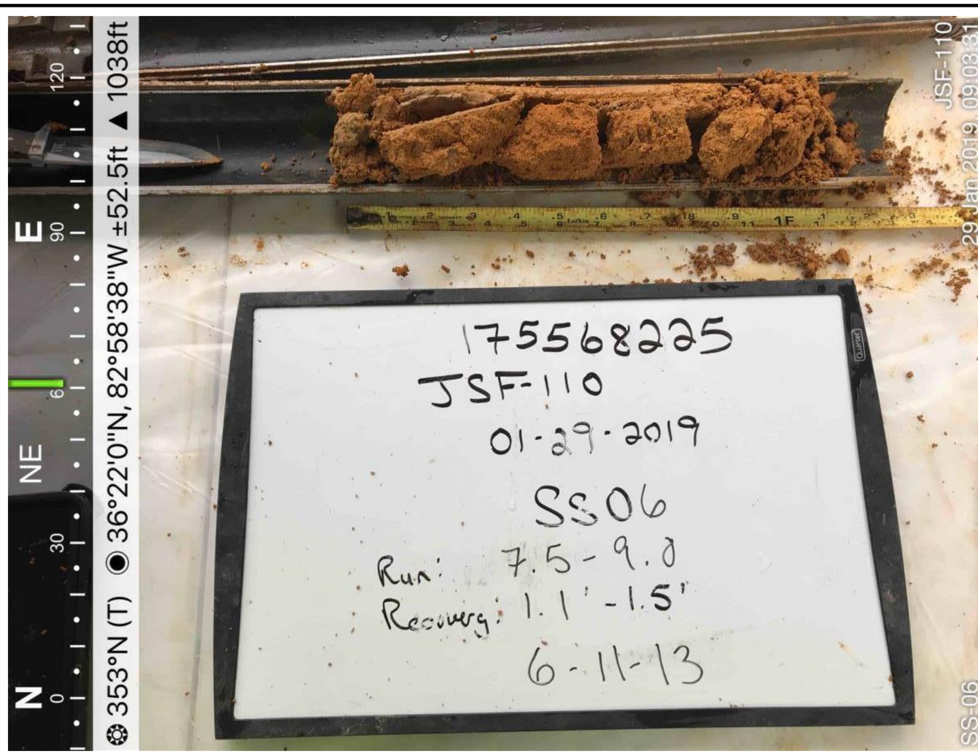
Comments:
Interval (6.0-7.5 feet).

Photograph ID: 146

Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Interval (7.5-9.0 feet).



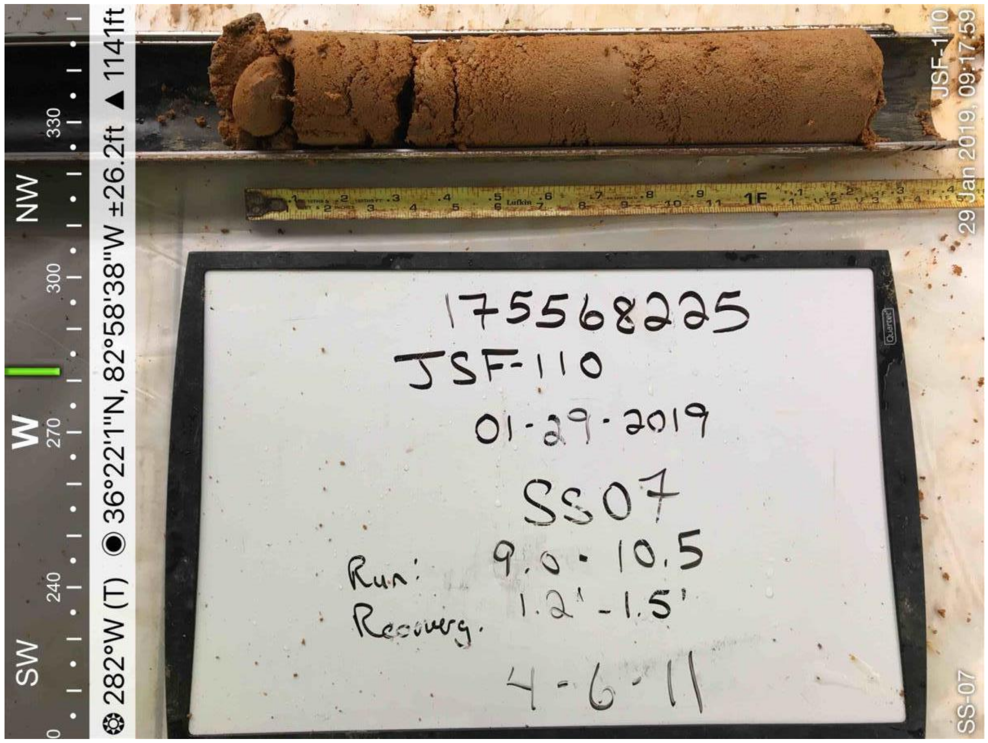
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 147

Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Interval (9.0-10.5 feet).

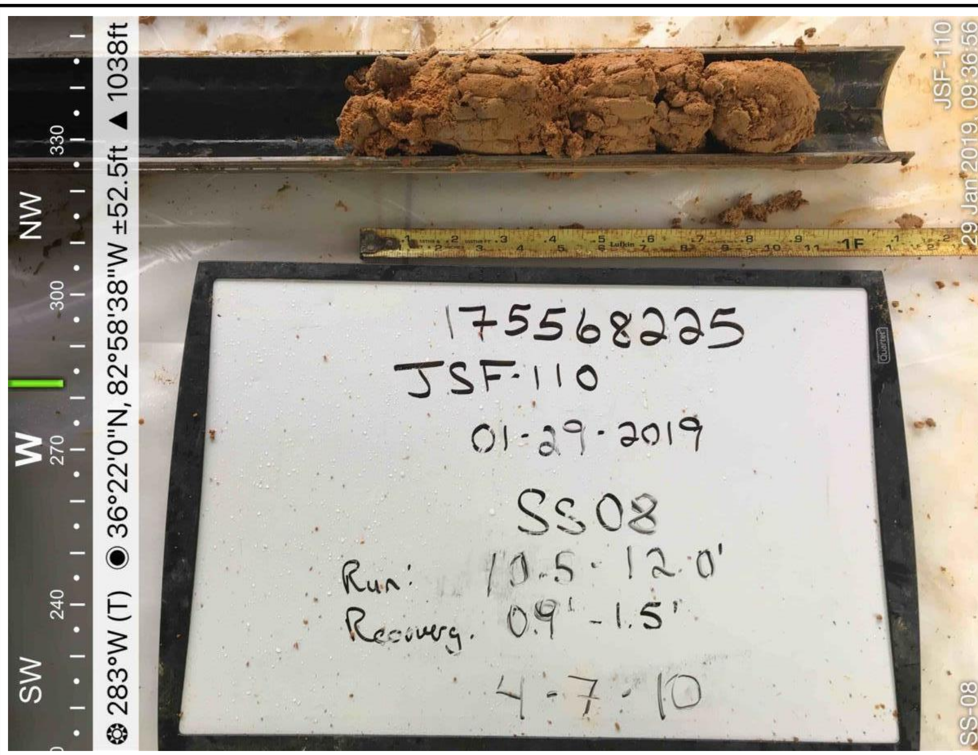


Photograph ID: 148

Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Interval (10.5-12.0 feet).



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 149

Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Interval (12.0-13.5 feet). Metadata split spoon should be SS09.

Photograph ID: 150

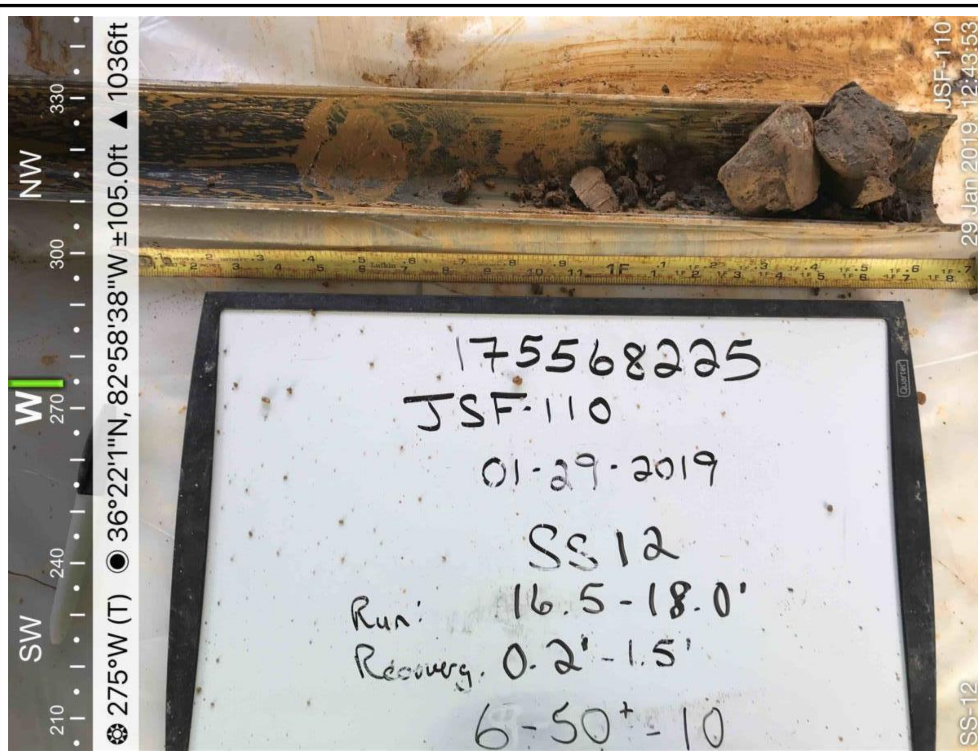
Photo Location:
JSF-110

Photo Date:
1/29/2019

Comments:
Photo of interval (13.5-15.0 feet) unavailable.

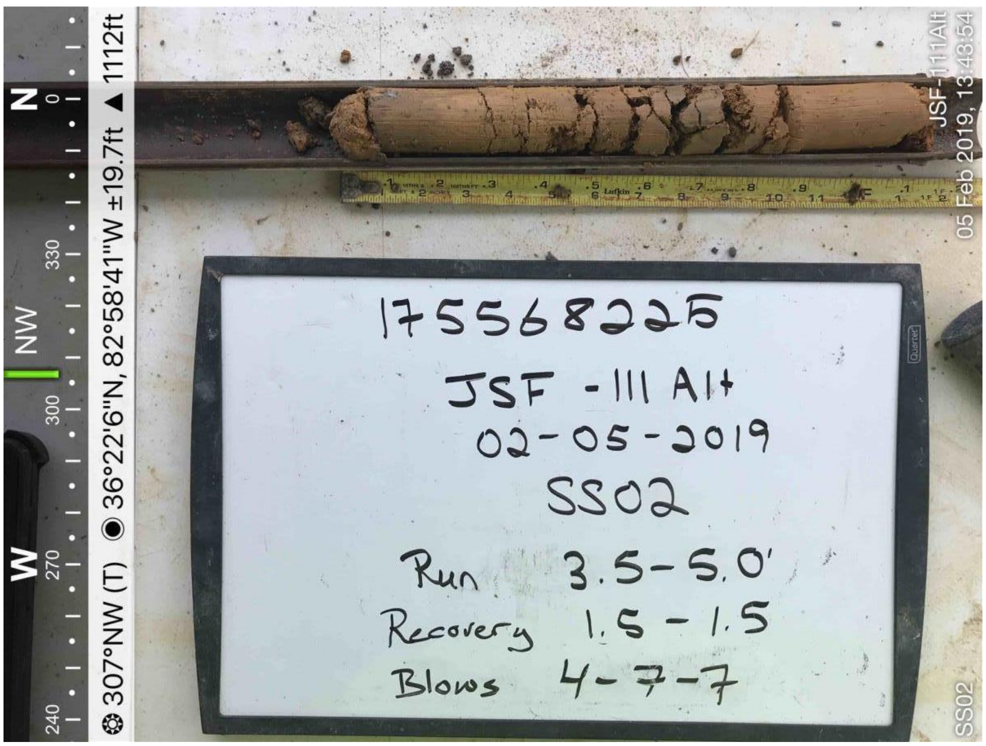
No Photo Applicable

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 151 **Photo Location:** JSF-110 **Photo Date:** 1/29/2019 **Comments:** Interval (15.0-16.5 feet).	
Photograph ID: 152 **Photo Location:** JSF-110 **Photo Date:** 1/29/2019 **Comments:** Interval (16.5-18.0 feet).	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 153	No Photo Applicable
Photo Location: JSF-111	
Photo Date: 2/5/2019	
Comments: Photo of interval (2.0-3.5 feet) unavailable.	

Photograph ID: 154	
Photo Location: JSF-111	
Photo Date: 2/5/2019	
Comments: Interval (3.5-5.0 feet). Location shown on white board should be JSF-111. Metadata location should be JSF-111. Recovery shown on white board should be 1.2.	

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 155

Photo Location:
JSF-111

Photo Date:
2/5/2019

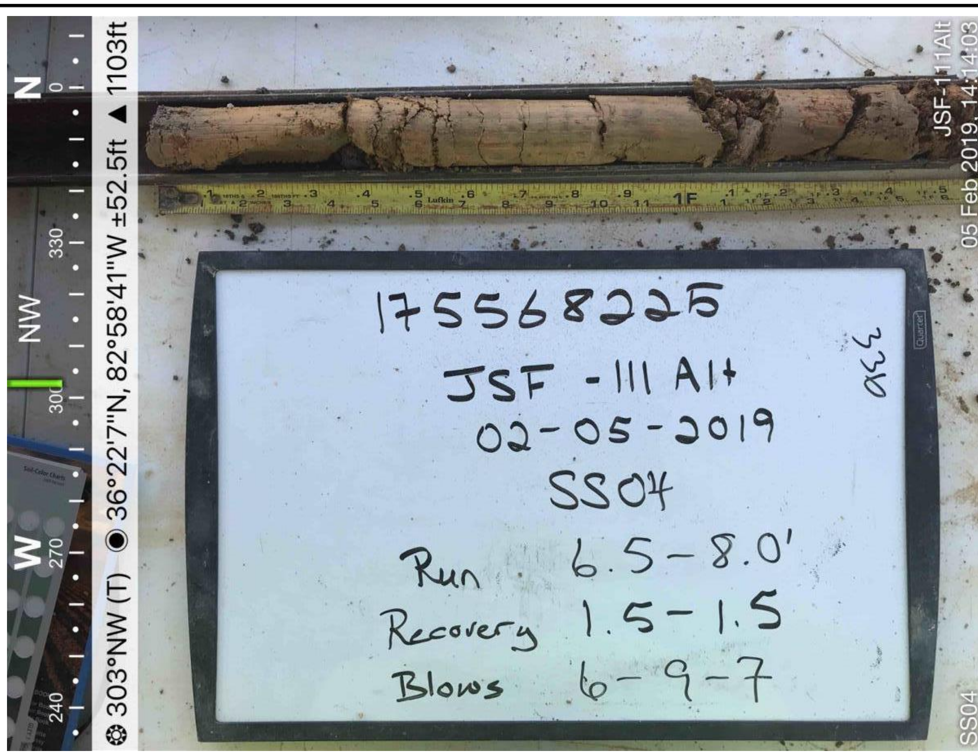
Comments:
Interval (5.0-6.5 feet). Location shown on white board should be JSF-111. Metadata location should be JSF-111.

Photograph ID: 156

Photo Location:
JSF-111

Photo Date:
2/5/2019

Comments:
Interval (6.5-8.0 feet). Location shown on white board should be JSF-111. Metadata location should be JSF-111.



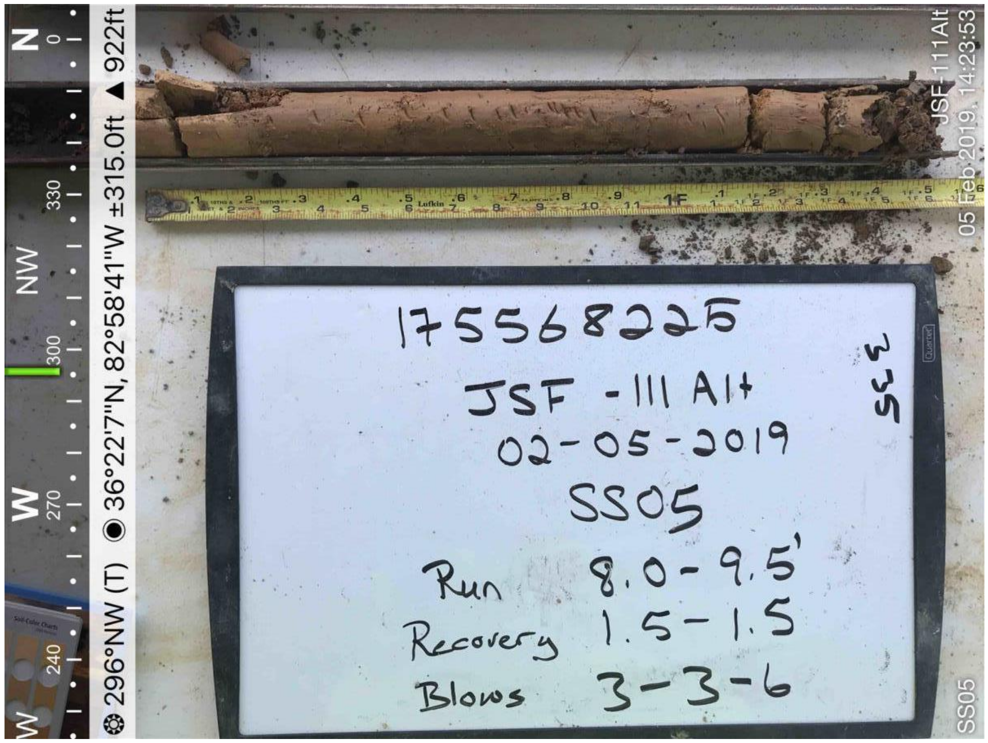
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 157

Photo Location:
JSF-111

Photo Date:
2/5/2019

Comments:
Interval (8.0-9.5 feet). Location shown on white board should be JSF-111. Metadata location should be JSF-111.



Photograph ID: 158

Photo Location:
JSF-111

Photo Date:
2/5/2019

Comments:
Photo of interval (9.5-11.0 feet) unavailable.

No Photo Applicable

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 159

Photo Location:
JSF-111

Photo Date:
2/5/2019

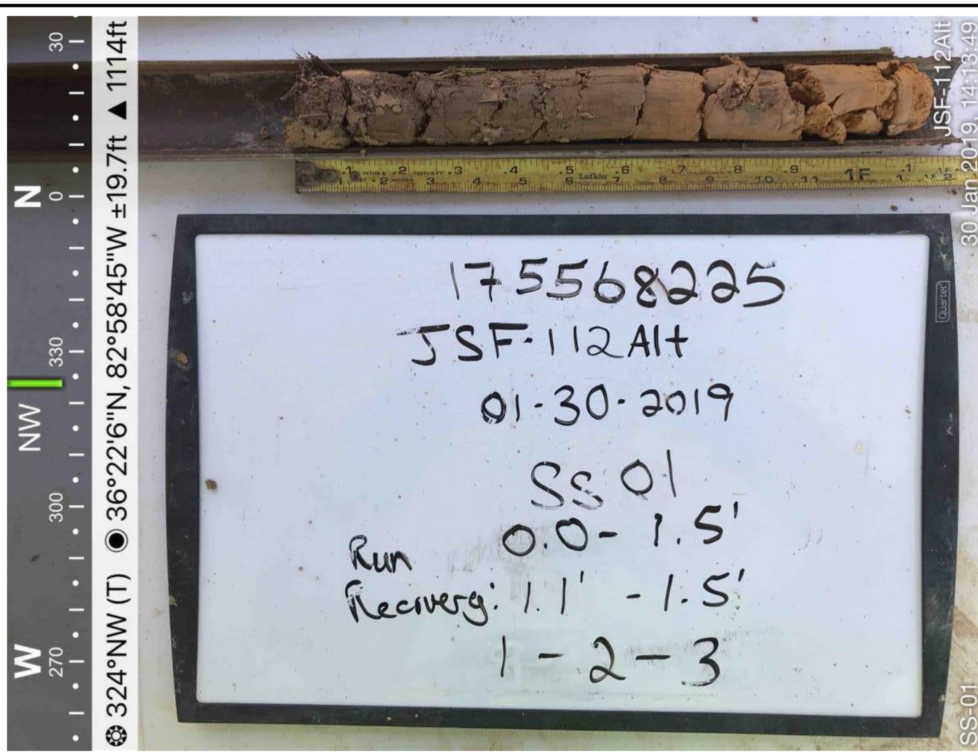
Comments:
Interval (11.0-11.7 feet). Location shown on white board should be JSF-111. Interval shown on white board should be 11.0-11.7. Metadata location should be JSF-111. Metadata split spoon should be SS07. Blow count shown on white board should be 3-50/0.2.

Photograph ID: 160

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (0.0-1.5 feet).



Stantec **Photographic Log**

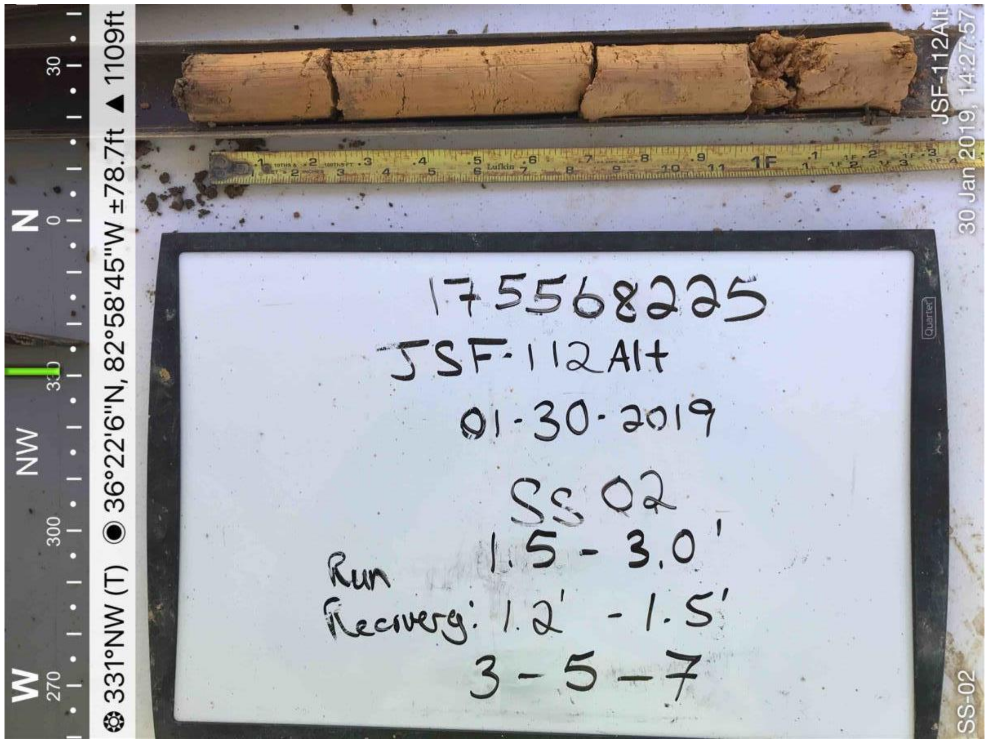
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 161

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (1.5-3.0 feet).

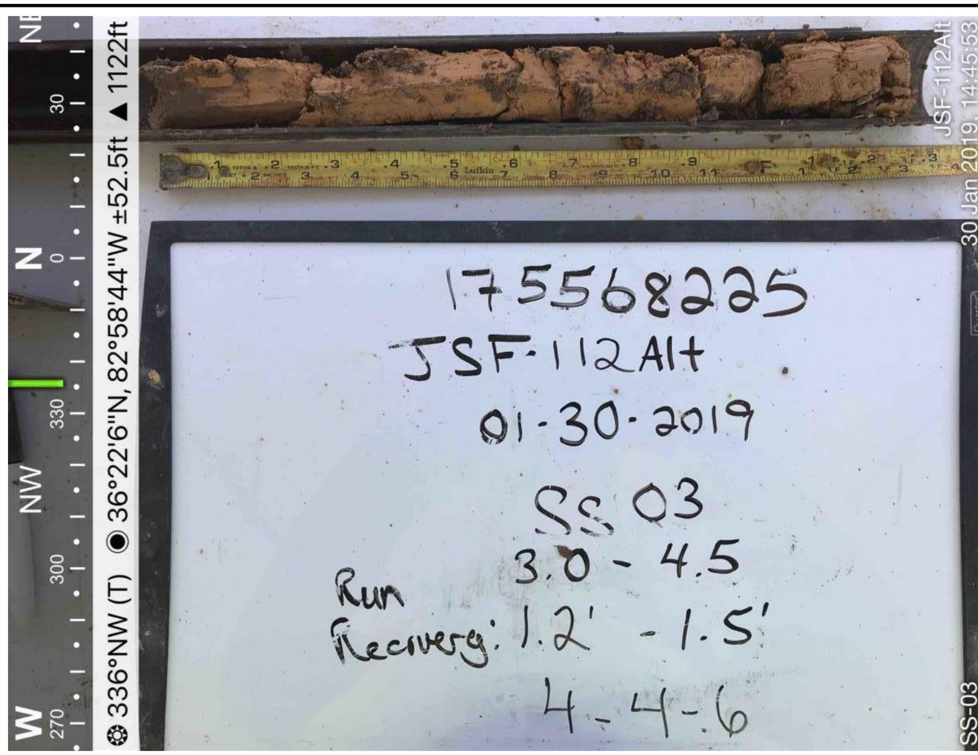


Photograph ID: 162

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (3.0-4.5 feet).



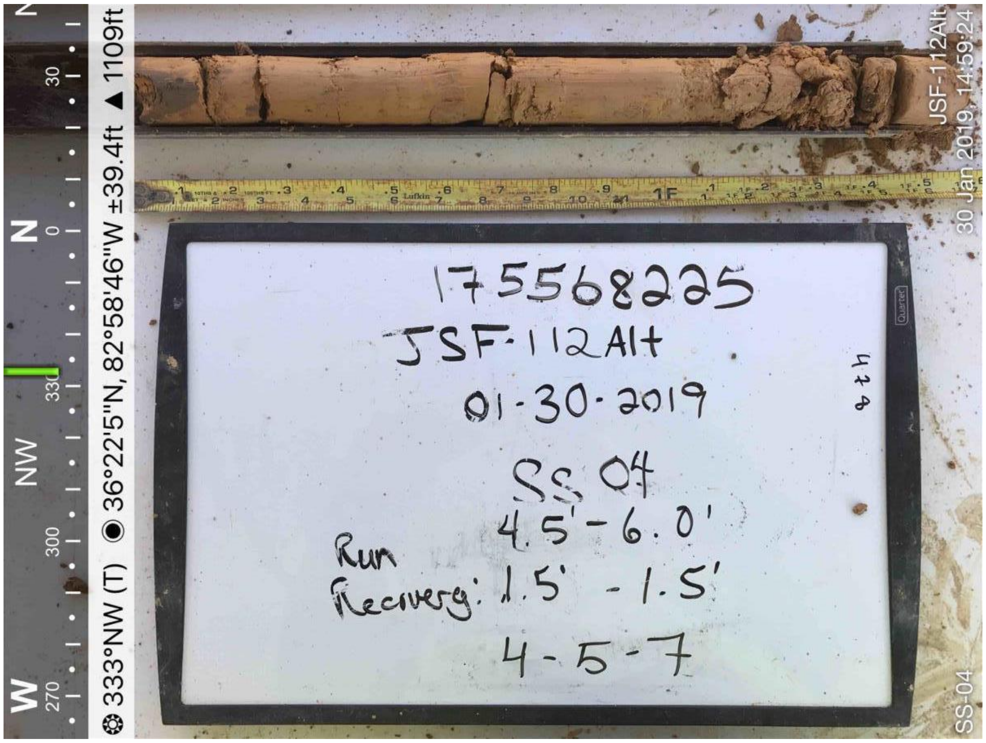
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 163

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (4.5-6.0 feet).

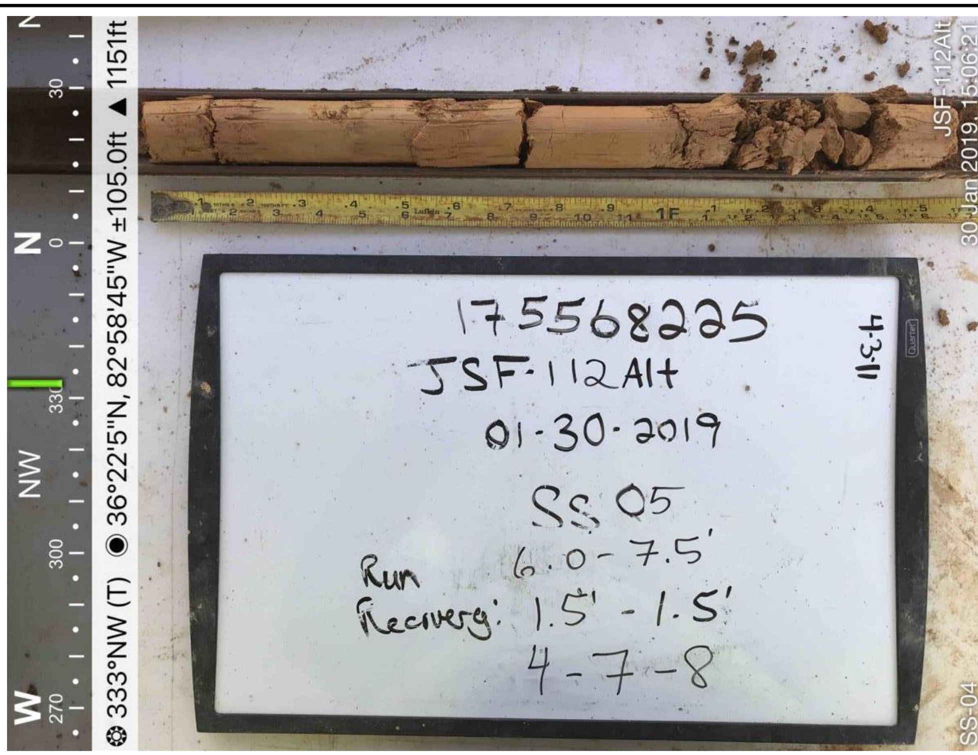


Photograph ID: 164

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (6.0-7.5 feet). Metadata split spoon should be SS05.



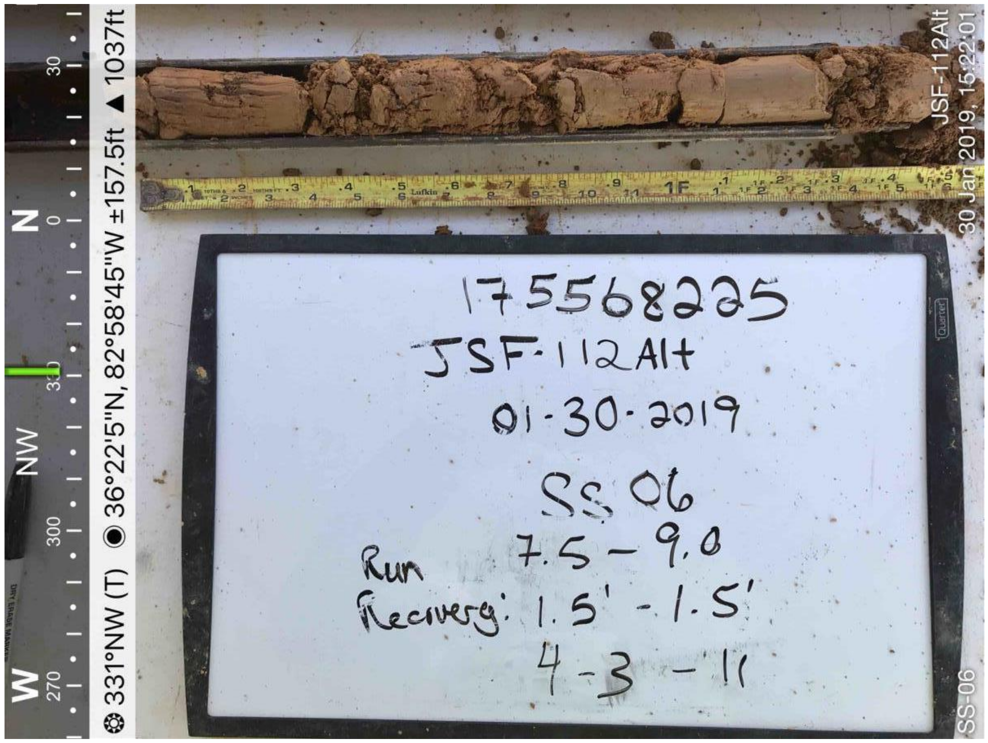
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 165

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (7.5-9.0 feet).

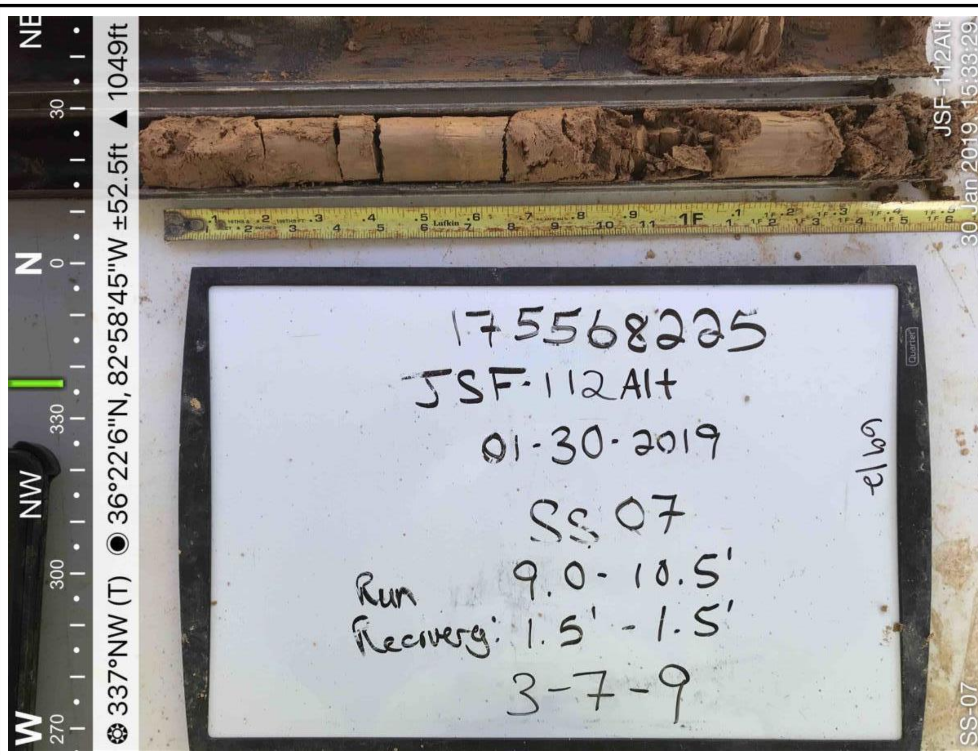


Photograph ID: 166

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (9.0-10.5 feet).



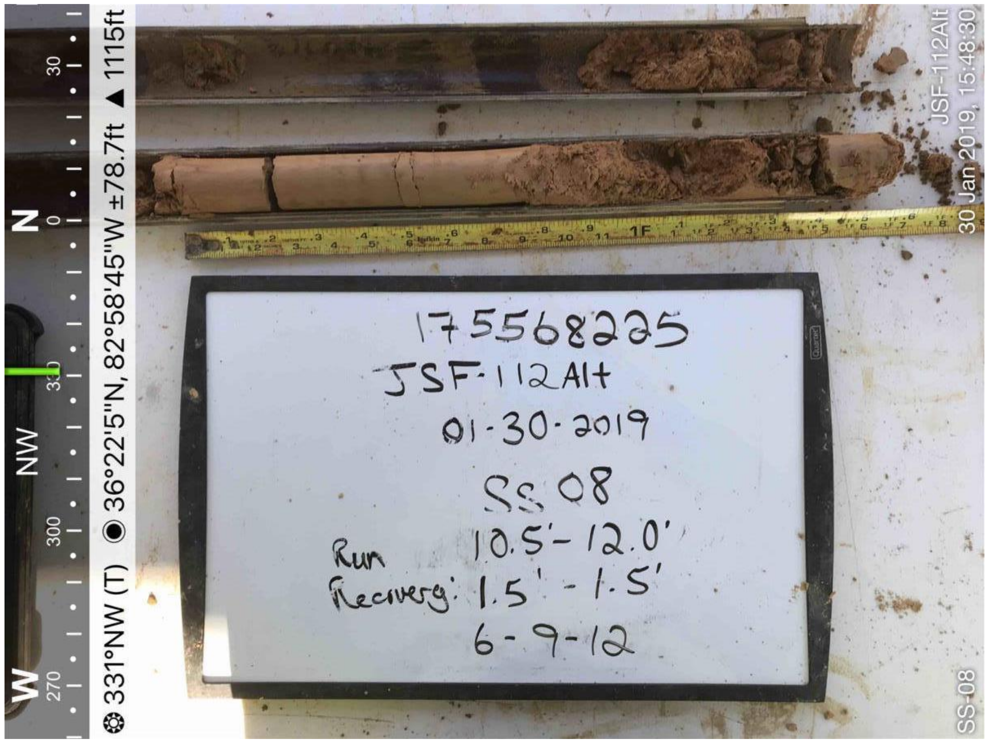
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 167

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (10.5-12.0 feet).

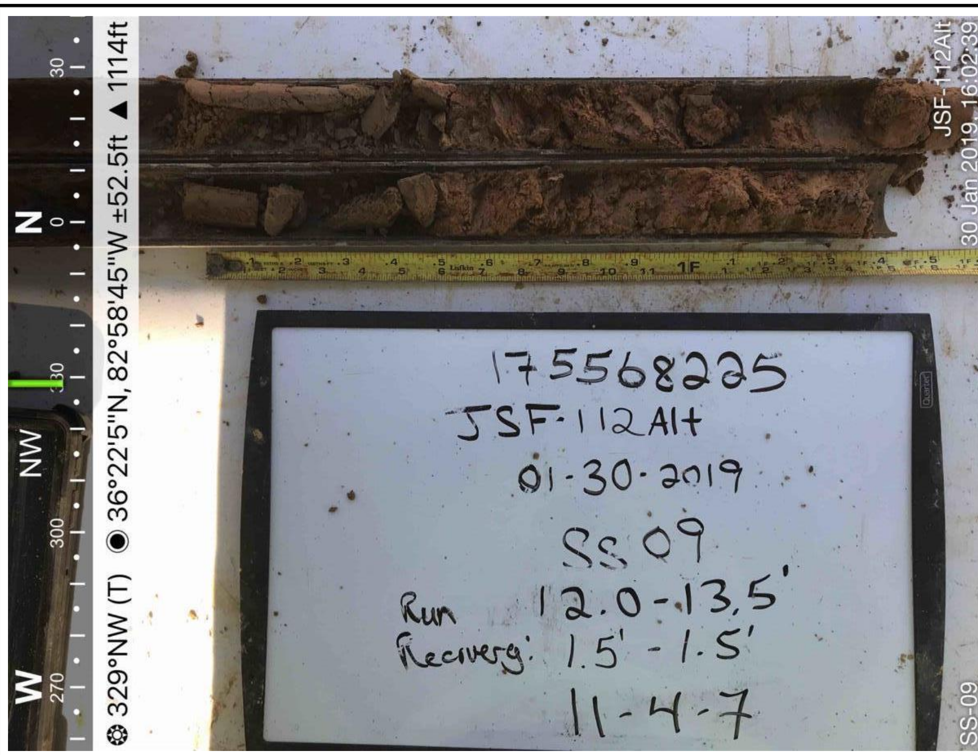


Photograph ID: 168

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (12.0-13.5 feet).



Stantec

Photographic Log

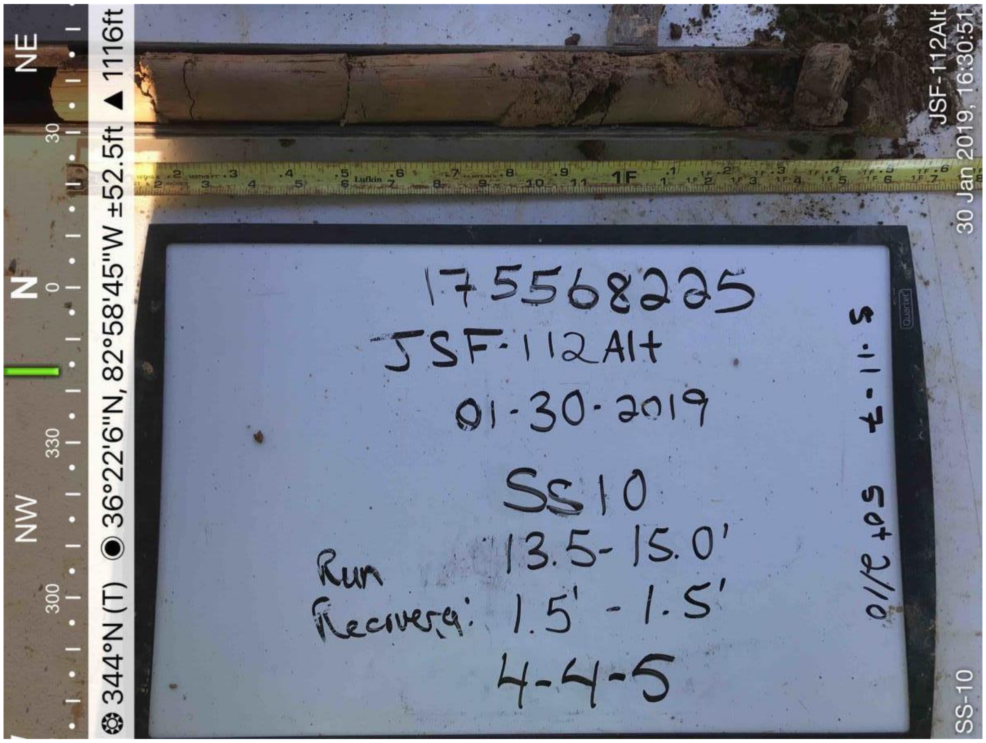
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 169

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (13.5-15.0 feet).

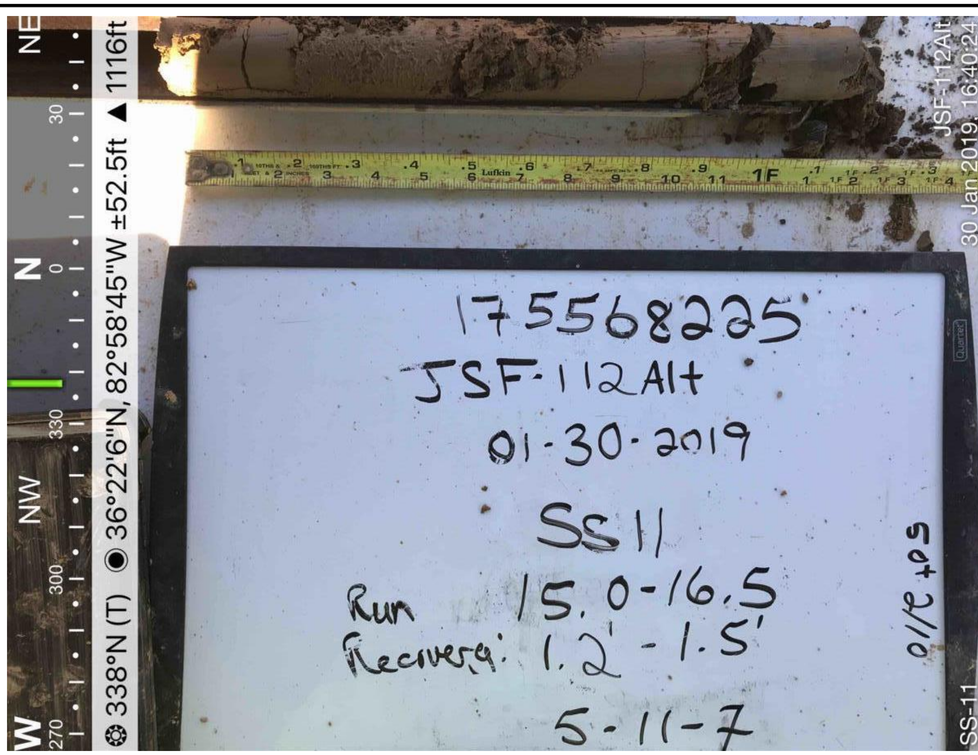


Photograph ID: 170

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (15.0-16.5 feet).



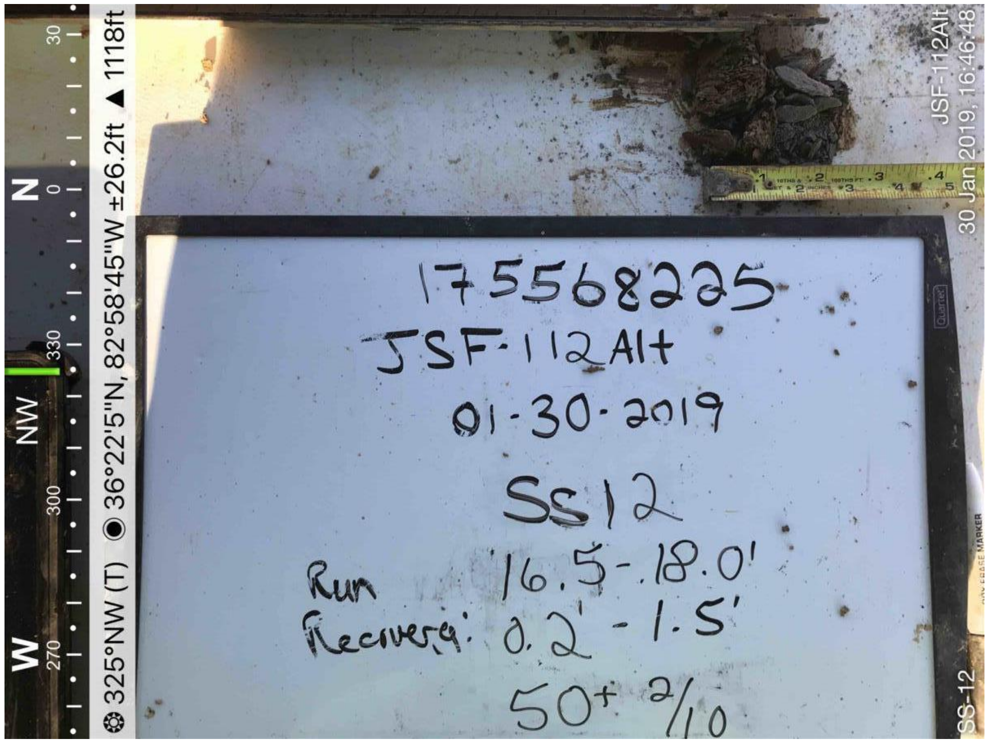
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 171

Photo Location:
JSF-112Alt

Photo Date:
1/30/2019

Comments:
Interval (16.5-16.7 feet). Interval shown on white board should be 16.5-16.7. Boring refusal at 16.7 feet.

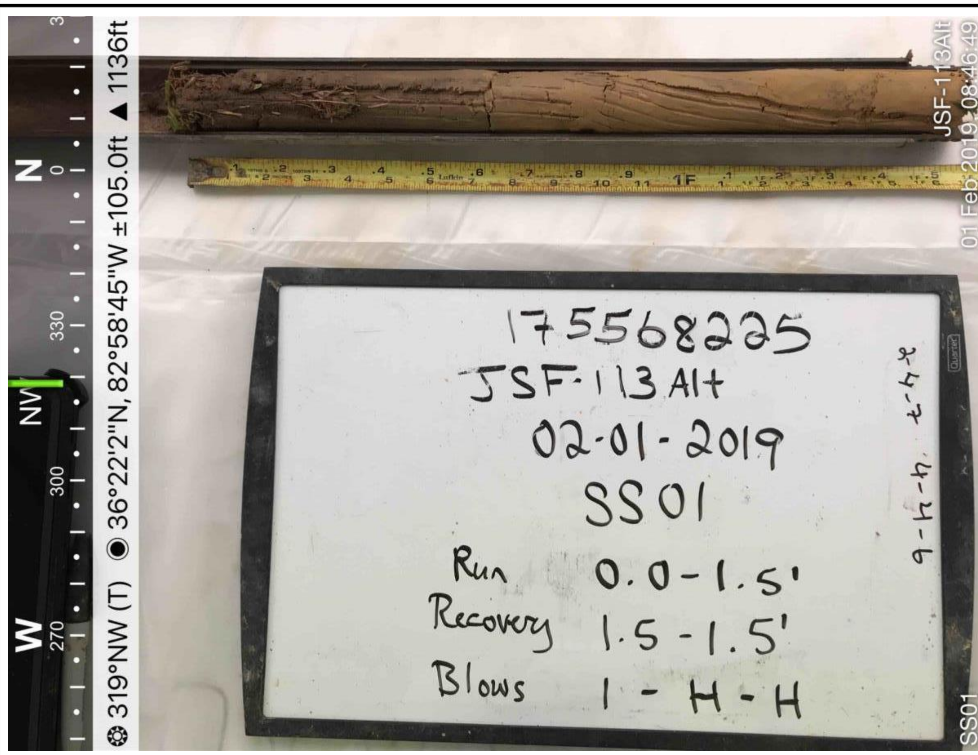


Photograph ID: 172

Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

Comments:
Interval (0.0-1.5 feet). H is the same as WH on the boring log.



Stantec **Photographic Log**

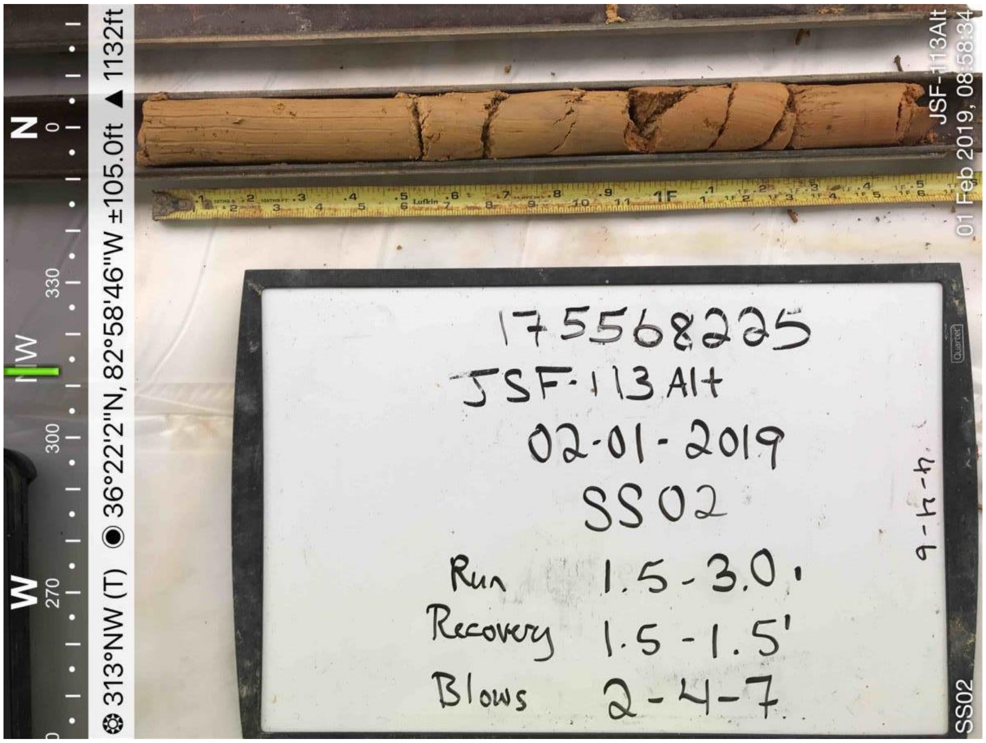
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 173

Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

Comments:
Interval (1.5-3.0 feet).

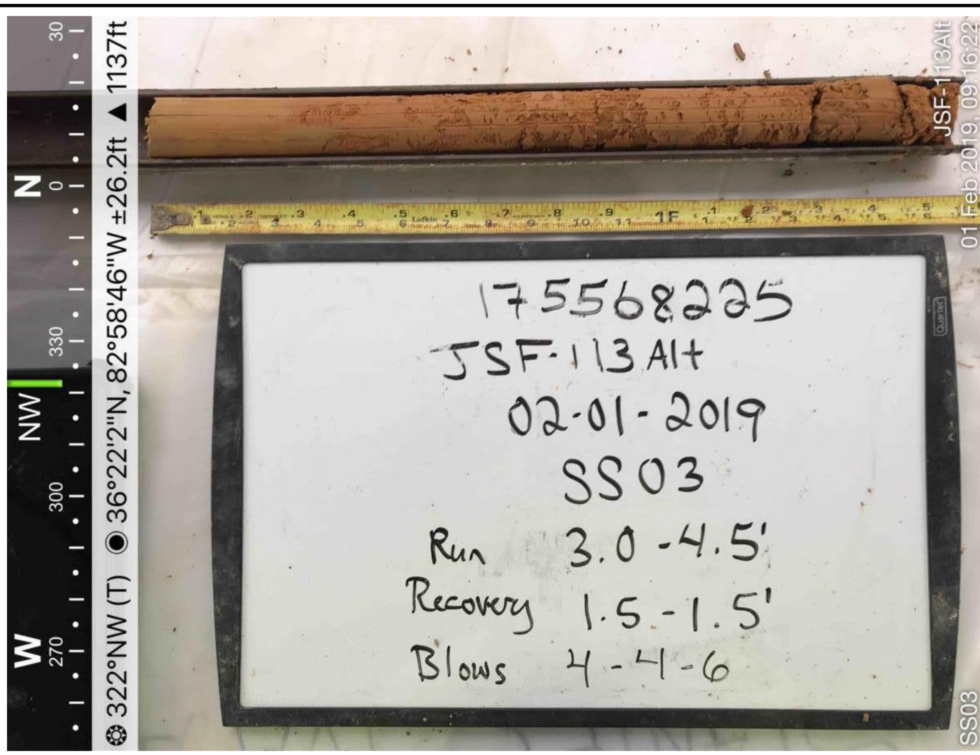


Photograph ID: 174

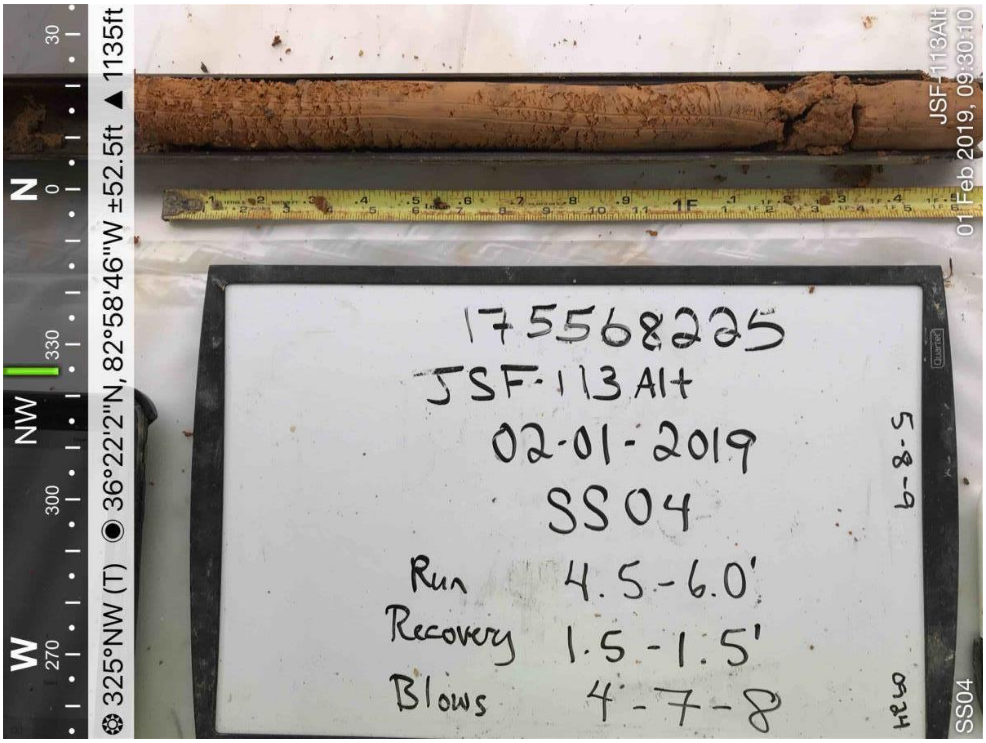
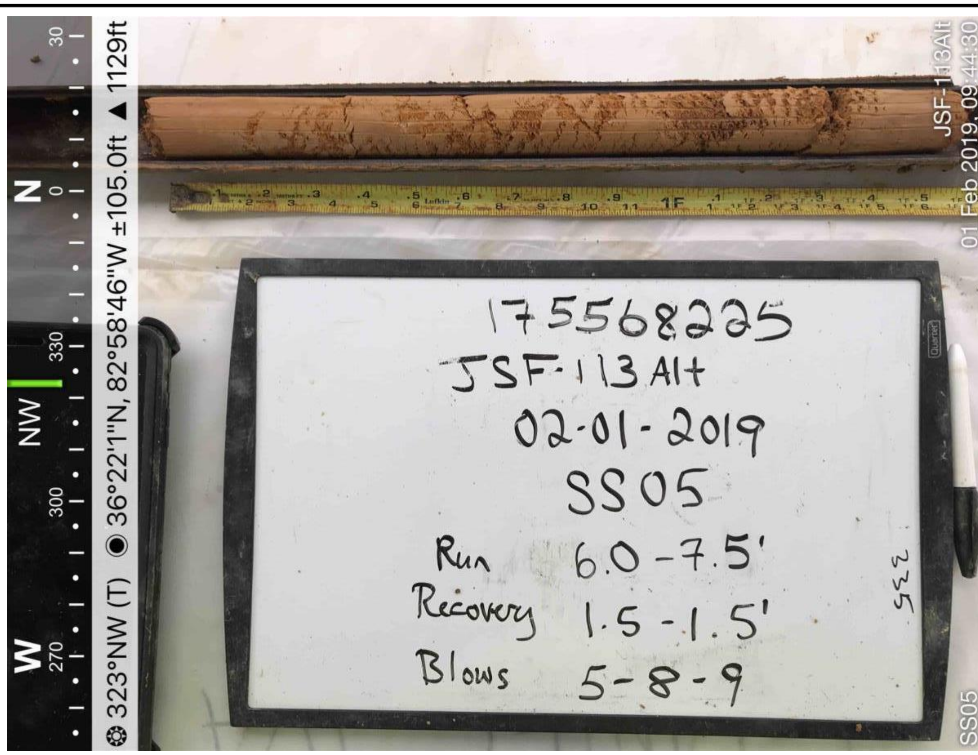
Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

Comments:
Interval (3.0-4.5 feet).



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 175 **Photo Location:** JSF-113Alt **Photo Date:** 2/1/2019 **Comments:** Interval (4.5-6.0 feet).	
Photograph ID: 176 **Photo Location:** JSF-113Alt **Photo Date:** 2/1/2019 **Comments:** Interval (6.0-7.5 feet).	

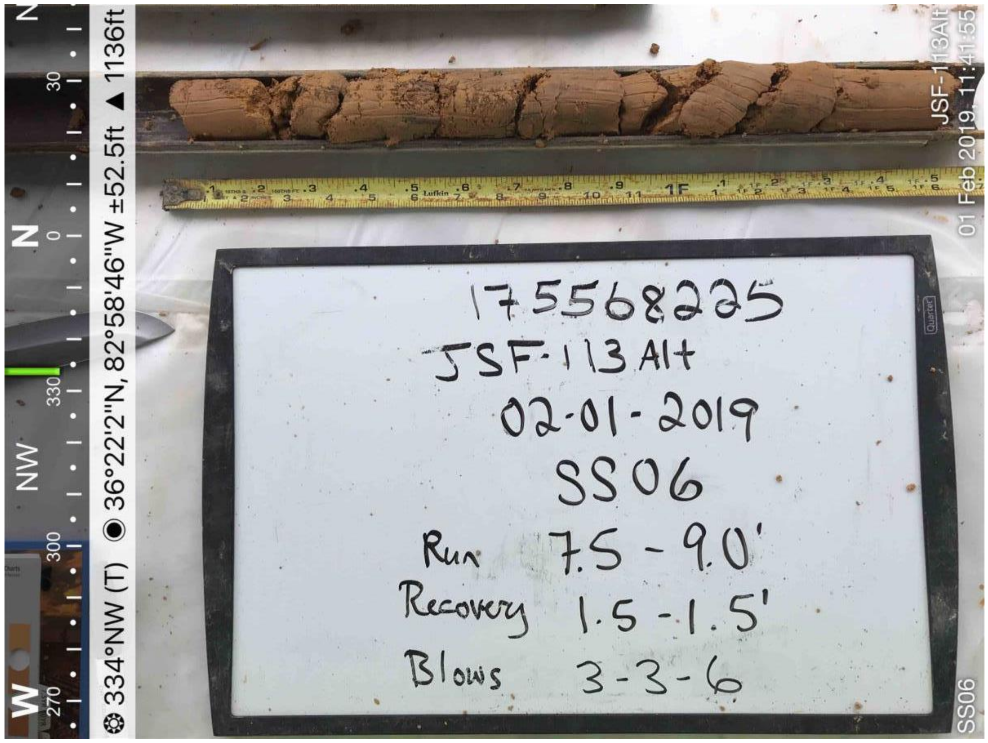
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil (JSF) Plant	Site Location:	Rogersville, Tennessee

Photograph ID: 177

Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

Comments:
Interval (7.5-9.0 feet).



Photograph ID: 178

Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

Comments:
Interval (9.0-10.5 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 179

Photo Location:
JSF-113Alt

Photo Date:
2/1/2019

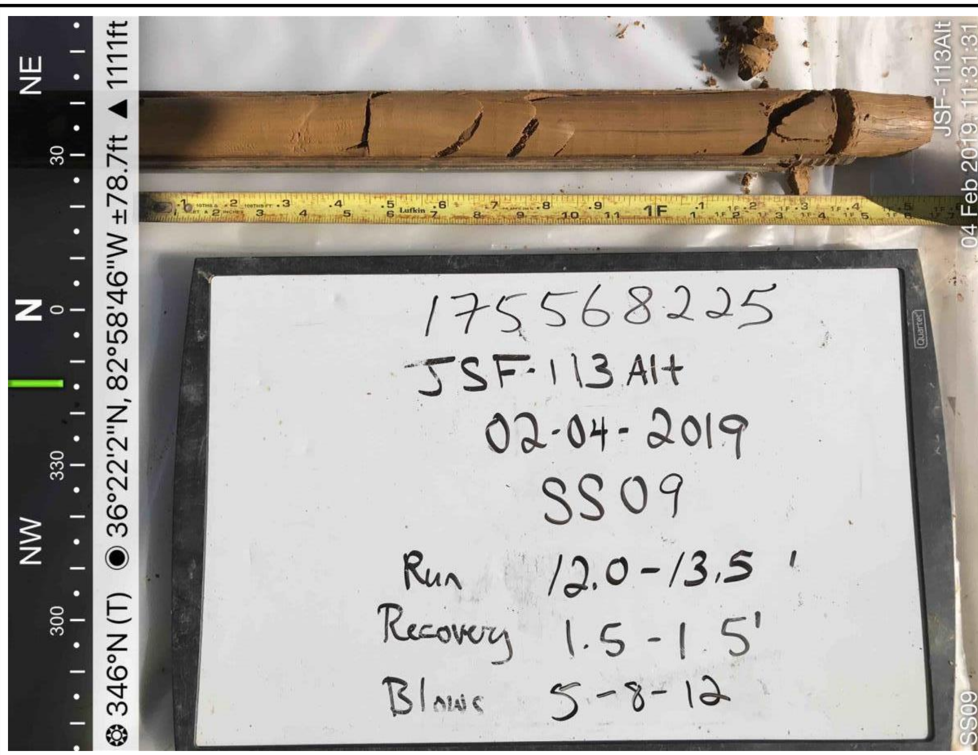
Comments:
Interval (10.5-12.0 feet).

Photograph ID: 180

Photo Location:
JSF-113Alt

Photo Date:
2/4/2019

Comments:
Interval (12.0-13.5 feet).



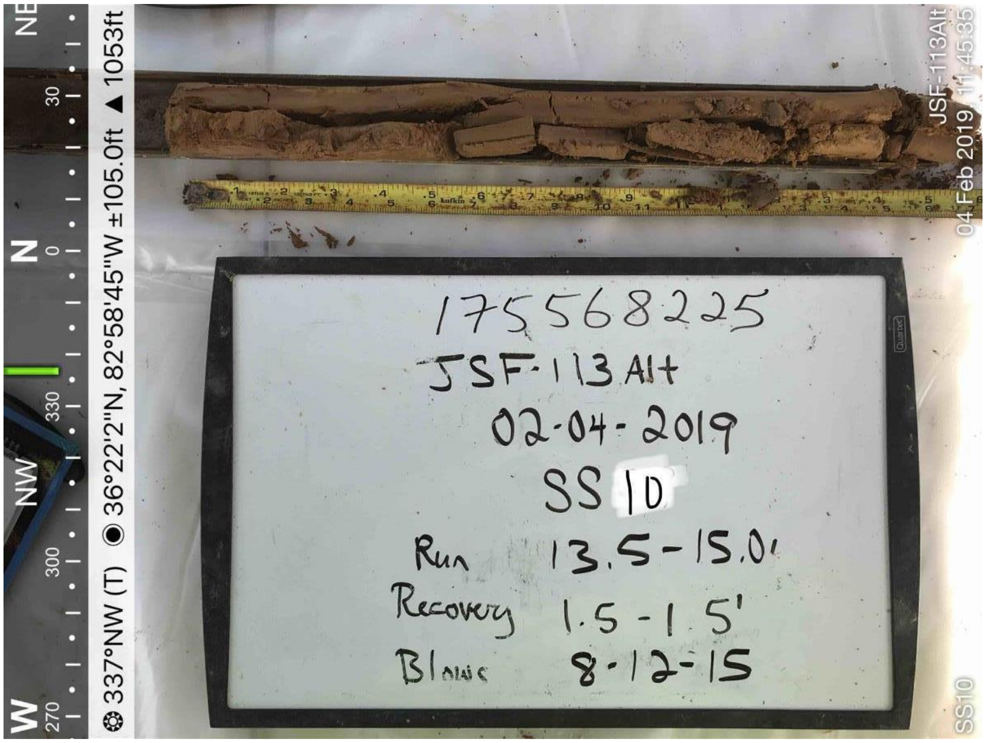
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 181

Photo Location:
JSF-113Alt

Photo Date:
2/4/2019

Comments:
Interval (13.5-15.0 feet). White board split spoon change was made by CS on April 12, 2019.

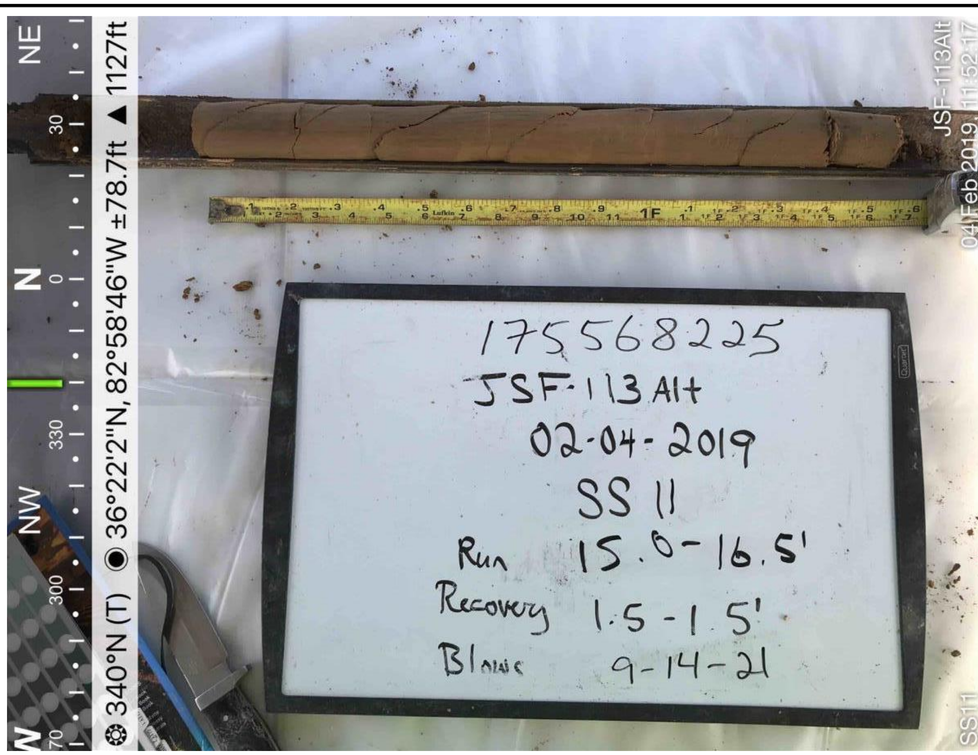


Photograph ID: 182

Photo Location:
JSF-113Alt

Photo Date:
2/4/2019

Comments:
Interval (15.0-16.5 feet).



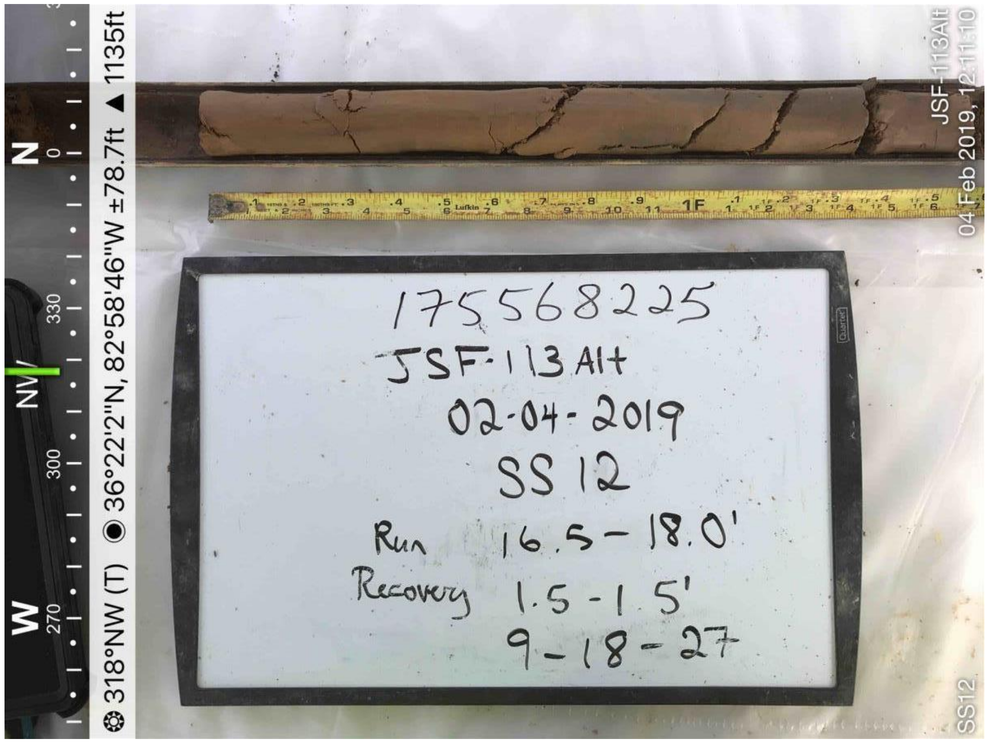
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 183

Photo Location:
JSF-113Alt

Photo Date:
2/4/2019

Comments:
Interval (16.5-18.0 feet).



Photograph ID: 184

Photo Location:
JSF-113Alt

Photo Date:
2/4/2019

Comments:
Interval (18.0-18.9 feet). Interval shown on white board should be 18.0-18.9. Recovery shown on white board should be 0.6. Blow count shown on white board should be 9-50/0.4.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 185

Photo Location:
JSF-206

Photo Date:
5/21/2019

Comments:
Photo of intervals (0-17.2 feet) unavailable. Refer to photos for adjacent boring JSF-110 for intervals (0.0-17.2 feet).

No Photo Applicable

Photograph ID: 186

Photo Location:
JSF-206

Photo Date:
5/22/2019

Comments:
Rock core box 1 (17.2-31.0 feet). Rock core interval shown on box should be 17.2-31.0 feet.

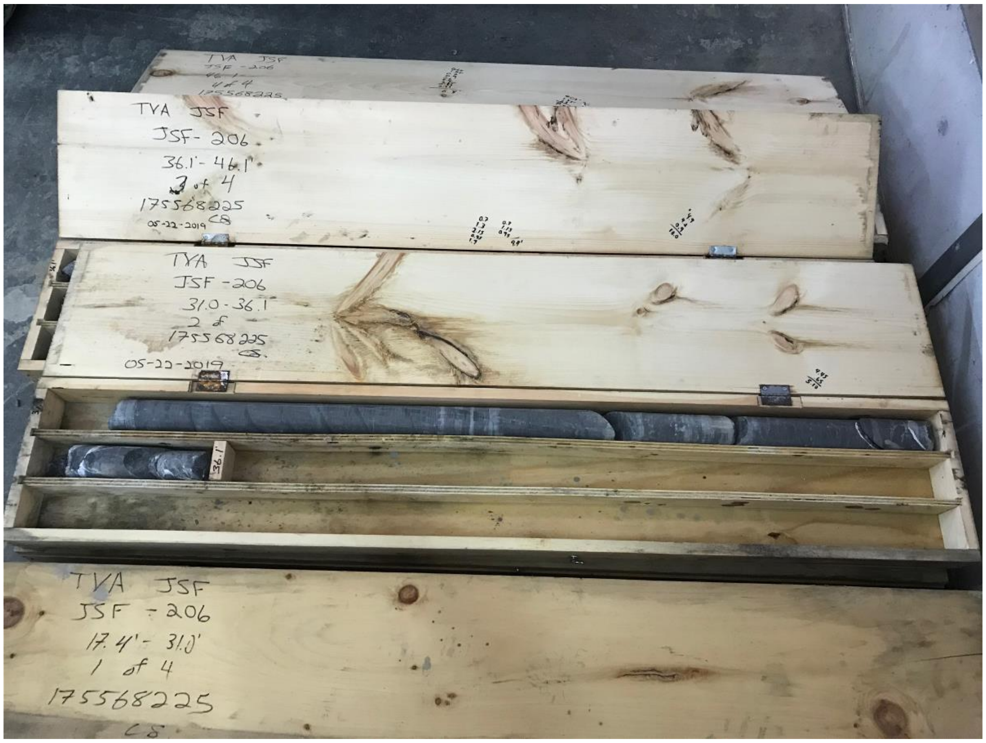
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 187

Photo Location:
JSF-206

Photo Date:
5/22/2019

Comments:
Rock core box 2 (31.0 to 36.1 feet).



Photograph ID: 188

Photo Location:
JSF-206

Photo Date:
5/22/2019

Comments:
Rock core box 3 (36.1 to 46.1 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 189

Photo Location:
JSF-206

Photo Date:
5/22/2019

Comments:
Rock core box 4 (46.1 to 55.0 feet). Depth interval shown on rock core box should be 46.1-55.0.

Photograph ID: 190

Photo Location:
JSF-206S

Photo Date:
6/26/2019

Comments:
Photo of intervals (0.0-32.0 feet) unavailable because no samples were collected. Refer to adjacent JSF-206 for photo interval (17.2-32.0 feet).

No Photo Applicable

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 191

Photo Location:
JSF-207

Photo Date:
5/15/2019

Comments:
Continuation of boring JSF-112Alt. Refer to JSF-112Alt for photo interval (0.0-16.7). Photo of interval (16.7-17.5) unavailable because no samples were collected.

No Photo Applicable

Photograph ID: 192

Photo Location:
JSF-207

Photo Date:
5/16/2019

Comments:
Rock core box 1 of 4 (17.5-26.9 feet).

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 193

Photo Location:
JSF-207

Photo Date:
5/16/2019

Comments:
Rock core box 2 of 4 (26.9-36.7 feet).

Photograph ID: 194

Photo Location:
JSF-207

Photo Date:
5/20/2019

Comments:
Rock core box 3 of 4 (36.7-46.7 feet).

Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 195

Photo Location:
JSF-207

Photo Date:
5/21/2019

Comments:
Rock core box 4 of 4 (46.7-56.7 feet).

Photograph ID: 196

Photo Location:
JSF-208

Photo Date:
6/27/2019

Comments:
Photo for interval (11.7-50.0 feet) unavailable. Boring JSF-208 was advanced by overdrilling boring JSF-111 and no samples were collected.

No Photo Applicable

Stantec

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**John Sevier Fossil (JSF) Plant**	**Site Location:**	**Rogersville, Tennessee**

Photograph ID: 197	No Photo Applicable
Photo Location: JSF-209	
Photo Date: 6/24/2019	
Comments: Photo for interval (18.9-35.0 feet) unavailable. Boring JSF-209 was advanced by overdrilling boring JSF-113Alt. Refer to JSF-113Alt for photo intervals (0.0-18.9).	

ATTACHMENT D.2

Photographic Log of Monitoring Wells

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil Plant (JSF)	Site Location:	Rogersville, Tennessee

Photograph ID: 1

Photo Location:
JSF-106

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-106. Well was installed in boring JSF-106.

Photograph ID: 2

Photo Location:
JSF-107

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-107. Well was installed in boring JSF-107.

Stantec

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil Plant (JSF)	Site Location:	Rogersville, Tennessee

Photograph ID: 3

Photo Location:
JSF-108

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-108. Well was installed in boring JSF-108.

Photograph ID: 4

Photo Location:
JSF-109

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-109. Well was installed in boring JSF-109Alt2.

Stantec

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil Plant (JSF)	Site Location:	Rogersville, Tennessee

Photograph ID: 5

Photo Location:
JSF-110

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-110. Well was installed in boring JSF-110.

Photograph ID: 6

Photo Location:
JSF-207

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-207. Well was installed in boring JSF-207 (Continuation of boring JSF-112Alt).

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil Plant (JSF)	Site Location:	Rogersville, Tennessee

Photograph ID: 7

Photo Location:
JSF-208

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-208. Well was installed in boring JSF-208 (Continuation of boring JSF-111).

Photograph ID: 8

Photo Location:
JSF-209

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-209. Well was installed in boring JSF-209 (Continuation of boring JSF-113Alt).

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	John Sevier Fossil Plant (JSF)	Site Location:	Rogersville, Tennessee

Photograph ID: 9

Photo Location:
JSF-210, JSF-206, JSF-110

Photo Date:
8/6/2019

Comments:
Completion of monitoring well JSF-210 (on the left), JSF-206 (in the middle) and JSF-110 (on the right). Wells JSF-210 and JSF-206 were installed in borings JSF-206 and JSF-206S, respectively.

APPENDIX E – DOWNHOLE GEOPHYSICAL TESTING REPORT

May 29, 2019

Mr. Mark Densmore
Stantec
837 North Oxford Road
Springfield, IL 62702

Subject: Results of Geophysical Borehole Logging
Two Boreholes (JSF-206 and JSF-207)
TVA John Sevier Fossil Plant
Rogersville, TN
ARM Project: 190453

Dear Mr. Densmore,

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 May 23, 2019. 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 and Pumping

ARM has provided a summary of these logging methods in Attachment A. ARM acquired the 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

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 9. Predominant groups or "sets" are indicated by the clustering of data points in the polar diagrams.

Figure 4 presents a polar diagram 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. Figure 5 presents the same data, with the data set(s) categorized by borehole.

ARM used statistical contouring to identify windows in which to calculate the mean orientation of all bedding and fracture planes. Figure 6 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 8 shows a predominant NE/SW strike direction.

Figure 7 presents a polar diagram 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 sets 1 and 2 and fracture sets 1 and 2 orientations, respectively, suggest the latter may be bedding partings. The rose diagram in Figure 9 shows a predominant NE/SW strike direction.

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

Planes	Dip	Dip Direction	Strike/Dip
Bedding Set 1	44	141	N51E/44SE
Bedding Set 2	34	336	N66E/34NW
Fracture Set 1	43	140	N50E/43SE
Fracture Set 2	45	331	N61E/45NW

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.
F. Decrease in formation resistivity.

Tables 2A and 2B presents the interpreted flow zones 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 decrease in formation resistivity may be caused by an increase in water content but may also be caused by lithologic changes such as an increase in clay mineral content. For this reason, resistivity deflections are compared to the gamma ray curve to identify lithologic changes. A combination of the above indicators provides the highest level of confidence for identifying water-bearing zones.

Upward flow was detected under ambient and pumping conditions in both JSF-206 and JSF-207.

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

Borehole	Depth (Feet)	Indicators	Type
JSF-206	20-22	B, C, E	Receiving zone
JSF-206	35-36	B, C, E	Receiving zone
JSF-206	43-45	A, C, D, E	Producing zone
JSF-206	53-55	A, C	Producing zone
JSF-207	33-35	B, C, E	Receiving zone
JSF-207	43-45	A, C, F	Producing zone
JSF-207	49-51	A, C, D, E, F	Producing zone

Table 2B: 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**
JSF-206	35-36	B, C, E	Receiving zone
JSF-206	43-45	A, C, D, E	Producing zone
JSF-206	48-49	A, C, E, F	Producing zone
JSF-206	53-55	A, C	Producing zone
JSF-207	33-35	A, C, E	Producing zone
JSF-207	43-45	A, C, F	Producing zone
JSF-207	49-51	A, C, D, E, F	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 Rajković

Duro Rajkovic
Senior Geophysicist

FIGURES

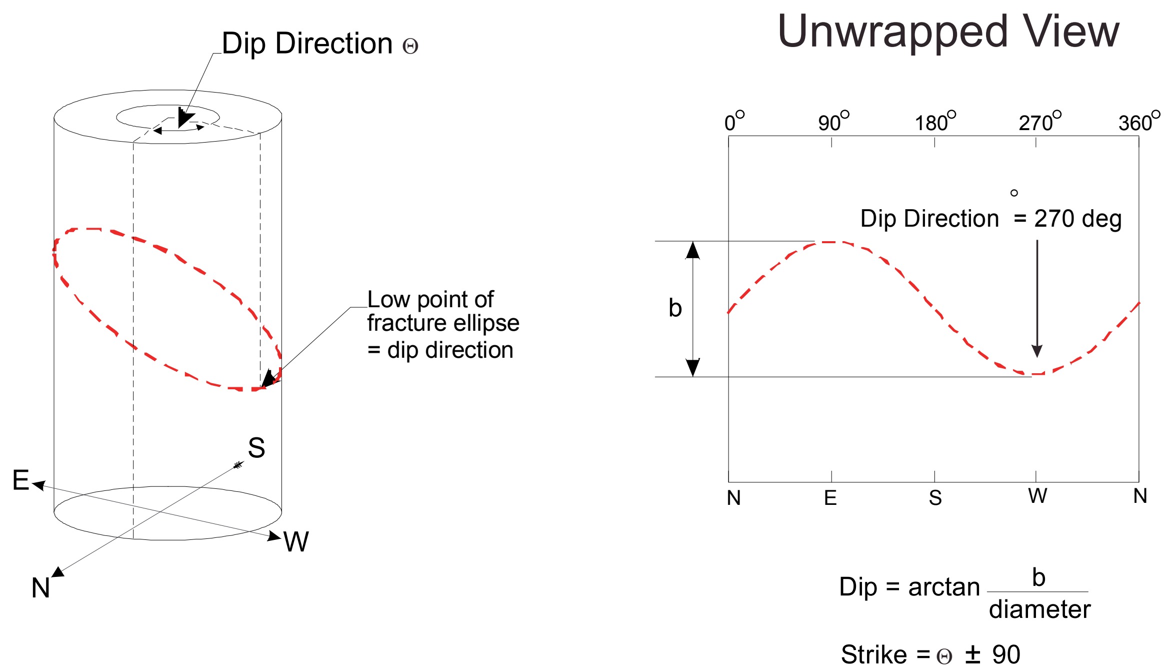


Figure 1: Diagram illustrating unwrapped view of fracture signature.

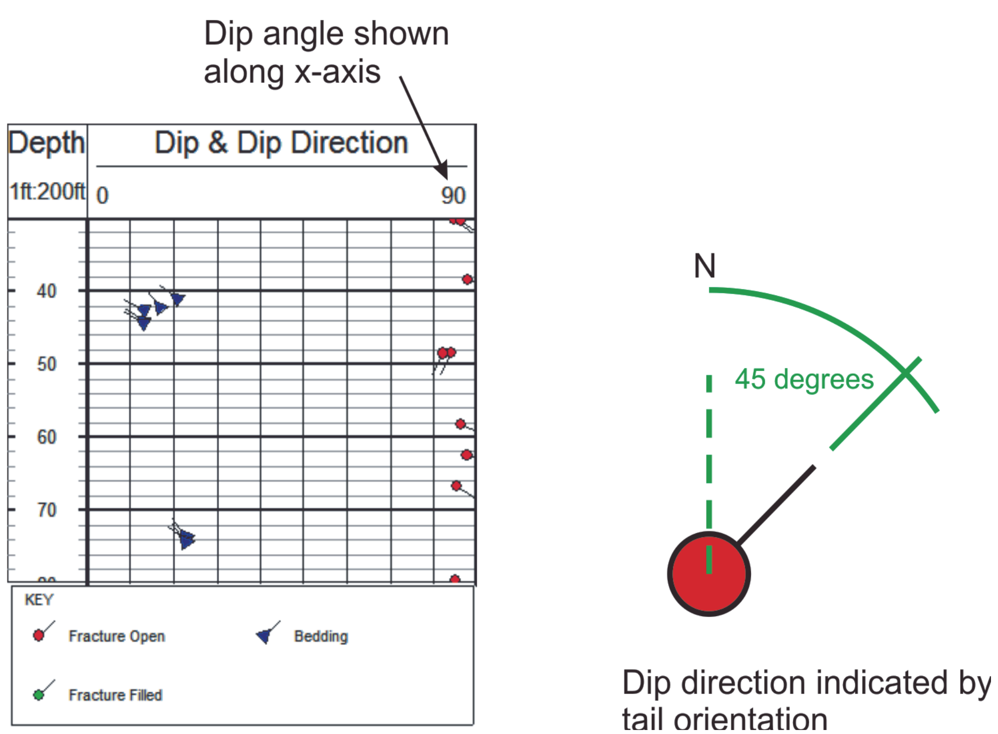


Figure 2: Dip & dip direction determination from the tadpole plot.

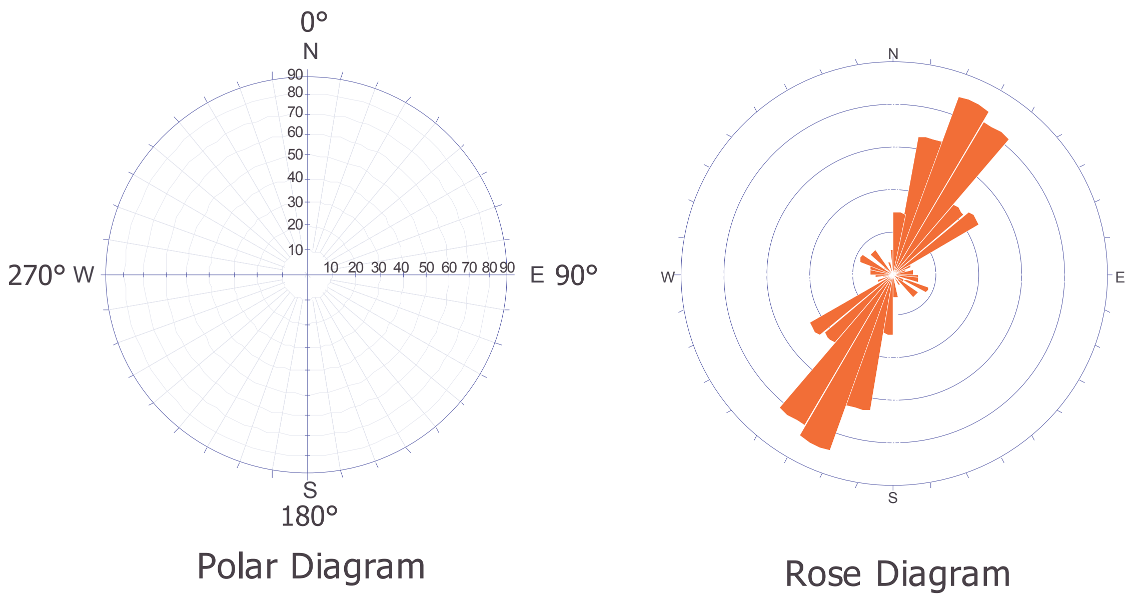


Figure 3: Example polar and rose diagrams. Polar diagram is used in this report for plotting dip and dip direction. Rose diagrams are used for plotting the frequency or number of strike measurements per sector.

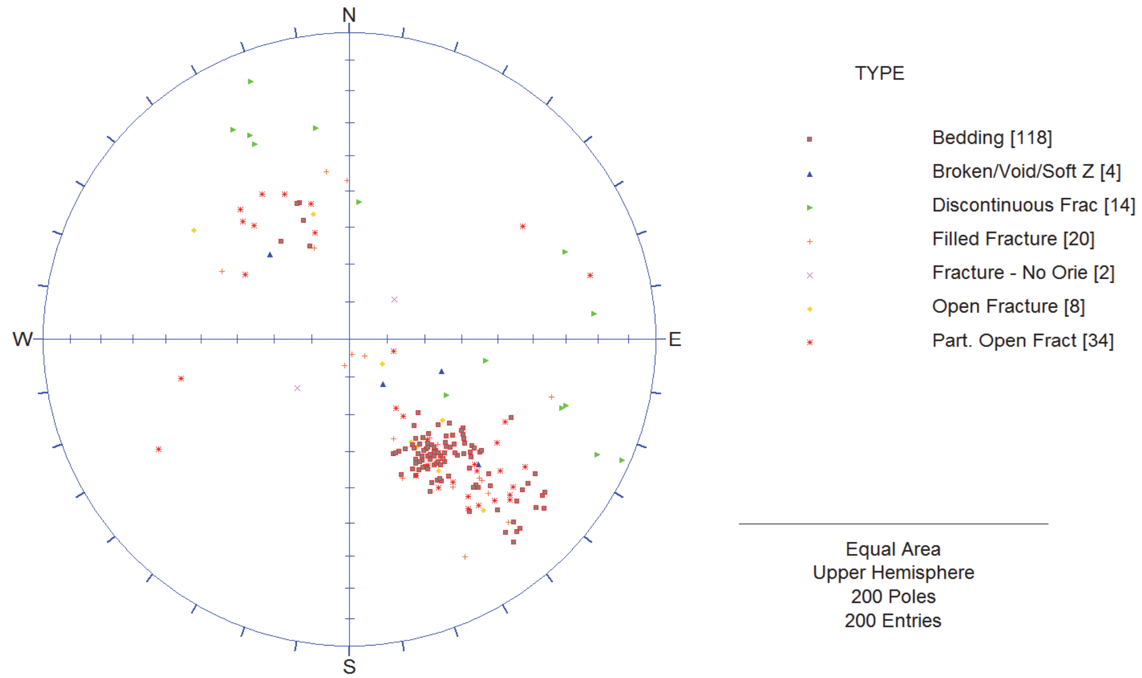


Figure 4: A polar diagram plotting dip and dip direction of all planes categorized by plane type.

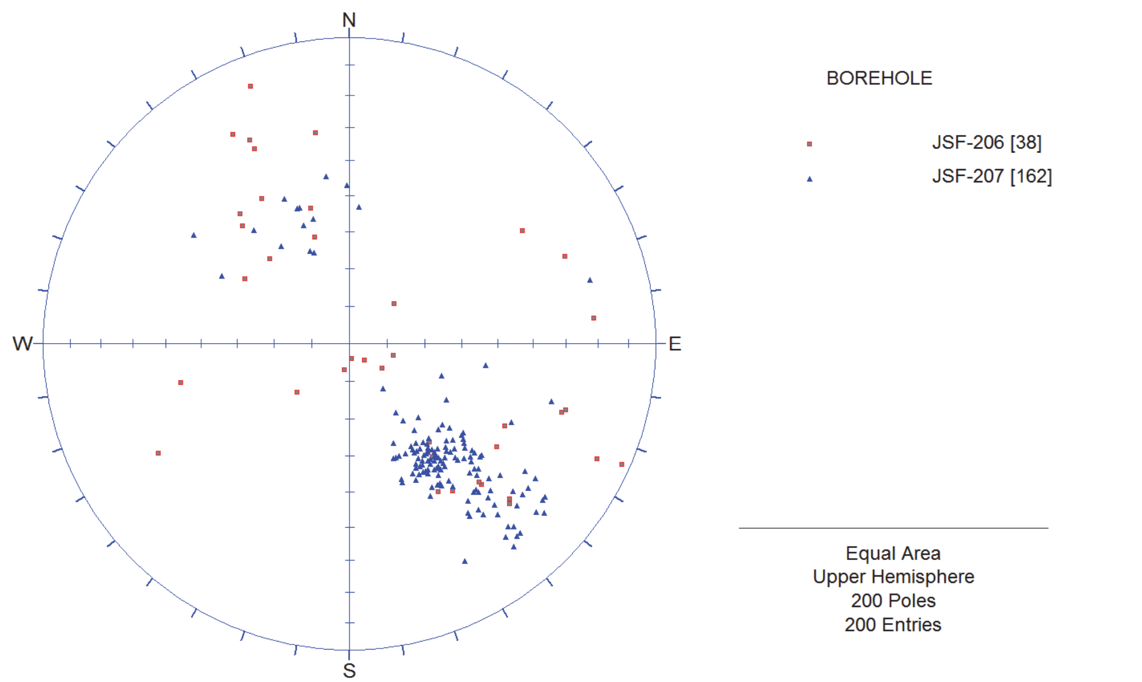


Figure 5: A polar diagram plotting dip and dip direction of all planes categorized by borehole.

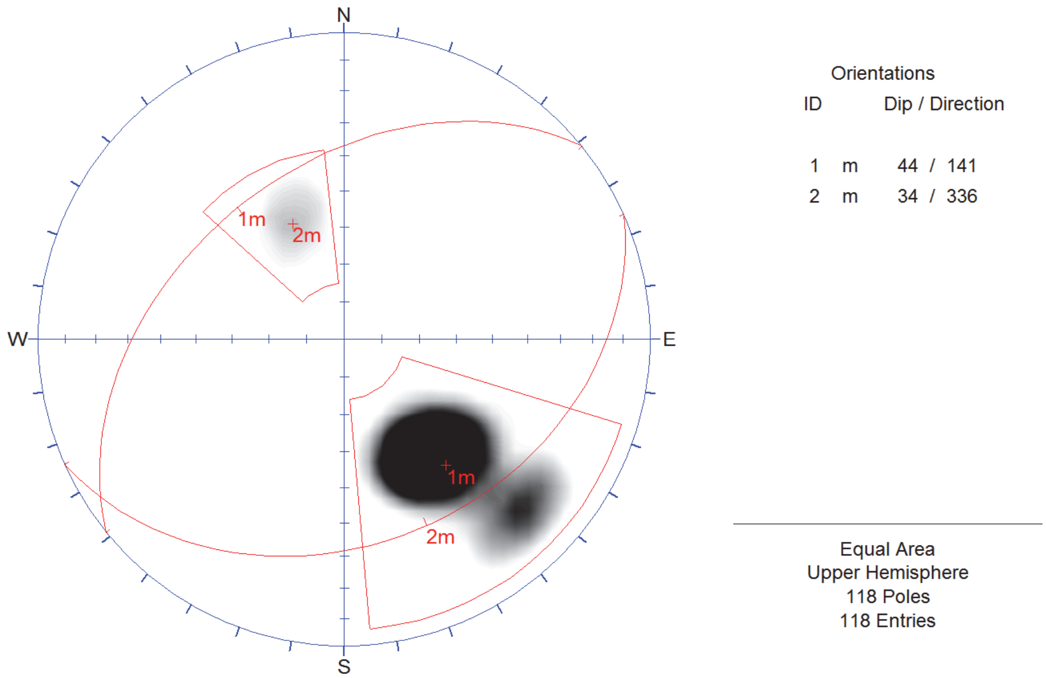


Figure 6: A polar diagram with statistical contouring of all bedding planes. The calculated mean dip angle and direction is shown at the right of the diagram.

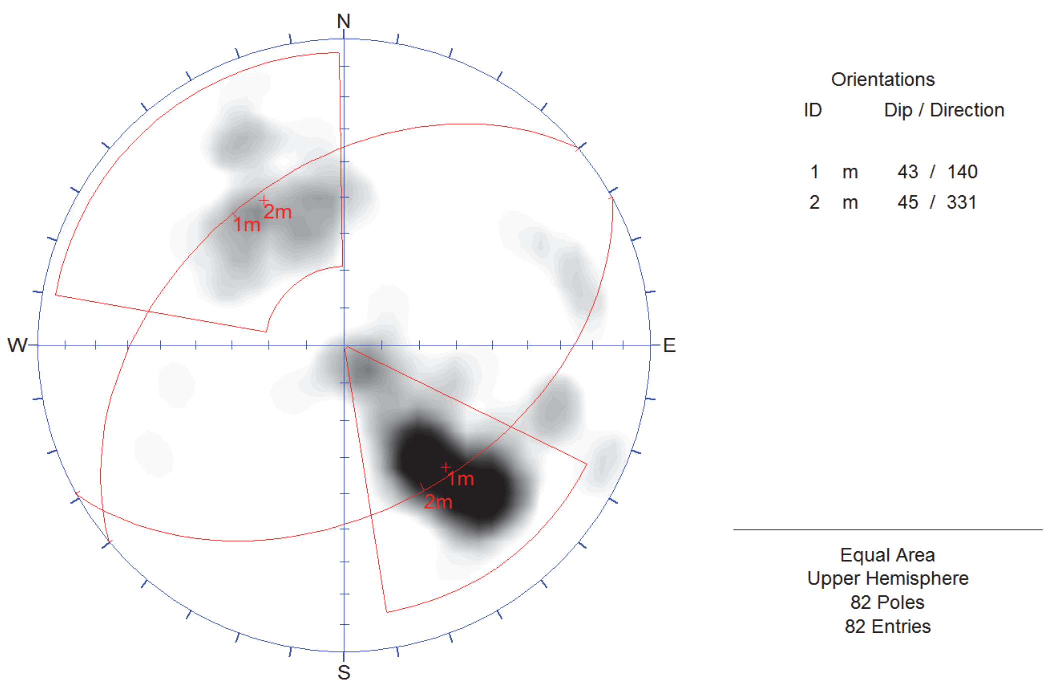


Figure 7: A polar diagram with statistical contouring of all fracture planes. The calculated mean dip angle and direction is shown at the right of the diagram.

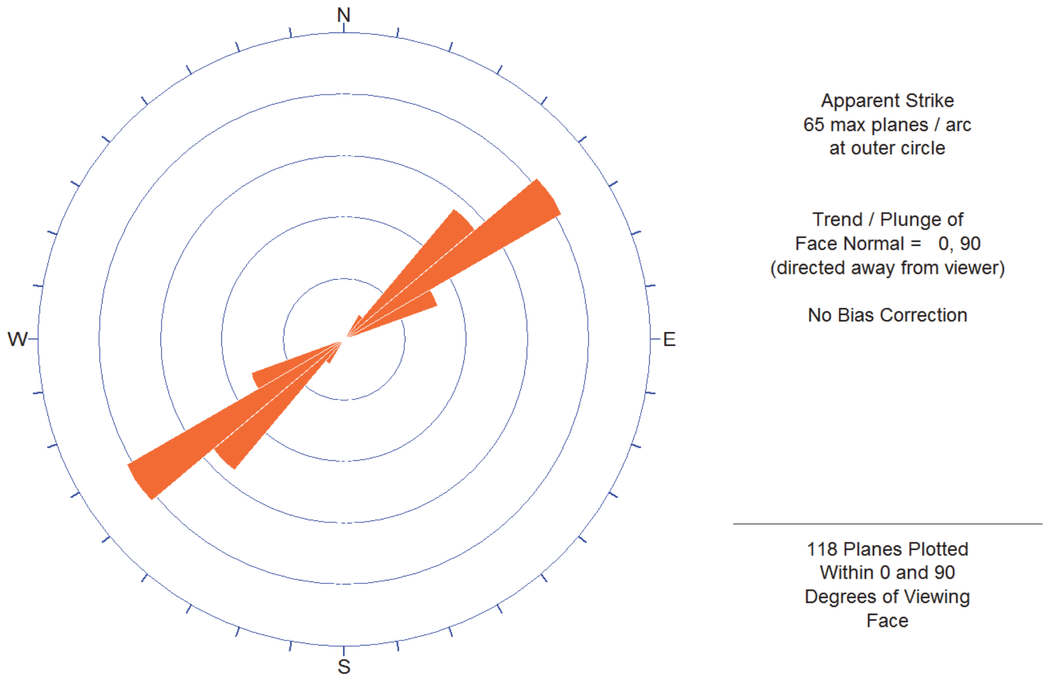


Figure 8: A rose diagram illustrating strike distribution of all bedding planes.

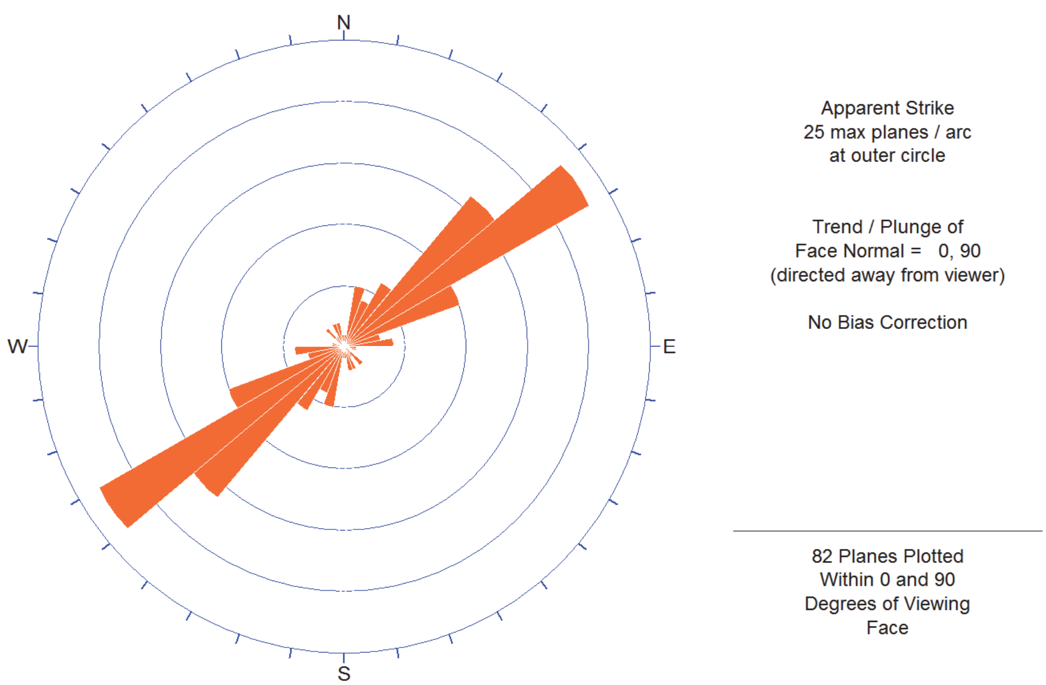


Figure 9: A rose diagram illustrating strike distribution of all fractures.

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.

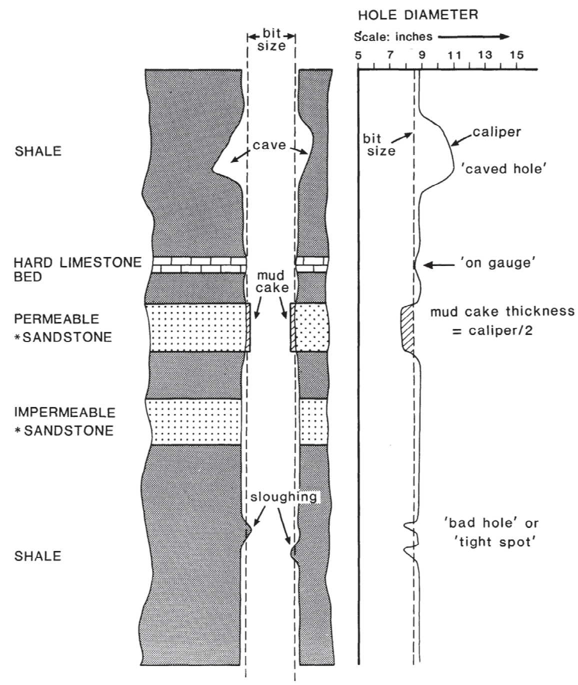


Figure A- 1: The caliper log showing some typical responses. (From Rider, 2002).

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.

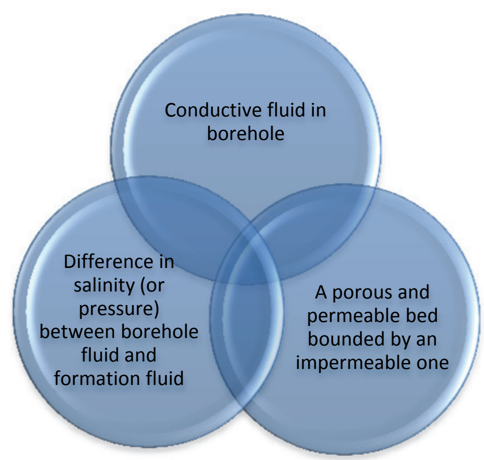


Figure A- 2: Conditions required to produce an SP response.

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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.

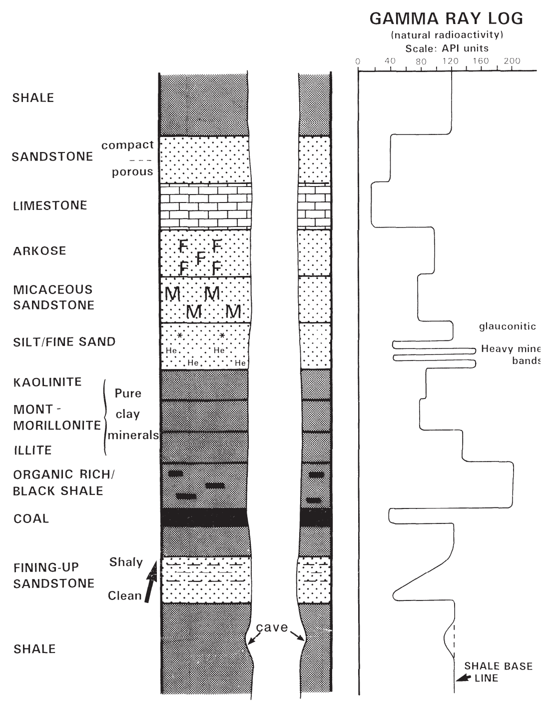


Figure A- 3: Characteristic gamma ray responses. (From Rider, 2002).

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.

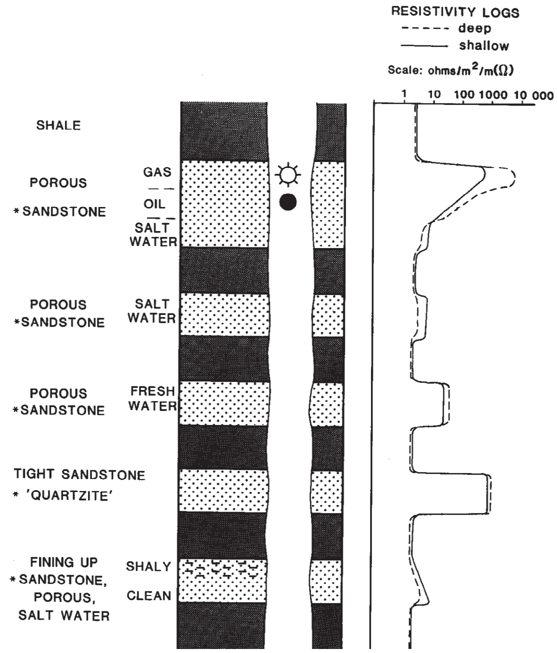


Figure A- 4: Characteristic resistivity responses. (From Rider, 2002)

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.

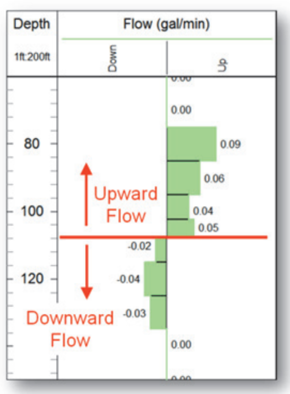


Figure A- 5: Example heat pulse flowmeter log.

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.

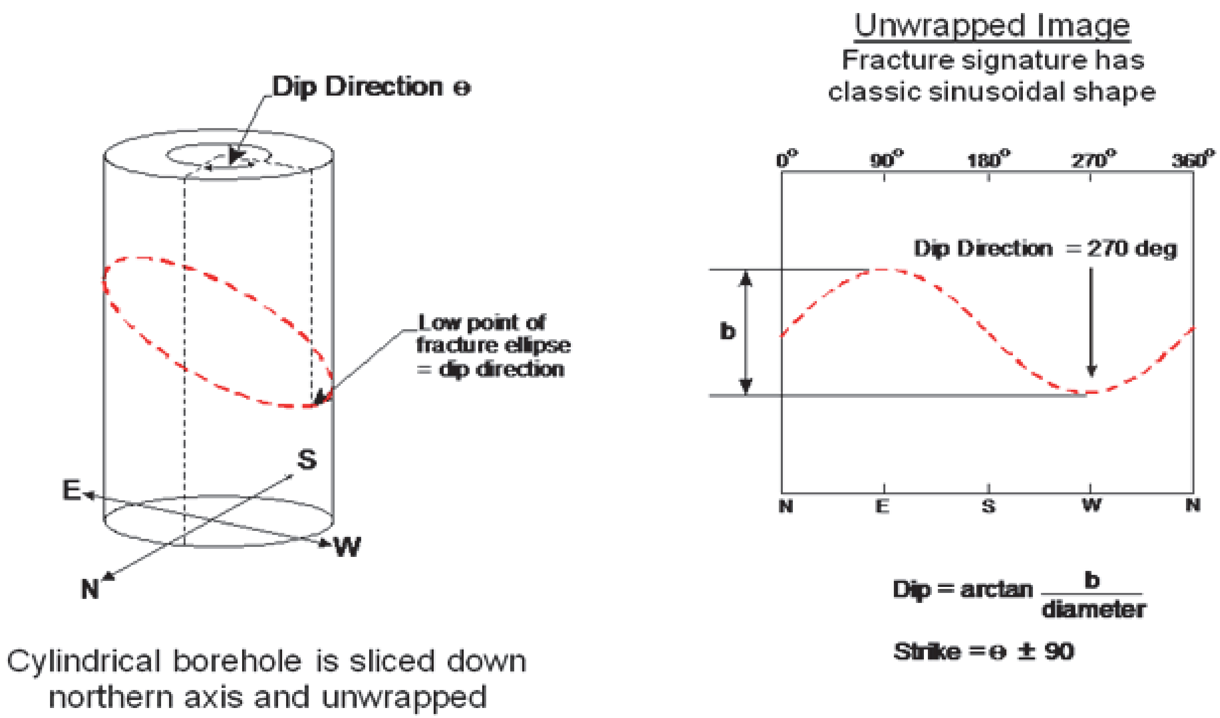


Figure A- 6: Schematic showing the sinusoidal fracture signature in the unwrapped borehole view.

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.

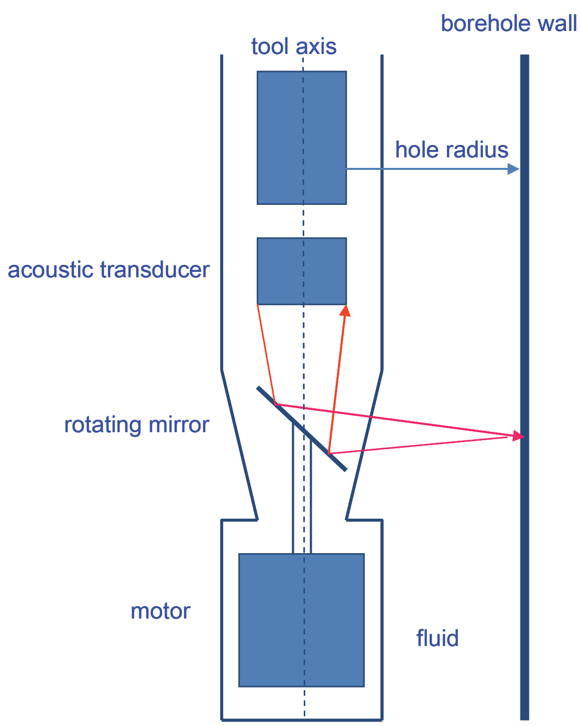


Figure A- 7: Schematic of the acoustic televiewer tool.

ATTACHMENT B
BOREHOLE LOGS

Televiewer Logs

COMP	Stantec
WELL	JSF-206
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	190453
API	N/A

COMPANY: Stantec STATE: TN
WELL ID: JSF-206 ARM NO.: 190453
FIELD/SITE: Rogersville API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES
Ford F350

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 2.2 G.L.

LOGGING DATE	05.23.2019	05.23.2019			
RUN NO	2	4			
TYPE LOG	OTV.UV	ATV.GR			
DRILLER DEPTH (FT)	56.1	56.1			
ARM DEPTH (FT)	55.27	55.26			
BTM LOGGED INTERVAL (FT)	55.5	55.26			
TOP LOGGED INTERVAL (FT)	2.84	11			
CASING SIZE (IN)/DEPTH (FT)	3.8/18.5	3.8/18.5			
CASING ARM (FT)	18.37	18.37			
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	12.83	13.23			
MAG. DECLINATION (DEG)	6.48 W	6.48 W			
RECORDED BY	R. Gecelosky	R. Gecelosky			
WITNESSED BY					

REMARKS:

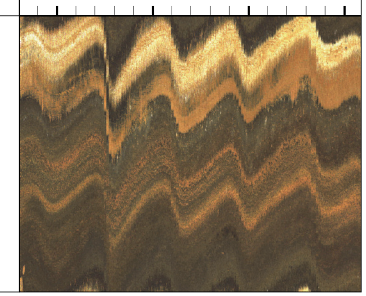
Symbols

Bottom of Casing
Fluid Level

Structure

Open Fracture
Discontinuous Fract
Part. Open Fract
Filled Fracture
Fracture - No Orientation
Broken/Void/Soft Zone

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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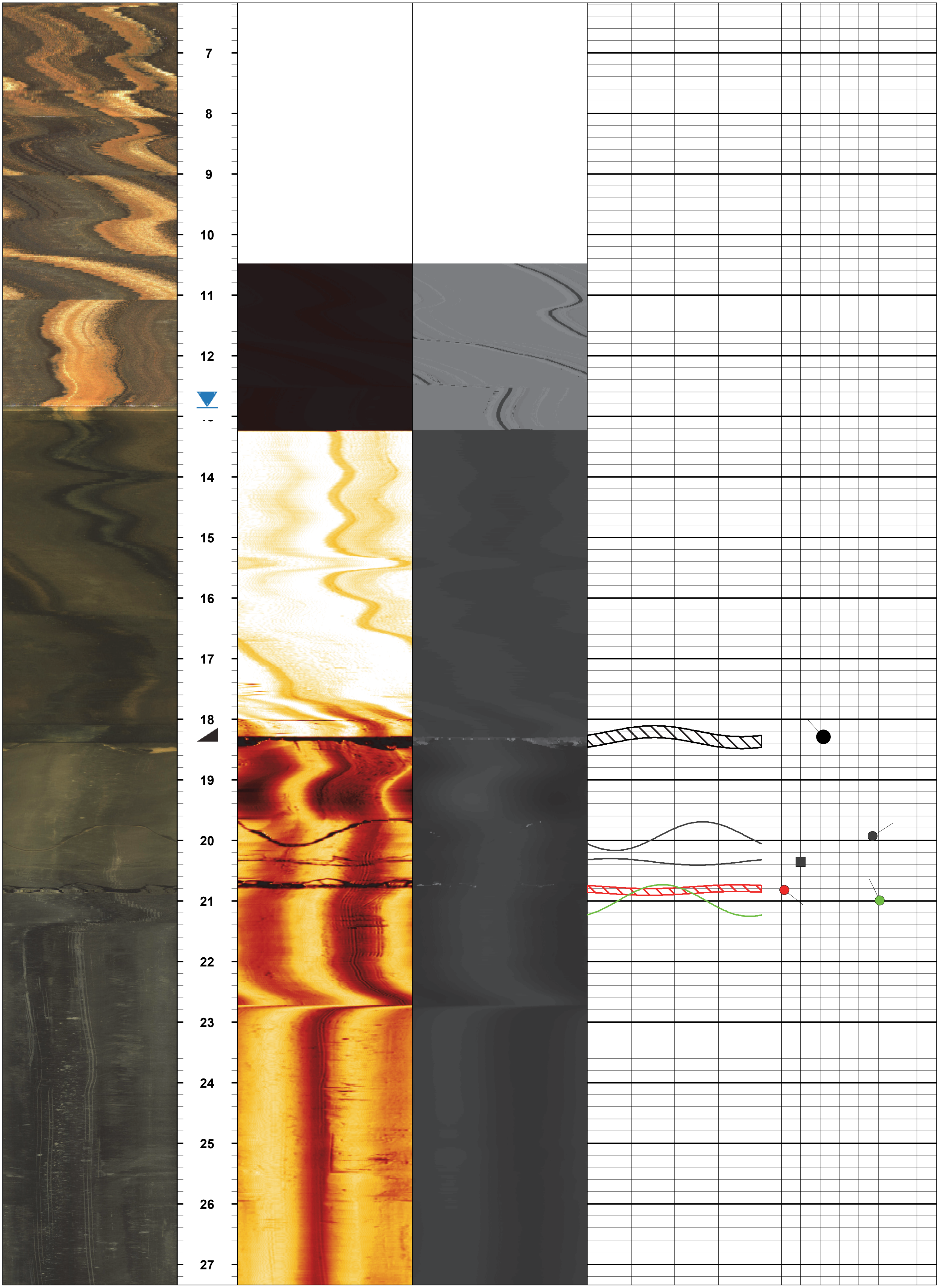
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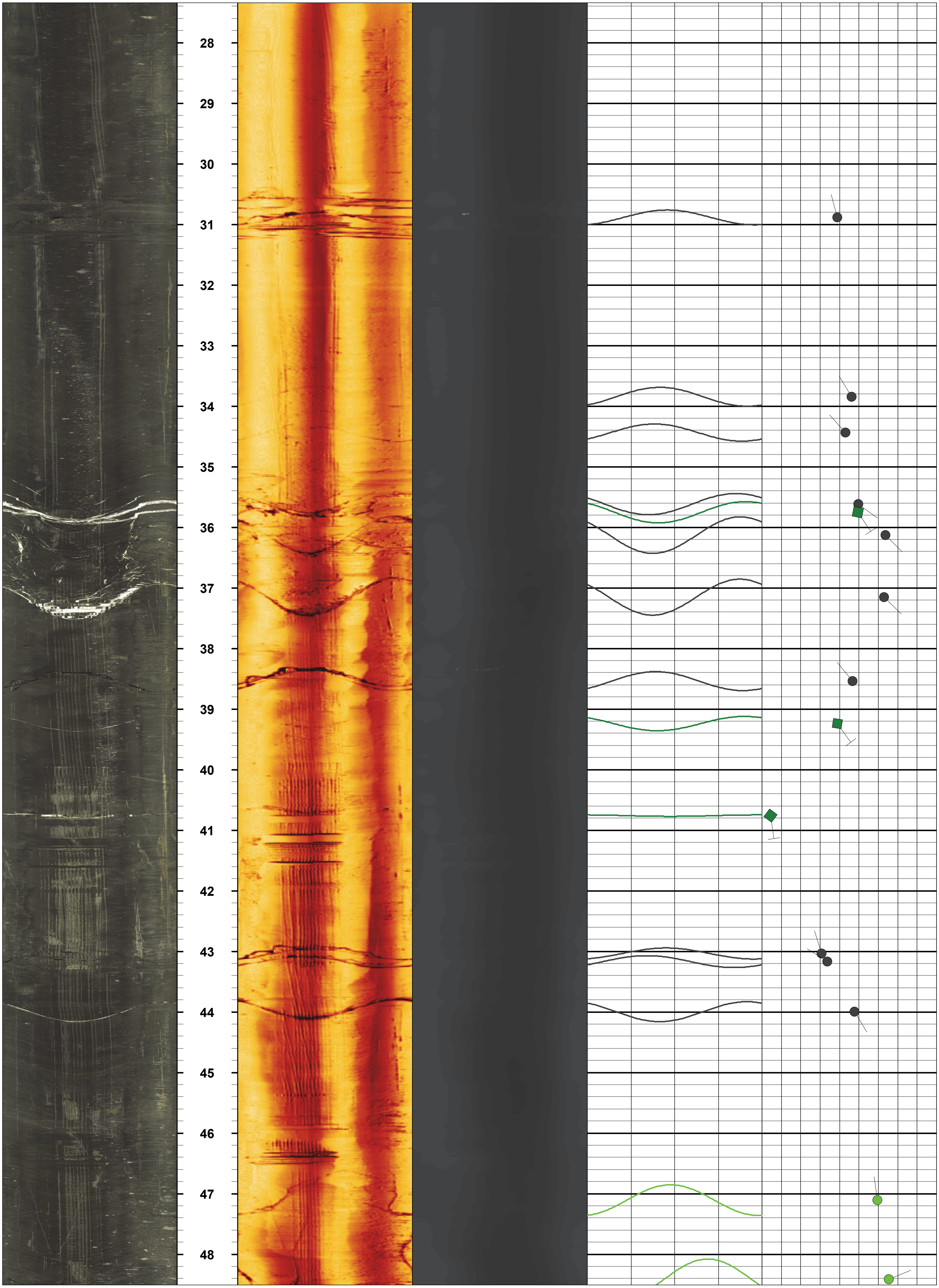
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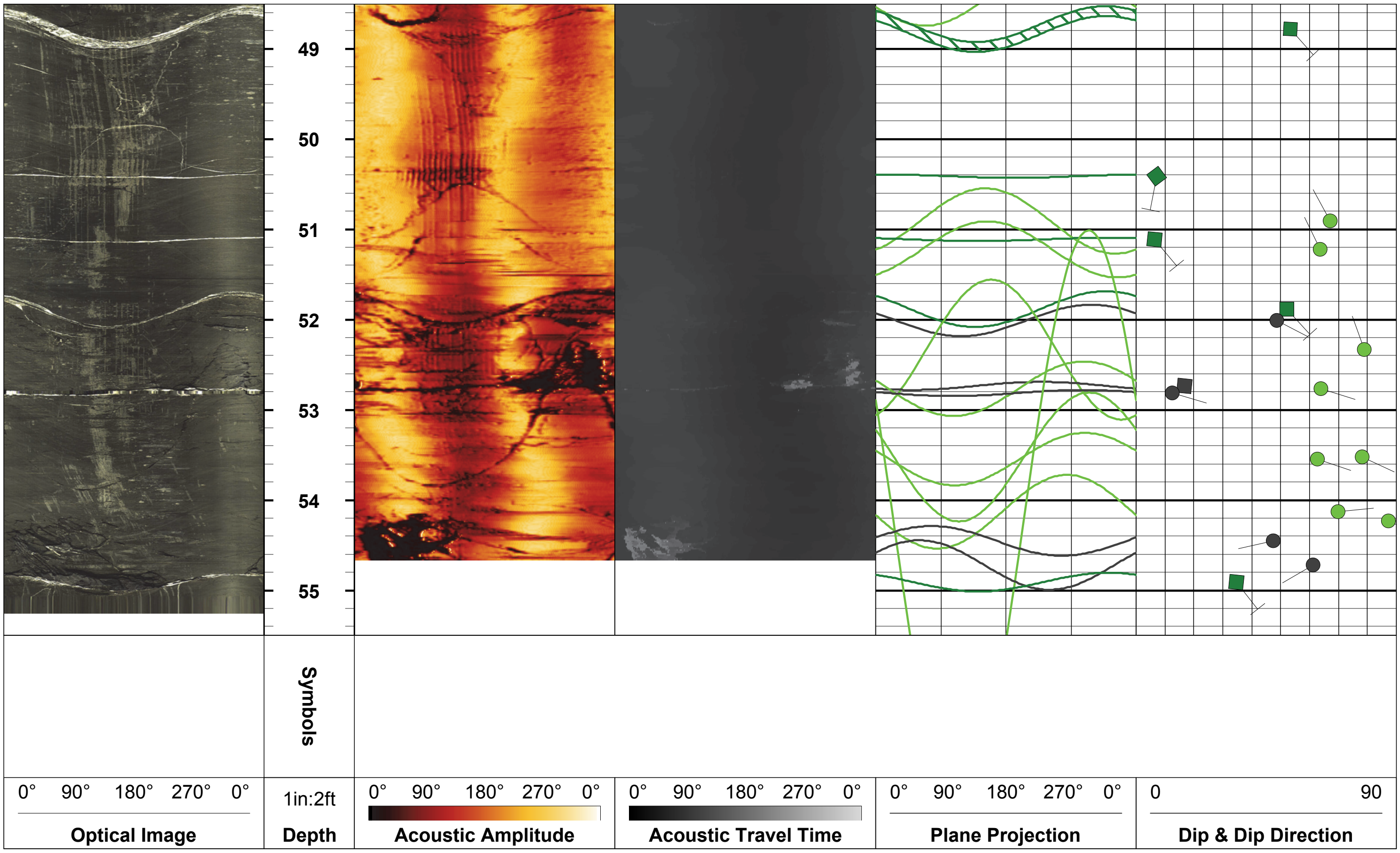

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Symbols
0° 90° 180° 270° 0°
Optical Image
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Acoustic Amplitude
0° 90° 180° 270° 0°
Acoustic Travel Time
0° 90° 180° 270° 0°
Plane Projection
0 90
Dip & Dip Direction

Hydro Log

COMP Stantec
WELL JSF-206
FLD Rogersville
CNTY Hawkins
STAT TN
ARM 190453
API N/A

COMPANY:	Stantec	STATE:	TN
WELL ID:	JSF-206	ARM NO.:	190453
FIELD/SITE:	Rogersville	API NO.:	N/A
COUNTY:	Hawkins		

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface ELEVATION: K.B.
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM: D.F.
DRILLING MEAS. FROM: STICK UP: 2.2 G.L.

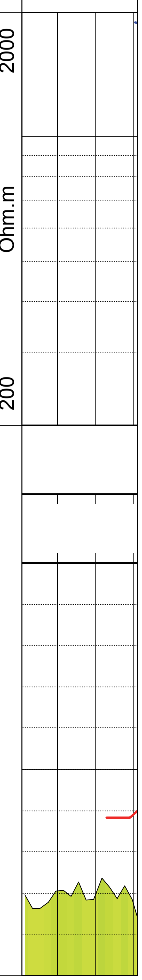
LOGGING DATE	05.23.2019	05.23.2019	05.23.2019	05.23.2019	05.23.2019
RUN NO	1	3	5	6	7
TYPE LOG	FTC.GR	CAL	RES	HPFM A	HPFM P
DRILLER DEPTH (FT)	56.1	56.1	56.1	56.1	56.1
ARM DEPTH (FT)	55.19	55.26	55.19	N/A	N/A
BTM LOGGED INTERVAL (FT)	55.3	55.26	55.19	53.07	53.01
TOP LOGGED INTERVAL (FT)	3.93	4.48	30.52	18.01	21.99
CASING SIZE (IN)/DEPTH (FT)	3.8/18.5	3.8/18.5	3.8/18.5	3.8/18.5	3.8/18.5
CASING ARM (FT)	18.37	18.37	18.37	18.37	18.37
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	12.48				
MAG. DECLINATION (DEG)	6.48 W	6.48 W	6.48 W	6.48 W	6.48 W
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky
WITNESSED BY					

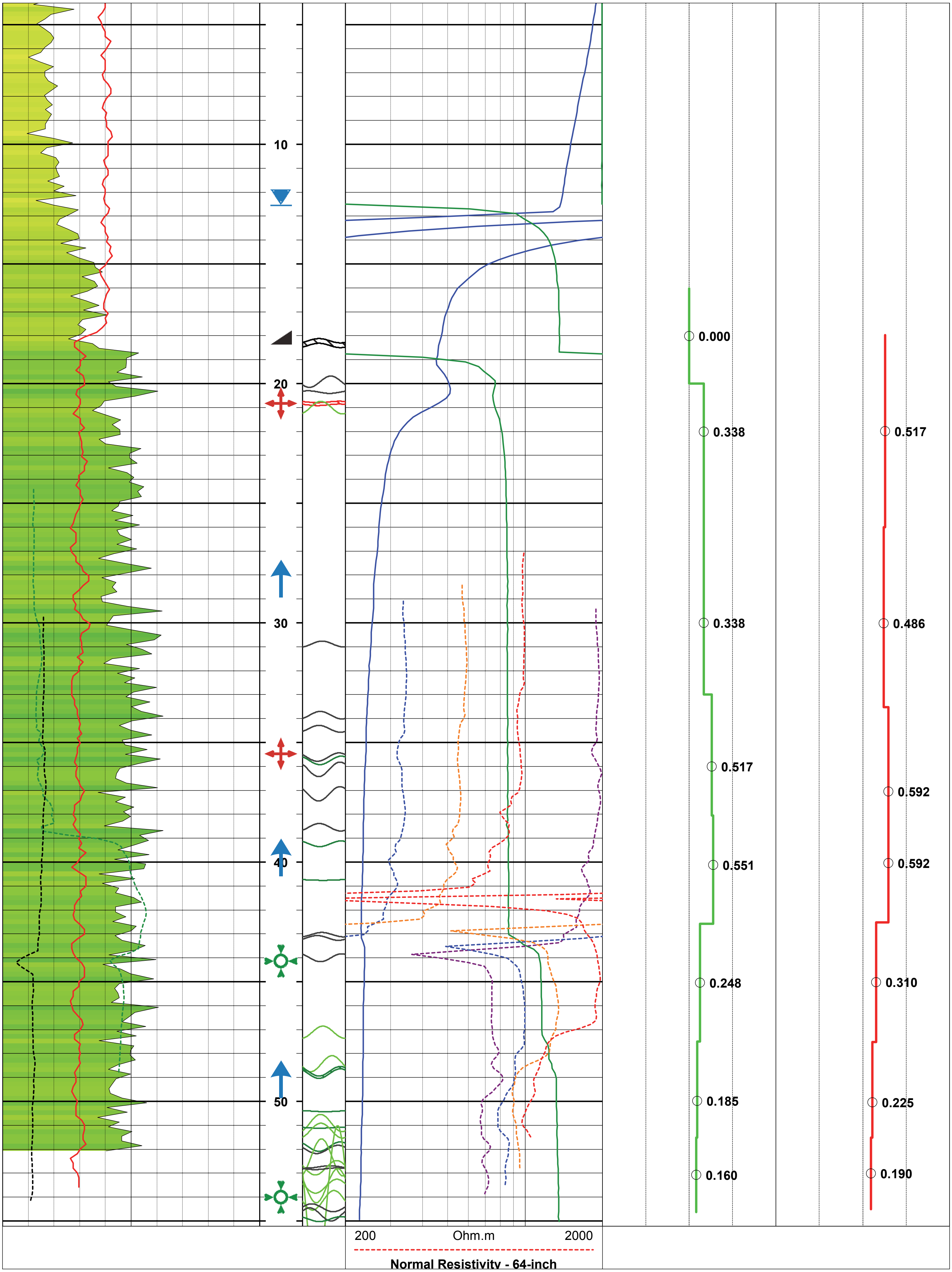
REMARKS:

Symbols

- Bottom of Casing
- Receiving Zone
- Up Flow
- Fluid Level
- Producing Zone

Natural Gamma	Depth	Televiewer Fractures	Fluid Temperature	Vertical Flow
0 CPS 200	1in:5ft		23 'C 27	Ambient Gal/Min (Down, Up)
3-Arm Caliper: 3 in 5	Symbols		Fluid Conductivity (25 'C): 400 uS/cm 800	Pumping Gal/Min (Down, Up)
Spontaneous Potential: 0 mV 1000			Normal Resistivity - 8-inch: 200 Ohm.m 2000	
Single Point Resistance: 0 Ohm 1000			Normal Resistivity - 16-inch: 200 Ohm.m 2000	
			Normal Resistivity - 32-inch: 200 Ohm.m 2000	
			Normal Resistivity - 64-inch: 200 Ohm.m 2000	

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0.592
0.592
0.310
0.225
0.190
200
Ohm.m
2000
Normal Resistivity - 64-inch

			200 Ohm.m 2000 **Normal Resistivity - 32-inch**	
0 Ohm 1000 **Single Point Resistance**	**Symbols**	**Televiewer Fractures**	200 Ohm.m 2000 **Normal Resistivity - 16-inch**	
0 mV 1000 **Spontaneous Potential**			200 Ohm.m 2000 **Normal Resistivity - 8-inch**	
3 in 5 **3-Arm Caliper**			400 uS/cm 800 **Fluid Conductivity (25 'C)**	
0 CPS 200 **Natural Gamma**	1in:5ft **Depth**		23 'C 27 **Fluid Temperature**	**Vertical Flow**

Vertical Flow	
Down / Up Gal/Min **Ambient**	Down / Up Gal/Min **Pumping**

Televiewer Logs

ARM GEOPHYSICS
Surface & Borehole Services

COMP	Stantec
WELL	JSF-207
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	190453
API	N/A

COMPANY: Stantec
WELL ID: JSF-207
FIELD/SITE: Rogersville
COUNTY: Hawkins
STATE: TN
ARM NO.: 190453
API NO.: N/A

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES
Ford F350

PERMANENT DATUM: Ground Surface ELEVATION:
LOG MEASURED FROM: Ground Surface ABOVE PERM. DATUM:
DRILLING MEAS. FROM: STICK UP: 2.85

K.B.
D.F.
G.L.

LOGGING DATE	05.23.2019	05.23.2019			
RUN NO	2	5			
TYPE LOG	OTV.UV	ATV.GR			
DRILLER DEPTH (FT)	56.7	56.7			
ARM DEPTH (FT)	56.82	56.77			
BTM LOGGED INTERVAL (FT)	56.82	56.77			
TOP LOGGED INTERVAL (FT)	2.28	15.12			
CASING SIZE (IN)/DEPTH (FT)	3.8/17.5	3.8/17.5			
CASING ARM (FT)	17.69	17.69			
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	14.86	15.50			
MAG. DECLINATION (DEG)	6.48 W	6.48 W			
RECORDED BY	R. Gecelosky	R. Gecelosky			
WITNESSED BY					

REMARKS:

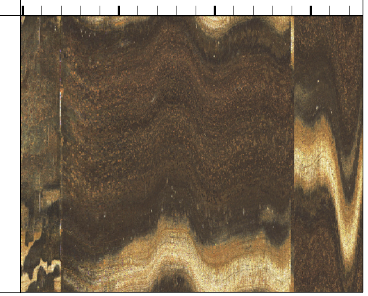
Symbols

Bottom of Casing
Fluid Level

Structure

Open Fracture
Bedding
Discontinuous Fract
Part. Open Fract
Filled Fracture
Broken/Void/Soft Zone

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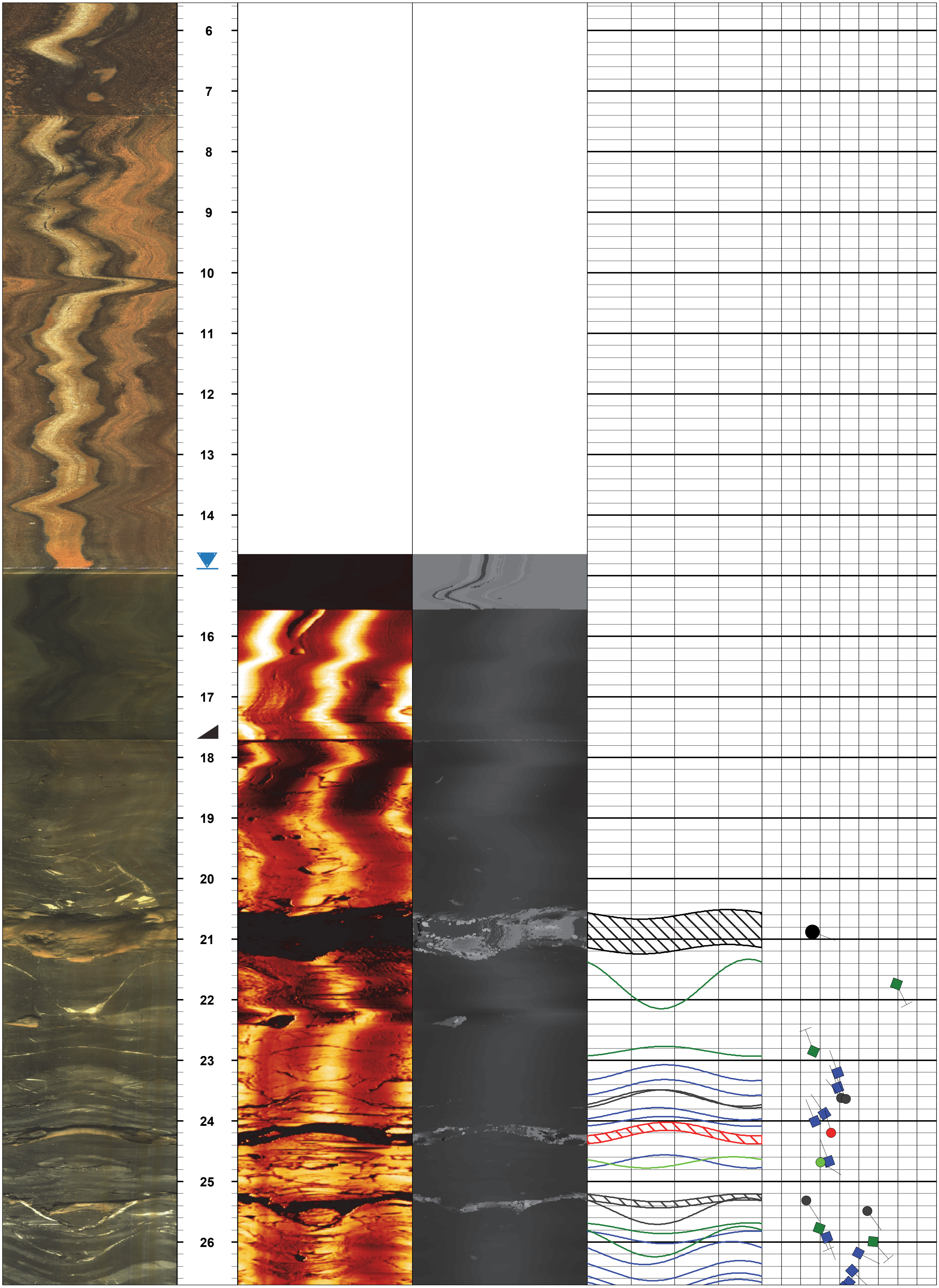
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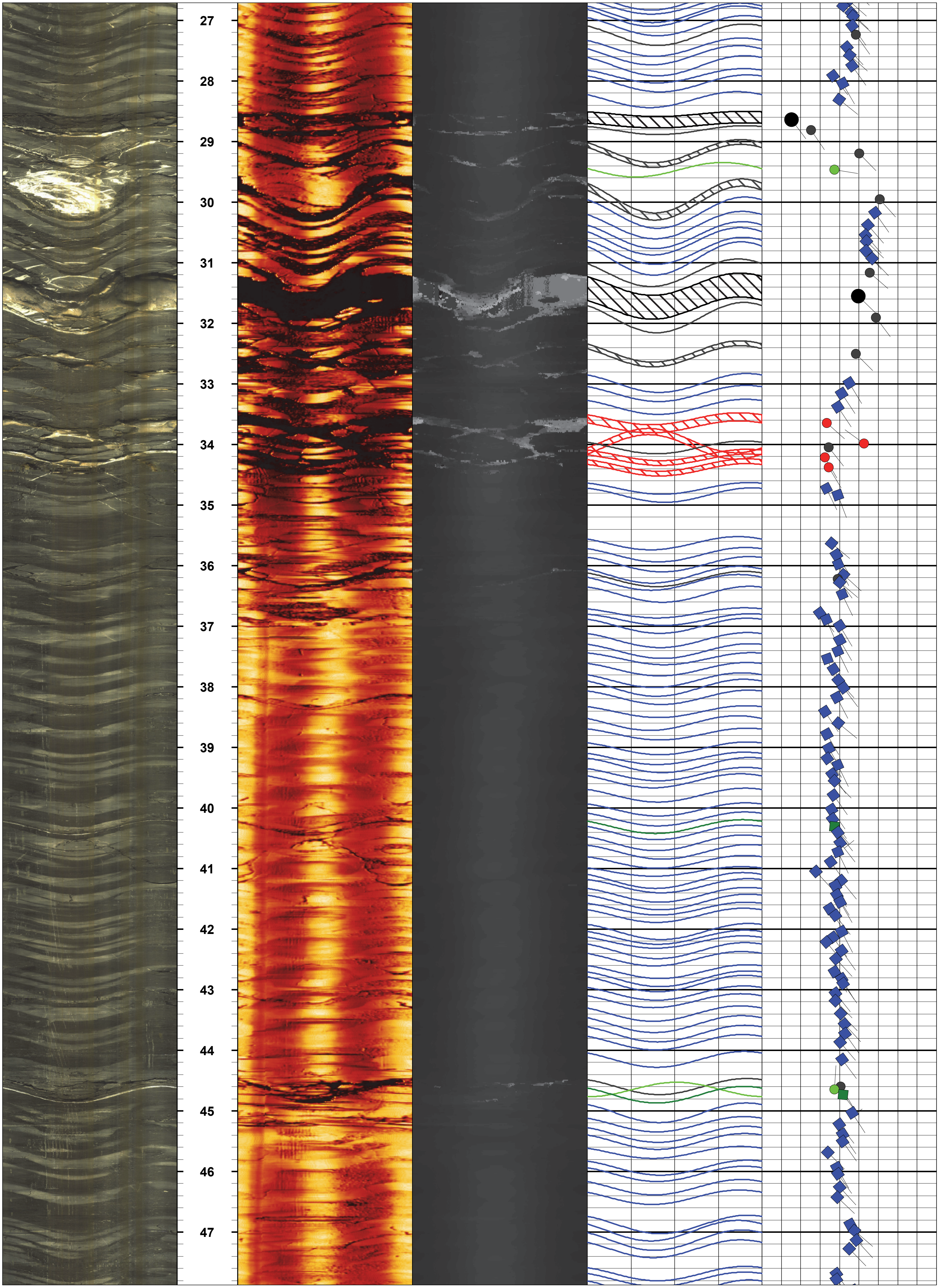
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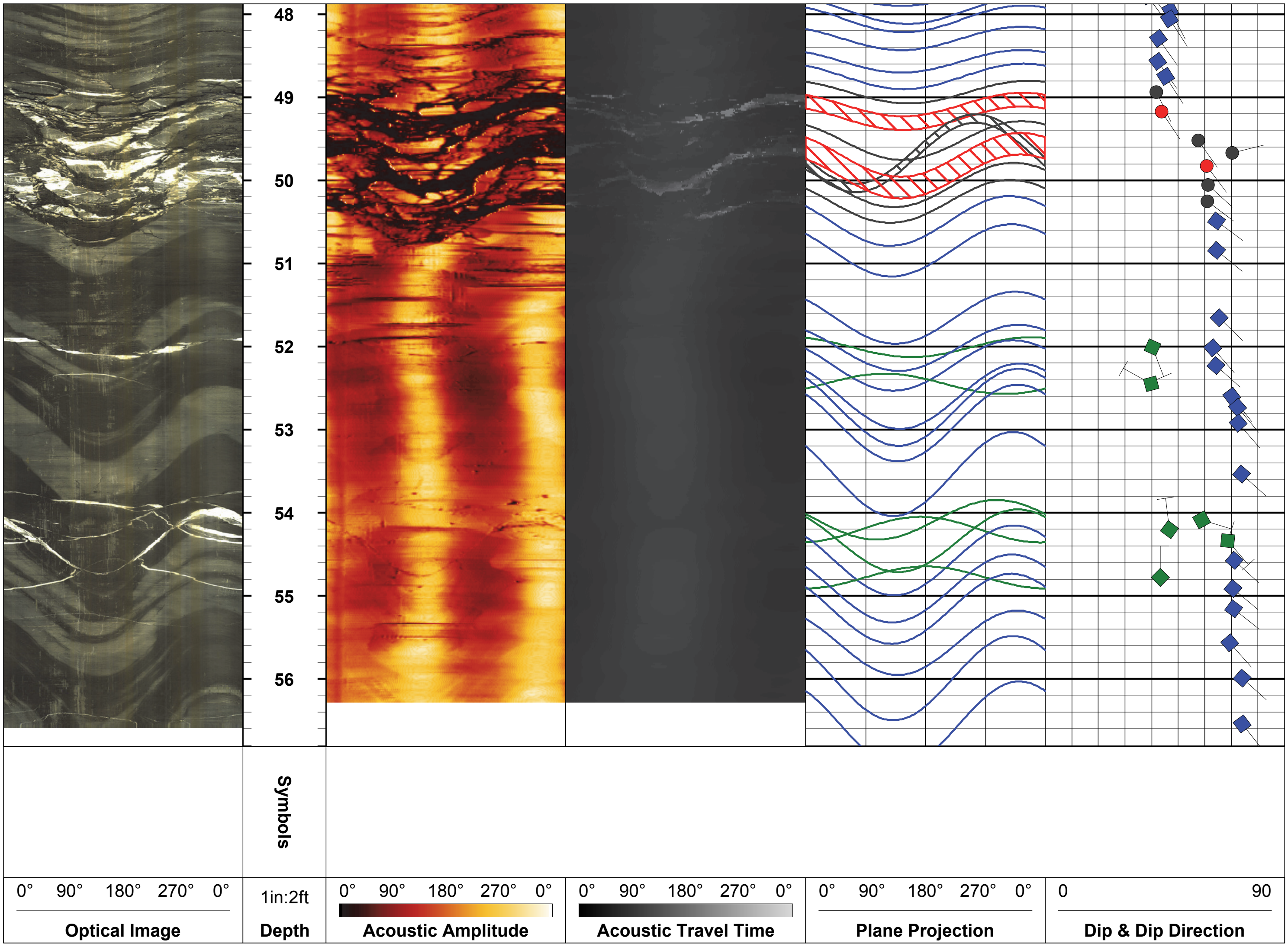
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Symbols
0° 90° 180° 270° 0°
Optical Image
1in:2ft
Depth
0° 90° 180° 270° 0°
Acoustic Amplitude
0° 90° 180° 270° 0°
Acoustic Travel Time
0° 90° 180° 270° 0°
Plane Projection
0
90
Dip & Dip Direction

Hydro Log

ARM GEOPHYSICS — Surface & Borehole Services

COMP	Stantec
WELL	JSF-207
FLD	Rogersville
CNTY	Hawkins
STAT	TN
ARM	190453
API	N/A

COMPANY: Stantec — STATE: TN
WELL ID: JSF-207 — ARM NO.: 190453
FIELD/SITE: Rogersville — API NO.: N/A
COUNTY: Hawkins

LOCATION:
NORTHING:
EASTING:
SEC: TWP: QUAD:

OTHER SERVICES

PERMANENT DATUM: Ground Surface — ELEVATION: — K.B.
LOG MEASURED FROM: Ground Surface — ABOVE PERM. DATUM: — D.F.
DRILLING MEAS. FROM: — STICK UP: 2.85 — G.L.

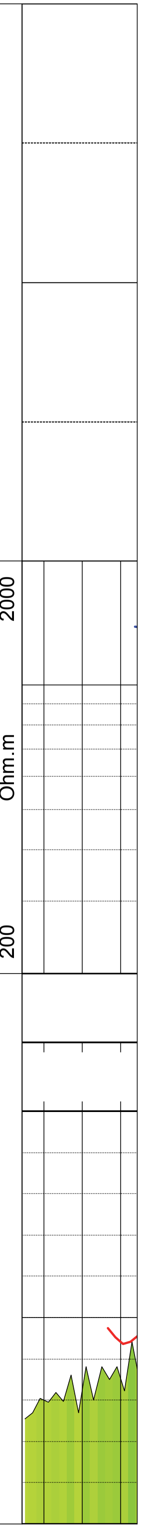
LOGGING DATE	05.23.2019	05.23.2019	05.23.2019	05.23.2019	05.23.2019
RUN NO	1	3	4	6	7
TYPE LOG	FTC.GR	CAL	RES	HPFM A	HPFM P
DRILLER DEPTH (FT)	56.7	56.7	56.7	56.7	56.7
ARM DEPTH (FT)	56.7	56.85	56.6	N/A	N/A
BTM LOGGED INTERVAL (FT)	56.93	56.85	56.6	55.53	55.37
TOP LOGGED INTERVAL (FT)	3.28	3.85	29.84	17.22	20.02
CASING SIZE (IN)/DEPTH (FT)	3.8/17.5	3.8/17.5	3.8/17.5	3.8/17.5	3.8/17.5
CASING ARM (FT)	17.69	17.69	17.69	17.69	17.69
BIT SIZE (IN)					
FLUID LEVEL IN HOLE (FT)	14.58				
MAG. DECLINATION (DEG)	6.48 W	6.48 W	6.48 W	6.48 W	6.48 W
RECORDED BY	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky	R. Gecelosky
WITNESSED BY					

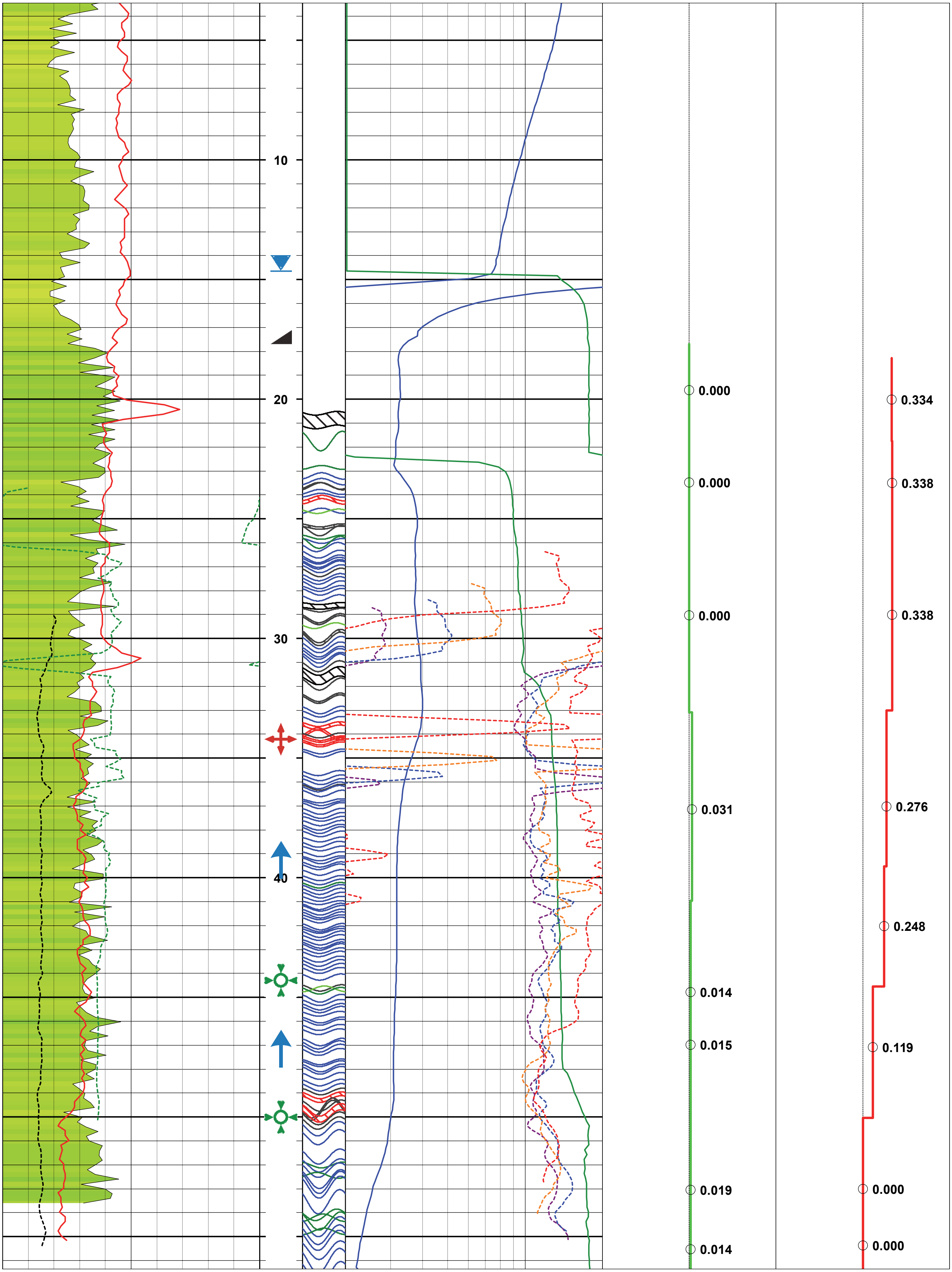
REMARKS:

Symbols

- Bottom of Casing
- Receiving Zone
- Up Flow
- Fluid Level
- Producing Zone

Natural Gamma 0 CPS 200 / 3-Arm Caliper 3 in 5 / Spontaneous Potential 0 mV 1000 / Single Point Resistance 0 Ohm 1000	Depth 1in:5ft	Symbols	Televiewer Fractures	Fluid Temperature 18 'C 22 / Fluid Conductivity (25 'C) 400 uS/cm 800 / Normal Resistivity - 8-inch 200 Ohm.m 2000 / Normal Resistivity - 16-inch 200 Ohm.m 2000 / Normal Resistivity - 32-inch 200 Ohm.m 2000 / Normal Resistivity - 64-inch 200 Ohm.m 2000	Vertical Flow: Ambient Gal/Min (Down, Up); Pumping Gal/Min (Down, Up)




10
20
30
40
0.000
0.000
0.000
0.031
0.014
0.015
0.019
0.014
0.334
0.338
0.338
0.276
0.248
0.119
0.000
0.000

Track	Min	Units	Max
Normal Resistivity - 64-inch	200	Ohm.m	2000
Normal Resistivity - 32-inch	200	Ohm.m	2000
Normal Resistivity - 16-inch	200	Ohm.m	2000
Normal Resistivity - 8-inch	200	Ohm.m	2000
Fluid Conductivity (25 'C)	400	uS/cm	800
Fluid Temperature	18	'C	22
Single Point Resistance	0	Ohm	1000
Spontaneous Potential	0	mV	1000
3-Arm Caliper	3	in	5
Natural Gamma	0	CPS	200

Symbols

1in:5ft

Depth

Televiewer Fractures

Vertical Flow

	Ambient	Pumping
Direction	Down / Up	Down / Up
Units	Gal/Min	Gal/Min

ATTACHMENT C
TABULATED LISTING OF PLANE ORIENTATIONS

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-206	18.3	317.88	31.84	19.84	Broken/Void/Soft Zone	N48E/32NW
JSF-206	19.93	57.35	57.1	0	Part. Open Fract	N33W/57NE
JSF-206	20.36	227.31	19.99	0	Fracture - No Orientation	N43W/20SW
JSF-206	20.82	127.97	11.48	13.03	Open Fracture	N38E/11SE
JSF-206	21	334.06	60.78	0	Discontinuous Fract	N64E/61NW
JSF-206	30.88	344.71	38.96	0	Part. Open Fract	N75E/39NW
JSF-206	33.85	329.19	46.12	0	Part. Open Fract	N59E/46NW
JSF-206	34.44	318.2	43.01	0	Part. Open Fract	N48E/43NW
JSF-206	35.62	125.99	49.78	0	Part. Open Fract	N36E/50SE
JSF-206	35.75	145.88	49.46	0	Filled Fracture	N56E/49SE
JSF-206	36.13	135.23	63.57	0	Part. Open Fract	N45E/64SE
JSF-206	37.15	134.33	62.99	0	Part. Open Fract	N44E/63SE
JSF-206	38.54	320.59	46.71	0	Part. Open Fract	N51E/47NW
JSF-206	39.24	144	38.97	0	Filled Fracture	N54E/39SE
JSF-206	40.76	170.98	4.48	0	Filled Fracture	N81E/4SE
JSF-206	43.03	342.21	30.78	0	Part. Open Fract	N72E/31NW
JSF-206	43.17	302.33	33.71	0	Part. Open Fract	N32E/34NW
JSF-206	43.99	149.18	47.81	0	Part. Open Fract	N59E/48SE
JSF-206	47.11	351.46	59.44	0	Discontinuous Fract	N81E/59NW
JSF-206	48.41	68.23	65.37	0	Discontinuous Fract	N22W/65NE
JSF-206	48.78	137.88	53.4	7.46	Filled Fracture	N48E/53SE
JSF-206	50.41	190.13	7.08	0	Filled Fracture	N80W/7SW
JSF-206	50.91	331.67	67.25	0	Discontinuous Fract	N62E/67NW
JSF-206	51.11	139.91	6.35	0	Filled Fracture	N50E/6SE
JSF-206	51.23	334.14	63.81	0	Discontinuous Fract	N64E/64NW
JSF-206	51.89	137.6	52.17	0	Filled Fracture	N48E/52SE
JSF-206	52.01	118.01	48.59	0	Part. Open Fract	N28E/49SE
JSF-206	52.33	339.68	79.04	0	Discontinuous Fract	N70E/79NW
JSF-206	52.73	48.77	16.79	0	Fracture - No Orientation	N41W/17NE
JSF-206	52.77	107.31	63.96	0	Discontinuous Fract	N17E/64SE
JSF-206	52.81	105.96	12.66	0	Part. Open Fract	N16E/13SE
JSF-206	53.52	115.07	78.11	0	Discontinuous Fract	N25E/78SE
JSF-206	53.54	108.84	62.61	0	Discontinuous Fract	N19E/63SE
JSF-206	54.13	84.66	69.8	0	Discontinuous Fract	N5W/70NE
JSF-206	54.24	114.52	87.33	0	Discontinuous Fract	N25E/87SE
JSF-206	54.45	257.17	47.55	0	Part. Open Fract	N13W/48SW
JSF-206	54.72	240.19	61.29	0	Part. Open Fract	N30W/61SW
JSF-206	54.91	141.38	34.6	0	Filled Fracture	N51E/35SE
JSF-207	20.88	109.94	26.01	61.68	Broken/Void/Soft Zone	N20E/26SE
JSF-207	21.74	152.96	69.29	0	Filled Fracture	N63E/69SE
JSF-207	22.85	339.78	26.68	0	Filled Fracture	N70E/27NW
JSF-207	23.21	340.38	39.15	0	Bedding	N70E/39NW
JSF-207	23.45	339.94	39.16	0	Bedding	N70E/39NW
JSF-207	23.62	320.68	40.8	0	Part. Open Fract	N51E/41NW
JSF-207	23.64	336.2	43.33	0	Part. Open Fract	N66E/43NW
JSF-207	23.88	325.28	32.3	0	Bedding	N55E/32NW
JSF-207	24.01	337.37	27.18	0	Bedding	N67E/27NW
JSF-207	24.2	344.36	35.72	13.16	Open Fracture	N74E/36NW
JSF-207	24.67	339.05	34.4	0	Bedding	N69E/34NW
JSF-207	24.69	120.96	30.22	0	Discontinuous Fract	N31E/30SE
JSF-207	25.32	146.7	22.84	12.17	Part. Open Fract	N57E/23SE
JSF-207	25.49	143.91	54.29	0	Part. Open Fract	N54E/54SE
JSF-207	25.77	156.22	29.39	0	Filled Fracture	N66E/29SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-207	25.92	159.41	33.51	0	Bedding	N69E/34SE
JSF-207	25.99	138.72	57.19	0	Filled Fracture	N49E/57SE
JSF-207	26.18	116.82	49.77	0	Bedding	N27E/50SE
JSF-207	26.47	134.46	46.54	0	Bedding	N44E/47SE
JSF-207	26.67	131.58	44.85	0	Bedding	N42E/45SE
JSF-207	26.75	131.7	41.71	0	Bedding	N42E/42SE
JSF-207	26.87	133.6	45.87	0	Bedding	N44E/46SE
JSF-207	26.93	131.58	47.06	0	Bedding	N42E/47SE
JSF-207	27.09	144.76	46.46	0	Bedding	N55E/46SE
JSF-207	27.23	144.52	48.34	0	Part. Open Fract	N55E/48SE
JSF-207	27.44	137.55	43.69	0	Bedding	N48E/44SE
JSF-207	27.58	131.64	45.13	0	Bedding	N42E/45SE
JSF-207	27.75	144.43	46.45	0	Bedding	N54E/46SE
JSF-207	27.91	142.27	36.7	0	Bedding	N52E/37SE
JSF-207	28.04	149.35	41.62	0	Bedding	N59E/42SE
JSF-207	28.31	128.49	39.87	0	Bedding	N38E/40SE
JSF-207	28.64	143.46	15.23	22.77	Broken/Void/Soft Zone	N53E/15SE
JSF-207	28.81	145.83	25.23	0	Part. Open Fract	N56E/25SE
JSF-207	29.2	136.22	50.25	6.05	Part. Open Fract	N46E/50SE
JSF-207	29.47	99.44	37.35	0	Discontinuous Fract	N9E/37SE
JSF-207	29.95	138.56	60.75	6.91	Part. Open Fract	N49E/61SE
JSF-207	30.17	145.13	58.28	0	Bedding	N55E/58SE
JSF-207	30.37	139.19	54.5	0	Bedding	N49E/55SE
JSF-207	30.54	139.15	53.33	0	Bedding	N49E/53SE
JSF-207	30.64	134.59	53.83	0	Bedding	N45E/54SE
JSF-207	30.8	140.83	53.57	0	Bedding	N51E/54SE
JSF-207	30.93	136.77	56.87	0	Bedding	N47E/57SE
JSF-207	31.16	131.22	55.61	0	Part. Open Fract	N41E/56SE
JSF-207	31.55	134.1	49.7	30.58	Broken/Void/Soft Zone	N44E/50SE
JSF-207	31.91	142.91	58.81	0	Part. Open Fract	N53E/59SE
JSF-207	32.51	135.16	48.45	6.27	Part. Open Fract	N45E/48SE
JSF-207	32.98	148.37	45.04	0	Bedding	N58E/45SE
JSF-207	33.15	146.52	41.13	0	Bedding	N57E/41SE
JSF-207	33.38	146.37	39.2	0	Bedding	N56E/39SE
JSF-207	33.64	131.46	33.41	13.43	Open Fracture	N41E/33SE
JSF-207	33.99	305.91	52.52	7.42	Open Fracture	N36E/53NW
JSF-207	34.04	142.05	34.35	0	Part. Open Fract	N52E/34SE
JSF-207	34.21	149.65	32.39	7.95	Open Fracture	N60E/32SE
JSF-207	34.38	148.81	34.54	7.75	Open Fracture	N59E/35SE
JSF-207	34.72	153.5	33.26	0	Bedding	N64E/33SE
JSF-207	34.83	159.05	39.02	0	Bedding	N69E/39SE
JSF-207	35.63	130.45	35.83	0	Bedding	N40E/36SE
JSF-207	35.82	146.14	38.36	0	Bedding	N56E/38SE
JSF-207	35.98	154.15	39.41	0	Bedding	N64E/39SE
JSF-207	36.15	132.51	42	0	Bedding	N43E/42SE
JSF-207	36.22	142.43	39.21	0	Part. Open Fract	N52E/39SE
JSF-207	36.27	130.43	40.15	0	Bedding	N40E/40SE
JSF-207	36.47	154.24	41.43	0	Bedding	N64E/41SE
JSF-207	36.78	143.42	29.65	0	Bedding	N53E/30SE
JSF-207	36.89	156.69	33.1	0	Bedding	N67E/33SE
JSF-207	36.99	149.23	40	0	Bedding	N59E/40SE
JSF-207	37.23	150.07	40.04	0	Bedding	N60E/40SE
JSF-207	37.41	154.32	39.01	0	Bedding	N64E/39SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-207	37.54	158.75	33.59	0	Bedding	N69E/34SE
JSF-207	37.71	149.11	36.87	0	Bedding	N59E/37SE
JSF-207	37.89	138.07	39.45	0	Bedding	N48E/39SE
JSF-207	38.02	142.48	42.06	0	Bedding	N52E/42SE
JSF-207	38.17	152.19	38.57	0	Bedding	N62E/39SE
JSF-207	38.41	146.61	32.57	0	Bedding	N57E/33SE
JSF-207	38.6	129.39	39.32	0	Bedding	N39E/39SE
JSF-207	38.78	149.68	33.37	0	Bedding	N60E/33SE
JSF-207	39.01	149.75	34.53	0	Bedding	N60E/35SE
JSF-207	39.18	143.74	33.73	0	Bedding	N54E/34SE
JSF-207	39.29	154.02	39.2	0	Bedding	N64E/39SE
JSF-207	39.44	145.05	36.23	0	Bedding	N55E/36SE
JSF-207	39.55	135.3	37.39	0	Bedding	N45E/37SE
JSF-207	39.78	144.97	36.91	0	Bedding	N55E/37SE
JSF-207	40.03	146.1	36.01	0	Bedding	N56E/36SE
JSF-207	40.18	144.94	36.49	0	Bedding	N55E/36SE
JSF-207	40.31	140.07	37.29	0	Filled Fracture	N50E/37SE
JSF-207	40.4	142.16	38.99	0	Bedding	N52E/39SE
JSF-207	40.57	142.33	40.21	0	Bedding	N52E/40SE
JSF-207	40.72	154.04	39.13	0	Bedding	N64E/39SE
JSF-207	40.89	143.88	35.4	0	Bedding	N54E/35SE
JSF-207	41.05	137.23	27.75	0	Bedding	N47E/28SE
JSF-207	41.19	140.43	40.91	0	Bedding	N50E/41SE
JSF-207	41.28	151.98	37.85	0	Bedding	N62E/38SE
JSF-207	41.43	149.04	38.68	0	Bedding	N59E/39SE
JSF-207	41.55	150.14	40.43	0	Bedding	N60E/40SE
JSF-207	41.66	146.8	34.88	0	Bedding	N57E/35SE
JSF-207	41.77	142.21	37.91	0	Bedding	N52E/38SE
JSF-207	42.04	152.15	40.98	0	Bedding	N62E/41SE
JSF-207	42.14	144.96	36.65	0	Bedding	N55E/37SE
JSF-207	42.21	140.67	33.24	0	Bedding	N51E/33SE
JSF-207	42.35	144.54	41.09	0	Bedding	N55E/41SE
JSF-207	42.49	137.31	38.03	0	Bedding	N47E/38SE
JSF-207	42.7	148.96	37.5	0	Bedding	N59E/38SE
JSF-207	42.82	149.3	41.05	0	Bedding	N59E/41SE
JSF-207	42.9	144.42	41.89	0	Bedding	N54E/42SE
JSF-207	43.06	142.09	37.9	0	Bedding	N52E/38SE
JSF-207	43.18	135.51	37.76	0	Bedding	N46E/38SE
JSF-207	43.39	135.38	40.64	0	Bedding	N45E/41SE
JSF-207	43.56	137.76	42.43	0	Bedding	N48E/42SE
JSF-207	43.72	144.36	42.81	0	Bedding	N54E/43SE
JSF-207	43.87	140.27	40.29	0	Bedding	N50E/40SE
JSF-207	44.15	142.89	41.22	0	Bedding	N53E/41SE
JSF-207	44.6	148.46	40.69	0	Part. Open Fract	N58E/41SE
JSF-207	44.65	4	37.46	0	Discontinuous Fract	N86W/37NE
JSF-207	44.73	142.33	41.8	0	Filled Fracture	N52E/42SE
JSF-207	45.03	147.51	46.39	0	Bedding	N58E/46SE
JSF-207	45.22	142.21	39.79	0	Bedding	N52E/40SE
JSF-207	45.39	145.26	41.46	0	Bedding	N55E/41SE
JSF-207	45.5	144.3	41.66	0	Bedding	N54E/42SE
JSF-207	45.68	134.9	33.91	0	Bedding	N45E/34SE
JSF-207	45.94	150.01	38.56	0	Bedding	N60E/39SE
JSF-207	46.04	144.13	39.03	0	Bedding	N54E/39SE

Planar Orientations

Well ID	Depth (feet)	Dip Dir. (deg)	Dip (deg)	Aperture (mm)	Type	Strike/Dip (Quadrant)
JSF-207	46.26	137.33	40	0	Bedding	N47E/40SE
JSF-207	46.43	133.45	38.74	0	Bedding	N43E/39SE
JSF-207	46.87	150.42	45.5	0	Bedding	N60E/46SE
JSF-207	46.98	130.71	47.79	0	Bedding	N41E/48SE
JSF-207	47.13	137.87	48.7	0	Bedding	N48E/49SE
JSF-207	47.27	135.65	44.94	0	Bedding	N46E/45SE
JSF-207	47.69	145.06	38.27	0	Bedding	N55E/38SE
JSF-207	47.78	143.54	38.39	0	Bedding	N54E/38SE
JSF-207	47.95	152.45	47.03	0	Bedding	N62E/47SE
JSF-207	48.06	147.28	46.68	0	Bedding	N57E/47SE
JSF-207	48.29	144.34	42.55	0	Bedding	N54E/43SE
JSF-207	48.56	144.22	42.19	0	Bedding	N54E/42SE
JSF-207	48.75	147.54	45.15	0	Bedding	N58E/45SE
JSF-207	48.93	154.38	41.75	0	Part. Open Fract	N64E/42SE
JSF-207	49.17	146.11	43.66	13.68	Open Fracture	N56E/44SE
JSF-207	49.52	145.06	57.44	0	Part. Open Fract	N55E/57SE
JSF-207	49.67	75.57	70.37	4.11	Part. Open Fract	N14W/70NE
JSF-207	49.82	142.58	60.83	14.86	Open Fracture	N53E/61SE
JSF-207	50.05	132.68	61.29	0	Part. Open Fract	N43E/61SE
JSF-207	50.25	126.87	60.99	0	Part. Open Fract	N37E/61SE
JSF-207	50.49	126.56	64.35	0	Bedding	N37E/64SE
JSF-207	50.84	129.52	64.37	0	Bedding	N40E/64SE
JSF-207	51.65	134.4	65.35	0	Bedding	N44E/65SE
JSF-207	52.01	159.03	40.32	0	Filled Fracture	N69E/40SE
JSF-207	52.02	139.28	63.06	0	Bedding	N49E/63SE
JSF-207	52.23	131.41	64.12	0	Bedding	N41E/64SE
JSF-207	52.45	298.71	39.87	0	Filled Fracture	N29E/40NW
JSF-207	52.6	141.47	70.15	0	Bedding	N51E/70SE
JSF-207	52.73	139.57	72.31	0	Bedding	N50E/72SE
JSF-207	52.92	138.59	72.55	0	Bedding	N49E/73SE
JSF-207	53.53	131.55	73.73	0	Bedding	N42E/74SE
JSF-207	54.08	106.9	58.77	0	Filled Fracture	N17E/59SE
JSF-207	54.2	352.75	46.71	0	Filled Fracture	N83E/47NW
JSF-207	54.34	139.45	68.63	0	Filled Fracture	N49E/69SE
JSF-207	54.58	132.92	71.14	0	Bedding	N43E/71SE
JSF-207	54.78	359.57	43.19	0	Filled Fracture	N90E/43NW
JSF-207	54.91	129.7	70.49	0	Bedding	N40E/70SE
JSF-207	55.16	128.73	70.87	0	Bedding	N39E/71SE
JSF-207	55.56	138.49	69.3	0	Bedding	N48E/69SE
JSF-207	55.99	131.75	73.92	0	Bedding	N42E/74SE
JSF-207	56.55	141.09	74.03	0	Bedding	N51E/74SE

APPENDIX F – WATER QUALITY PARAMETERS

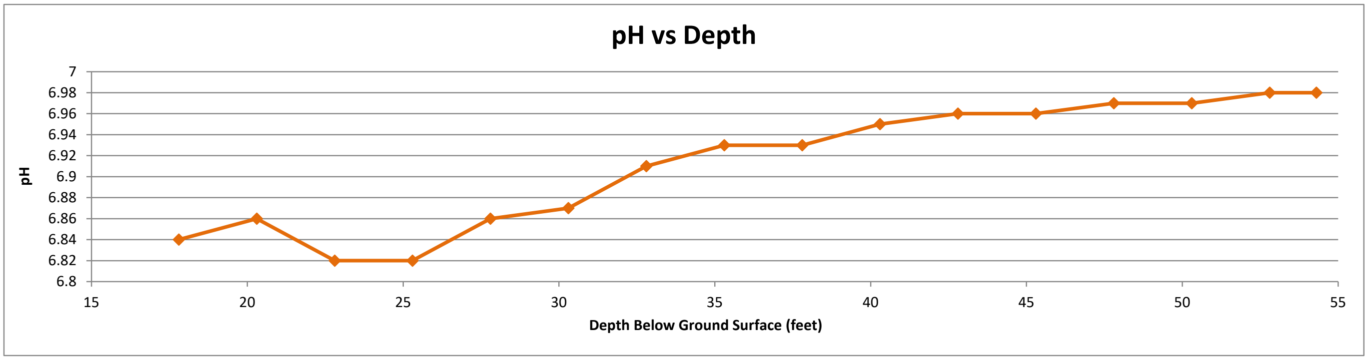
Summary of Groundwater Quality Parameters During Drilling
John Sevier Fossil Plant
May 2019

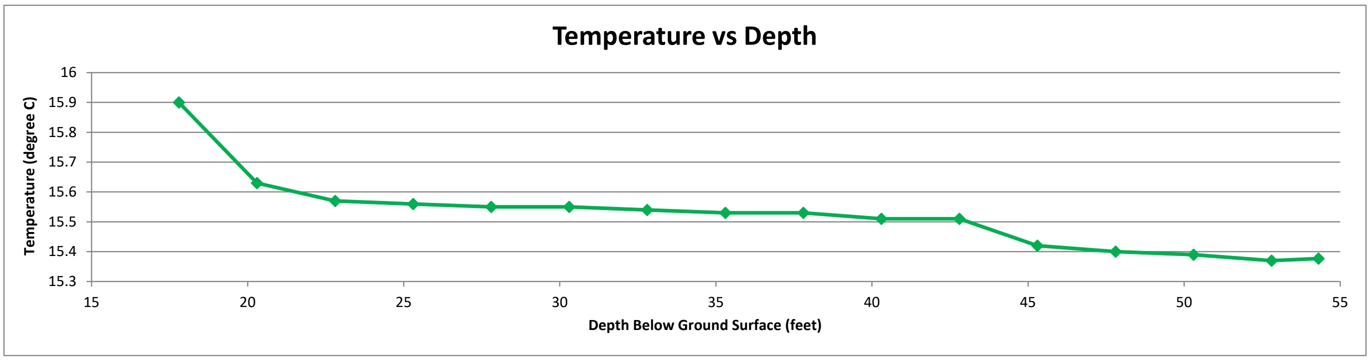
Sample Location	Sample Date	Sample Depth (ft below TOC)	pH	Temperature, Water	Specific Conductance	Dissolved Oxygen
		units	SU	Degree C	uS/cm	mg/L
JSF-206	**24-May-19**	17.8	6.84	15.90	484	0.59
		20.3	6.86	15.63	509	0.50
		22.8	6.82	15.57	510	0.48
		25.3	6.82	15.56	510	0.43
		27.8	6.86	15.55	510	0.41
		30.3	6.87	15.55	510	0.40
		32.8	6.91	15.54	510	0.39
		35.3	6.93	15.53	510	0.40
		37.8	6.93	15.53	509	0.40
		40.3	6.95	15.51	511	0.43
		42.8	6.96	15.51	509	0.48
		45.3	6.96	15.42	545	0.52
		47.8	6.97	15.40	528	0.57
		50.3	6.97	15.39	563	0.51
		52.8	6.98	15.37	565	0.43
		54.3	6.98	15.38	566	0.34
JSF-207	**24-May-19**	17.1	7.18	14.73	518	NM
		19.6	7.17	14.76	530	0.27
		22.1	7.2	14.89	538	0.21
		24.6	7.23	14.98	547	0.17
		27.1	7.25	15.09	554	0.17
		29.6	7.26	15.14	555	0.16
		32.1	7.26	15.12	557	0.15
		34.6	7.26	15.11	557	0.16
		37.1	7.23	14.92	570	0.15
		39.6	7.23	14.91	571	0.15
		42.1	7.23	14.91	571	0.14
		44.6	7.23	14.88	575	0.14
		47.1	7.22	14.85	587	0.14
		49.6	7.22	14.75	589	0.14
		52.1	7.2	14.59	593	0.14
		54.6	7.2	14.50	592	0.13
		56.1	7.2	14.47	592	0.12

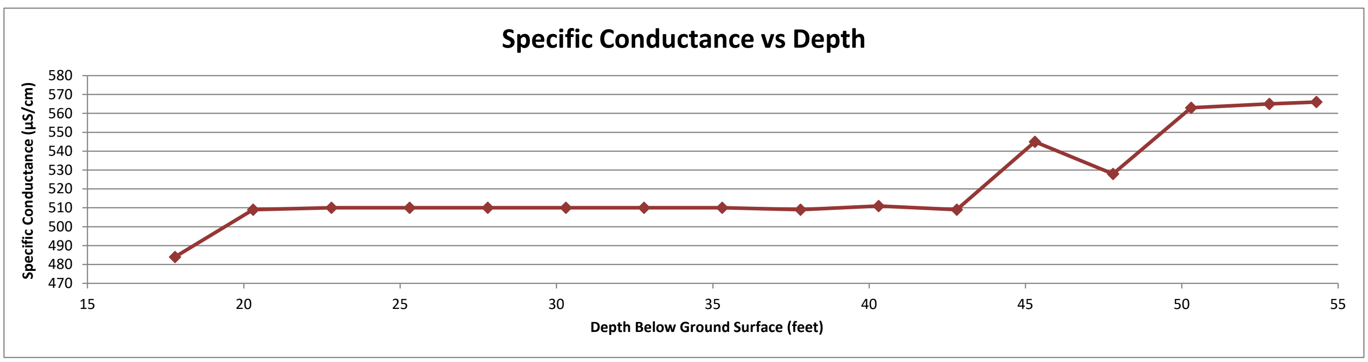
Notes:

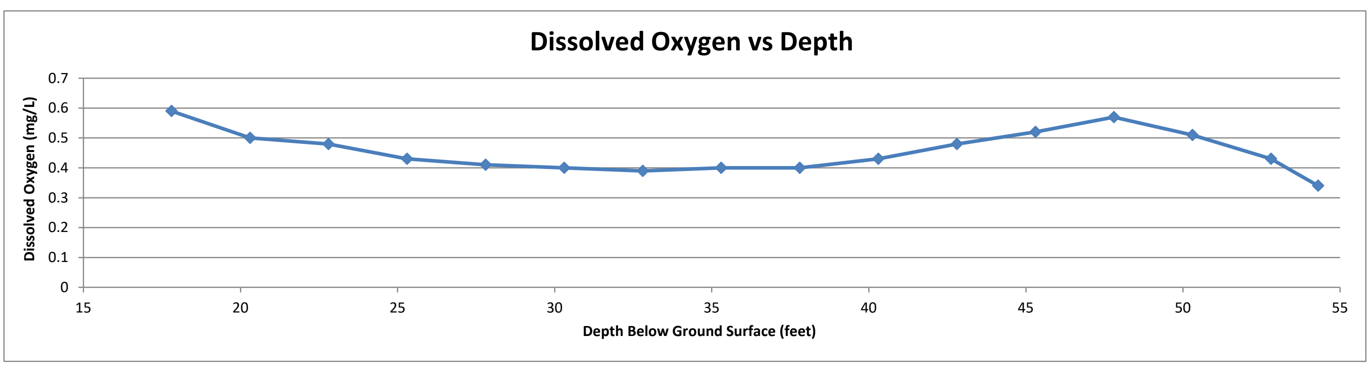
ft	feet
Degree C	degrees Celsius
mg/L	milligrams per Liter
NM	not measured
SU	Standard Units
TOC	Top of Casing
uS/cm	microSiemens per centimeter

JSF-206 FIELD PARAMETER DATA

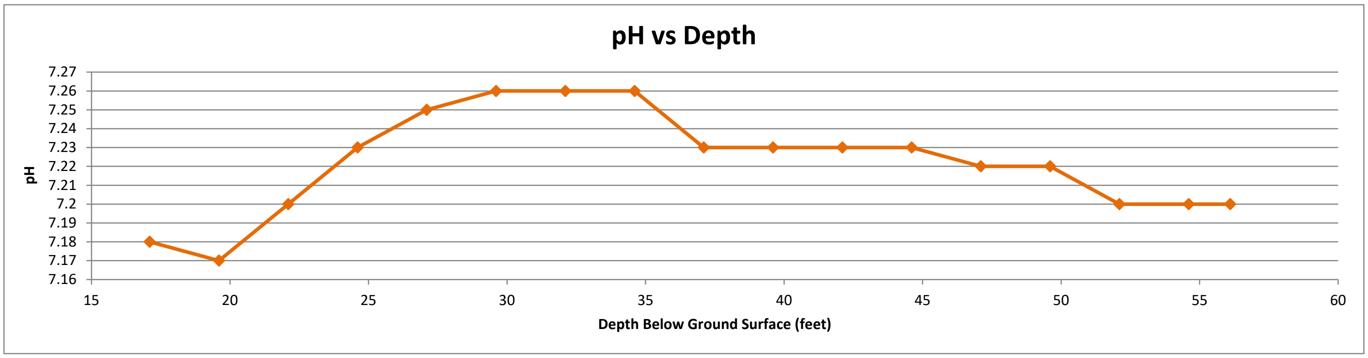


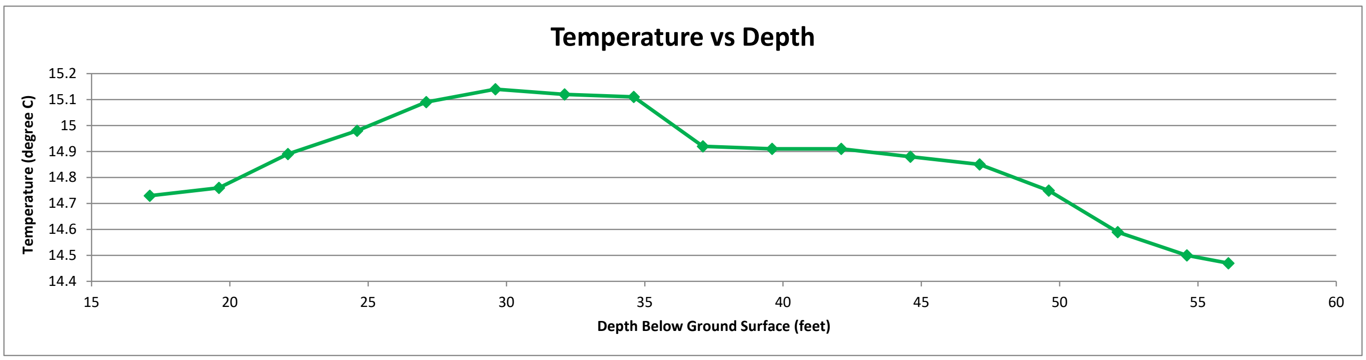


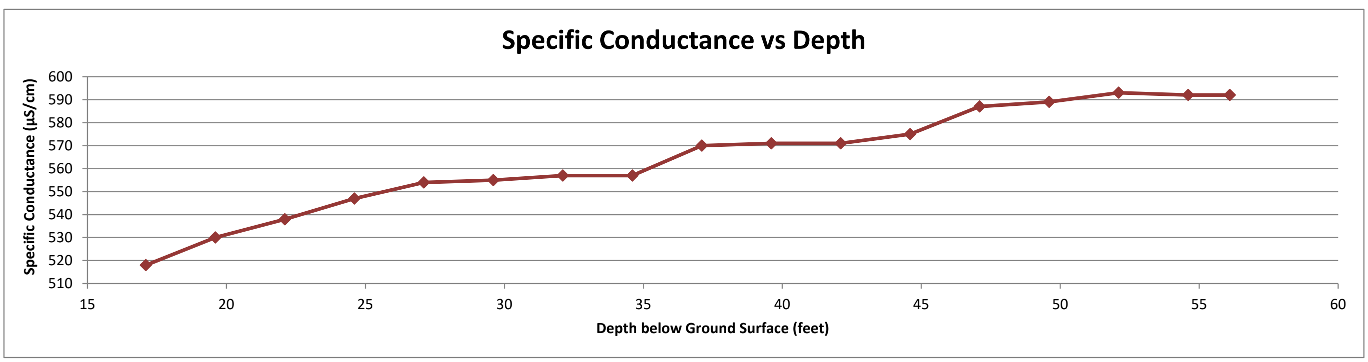


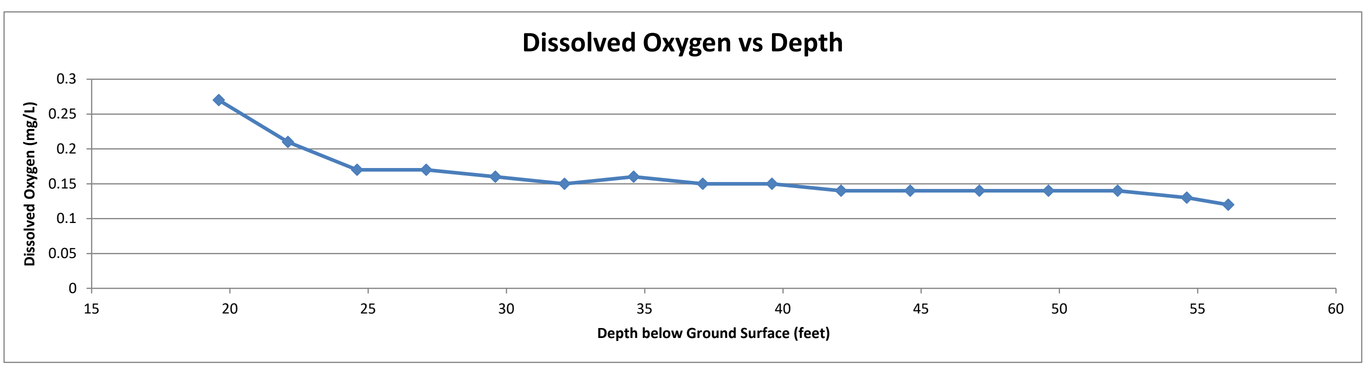


JSF-207 FIELD PARAMETERS









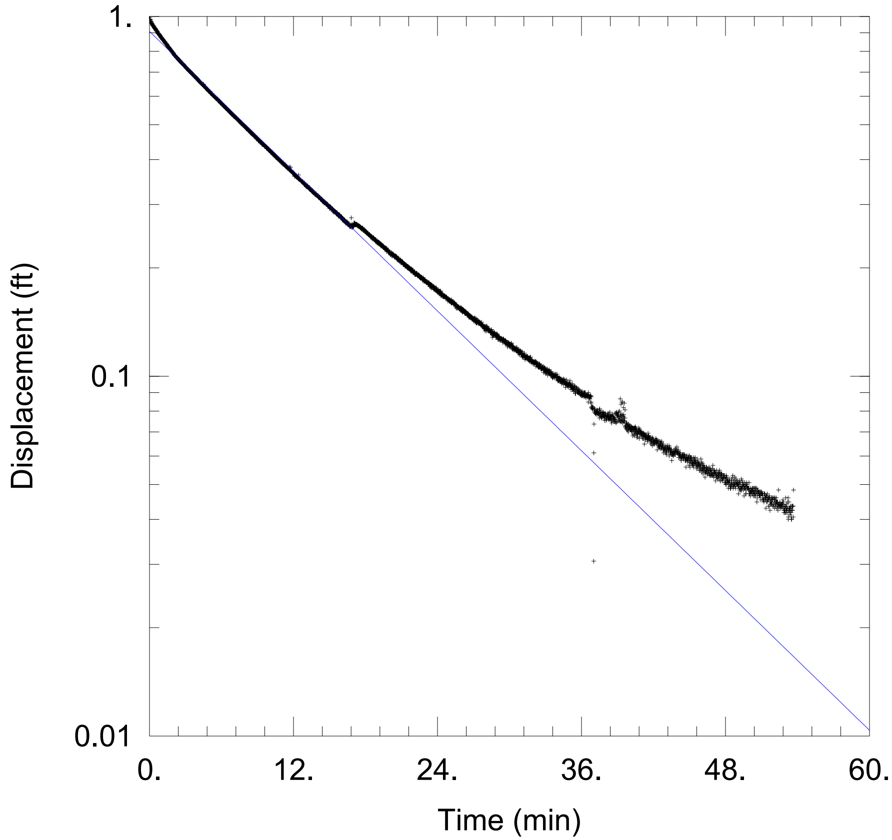
APPENDIX G – SLUG TEST RESULTS

Stantec

Slug Test Results
JSF Plant Hydrogeological Investigation

Well ID	Test	Test Date	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/sec)
JSF-106	Falling Head 1	4/4/2019	0.8525	3.0E-04
	Rising Head 1	4/4/2019	0.5595	2.0E-04
	Falling Head 2	4/4/2019	0.8687	3.1E-04
	Rising Head 2	4/4/2019	0.6942	2.4E-04
	Falling Head 3	4/10/2019	0.9588	3.4E-04
	Rising Head 3	4/10/2019	0.778	2.7E-04
	Falling Head 4	4/10/2019	0.9255	3.3E-04
JSF-107	Rising Head 1	4/16/2019	1.122	4.0E-04
	Rising Head 2	4/16/2019	0.9122	3.2E-04
	Rising Head 3	4/16/2019	0.7454	2.6E-04
JSF-108	Falling Head 1	4/10/2019	0.0734	2.6E-05
	Rising Head 1	4/11/2019	0.04854	1.7E-05
	Falling Head 2	4/11/2019	0.0575	2.0E-05
	Rising Head 2	4/15/2019	0.03642	1.3E-05
	Rising Head 3	4/16/2019	0.01692	6.0E-06
	Falling Head 3	10/18/2019	0.01731	6.1E-06
JSF-109	Rising Head 1	4/17/2019	0.01884	6.6E-06
	Rising Head 2	4/18/2019	0.01795	6.3E-06
	Falling Head 1	10/18/2019	0.0366	1.3E-05
JSF-110	Rising Head 1	4/16/2019	7.682	2.7E-03
	Rising Head 2	4/16/2019	8.173	2.9E-03
	Rising Head 3	4/16/2019	8.967	3.2E-03
JSF-206	Falling Head 1	10/15/2019	4.141	1.5E-03
	Rising Head 1	10/15/2019	5.597	2.0E-03
	Falling Head 2	10/15/2019	3.615	1.3E-03
	Falling Head 3	10/15/2019	3.834	1.4E-03
	Rising Head 3	10/15/2019	4.015	1.4E-03
JSF-207	Falling Head 1	10/16/2019	2.595	9.2E-04
	Rising Head 1	10/16/2019	2.561	9.0E-04
	Falling Head 2	10/16/2019	2.536	8.9E-04
	Rising Head 2	10/17/2019	2.93	1.0E-03
	Falling Head 3	10/17/2019	2.623	9.3E-04
	Rising Head 3	10/17/2019	2.56	9.0E-04
JSF-208	Falling Head 1	10/17/2019	0.04459	1.6E-05
	Rising Head 1	10/18/2019	0.0361	1.3E-05
JSF-209	Falling Head 1	10/15/2019	1.656	5.8E-04
	Rising Head 1	10/15/2019	1.062	3.7E-04
	Falling Head 2	10/16/2019	0.4399	1.6E-04
	Rising Head 2	10/16/2019	0.5224	1.8E-04
	Falling Head 3	10/16/2019	0.557	2.0E-04
	Rising Head 3	10/16/2019	0.539	1.9E-04
	Falling Head 4	10/16/2019	0.4641	1.6E-04
	Rising Head 4	10/16/2019	0.4022	1.4E-04
JSF-210	Falling Head 1	10/15/2019	1.437	5.1E-04
	Rising Head 1	10/15/2019	1.58	5.6E-04
	Rising Head 2	10/15/2019	1.531	5.4E-04
	Falling Head 3	10/15/2019	1.278	4.5E-04
	Rising Head 3	10/15/2019	1.431	5.0E-04

Notes
ft/day - feet per day
cm/sec - centimeters per second
Slug tests were conducted between April 4 and October 18, 2019
Data analysis was completed using AQTESOLV™, Version 4.50 Professional
Analysis was completed using the Bouwer-Rice (1976) solution



JSF-106 FH 1

Data Set: Z:\...\JSF-106_FH-1.aqt
Date: 05/08/20 Time: 16:04:13

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

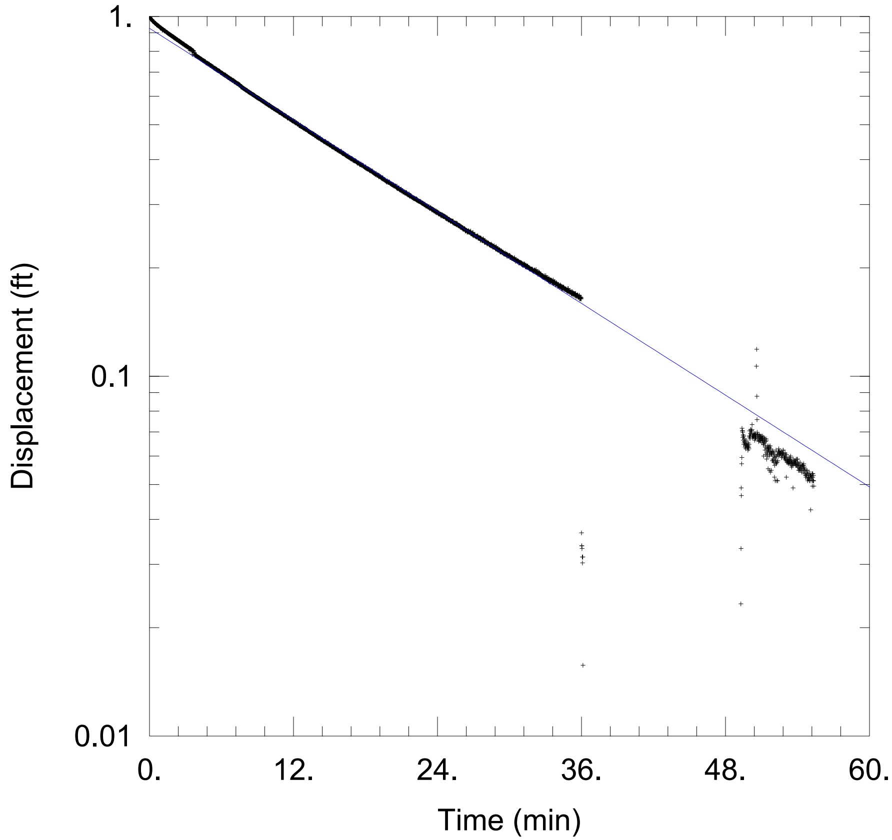
K = 0.8525 ft/day
y0 = 0.9084 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 RH 1

Data Set: Z:\...\JSF-106_RH-1.aqt
Date: 05/08/20 Time: 16:06:46

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

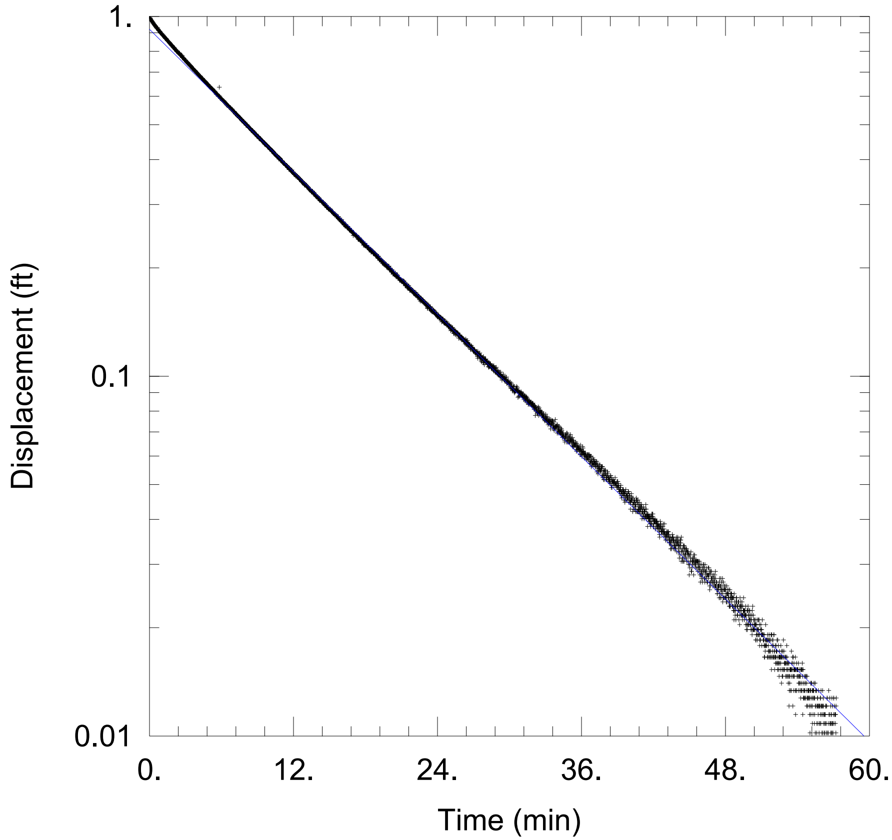
K = 0.5595 ft/day
y0 = 0.9271 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 FH 2

Data Set: Z:\...\JSF-106_FH-2.aqt
Date: 05/08/20 Time: 16:05:09

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

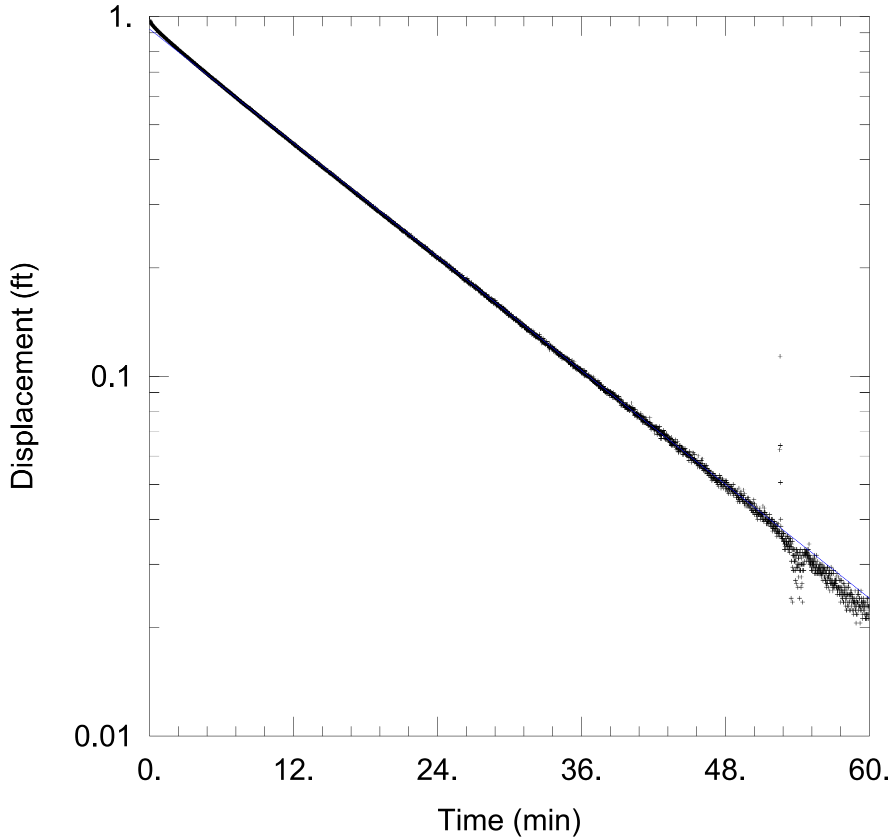
K = 0.8687 ft/day
y0 = 0.9206 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 RH 2

Data Set: Z:\...\JSF-106_RH-2.aqt
Date: 05/08/20 Time: 16:07:08

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

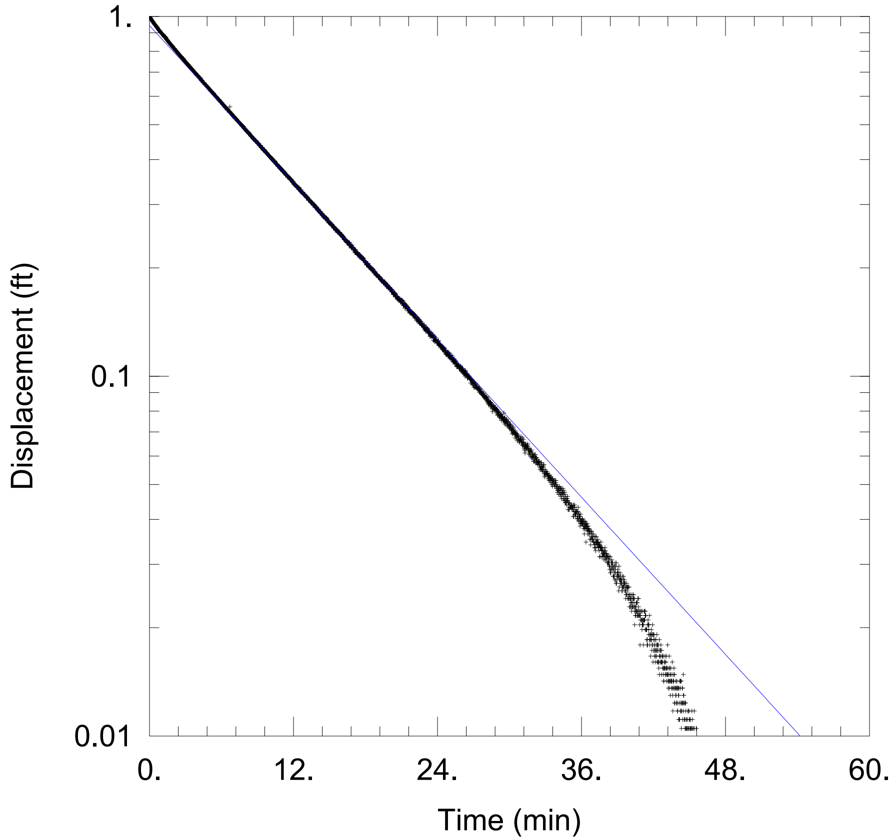
K = 0.6942 ft/day
y0 = 0.922 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 FH 3

Data Set: Z:\...\JSF-106_FH-3.aqt
Date: 05/08/20 Time: 16:05:43

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

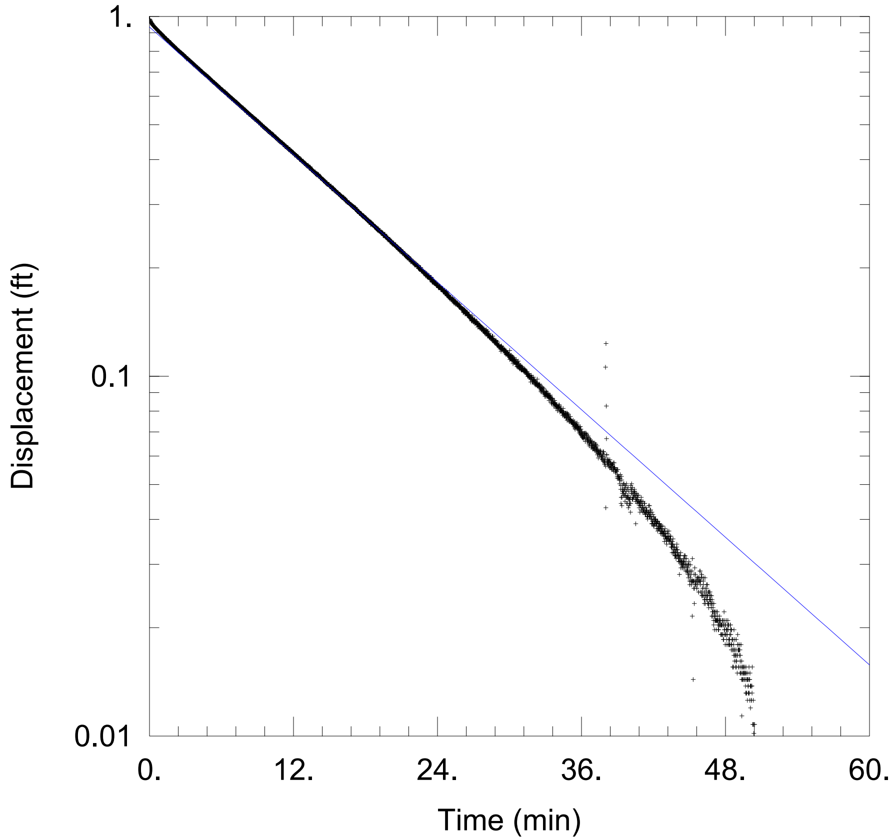
K = 0.9588 ft/day
y0 = 0.943 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 RH 3

Data Set: Z:\...\JSF-106_RH-3.aqt
Date: 05/08/20 Time: 16:07:39

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.778 ft/day
y0 = 0.9341 ft

AQUIFER DATA

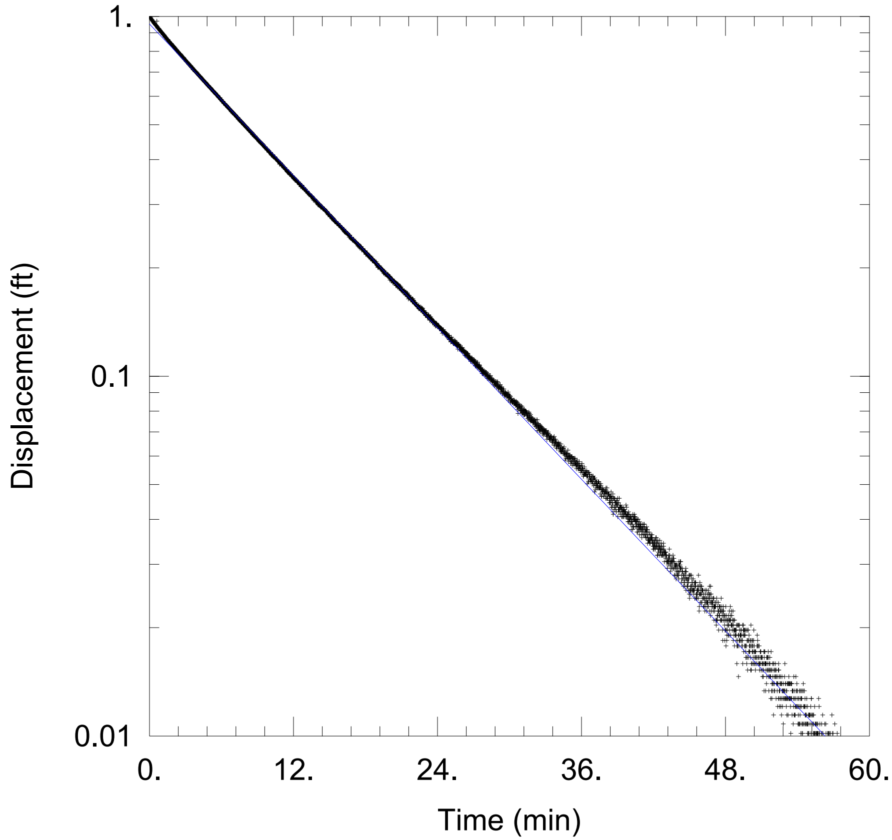
Saturated Thickness: 8.55 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-106 FH 4

Data Set: Z:\...\JSF-106_FH-4.aqt
Date: 05/08/20 Time: 16:06:16

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-106
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

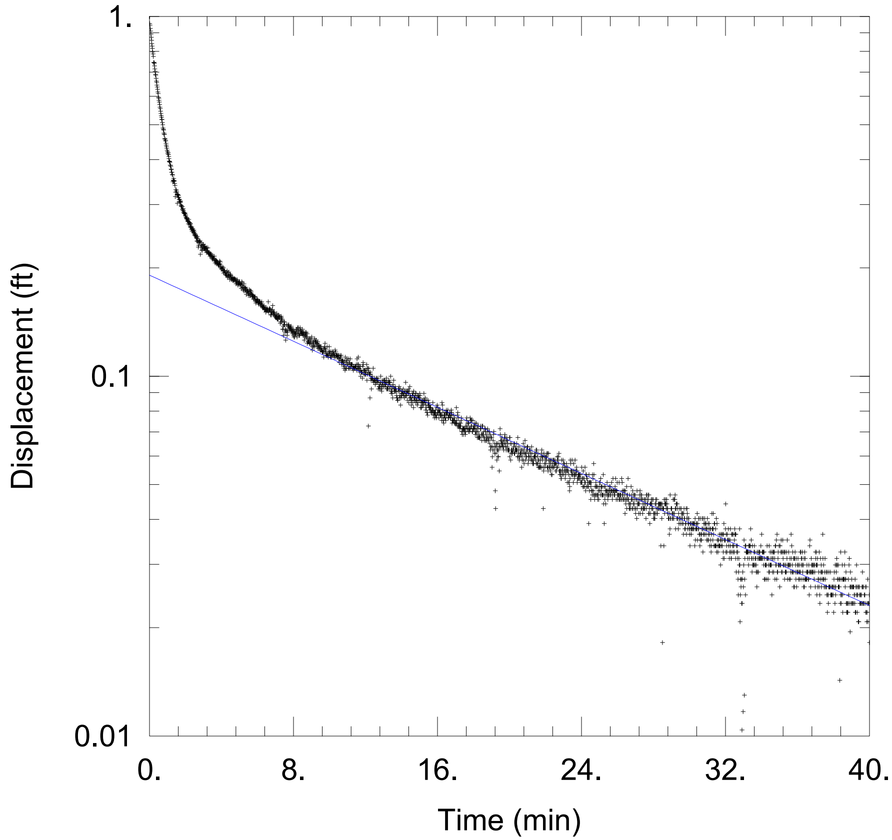
K = 0.9255 ft/day
y0 = 0.9524 ft

AQUIFER DATA

Saturated Thickness: 8.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-106)

Initial Displacement: 1. ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.55 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-107 RH 1

Data Set: Z:\...\JSF-107_RH-1.aqt
Date: 05/11/20 Time: 13:03:42

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-107
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.122 ft/day
y0 = 0.1909 ft

AQUIFER DATA

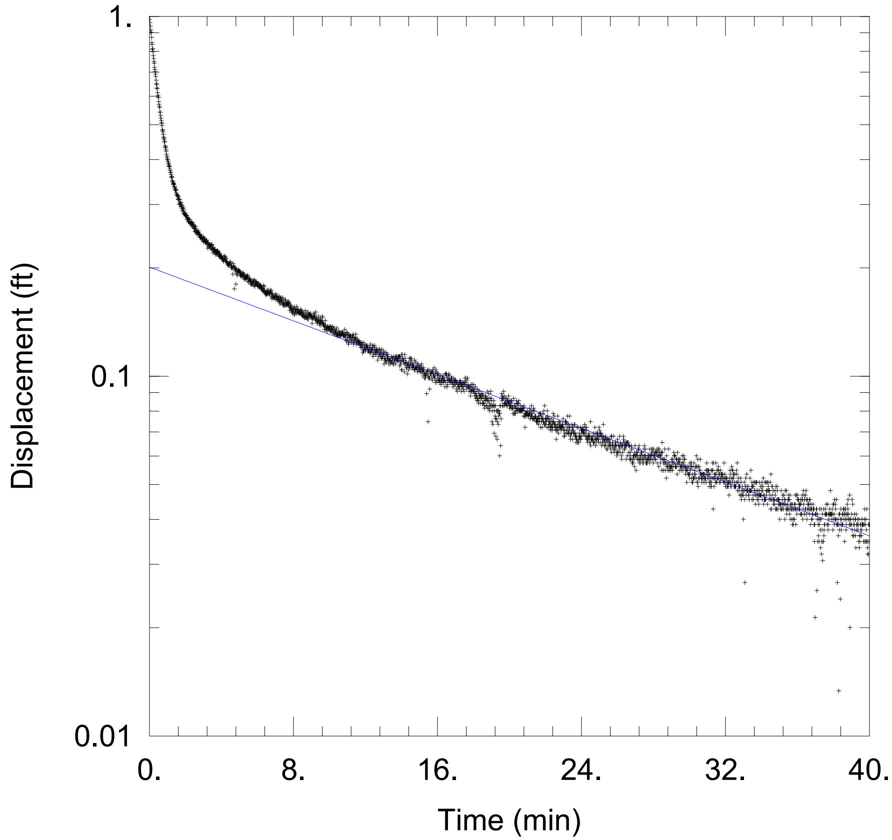
Saturated Thickness: 1.56 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-107)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 1.56 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-107 RH 2

Data Set: Z:\...\JSF-107_RH-2.aqt
Date: 05/11/20 Time: 13:03:21

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-107
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.9122 ft/day
y0 = 0.2009 ft

AQUIFER DATA

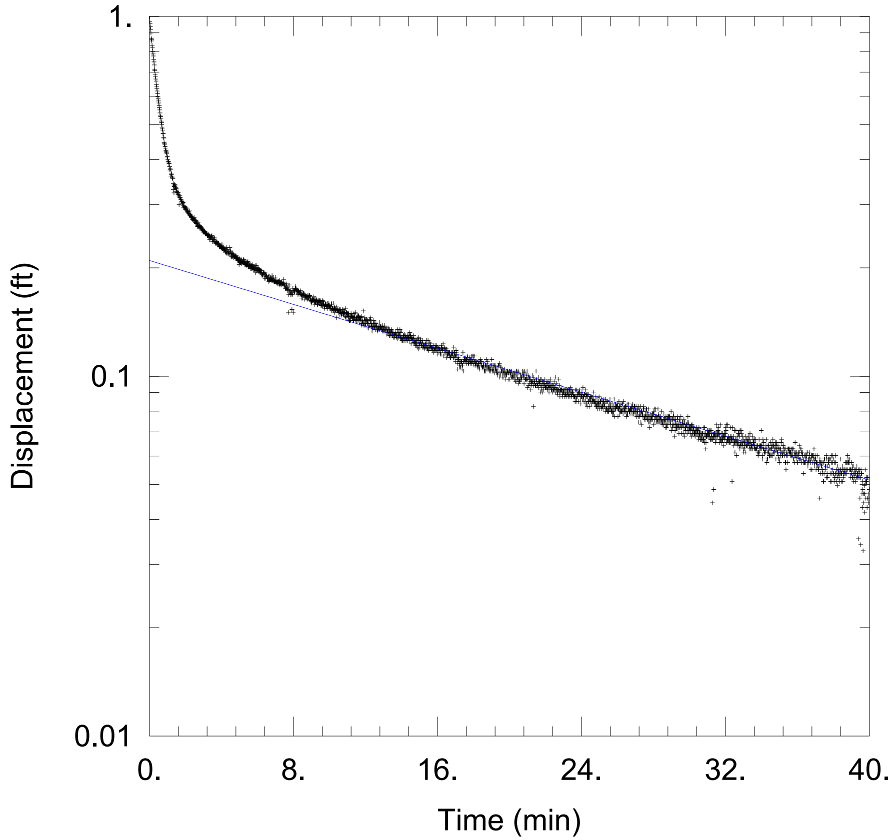
Saturated Thickness: 1.56 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-107)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 1.56 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-107 RH 3

Data Set: Z:\...\JSF-107_RH-3.aqt
Date: 05/11/20 Time: 13:03:05

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-107
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.7454 ft/day
y0 = 0.2097 ft

AQUIFER DATA

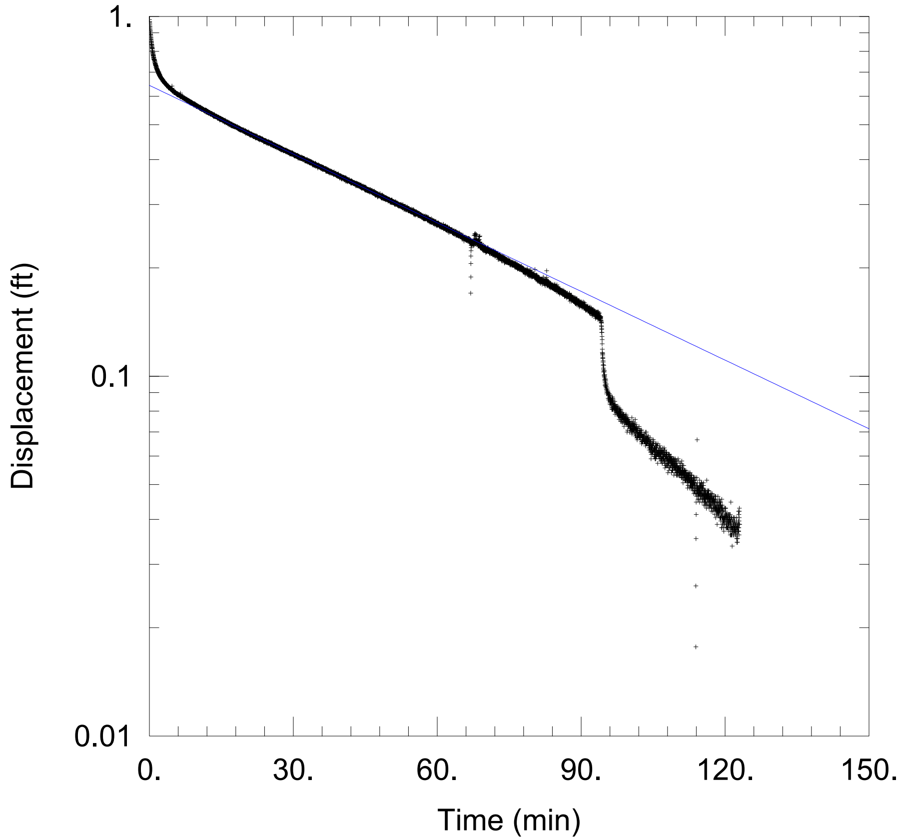
Saturated Thickness: 1.56 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-107)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 1.56 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 FH 1

Data Set: Z:\...\JSF-108_FH-1-Alternative.aqt
Date: 05/11/20 Time: 13:02:06

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.07343 ft/day
y0 = 0.643 ft

AQUIFER DATA

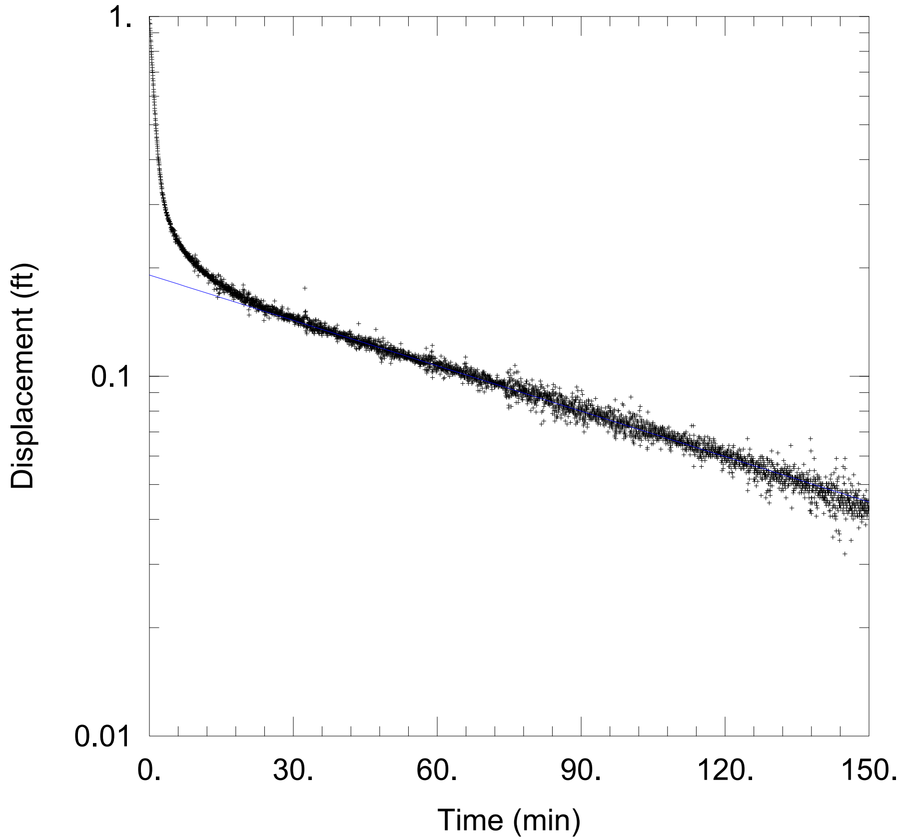
Saturated Thickness: 8.33 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 8.33 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 RH 1

Data Set: Z:\...\JSF-108_RH-1.aqt
Date: 05/11/20 Time: 13:00:34

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

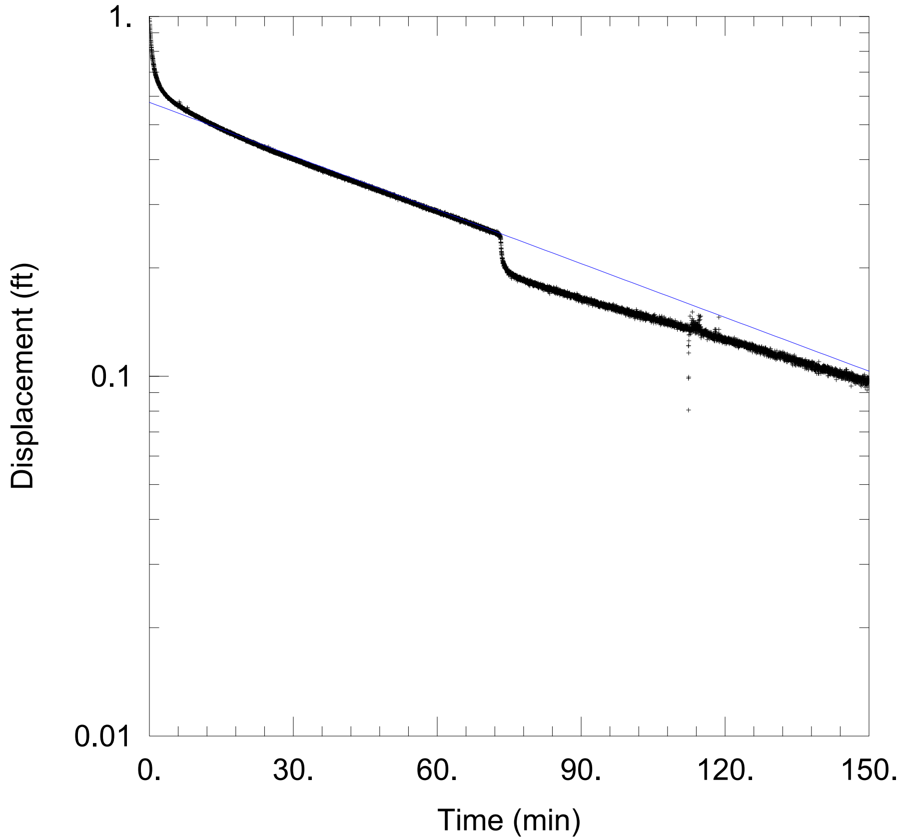
K = 0.04854 ft/day
y0 = 0.1911 ft

AQUIFER DATA

Saturated Thickness: 8.33 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.33 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 FH 2

Data Set: Z:\...\JSF-108_FH-2-Alternative.aqt
Date: 05/11/20 Time: 13:01:25

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0575 ft/day
y0 = 0.577 ft

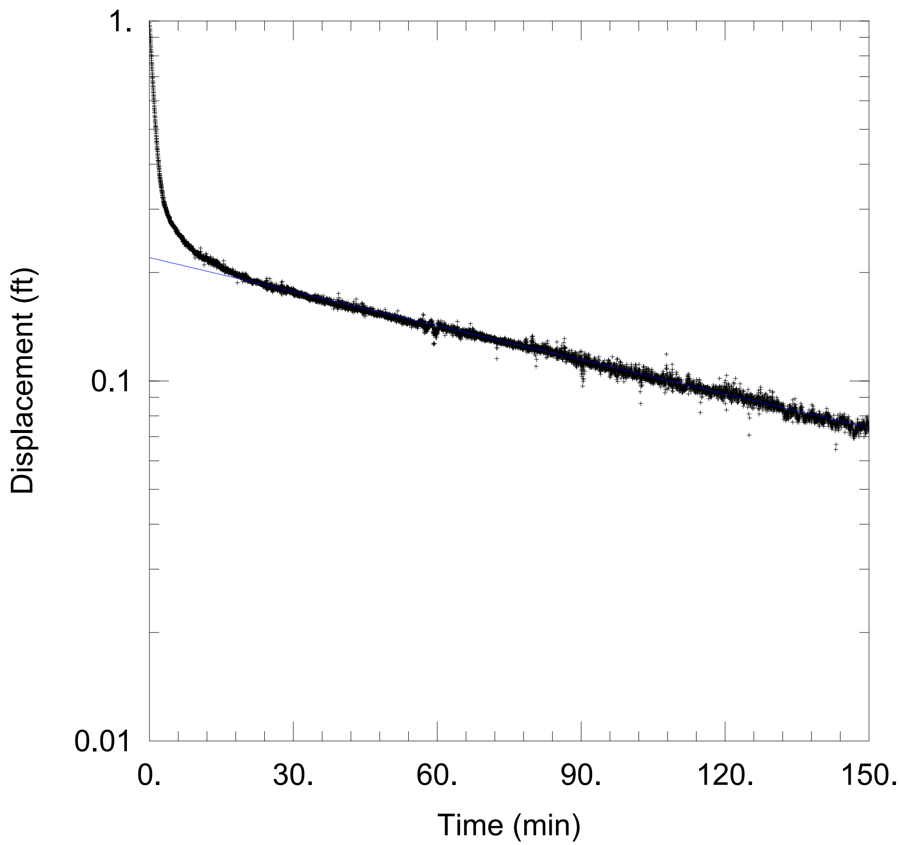
AQUIFER DATA

Saturated Thickness: 8.33 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 8.33 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 RH 2

Data Set: Z:\...\JSF-108_RH-2.aqt
Date: 05/11/20 Time: 13:00:02

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.03642 ft/day
y0 = 0.2201 ft

AQUIFER DATA

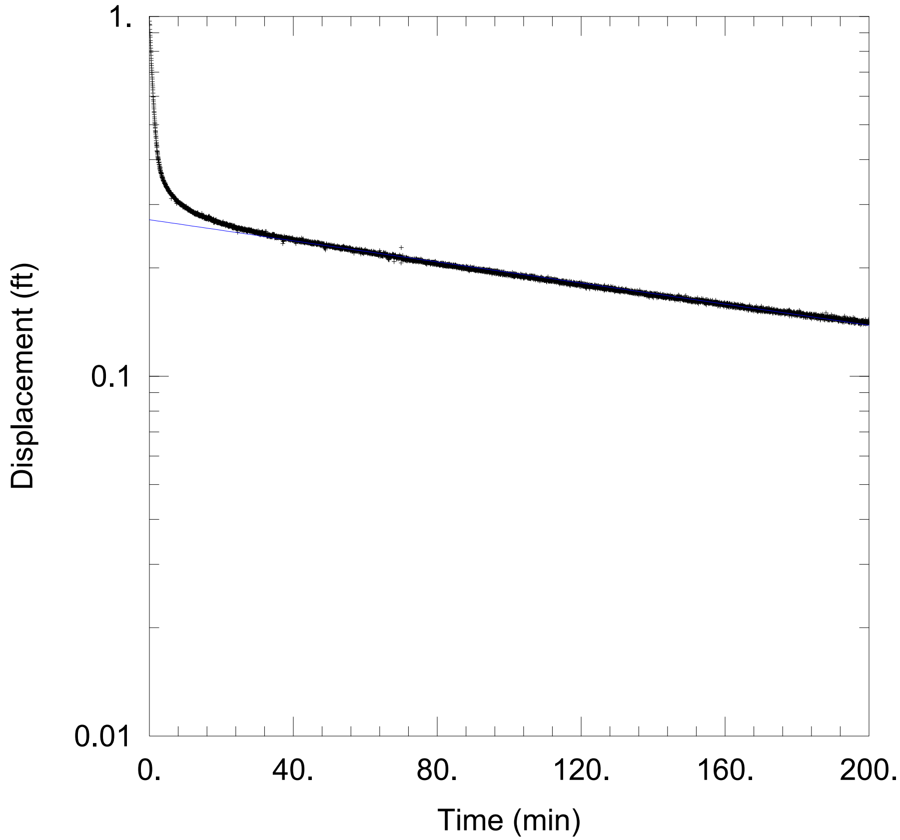
Saturated Thickness: 8.33 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 8.33 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 RH 3

Data Set: Z:\...\JSF-108_RH-3.aqt
Date: 05/11/20 Time: 13:04:03

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

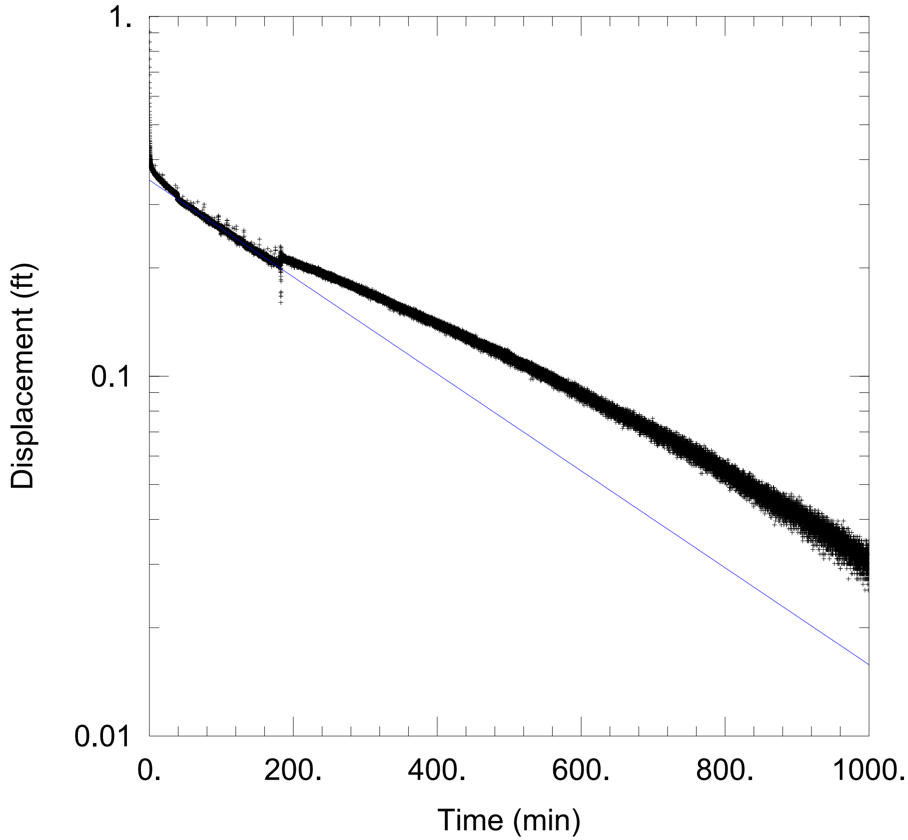
K = 0.01692 ft/day
y0 = 0.2722 ft

AQUIFER DATA

Saturated Thickness: 8.33 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft
Static Water Column Height: 8.33 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-108 FH 3

Data Set: Z:\...\JSF-108_FH-3.aqt
Date: 05/08/20 Time: 16:43:15

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-108
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01731 ft/day
y0 = 0.3507 ft

AQUIFER DATA

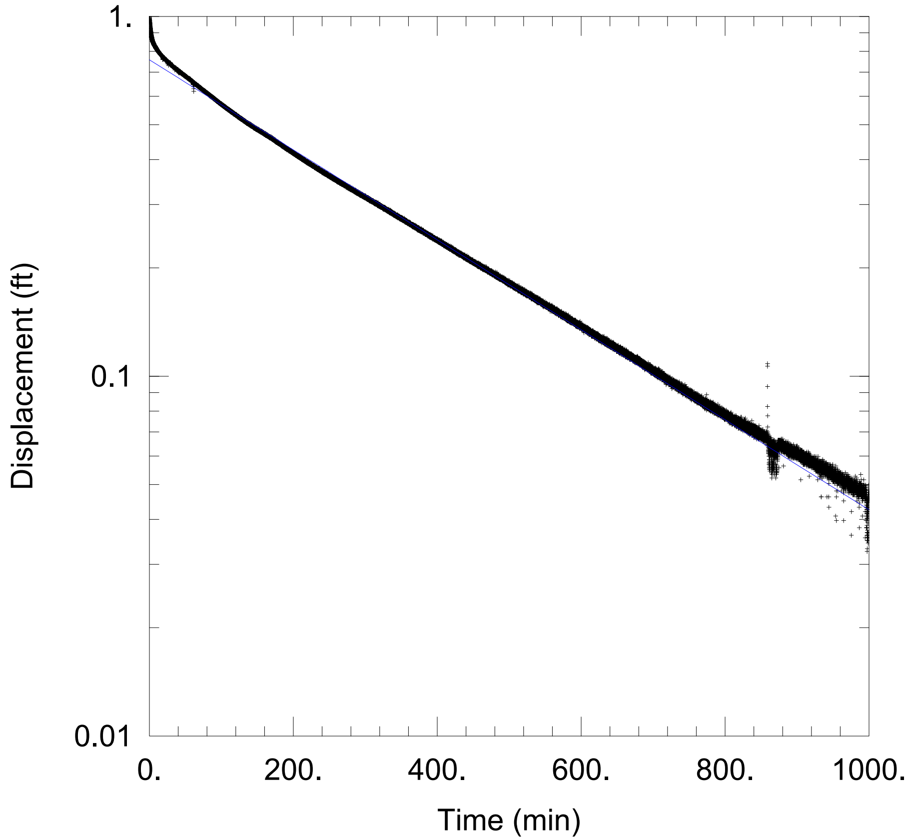
Saturated Thickness: 7.35 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-108)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 7.35 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-109 RH 1

Data Set: Z:\...\JSF-109_RH-1.aqt
Date: 05/08/20 Time: 16:17:48

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-109
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01884 ft/day
y0 = 0.7576 ft

AQUIFER DATA

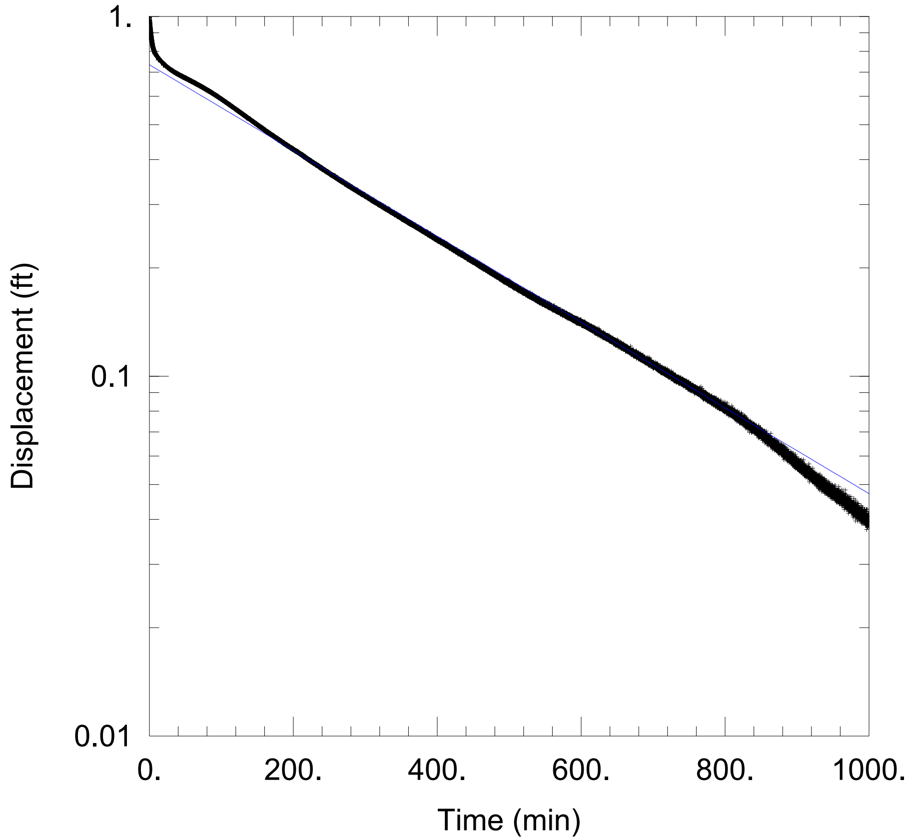
Saturated Thickness: 6.11 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-109)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 6.11 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-109 RH 2

Data Set: Z:\...\JSF-109_RH-2.aqt
Date: 05/08/20 Time: 16:18:44

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-109
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01795 ft/day
y0 = 0.7339 ft

AQUIFER DATA

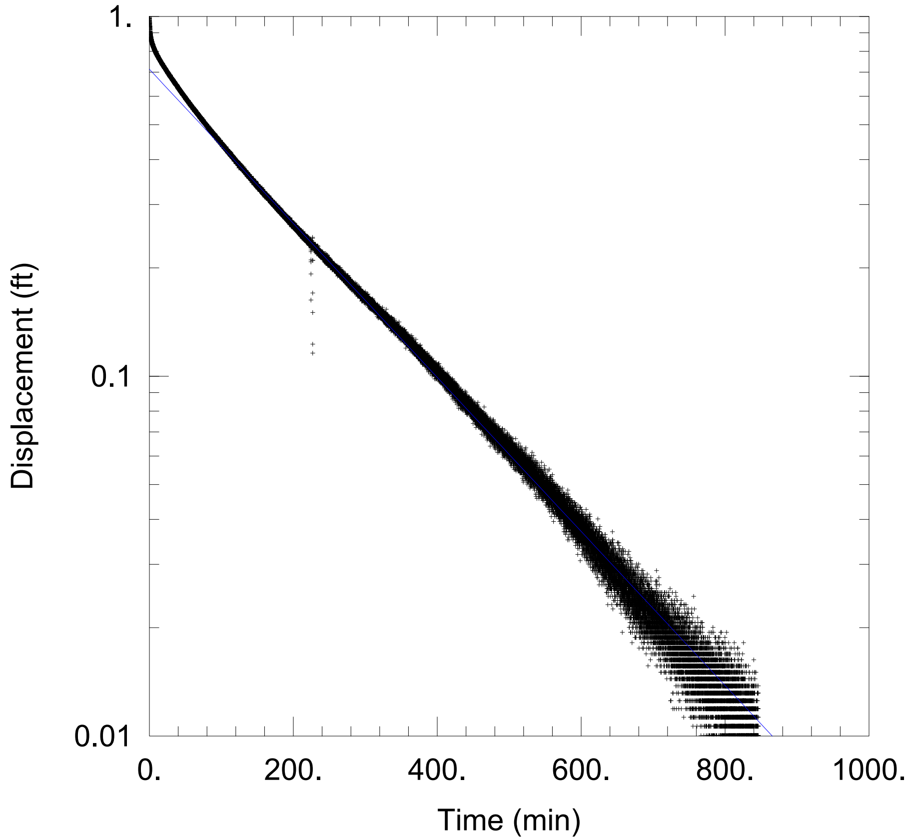
Saturated Thickness: 6.11 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-109)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 6.11 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-109 FH 1

Data Set: Z:\...\JSF-109_FH-1-OCT.aqt
Date: 05/08/20 Time: 16:44:17

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-109
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0366 ft/day
y0 = 0.7129 ft

AQUIFER DATA

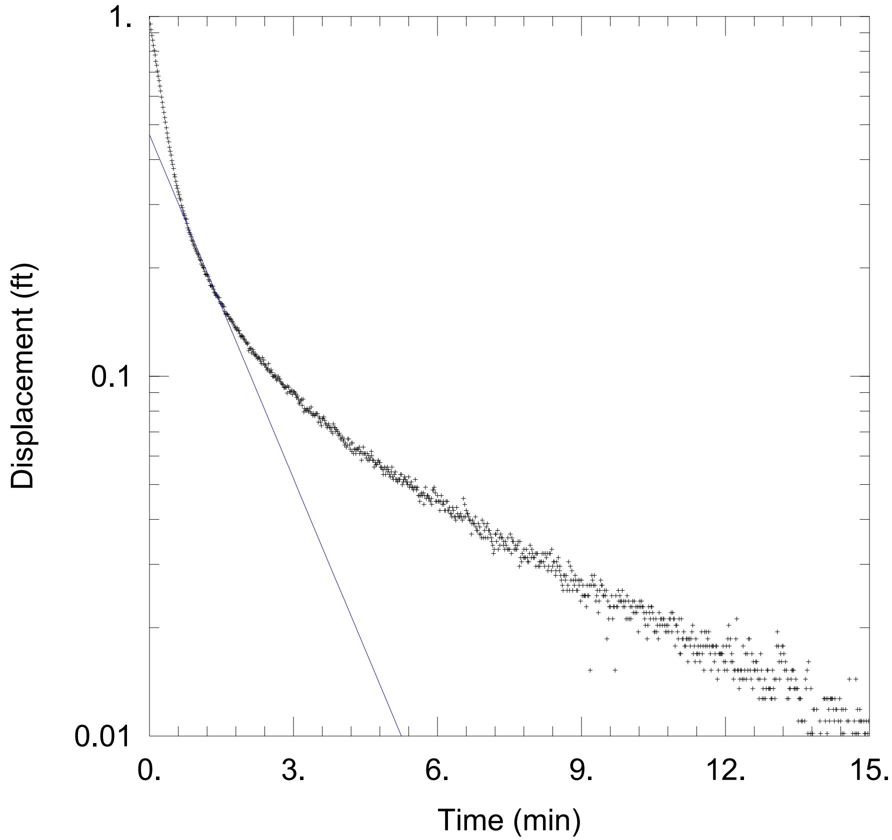
Saturated Thickness: 5.27 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-109)

Initial Displacement: 1. ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 5.27 ft
Screen Length: 10. ft
Well Radius: 0.552 ft



JSF-110 RH 1

Data Set: Z:\...\JSF-110_RH-1.aqt
Date: 05/08/20 Time: 16:19:27

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-110
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.682 ft/day
y0 = 0.4687 ft

AQUIFER DATA

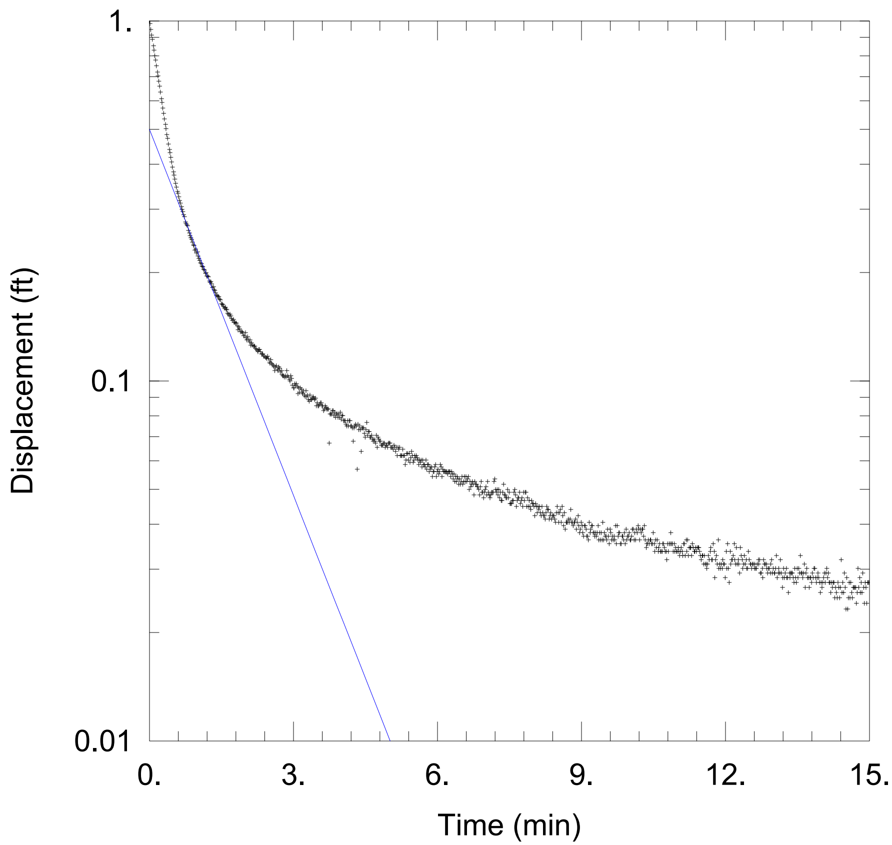
Saturated Thickness: 2.84 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-110)

Initial Displacement: 1. ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.1667 ft

Static Water Column Height: 2.84 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-110 RH 2

Data Set: Z:\...\JSF-110_RH-2.aqt
Date: 05/08/20 Time: 16:20:13

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-110
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

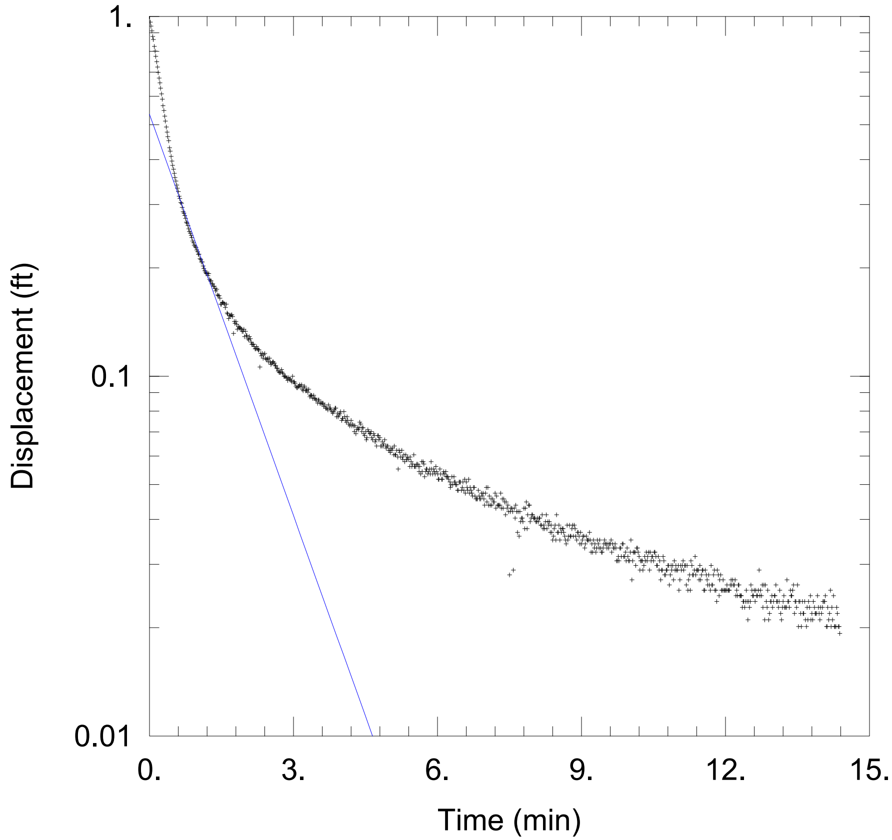
K = 8.173 ft/day
y0 = 0.4993 ft

AQUIFER DATA

Saturated Thickness: 2.84 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-110)

Initial Displacement: 1. ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.1667 ft
Static Water Column Height: 2.84 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-110 RH 3

Data Set: Z:\...\JSF-110_RH-3.aqt
Date: 05/08/20 Time: 16:20:37

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-110
Test Date: April 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

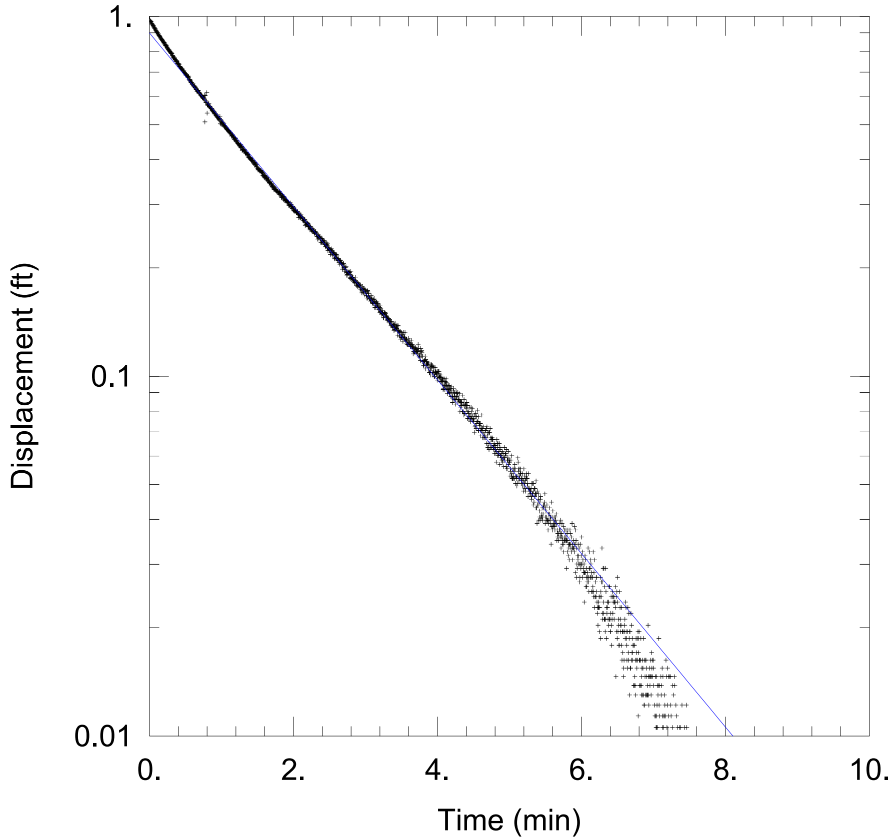
K = 8.967 ft/day
y0 = 0.5344 ft

AQUIFER DATA

Saturated Thickness: 2.84 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-110)

Initial Displacement: 1. ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.1667 ft
Static Water Column Height: 2.84 ft
Screen Length: 5. ft
Well Radius: 0.552 ft



JSF-206 FH 1

Data Set: Z:\...\JSF-206_FH-1.aqt
Date: 05/08/20 Time: 16:45:04

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-206
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

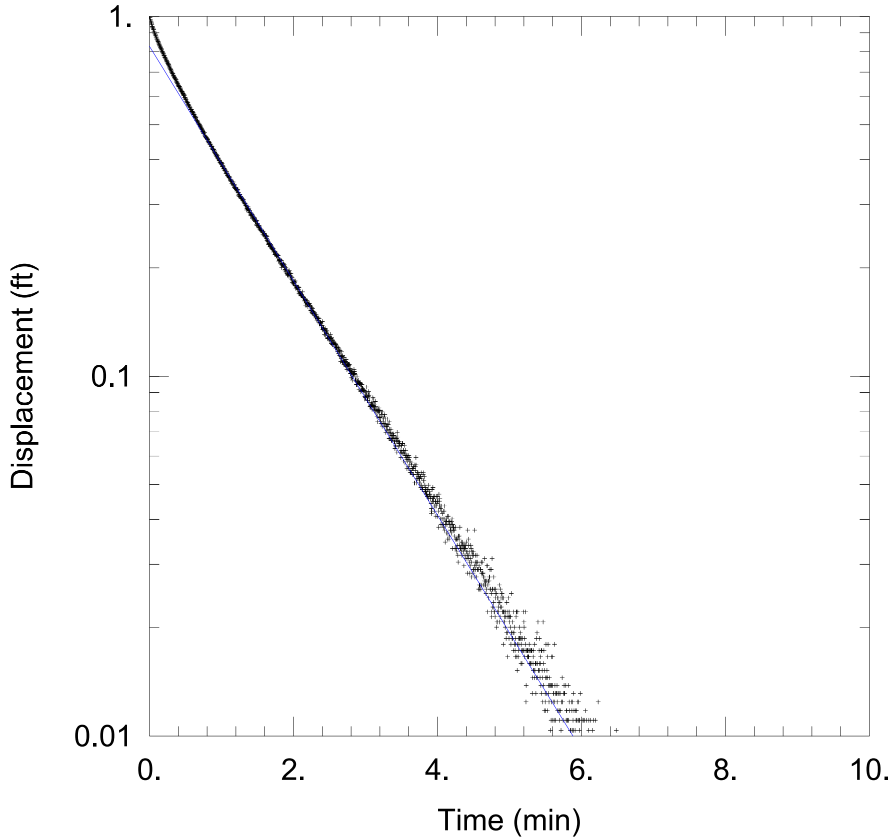
K = 4.141 ft/day
y0 = 0.8992 ft

AQUIFER DATA

Saturated Thickness: 12.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-206)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.7 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.7 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-206 RH 1

Data Set: Z:\...\JSF-206_RH-1.aqt
Date: 05/08/20 Time: 16:46:35

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-206
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

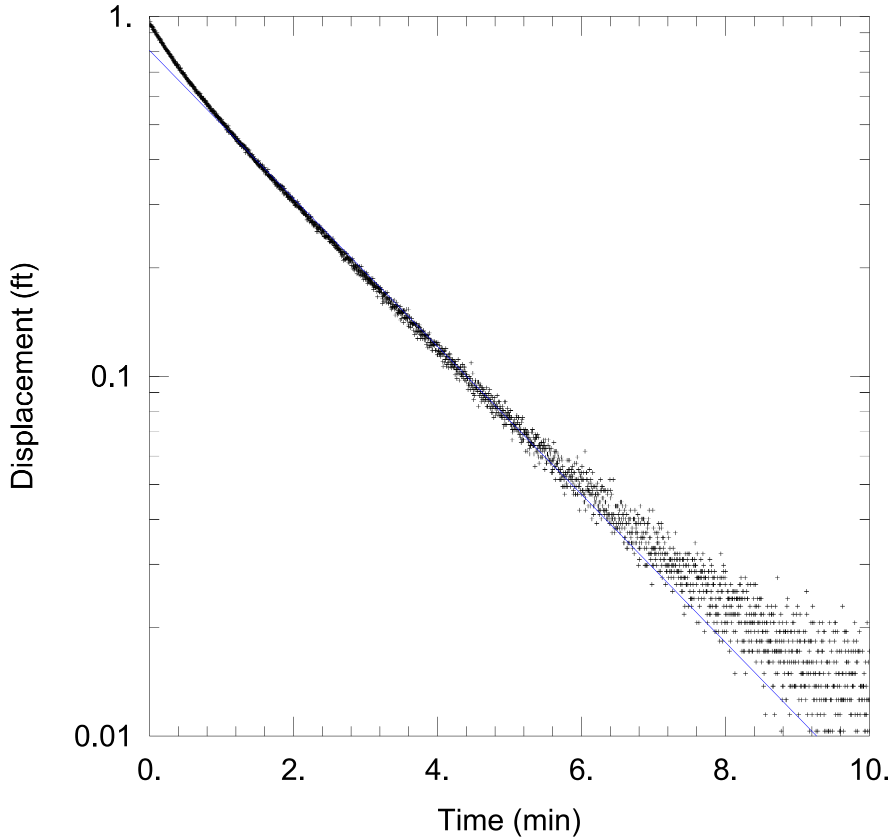
K = 5.597 ft/day
y0 = 0.8256 ft

AQUIFER DATA

Saturated Thickness: 12.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-206)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.7 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.7 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-206 FH 2

Data Set: Z:\...\JSF-206_FH-2.aqt
Date: 05/08/20 Time: 16:45:52

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-206
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

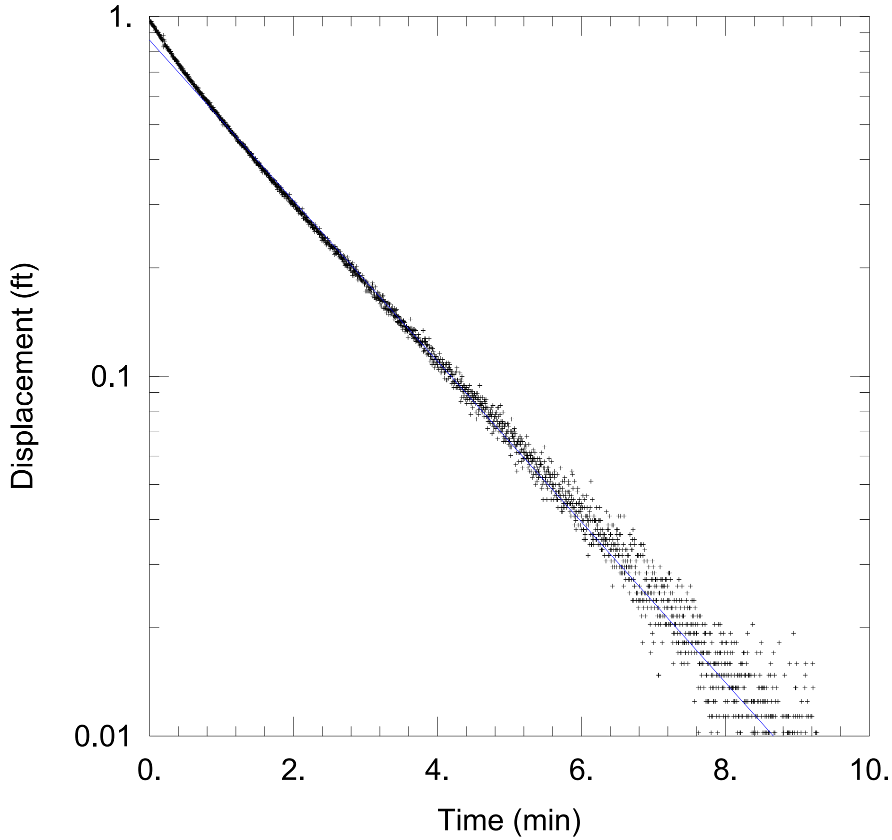
K = 3.615 ft/day
y0 = 0.8295 ft

AQUIFER DATA

Saturated Thickness: 12.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-206)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.7 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.7 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-206 FH 3

Data Set: Z:\...\JSF-206_FH-3.aqt
Date: 05/08/20 Time: 16:46:15

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-206
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.834 ft/day
y0 = 0.8596 ft

AQUIFER DATA

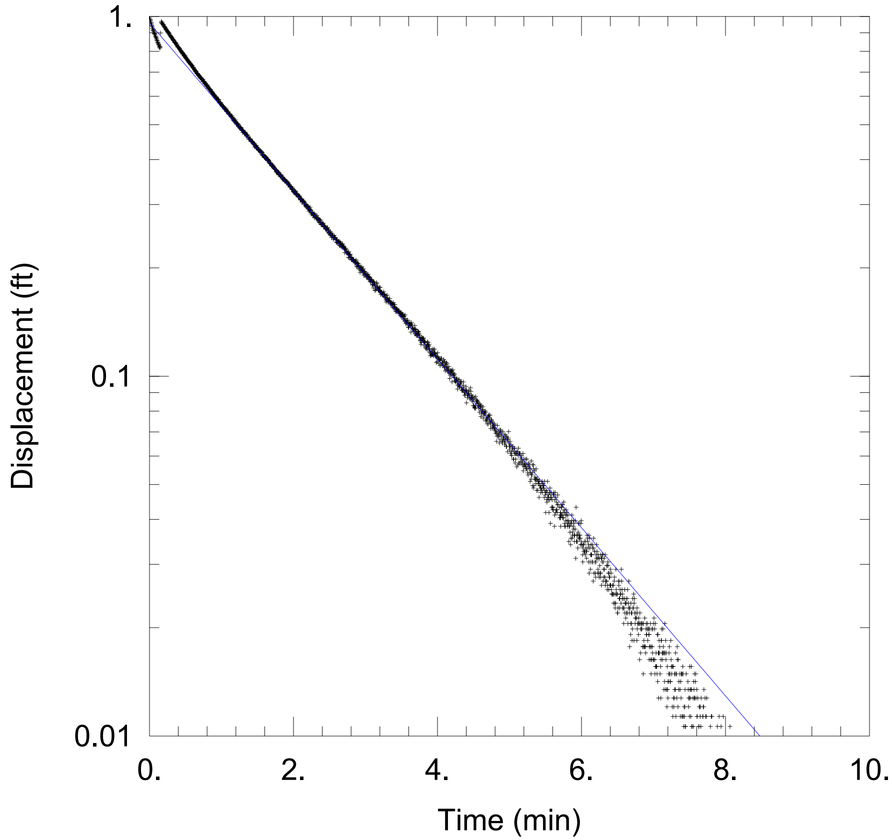
Saturated Thickness: 12.7 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-206)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.7 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.7 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-206 RH 3

Data Set: Z:\...\JSF-206_RH-3.aqt
Date: 05/08/20 Time: 16:46:58

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-206
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

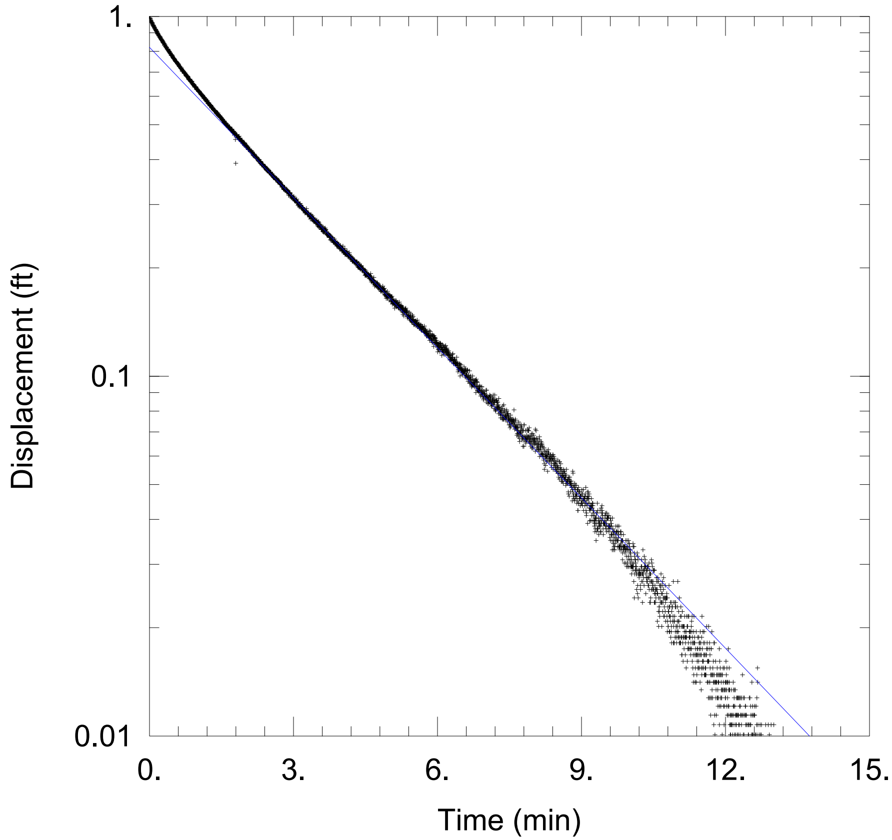
K = 4.015 ft/day
y0 = 0.959 ft

AQUIFER DATA

Saturated Thickness: 12.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-206)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.7 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.7 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 FH 1

Data Set: Z:\...\JSF-207_FH-1.aqt
Date: 05/08/20 Time: 16:47:44

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

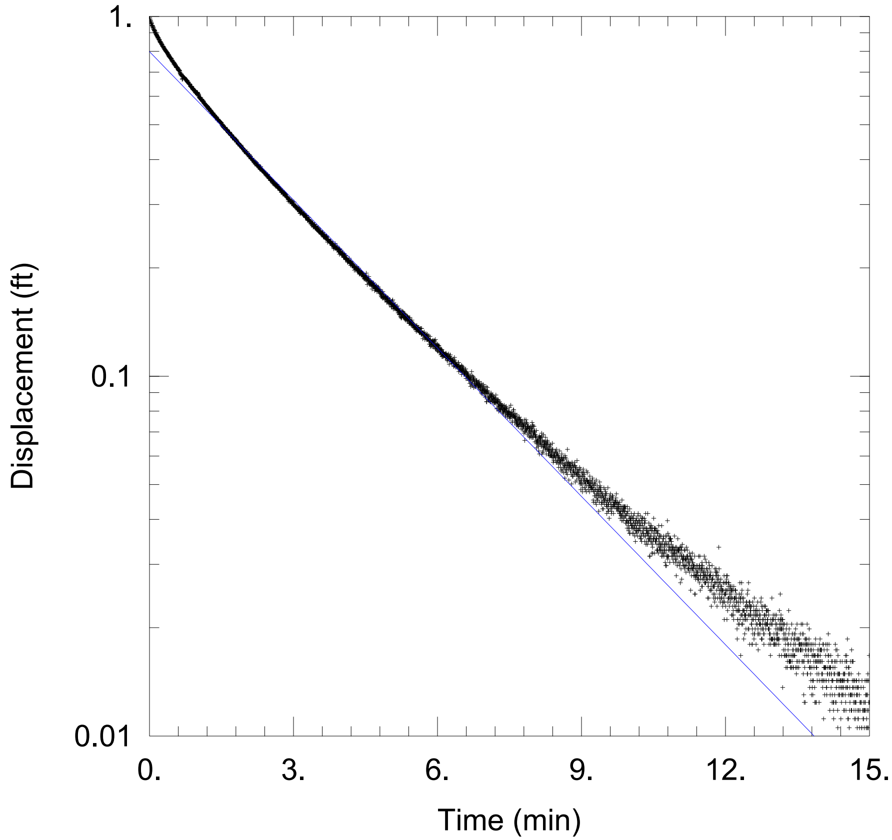
K = 2.595 ft/day
y0 = 0.8202 ft

AQUIFER DATA

Saturated Thickness: 20.86 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 RH 1

Data Set: Z:\...\JSF-207_RH-1.aqt
Date: 05/08/20 Time: 16:49:01

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

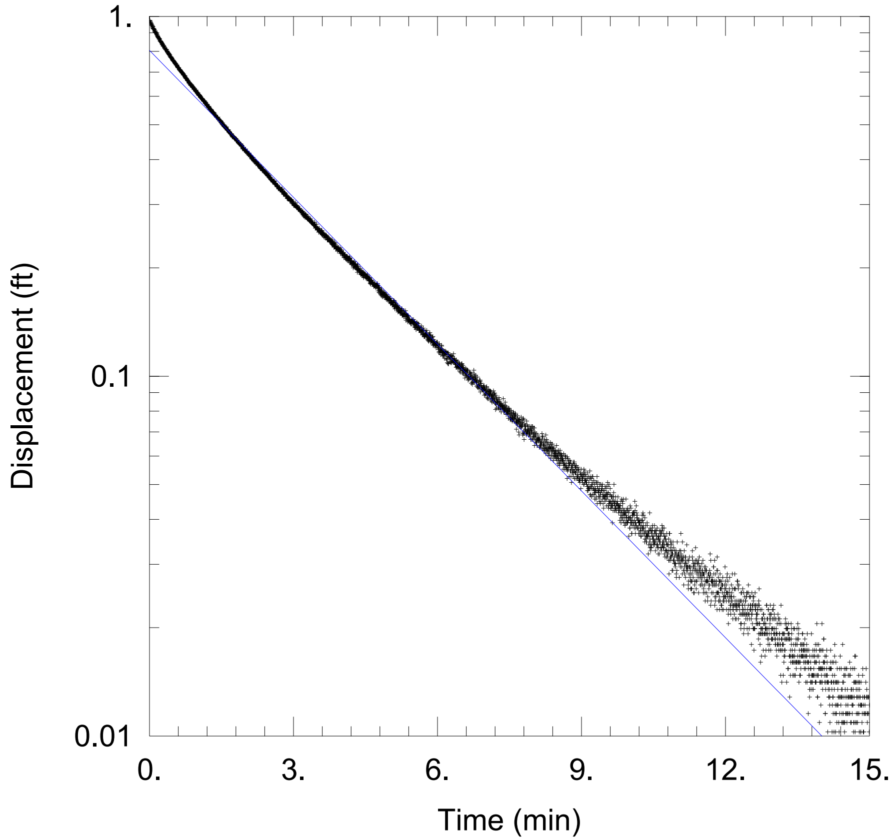
K = 2.561 ft/day
y0 = 0.798 ft

AQUIFER DATA

Saturated Thickness: 20.86 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 FH 2

Data Set: Z:\...\JSF-207_FH-2.aqt
Date: 05/08/20 Time: 16:48:09

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

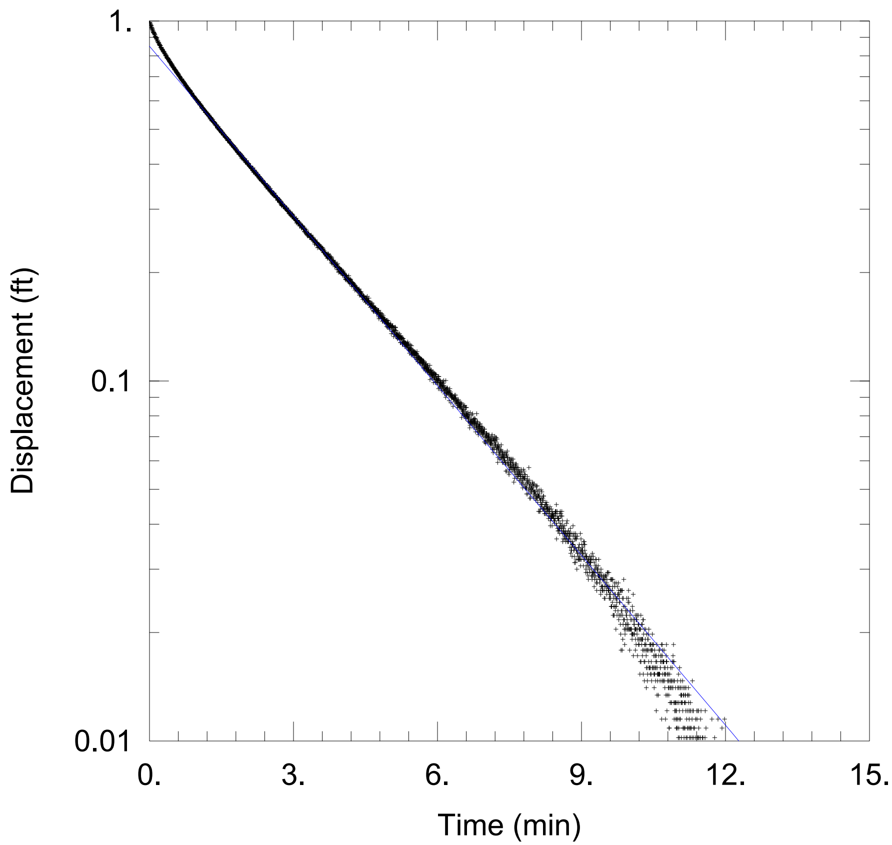
K = 2.536 ft/day
y0 = 0.8043 ft

AQUIFER DATA

Saturated Thickness: 20.86 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 RH 2

Data Set: Z:\...\JSF-207_RH-2.aqt
Date: 05/08/20 Time: 16:49:23

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

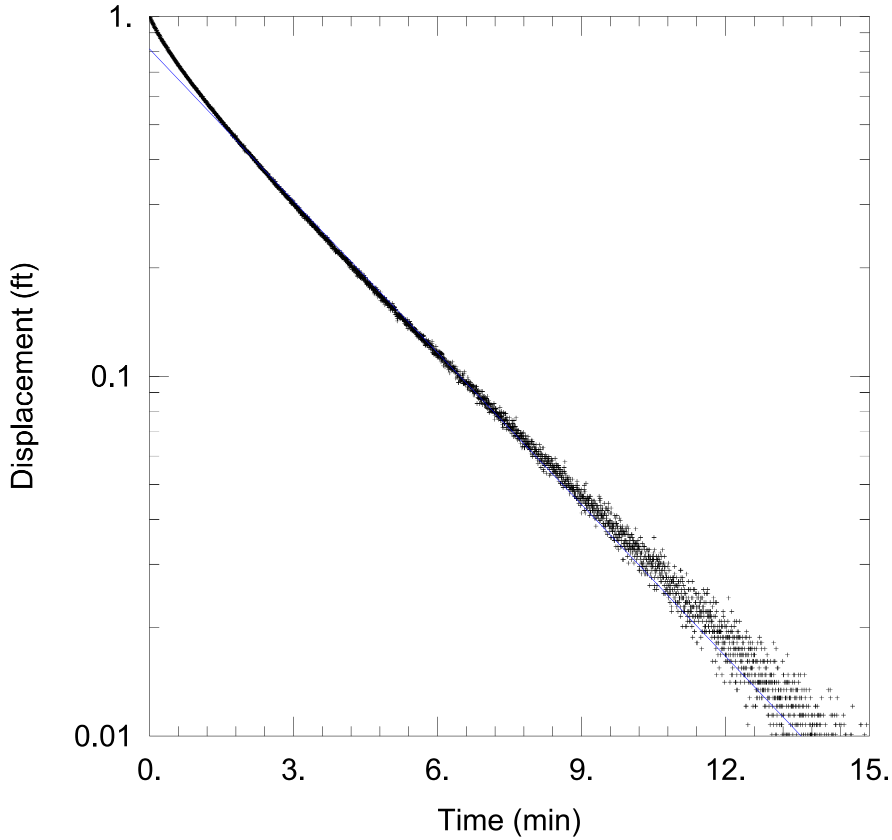
K = 2.93 ft/day
y0 = 0.8502 ft

AQUIFER DATA

Saturated Thickness: 20.86 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 FH 3

Data Set: Z:\...\JSF-207_FH-3.aqt
Date: 05/08/20 Time: 16:48:39

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

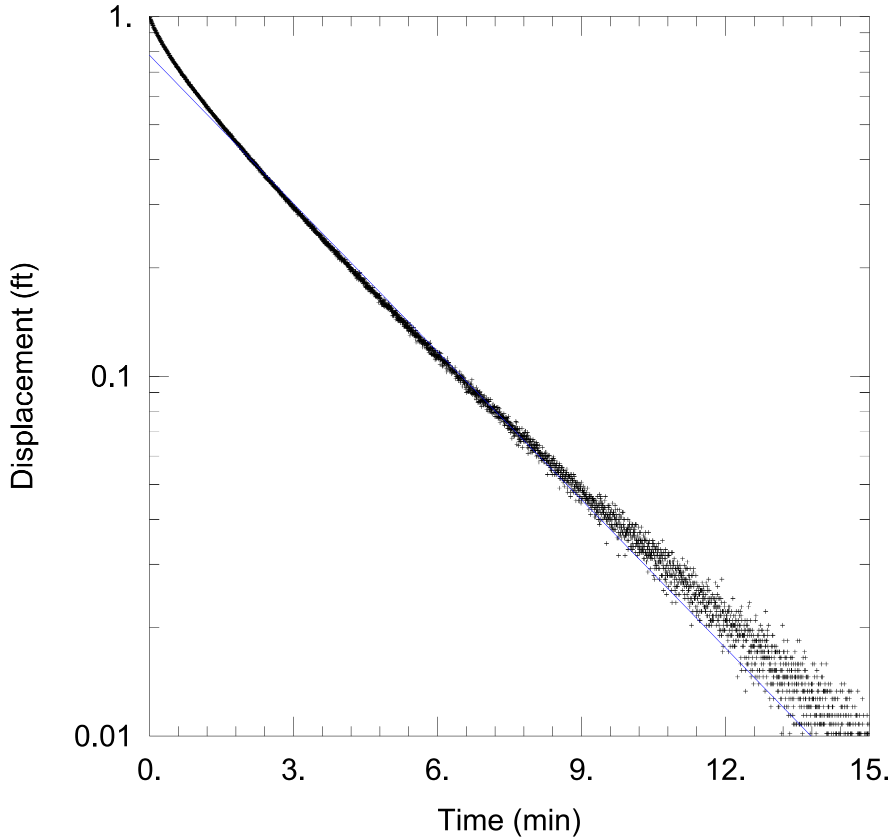
K = 2.623 ft/day
y0 = 0.8119 ft

AQUIFER DATA

Saturated Thickness: 20.86 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-207 RH 3

Data Set: Z:\...\JSF-207_RH-3.aqt
Date: 05/08/20 Time: 16:50:27

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-207
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.56 ft/day
y0 = 0.7801 ft

AQUIFER DATA

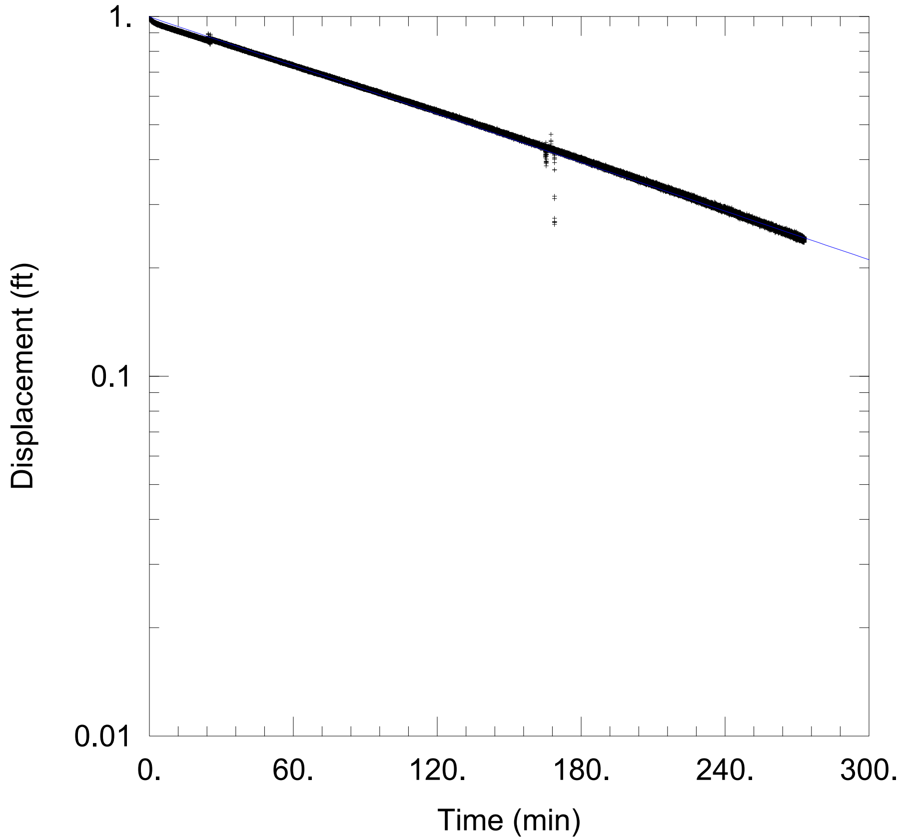
Saturated Thickness: 20.86 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-207)

Initial Displacement: 1. ft
Total Well Penetration Depth: 20.86 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 20.86 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-208 FH 1

Data Set: Z:\...\JSF-208_FH-1.aqt
Date: 05/08/20 Time: 16:52:54

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-208
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04459 ft/day
y0 = 0.9973 ft

AQUIFER DATA

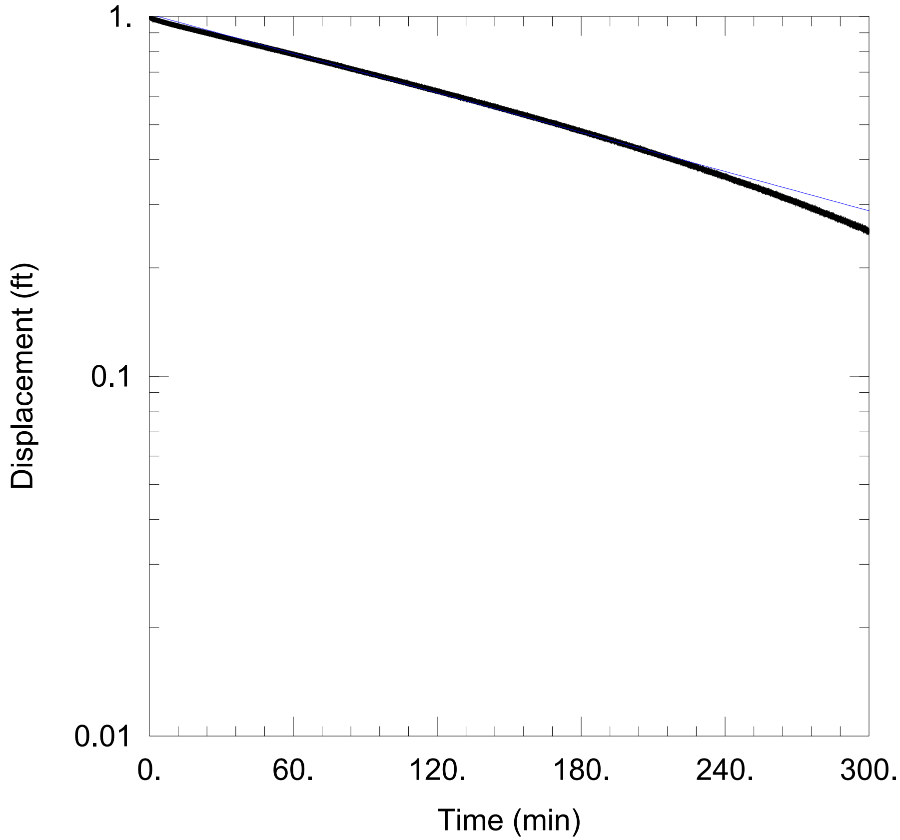
Saturated Thickness: 31.39 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-208)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.39 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 31.39 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-208 RH 1

Data Set: Z:\...\JSF-208_RH-1.aqt
Date: 05/08/20 Time: 16:53:34

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-208
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

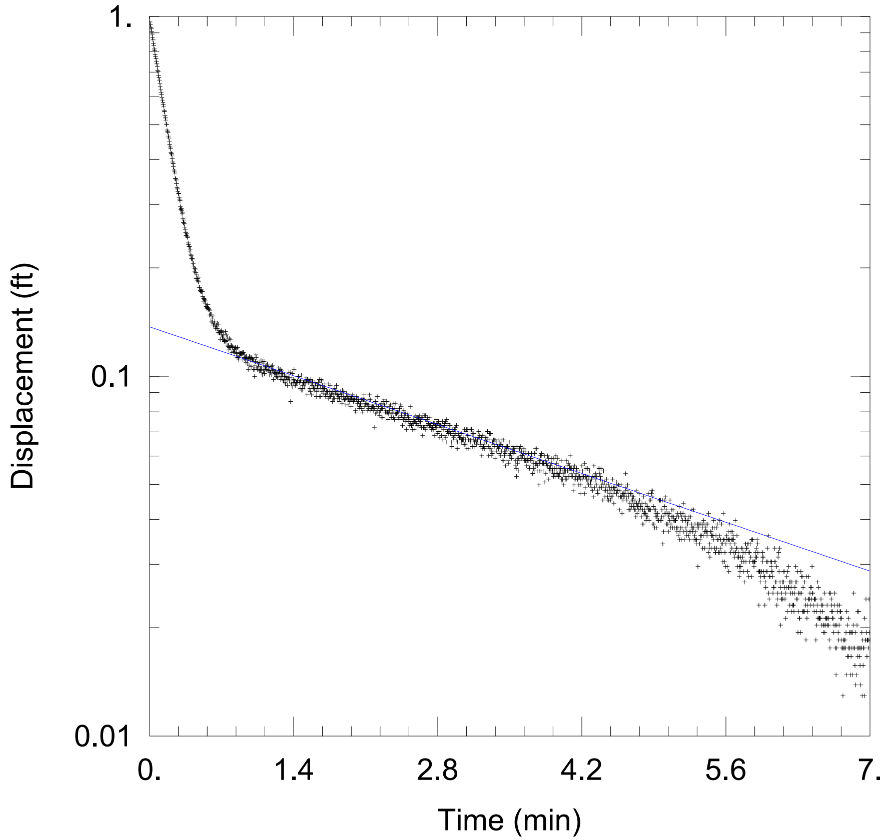
K = 0.0361 ft/day
y0 = 1.014 ft

AQUIFER DATA

Saturated Thickness: 31.39 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-208)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.39 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 31.39 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 FH 1

Data Set: Z:\...\JSF-209_FH-1.aqt
Date: 05/08/20 Time: 16:54:46

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

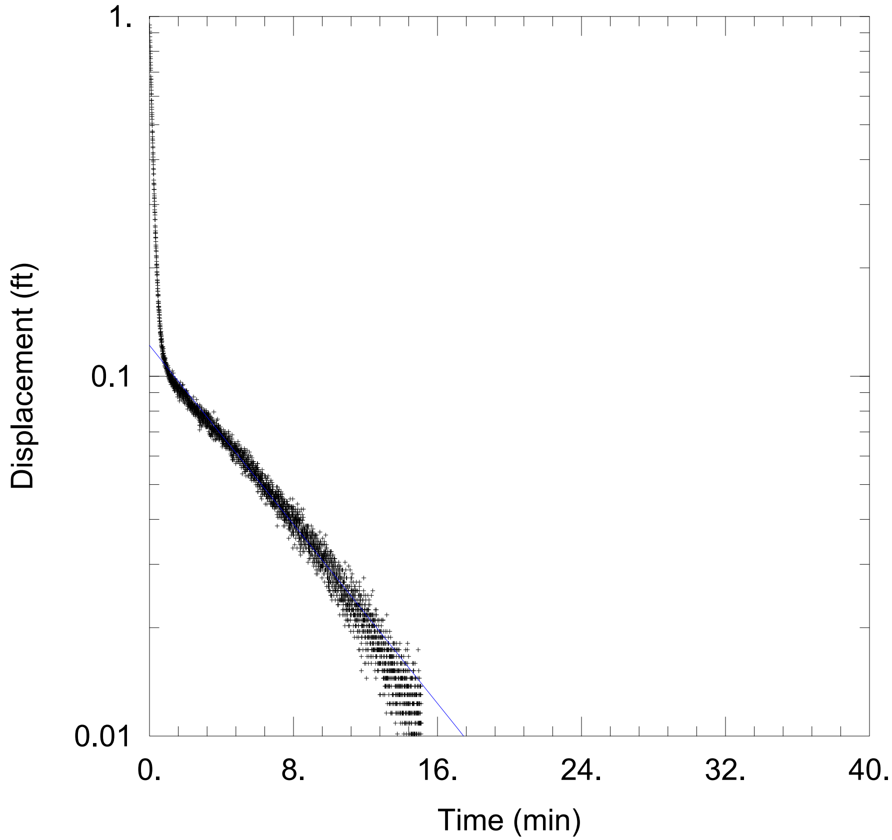
K = 1.656 ft/day
y0 = 0.1371 ft

AQUIFER DATA

Saturated Thickness: 12.28 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 RH 1

Data Set: Z:\...\JSF-209_RH-1.aqt
Date: 05/08/20 Time: 16:58:25

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

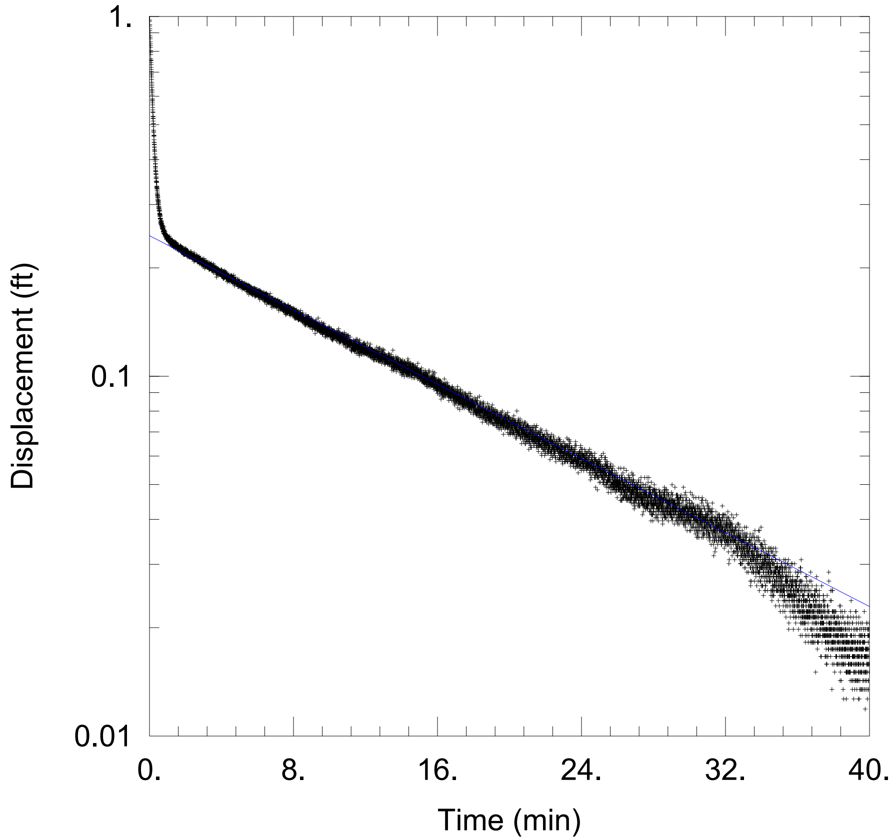
K = 1.062 ft/day
y0 = 0.1218 ft

AQUIFER DATA

Saturated Thickness: 12.28 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 FH 2

Data Set: Z:\...\JSF-209_FH-2.aqt
Date: 05/08/20 Time: 16:56:35

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.4399 ft/day
y0 = 0.2457 ft

AQUIFER DATA

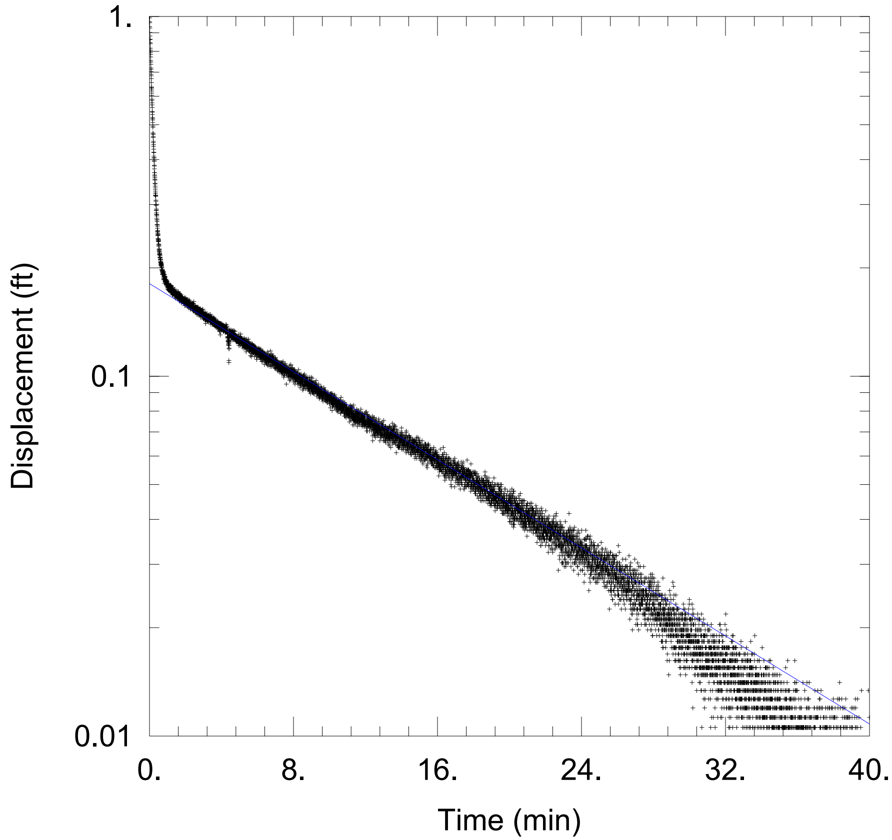
Saturated Thickness: 12.28 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 RH 2

Data Set: Z:\...\JSF-209_RH-2.aqt
Date: 05/08/20 Time: 16:58:50

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.5224 ft/day
y0 = 0.1809 ft

AQUIFER DATA

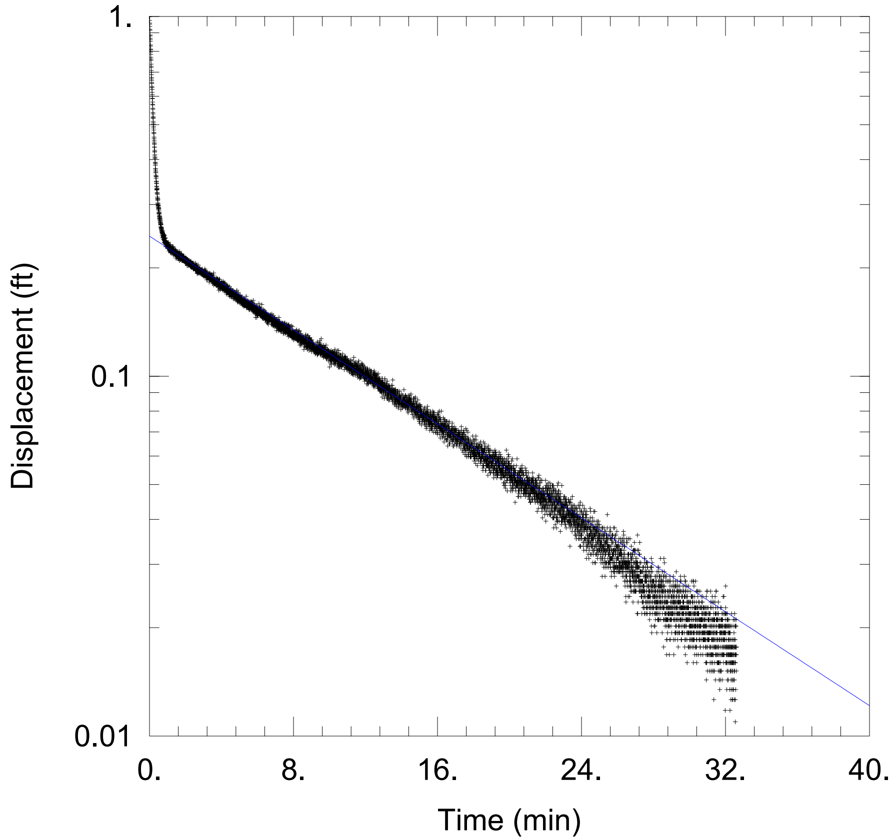
Saturated Thickness: 12.28 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 FH 3

Data Set: Z:\...\JSF-209_FH-3.aqt
Date: 05/08/20 Time: 16:57:25

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

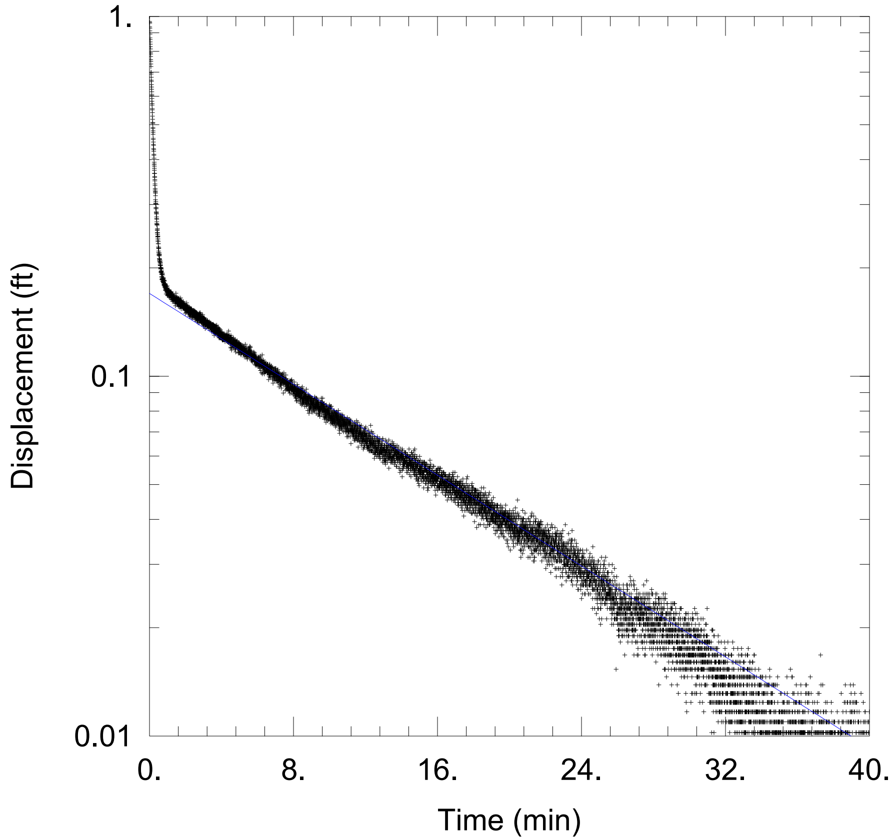
K = 0.557 ft/day
y0 = 0.2451 ft

AQUIFER DATA

Saturated Thickness: 12.28 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 RH 3

Data Set: Z:\...\JSF-209_RH-3.aqt
Date: 05/08/20 Time: 16:59:11

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

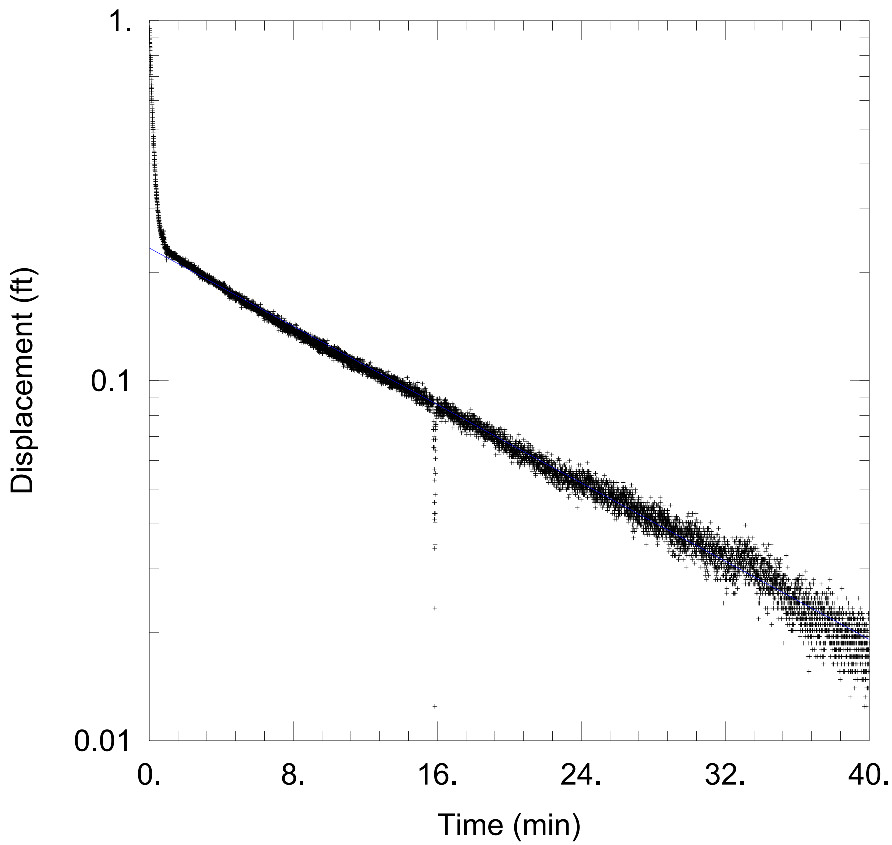
K = 0.539 ft/day
y0 = 0.1699 ft

AQUIFER DATA

Saturated Thickness: 12.28 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 FH 4

Data Set: Z:\...\JSF-209_FH-4.aqt
Date: 05/08/20 Time: 16:57:47

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

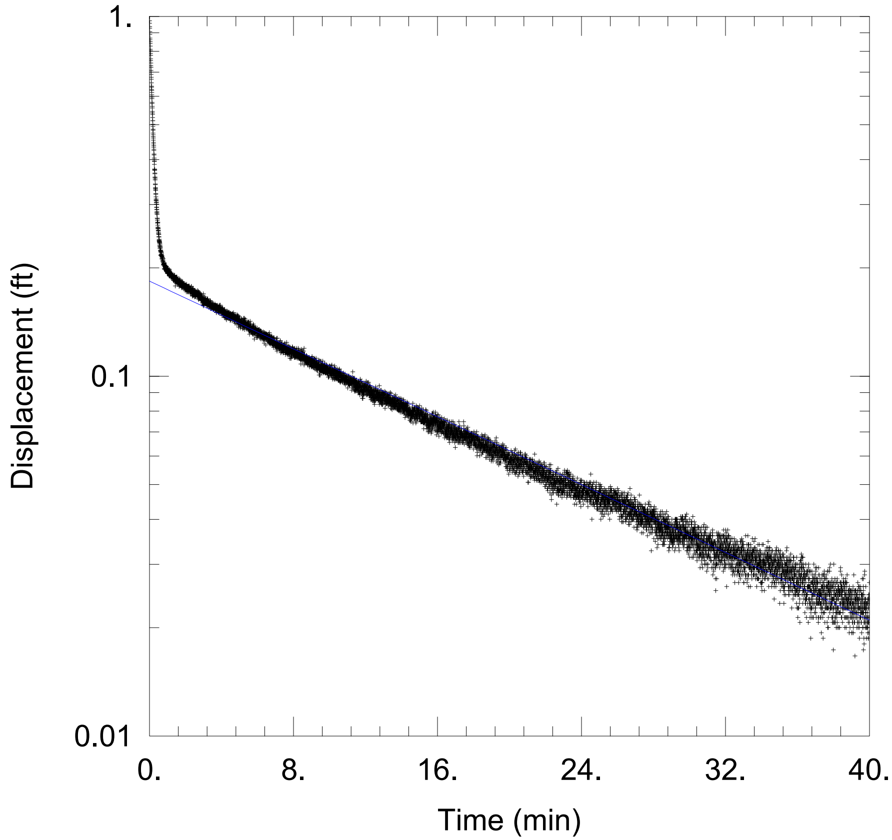
K = 0.4641 ft/day
y0 = 0.2336 ft

AQUIFER DATA

Saturated Thickness: 12.28 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-209 RH 4

Data Set: Z:\...\JSF-209_RH-4.aqt
Date: 05/08/20 Time: 16:59:34

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-209
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.4022 ft/day
y0 = 0.1838 ft

AQUIFER DATA

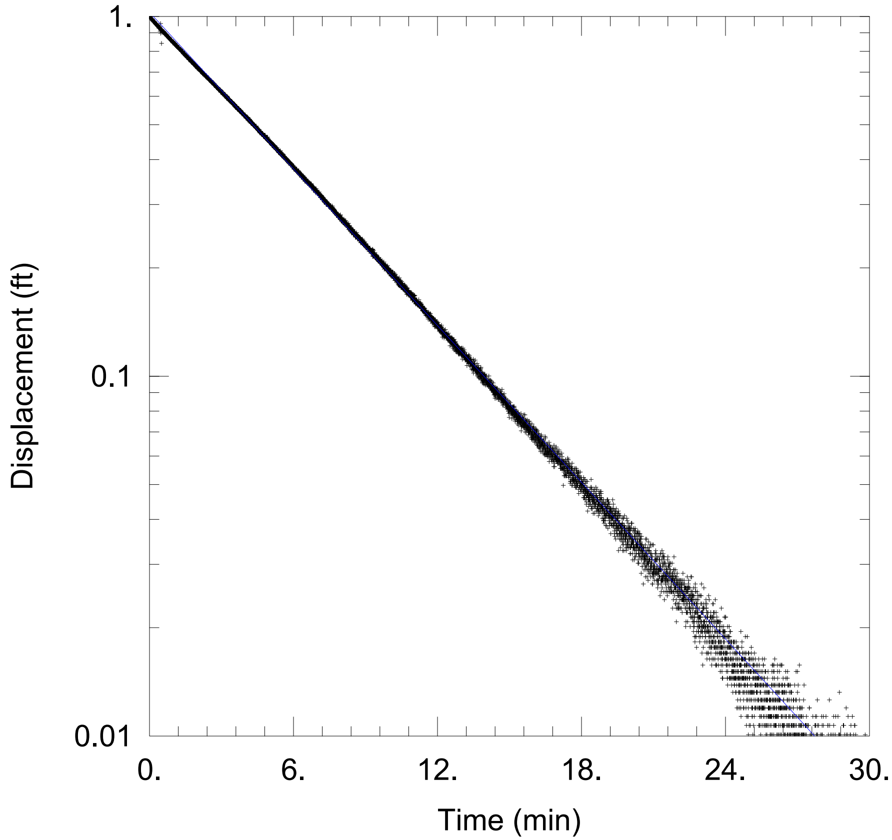
Saturated Thickness: 12.28 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-209)

Initial Displacement: 1. ft
Total Well Penetration Depth: 12.28 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 12.28 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-210 FH 1

Data Set: Z:\...\JSF-210_FH-1.aqt
Date: 05/08/20 Time: 17:00:05

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-210
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

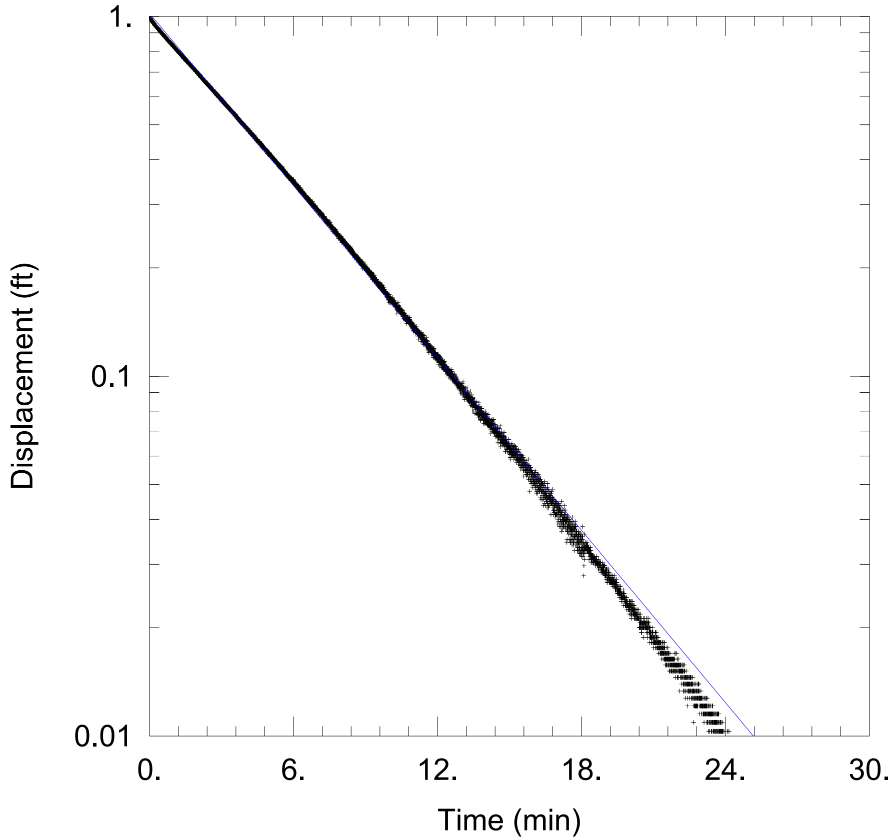
K = 1.437 ft/day
y0 = 1.027 ft

AQUIFER DATA

Saturated Thickness: 31.14 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-210)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.14 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 31.14 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-210 RH 1

Data Set: Z:\...\JSF-210_RH-1.aqt
Date: 05/08/20 Time: 17:00:54

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-210
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.58 ft/day
y0 = 1.02 ft

AQUIFER DATA

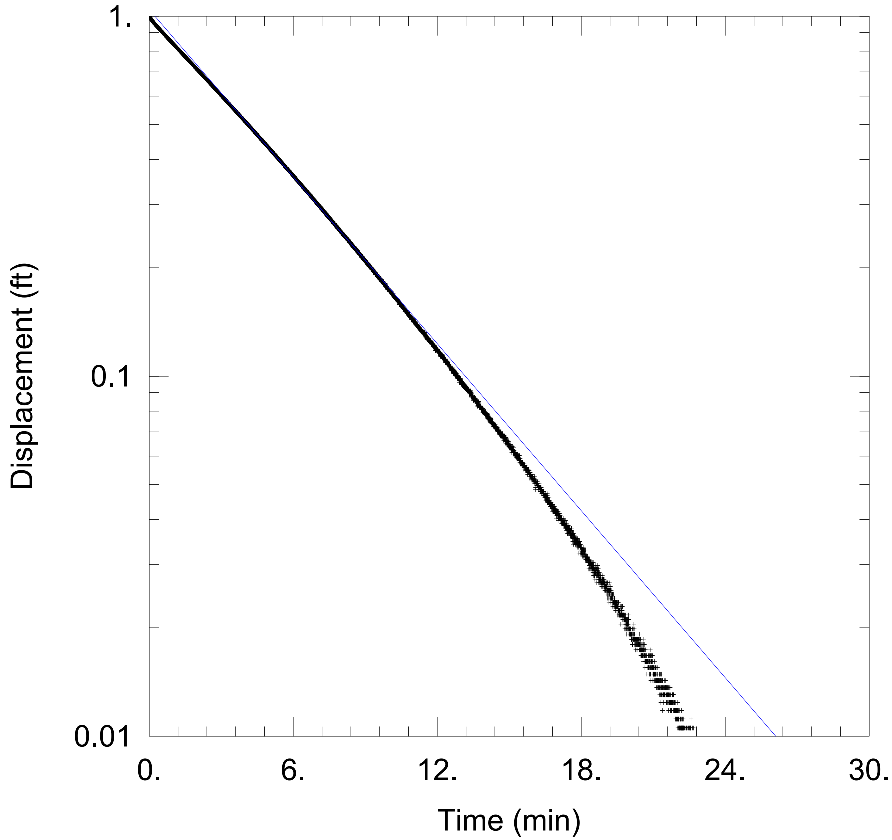
Saturated Thickness: 31.14 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-210)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.14 ft
Casing Radius: 0.1667 ft

Static Water Column Height: 31.14 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-210 RH 2

Data Set: Z:\...\JSF-210_RH-2.aqt
Date: 05/08/20 Time: 17:01:21

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-210
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

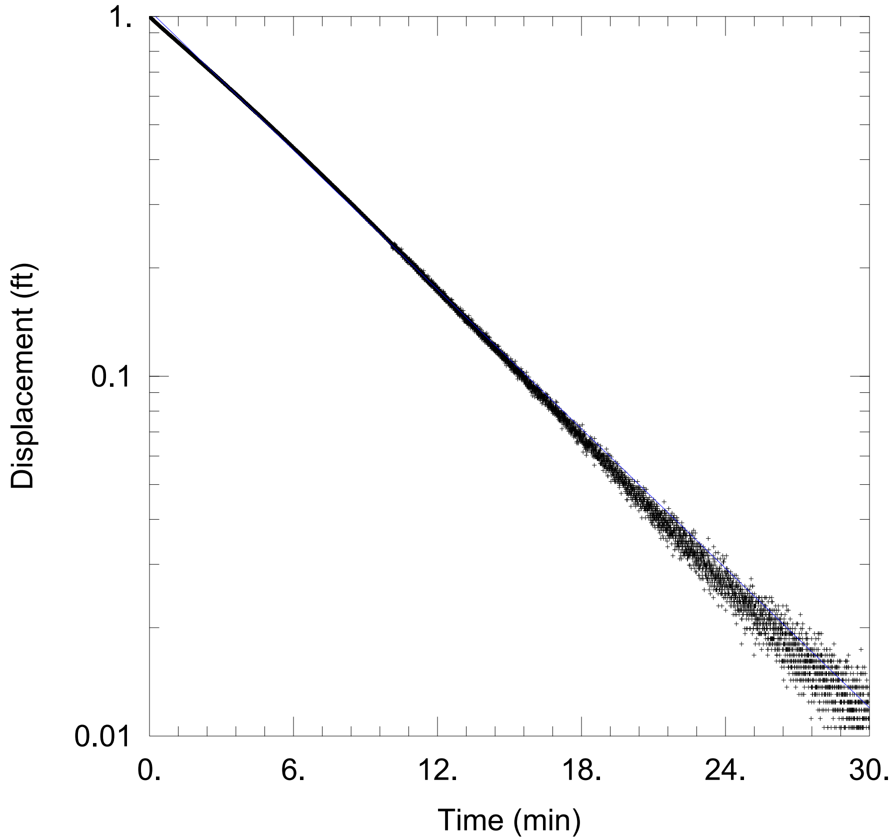
K = 1.531 ft/day
y0 = 1.043 ft

AQUIFER DATA

Saturated Thickness: 31.14 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-210)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.14 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 31.14 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-210 FH 3

Data Set: Z:\...\JSF-210_FH-3.aqt
Date: 05/08/20 Time: 17:00:26

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-210
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

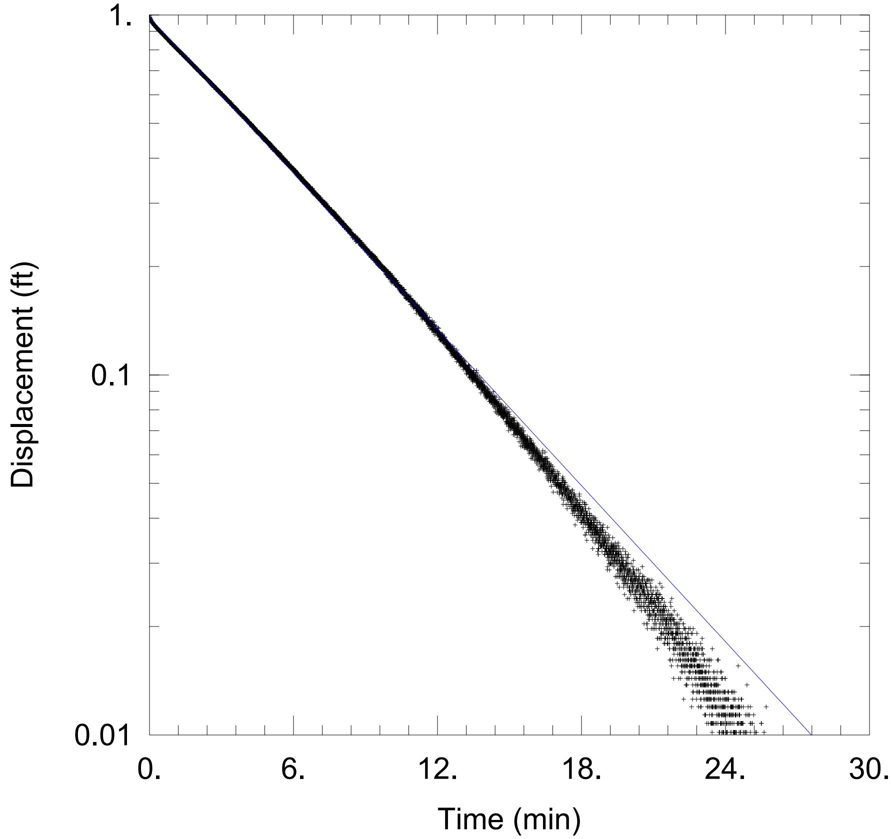
K = 1.278 ft/day
y0 = 1.038 ft

AQUIFER DATA

Saturated Thickness: 31.14 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-210)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.14 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 31.14 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft



JSF-210 RH 3

Data Set: Z:\...\JSF-210_RH-3.aqt
Date: 05/08/20 Time: 17:01:48

PROJECT INFORMATION

Company: Stantec
Client: TVA-JSF
Project: 175568225
Location: Rogersville, TN
Test Well: JSF-210
Test Date: October 2019

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.431 ft/day
y0 = 0.9848 ft

AQUIFER DATA

Saturated Thickness: 31.14 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (JSF-210)

Initial Displacement: 1. ft
Total Well Penetration Depth: 31.14 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 31.14 ft
Screen Length: 9.8 ft
Well Radius: 0.333 ft

APPENDIX H.3

GROUNDWATER INVESTIGATION EVENT #1 SAMPLING AND ANALYSIS REPORT

John Sevier Fossil Plant Groundwater Investigation Event #1 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

September 10, 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	July 16, 2021
1	Addresses August 13, 2021 TDEC Review Comments and Issued for TDEC Review	September 10, 2021

This document entitled John Sevier 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 Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by ______________________ on behalf of

James M. Kerr, 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
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 #1	Groundwater Investigation sampling event performed August 12-15, 2019
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 on August 12-15, 2019 (Event #1) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF 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. No variances in scope or procedures occurred during field activities, as indicated in Section 3.6.

Event #1 is the first 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 #1. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the JSF 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 JSF 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 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #1 were conducted August 12-15, 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. 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 #1, Stantec conducted the following field activities:

- Measured groundwater levels at 10 monitoring wells installed for the TDEC Order, and 17 monitoring wells and 16 piezometers installed for other environmental programs (27 total monitoring wells)
- Measured pore water levels at 10 temporary wells and seven piezometers installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from ten 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, four field blanks, one filter blank, one tubing blank, 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 JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J and Highway 70 Borrow Area) as well as the monitoring wells, temporary 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 JSF 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 JSF Plant EAR. Pore water levels measured in 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, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3, and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

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. No deviations from the SAP, TIs, or QAPP occurred during this investigation as summarized in the Variations section of this report.

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 #1.

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, and temperature. 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 form also documents 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*. *COC*s 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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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 #1.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 27 monitoring wells and pore water levels at ten temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement.* On August 12, 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 16 piezometers and seven piezometers, respectively. Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells and piezometers screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells and piezometers screened in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in

temporary wells and piezometers, along with overburden groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from ten monitoring wells as shown in Table B.2 in Appendix B. Split samples collected by CEC during Event #1 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*.

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. Due to final turbidity readings higher than ten NTUs at well JSF-110, 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 new 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 field 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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. No variations in scope or procedures were documented during field activities.

4.0 SUMMARY

The data presented in this report are only for groundwater investigation sampling Event #1 at the JSF 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 piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #1 included collecting groundwater level measurements at 27 monitoring wells and 16 piezometers; pore water measurements at ten temporary wells and seven piezometers in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3 and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at ten 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 GEL and TestAmerica and validated or verified by EnvStds.

Stantec has completed Event #1 of the groundwater investigation at the JSF Plant in Rogersville, 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 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 John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 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

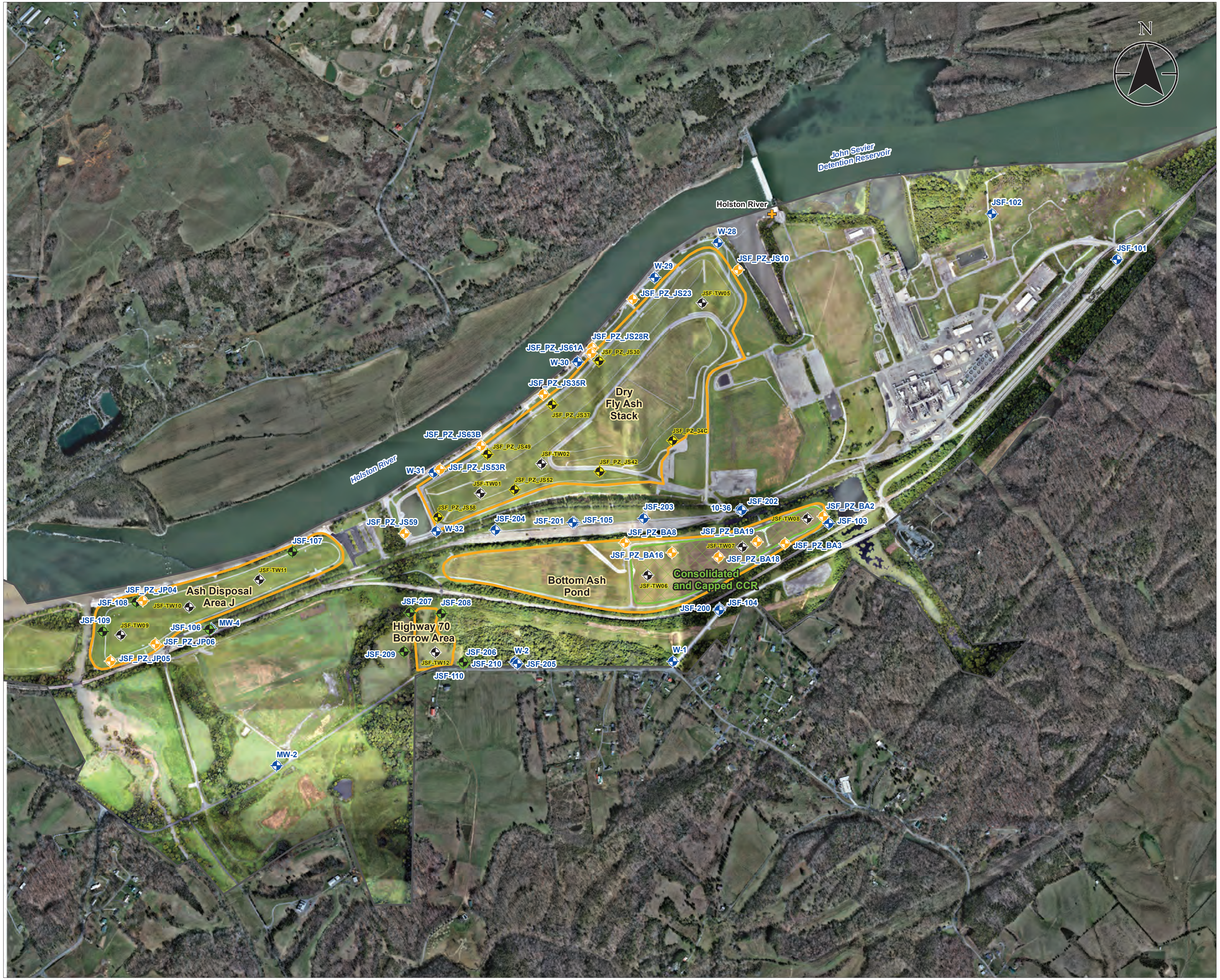

Exhibit No.

A.1

Title

Monitoring Well and Piezometer Network

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225

Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)

Stantec TVA

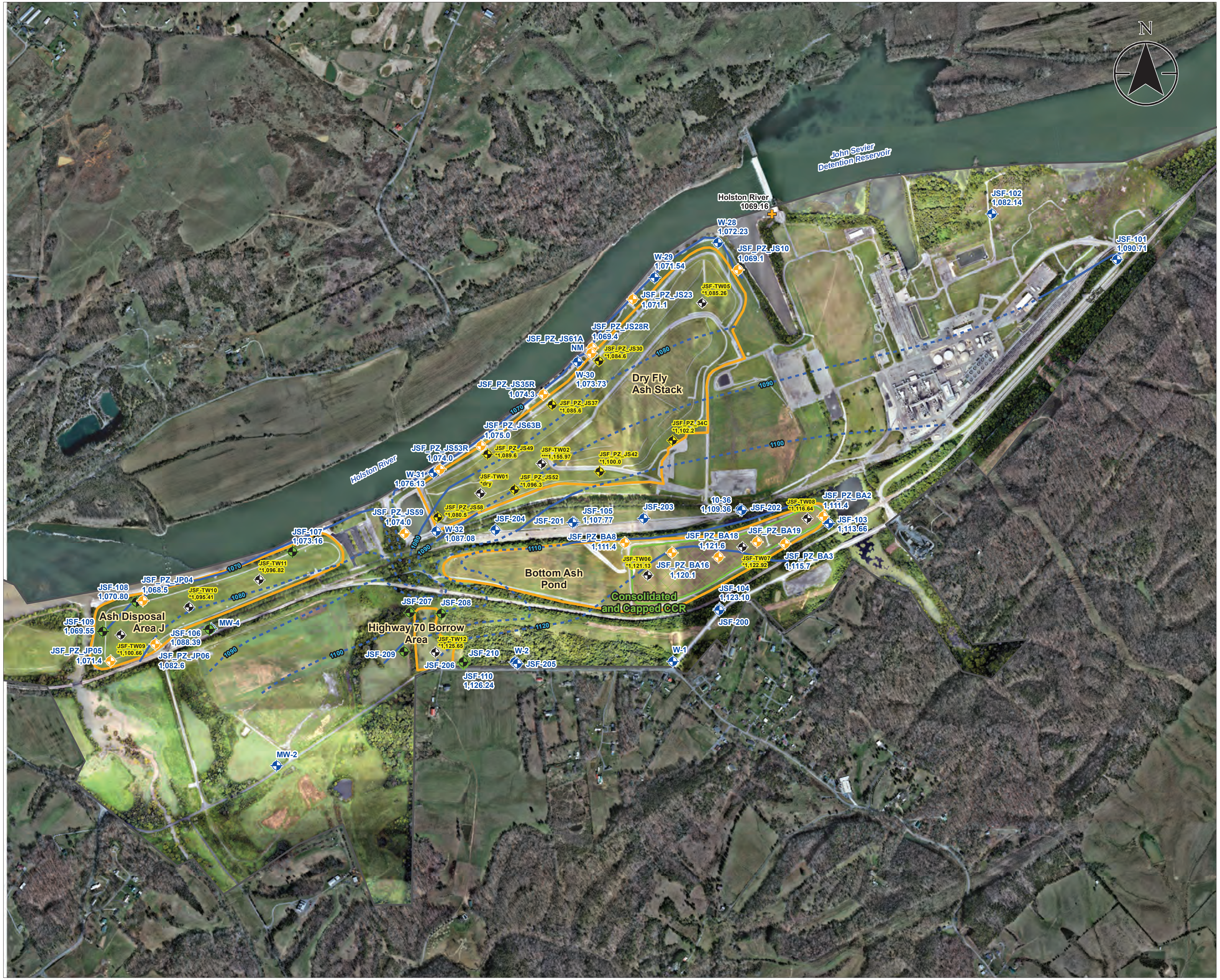

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #1 (August 12, 2019), Overburden

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

*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.

***Elevation erroneous.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec

TVA

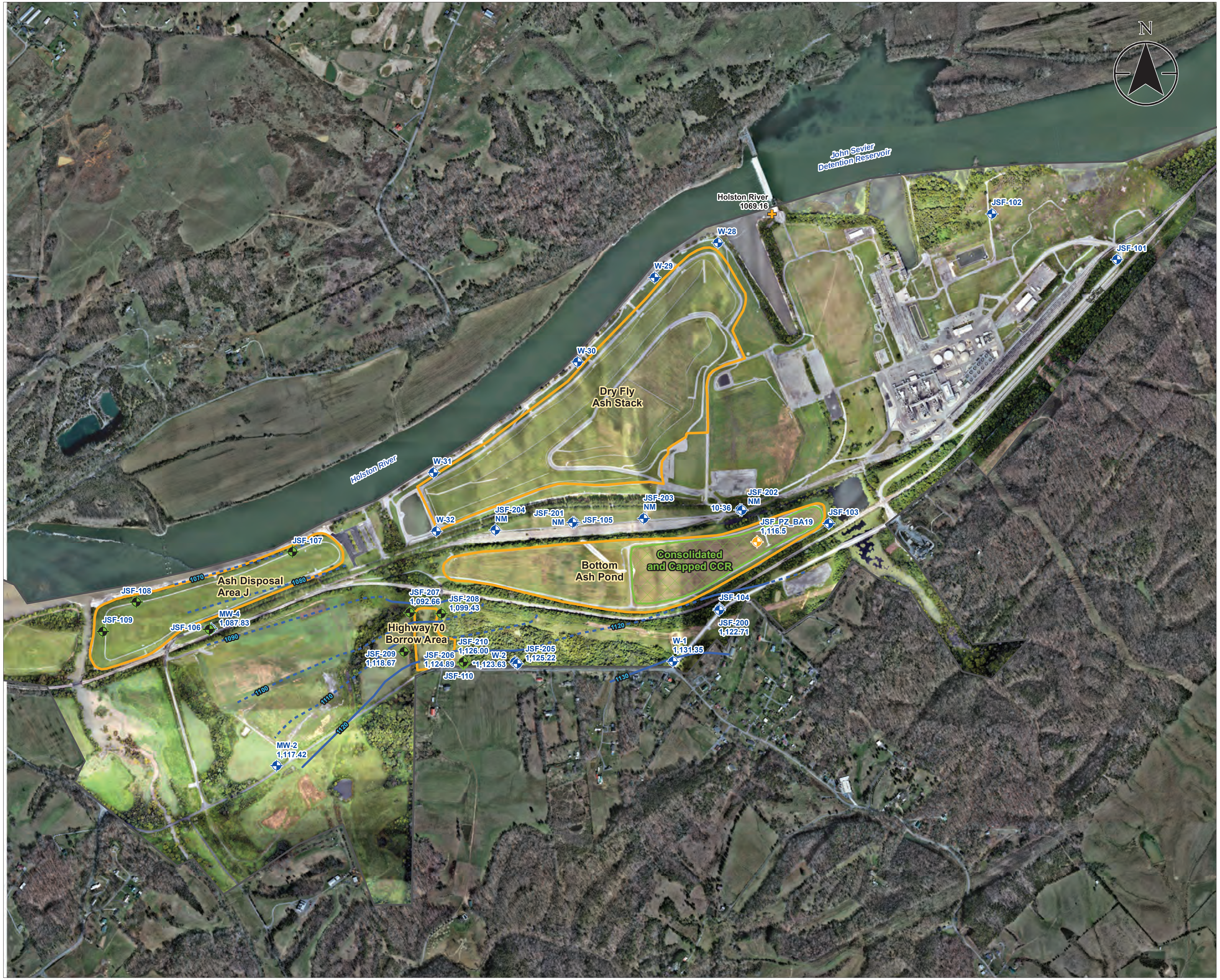

Exhibit No.

A.3

Title

Groundwater Elevation Contour Map, Event #1 (August 12, 2019), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-06-09
Technical Review by MT on 2021-06-09

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

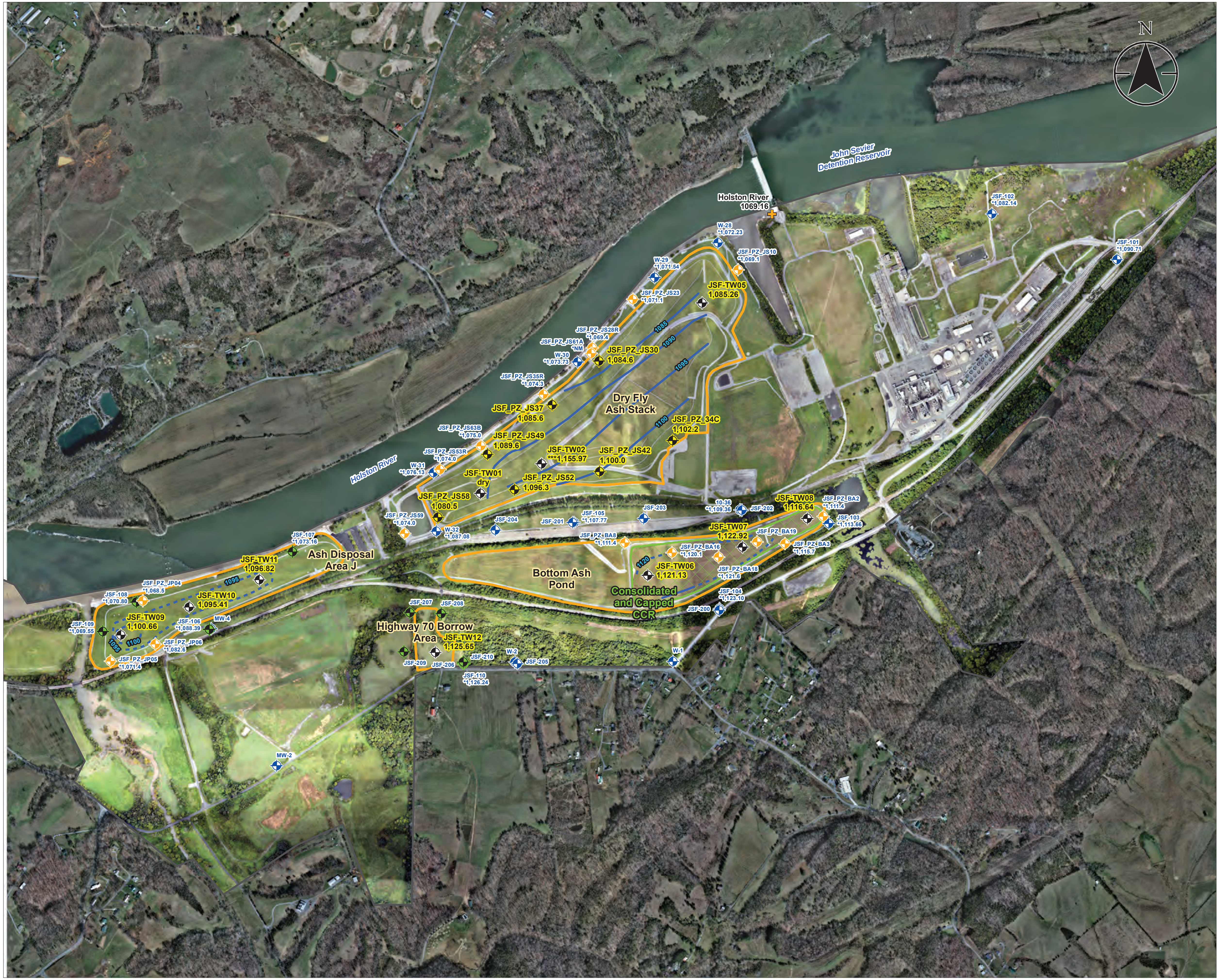

Exhibit No.
A.4

Title
Pore Water Elevation Contour Map, Event #1 (August 12, 2019)

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet
1:6,000 (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
- Holston River Gauge: surface water elevation in ft amsl
- Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)
- Pore water Contour (5 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

*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.

***Elevation erroneous.

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier 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	
JSF-00-GW-43-001	W-28	12-Aug-19	16.91	1089.14	1072.23	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	12-Aug-19	8.28	1079.82	1071.54	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	12-Aug-19	7.60	1081.33	1073.73	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	12-Aug-19	9.48	1085.61	1076.13	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	12-Aug-19	18.04	1105.12	1087.08	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	12-Aug-19	11.02	1120.38	1109.36	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	12-Aug-19	16.30	1147.65	1131.35	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	12-Aug-19	11.19	1134.82	1123.63	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	12-Aug-19	13.82	1131.24	1117.42	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	12-Aug-19	9.40	1097.23	1087.83	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	12-Aug-19	19.72	1110.43	1090.71	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	12-Aug-19	9.28	1091.42	1082.14	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	12-Aug-19	13.07	1126.73	1113.66	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	12-Aug-19	22.59	1145.69	1123.10	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	12-Aug-19	13.34	1121.11	1107.77	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	12-Aug-19	23.80	1146.51	1122.71	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	12-Aug-19	NM	1121.17	NM	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	12-Aug-19	NM	1120.73	NM	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	12-Aug-19	NM	1124.14	NM	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	12-Aug-19	NM	1118.13	NM	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	12-Aug-19	11.01	1136.23	1125.22	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	12-Aug-19	9.82	1098.21	1088.39	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	12-Aug-19	36.59	1109.75	1073.16	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	12-Aug-19	38.61	1109.41	1070.80	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	12-Aug-19	35.17	1104.72	1069.55	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	12-Aug-19	16.20	1142.44	1126.24	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	12-Aug-19	17.84	1142.73	1124.89	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	12-Aug-19	20.05	1112.71	1092.66	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	12-Aug-19	12.79	1112.22	1099.43	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	12-Aug-19	21.72	1140.39	1118.67	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	12-Aug-19	16.75	1142.75	1126.00	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	12-Aug-19	34.6	n/a	1111.4	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	12-Aug-19	22.7	n/a	1115.7	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	12-Aug-19	23.2	n/a	1111.4	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	12-Aug-19	25.1	n/a	1120.1	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	12-Aug-19	31.2	n/a	1121.6	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	12-Aug-19	28.7	n/a	1116.5	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	12-Aug-19	15.9	n/a	1069.1	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	12-Aug-19	4.0	n/a	1071.1	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	12-Aug-19	9.5	n/a	1069.4	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	12-Aug-19	7.0	n/a	1074.3	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	12-Aug-19	8.3	n/a	1074.0	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	12-Aug-19	25.3	n/a	1074.0	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	12-Aug-19	NM	n/a	NM	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	12-Aug-19	14.4	n/a	1075.0	1089.4	1065.5	23.9	n/a	Foundation Clays
n/a	JSF_PZ_JP04	12-Aug-19	37.1	n/a	1068.5	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	12-Aug-19	33.1	n/a	1071.4	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	12-Aug-19	23.7	n/a	1082.6	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	12-Aug-19	n/a	n/a	1069.16	n/a	n/a	n/a	n/a	n/a

See notes on last page.

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
August 2019

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. Holston River data point is the closest reading to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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. Groundwater levels were not measured in select peizometers as noted above because the sensors were not recording data.
6. Groundwater levels in Vacatur Program monitoring wells JSF-201 through JSF-204 were not measured during this event. They were added to the list of gauging locations after Event #2 to increase data coverage.

TABLE B.1b – Pore Water Level Measurements
John Sevier Fossil Plant
August 2019

Temporary 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	
Temporary Wells									
JSF-TW01	12-Aug-19	*72.91	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02**	12-Aug-19	17.84	1173.81	1155.97	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	12-Aug-19	78.90	1164.16	1085.26	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	12-Aug-19	28.83	1149.96	1121.13	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	12-Aug-19	30.64	1153.56	1122.92	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	12-Aug-19	33.49	1150.13	1116.64	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	12-Aug-19	10.75	1111.41	1100.66	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	12-Aug-19	20.11	1115.52	1095.41	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	12-Aug-19	15.47	1112.29	1096.82	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	12-Aug-19	19.81	1145.46	1125.65	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	12-Aug-19	18.2	n/a	1102.2	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	12-Aug-19	21.0	n/a	1084.6	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	12-Aug-19	18.2	n/a	1085.6	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	12-Aug-19	38.2	n/a	1100.0	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	12-Aug-19	9.2	n/a	1089.6	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	12-Aug-19	40.5	n/a	1096.3	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	12-Aug-19	19.7	n/a	1080.5	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well, the well is considered dry
**	The depth to pore water measurement was erroneous, measured or documented incorrectly.
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

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 elevations, pore water elevations, and piezometer data were obtained from geotechnical instrumentation database. Piezometer sensor formations were obtained from boring logs. Data from automated piezometers were averaged for the measurement date.
3. Pore water elevations in piezometers are calculated values. Depth to pore water in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.

TABLE B.2 – Summary of Groundwater Samples
John Sevier Fossil Plant
August 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
JSF-106	JSF-GW-022-20190813	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
	JSF-GW-DUP01-20190813	Field Duplicate Sample		x		x		x	x	x	x	x	x
JSF-107	JSF-GW-023-20190814	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-108	JSF-GW-024-20190814	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-109	JSF-GW-025-20190814	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-110	JSF-GW-026-20190812	Normal Environmental Sample	x	x	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20190813	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-207	JSF-GW-028-20190815	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-208	JSF-GW-029-20190815	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-209	JSF-GW-030-20190813	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-210	JSF-GW-031-20190814	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.
2. CEC collected split samples from JSF-107, JSF-206, and JSF-209.

TABLE B.3 – Summary of Groundwater Quality Parameters
John Sevier Fossil Plant
August 2019

Sample Location		JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208	JSF-209	JSF-210
Sample Date		13-Aug-19	14-Aug-19	14-Aug-19	14-Aug-19	12-Aug-19	13-Aug-19	15-Aug-19	15-Aug-19	13-Aug-19	14-Aug-19
Sample ID		JSF-GW-022-20190813	JSF-GW-023-20190814	JSF-GW-024-20190814	JSF-GW-025-20190814	JSF-GW-026-20190812	JSF-GW-027-20190813	JSF-GW-028-20190815	JSF-GW-029-20190815	JSF-GW-030-20190813	JSF-GW-031-20190814
Sample Depth		16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters											
Dissolved Oxygen	%	5.6	8.0	11.8	2.4	14.8	3.4	4.2	5.1	3.3	5.0
Dissolved Oxygen	mg/L	0.59	0.84	1.15	0.22	1.43	0.34	0.42	0.49	0.32	0.45
ORP	mV	171.0	124.5	221.9	-111.4	149.0	-25.0	-55.1	-32.5	-68.7	-52.6
pH (field)	SU	6.43	6.30	6.85	6.45	5.15	6.87	7.37	7.02	7.25	7.01
Specific Cond. (Field)	uS/cm	812	481.6	1,133	4,296	78.4	600	578.2	1,128	463.9	643
Temperature, Water (C)	DEG C	21.4	18.4	19.9	19.4	21.0	17.9	15.9	17.1	16.7	18.9
Turbidity, field	NTU	1.36	0.99	1.70	5.84	36.7	3.41	2.08	2.46	1.98	5.45

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
John Sevier Fossil Plant
August 2019

Sample Location				JSF-106		JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207
Sample Date				13-Aug-19	13-Aug-19	14-Aug-19	14-Aug-19	14-Aug-19	12-Aug-19	13-Aug-19	15-Aug-19
Sample ID				JSF-GW-022-20190813	JSF-GW-DUP01-20190813	JSF-GW-023-20190814	JSF-GW-024-20190814	JSF-GW-025-20190814	JSF-GW-026-20190812	JSF-GW-027-20190813	JSF-GW-028-20190815
Sample Depth				16 ft	16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 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
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	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	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.492 U*	0.401 U*	<0.323	<0.323	**15.5[A]**	0.413 U*	0.638 U*	1.00 U*
Barium	ug/L	2,000[A]	n/v	76.4	72.9	26.9	44.0	47.3	45.1	163	250
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.396 U*
Boron	ug/L	n/v	n/v	308 U*	297 U*	5,100	5,770	191 U*	<38.6	<38.6	294 U*
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	0.206 J	<0.125	<0.125	<0.125	<0.125	0.131 J
Calcium	ug/L	n/v	n/v	123,000	119,000	82,600	193,000	246,000	11,300	112,000	102,000
Chromium	ug/L	100[A]	n/v	2.99 U*	2.64 U*	<1.53	<1.53	<1.53	3.84 U*	2.23 U*	<1.53
Cobalt	ug/L	n/v	6[B]	2.06	1.96	0.427 J	0.332 J	**11.1[B]**	2.73	1.19	0.220 J
Copper	ug/L	n/v	n/v	1.52 U*	1.30 U*	<0.627	<0.627	<0.627	1.20 U*	<0.627	0.684 U*
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128	<0.128	0.134 J	0.537 J	<0.128	0.167 J
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	<3.39	<3.39	<3.39	4.47 U*	10.0 U*	11.2 U*
Magnesium	ug/L	n/v	n/v	13,800	13,400	10,300	36,500	27,300	817	6,770	13,000
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610	**1,070[B]**	16.5	4.81 J	<0.610	<0.610	2.15 J
Nickel	ug/L	100(TN MCL)[A]	n/v	3.14	2.98	1.60 U*	1.94 U*	1.68 U*	20.2	1.25 U*	0.379 U*
Potassium	ug/L	n/v	n/v	2,820	2,720	1,580	1,070	2,600	725	993	763
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	44,800	43,000	6,910	34,200	873,000	2,160	9,460	13,100
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.246 U*
Vanadium	ug/L	n/v	n/v	1.66 U*	1.45 U*	<0.991	<0.991	<0.991	2.56 U*	1.15 U*	<0.991
Zinc	ug/L	n/v	n/v	5.87 U*	9.00 U*	4.76 J	<3.22	4.34 J	11.1 U*	3.24 U*	3.97 J
Dissolved Metals											
Antimony	ug/L	6[A]	n/v	-	-	-	-	-	<0.378	-	-
Arsenic	ug/L	10[A]	n/v	-	-	-	-	-	<0.323	-	-
Barium	ug/L	2,000[A]	n/v	-	-	-	-	-	41.7	-	-
Beryllium	ug/L	4[A]	n/v	-	-	-	-	-	<0.182	-	-
Boron	ug/L	n/v	n/v	-	-	-	-	-	<38.6	-	-
Cadmium	ug/L	5[A]	n/v	-	-	-	-	-	<0.125	-	-
Calcium	ug/L	n/v	n/v	-	-	-	-	-	11,400	-	-
Chromium	ug/L	100[A]	n/v	-	-	-	-	-	2.87 U*	-	-
Cobalt	ug/L	n/v	6[B]	-	-	-	-	-	2.17	-	-
Copper	ug/L	n/v	n/v	-	-	-	-	-	4.40 U*	-	-
Lead	ug/L	n/v	15[B]	-	-	-	-	-	<0.128	-	-
Lithium	ug/L	n/v	40[B]	-	-	-	-	-	<3.39	-	-
Magnesium	ug/L	n/v	n/v	-	-	-	-	-	754	-	-
Mercury	ug/L	2[A]	n/v	-	-	-	-	-	<0.101	-	-
Molybdenum	ug/L	n/v	100[B]	-	-	-	-	-	<0.610	-	-
Nickel	ug/L	100(TN MCL)[A]	n/v	-	-	-	-	-	3.15 U*	-	-
Potassium	ug/L	n/v	n/v	-	-	-	-	-	571	-	-
Selenium	ug/L	50[A]	n/v	-	-	-	-	-	<1.51	-	-
Silver	ug/L	100(TN MCL)[A]	n/v	-	-	-	-	-	<0.177	-	-
Sodium	ug/L	n/v	n/v	-	-	-	-	-	2,220	-	-
Thallium	ug/L	2[A]	n/v	-	-	-	-	-	<0.148	-	-
Vanadium	ug/L	n/v	n/v	-	-	-	-	-	1.34 U*	-	-
Zinc	ug/L	n/v	n/v	-	-	-	-	-	16.8 U*	-	-
Anions											
Chloride	mg/L	n/v	n/v	9.71	9.68	2.61	11.4	559	2.32	15.9	10.7
Fluoride	mg/L	4[A]	n/v	0.0791 J	0.0801 J	0.730	0.165	0.179 J	0.0346 J	0.0507 J	0.0639 J
Sulfate	mg/L	n/v	n/v	113	113	128	263	751	4.80	47.8	68.0
General Chemistry											
Alkalinity, Bicarbonate	mg/L	n/v	n/v	218	223	110	362	725	31.4	249	231
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	218	223	110	362	725	31.4	249	231
Total Dissolved Solids	mg/L	n/v	n/v	464	470	286	738	2,600	55.0	353	382

See notes on last page.

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TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
John Sevier Fossil Plant
August 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-208 15-Aug-19 JSF-GW-029-20190815 40.5 ft Normal Environmental Sample Final-Verified	JSF-209 13-Aug-19 JSF-GW-030-20190813 32.5 ft Normal Environmental Sample Validated	JSF-210 14-Aug-19 JSF-GW-031-20190814 46.5 ft Normal Environmental Sample Final-Verified
Total Metals						
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	1.70 U*	0.983 U*	0.939 U*
Barium	ug/L	2,000[A]	n/v	61.2	35.0	131
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	1,920	117 U*	<38.6
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	174,000	85,200	121,000
Chromium	ug/L	100[A]	n/v	<1.53	2.06 U*	<1.53
Cobalt	ug/L	n/v	6[B]	0.490 J	0.474 U*	0.544
Copper	ug/L	n/v	n/v	1.34 U*	<0.627	<0.627
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	40[B]	17.9 U*	5.74 U*	8.71 U*
Magnesium	ug/L	n/v	n/v	26,300	4,690	7,000
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	7.48	1.24 J	0.963 J
Nickel	ug/L	100(TN MCL)[A]	n/v	1.48 U*	<0.336	0.515 U*
Potassium	ug/L	n/v	n/v	6,910	749	1,540
Selenium	ug/L	50[A]	n/v	<1.51	<1.51	<1.51
Silver	ug/L	100(TN MCL)[A]	n/v	<0.177	<0.177	<0.177
Sodium	ug/L	n/v	n/v	34,500	21,100	18,700
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	0.996 U*	1.05 U*	<0.991
Zinc	ug/L	n/v	n/v	5.11	4.32 U*	3.44 J
Dissolved Metals						
Antimony	ug/L	6[A]	n/v	-	-	-
Arsenic	ug/L	10[A]	n/v	-	-	-
Barium	ug/L	2,000[A]	n/v	-	-	-
Beryllium	ug/L	4[A]	n/v	-	-	-
Boron	ug/L	n/v	n/v	-	-	-
Cadmium	ug/L	5[A]	n/v	-	-	-
Calcium	ug/L	n/v	n/v	-	-	-
Chromium	ug/L	100[A]	n/v	-	-	-
Cobalt	ug/L	n/v	6[B]	-	-	-
Copper	ug/L	n/v	n/v	-	-	-
Lead	ug/L	n/v	15[B]	-	-	-
Lithium	ug/L	n/v	40[B]	-	-	-
Magnesium	ug/L	n/v	n/v	-	-	-
Mercury	ug/L	2[A]	n/v	-	-	-
Molybdenum	ug/L	n/v	100[B]	-	-	-
Nickel	ug/L	100(TN MCL)[A]	n/v	-	-	-
Potassium	ug/L	n/v	n/v	-	-	-
Selenium	ug/L	50[A]	n/v	-	-	-
Silver	ug/L	100(TN MCL)[A]	n/v	-	-	-
Sodium	ug/L	n/v	n/v	-	-	-
Thallium	ug/L	2[A]	n/v	-	-	-
Vanadium	ug/L	n/v	n/v	-	-	-
Zinc	ug/L	n/v	n/v	-	-	-
Anions						
Chloride	mg/L	n/v	n/v	26.8	3.71	14.8
Fluoride	mg/L	4[A]	n/v	0.0661 J	0.0602 J	0.0671 J
Sulfate	mg/L	n/v	n/v	294	64.4	57.6
General Chemistry						
Alkalinity, Bicarbonate	mg/L	n/v	n/v	299	233	274
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	299	233	274
Total Dissolved Solids	mg/L	n/v	n/v	793	361	327

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.
2. CEC collected split samples from JSF-107, JSF-206 and JSF-209

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
August 2019

Sample Location				JSF-106		JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208
Sample Date				13-Aug-19	13-Aug-19	14-Aug-19	14-Aug-19	14-Aug-19	12-Aug-19	13-Aug-19	15-Aug-19	15-Aug-19
Sample ID				JSF-GW-022-20190813	JSF-GW-DUP01-20190813	JSF-GW-023-20190814	JSF-GW-024-20190814	JSF-GW-025-20190814	JSF-GW-026-20190812	JSF-GW-027-20190813	JSF-GW-028-20190815	JSF-GW-029-20190815
Sample Depth				16 ft	16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	40.5 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
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	0.895 +/-(0.598)	0.626 +/-(0.565)U	0.763 +/-(0.562)	0.392 +/-(0.435)U	0.761 +/-(0.577)	0.692 +/-(0.624)U	0.122 +/-(0.450)U	0.606 +/-(0.608)U	-0.137 +/-(0.367)U
Radium-228	pCi/L	n/v	n/v	0.00814 +/-(0.196)U	-0.0911 +/-(0.297)U	0.120 +/-(0.360)U	0.0808 +/-(0.418)U	-0.195 +/-(0.386)U	0.928 +/-(0.416)	0.228 +/-(0.248)U	0.261 +/-(0.530)U	0.133 +/-(0.548)U
Radium-226+228	pCi/L	5[A]	n/v	0.903 +/-(0.629)J	0.626 +/-(0.639)U	0.884 +/-(0.668)J	0.472 +/-(0.603)U	0.761 +/-(0.694)J	1.62 +/-(0.750)J	0.350 +/-(0.514)U	0.867 +/-(0.806)U	0.133 +/-(0.660)U

See notes on last page.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
August 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-209 13-Aug-19 JSF-GW-030-20190813 32.5 ft Normal Environmental Sample Final-Verified	JSF-210 14-Aug-19 JSF-GW-031-20190814 46.5 ft Normal Environmental Sample Validated
Radiological Parameters					
Radium-226	pCi/L	n/v	n/v	0.760 +/-(0.636)U	0.581 +/-(0.510)U
Radium-228	pCi/L	n/v	n/v	-0.0948 +/-(0.209)U	0.0917 +/-(0.253)U
Radium-226+228	pCi/L	5[A]	n/v	0.760 +/-(0.670)U	0.673 +/-(0.569)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.

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APPENDIX H.4

GROUNDWATER INVESTIGATION EVENT #2 SAMPLING AND ANALYSIS REPORT

John Sevier Fossil Plant Groundwater Investigation Event #2 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

July 16, 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	July 16, 2021

Sign-off Sheet

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Prepared by Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by ____________ on behalf of

James M. Kerr, 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 October 7-10, 2019
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 on October 7-10, 2019 (Event #2) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation upon completion of six groundwater sampling events is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF 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. 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 #2. The remaining sampling events will be completed before overall conclusions and findings about the groundwater investigation and groundwater conditions at the JSF 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 JSF 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 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #2 were conducted October 7-10, 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 #2, Stantec conducted the following field activities:

- Measured groundwater levels at ten monitoring wells installed for the TDEC Order, and 17 monitoring wells and 15 piezometers installed for other environmental programs (27 total monitoring wells)
- Measured pore water levels at ten temporary wells and seven piezometers installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from eight 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, three field blanks, one filter blank, one tubing blank, 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 JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J and Highway 70 Borrow Area) as well as the monitoring wells, temporary 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 JSF 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 will not be 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 JSF Plant EAR. Pore water levels measured in 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, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3, and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

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 #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 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, and temperature. 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 form also documents 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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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 #2.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 27 monitoring wells and pore water levels at ten temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. On October 7, 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 15 piezometers and seven piezometers, respectively.

Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells and piezometers screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells and piezometers screened in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in

temporary wells and piezometers, along with overburden groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from eight 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*. Monitoring wells JSF-107 and JSF-110 were not sampled due to insufficient water column.

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. 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 JSF 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. The turbidity readings following purging at well JSF-109 had stabilized below 5 NTUs, but after collecting the total metals sample, the turbidity was > 5 NTUs. Therefore, a dissolved metals sample was collected from well JSF-109.

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 new 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 field 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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 #2 at the JSF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Groundwater samples were not collected from monitoring wells JSF-107 and JSF-110 because of insufficient water column.

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 #2 at the JSF 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 piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #2 included collecting groundwater level measurements at 27 monitoring wells and 15 piezometers; pore water measurements at ten temporary wells and seven piezometers in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1 a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3 and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at eight 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 GEL and TestAmerica and validated or verified by EnvStds.

Stantec has completed Event #2 of the groundwater investigation at the JSF Plant in Rogersville, 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 evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 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 and Piezometer Network

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

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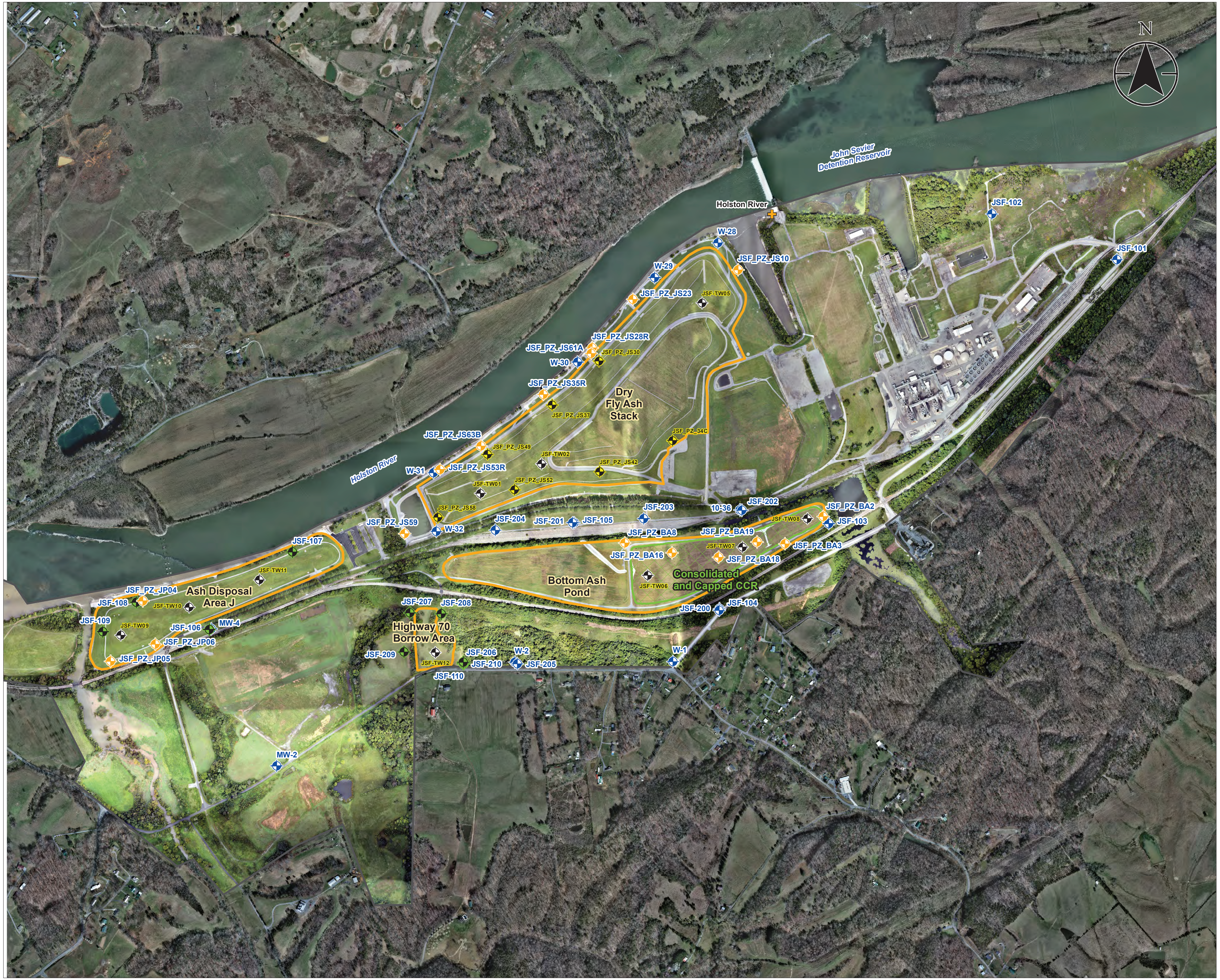

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)

Stantec TVA

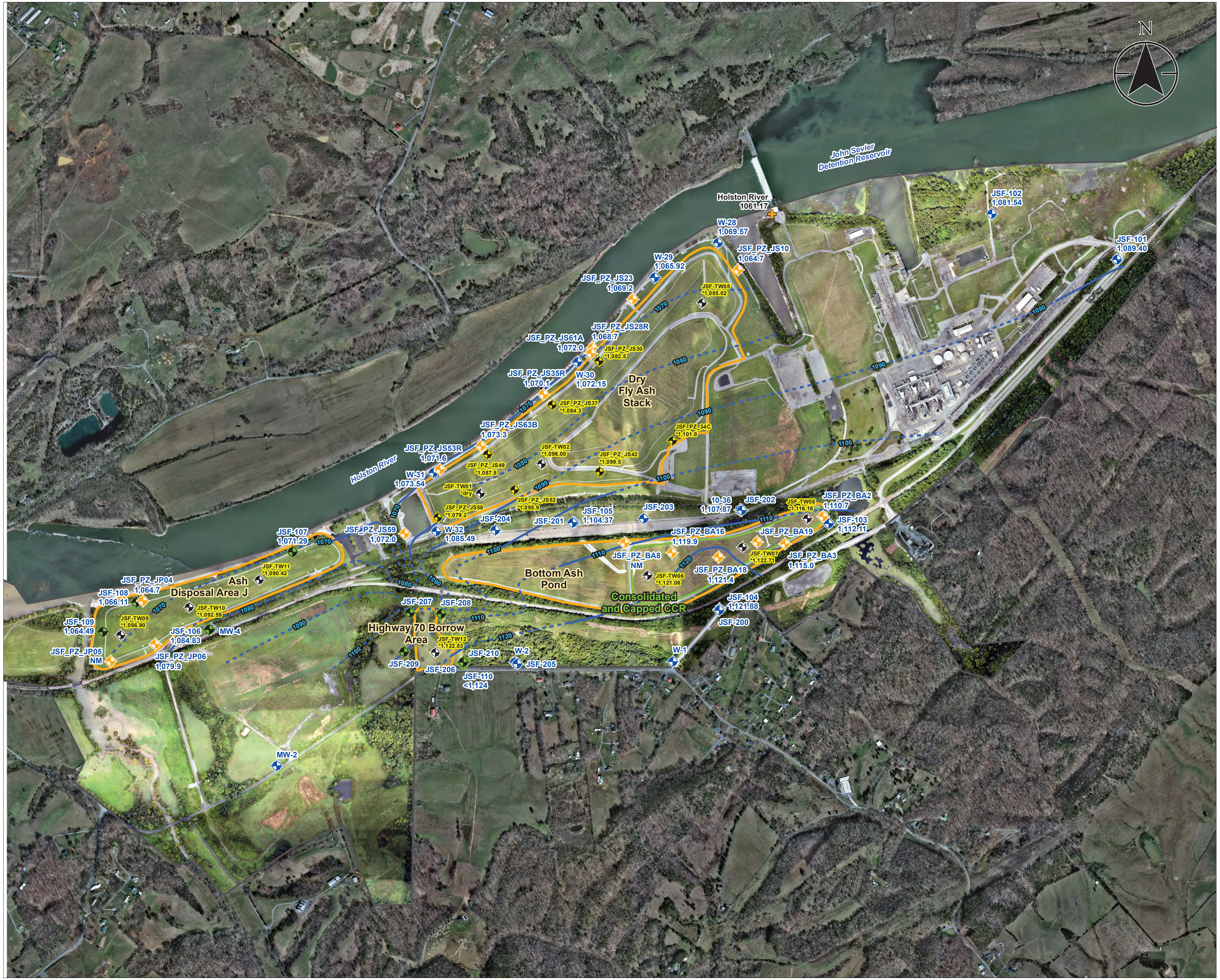

Exhibit No.

A.2

Title

Groundwater Elevation Contour Map Event #2 (October 7, 2019), Overburden

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225

Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

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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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

< Groundwater elevations are rounded to nearest foot to constrain potential elevation when depth to groundwater could not be measured.

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

Exhibit No.
A.3

Title

Groundwater Elevation Contour Map Event #2 (October 7, 2019), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location | 175568225
Rogersville, Tennessee
Prepared by DMB on 2021-06-09
Technical Review by MD on 2021-06-09

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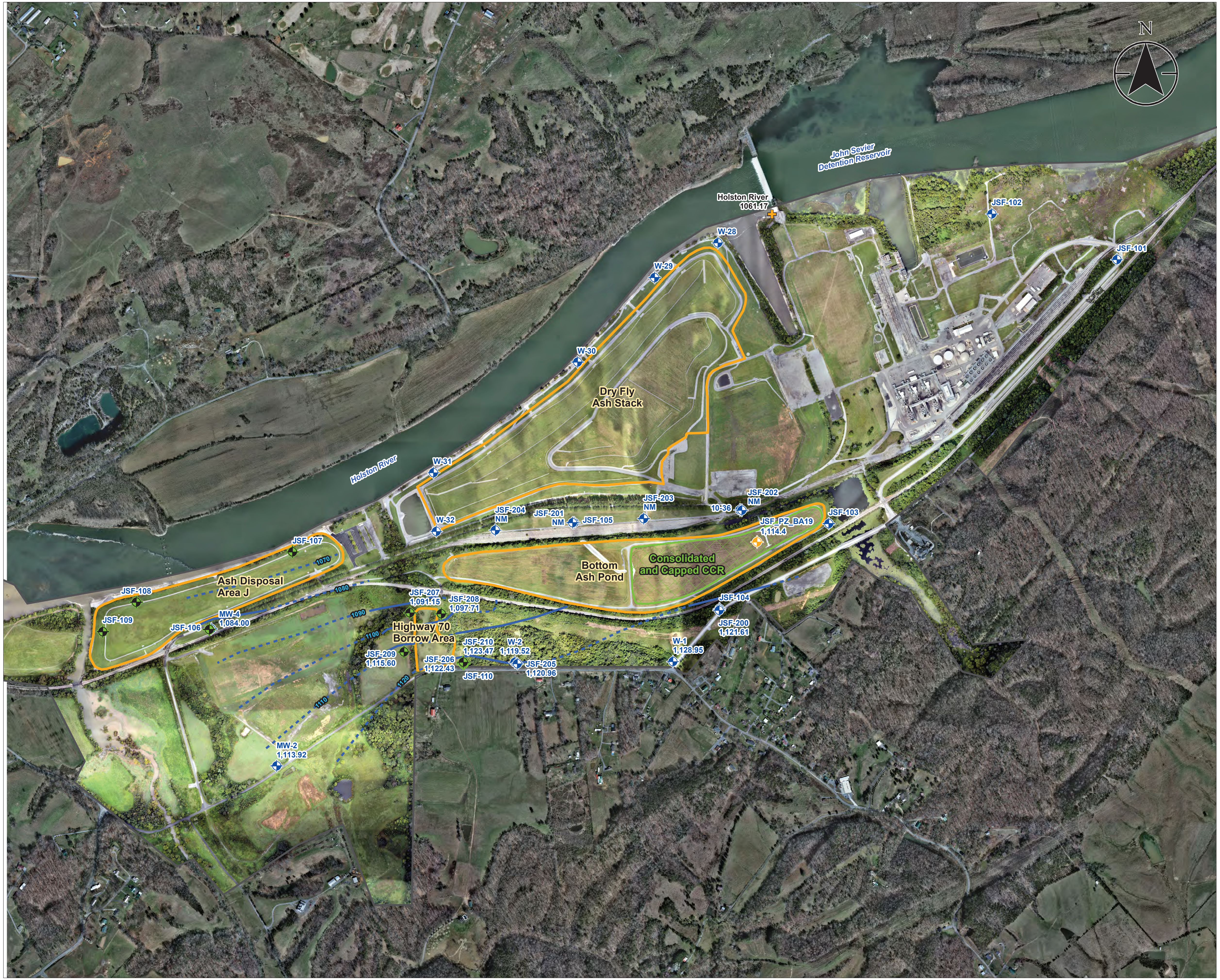

Legend

- 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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

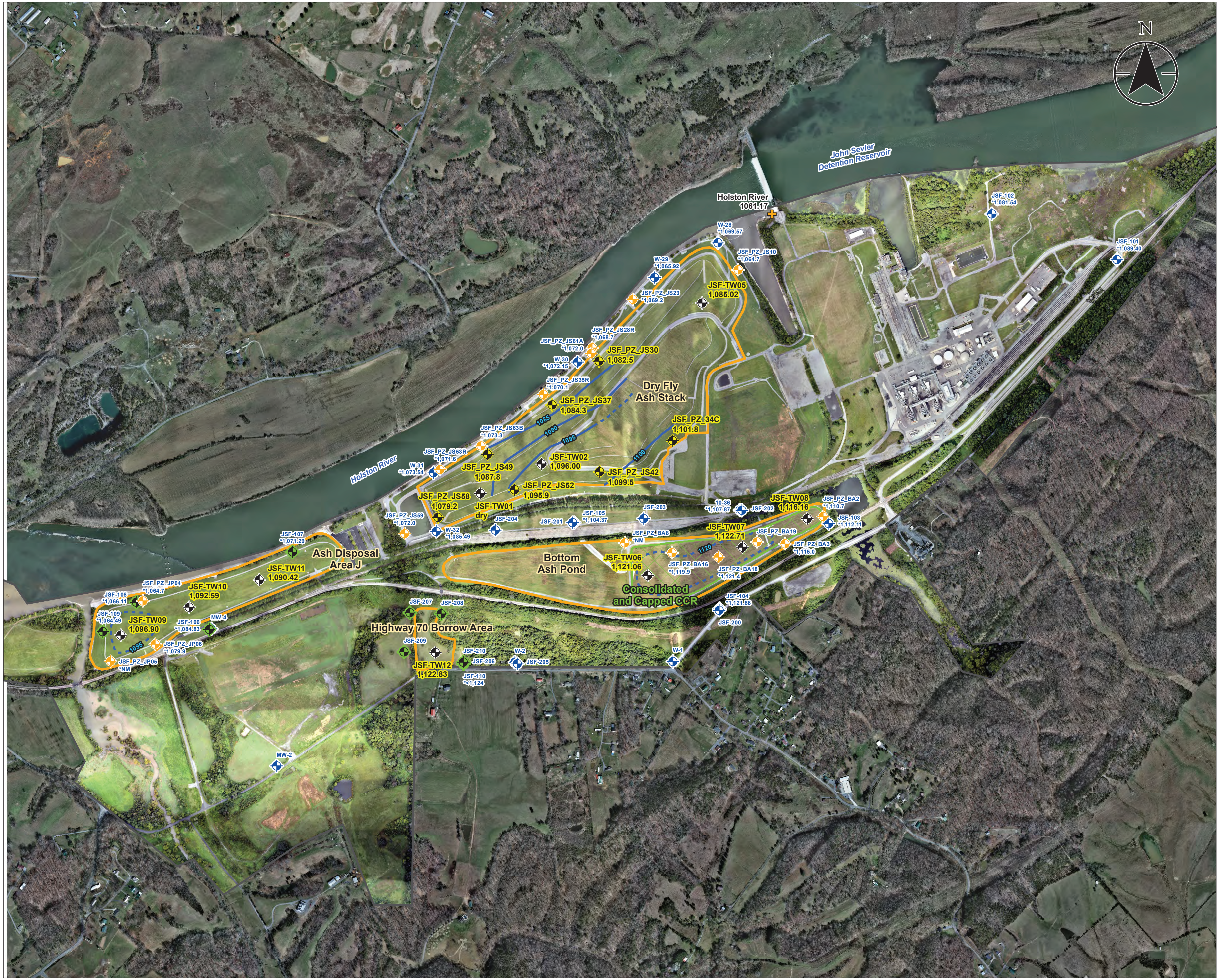

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Exhibit No.
A.4

Title
Pore Water Elevation Contour Map Event #2 (October 7, 2019)

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

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1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)
- Porewater Contour (5 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

< Groundwater elevations are rounded to nearest foot to constrain potential elevation when depth to groundwater could not be measured.

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

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APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier 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	
JSF-00-GW-43-001	W-28	7-Oct-19	19.57	1089.14	1069.57	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	7-Oct-19	13.90	1079.82	1065.92	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	7-Oct-19	9.18	1081.33	1072.15	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	7-Oct-19	12.07	1085.61	1073.54	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	7-Oct-19	19.63	1105.12	1085.49	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	7-Oct-19	12.51	1120.38	1107.87	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	7-Oct-19	18.70	1147.65	1128.95	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	7-Oct-19	15.30	1134.82	1119.52	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	7-Oct-19	17.32	1131.24	1113.92	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	7-Oct-19	13.23	1097.23	1084.00	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	7-Oct-19	21.03	1110.43	1089.40	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	7-Oct-19	9.88	1091.42	1081.54	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	7-Oct-19	14.62	1126.73	1112.11	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	7-Oct-19	23.81	1145.69	1121.88	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	7-Oct-19	16.74	1121.11	1104.37	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	7-Oct-19	24.90	1146.51	1121.61	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	7-Oct-19	NM	1121.17	NM	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	7-Oct-19	NM	1120.73	NM	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	7-Oct-19	NM	1124.14	NM	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	7-Oct-19	NM	1118.13	NM	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	7-Oct-19	15.27	1136.23	1120.96	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	7-Oct-19	13.38	1098.21	1084.83	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	7-Oct-19	38.46	1109.75	1071.29	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	7-Oct-19	43.30	1109.41	1066.11	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	7-Oct-19	40.23	1104.72	1064.49	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	7-Oct-19	18.53*	1142.44	Dry*	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	7-Oct-19	20.30	1142.73	1122.43	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	7-Oct-19	21.56	1112.71	1091.15	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	7-Oct-19	14.51	1112.22	1097.71	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	7-Oct-19	24.79	1140.39	1115.60	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	7-Oct-19	19.28	1142.75	1123.47	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	7-Oct-19	35.3	n/a	1110.7	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	7-Oct-19	23.4	n/a	1115.0	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	7-Oct-19	NM	n/a	NM	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	7-Oct-19	25.3	n/a	1119.9	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	7-Oct-19	31.4	n/a	1121.4	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	7-Oct-19	30.8	n/a	1114.4	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	7-Oct-19	20.3	n/a	1064.7	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	7-Oct-19	5.9	n/a	1069.2	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	7-Oct-19	10.2	n/a	1068.7	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	7-Oct-19	11.2	n/a	1070.1	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	7-Oct-19	10.7	n/a	1071.6	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	7-Oct-19	27.3	n/a	1072.0	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	7-Oct-19	17.7	n/a	1072.0	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	7-Oct-19	16.1	n/a	1073.3	1089.4	1065.5	23.9	n/a	FoundationClays
n/a	JSF_PZ_JP04	7-Oct-19	40.9	n/a	1064.7	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	7-Oct-19	NM	n/a	NM	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	7-Oct-19	26.4	n/a	1079.9	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	7-Oct-19	n/a	n/a	1061.17	n/a	n/a	n/a	n/a	n/a

See notes on last page.

Notes:

*	<0.4 ft (length of end cap) of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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. Holston River data point is the closest reading to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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. Groundwater levels were not measured in select peizometers as noted above because the sensors were not recording data.
6. Groundwater levels in Vacatur Program monitoring wells JSF-201 through -204 were not measured during this event. They were added to the list of gauging locations after Event #2 to increase data coverage.

TABLE B.1b – Pore Water Level Measurements
John Sevier Fossil Plant
October 2019

Temporary 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	
Temporary Wells									
JSF-TW01	7-Oct-19	*72.93	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02	7-Oct-19	77.81	1173.81	1096.00	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	7-Oct-19	79.14	1164.16	1085.02	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	7-Oct-19	28.90	1149.96	1121.06	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	7-Oct-19	30.85	1153.56	1122.71	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	7-Oct-19	33.97	1150.13	1116.16	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	7-Oct-19	14.51	1111.41	1096.90	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	7-Oct-19	22.93	1115.52	1092.59	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	7-Oct-19	21.87	1112.29	1090.42	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	7-Oct-19	22.63	1145.46	1122.83	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	7-Oct-19	18.6	n/a	1101.8	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	7-Oct-19	23.1	n/a	1082.5	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	7-Oct-19	19.5	n/a	1084.3	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	7-Oct-19	38.7	n/a	1099.5	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	7-Oct-19	11.0	n/a	1087.8	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	7-Oct-19	40.9	n/a	1095.9	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	7-Oct-19	21.0	n/a	1079.2	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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

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 elevations, pore water elevations, and piezometer data were obtained from geotechnical instrumentation database. Piezometer sensor formations were obtained from boring logs. Data from automated piezometers were averaged for the measurement date.
3. Pore water elevations in piezometers are calculated values. Depth to pore water in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.

TABLE B.2 – Summary of Groundwater Samples
John Sevier Fossil Plant
October 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
JSF-106	JSF-GW-022-20191008	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-108	JSF-GW-024-20191009	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-109	JSF-GW-025-20191009	Normal Environmental Sample	x	x	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20191008	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-207	JSF-GW-028-20191010	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
	JSF-GW-DUP01-20191010	Field Duplicate Sample		x		x		x	x	x	x	x	x
JSF-208	JSF-GW-029-20191010	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-209	JSF-GW-030-20191010	Normal Environmental Sample	x	x		x		x	x	x	x	x	x
JSF-210	JSF-GW-031-20191008	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/SW846 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
John Sevier Fossil Plant
October 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	JSF-106 8-Oct-19 JSF-GW-022-20191008 16 ft Normal Environmental Sample Final QC Review	JSF-108 9-Oct-19 JSF-GW-024-20191009 50 ft Normal Environmental Sample Final QC Review	JSF-109 9-Oct-19 JSF-GW-025-20191009 45 ft Normal Environmental Sample Final QC Review	JSF-206 8-Oct-19 JSF-GW-027-20191008 28.5 ft Normal Environmental Sample Final QC Review	JSF-207 10-Oct-19 JSF-GW-028-20191010 36.5 ft Normal Environmental Sample Final QC Review	JSF-208 10-Oct-19 JSF-GW-029-20191010 40.5 ft Normal Environmental Sample Final QC Review	JSF-209 10-Oct-19 JSF-GW-030-20191010 32.5 ft Normal Environmental Sample Final QC Review	JSF-210 8-Oct-19 JSF-GW-031-20191008 46.5 ft Normal Environmental Sample Final QC Review
Field Parameters									
Dissolved Oxygen	%	3.5	8.2	5.5	4.2	3.6	4.9	4.2	3.1
Dissolved Oxygen	mg/L	0.30	0.77	0.52	0.40	0.36	0.49	0.40	0.31
ORP	mV	129.0	63.5	-89.1	-53.9	66.4	-47.9	73.0	-73.2
pH (field)	SU	6.61	8.14	7.14	7.10	7.34	7.08	7.30	7.18
Specific Cond. (Field)	uS/cm	645	983	3,243	453.7	516.0	1,039	377.6	514.8
Temperature, Water (C)	DEG C	22.4	19.5	18.0	17.6	15.4	15.7	16.4	17.1
Turbidity, field	NTU	3.06	2.14	3.58	2.09	1.56	2.87	1.29	4.83

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
John Sevier Fossil Plant
October 2019

Sample Location				JSF-106	JSF-108	JSF-109	JSF-206	JSF-207		JSF-208	JSF-209	JSF-210
Sample Date				8-Oct-19	9-Oct-19	9-Oct-19	8-Oct-19	10-Oct-19	10-Oct-19	10-Oct-19	10-Oct-19	8-Oct-19
Sample ID				JSF-GW-022-20191008	JSF-GW-024-20191009	JSF-GW-025-20191009	JSF-GW-027-20191008	JSF-GW-028-20191010	JSF-GW-DUP01-20191010	JSF-GW-029-20191010	JSF-GW-030-20191010	JSF-GW-031-20191008
Sample Depth				16 ft	50 ft	45 ft	28.5 ft	36.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
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	Final-Verified
Total Metals												
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378	<0.378	0.421 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.380 J	0.438 J	7.97	0.671 J	0.926 J	0.827 J	5.75	0.583 J	1.04
Barium	ug/L	2,000[A]	n/v	75.4	58.3	56.3	174	260	257	68.6	32.3	146
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	0.374 J	0.200 J	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	308	5,570	150	<38.6	303	290	1,510	85.6 U*	<38.6
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	115,000	167,000	211,000	105,000	103,000	102,000	180,000	76,200	116,000
Chromium	ug/L	100[A]	n/v	2.17 U*	1.85 U*	2.45 U*	2.69 U*	1.61 U*	<1.53	<1.53	<1.53	2.76 U*
Cobalt	ug/L	n/v	6[B]	0.550	2.81	**8.90[B]**	0.744	0.192 J	0.135 J	0.381 J	0.159 J	0.684
Copper	ug/L	n/v	n/v	2.48 U*	1.18 U*	1.76 U*	1.56 U*	<0.627	<0.627	<0.627	<0.627	1.62 U*
Lead	ug/L	n/v	15[B]	<0.128	<0.128	<0.128	<0.128	0.128 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	6.17	10.4	11.1	10.6	8.24	3.63 J	12.3
Magnesium	ug/L	n/v	n/v	12,100	34,200	24,300	6,060	12,500	12,300	28,100	3,980	6,240
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	45.1	5.58	<0.610	2.66 J	2.48 J	7.21	<0.610	0.622 J
Nickel	ug/L	100 (TN MCL)[A]	n/v	2.14	1.96	3.36	1.28	0.750 J	<0.336	0.790 J	<0.336	0.381 J
Potassium	ug/L	n/v	n/v	2,650	756	2,150	1,020	648	644	3,360	759	1,110
Selenium	ug/L	50[A]	n/v	<1.51	<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	<0.177
Sodium	ug/L	n/v	n/v	32,900	19,200	595,000	8,450	12,900	13,000	52,100	11,400	12,000
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	<0.148	0.260 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	<0.991	1.24	<0.991	<0.991	<0.991	1.15	<0.991	<0.991
Zinc	ug/L	n/v	n/v	5.57 U*	4.07 U*	5.36 U*	3.78 U*	<3.22	<3.22	<3.22	<3.22	3.67 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	-	-	<0.378	-	-	-	-	-	-
Arsenic	ug/L	10[A]	n/v	-	-	8.04	-	-	-	-	-	-
Barium	ug/L	2,000[A]	n/v	-	-	57.4	-	-	-	-	-	-
Beryllium	ug/L	4[A]	n/v	-	-	<0.182	-	-	-	-	-	-
Boron	ug/L	n/v	n/v	-	-	148 U*	-	-	-	-	-	-
Cadmium	ug/L	5[A]	n/v	-	-	<0.125	-	-	-	-	-	-
Calcium	ug/L	n/v	n/v	-	-	211,000	-	-	-	-	-	-
Chromium	ug/L	100[A]	n/v	-	-	5.10 U*	-	-	-	-	-	-
Cobalt	ug/L	n/v	6[B]	-	-	**8.58[B]**	-	-	-	-	-	-
Copper	ug/L	n/v	n/v	-	-	2.02 U*	-	-	-	-	-	-
Lead	ug/L	n/v	15[B]	-	-	0.188 J	-	-	-	-	-	-
Lithium	ug/L	n/v	40[B]	-	-	6.35	-	-	-	-	-	-
Magnesium	ug/L	n/v	n/v	-	-	24,900	-	-	-	-	-	-
Mercury	ug/L	2[A]	n/v	-	-	<0.101	-	-	-	-	-	-
Molybdenum	ug/L	n/v	100[B]	-	-	3.33 J	-	-	-	-	-	-
Nickel	ug/L	100 (TN MCL)[A]	n/v	-	-	3.39	-	-	-	-	-	-
Potassium	ug/L	n/v	n/v	-	-	2,040	-	-	-	-	-	-
Selenium	ug/L	50[A]	n/v	-	-	<1.51	-	-	-	-	-	-
Silver	ug/L	100 (TN MCL)[A]	n/v	-	-	<0.177	-	-	-	-	-	-
Sodium	ug/L	n/v	n/v	-	-	565,000	-	-	-	-	-	-
Thallium	ug/L	2[A]	n/v	-	-	<0.148	-	-	-	-	-	-
Vanadium	ug/L	n/v	n/v	-	-	1.55	-	-	-	-	-	-
Zinc	ug/L	n/v	n/v	-	-	4.42 U*	-	-	-	-	-	-
Anions												
Chloride	mg/L	n/v	n/v	10.5	10.4	431	11.9	11.4	11.4	22.1	3.19	15.5
Fluoride	mg/L	4[A]	n/v	0.0732 U*	0.153	0.173 J	0.0566 U*	0.0585 J	0.0577 J	0.0729 J	0.0537 J	0.0599 U*
Sulfate	mg/L	n/v	n/v	108	258	638	44.5	75.2	74.6	297	55.5	57.7
General Chemistry												
Alkalinity, Bicarbonate	mg/L	n/v	n/v	263	364	613	242	235	235	309	262	262
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	263	364	613	242	235	235	309	262	262
Total Dissolved Solids	mg/L	n/v	n/v	461	745	2,450	334	345 J	395	978	595	387

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.

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TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
October 2019

Sample Location				JSF-106	JSF-108	JSF-109	JSF-206	JSF-207	JSF-207	JSF-208	JSF-209
Sample Date				8-Oct-19	9-Oct-19	9-Oct-19	8-Oct-19	10-Oct-19	10-Oct-19	10-Oct-19	10-Oct-19
Sample ID				JSF-GW-022-20191008	JSF-GW-024-20191009	JSF-GW-025-20191009	JSF-GW-027-20191008	JSF-GW-028-20191010	JSF-GW-DUP01-20191010	JSF-GW-029-20191010	JSF-GW-030-20191010
Sample Depth				16 ft	50 ft	45 ft	28.5 ft	36.5 ft	36.5 ft	40.5 ft	32.5 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
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
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.716 +/-(0.619)U	0.206 +/-(0.434)U	0.156 +/-(0.497)U	0.449 +/-(0.573)U	0.290 +/-(0.525)U	0.161 +/-(0.476)U	0.0813 +/-(0.419)U	0.410 +/-(0.566)U
Radium-228	pCi/L	n/v	n/v	0.458 +/-(0.489)U	0.216 +/-(0.529)U	0.156 +/-(0.410)U	0.374 +/-(0.405)U	-0.135 +/-(0.444)U	0.621 +/-(0.601)U	0.457 +/-(0.457)U	-0.0129 +/-(0.389)U
Radium-226+228	pCi/L	5[A]	n/v	1.17 +/-(0.789)U	0.422 +/-(0.684)U	0.311 +/-(0.644)U	0.823 +/-(0.701)U	0.290 +/-(0.687)U	0.782 +/-(0.767)U	0.538 +/-(0.620)U	0.410 +/-(0.687)U

See notes on last page.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
October 2019

Sample Location				JSF-210
Sample Date				8-Oct-19
Sample ID				JSF-GW-031-20191008
Sample Depth				46.5 ft
Sample Type				Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified
Radiological Parameters				
Radium-226	pCi/L	n/v	n/v	0.209 +/-(0.523)U
Radium-228	pCi/L	n/v	n/v	0.167 +/-(0.318)U
Radium-226+228	pCi/L	5[A]	n/v	0.377 +/-(0.612)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.5

GROUNDWATER INVESTIGATION EVENT #3 SAMPLING AND ANALYSIS REPORT

Stantec

John Sevier Fossil Plant Groundwater Investigation Event #3 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

July 16, 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	July 16, 2021

Sign-off Sheet

This document entitled John Sevier 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 Farr, Senior Principal Geologist

Approved by ____________ on behalf of

James M. Kerr, 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 #3	Groundwater Investigation sampling event performed December 2-5, 2019
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 2-5, 2019 (Event #3) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation upon completion of six groundwater sampling events is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF 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 JSF 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 JSF 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 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #3 were conducted December 2-5, 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.

During Event #3, Stantec conducted the following field activities:

- Measured groundwater levels at ten monitoring wells installed for the TDEC Order, and 21 monitoring wells and 16 piezometers installed for other environmental programs (31 total monitoring wells)
- Measured pore water levels at ten temporary wells and seven piezometers installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from nine 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, three field blanks, one tubing blank, and two equipment blanks
- 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 JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J and Highway 70 Borrow Area) 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 JSF 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 will not be 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 JSF Plant EAR. Pore water levels measured in 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, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3 and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

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.

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, and temperature. 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 form also documents 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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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 #3.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 31 monitoring wells and pore water levels at ten temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. On December 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*.

Groundwater and pore water measurements were also obtained from transducers installed within 16 piezometers and seven piezometers, respectively.

Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells and piezometers screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells and piezometers screened in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in

temporary wells and piezometers, along with overburden groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from nine 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*. An exception occurred at well JSF-110 where the depth to water was below the dedicated pump intake depth. Therefore, a decontaminated, non-dedicated pump and length of disposable tubing were used to obtain that groundwater sample. During purging, the water level dropped below the top of the non-dedicated pump intake. JSF-110 was allowed to recover overnight prior to collecting a groundwater sample following the procedures for low-yield wells described in the SAP. A groundwater sample was not collected from monitoring well JSF-107 because of insufficient water column.

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. 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 JSF 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. 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 field 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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 JSF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- A groundwater sample was not collected from monitoring well JSF-107 because of insufficient water column.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- The groundwater elevation in monitoring well JSF-110 was below the dedicated pump intake therefore, the dedicated pump was removed and a nondedicated pump and disposable tubing were used for purging and sampling the well. During purging the water level dropped below the nondedicated pump intake. As a result, the well was sampled following low-yield well procedures after recovering for 24 hours. Required equipment and tubing blanks were collected from the nondedicated pump and tubing.

- 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 #3 at the JSF 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 piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #3 included collecting groundwater level measurements at 31 monitoring wells and 16 piezometers; pore water measurements at ten temporary wells and seven piezometers in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1 a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3, and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at nine 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, except for JSF-110 which was sampled following low-yield well procedures described in the SAP. 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 validated or verified by EnvStds.

Stantec has completed Event #3 of the groundwater investigation at the JSF Plant in Rogersville, 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 John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc. (Stantec) 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 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

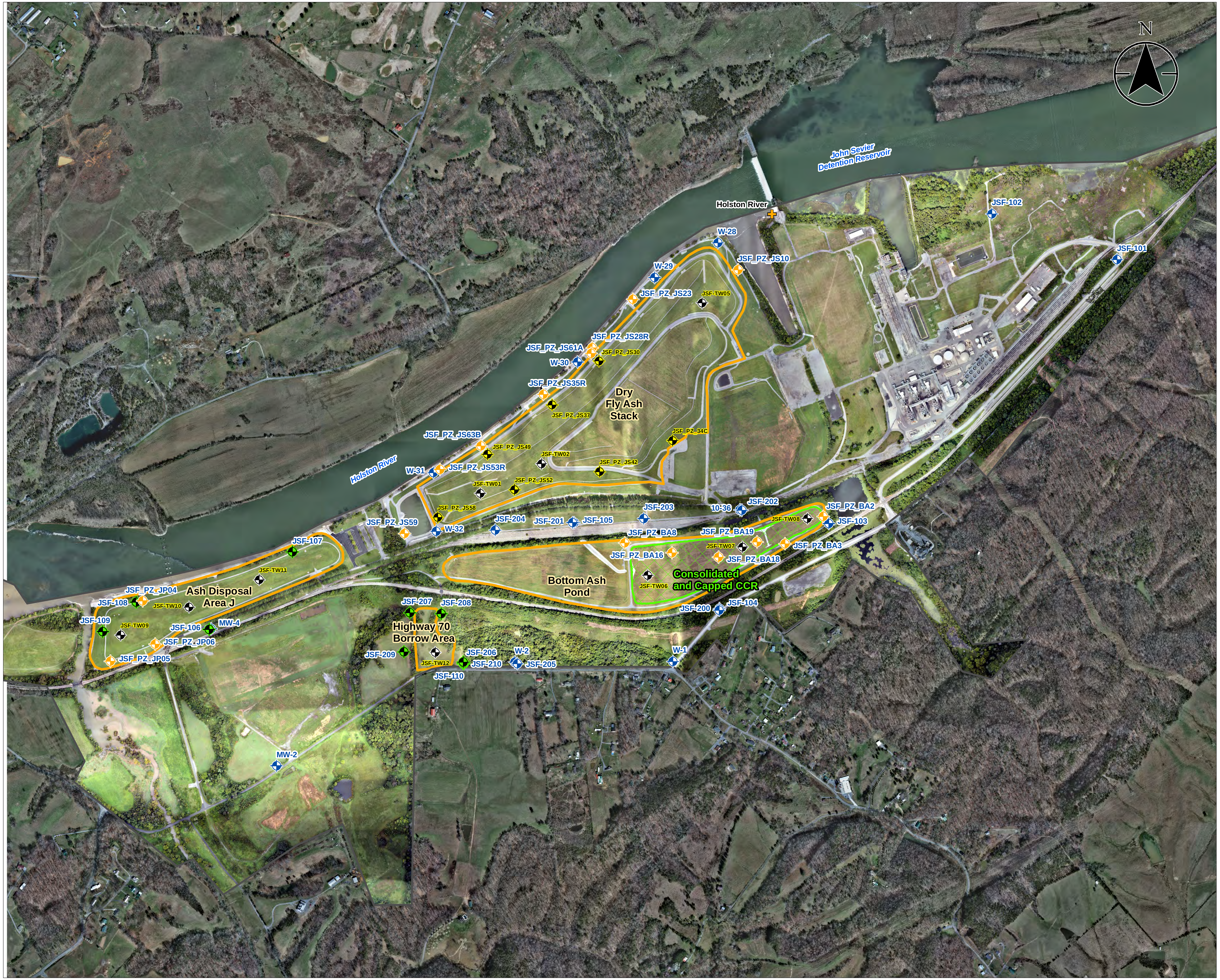


Exhibit No.

A.1

Title

Monitoring Well and Piezometer Network

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

0 500 1,000 1,500 2,000 Feet

1:6,000 (At original document size of 22x34)

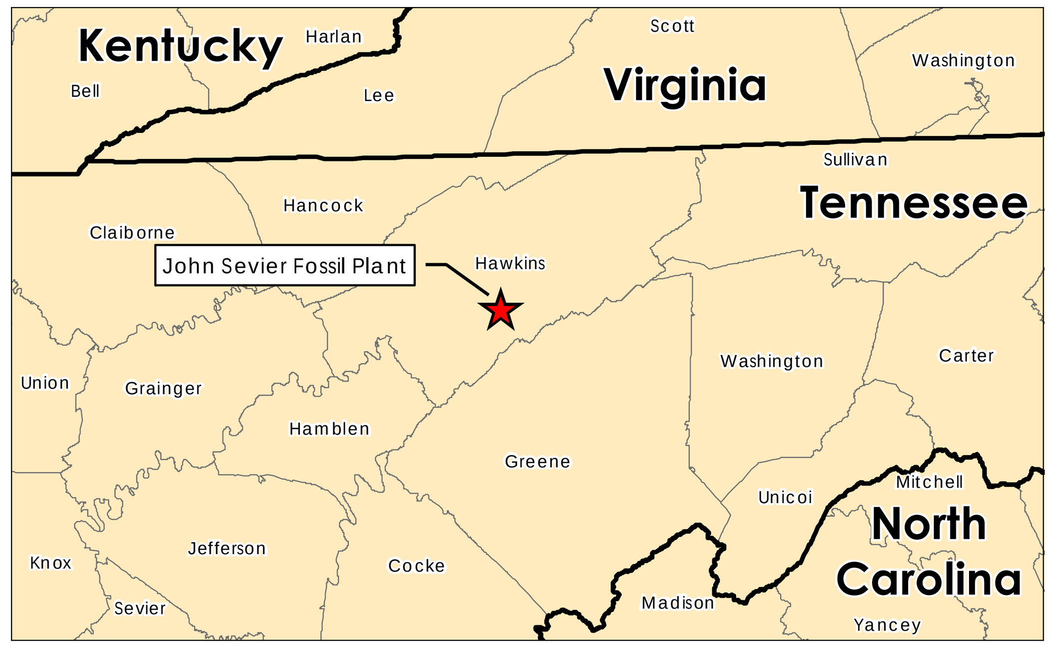
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec TVA

Revised: 2021-07-01 By: mbough

U:\TVA-EIP\175568225_JSF_Phase2\gis\mxd\GW_Tech_Memo\JSF_GW_TM_ExhA1_GW_MonitoringWellNetwork.mxd

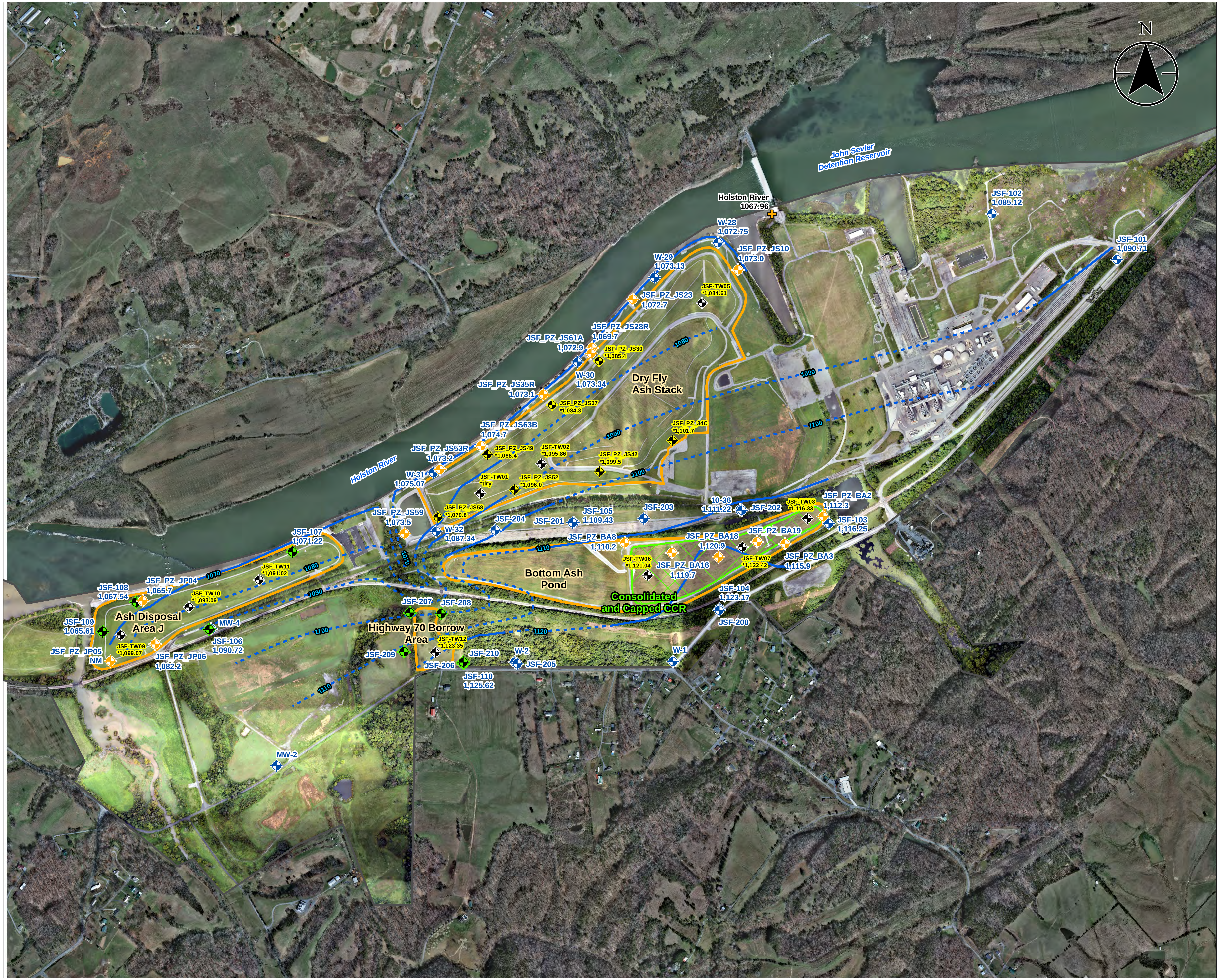


Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #3 (December 2, 2019), Overburden

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225

Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

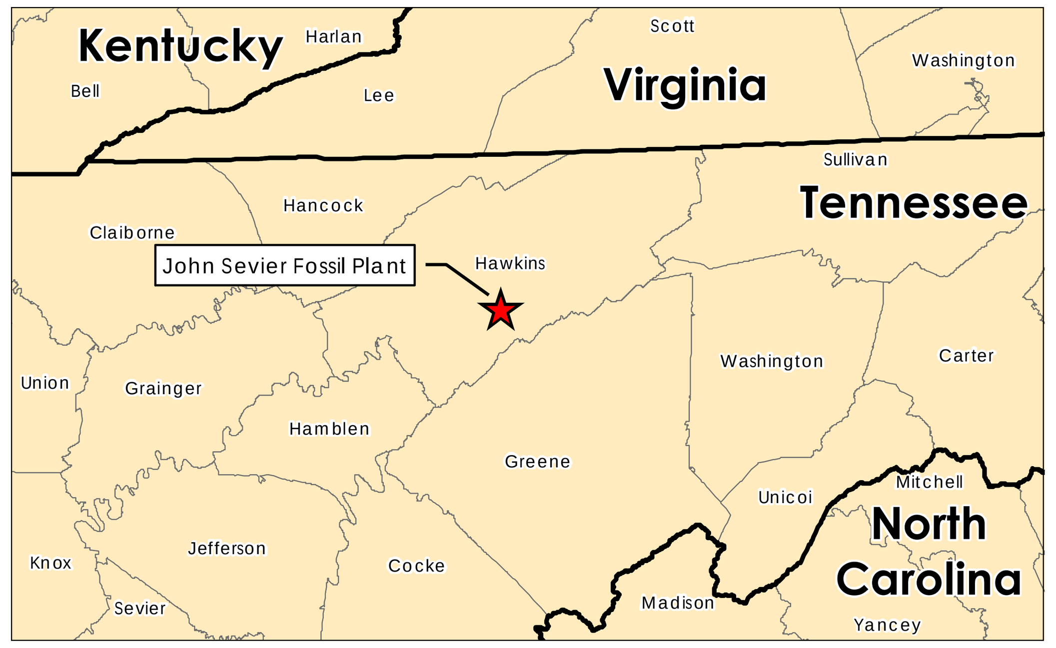
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created manually
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

U:\TVA-EP\175568225_JSF_Phase2\gis\mxd\GW_Tech_Memo\JSF_GW_TM_ExhA2_GW_Event3_Overburden_POT_Contour_wPZ.mxd Revised: 2021-07-08 By: mbough

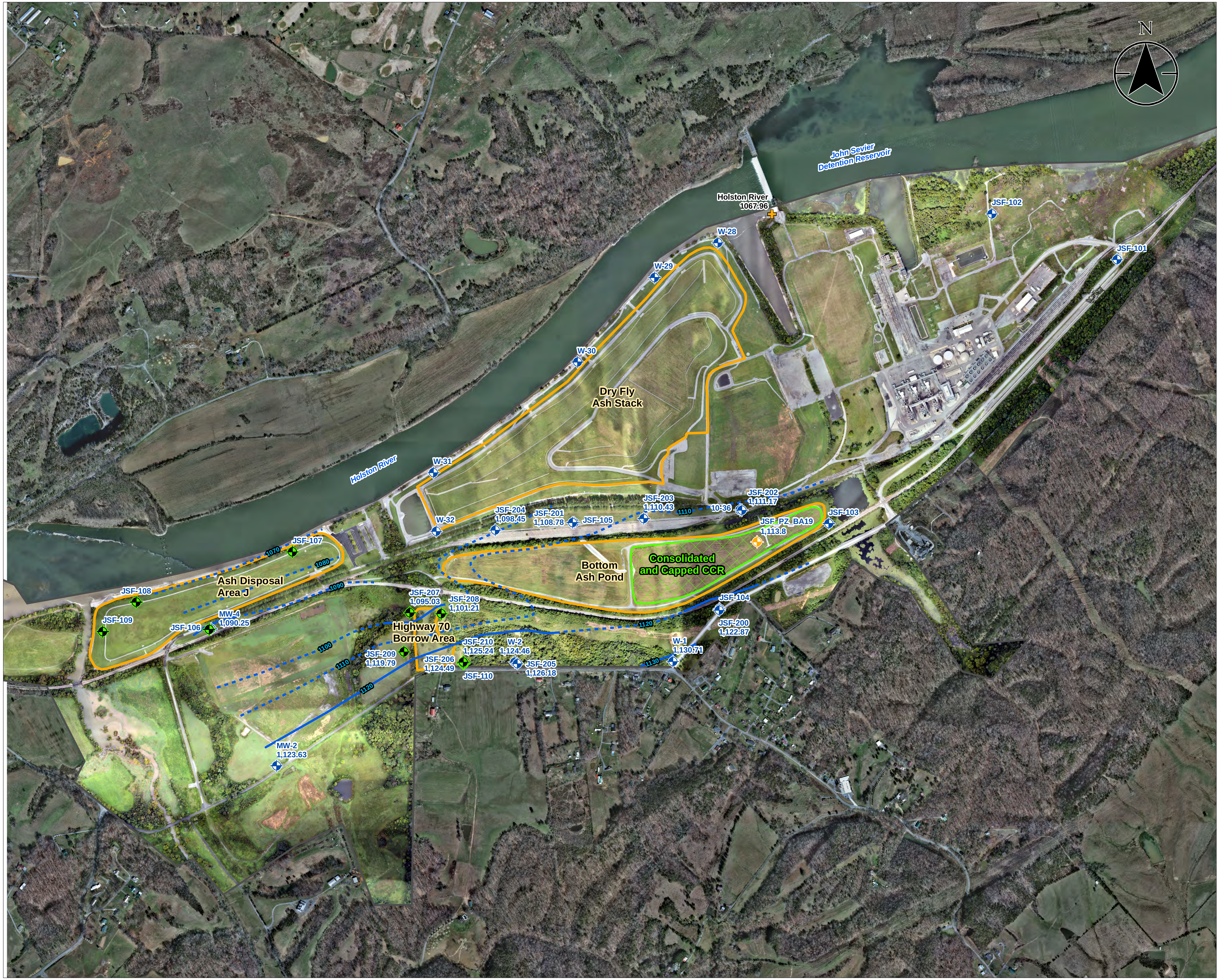


Exhibit No.

A.3

Title

Groundwater Elevation Contour Map, Event #3 (December 2, 2019), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-06-09
Technical Review by MD on 2021-06-09

0 500 1,000 1,500 2,000 Feet

1:6,000 (At original document size of 22x34)

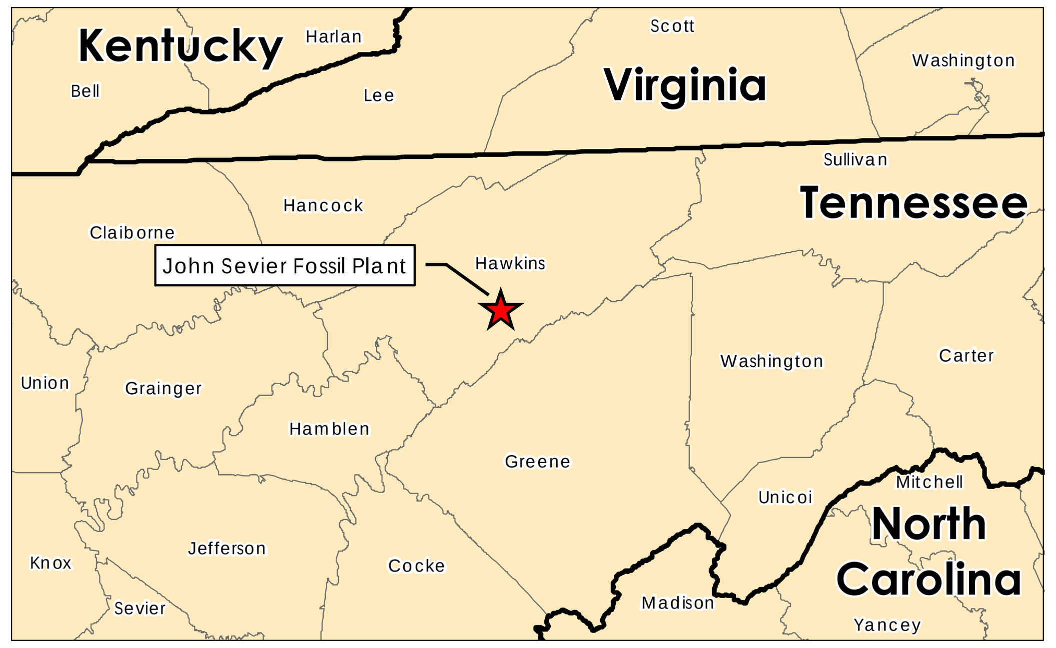
Legend

- 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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created manually
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

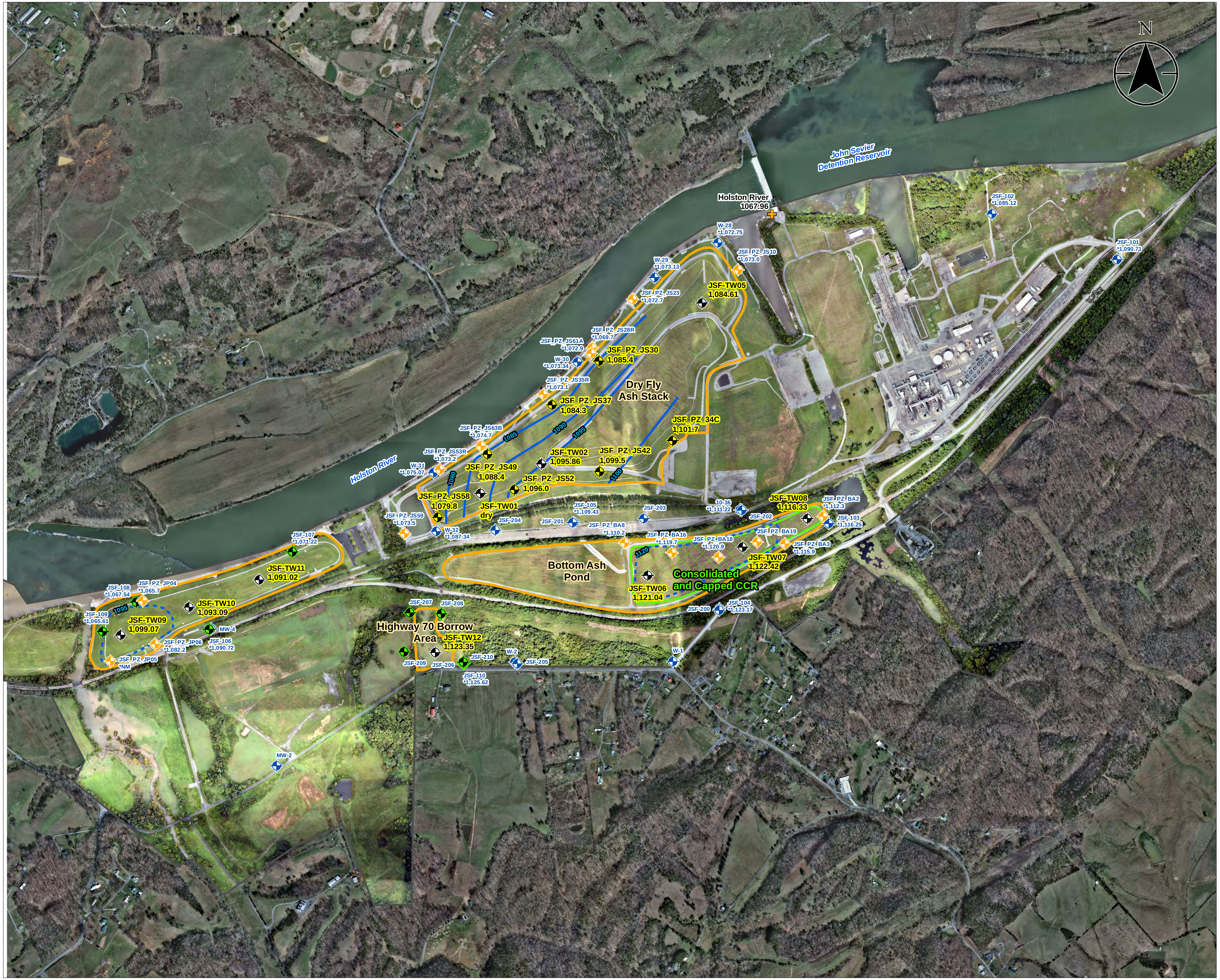


Exhibit No.

A.4

Title

Pore Water Elevation Contour Map, Event #3 (December 2, 2019)

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225

Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)
- Pore water Contour (5 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

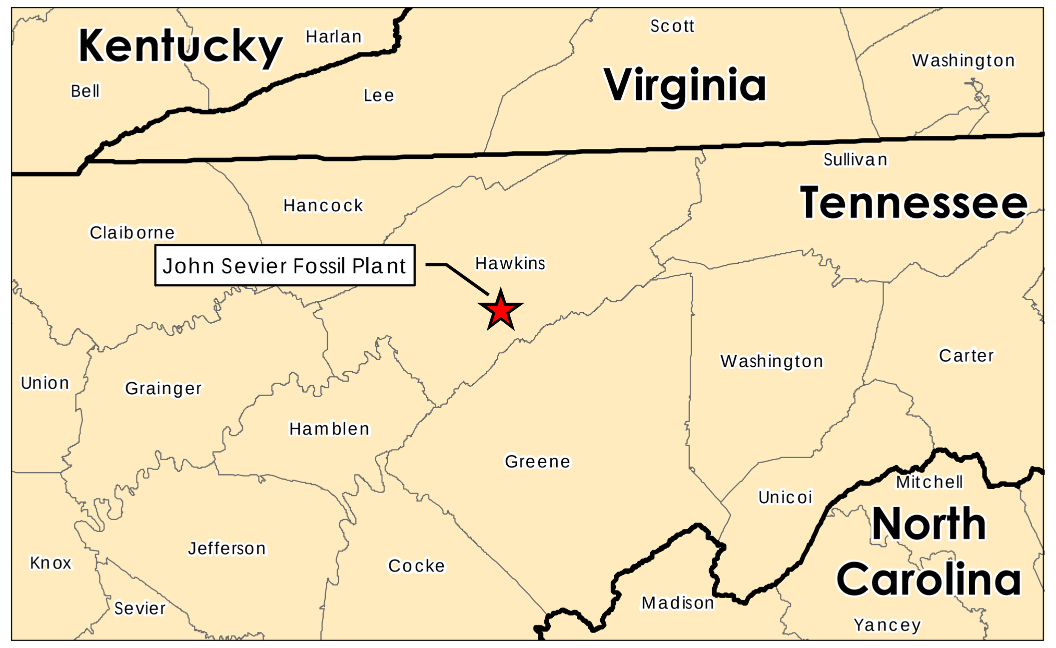
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier 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	
JSF-00-GW-43-001	W-28	2-Dec-19	16.39	1089.14	1072.75	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	2-Dec-19	6.69	1079.82	1073.13	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	2-Dec-19	7.99	1081.33	1073.34	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	2-Dec-19	10.54	1085.61	1075.07	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	2-Dec-19	17.78	1105.12	1087.34	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	2-Dec-19	9.16	1120.38	1111.22	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	2-Dec-19	16.94	1147.65	1130.71	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	2-Dec-19	10.36	1134.82	1124.46	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	2-Dec-19	7.61	1131.24	1123.63	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	2-Dec-19	6.98	1097.23	1090.25	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	2-Dec-19	19.72	1110.43	1090.71	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	2-Dec-19	6.30	1091.42	1085.12	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	2-Dec-19	10.48	1126.73	1116.25	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	2-Dec-19	22.52	1145.69	1123.17	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	2-Dec-19	11.68	1121.11	1109.43	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	2-Dec-19	23.64	1146.51	1122.87	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	2-Dec-19	12.39	1121.17	1108.78	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	2-Dec-19	9.56	1120.73	1111.17	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	2-Dec-19	13.71	1124.14	1110.43	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	2-Dec-19	19.68	1118.13	1098.45	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	2-Dec-19	10.05	1136.23	1126.18	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	2-Dec-19	7.49	1098.21	1090.72	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	2-Dec-19	38.53	1109.75	1071.22	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	2-Dec-19	41.87	1109.41	1067.54	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	2-Dec-19	39.11	1104.72	1065.61	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	2-Dec-19	16.82	1142.44	1125.62	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	2-Dec-19	18.24	1142.73	1124.49	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	2-Dec-19	17.68	1112.71	1095.03	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	2-Dec-19	11.01	1112.22	1101.21	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	2-Dec-19	20.60	1140.39	1119.79	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	2-Dec-19	17.51	1142.75	1125.24	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	2-Dec-19	33.7	n/a	1112.3	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	2-Dec-19	22.5	n/a	1115.9	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	2-Dec-19	24.4	n/a	1110.2	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	2-Dec-19	25.5	n/a	1119.7	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	2-Dec-19	31.9	n/a	1120.9	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	2-Dec-19	31.4	n/a	1113.8	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	2-Dec-19	12.0	n/a	1073.0	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	2-Dec-19	2.4	n/a	1072.7	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	2-Dec-19	9.2	n/a	1069.7	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	2-Dec-19	8.2	n/a	1073.1	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	2-Dec-19	9.1	n/a	1073.2	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	2-Dec-19	25.8	n/a	1073.5	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	2-Dec-19	16.8	n/a	1072.9	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	2-Dec-19	14.7	n/a	1074.7	1089.4	1065.5	23.9	n/a	FoundationClays
n/a	JSF_PZ_JP04	2-Dec-19	39.9	n/a	1065.7	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	2-Dec-19	NM	n/a	NM	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	2-Dec-19	24.1	n/a	1082.2	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	2-Dec-19	n/a	n/a	1067.96	n/a	n/a	n/a	n/a	n/a

See notes on last page.

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
December 2019

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. Holsten River data point is the reading closest to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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. Groundwater levels were not measured in select peizometers as noted above because the sensors were not recording data.

TABLE B.1b – Pore Water Level Measurements
John Servier Fossil Plant
December 2019

Temporary 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	
Temporary Wells									
JSF-TW01	2-Dec-19	*72.97	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02	2-Dec-19	77.95	1173.81	1095.86	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	2-Dec-19	79.55	1164.16	1084.61	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	2-Dec-19	28.92	1149.96	1121.04	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	2-Dec-19	31.14	1153.56	1122.42	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	2-Dec-19	33.80	1150.13	1116.33	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	2-Dec-19	12.34	1111.41	1099.07	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	2-Dec-19	22.43	1115.52	1093.09	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	2-Dec-19	21.27	1112.29	1091.02	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	2-Dec-19	22.11	1145.46	1123.35	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	2-Dec-19	18.7	n/a	1101.7	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	2-Dec-19	20.2	n/a	1085.4	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	2-Dec-19	19.5	n/a	1084.3	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	2-Dec-19	38.7	n/a	1099.5	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	2-Dec-19	10.4	n/a	1088.4	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	2-Dec-19	40.8	n/a	1096.0	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	2-Dec-19	20.4	n/a	1079.8	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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

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 elevations, pore water elevations, and piezometer data were obtained from geotechnical instrumentation database. Piezometer sensor formations were obtained from boring logs. Data from automated piezometers were averaged for the measurement date.
3. Pore water elevations in piezometers are calculated values. Depth to pore water in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.

TABLE B.2 – Summary of Groundwater Samples
John Sevier 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
JSF-106	JSF-GW-022-20191203	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-108	JSF-GW-024-20191204	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-109	JSF-GW-025-20191204	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-110	JSF-GW-026-20191204	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20191203	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-207	JSF-GW-028-20191205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	JSF-GW-DUP01-20191205	Field Duplicate Sample		x	x	x	x	x	x	x	x
JSF-208	JSF-GW-029-20191205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-209	JSF-GW-030-20191205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-210	JSF-GW-031-20191203	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/SW846 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
John Sevier Fossil Plant
December 2019

Sample Location		JSF-106	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208	JSF-209	JSF-210
Sample Date		3-Dec-19	4-Dec-19	4-Dec-19	4-Dec-19	3-Dec-19	5-Dec-19	5-Dec-19	5-Dec-19	3-Dec-19
Sample ID		JSF-GW-022-20191203	JSF-GW-024-20191204	JSF-GW-025-20191204	JSF-GW-026-20191204	JSF-GW-027-20191203	JSF-GW-028-20191205	JSF-GW-029-20191205	JSF-GW-030-20191205	JSF-GW-031-20191203
Sample Depth		16 ft	50 ft	45 ft	17.7 ft	28.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters										
Dissolved Oxygen	%	26.8	28.0	11.2	29.7	4.3	92.0	8.7	7.5	5.8
Dissolved Oxygen	mg/L	2.72	2.83	1.15	3.16	0.42	1.38	0.88	0.79	0.61
ORP	mV	-233.7	52.2	-63.1	133.4	-301.1	54.6	-101.2	24.1	-303.9
pH (field)	SU	6.57	6.91	6.92	6.69	6.99	7.48	7.18	7.36	7.20
Specific Cond. (Field)	uS/cm	554.7	1,072	3,209	399.5	518.9	548.9	1,118	390.2	633.9
Temperature, Water (C)	DEG C	13.7	14.6	14.5	11.9	15.5	13.5	15.4	14.7	13.9
Turbidity, field	NTU	1.59	3.72	4.40	2.44	1.65	0.57	0.97	0.67	2.40

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
John Sevier Fossil Plant
December 2019

Sample Location				JSF-106	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207		JSF-208
Sample Date				3-Dec-19	4-Dec-19	4-Dec-19	4-Dec-19	3-Dec-19	5-Dec-19	5-Dec-19	5-Dec-19
Sample ID				JSF-GW-022-20191203	JSF-GW-024-20191204	JSF-GW-025-20191204	JSF-GW-026-20191204	JSF-GW-027-20191203	JSF-GW-028-20191205	JSF-GW-DUP01-20191205	JSF-GW-029-20191205
Sample Depth				16 ft	50 ft	45 ft	17.7 ft	28.5 ft	36.5 ft	36.5 ft	40.5 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
Level of Review				Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
	Units	EPA MCLs	CCR Rule GWPS								
Total Metals											
Antimony	ug/L	6[A]	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.412 J	0.428 J	4.22	0.411 J	0.558 J	0.567 J	0.435 J	3.38
Barium	ug/L	2,000[A]	n/v	52.6	58.8	47.9	85.2	168	138	141	63.6
Beryllium	ug/L	4[A]	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	0.182 UJ	0.182 UJ	<0.182
Boron	ug/L	n/v	n/v	126	4,830	115	<38.6	<38.6	161	152	1,410
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125	<0.125	<0.125	<0.125	0.157 J	<0.125	<0.125
Calcium	ug/L	n/v	n/v	62,900	171,000	204,000	53,000	96,100	93,600	96,200	169,000
Chromium	ug/L	100[A]	n/v	2.12 U*	<1.53	1.66 U*	2.32 U*	2.04 U*	2.45 U*	1.79 U*	2.65 U*
Cobalt	ug/L	n/v	6[B]	0.171 J	3.65	5.16	0.900	0.656	0.375 J	0.284 J	0.349 J
Copper	ug/L	n/v	n/v	1.49 J	<0.627	0.909 J	1.15 J	<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	0.150 J	<0.128	<0.128
Lithium	ug/L	n/v	40[B]	<3.39	<3.39	3.68 J	<3.39	7.64	22.6 U*	15.6 U*	23.6 U*
Magnesium	ug/L	n/v	n/v	8,870	32,900	23,100	2,650	5,560	10,000	10,300	26,500
Mercury	ug/L	2[A]	n/v	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	1.23 J	48.7	6.98	<0.610	<0.610	0.829 J	0.850 J	6.73
Nickel	ug/L	100(TN MCL)[A]	n/v	1.27 U*	1.76 U*	2.29	2.16	1.26 U*	0.748 U*	0.712 U*	0.685 U*
Potassium	ug/L	n/v	n/v	3,030	697	1,910	1,000	994	706	701	4,460
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	40,100	17,700	485,000	20,200	8,260	8,470	8,550	45,100
Thallium	ug/L	2[A]	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	0.265 J	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.28 U*	<0.991	1.30 U*	1.47 U*	1.34 U*	2.52 U*	1.95 U*	2.06 U*
Zinc	ug/L	n/v	n/v	7.58 U*	<3.22	<3.22	12.4 U*	4.47 U*	3.74 U*	4.19 U*	4.28 U*
Anions											
Chloride	mg/L	n/v	n/v	9.70	9.10	416	4.04	11.0	6.95	6.94	25.3
Fluoride	mg/L	4[A]	n/v	0.112	0.200	0.210 J	0.0692 J	0.0711 J	0.0704 J	0.0681 J	0.106
Sulfate	mg/L	n/v	n/v	110	242	468	73.7	37.2	72.6	72.5	276
General Chemistry											
Alkalinity, Bicarbonate	mg/L	n/v	n/v	141	367	628	155	239	226	221	312
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	141	367	628	155	239	226	221	312
Total Dissolved Solids	mg/L	n/v	n/v	348	753	2,000	279	308	318	325	740

See notes on last page.

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
John Sevier Fossil Plant
December 2019

Sample Location				JSF-209	JSF-210
Sample Date				5-Dec-19	3-Dec-19
Sample ID				JSF-GW-030-20191205	JSF-GW-031-20191203
Sample Depth				32.5 ft	46.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Validated	Final-Verified
Total Metals					
Antimony	ug/L	6[A]	n/v	<0.378	<0.378
Arsenic	ug/L	10[A]	n/v	0.411 J	1.17
Barium	ug/L	2,000[A]	n/v	30.8	170
Beryllium	ug/L	4[A]	n/v	0.182 UJ	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6
Cadmium	ug/L	5[A]	n/v	<0.125	<0.125
Calcium	ug/L	n/v	n/v	66,100	114,000
Chromium	ug/L	100[A]	n/v	1.60 U*	<1.53
Cobalt	ug/L	n/v	6[B]	0.100 J	0.606
Copper	ug/L	n/v	n/v	<0.627	0.643 J
Lead	ug/L	n/v	15[B]	<0.128	<0.128
Lithium	ug/L	n/v	40[B]	16.5 U*	10.8
Magnesium	ug/L	n/v	n/v	3,540	6,000
Mercury	ug/L	2[A]	n/v	<0.101	<0.101
Molybdenum	ug/L	n/v	100[B]	<0.610	<0.610
Nickel	ug/L	100(TN MCL)[A]	n/v	<0.336	<0.336
Potassium	ug/L	n/v	n/v	643	1,060
Selenium	ug/L	50[A]	n/v	<1.51	<1.51
Silver	ug/L	100(TN MCL)[A]	n/v	<0.177	<0.177
Sodium	ug/L	n/v	n/v	9,920	11,200
Thallium	ug/L	2[A]	n/v	<0.148	0.165 J
Vanadium	ug/L	n/v	n/v	1.42 U*	1.14 U*
Zinc	ug/L	n/v	n/v	3.80 U*	<3.22
Anions					
Chloride	mg/L	n/v	n/v	4.25	19.9
Fluoride	mg/L	4[A]	n/v	0.0447 J	0.0576 J
Sulfate	mg/L	n/v	n/v	34.5	62.9
General Chemistry					
Alkalinity, Bicarbonate	mg/L	n/v	n/v	193	262
Alkalinity, Carbonate	mg/L	n/v	n/v	<5.00	<5.00
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	193	262
Total Dissolved Solids	mg/L	n/v	n/v	228	397

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.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
December 2019

Sample Location				JSF-106	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207		JSF-208
Sample Date				3-Dec-19	4-Dec-19	4-Dec-19	4-Dec-19	3-Dec-19	5-Dec-19	5-Dec-19	5-Dec-19
Sample ID				JSF-GW-022-20191203	JSF-GW-024-20191204	JSF-GW-025-20191204	JSF-GW-026-20191204	JSF-GW-027-20191203	JSF-GW-028-20191205	JSF-GW-DUP01-20191205	JSF-GW-029-20191205
Sample Depth				16 ft	50 ft	45 ft	17.7 ft	28.5 ft	36.5 ft	36.5 ft	40.5 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
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.404 +/-(0.525)U	0.309 +/-(0.452)U	0.451 +/-(0.548)U	0.979 +/-(0.655)U*	0.672 +/-(0.646)U	0.390 +/-(0.535)U	0.414 +/-(0.502)U	0.459 +/-(0.447)U
Radium-228	pCi/L	n/v	n/v	0.0739 +/-(0.304)U	0.398 +/-(0.477)U	-0.223 +/-(0.342)U	0.0514 +/-(0.301)U	0.0814 +/-(0.301)U	-0.342 +/-(0.273)U	0.223 +/-(0.399)U	0.955 +/-(0.602)
Radium-226+228	pCi/L	5[A]	n/v	0.478 +/-(0.607)U	0.707 +/-(0.657)U	0.451 +/-(0.646)U	1.03 +/-(0.721)U*	0.753 +/-(0.713)U	0.390 +/-(0.601)U	0.637 +/-(0.641)U	1.41 +/-(0.749)J

See notes on last page.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
December 2019

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-209 5-Dec-19 JSF-GW-030-20191205 32.5 ft Normal Environmental Sample Validated	JSF-210 3-Dec-19 JSF-GW-031-20191203 46.5 ft Normal Environmental Sample Final-Verified
Radiological Parameters					
Radium-226	pCi/L	n/v	n/v	0.474 +/-(0.430)U	0.597 +/-(0.515)U
Radium-228	pCi/L	n/v	n/v	-0.364 +/-(0.399)U	0.421 +/-(0.399)U
Radium-226+228	pCi/L	5[A]	n/v	0.474 +/-(0.587)U	1.02 +/-(0.651)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
U*	this result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level.

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX H.6

GROUNDWATER INVESTIGATION EVENT #4 SAMPLING AND ANALYSIS REPORT

Stantec

John Sevier Fossil Plant Groundwater Investigation Event #4 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

September 10, 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	July 16, 2021
1	Addresses August 18, 2021 TDEC Review Comments and Issued for TDEC Review	September 10, 2021

This document entitled John Sevier 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 Rebekah Brooks

Rebekah Brooks, Principal Hydrogeologist

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 #4	Groundwater Investigation sampling event performed February 3-7, 2020
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 February 3-7, 2020 (Event #4) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation upon completion of six groundwater sampling events is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, including data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF 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 sampling activities for this event. Terracon Consultants, Inc. (Terracon) measured static groundwater levels and the data are included in this SAR. Laboratory analysis of constituents was performed by GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and

Eurofins TestAmerica, Inc. (TestAmerica) in North Canton, Ohio (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 JSF 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 JSF 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 February 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #4 were conducted February 3-7, 2020. During this event, Terracon performed groundwater level measurements, and Stantec performed 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. 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 #4, the following field activities were conducted:

- Measured groundwater levels at ten monitoring wells installed for the TDEC Order, and 21 monitoring wells and 17 piezometers installed for other environmental programs (31 total monitoring wells)
- Measured pore water levels at ten temporary wells and five piezometers installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from ten 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, four field blanks and one equipment blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in North Canton, Ohio.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J, and Highway 70 Borrow Area) 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 JSF 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 will not be 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 JSF Plant EAR. Pore water levels measured in 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, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3 and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

Stantec and 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 program-specific field forms. Health and safety forms were completed in accordance with TVA, Stantec, and Terracon health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

Stantec and Terracon 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 and Terracon 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, Terracon documented well inspection observations at each monitoring well 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

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.

3.2.1.5 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, and temperature. 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 form also documents 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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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 during Event #4.

3.3.1 Static Water Level Measurements

Terracon FSP measured static groundwater levels at 31 monitoring wells and pore water levels at 10 temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. On February 3, 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. 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 JSF 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 17 piezometers and five piezometers, respectively.

Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells and piezometers screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells and piezometers screened in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in temporary wells and piezometers, along with groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from ten monitoring wells as shown in Table B.2 in Appendix B. Split samples collected by CEC during Event #4 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*.

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. 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 JSF 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. 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 field 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 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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 North Canton, Ohio (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 JSF Plant.

3.6.1 Variations in Scope

There were no variations in scope during groundwater investigation sampling Event #4 at the JSF Plant.

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.
- DO was not within the afternoon calibration verification acceptance criteria on February 5, 2020. These calibration variations were evaluated as part of the data validation/verification process performed by EnvStds.

4.0 SUMMARY

The data presented in this report are only for groundwater investigation sampling Event #4 at the JSF 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 piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #4 included collecting groundwater level measurements at 31 monitoring wells and 17 piezometers; pore water measurements at ten temporary wells and five piezometers in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3, and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at ten 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 GEL and TestAmerica and validated or verified by EnvStds.

Stantec and Terracon have completed Event #4 of the groundwater investigation at the JSF Plant in Rogersville, 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 John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc (Stantec). 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 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 and Piezometer Network

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

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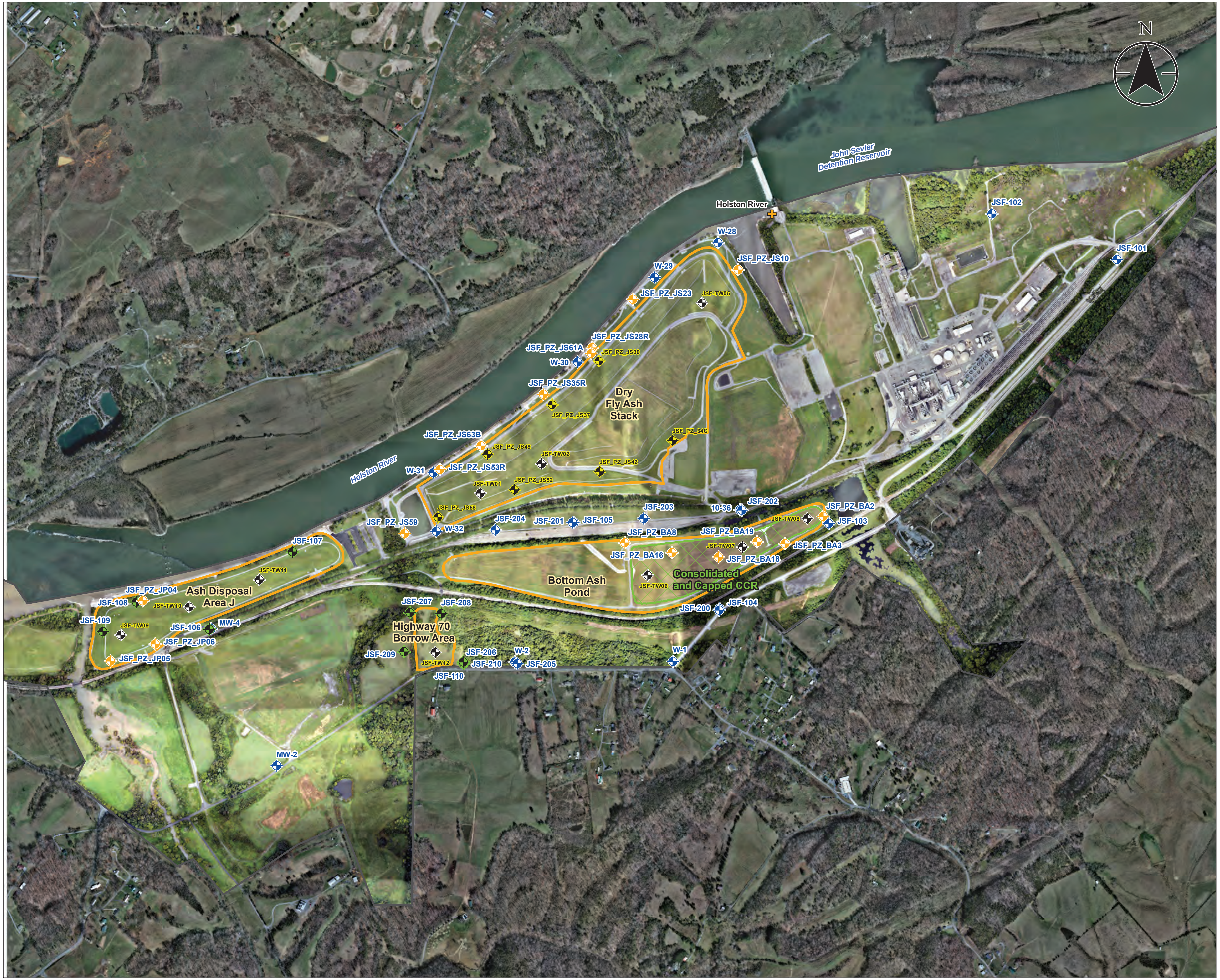

Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)

Stantec TVA

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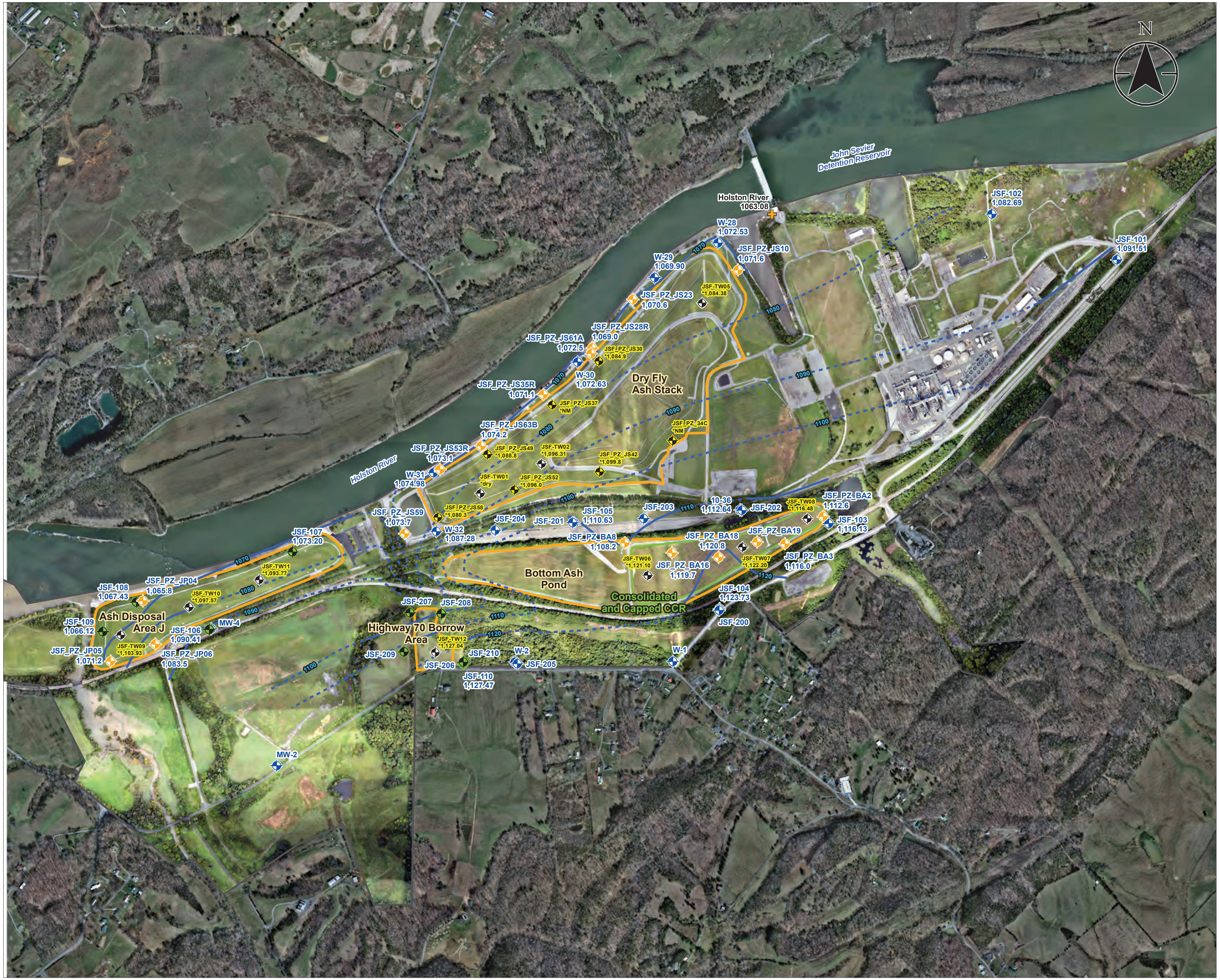

Exhibit No.
A.2

Title
Groundwater Elevation Contour Map, Event #4 (February 3, 2020), Overburden

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet
1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

*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.

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

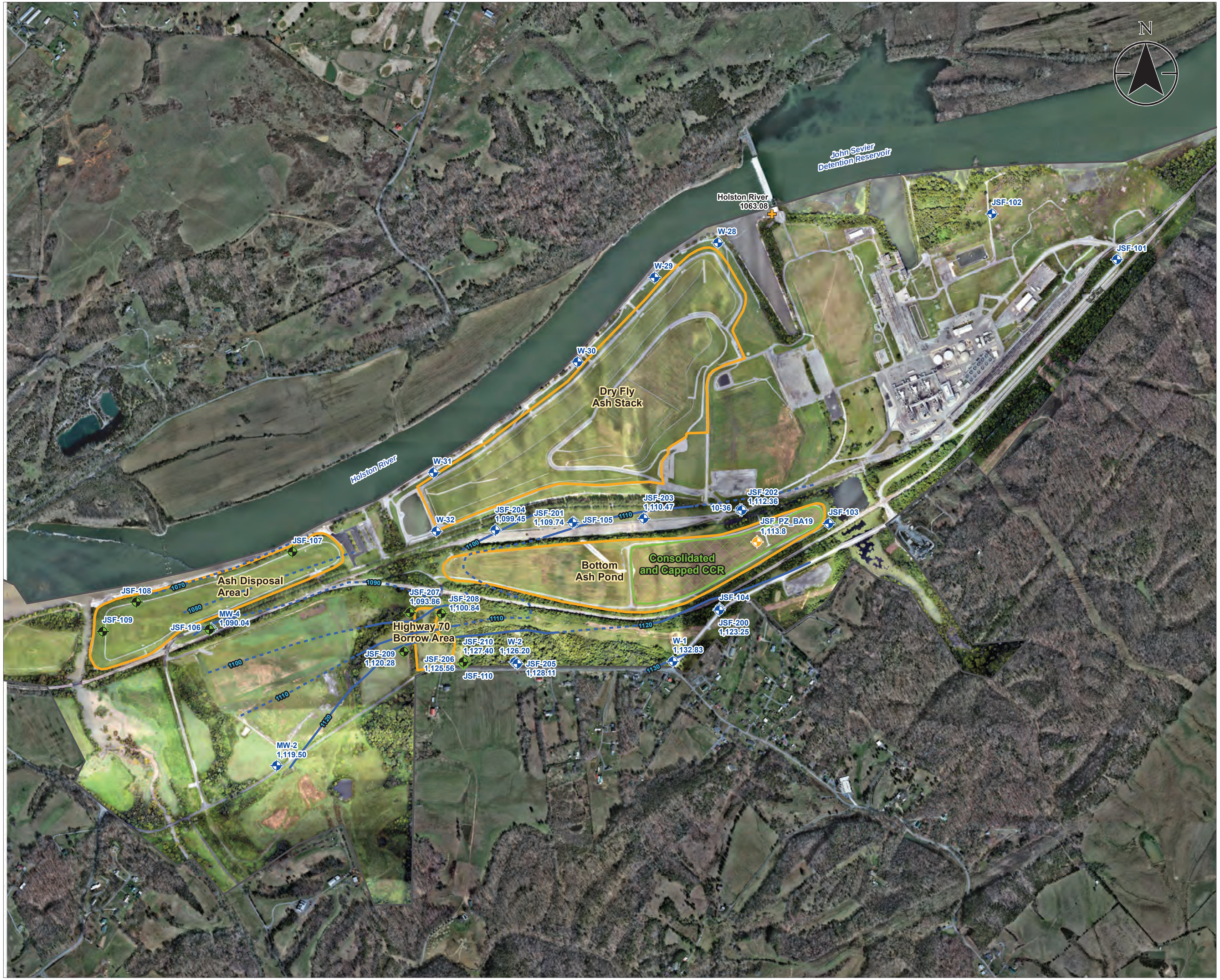

Exhibit No.

A.3

Title

Groundwater Elevation Contour Map, Event #4 (February 3, 2020), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-06-16
Technical Review by MD on 2021-06-16

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

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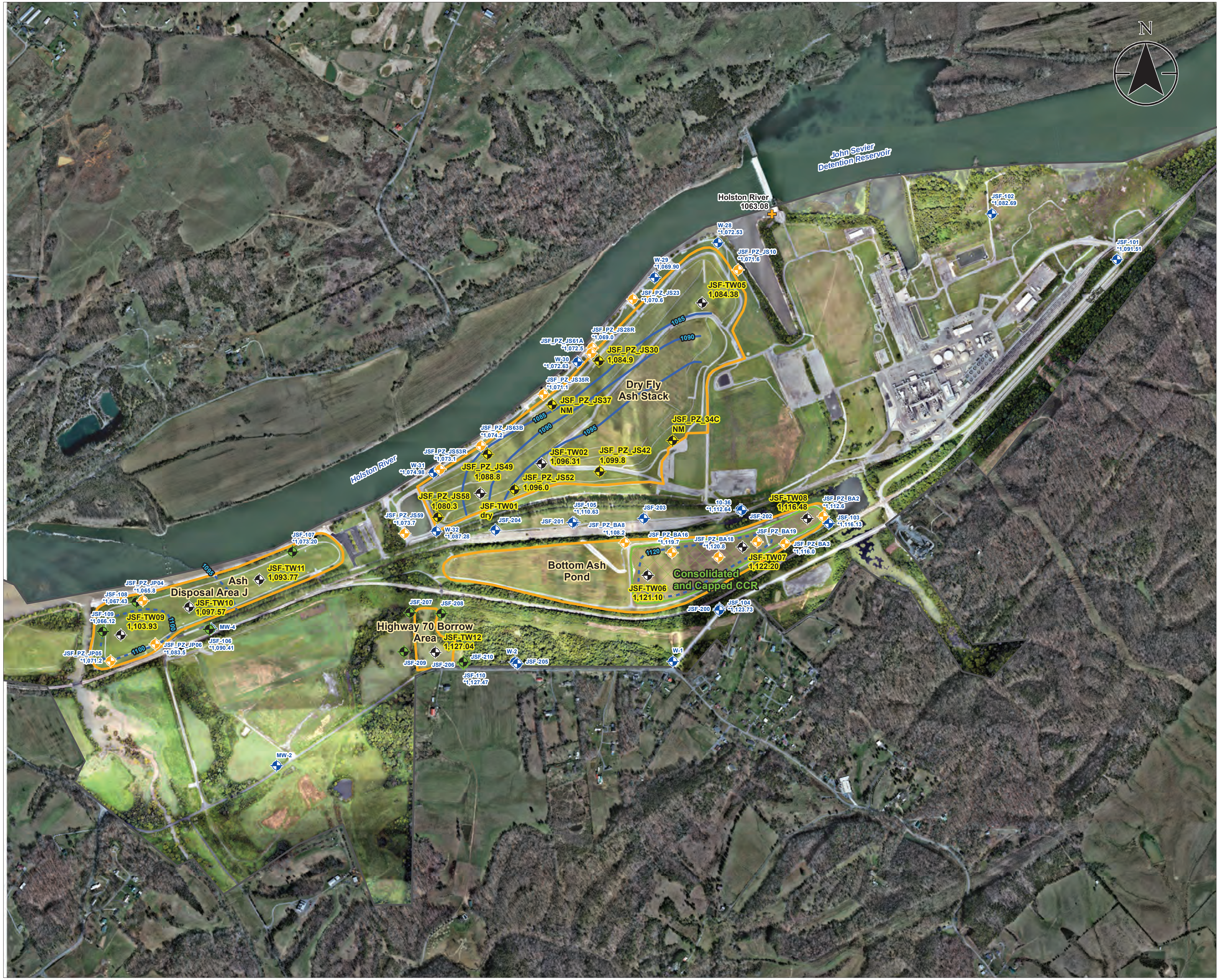

Exhibit No.
A.4

Title
Pore Water Elevation Contour Map, Event #4 (February 3, 2020)

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-08
Technical Review by MD on 2021-07-08

0 500 1,000 1,500 2,000 Feet
1:6,000 (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
- Holston River Gauge — surface water elevation in ft amsl
- Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)
- Pore water Contour (5 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.

Stantec TVA

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APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier 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	
JSF-00-GW-43-001	W-28	3-Feb-20	16.61	1089.14	1072.53	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	3-Feb-20	9.92	1079.82	1069.90	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	3-Feb-20	8.70	1081.33	1072.63	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	3-Feb-20	10.63	1085.61	1074.98	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	3-Feb-20	17.84	1105.12	1087.28	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	3-Feb-20	7.74	1120.38	1112.64	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	3-Feb-20	14.82	1147.65	1132.83	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	3-Feb-20	8.62	1134.82	1126.20	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	3-Feb-20	11.74	1131.24	1119.50	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	3-Feb-20	7.19	1097.23	1090.04	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	3-Feb-20	18.92	1110.43	1091.51	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	3-Feb-20	8.73	1091.42	1082.69	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	3-Feb-20	10.60	1126.73	1116.13	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	3-Feb-20	21.96	1145.69	1123.73	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	3-Feb-20	10.48	1121.11	1110.63	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	3-Feb-20	23.26	1146.51	1123.25	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	3-Feb-20	11.43	1121.17	1109.74	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	3-Feb-20	8.37	1120.73	1112.36	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	3-Feb-20	13.67	1124.14	1110.47	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	3-Feb-20	18.68	1118.13	1099.45	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	3-Feb-20	8.12	1136.23	1128.11	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	3-Feb-20	7.80	1098.21	1090.41	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	3-Feb-20	36.55	1109.75	1073.20	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	3-Feb-20	41.98	1109.41	1067.43	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	3-Feb-20	38.60	1104.72	1066.12	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	3-Feb-20	14.97	1142.44	1127.47	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	3-Feb-20	17.17	1142.73	1125.56	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	3-Feb-20	18.85	1112.71	1093.86	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	3-Feb-20	11.38	1112.22	1100.84	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	3-Feb-20	20.11	1140.39	1120.28	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	3-Feb-20	15.35	1142.75	1127.40	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	3-Feb-20	33.4	n/a	1112.6	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	3-Feb-20	22.4	n/a	1116.0	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	3-Feb-20	26.4	n/a	1108.2	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	3-Feb-20	25.5	n/a	1119.7	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	3-Feb-20	32.0	n/a	1120.8	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	3-Feb-20	31.4	n/a	1113.8	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	3-Feb-20	13.4	n/a	1071.6	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	3-Feb-20	4.5	n/a	1070.6	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	3-Feb-20	9.9	n/a	1069.0	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	3-Feb-20	10.2	n/a	1071.1	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	3-Feb-20	9.2	n/a	1073.1	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	3-Feb-20	25.6	n/a	1073.7	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	3-Feb-20	17.2	n/a	1072.5	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	3-Feb-20	15.2	n/a	1074.2	1089.4	1065.5	23.9	n/a	FoundationClays
n/a	JSF_PZ_JP04	3-Feb-20	39.8	n/a	1065.8	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	3-Feb-20	33.3	n/a	1071.2	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	3-Feb-20	22.8	n/a	1083.5	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	3-Feb-20	n/a	n/a	1063.08	n/a	n/a	n/a	n/a	n/a

See notes on last page.

Stantec

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
February 2020

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

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. Holsten River data point is the reading closest to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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.

TABLE B.1b – Pore Water Level Measurements
John Sevier Fossil Plant
February 2020

Temporary 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	
Temporary Wells									
JSF-TW01	3-Feb-20	*72.92	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02	3-Feb-20	77.50	1173.81	1096.31	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	3-Feb-20	79.78	1164.16	1084.38	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	3-Feb-20	28.86	1149.96	1121.10	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	3-Feb-20	31.36	1153.56	1122.20	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	3-Feb-20	33.65	1150.13	1116.48	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	3-Feb-20	7.48	1111.41	1103.93	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	3-Feb-20	17.95	1115.52	1097.57	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	3-Feb-20	18.52	1112.29	1093.77	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	3-Feb-20	18.42	1145.46	1127.04	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	3-Feb-20	NM	n/a	NA	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	3-Feb-20	20.7	n/a	1084.9	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	3-Feb-20	NM	n/a	NA	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	3-Feb-20	38.4	n/a	1099.8	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	3-Feb-20	10.0	n/a	1088.8	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	3-Feb-20	40.8	n/a	1096.0	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	3-Feb-20	19.9	n/a	1080.3	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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

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. Piezometer sensor formation information obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
3. Pore water elevations in piezometers are calculated values. Depth to pore water in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. Pore water levels were not measured in select piezometers as noted above because the sensors were not recording data.

TABLE B.2 – Summary of Groundwater Samples
John Sevier Fossil Plant
February 2020

			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
JSF-106	JSF-GW-022-20200204	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-107	JSF-GW-023-20200205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-108	JSF-GW-024-20200206	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-109	JSF-GW-025-20200206	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-110	JSF-GW-026-20200204	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20200205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-207	JSF-GW-028-20200206	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	JSF-GW-DUP01-20200206	Field Duplicate Sample		x	x	x	x	x	x	x	x
JSF-208	JSF-GW-029-20200207	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-209	JSF-GW-030-20200205	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-210	JSF-GW-031-20200204	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/SW846 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 JSF-107, JSF-206 and JSF-209.

TABLE B.3 – Summary of Groundwater Quality Parameters
John Sevier Fossil Plant
February 2020

Sample Location		JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208	JSF-209	JSF-210
Sample Date		4-Feb-20	5-Feb-20	6-Feb-20	6-Feb-20	4-Feb-20	5-Feb-20	6-Feb-20	7-Feb-20	5-Feb-20	4-Feb-20
Sample ID		JSF-GW-022-20200204	JSF-GW-023-20200205	JSF-GW-024-20200206	JSF-GW-025-20200206	JSF-GW-026-20200204	JSF-GW-027-20200205	JSF-GW-028-20200206	JSF-GW-029-20200207	JSF-GW-030-20200205	JSF-GW-031-20200204
Sample Depth		16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters											
Dissolved Oxygen	%	40.1	7.2 J	6.1	4.2	24.9	3.1 J	11.6	5.3	19.9 J	10.2
Dissolved Oxygen	mg/L	4.30	0.72 J	0.61	0.42	2.64	0.31 J	1.18	0.59	2.00 J	1.00
ORP	mV	263.6	226.9	142.8	-26.3	288.4	-15.3	192.8	-0.7	101.2	-53.4
pH (field)	SU	6.62	6.22	7.02	7.05	5.47	7.01	7.48	7.17	7.35	7.13
Specific Cond. (Field)	uS/cm	415.2	395.5	1,114	3,141	64.5	530	505.0	1,110	314.0	610
Temperature, Water (C)	DEG C	12.8	15.5	15.4	15.6	13.2	15.6	14.4	11.6	15.6	14.9
Turbidity, field	NTU	0.60	0.24	0.44	4.82	0.30	3.40	0.26	0.63	0.36	0.59

Notes:

%	percent
Cond.	conductance
DEG C	degrees Celsius
ft	feet below top of casing
ID	identification
J	quantitation is approximate due to limitations identified during data validation
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
John Sevier Fossil Plant
February 2020

Sample Location	Units	EPA MCLs	CCR Rule GWPS	JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207		JSF-208
Sample Date				4-Feb-20	5-Feb-20	6-Feb-20	6-Feb-20	4-Feb-20	5-Feb-20	6-Feb-20	6-Feb-20	7-Feb-20
Sample ID				JSF-GW-022-20200204	JSF-GW-023-20200205	JSF-GW-024-20200206	JSF-GW-025-20200206	JSF-GW-026-20200204	JSF-GW-027-20200205	JSF-GW-028-20200206	JSF-GW-DUP01-20200206	JSF-GW-029-20200207
Sample Depth				16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	36.5 ft	40.5 ft
Sample Type				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
Level of Review				Final-Verified	Validated	Validated	Validated	Final-Verified	Validated	Validated	Validated	Final-Verified
Total Metals												
Antimony	ug/L	6[A]	n/v	<0.570	<0.570	<0.570	<0.570	1.12 J	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	10[A]	n/v	<0.750	<0.750	<0.750	3.98 J	<0.750	<0.750	<0.750	<0.750	3.71 J
Barium	ug/L	2,000[A]	n/v	46.0	27.8	53.2	38.4	54.4	198	169	168	39.4
Beryllium	ug/L	4[A]	n/v	<0.305	<0.305	<0.305	<0.305	0.340 J	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	n/v	n/v	88.4	5,320	5,920	139	<16.0	17.8 J	161	159	1,690
Cadmium	ug/L	5[A]	n/v	<0.197	0.277 J	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	n/v	n/v	75,900	79,400	182,000	220,000	11,200	120,000	91,000	90,100	161,000
Chromium	ug/L	100[A]	n/v	<0.980	<0.980	<0.980	19.2	<0.980	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	n/v	6[B]	<0.190	<0.190	3.45	5.34	1.54	0.270 J	0.216 J	0.236 J	<0.190
Copper	ug/L	n/v	n/v	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70
Lead	ug/L	n/v	15[B]	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	n/v	40[B]	<1.65	<1.65	<1.65	<1.65	<1.65	10.6	5.84 J	5.90 J	8.19
Magnesium	ug/L	n/v	n/v	10,900	8,760	34,700	25,100	752 J	6,530	8,950	8,900	23,300
Mercury	ug/L	2[A]	n/v	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	100[B]	1.49 U*	**886[B]**	51.6	9.57	7.96	<1.08	2.22 J	1.45 J	6.21
Nickel	ug/L	100(TN MCL)[A]	n/v	<1.47	<1.47	1.63 J	14.0	1.54 U*	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	n/v	n/v	2,570	1,480	743 J	2,040	329 J	1,030	644 J	638 J	4,180
Selenium	ug/L	50[A]	n/v	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890
Silver	ug/L	100(TN MCL)[A]	n/v	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	16,400	6,210	20,700	483,000	1,850	8,650	7,520	7,490	37,200
Thallium	ug/L	2[A]	n/v	<0.200	<0.200	<0.200	<0.200	1.12 U*	<0.200	<0.200	<0.200	<0.200
Vanadium	ug/L	n/v	n/v	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	21.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0
Anions												
Chloride	mg/L	n/v	n/v	4.74	3.10	10.7	392	3.22	30.0	8.33	8.32	26.4
Fluoride	mg/L	4[A]	n/v	0.116	0.759	0.224	0.217	0.0454 J	0.0466 J	0.0655	0.0647	0.118
Sulfate	mg/L	n/v	n/v	105	138	281	410	11.4	67.4	58.2	58.3	268
General Chemistry												
Alkalinity, Bicarbonate	mg/L	n/v	n/v	125	111	335	601	17.6	233	200	199	286
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	125	111	335	601	17.6	233	200	199	286
Total Dissolved Solids	mg/L	n/v	n/v	354	335	785	1,890	98.0 J	363	325	345	789

See notes on last page.

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
John Sevier Fossil Plant
February 2020

Sample Location				JSF-209	JSF-210
Sample Date				5-Feb-20	4-Feb-20
Sample ID				JSF-GW-030-20200205	JSF-GW-031-20200204
Sample Depth				32.5 ft	46.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Validated	Final-Verified
Total Metals					
Antimony	ug/L	6 A	n/v	<0.570	<0.570
Arsenic	ug/L	10 A	n/v	<0.750	<0.750
Barium	ug/L	2,000 A	n/v	31.0	157
Beryllium	ug/L	4 A	n/v	<0.305	<0.305
Boron	ug/L	n/v	n/v	36.5	19.8 J
Cadmium	ug/L	5 A	n/v	<0.197	<0.197
Calcium	ug/L	n/v	n/v	67,700	137,000
Chromium	ug/L	100 A	n/v	<0.980	<0.980
Cobalt	ug/L	n/v	6 B	<0.190	0.553 J
Copper	ug/L	n/v	n/v	<1.70	<1.70
Lead	ug/L	n/v	15 B	<0.450	<0.450
Lithium	ug/L	n/v	40 B	3.13 J	11.8
Magnesium	ug/L	n/v	n/v	3,420	7,240
Mercury	ug/L	2 A	n/v	<0.130	<0.130
Molybdenum	ug/L	n/v	100 B	5.04 U*	1.15 U*
Nickel	ug/L	100 (TN MCL) A	n/v	<1.47	<1.47
Potassium	ug/L	n/v	n/v	686 J	1,080
Selenium	ug/L	50 A	n/v	<0.890	<0.890
Silver	ug/L	100 (TN MCL) A	n/v	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	9,210	12,300
Thallium	ug/L	2 A	n/v	0.813 U*	<0.200
Vanadium	ug/L	n/v	n/v	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	<15.0
Anions					
Chloride	mg/L	n/v	n/v	3.81	40.9
Fluoride	mg/L	4 A	n/v	0.0664	0.0606
Sulfate	mg/L	n/v	n/v	41.0	87.9
General Chemistry					
Alkalinity, Bicarbonate	mg/L	n/v	n/v	204	250
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	204	250
Total Dissolved Solids	mg/L	n/v	n/v	273	499

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.
2. CEC collected split samples from JSF-107, JSF-206, and JSF-209.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
February 2020

Sample Location				JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	
Sample Date				4-Feb-20	5-Feb-20	6-Feb-20	6-Feb-20	4-Feb-20	5-Feb-20	6-Feb-20	6-Feb-20
Sample ID				JSF-GW-022-20200204	JSF-GW-023-20200205	JSF-GW-024-20200206	JSF-GW-025-20200206	JSF-GW-026-20200204	JSF-GW-027-20200205	JSF-GW-028-20200206	JSF-GW-DUP01-20200206
Sample Depth				16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	36.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental 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	Validated	Validated	Validated	Final-Verified	Validated	Validated	Validated
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.0911 +/-(0.404)U	0.246 +/-(0.525)U	0.229 +/-(0.530)U	0.937 +/-(0.662)U	0.463 +/-(0.526)U	1.03 +/-(0.788)	1.18 +/-(0.740)	0.429 +/-(0.566)U
Radium-228	pCi/L	n/v	n/v	0.101 +/-(0.375)U	0.0237 +/-(0.266)U	-0.115 +/-(0.400)U	0.260 +/-(0.384)U	-0.118 +/-(0.245)U	0.233 +/-(0.355)U	-0.320 +/-(0.372)U	-0.0253 +/-(0.287)U
Radium-226+228	pCi/L	5[A]	n/v	0.192 +/-(0.551)U	0.270 +/-(0.589)U	0.229 +/-(0.665)U	1.20 +/-(0.765)U	0.463 +/-(0.580)U	1.26 +/-(0.864)J	1.18 +/-(0.829)J	0.429 +/-(0.635)U

See notes on last page.

Stantec

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
February 2020

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-208 7-Feb-20 JSF-GW-029-20200207 40.5 ft Normal Environmental Sample Final-Verified	JSF-209 5-Feb-20 JSF-GW-030-20200205 32.5 ft Normal Environmental Sample Validated	JSF-210 4-Feb-20 JSF-GW-031-20200204 46.5 ft Normal Environmental Sample Final-Verified
Radiological Parameters						
Radium-226	pCi/L	n/v	n/v	0.888 +/-(0.685)U	0.450 +/-(0.577)U	0.467 +/-(0.573)U
Radium-228	pCi/L	n/v	n/v	0.224 +/-(0.301)U	0.186 +/-(0.274)U	0.593 +/-(0.429)U
Radium-226+228	pCi/L	5[A]	n/v	1.11 +/-(0.748)U	0.636 +/-(0.638)U	1.06 +/-(0.716)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.7

GROUNDWATER INVESTIGATION EVENT #5 SAMPLING AND ANALYSIS REPORT

John Sevier Fossil Plant Groundwater Investigation Event #5 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

September 10, 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	July 16, 2021
1	Addresses August 19, 2021 TDEC Review Comments and Issued for TDEC Review	September 10, 2021

Sign-off Sheet

This document entitled John Sevier 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 Rebekah Brooks

Rebekah Brooks, Principal Hydrogeologist

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 #5	Groundwater Investigation sampling event performed April 6-9, 2020
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 April 6-9, 2020 (Event #5) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation upon completion of six groundwater sampling events, is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF Plant.

- *Groundwater Investigation SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018)
- *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 GEL Laboratories LLC (GEL) in Charleston, South Carolina (radium samples only) and by Eurofins TestAmerica, Inc. (TestAmerica) in North Canton, Ohio (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 JSF 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 JSF 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 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #5 were conducted April 6-9, 2020. 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.

During Event #5, Stantec conducted the following field activities:

- Measured groundwater levels at 10 monitoring wells installed for the TDEC Order, and 21 monitoring wells and 17 piezometers installed for other environmental programs (31 total monitoring wells)
- Measured pore water levels at 10 temporary wells and six piezometers installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from 10 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, 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 JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J, and Highway 70 Borrow Area) 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 JSF 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 will not be 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 JSF Plant EAR. Pore water levels measured in 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, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3, and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

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 form also documents 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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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 #5.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 31 monitoring wells and pore water levels at 10 temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. On April 6, 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. 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 17 piezometers and six piezometers, respectively.

Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells and piezometers screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells and piezometers screened in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in

temporary wells and piezometers, along with overburden groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from 10 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*.

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. 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 JSF 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. 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 field 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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 via 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 JSF Plant.

3.6.1 Variations in Scope

There were no variations in scope during groundwater investigation sampling Event #5 at the JSF Plant.

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 #5 at the JSF 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 piezometers and temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #5 included collecting groundwater level measurements at 31 monitoring wells and 17 piezometers; pore water measurements at 10 temporary wells and six piezometers in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3 and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at 10 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 GEL and TestAmerica, and validated or verified by EnvStds.

Stantec has completed Event #5 of the groundwater investigation at the JSF Plant in Rogersville, 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 John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 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

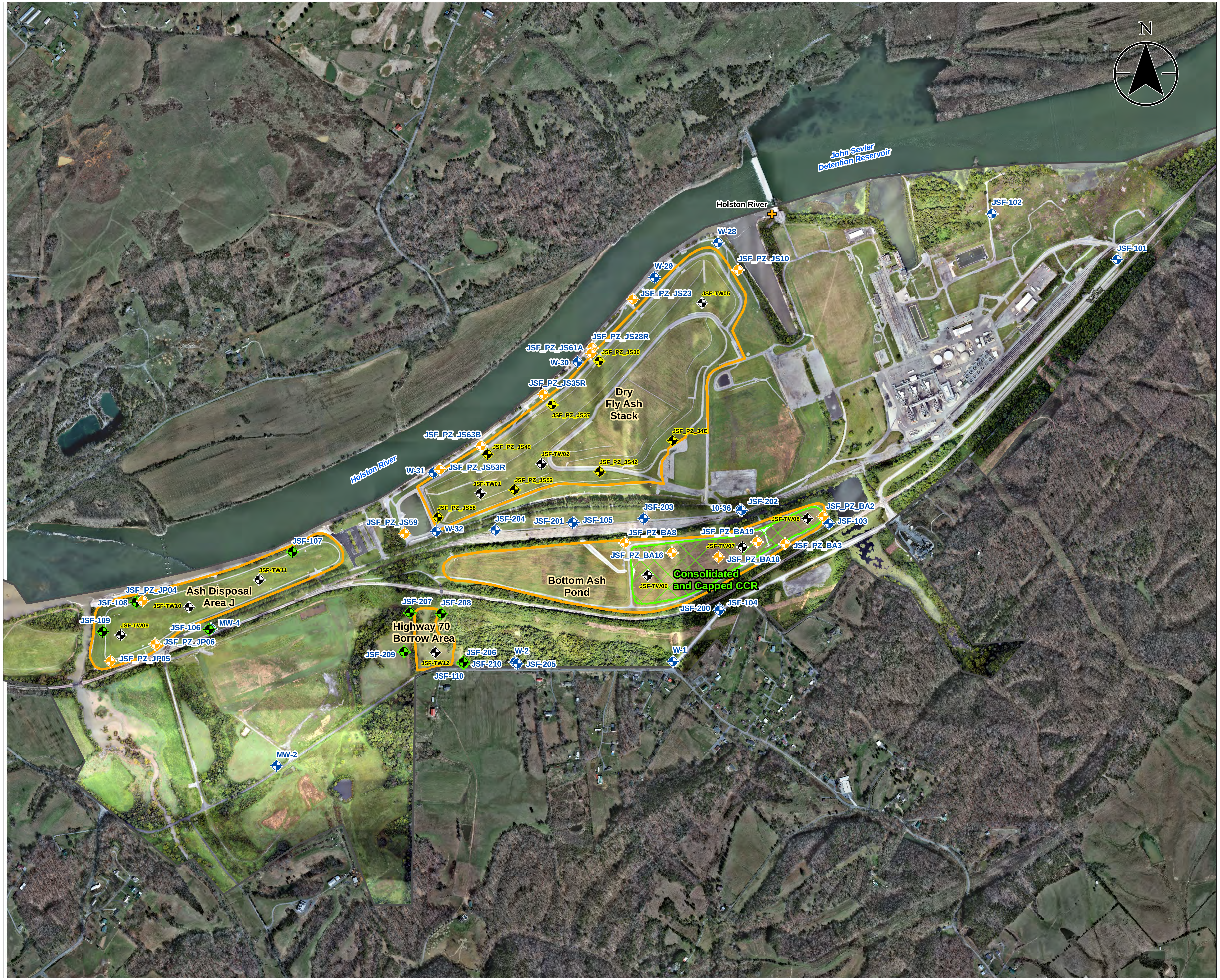


Exhibit No.
A.1

Title
Monitoring Well and Piezometer Network

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

0 500 1,000 1,500 2,000 Feet
1:6,000 (At original document size of 22x34)

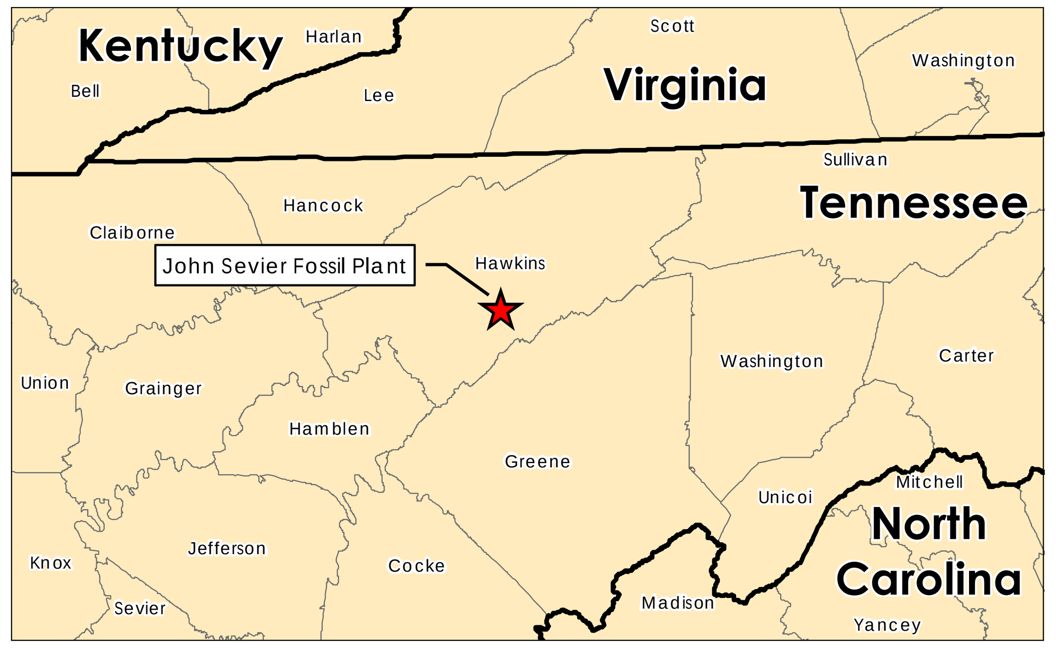
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec TVA

U:\TVA-EP\175568225_JSF_Phase2\gis\mxd\GW_Tech_Memo\JSF_GW_TM_ExhA1_GW_MonitoringWellNetwork.mxd Revised: 2021-07-01 By: mbough

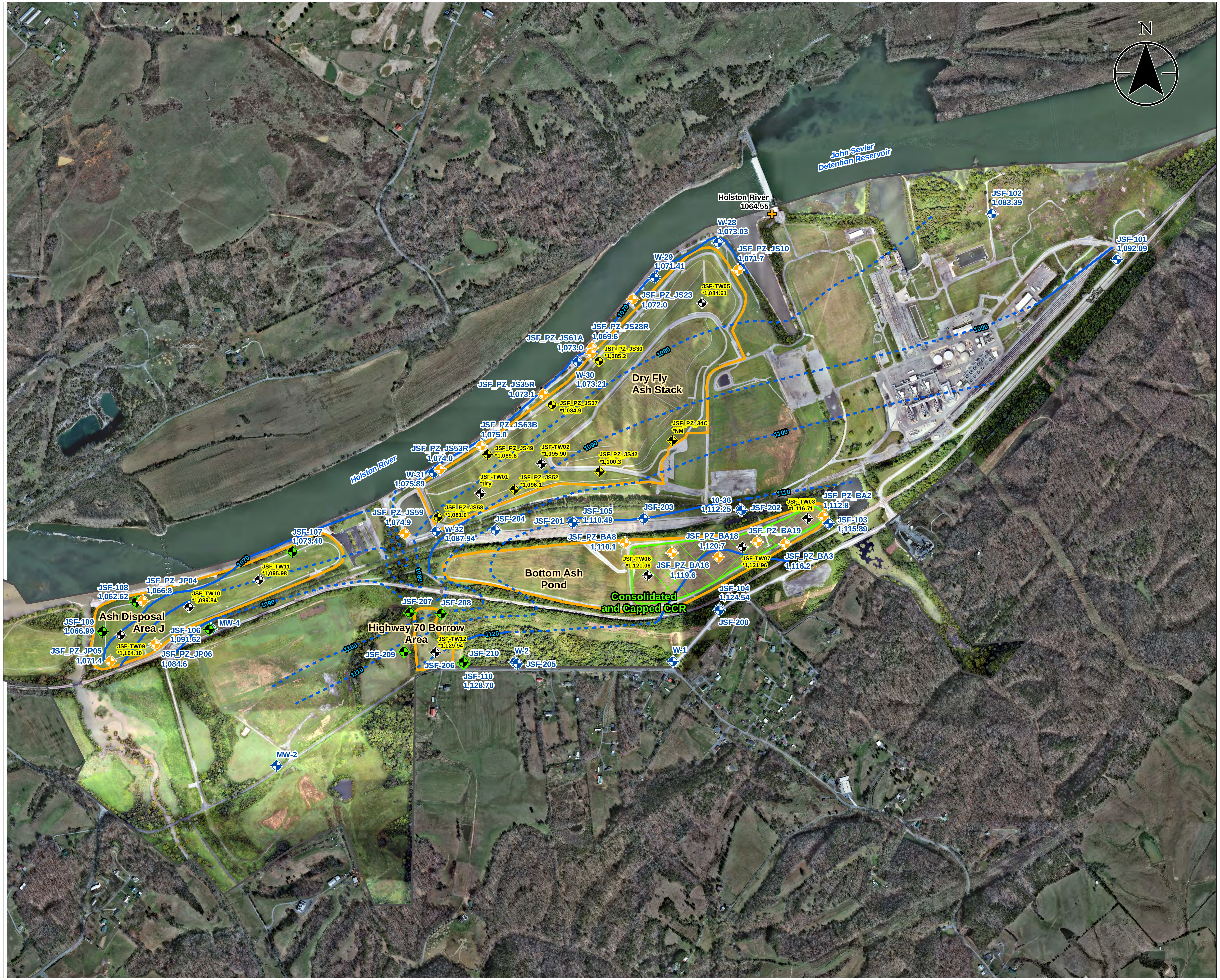


Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #5 (April 6, 2020), Overburden

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-13
Technical Review by MD on 2021-07-13

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

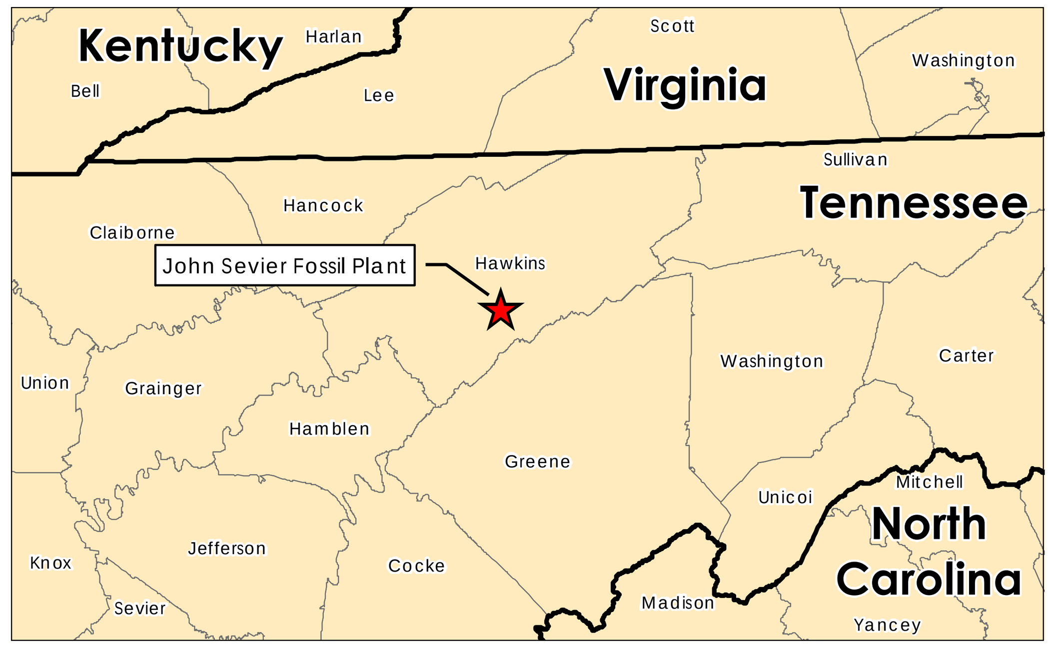
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

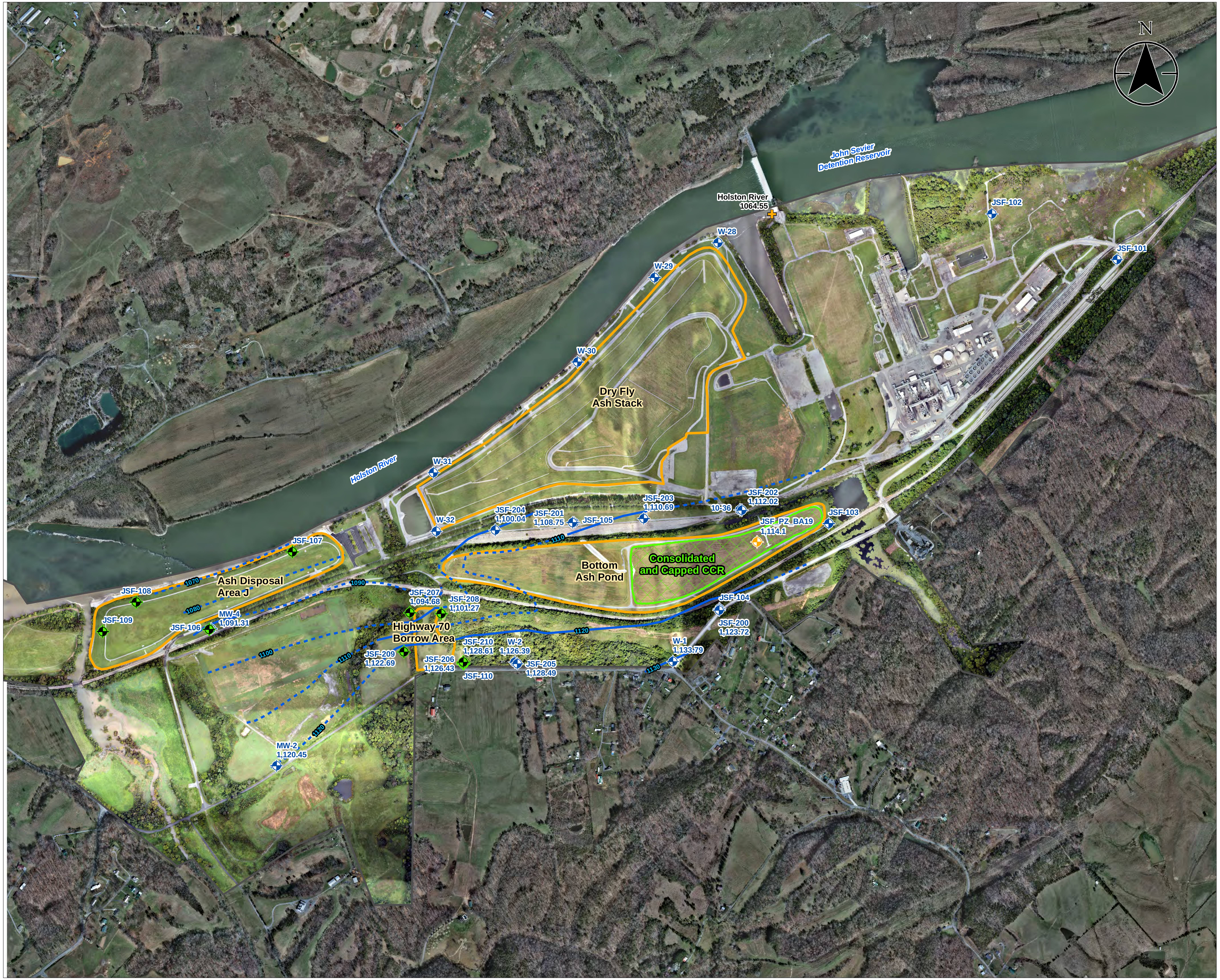


Exhibit No.

A.3

Title

Groundwater Elevation Contour Map, Event #5 (April 6, 2020), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-06-16
Technical Review by MD on 2021-06-16

0 500 1,000 1,500 2,000 Feet

1:6,000 (At original document size of 22x34)

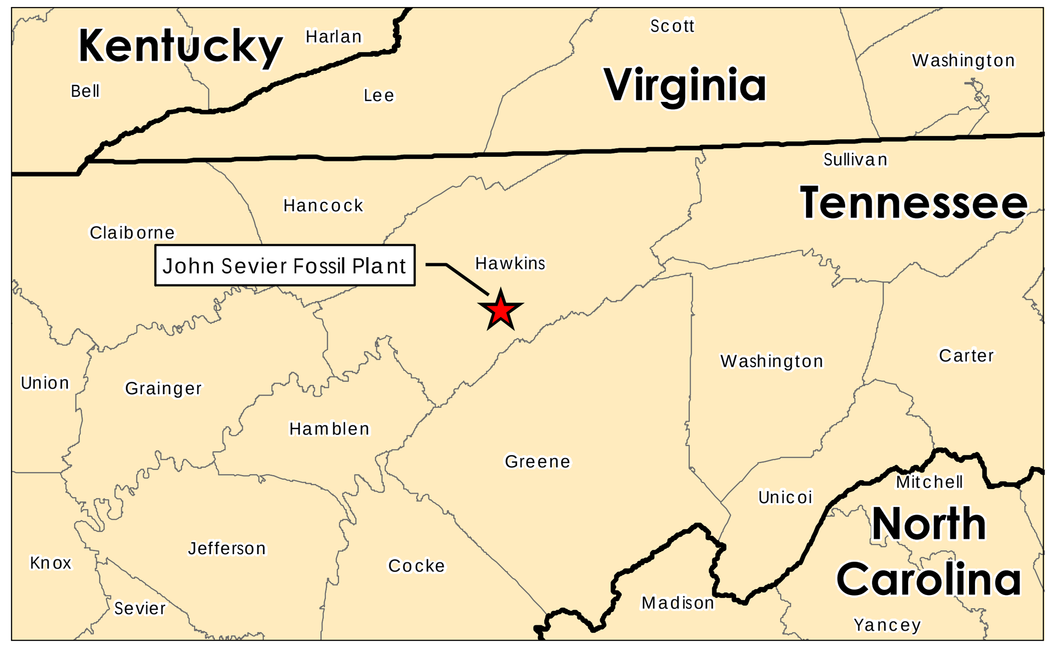
Legend

- 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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

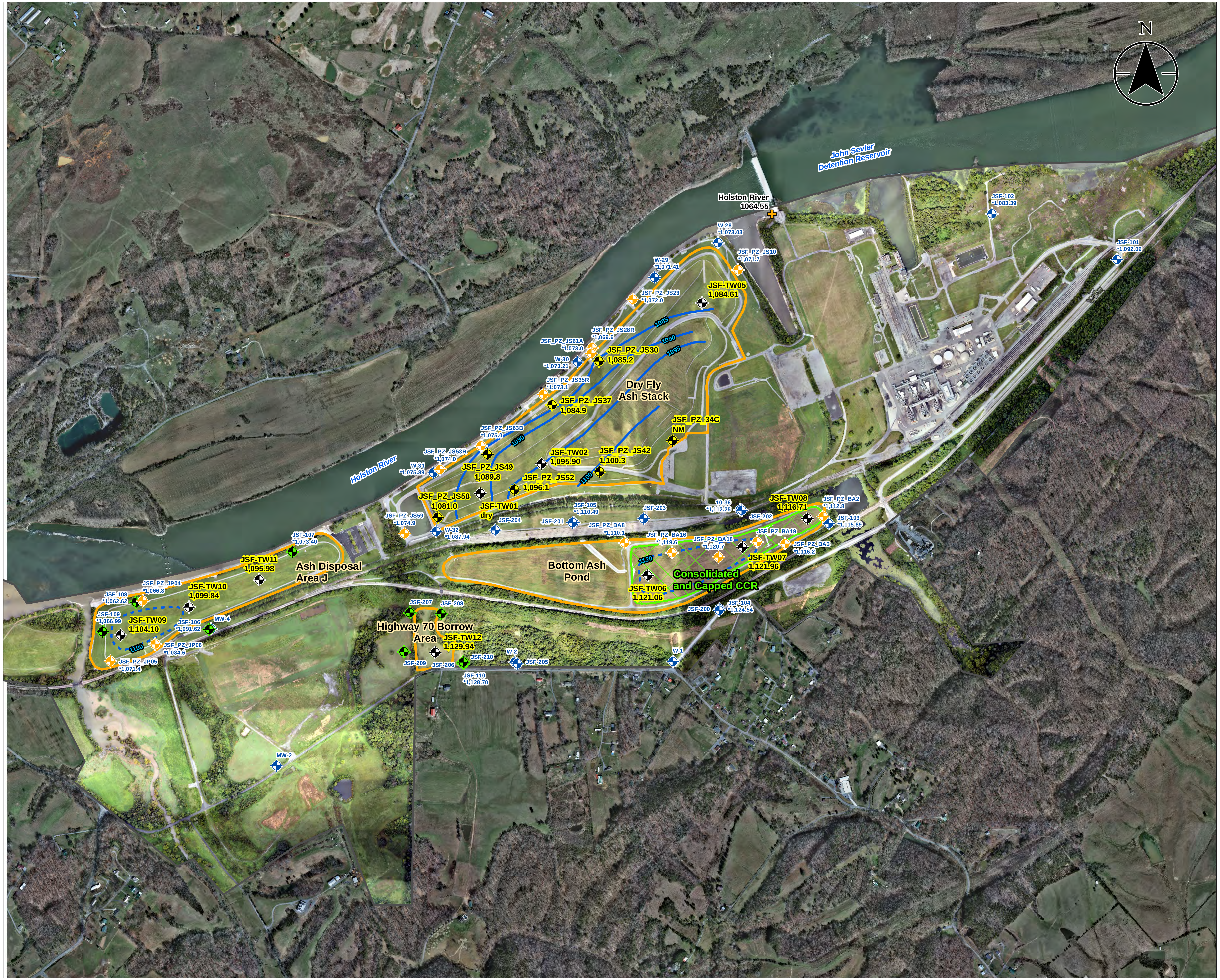


Exhibit No.
A.4

Title
Pore Water Elevation Contour Map, Event #5 (April 6, 2020)

Client/Project
Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location
Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-13
Technical Review by MD on 2021-07-13

0 500 1,000 1,500 2,000 Feet
1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)
- Pore water Contour (5 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

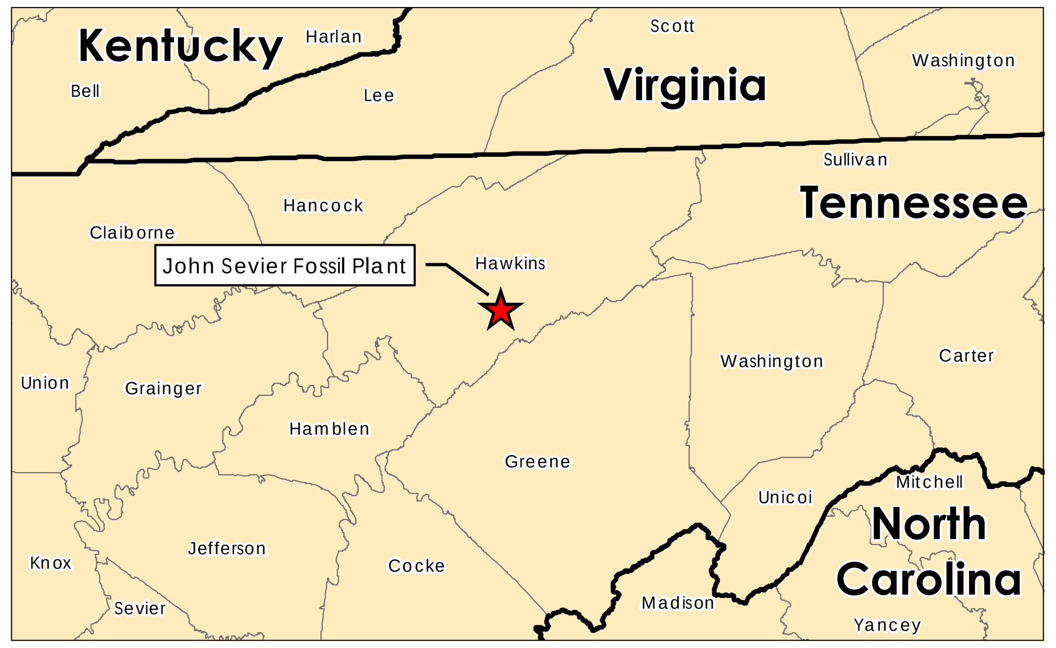
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
April 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	
JSF-00-GW-43-001	W-28	6-Apr-20	16.11	1089.14	1073.03	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	6-Apr-20	8.41	1079.82	1071.41	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	6-Apr-20	8.12	1081.33	1073.21	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	6-Apr-20	9.72	1085.61	1075.89	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	6-Apr-20	17.18	1105.12	1087.94	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	6-Apr-20	8.13	1120.38	1112.25	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	6-Apr-20	13.86	1147.65	1133.79	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	6-Apr-20	8.43	1134.82	1126.39	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	6-Apr-20	10.79	1131.24	1120.45	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	6-Apr-20	5.92	1097.23	1091.31	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	6-Apr-20	18.34	1110.43	1092.09	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	6-Apr-20	8.03	1091.42	1083.39	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	6-Apr-20	10.84	1126.73	1115.89	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	6-Apr-20	21.15	1145.69	1124.54	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	6-Apr-20	10.62	1121.11	1110.49	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	6-Apr-20	22.79	1146.51	1123.72	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	6-Apr-20	12.42	1121.17	1108.75	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	6-Apr-20	8.71	1120.73	1112.02	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	6-Apr-20	13.45	1124.14	1110.69	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	6-Apr-20	18.09	1118.13	1100.04	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	6-Apr-20	7.74	1136.23	1128.49	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	6-Apr-20	6.59	1098.21	1091.62	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	6-Apr-20	36.35	1109.75	1073.40	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	6-Apr-20	46.79	1109.41	1062.62	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	6-Apr-20	37.73	1104.72	1066.99	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	6-Apr-20	13.74	1142.44	1128.70	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	6-Apr-20	16.30	1142.73	1126.43	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	6-Apr-20	18.03	1112.71	1094.68	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	6-Apr-20	10.95	1112.22	1101.27	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	6-Apr-20	17.70	1140.39	1122.69	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	6-Apr-20	14.14	1142.75	1128.61	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	6-Apr-20	33.2	n/a	1112.8	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	6-Apr-20	22.2	n/a	1116.2	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	6-Apr-20	24.5	n/a	1110.1	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	6-Apr-20	25.6	n/a	1119.6	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	6-Apr-20	32.1	n/a	1120.7	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	6-Apr-20	31.1	n/a	1114.1	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	6-Apr-20	13.3	n/a	1071.7	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	6-Apr-20	3.1	n/a	1072.0	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	6-Apr-20	9.3	n/a	1069.6	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	6-Apr-20	8.2	n/a	1073.1	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	6-Apr-20	8.3	n/a	1074.0	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	6-Apr-20	24.4	n/a	1074.9	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	6-Apr-20	16.7	n/a	1073.0	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	6-Apr-20	14.4	n/a	1075.0	1089.4	1065.5	23.9	n/a	FoundationClays
n/a	JSF_PZ_JP04	6-Apr-20	38.8	n/a	1066.8	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	6-Apr-20	33.1	n/a	1071.4	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	6-Apr-20	21.7	n/a	1084.6	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	6-Apr-20	n/a	n/a	1064.55	n/a	n/a	n/a	n/a	n/a

See notes on last page.

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

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. Holsten River data point is the reading closest to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. 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.

TABLE B.1b – Pore Water Level Measurements
John Sevier Fossil Plant
April 2020

Temporary 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	
Temporary Wells									
JSF-TW01	6-Apr-20	*72.96	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02	6-Apr-20	77.91	1173.81	1095.90	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	6-Apr-20	79.55	1164.16	1084.61	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	6-Apr-20	28.90	1149.96	1121.06	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	6-Apr-20	31.60	1153.56	1121.96	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	6-Apr-20	33.42	1150.13	1116.71	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	6-Apr-20	7.31	1111.41	1104.10	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	6-Apr-20	15.68	1115.52	1099.84	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	6-Apr-20	16.31	1112.29	1095.98	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	6-Apr-20	15.52	1145.46	1129.94	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	6-Apr-20	NM	n/a	NM	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	6-Apr-20	20.4	n/a	1085.2	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	6-Apr-20	18.9	n/a	1084.9	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	6-Apr-20	37.9	n/a	1100.3	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	6-Apr-20	9.0	n/a	1089.8	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	6-Apr-20	40.7	n/a	1096.1	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	6-Apr-20	19.2	n/a	1081.0	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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

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. Piezometer sensor formation information obtained from boring logs. Data from automated piezometers are averaged for the measurement date.
3. Pore water elevations in piezometers are calculated values. Depth to pore water in the vibrating wire piezometers is not manually measured. Accuracy of piezometer data is to 0.1 ft.
4. Screen interval shown for temporary wells is below ground surface when drilled.
5. Pore water levels were not measured in select piezometers as noted above because the sensors were not recording data.

TABLE B.2 – Summary of Groundwater Samples
John Sevier Fossil Plant
April 2020

			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
JSF-106	JSF-GW-022-20200407	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-107	JSF-GW-023-20200409	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-108	JSF-GW-024-20200409	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-109	JSF-GW-025-20200409	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-110	JSF-GW-026-20200407	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20200407	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-207	JSF-GW-028-20200408	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	JSF-GW-DUP01-20200408	Field Duplicate Sample		x	x	x	x	x	x	x	x
JSF-208	JSF-GW-029-20200408	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-209	JSF-GW-030-20200408	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-210	JSF-GW-031-20200407	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/SW846 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
John Sevier Fossil Plant
April 2020

Sample Location		JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208	JSF-209	JSF-210
Sample Date		7-Apr-20	9-Apr-20	9-Apr-20	9-Apr-20	7-Apr-20	7-Apr-20	8-Apr-20	8-Apr-20	8-Apr-20	7-Apr-20
Sample ID		JSF-GW-022-20200407	JSF-GW-023-20200409	JSF-GW-024-20200409	JSF-GW-025-20200409	JSF-GW-026-20200407	JSF-GW-027-20200407	JSF-GW-028-20200408	JSF-GW-029-20200408	JSF-GW-030-20200408	JSF-GW-031-20200407
Sample Depth		16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters											
Dissolved Oxygen	%	21.0	27.0	12.4	5.2	23.2	2.9	4.5	17.9	5.3	6.1
Dissolved Oxygen	mg/L	2.10	2.63	1.22	0.50	2.39	0.28	0.44	1.87	0.54	0.62
ORP	mV	141.4	170.7	78.4	-24.4	238.6	-17.1	24.5	172.0	151.2	-27.6
pH (field)	SU	6.58	6.32	6.85	6.73	5.04	6.88	7.32	7.27	7.31	7.03
Specific Cond. (Field)	uS/cm	415.6	418.2	991	2,977	71.7	457.4	533.0	950	347.8	593.3
Temperature, Water (C)	DEG C	14.2	15.9	16.6	17.1	13.6	16.3	14.8	14.4	15.8	16.3
Turbidity, field	NTU	4.59	0.11	2.03	2.12	1.79	4.71	0.38	1.13	0.70	3.11

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
John Sevier Fossil Plant
April 2020

Sample Location				JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207		JSF-208
Sample Date				7-Apr-20	9-Apr-20	9-Apr-20	9-Apr-20	7-Apr-20	7-Apr-20	8-Apr-20	8-Apr-20	8-Apr-20
Sample ID				JSF-GW-022-20200407	JSF-GW-023-20200409	JSF-GW-024-20200409	JSF-GW-025-20200409	JSF-GW-026-20200407	JSF-GW-027-20200407	JSF-GW-028-20200408	JSF-GW-DUP01-20200408	JSF-GW-029-20200408
Sample Depth				16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft		40.5 ft
Sample Type				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
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	Final-Verified
Total Metals												
Antimony	ug/L	6^{A}	n/v	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	1.27 J
Arsenic	ug/L	10^{A}	n/v	<0.750	<0.750	<0.750	8.90	<0.750	<0.750	<0.750	<0.750	1.16 J
Barium	ug/L	$2,000^{A}$	n/v	37.5	22.6	51.0	34.5	74.2	162	226	218	34.7
Beryllium	ug/L	4^{A}	n/v	<0.305	<0.305	<0.305	<0.305	0.354 J	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	n/v	n/v	87.9	4,470	5,480	128	<16.0	16.3 J	337	337	1,630
Cadmium	ug/L	5^{A}	n/v	<0.197	0.426 J	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	0.658 J
Calcium	ug/L	n/v	n/v	69,500	74,700	174,000	182,000	7,400	95,800	97,000	94,400	161,000
Chromium	ug/L	100^{A}	n/v	<0.980	8.02	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	n/v	6^{B}	0.199 J	<0.190	**8.47^{B}**	**6.38^{B}**	1.56	0.205 J	<0.190	<0.190	<0.190
Copper	ug/L	n/v	n/v	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70
Lead	ug/L	n/v	15^{B}	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	n/v	40^{B}	<1.65	<1.65	<1.65	2.64 J	<1.65	8.82	10.9	9.37	9.70
Magnesium	ug/L	n/v	n/v	9,390	8,440	33,100	21,100	539 J	5,080	12,000	11,800	25,000
Mercury	ug/L	2^{A}	n/v	0.139 U*	<0.130	<0.130	<0.130	<0.130	<0.130	0.130 UJ	0.130 UJ	0.130 UJ
Molybdenum	ug/L	n/v	100^{B}	7.88	**$1,160^{B}$**	48.8	10.6	<1.08	<1.08	2.87 J	2.85 J	6.17
Nickel	ug/L	$100_{(TN\ MCL)}{}^{A}$	n/v	<1.47	<1.47	1.61 J	4.82	2.01	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	n/v	n/v	2,300	1,370	751 J	2,180	412 J	881 J	579 J	607 J	3,870
Selenium	ug/L	50^{A}	n/v	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890
Silver	ug/L	$100_{(TN\ MCL)}{}^{A}$	n/v	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	11,500	5,360	22,100	500,000	5,490	7,470	11,400	11,200	36,400
Thallium	ug/L	2^{A}	n/v	1.26	<0.200	<0.200	<0.200	0.254 J	<0.200	<0.200	<0.200	0.571 U*
Vanadium	ug/L	n/v	n/v	<0.820	<0.820	<0.820	1.03 J	<0.820	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0
Anions												
Chloride	mg/L	n/v	n/v	3.23	3.24	11.3	481	7.76	11.2	9.92	9.91	23.6
Fluoride	mg/L	4^{A}	n/v	0.132	0.829	0.408	0.244	0.0493 J	0.0465 J	0.0695	0.0686	0.155
Sulfate	mg/L	n/v	n/v	71.9	139	288	410	10.6	43.3	85.7	85.7	283
General Chemistry												
Alkalinity, Bicarbonate	mg/L	n/v	n/v	153	95.3	356	720	12.1	218	227	227	286
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	153	95.3	356	720	12.1	218	227	227	286
Total Dissolved Solids	mg/L	n/v	n/v	275	352	888	1,930	47.0	315	342	362	711

See notes on last page.

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
John Sevier Fossil Plant
April 2020

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-209 8-Apr-20 JSF-GW-030-20200408 32.5 ft Normal Environmental Sample Final-Verified	JSF-210 7-Apr-20 JSF-GW-031-20200407 46.5 ft Normal Environmental Sample Final-Verified
Total Metals					
Antimony	ug/L	6[A]	n/v	<0.570	<0.570
Arsenic	ug/L	10[A]	n/v	<0.750	<0.750
Barium	ug/L	2,000[A]	n/v	30.2	134
Beryllium	ug/L	4[A]	n/v	<0.305	<0.305
Boron	ug/L	n/v	n/v	38.7	17.9 J
Cadmium	ug/L	5[A]	n/v	<0.197	<0.197
Calcium	ug/L	n/v	n/v	65,400	122,000
Chromium	ug/L	100[A]	n/v	<0.980	<0.980
Cobalt	ug/L	n/v	6[B]	<0.190	0.993 J
Copper	ug/L	n/v	n/v	<1.70	<1.70
Lead	ug/L	n/v	15[B]	<0.450	<0.450
Lithium	ug/L	n/v	40[B]	3.42 J	9.67
Magnesium	ug/L	n/v	n/v	3,490	6,420
Mercury	ug/L	2[A]	n/v	0.130 UJ	<0.130
Molybdenum	ug/L	n/v	100[B]	<1.08	<1.08
Nickel	ug/L	$100_{(TN\ MCL)}$[A]	n/v	<1.47	<1.47
Potassium	ug/L	n/v	n/v	731 J	1,020
Selenium	ug/L	50[A]	n/v	<0.890	<0.890
Silver	ug/L	$100_{(TN\ MCL)}$[A]	n/v	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	12,100	10,700
Thallium	ug/L	2[A]	n/v	0.285 U*	<0.200
Vanadium	ug/L	n/v	n/v	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	<15.0
Anions					
Chloride	mg/L	n/v	n/v	3.60	20.4
Fluoride	mg/L	4[A]	n/v	0.0679	0.0544
Sulfate	mg/L	n/v	n/v	40.8	69.1
General Chemistry					
Alkalinity, Bicarbonate	mg/L	n/v	n/v	216	265
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	216	265
Total Dissolved Solids	mg/L	n/v	n/v	267	424

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.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
April 2020

Sample Location				JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	
Sample Date				7-Apr-20	9-Apr-20	9-Apr-20	9-Apr-20	7-Apr-20	7-Apr-20	8-Apr-20	8-Apr-20
Sample ID				JSF-GW-022-20200407	JSF-GW-023-20200409	JSF-GW-024-20200409	JSF-GW-025-20200409	JSF-GW-026-20200407	JSF-GW-027-20200407	JSF-GW-028-20200408	JSF-GW-DUP01-20200408
Sample Depth				16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	36.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental 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
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.124 +/-(0.446)U	0.508 +/-(0.586)U	0.0518 +/-(0.437)U	0.746 +/-(0.627)U	0.204 +/-(0.361)U	0.0798 +/-(0.426)U	0.603 +/-(0.597)U	0.507 +/-(0.438)U
Radium-228	pCi/L	n/v	n/v	-0.198 +/-(0.307)U	-0.0163 +/-(0.323)U	1.42 +/-(0.584)	-0.0535 +/-(0.299)U	0.0579 +/-(0.245)U	0.0272 +/-(0.513)U	0.853 +/-(0.615)U	0.0722 +/-(0.417)U
Radium-226+228	pCi/L	5[A]	n/v	0.124 +/-(0.542)U	0.508 +/-(0.669)U	1.48 +/-(0.730)J	0.746 +/-(0.695)U	0.262 +/-(0.436)U	0.107 +/-(0.667)U	1.46 +/-(0.857)U	0.579 +/-(0.605)U

See notes on last page.

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TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
April 2020

Sample Location				JSF-208	JSF-209	JSF-210
Sample Date				8-Apr-20	8-Apr-20	7-Apr-20
Sample ID				JSF-GW-029-20200408	JSF-GW-030-20200408	JSF-GW-031-20200407
Sample Depth				40.5 ft	32.5 ft	46.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	EPA MCLs	CCR Rule GWPS	Final-Verified	Final-Verified	Final-Verified
Radiological Parameters						
Radium-226	pCi/L	n/v	n/v	0.367 +/-(0.468)U	0.0189 +/-(0.391)U	0.423 +/-(0.382)U
Radium-228	pCi/L	n/v	n/v	0.386 +/-(0.393)U	0.383 +/-(0.542)U	-0.296 +/-(0.307)U
Radium-226+228	pCi/L	5[A]	n/v	0.753 +/-(0.611)U	0.402 +/-(0.669)U	0.423 +/-(0.490)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

John Sevier Fossil Plant Groundwater Investigation Event #6 Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
John Sevier Fossil Plant
Rogersville, Tennessee

September 10, 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	July 16, 2021
1	Addresses August 20, 2021 TDEC Review Comments and Issued for TDEC Review	September 10, 2021

Sign-off Sheet

This document entitled John Sevier 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 Marilou Toole

Marilou Toole, Environmental Engineer

Reviewed by Carole M. Farr

Carole M. Farr, Senior Principal Geologist

Approved by Rebekah Brooks

Rebekah Brooks, Principal Hydrogeologist

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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 #6	Groundwater Investigation sampling event performed June 8-11, 2020
FSP	Field Sampling Personnel
ft	Feet
GEL	GEL Laboratories LLC
ID	Identification
IDW	Investigation Derived Waste
JSF Plant	John Sevier 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 June 8-11, 2020 (Event #6) at TVA's John Sevier Fossil Plant (JSF Plant) located in Rogersville, Tennessee.

The purpose of the groundwater investigation, upon completion of six groundwater sampling events, is to characterize groundwater conditions at the JSF 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 JSF 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 and consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs. This evaluation will 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 JSF 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. A minor variation in procedures from those outlined in the SAP occurred during field activities due to field conditions and programmatic updates and is referenced in Section 3.6.

Event #6 is the last 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 Canton, Ohio (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 #6. Overall conclusions and findings about the six groundwater investigations and groundwater conditions at the JSF Plant will be 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 JSF 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 June 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 JSF Plant Hydrogeological Investigation SAR.

In addition, pore water measurements from temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data. Temporary well and piezometer installation activities are described in the JSF Plant Exploratory Drilling SAR, and temporary well gauging and sampling information is provided in the JSF Plant CCR Material Characteristics SAR.

3.0 FIELD ACTIVITIES

Groundwater investigation field activities for Event #6 were conducted June 8-11, 2020. 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.

During Event #6, Stantec conducted the following field activities:

- Measured groundwater levels at 10 monitoring wells installed for the TDEC Order, and 21 monitoring wells installed for other environmental programs (31 total monitoring wells)
- Measured pore water levels at 10 temporary wells installed in the CCR units
- Measured the surface water level at one location in the Holston River
- Collected groundwater samples from 10 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 field duplicate, one matrix spike/matrix spike duplicate/lab duplicate, three field blanks and one equipment blank
- Shipped the collected samples to GEL in Charleston, South Carolina, and TestAmerica in North Canton, Ohio.

Details on each activity are presented in the sections below.

3.1 WORK LOCATIONS

The TDEC Order CCR units at the JSF Plant (Dry Fly Ash Stack, Bottom Ash Pond, Ash Disposal Area J and Highway 70 Borrow Area) as well as the monitoring wells and temporary wells sampled and/or gauged during Event #6 are shown on Exhibit A.1 in Appendix A. TVA is currently sampling groundwater at the JSF 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 will not be 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 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 JSF Plant EAR. Pore water levels measured in temporary wells installed in the CCR units are presented in Table B.1b. Groundwater and pore water elevations are shown on Exhibits A.2, A.3, and A.4 in Appendix A. Groundwater elevation contours are depicted on Exhibits A.2 and A.3, and pore water elevation contours are depicted on Exhibit A.4 in Appendix A.

Groundwater analytical and field duplicate samples were collected from the TDEC Order groundwater investigation 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

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*
- *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 #6.

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 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 form also documents 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

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 for Greeneville-Greene County Municipal Airport (KGCY) in Greeneville, 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.

3.3.1 Static Water Level Measurements

FSP measured static groundwater levels at 31 monitoring wells and pore water levels at 10 temporary wells in accordance with ENV-TI-05.80.44, *Groundwater Level and Well Depth Measurement*. On June 8, 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. 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*.

Additionally, a surface water level measurement for the Holston River was provided by TVA using the reading closest to noon Eastern Standard Time recorded by an automated staff gauge. The surface water staff gauge location is shown on Exhibit A.1 in Appendix A.

Groundwater level data 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 monitoring wells screened in overburden, along with pore water elevations, is included as Exhibit A.2 in Appendix A. A groundwater elevation contour map based on groundwater measurements in monitoring wells installed in bedrock, along with pore water elevations, is included as Exhibit A.3 in Appendix A. A pore water elevation contour map based on pore water measurements in temporary wells, along with overburden groundwater elevations, is included as Exhibit A.4 in Appendix A.

3.3.2 Groundwater Purging & Sampling

Analytical and field duplicate samples (as specified in the SAP) were collected from 10 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*.

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. 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 JSF 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. 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 field 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 JSF Plant-specific waste management plan; and local, state, and federal regulations. Transportation and disposal of IDW was coordinated with JSF Plant facility management. Used calibration solution was containerized and stored for disposal as directed by JSF Plant facility management. Purge water and decontamination fluids were containerized for later disposal as specified in the JSF 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 North Canton, Ohio (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 JSF Plant.

3.6.1 Variations in Scope

There were no variations in scope during groundwater investigation sampling Event #6 at the JSF Plant.

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 JSF 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 temporary wells installed in the CCR units at the JSF Plant are presented in this SAR for comparison with groundwater data.

Event #6 included collecting groundwater level measurements at 31 monitoring wells; pore water measurements at 10 temporary wells in the CCR units; and one surface water measurement at a gauge located in the Holston River. Groundwater and surface water measurements and elevations are provided in Table B.1 a, and porewater measurements and elevations are provided in Table B.1b, and depicted on Exhibits A.2, A.3, and A.4.

Groundwater quality measurements and groundwater analytical samples were collected at 10 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 GEL and TestAmerica, and validated or verified by EnvStds.

Stantec has completed Event #6 of the groundwater investigation at the JSF Plant in Rogersville, 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 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 John Sevier Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. October 2018.

Stantec Consulting Services Inc. (Stantec) 2018. *Environmental Investigation Plan, John Sevier Fossil Plant*. Revision 3. Prepared for Tennessee Valley Authority. October 19, 2018.

Stantec. 2019. *Groundwater Investigation Sampling and Analysis Plan (SAP), John Sevier Fossil Plant*. Revision 3 Redline. Prepared for Tennessee Valley Authority. May 28, 2019.

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 and Piezometer Network

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-01
Technical Review by MT on 2021-07-01

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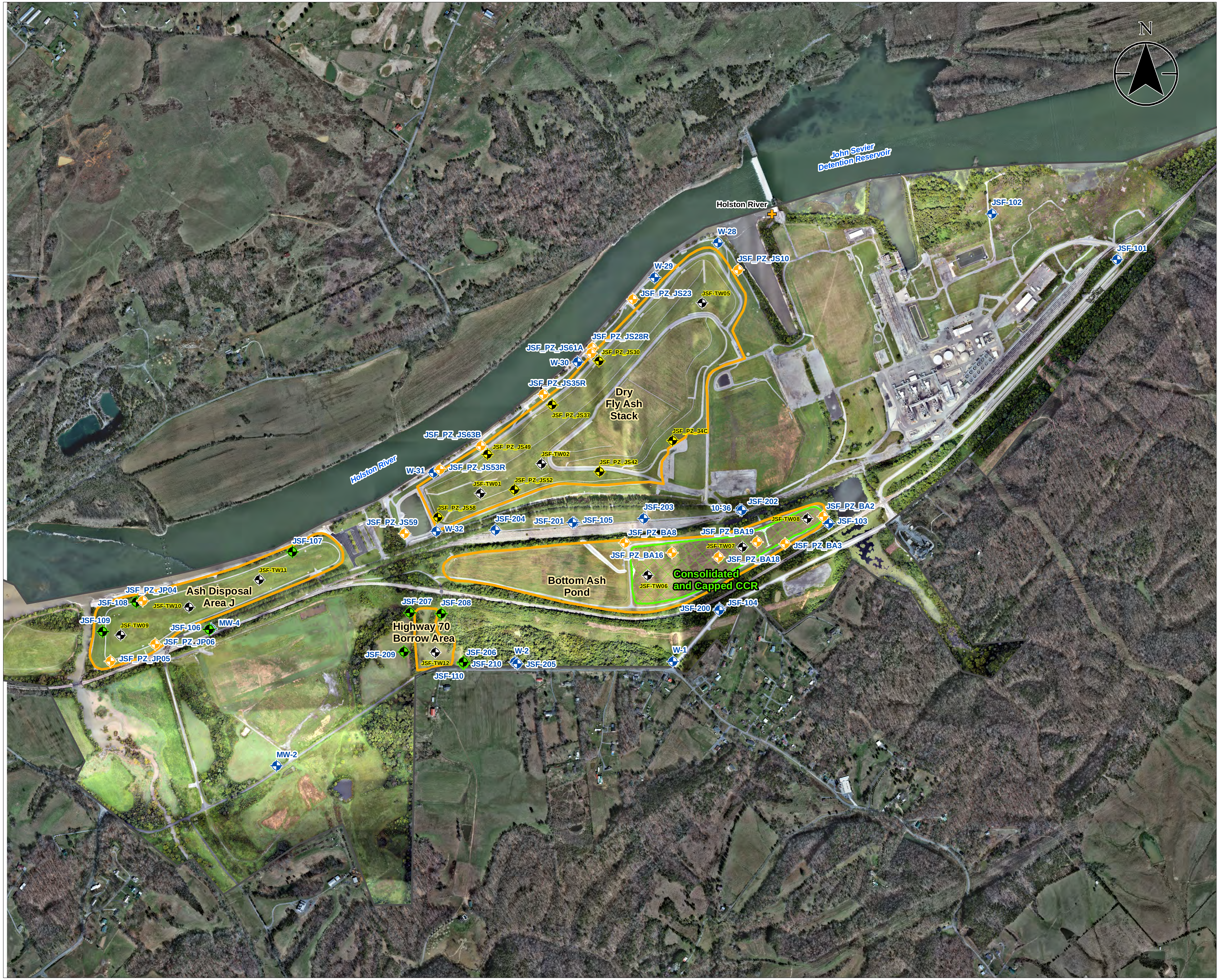


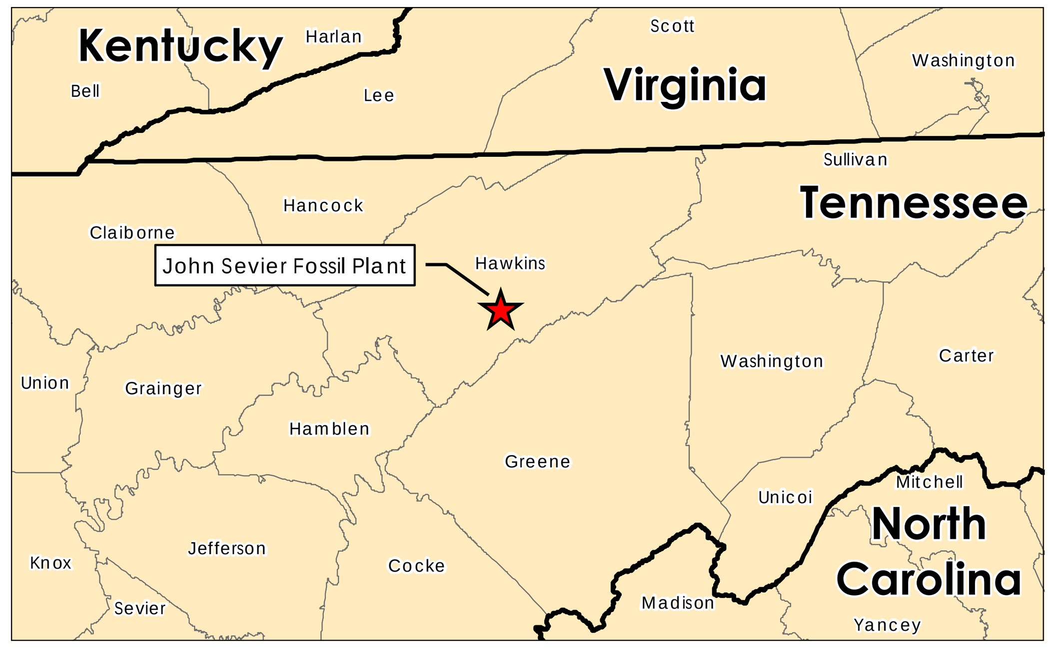
Legend

- Groundwater Investigation Monitoring Well
- Other Monitoring Well
- Piezometer
- Pore Water Piezometer in CCR Material
- Temporary Well within CCR Material
- Holston River Gauge
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)



Stantec

TVA

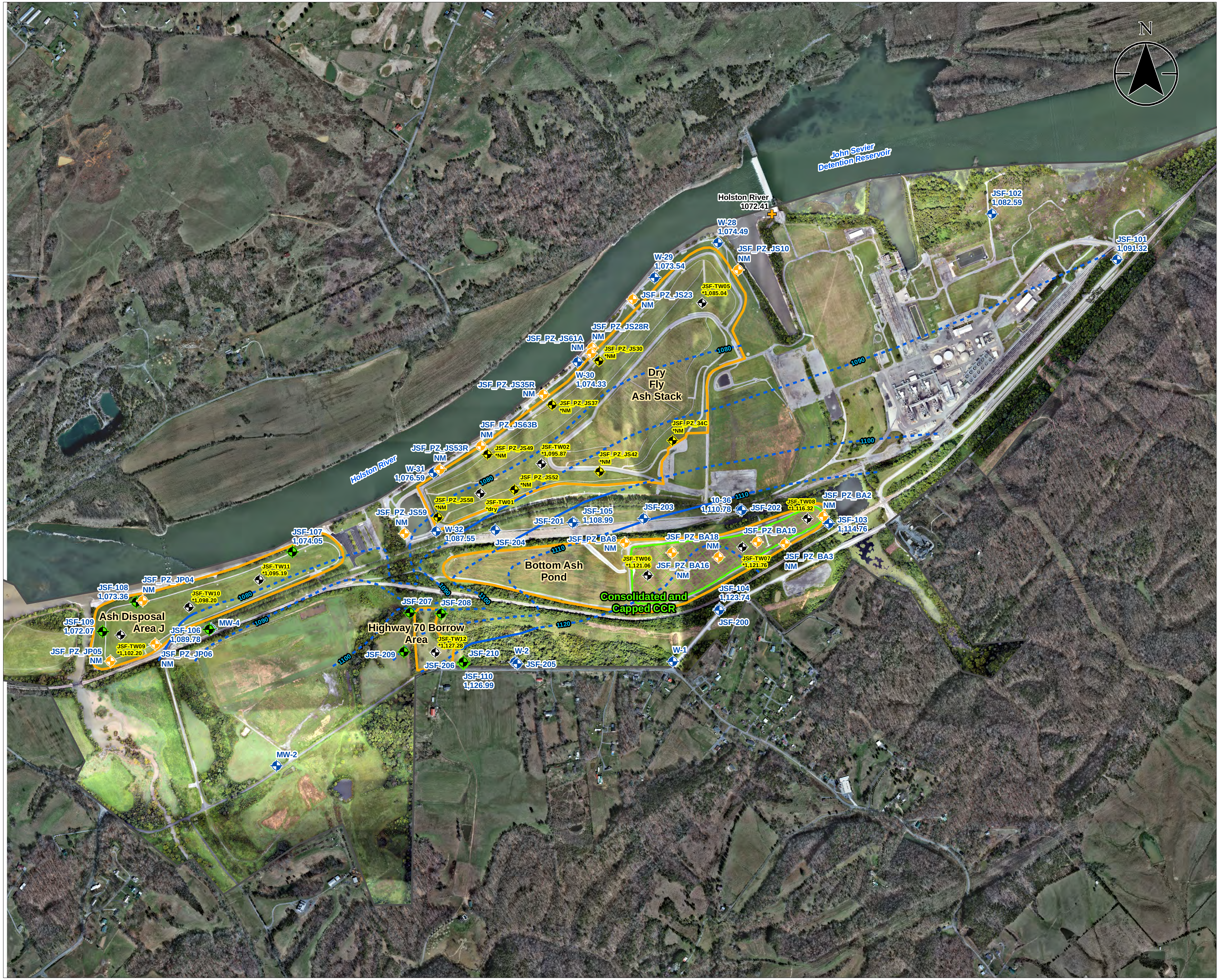


Exhibit No.

A.2

Title

Groundwater Elevation Contour Map, Event #6 (June 8, 2020), Overburden

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-13
Technical Review by MD on 2021-07-13

0 500 1,000 1,500 2,000 Feet

1:6,000 (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
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

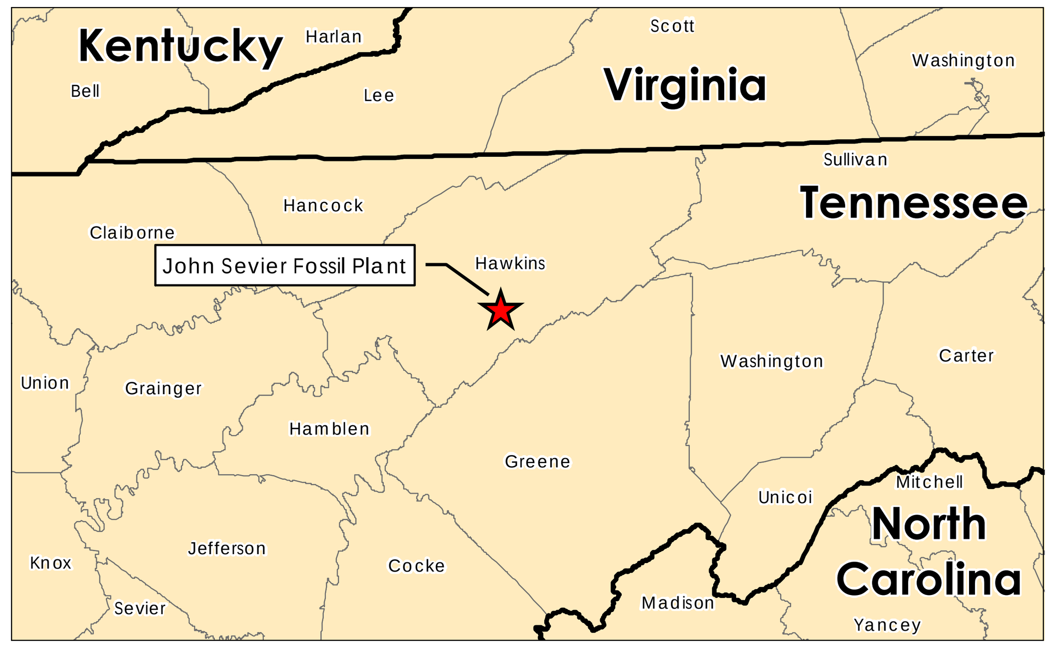
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

U:\TVA-EIP\175568225_JSF_Phase2\gis\mxd\GW_Tech_Memo\JSF_GW_TM_ExhA2_GW_Event6_Overburden_POT_Contour_wPZ.mxd Revised: 2021-07-13 By: mbough

Exhibit No.

A.3

Title

Groundwater Elevation Contour Map, Event #6 (June 8, 2020), Bedrock

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location 175568225

Rogersville, Tennessee

Prepared by DMB on 2021-06-16
Technical Review by MD on 2021-06-16

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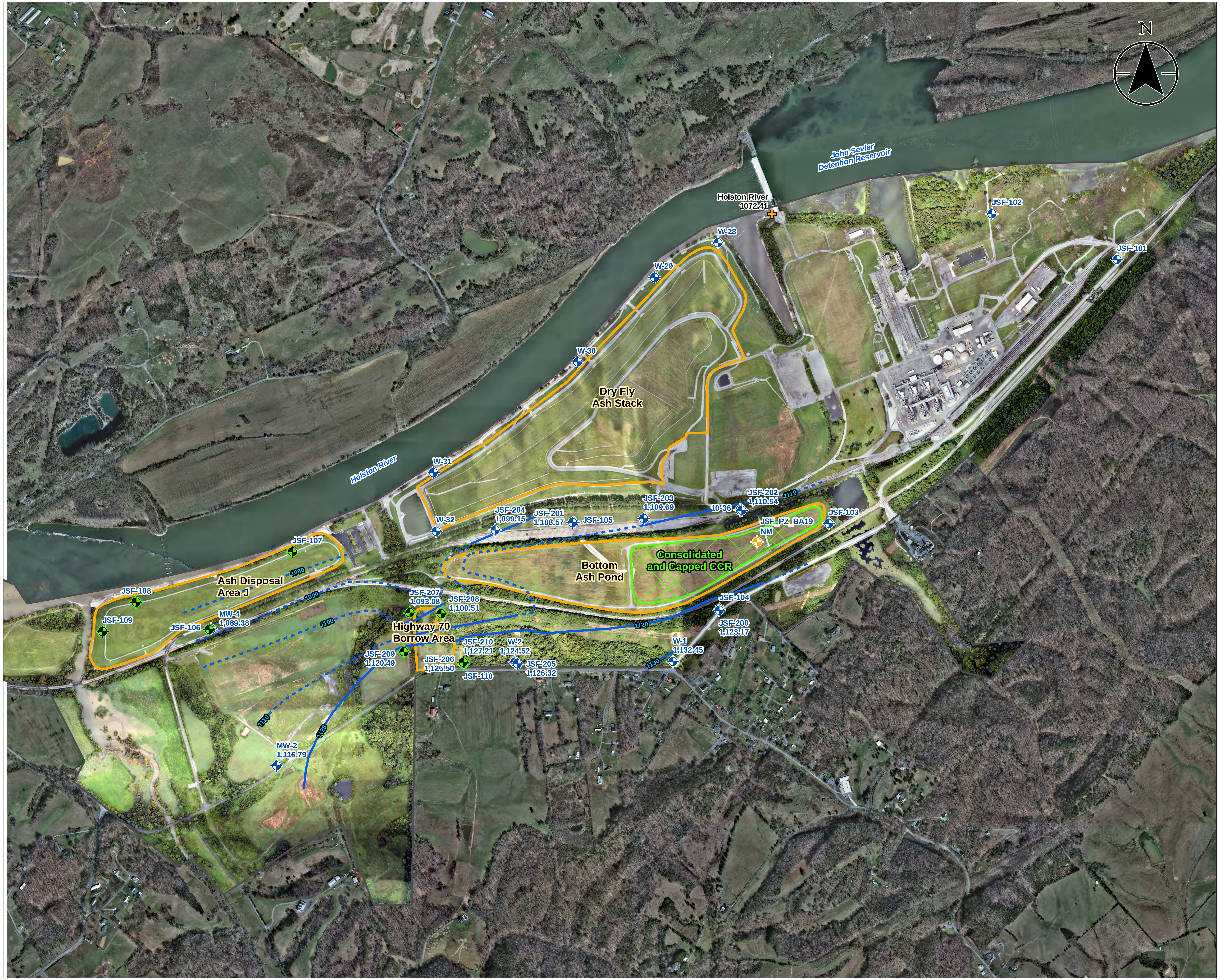


Legend

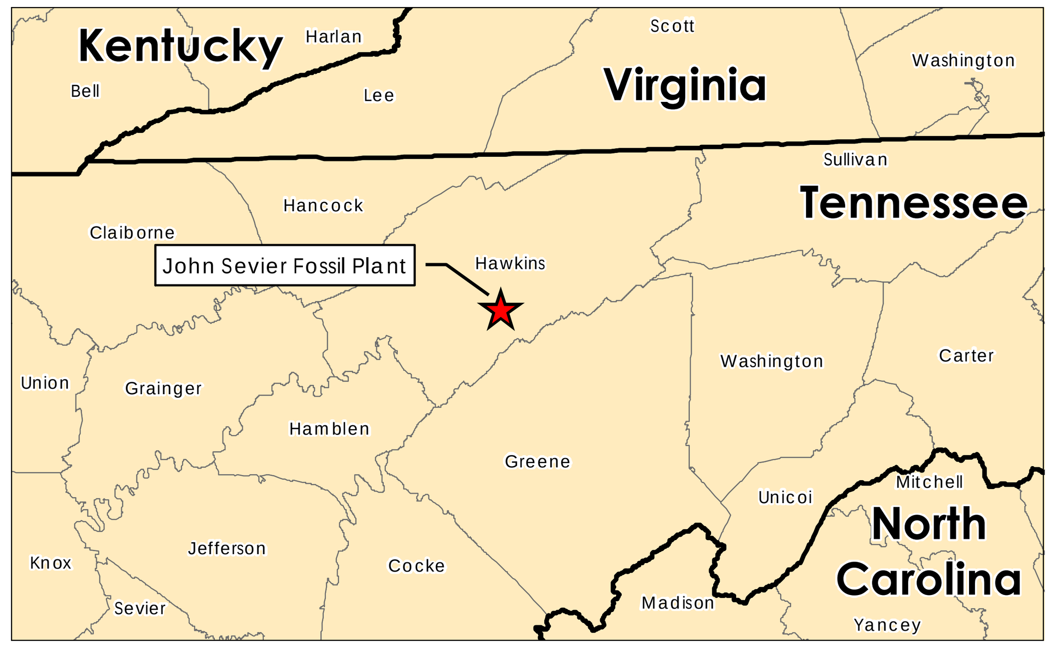
- Groundwater Investigation Monitoring Well groundwater elevation in feet above mean sea level (ft amsl)
- Other Monitoring Well groundwater elevation in ft amsl
- Piezometer groundwater elevation in ft amsl
- Holston River Gauge surface water elevation in ft amsl
- Interpolated Groundwater Contour (10 ft interval; elevations are in ft amsl)
- Groundwater Contour (10 ft interval; elevations are in ft amsl)
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

NM: Not measured

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Groundwater contours were created using Surfer Version 16.1.350 (December 13, 2018) and manual adjustment
4. Groundwater contours constrained by topography in some areas.
5. Wells with no associated elevation are screened in a different hydrogeologic unit.



Stantec

TVA

Exhibit No.
A.4

Title

Pore Water Elevation Contour Map, Event #6 (June 8, 2020)

Client/Project

Tennessee Valley Authority
John Sevier Fossil (JSF) Plant TDEC Order

Project Location

Rogersville, Tennessee

175568225
Prepared by DMB on 2021-07-13
Technical Review by MD on 2021-07-13

0 500 1,000 1,500 2,000 Feet

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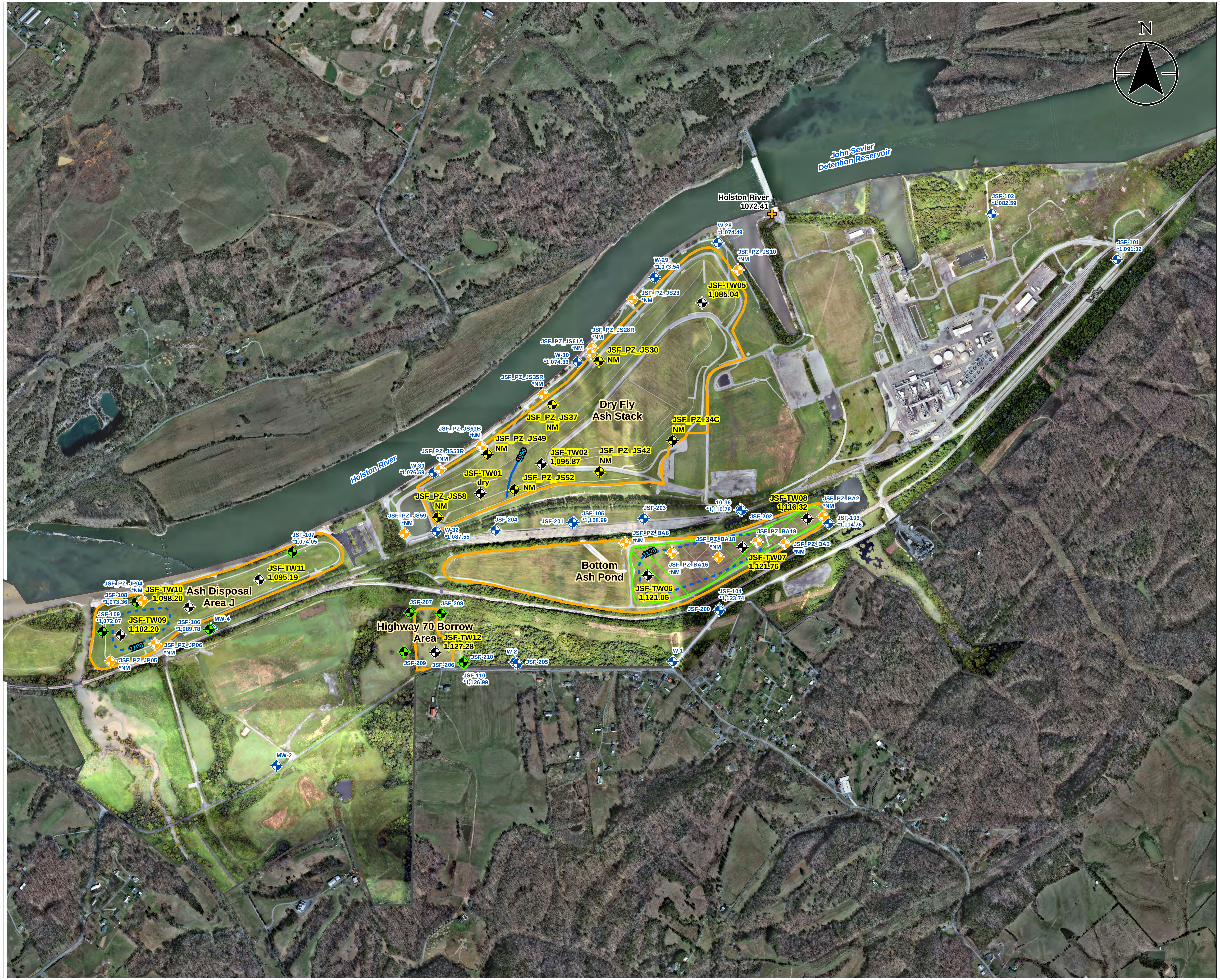


Legend

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

Holston River Gauge
surface water elevation in ft amsl

Interpolated Pore water Contour (5 ft interval; elevations are in ft amsl)

Pore water Contour (5 ft interval; elevations are in ft amsl)

2018 Imagery Boundary

CCR Unit Area (Approximate)

Consolidated & Capped CCR Area (Approximate)

CCR: Coal combustion residuals

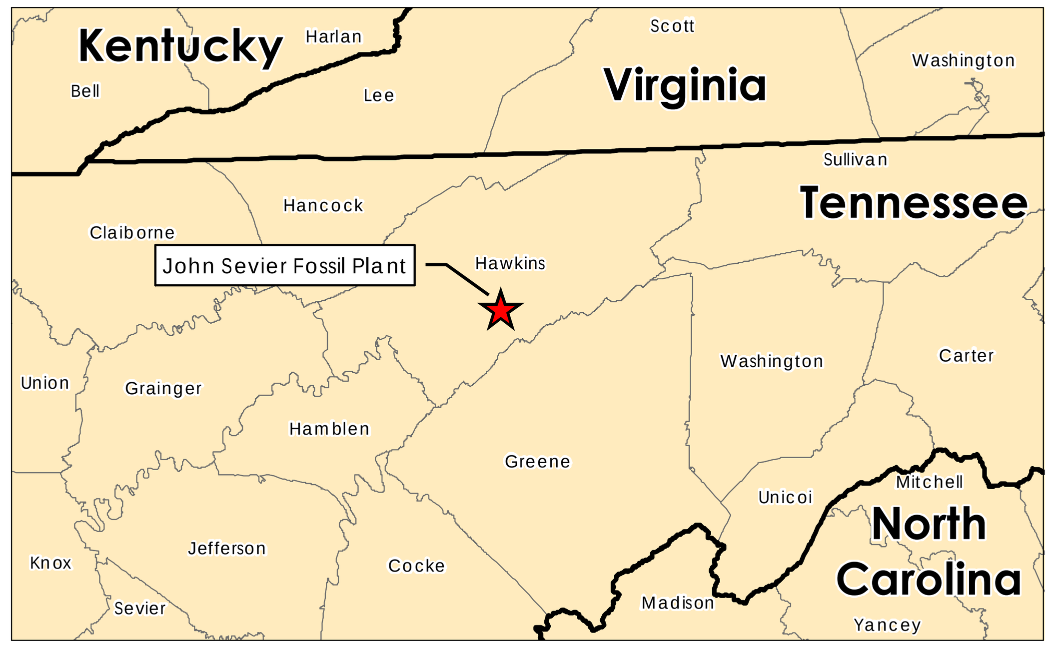
NM: Not measured

dry: water was not detected

*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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (2017-03-08) and TVA (2018-09-11)
3. Pore water contours were created with manual adjustment using Surfer Version 16 (December 13, 2018)
4. Groundwater contours constrained by topography in some areas.
5. Wells or piezometers with no associated elevation are screened in a different hydrogeologic unit.



Stantec TVA

APPENDIX B - TABLES

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
June 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	
JSF-00-GW-43-001	W-28	8-Jun-20	14.65	1089.14	1074.49	n/a	n/a	n/a	17.3 - 27.3	Overburden
JSF-00-GW-43-002	W-29	8-Jun-20	6.28	1079.82	1073.54	n/a	n/a	n/a	12.3 - 22.2	Overburden
JSF-00-GW-43-003	W-30	8-Jun-20	7.00	1081.33	1074.33	n/a	n/a	n/a	12.0 - 21.9	Overburden
JSF-00-GW-43-004	W-31	8-Jun-20	9.02	1085.61	1076.59	n/a	n/a	n/a	8.3 - 18.3	Overburden
JSF-00-GW-43-005	W-32	8-Jun-20	17.57	1105.12	1087.55	n/a	n/a	n/a	15.1 - 25.0	Overburden
JSF-00-GW-43-006	10-36	8-Jun-20	9.60	1120.38	1110.78	n/a	n/a	n/a	12.7 - 22.5	Overburden
JSF-00-GW-43-007	JSF-1 (W-1)	8-Jun-20	15.20	1147.65	1132.45	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-008	JSF-2 (W-2)	8-Jun-20	10.30	1134.82	1124.52	n/a	n/a	n/a	Rock well no Screen	Bedrock
JSF-00-GW-43-009	MW-2	8-Jun-20	14.45	1131.24	1116.79	n/a	n/a	n/a	22.7 - 32.7	Weathered Bedrock
JSF-00-GW-43-010	MW-4	8-Jun-20	7.85	1097.23	1089.38	n/a	n/a	n/a	12.5 - 27.3	Weathered Shale
JSF-00-GW-43-011	JSF-101	8-Jun-20	19.11	1110.43	1091.32	n/a	n/a	n/a	17.1 - 27.2	Overburden
JSF-00-GW-43-012	JSF-102	8-Jun-20	8.83	1091.42	1082.59	n/a	n/a	n/a	9.9 - 20.0	Overburden
JSF-00-GW-43-013	JSF-103	8-Jun-20	11.97	1126.73	1114.76	n/a	n/a	n/a	13.6 - 23.7	Overburden
JSF-00-GW-43-014	JSF-104	8-Jun-20	21.95	1145.69	1123.74	n/a	n/a	n/a	20.4 - 30.6	Overburden
JSF-00-GW-43-015	JSF-105	8-Jun-20	12.12	1121.11	1108.99	n/a	n/a	n/a	11.2 - 21.3	Overburden
JSF-00-GW-43-016	JSF-200	8-Jun-20	23.34	1146.51	1123.17	n/a	n/a	n/a	29.6 - 39.6	Bedrock
JSF-00-GW-43-017	JSF-201	8-Jun-20	12.60	1121.17	1108.57	n/a	n/a	n/a	31.1 - 41.1	Bedrock
JSF-00-GW-43-018	JSF-202	8-Jun-20	10.19	1120.73	1110.54	n/a	n/a	n/a	23.6 - 33.6	Bedrock
JSF-00-GW-43-019	JSF-203	8-Jun-20	14.45	1124.14	1109.69	n/a	n/a	n/a	29.3 - 39.3	Bedrock
JSF-00-GW-43-020	JSF-204	8-Jun-20	18.98	1118.13	1099.15	n/a	n/a	n/a	26.1 - 36.1	Bedrock
JSF-00-GW-43-021	JSF-205	8-Jun-20	9.91	1136.23	1126.32	n/a	n/a	n/a	29.5 - 39.5	Bedrock
JSF-00-GW-43-022	JSF-106	8-Jun-20	8.43	1098.21	1089.78	n/a	n/a	n/a	12.1 - 17.0	Overburden
JSF-00-GW-43-023	JSF-107	8-Jun-20	35.70	1109.75	1074.05	n/a	n/a	n/a	28.8 - 38.6	Overburden
JSF-00-GW-43-024	JSF-108	8-Jun-20	36.05	1109.41	1073.36	n/a	n/a	n/a	41.5 - 51.5	Overburden
JSF-00-GW-43-025	JSF-109	8-Jun-20	32.65	1104.72	1072.07	n/a	n/a	n/a	36.2 - 46.0	Overburden
JSF-00-GW-43-026	JSF-110	8-Jun-20	15.45	1142.44	1126.99	n/a	n/a	n/a	13.3 - 18.2	Overburden
JSF-00-GW-43-027	JSF-206	8-Jun-20	17.23	1142.73	1125.50	n/a	n/a	n/a	23.7 - 33.5	Bedrock
JSF-00-GW-43-028	JSF-207	8-Jun-20	19.63	1112.71	1093.08	n/a	n/a	n/a	32.7 - 42.5	Bedrock
JSF-00-GW-43-029	JSF-208	8-Jun-20	11.71	1112.22	1100.51	n/a	n/a	n/a	36.1 - 45.9	Bedrock
JSF-00-GW-43-030	JSF-209	8-Jun-20	19.90	1140.39	1120.49	n/a	n/a	n/a	27.7 - 37.5	Bedrock
JSF-00-GW-43-031	JSF-210	8-Jun-20	15.54	1142.75	1127.21	n/a	n/a	n/a	41.6 - 51.4	Bedrock
Piezometers										
n/a	JSF_PZ_BA2	8-Jun-20	NM	n/a	NM	1146.0	1105.8	40.2	n/a	Foundation Clays, and Bedrock
n/a	JSF_PZ_BA3	8-Jun-20	NM	n/a	NM	1138.4	1110.5	27.9	n/a	Foundation Clays
n/a	JSF_PZ_BA8	8-Jun-20	NM	n/a	NM	1134.6	1110.7	23.9	n/a	Foundation Clays and Bedrock
n/a	JSF_PZ_BA16	8-Jun-20	NM	n/a	NM	1145.2	1119.2	26.0	n/a	Foundation Clays
n/a	JSF_PZ_BA18	8-Jun-20	NM	n/a	NM	1152.8	1113.0	39.8	n/a	Foundation Clays
n/a	JSF_PZ_BA19	8-Jun-20	NM	n/a	NM	1145.2	1110.0	35.2	n/a	Bedrock
n/a	JSF_PZ_JS10	8-Jun-20	NM	n/a	NM	1085.0	1061.2	23.8	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS23	8-Jun-20	NM	n/a	NM	1075.1	1059.1	16.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS28R	8-Jun-20	NM	n/a	NM	1078.9	1062.9	16.0	n/a	Foundation Clays
n/a	JSF_PZ_JS35R	8-Jun-20	NM	n/a	NM	1081.3	1059.3	22.0	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS53R	8-Jun-20	NM	n/a	NM	1082.3	1071.2	11.1	n/a	Foundation Clays, Bedrock
n/a	JSF_PZ_JS59	8-Jun-20	NM	n/a	NM	1099.3	1068.2	31.1	n/a	Foundation Clays and Sands, Bedrock
n/a	JSF_PZ_JS61A	8-Jun-20	NM	n/a	NM	1089.7	1064.2	25.5	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JS63B	8-Jun-20	NM	n/a	NM	1089.4	1065.5	23.9	n/a	FoundationClays
n/a	JSF_PZ_JP04	8-Jun-20	NM	n/a	NM	1105.6	1059.6	46.0	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP05	8-Jun-20	NM	n/a	NM	1104.5	1058.8	45.7	n/a	Foundation Clays and Sands
n/a	JSF_PZ_JP06	8-Jun-20	NM	n/a	NM	1106.3	1065.7	40.6	n/a	Foundation Clays and Sands, Bedrock
Surface Water Gauge										
Holston River gauge	n/a	8-Jun-20	n/a	n/a	1072.41	n/a	n/a	n/a	n/a	n/a

See notes on last page.

TABLE B.1a – Groundwater Level Measurements
John Sevier Fossil Plant
June 2020

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. Holsten River data point is the reading closest to noon Eastern Standard Time recorded by the automated staff gauge provided by TVA.
3. For piezometers, ground surface elevation, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database and 2017 survey data. Data from automated piezometers are averaged for the measurement date.
4. Groundwater levels were not measured in select peizometers as noted above because the sensors were not recording data.

TABLE B.1b – Pore Water Level Measurements
John Sevier Fossil Plant
June 2020

Temporary 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	
Temporary Wells									
JSF-TW01	8-Jun-20	*72.90	1158.62	*Dry	n/a	n/a	n/a	59.3-69.1	CCR
JSF-TW02	8-Jun-20	77.94	1173.81	1095.87	n/a	n/a	n/a	65.7-75.5	CCR
JSF-TW05	8-Jun-20	79.12	1164.16	1085.04	n/a	n/a	n/a	68.8-78.6	CCR
JSF-TW06	8-Jun-20	28.90	1149.96	1121.06	n/a	n/a	n/a	11.8-21.6	CCR
JSF-TW07	8-Jun-20	31.80	1153.56	1121.76	n/a	n/a	n/a	22.8-32.6	CCR
JSF-TW08	8-Jun-20	33.81	1150.13	1116.32	n/a	n/a	n/a	19.1-28.9	CCR
JSF-TW09	8-Jun-20	9.21	1111.41	1102.20	n/a	n/a	n/a	27.1-36.9	CCR
JSF-TW10	8-Jun-20	17.32	1115.52	1098.20	n/a	n/a	n/a	28.3-38.1	CCR
JSF-TW11	8-Jun-20	17.10	1112.29	1095.19	n/a	n/a	n/a	20.3-30.1	CCR
JSF-TW12	8-Jun-20	18.18	1145.46	1127.28	n/a	n/a	n/a	10.4-20.2	CCR
Piezometers									
JSF_PZ_34C	8-Jun-20	NM	n/a	NM	1120.4	1098.9	21.5	n/a	CCR
JSF_PZ_JS30	8-Jun-20	NM	n/a	NM	1105.6	1075.6	30.0	n/a	CCR
JSF_PZ_JS37	8-Jun-20	NM	n/a	NM	1103.8	1079.8	24.0	n/a	CCR
JSF_PZ_JS42	8-Jun-20	NM	n/a	NM	1138.2	1091.7	46.5	n/a	CCR
JSF_PZ_JS49	8-Jun-20	NM	n/a	NM	1098.8	1073.3	25.5	n/a	CCR
JSF_PZ_JS52	8-Jun-20	NM	n/a	NM	1136.8	1091.8	45.0	n/a	CCR
JSF_PZ_JS58	8-Jun-20	NM	n/a	NM	1100.2	1072.7	27.5	n/a	CCR

Notes:

*	<0.1 ft of water was present in the sump/end cap of the well and is not indicative of groundwater, the well is considered dry
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

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, groundwater elevations and piezometer data were obtained from geotechnical instrumentation database.
3. Screen interval shown for temporary wells is below ground surface when drilled.
4. Pore water levels were not measured in select piezometers as noted above because the sensors were not recording data.

TABLE B.2 – Summary of Groundwater Samples
John Sevier Fossil Plant
June 2020

			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
JSF-106	JSF-GW-022-20200609	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-107	JSF-GW-023-20200611	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-108	JSF-GW-024-20200611	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-109	JSF-GW-025-20200611	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-110	JSF-GW-026-20200609	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-206	JSF-GW-027-20200609	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-207	JSF-GW-028-20200610	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
	JSF-GW-DUP01-20200610	Field Duplicate Sample		x	x	x	x	x	x	x	x
JSF-208	JSF-GW-029-20200610	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-209	JSF-GW-030-20200610	Normal Environmental Sample	x	x	x	x	x	x	x	x	x
JSF-210	JSF-GW-031-20200609	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/SW846 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
John Sevier Fossil Plant
June 2020

Sample Location		JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	JSF-208	JSF-209	JSF-210
Sample Date		9-Jun-20	11-Jun-20	11-Jun-20	11-Jun-20	9-Jun-20	9-Jun-20	10-Jun-20	10-Jun-20	10-Jun-20	9-Jun-20
Sample ID		JSF-GW-022-20200609	JSF-GW-023-20200611	JSF-GW-024-20200611	JSF-GW-025-20200611	JSF-GW-026-20200609	JSF-GW-027-20200609	JSF-GW-028-20200610	JSF-GW-029-20200610	JSF-GW-030-20200610	JSF-GW-031-20200609
Sample Depth		16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	40.5 ft	32.5 ft	46.5 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
Level of Review	Units	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review	Final QC Review
Field Parameters											
Dissolved Oxygen	%	3.8	4.1	3.5	4.1	7.4	1.7	6.5	4.4	5.2	3.8
Dissolved Oxygen	mg/L	0.38	0.40	0.35	0.40	0.73	0.17	0.64	0.44	0.52	0.38
ORP	mV	52.8	6.46	0.0	-82.4	111.7	44.6	38.1	32.6	53.2	72.9
pH (field)	SU	6.60	6.46	6.71	6.51	4.44	6.71	7.18	6.97	7.05	6.84
Specific Cond. (Field)	uS/cm	628	598.1	1,385	3,839	771	633	802	1,039	522	769
Temperature, Water (C)	DEG C	18.4	18.1	17.9	17.6	17.3	16.7	16.1	16.2	16.6	18.4
Turbidity, field	NTU	1.87	1.11	1.93	1.43	2.86	4.80	4.61	2.39	3.33	4.06

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
John Sevier Fossil Plant
June 2020

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-106 9-Jun-20 JSF-GW-022-20200609 16 ft Normal Environmental Sample Final-Verified	JSF-107 11-Jun-20 JSF-GW-023-20200611 37.5 ft Normal Environmental Sample Validated	JSF-108 11-Jun-20 JSF-GW-024-20200611 50 ft Normal Environmental Sample Validated	JSF-109 11-Jun-20 JSF-GW-025-20200611 45 ft Normal Environmental Sample Validated	JSF-110 9-Jun-20 JSF-GW-026-20200609 17 ft Normal Environmental Sample Final-Verified	JSF-206 9-Jun-20 JSF-GW-027-20200609 28.5 ft Normal Environmental Sample Final-Verified	JSF-207 10-Jun-20 JSF-GW-028-20200610 36.5 ft Normal Environmental Sample Final-Verified	JSF-207 10-Jun-20 JSF-GW-DUP01-20200610 Field Duplicate Sample Final-Verified
Total Metals											
Antimony	ug/L	6[A]	n/v	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570	<0.570
Arsenic	ug/L	10[A]	n/v	<0.750	<0.750	1.06 J	**19.9**[A]	<0.750	<0.750	<0.750	<0.750
Barium	ug/L	2,000[A]	n/v	42.6	21.8	49.5	45.1	55.3	164	227	231
Beryllium	ug/L	4[A]	n/v	<0.305	<0.305	<0.305	<0.305	<0.305	<0.305	<0.305	<0.305
Boron	ug/L	n/v	n/v	110	4,430	5,420	119	<16.0	<16.0	388	384
Cadmium	ug/L	5[A]	n/v	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197	<0.197
Calcium	ug/L	n/v	n/v	75,500	76,900	168,000	146,000	5,880	91,500	97,000	99,300
Chromium	ug/L	100[A]	n/v	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980	<0.980
Cobalt	ug/L	n/v	6[B]	<0.190	<0.190	**8.42**[B]	**9.74**[B]	1.08	0.237 J	<0.190	<0.190
Copper	ug/L	n/v	n/v	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70	<1.70
Lead	ug/L	n/v	15[B]	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450	<0.450
Lithium	ug/L	n/v	40[B]	<1.65	<1.65	<1.65	4.09 J	<1.65	8.76	9.80	10.0
Magnesium	ug/L	n/v	n/v	10,400	8,940	32,600	16,900	420 J	4,750	12,100	12,400
Mercury	ug/L	2[A]	n/v	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	100[B]	1.91 J	**849**[B]	38.6	6.09	<1.08	<1.08	3.44 J	3.34 J
Nickel	ug/L	$100_{\text{(TN MCL)}}$[A]	n/v	<1.47	<1.47	1.89 J	2.91	<1.47	<1.47	<1.47	<1.47
Potassium	ug/L	n/v	n/v	2,820	1,360	789 J	2,180	304 J	877 J	569 J	573 J
Selenium	ug/L	50[A]	n/v	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890	<0.890
Silver	ug/L	$100_{\text{(TN MCL)}}$[A]	n/v	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	10,900	6,160	24,500	531,000	1,480	7,220	11,200	11,400
Thallium	ug/L	2[A]	n/v	0.275 J	<0.200	<0.200	0.230 J	<0.200	<0.200	<0.200	<0.200
Vanadium	ug/L	n/v	n/v	<0.820	<0.820	<0.820	1.02 J	<0.820	<0.820	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0	<15.0
Anions											
Chloride	mg/L	n/v	n/v	3.19	3.69	12.5	417	2.63	9.17	9.16	9.11
Fluoride	mg/L	4[A]	n/v	0.132	0.640	0.199	0.322	0.0363 J	0.0435 J	0.0679	0.0661
Sulfate	mg/L	n/v	n/v	77.9	140	274	348	10.7	38.9	88.4	88.5
General Chemistry											
Alkalinity, Bicarbonate	mg/L	n/v	n/v	149	113	360	647	8.95	222	230	227
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	149	113	360	647	8.95	222	230	227
Total Dissolved Solids	mg/L	n/v	n/v	303	328	762	1,580	35.0 J	324	412	390

See notes on last page.

TABLE B.4 - Groundwater Analytical Results for Metals, Anions, and General Chemistry
John Sevier Fossil Plant
June 2020

Sample Location Sample Date Sample ID Sample Depth Sample Type Level of Review	Units	EPA MCLs	CCR Rule GWPS	JSF-208 10-Jun-20 JSF-GW-029-20200610 40.5 ft Normal Environmental Sample Final-Verified	JSF-209 10-Jun-20 JSF-GW-030-20200610 32.5 ft Normal Environmental Sample Final-Verified	JSF-210 9-Jun-20 JSF-GW-031-20200609 46.5 ft Normal Environmental Sample Final-Verified
Total Metals						
Antimony	ug/L	6[A]	n/v	1.09 J	<0.570	<0.570
Arsenic	ug/L	10[A]	n/v	1.03 J	<0.750	<0.750
Barium	ug/L	2,000[A]	n/v	41.1	33.2	133
Beryllium	ug/L	4[A]	n/v	<0.305	<0.305	<0.305
Boron	ug/L	n/v	n/v	1,710	63.2	18.2 J
Cadmium	ug/L	5[A]	n/v	<0.197	<0.197	<0.197
Calcium	ug/L	n/v	n/v	159,000	71,100	112,000
Chromium	ug/L	100[A]	n/v	<0.980	<0.980	<0.980
Cobalt	ug/L	n/v	6[B]	<0.190	<0.190	<0.190
Copper	ug/L	n/v	n/v	<1.70	<1.70	<1.70
Lead	ug/L	n/v	15[B]	<0.450	<0.450	<0.450
Lithium	ug/L	n/v	40[B]	7.69 J	3.16 J	10.2
Magnesium	ug/L	n/v	n/v	24,500	3,600	6,120
Mercury	ug/L	2[A]	n/v	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	100[B]	5.80	<1.08	<1.08
Nickel	ug/L	100(TN MCL)[A]	n/v	<1.47	<1.47	<1.47
Potassium	ug/L	n/v	n/v	2,820	697 J	1,030
Selenium	ug/L	50[A]	n/v	<0.890	<0.890	<0.890
Silver	ug/L	100(TN MCL)[A]	n/v	<0.0530	<0.0530	<0.0530
Sodium	ug/L	n/v	n/v	35,100	13,000	10,700
Thallium	ug/L	2[A]	n/v	<0.200	<0.200	<0.200
Vanadium	ug/L	n/v	n/v	<0.820	<0.820	<0.820
Zinc	ug/L	n/v	n/v	<15.0	<15.0	<15.0
Anions						
Chloride	mg/L	n/v	n/v	22.4	3.55	14.9
Fluoride	mg/L	4[A]	n/v	0.135	0.0737	0.0529
Sulfate	mg/L	n/v	n/v	285	48.9	56.7
General Chemistry						
Alkalinity, Bicarbonate	mg/L	n/v	n/v	289	225	260
Alkalinity, Carbonate	mg/L	n/v	n/v	<2.60	<2.60	<2.60
Alkalinity, Total as CaCO3	mg/L	n/v	n/v	289	225	260
Total Dissolved Solids	mg/L	n/v	n/v	754	377	405

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 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
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
John Sevier Fossil Plant
June 2020

Sample Location				JSF-106	JSF-107	JSF-108	JSF-109	JSF-110	JSF-206	JSF-207	
Sample Date				9-Jun-20	11-Jun-20	11-Jun-20	11-Jun-20	9-Jun-20	9-Jun-20	10-Jun-20	10-Jun-20
Sample ID				JSF-GW-022-20200609	JSF-GW-023-20200611	JSF-GW-024-20200611	JSF-GW-025-20200611	JSF-GW-026-20200609	JSF-GW-027-20200609	JSF-GW-028-20200610	JSF-GW-DUP01-20200610
Sample Depth				16 ft	37.5 ft	50 ft	45 ft	17 ft	28.5 ft	36.5 ft	
Sample Type				Normal Environmental Sample Final-Verified	Normal Environmental Sample Validated	Normal Environmental Sample Validated	Normal Environmental Sample Validated	Normal Environmental Sample Final-Verified	Normal Environmental Sample Final-Verified	Normal Environmental Sample Final-Verified	Field Duplicate Sample Final-Verified
	Units	EPA MCLs	CCR Rule GWPS								
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	0.0703 +/-(0.184)U	-0.00429 +/-(0.529)U	0.210 +/-(0.547)U	0.183 +/-(0.425)U	-0.0135 +/-(0.304)U	0.544 +/-(0.388)	0.197 +/-(0.253)U	0.526 +/-(0.361)
Radium-228	pCi/L	n/v	n/v	0.325 +/-(0.295)U	0.142 +/-(0.298)U	-0.0315 +/-(0.430)U	0.102 +/-(0.300)U	-0.674 +/-(0.447)U	-0.349 +/-(0.419)U	0.320 +/-(0.312)U	0.306 +/-(0.363)U
Radium-226+228	pCi/L	5^{A}	n/v	0.395 +/-(0.347)U	0.142 +/-(0.607)U	0.210 +/-(0.696)U	0.285 +/-(0.521)U	0.000 +/-(0.541)U	0.544 +/-(0.571)J	0.518 +/-(0.402)U	0.833 +/-(0.512)J

See notes on last page.

TABLE B.5 – Groundwater Analytical Results for Radiological Parameters
John Sevier Fossil Plant
June 2020

Sample Location Sample Date Sample ID Sample Depth Sample Type	Units	EPA MCLs	CCR Rule GWPS	JSF-208 10-Jun-20 JSF-GW-029-20200610 40.5 ft Normal Environmental Sample Final-Verified	JSF-209 10-Jun-20 JSF-GW-030-20200610 32.5 ft Normal Environmental Sample Final-Verified	JSF-210 9-Jun-20 JSF-GW-031-20200609 46.5 ft Normal Environmental Sample Final-Verified
Radiological Parameters						
Radium-226	pCi/L	n/v	n/v	0.120 +/-(0.312)U	-0.0279 +/-(0.205)U	0.173 +/-(0.294)U
Radium-228	pCi/L	n/v	n/v	0.305 +/-(0.277)U	-0.00802 +/-(0.300)U	0.192 +/-(0.319)U
Radium-226+228	pCi/L	5[A]	n/v	0.424 +/-(0.417)U	0.000 +/-(0.363)U	0.365 +/-(0.434)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.9

TECHNICAL EVALUATION OF WATER USE SURVEY

Appendix H.9 - Technical Evaluation of Water Use Survey

TDEC Commissioner’s Order:
Environmental Assessment Report
John Sevier Fossil Plant
Rogersville, Tennessee

July 3, 2023

Prepared for:

Tennessee Valley Authority
Chattanooga, Tennessee

Prepared by:

Stantec Consulting Services Inc.
Lexington, Kentucky

REVISION LOG

Revision	Description	Date
0	Submittal to TDEC	January 10, 2023
1	Addresses April 4, 2023 TDEC Review Comments and Issued for TDEC	July 3, 2023

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 _______________________________

Stu Gross, Senior Project Manager

Reviewed by _______________________________

John Griggs, PG, Senior Principal

Approved by _______________________________

Will Mattingly, Senior Principal

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LIST OF EXHIBITS

LIST OF ATTACHMENTS

Abbreviations

AOI	Area of Interest
CCR	Coal Combustion Residuals
EAR	Environmental Assessment Report.
EIP	Environmental Investigation Plan
GIS	Geographic Information System
IP	Implementation Plan
JSF Plant	John Sevier Fossil Plant
SAP	Sampling and Analysis Plan
Stantec	Stantec Consulting Services Inc.
Survey Area	JSF Plant ½-mile boundary
Survey	Desktop Survey
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order OGC15-0177
TVA	Tennessee Valley Authority
USGS	United States Geological Survey
WUS	Water Use 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 in the area surrounding TVA's John Sevier Fossil Plant (JSF Plant) in Rogersville, 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 part of the Environmental Investigation Plan (EIP) (TVA 2018), TVA developed a Water Use Survey (WUS) Sampling and Analysis Plan (SAP) (Stantec 2018). 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 property associated with the JSF Plant. 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 JSF Plant. Following this effort, owners of parcels within an area of interest (AOI) located downgradient of coal combustion residuals (CCR) management activities at the JSF 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 potentially usable private wells and springs. 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 JSF Plant. The goal of the Survey was to identify potential and known wells or springs within the Survey Area. Details of the Survey are provided in the following sections.

2.1.1 Data Sources and Evaluation

The following information and historical reports were obtained and reviewed:

- Law Engineering – Report of Hydrogeologic Evaluation – Pond J Fly Ash Disposal Site (Law Engineering, 1992) (herein referred to as the "1992 Law Engineering Report")

- Law Engineering – Report of Hydrogeologic and Engineering Evaluation (Revised) – Proposed Dry Fly Ash Disposal Facility Site (Law Engineering 1994) (herein referred to as the "1994 Law Engineering Report")
- TVA - Hydrogeological Evaluation of Dry Coal-Combustion Byproducts Landfill report (TVA 2009) (herein referred to as the "2009 TVA Report")
- TVA – John Sevier Fossil Plant Deconstruction Final Environmental Assessment report (TVA 2015) (herein referred to as the "2015 TVA Report")
- Neighborhood Well Survey Comments Prepared in Response to EIP, Jeff Scott (Scott 2018)
- United States Geological Survey (USGS) Public Water-Supply Systems and Associated Water Use in Tennessee, 2005 (Robinson and Brooks 2010)
- October 23, 2019 Aerial Imagery (Google Earth© 2020).

The following documents, obtained from government agencies, were reviewed:

- Parcel Data received from Hawkins County (Hawkins County 2019)
- Registered well information received from Luke Ewing, TDEC/Division of Water Resources Section / Drinking Water Unit (Ewing 2019)
- USGS National Water Information System online mapping database (USGS 2021).

The following individuals or entities were also contacted from local public water suppliers:

- Randy Calton, Persia Utility District (Calton 2019)
- Rogersville Water Department (Hatfield 2019).

2.1.1.1 Desktop Survey Results

The findings from the main data sources reviewed as part of this Survey are presented below.

Public Water Service Providers

Public water surrounding the JSF Plant is supplied by the Rogersville Water Commission and Persia Utility District water distribution systems (Robinson and Brooks 2010). The Persia Utility District reported that the Rogersville Water Commission and the Persia Utility District water distribution systems serve the entire Survey Area and are interconnected. Persia Utility District water is sourced from a quarry adjacent to the Holston River near River Mile Marker 102 approximately 1.25 miles downstream of the JSF Plant, and Rogersville Water Commission's water is sourced primarily from Big Creek approximately 1.75 miles north of the Survey Area (see Exhibit H.9-1). The Persia Utility District did not provide a service area map or additional information regarding the water distribution systems. The Rogersville Water Commission did not respond to multiple requests for information regarding their water supply system. Table H.9-1 summarizes the identified public water suppliers.

Hawkins County Parcel Information

Stantec obtained a parcel information set from Hawkins County in electronic format and assimilated the information into Stantec's geographic information system (GIS) database for the JSF Plant. Stantec used these data to populate Table H.9-2, including only those parcels partially or fully within the Survey Area which totaled 239 parcels. The parcel information included the following water supply classifications:

- Individual (14 parcels)
- Private (1 parcel)
- Public (209 parcels)
- None (15 parcels).

The 30 parcels classified as "individual", "private", or "none" are interpreted as having no connection to a municipal water supply. The remaining 209 parcels identified as "public" are likely served by a municipal water supply.

TDEC Water Well Logs

TDEC provided an electronic list of the recorded water 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. Table H.9-2 includes TDEC-documented well logs located on parcels within the Survey Area, and the well locations are shown on Exhibit H.9-2. Following this effort, coordinate locations for 12 well logs were identified within the Survey Area.

Historical Reports

1992 and 1994 Law Engineering Report Findings

The 1992 and 1994 reports prepared by Law Engineering each included a figure showing "water well locations". The two figures appeared to show the same set of water wells south of the Holston River. Neither report appeared to show wells within the Survey Area north of the river. The scale and quality of the figures prevented determination of parcel-specific locations for the identified wells.

2009 TVA Report Findings

The 2009 TVA Report included an inventory of water supply wells within approximately one mile of a "proposed landfill facility" associated with the JSF Plant. The inventory efforts included review of TDEC well log records, discussion with the Persia Utility District, review of Hawkins County property assessments and drive-by observations. The well locations within the Survey Area appeared to match the wells identified in the 1992 and 1994 Law Engineering Reports.

2015 TVA Report Findings

The 2015 TVA Report also included an inventory of water supply wells within “one mile of JSF facility”. The inventory efforts included review of TDEC well log records, discussion with the Persia Utility District, and review of Hawkins County property assessments.

Although the scale and quality of the figures provided in the historical reports were limited, 20 water supply wells were identified within the Survey Area from the historical reports. The probable locations of these identified water supply wells are shown on Exhibit H.9-2.

Jeff Scott EIP Comments

In a September 5, 2018 email, Jeff Scott, a resident of McCloud, Tennessee, provided comments to TVA regarding the EIP for the JSF Plant. Those comments included discussion of a local neighborhood survey in which he identified six potential private wells in the Survey Area. Three of these wells were not identified in other historical records sources reviewed. The other three wells were on parcels identified as “public” water supply in the county parcel data. Mr. Scott indicated that the landowners reported that three of the six wells were only used for watering livestock, filling swimming pools, washing cars, or other non-drinking water uses. The well locations identified by Mr. Scott are shown on Exhibit H.9-2 as “Scott Survey Wells”.

Recent Aerial Photograph Review

Stantec reviewed the October 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 Hawkins County as having “individual”, “none”, or “private” water sources and a building was present, then it was assumed that a private well for domestic or business purposes was present at the parcel. Alternatively, if a parcel was identified with an “individual”, “none”, 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. In the Survey Area, 14 parcels identified as having a “individual”, “none”, or “private” water source contained one or more buildings. A probable well location was placed on each of these parcels in the location of the buildings as shown on Exhibit H.9-2.

2.1.1.2 Summary of Desktop Survey Findings

Based on the records reviewed, the private well information obtained from these 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. Table H.9-3 provides a compilation from records reviewed of likely parcels within the Survey Area with potential private water supply wells or springs. 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.

Based on the results of the Survey, 39 parcels were identified in the Survey Area during the desktop survey that potentially contained up to 41 wells used for domestic or business purposes were identified. No known springs were identified within the Survey Area.

2.1.2 Hydrogeological Considerations

In addition to conducting the Survey, the Water Use Survey SAP (Stantec 2018) outlines a process to identify locations where groundwater or surface water has the potential to be affected by JSF Plant CCR management units using the results of investigative activities required as part of the EIP. This process includes consideration of geologic and hydrogeologic conditions (i.e. hydraulic barriers [rivers/streams], topography, groundwater flow direction, and watershed boundaries). Relevant hydrogeologic information presented in the EAR Chapter 5 is discussed below as it relates to identifying potential water supplies with the potential to be affected by JSF Plant CCR management units.

- Coarse-grained unconsolidated materials above bedrock and upper bedrock are defined as the uppermost aquifer, which is considered to be under unconfined conditions. The horizontal groundwater flow direction within the uppermost aquifer is generally to the north-northwest or northwest toward the Holston River or, near Dodson Creek, to the west toward Dodson Creek. Groundwater flow in the unconsolidated materials and upper bedrock is bounded to the north by the Holston River and to the west by Dodson Creek.

- Near the southern boundary of the JSF Plant, the groundwater flow direction was consistently from the southern boundary of the JSF Plant to the north toward the Holston River. Based on this finding, potable water wells located south and upgradient of the CCR management units would not be impacted by groundwater associated with the JSF Plant CCR management units.

- The topographically high ridge southeast of the JSF Plant creates a groundwater flow divide. Groundwater flow north of the divide is northward towards the Holston River, flow south of the divide is southeastward. In general, hydraulic gradients mimic surface topography, and groundwater flows from areas of higher elevation at groundwater divides towards the Holston River and Dodson Creek, which represent surface streams that bound groundwater flow. The key hydraulic barriers (Holston River, Dodson Creek, and topographically high ridges south and southeast of JSF Plant) are illustrated on Exhibit H.9-3.

2.1.3 Usable Water Well Identification

Considering the geologic and hydrogeologic conditions present at and in the vicinity of the JSF Plant, parcels containing a well or spring located immediately south of the Holston River in the vicinity of the JSF Plant would have the greatest likelihood of being downgradient of the JSF Plant CCR management units. This area was termed the AOI. Potable water wells screened in overburden or bedrock located south (upgradient) of the CCR management units or north of the Holston River (i.e., on the opposite side of the surface streams that bound groundwater flow from the JSF Plant) would have a low likelihood of being impacted from groundwater associated with the JSF Plant CCR management units based on hydrogeologic boundaries and current groundwater flow patterns.

Based on the results of the Survey, 2 parcels (highlighted on Exhibit H.9-3 and outlined in Table H.9-4) located within the AOI immediately south of the Holston River were identified during the Survey as potentially containing up to three private wells. No potential springs were identified on the 2 parcels. Using the results of the Survey, delivery of letters and postcards to the owners of these 2 parcels 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 section 2.0 and 3.0 of the IP. Using the process outlined in the IP, on May 2, 2023, a letter and stamped postcard containing basic inquiries into the presence of a well or spring was mailed to the parcel owners within the AOI, both of which were TVA. On May 12, 2023, TVA's JSF Plant Manager returned completed postcards and reported that there were no known water supply wells or springs on either parcel. Information obtained from the delivery and return of letters and postcards is presented in Table H.9-5. Postcard responses are included in Attachment H.9-A.

4.0 CONCLUSIONS

TVA owns both parcels located within 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 on either parcel. Based on the overall results of the WUS, current and historical CCR management associated with the JSF Plant have not affected water supply wells or springs located in the vicinity of the JSF Plant.

5.0 REFERENCES

Calton, Randy (Persia Utility District). (2019). Telephone conversation with Christopher Hatfield (Stantec), August 7, 2019.

Ewing, Luke (TDEC/Division of Water Resources Section / Drinking Water Unit). (2019). Email to Christopher Hatfield (Stantec), June 19, 2019.

Google Earth©. (2020). October 12, 2019 Aerial Imagery of John Sevier Fossil Plant and Surrounding Area, Rogersville, Tennessee, Viewed October 12, 2020.

Hatfield, Christopher (Stantec). (2019). Telephone and email requests to Town of Rogersville Water Department, May 6, August 7, and September 3, 2019.

Hawkins County. (2019). GIS-ready Electronic Parcel Data of Hawkins County, May 2019.

Tennessee Department of Environmental Conservation (TDEC). (2015). Commissioner's Order No. OGC15- 177. August 6.

Law Engineering. (1992). Report of Hydrogeologic Evaluation – Pond J Fly Ash Disposal Site, John Sevier Fossil Fuel Plant, July 9, 1992.

Law Engineering. (1994). Report of Hydrogeologic and Engineering Evaluation (Revised) – Proposed Dry Fly Ash Disposal Facility Site, John Sevier Fossil Plant, Rogersville, Tennessee, October 1994.

Robinson, J.A., and Brooks, J.M. (2010). Public Water-Supply Systems and Associated Water Use in Tennessee, 2005: U.S. Geological Survey Open-File Report 2010–1226.

Scott, Jeff. (2018). Email to Tennessee Commissioner's Order Comment (TVA) September 7, 2018.

Stantec Consulting Services, Inc. (Stantec). (2018). Water Use Survey, Sampling and Analysis Plan, John Sevier Fossil Plan, Revision 0, October 19, 2018.

Tennessee Valley Authority (TVA). (2009). John Sevier Fossil Plant – Hydrogeologic Evaluation of Dry Coal-Combustion Byproducts Landfill, April 2009.

TVA. (2015). John Sevier Fossil Plant Deconstruction – Final Environmental Assessment, April 2015.

TVA. (2018). Environmental Investigation Plan, John Sevier Fossil Plant, Revision 3, October 19, 2018.

United States Geological Survey (USGS). (2021). National Water Information System online mapping database, Viewed April 23, 2019, from https://maps.waterdata.usgs.gov/mapper/index.html.

TABLES

Table H.9-1 – JSF Plant Area Public Water Service Providers
John Sevier Fossil Plant

Public Water Supply Provider	Service Area in Relation to JSF Plant	Does Service Area Extend into Survey Area (Yes/No)	Water Source/Intake Location	Distance of Source/Intake from JSF Plant Survey Area
Persia Utility District	JSF Plant and surrounding area	Yes (also connected to Rogersville water system)	Quarry adjacent to Holston River near river mile marker 102	1.25 miles west (downstream)
Rogersville Water Commission	JSF Plant and surrounding area	Yes (also connected to Persia water system)	Big Creek	1.75 miles north (upstream)

Stantec

Table H.9-2 – JSF Plant Parcel Data Inside Survey Area
John Sevier Fossil Plant

ASSIGNED WELL ID	OWNER	PARCEL ADDRESS	PARCEL ID	HAWKINS COUNTY GIS WATER SERVICE DESIGNATION	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA REPORT WELL ID	SCOTT SURVEY RECORD	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
JSFPV-005	TVA	OLD STATE HWY 70	126 023.00	Public	1	98005525	605	Well #1 - 2015 TVA Report two unverified wells on historical map		TVA JSF Facility	YES
	MCCLOUD BAPTIST CHURCH	MCCLOUD RD	126 023.02	Public	0						YES
JSFPV-006	CLOUD #9 ENTERPRISES INC	TVA POND RD	126 024.00	Public	1	20170431	225			house or small building	YES
	SUMMERS-TAYLOR MATERIALS CO	TVA POND RD	126 024.01	Public	0						YES
	NEWMAN DEAN LAMB	MCCLOUD CHURCH RD 128	126 025.02	Public	0						YES
	HUGHES RONALD D &	MCCLOUD CHURCH RD 226	126 033.00	Public	0						YES
	WILSON EDWARD M	OLD STATE HWY 70 1004	126 069.00	Public	0						YES
	SNUFFER CHESTER	OLD STATE HWY 70	126 069.01	Public	0						YES
	ETHRIDGE RUBIN	OLD STATE HWY 70 1004	126 070.00	Public	0						YES
	SONS STEPHEN M & DESTINY	OLD STATE HWY 70 932	126 072.01	Public	0						YES
	LUSTER BETTY JO	OLD STATE HWY 70 908	126 073.00	Public	0						YES
	LUSTER BETTY JO	OLD STATE HWY 70 908	126 074.00	Public	0						YES
	BARNARD GLENN E &	TEMPLE RD	126 075.00	Public	0				no well		YES
JSFPV-018	BATES PHILLIP R &	OLD STATE HWY 70 792	126 079.00	Public	1				well used to provide livestock water	house and detacted garage	YES
	BATES PHILLIP RAY &	OLD STATE HWY 70 792	126 080.00	Public	0				capped well		YES
	MILES GLENDA	OLD STATE HWY 70 774	126 081.00	Public	0						YES
	LAWSON MAVIS G LE	OLD STATE HWY 70	126 082.00	Public	0						YES
JSFPV-019	HOUCK RON & PATSY	OLD STATE HWY 70	126 084.00	Public	2			Well #2 - 2009 TVA Report unlabeled well - 2015 TVA Report	existing well adjacent to hwy 70 near former house; hand pump well in middle of field on this parcel or Parcel 126 084.03; owner does not want wells tested	barn not near well location	YES
JSFPV-022	HOUCK BRADLEY & KASEY D	OLD STATE HWY 70 OFF	126 084.01	Public	1			Well #6 - 2009 TVA Report unlabeled well - 2015 TVA Report		house and possible outbuildings	YES
	HOUCK RON & PATSY	OLD STATE HWY 70 730	126 084.03	Public	0				capped well at house		YES
JSFPV-023	UNITED STATES OF AMERICA	OLD STATE HWY 70 702	126 085.00	Public	1	20122249	120			none	YES
JSFPV-022	UNITED STATES OF AMERICA	SANDERS RD 155	126 086.00	Public	1	20122245 20122246 20122248	94 48 445	unverified well shown on historical map		none	YES
	UNITED STATES OF AMERICA	OLD HWY 70 S 680	126 086.01	Public	0						YES
	UNITED STATES OF AMERICA	OLD HWY 70 S 682	126 086.02	Public	0						YES
JSFPV-023	UNITED STATES OF AMERICA	OLD STATE HWY 70 621	126 087.00	Public	1	20122247	125	Well #1 - 2009 TVA Report unlabeled well - 2015 TVA Report		none	YES
	SANDERS CHARLES W JR	DRU HANES RD 159	126 089.00	Public	0						YES
	TVA	OLD STATE HWY 70	126 090.00	Public	0						YES
	JENKINS WILLIAM L &	TVA POND RD OFF	127 001.00	Public	0						YES
	JENKINS KATHRYN MYERS	WEBSTER VALLEY RD 1288	127 017.00	Public	0						YES
	CLARK JERRY B &	OLD STATE HWY 70 1117	126 025.01	Public	0						NO
	CLARK J B & IRENE	OLD STATE HWY 70 S 1107	126 026.00	Public	0						NO
	FOSTER SHIRLEY ANN ETAL	MCCLOUD CHURCH RD 116	126 026.01	Public	0						NO
	CLARK JERRY BRANDON & JENNIFE	MCCLOUD CHURCH RD 110	126 026.02	Public	0						NO
JSFPV-007	MCCLOUD BAPTIST CHURCH	OLD STATE HWY 70	126 027.00	Public	1			Well #15 - 2009 TVA Report Well #2 - 2015 TVA Report		church	NO
	CLARK JERRY B & BARBARA F	OLD STATE HWY 70 1111	126 029.00	Public	0						NO
	WILLIS AUDREY D	OLD STATE HWY 70 1113	126 030.00	Public	0						NO
JSFPV-008	WALKER DOUGLAS SCOTT	MCCLOUD CHURCH RD 260	126 031.00	Public	1			Well #14 - 2009 TVA Report Well #3 - 2015 TVA Report		possible house	NO
	MORRISON RUSTY	MCCLOUD CHURCH RD 266	126 031.01	Public	0						NO
	WEEMS PHILLIP IVAN &	MCCLOUD CHURCH RD 250	126 032.00	Public	0						NO
	WEEMS PHILLIP IVAN	MCCLOUD CHURCH RD 254	126 032.01	Public	0						NO
	WEEMS PHILLIP IVAN &	MCCLOUD CHURCH RD 248	126 032.02	Public	0						NO
	WEEMS JAMES D &	MCCLOUD CHURCH RD 241	126 034.00	Public	0						NO
	MANIS GEORGE W & MAXINE	MCCLOUD CIR 251	126 035.00	Public	0						NO
JSFPV-009	MANIS PAUL	MCCLOUD CIR 247	126 035.01	Public	1			Well #16 - 2009 TVA Report Well #4 - 2015 TVA Report		house	NO
	LAMB DANA W & JODA B	MCCLOUD CHURCH RD 255	126 036.00	Public	0						NO
	WRIGHT HAROLD S &	OLD STATE HWY 70 1213	126 037.00	Public	0						NO
	CALTON JAMES M & LINDA FAYE LE	MCCLOUD CHURCH RD 257	126 038.00	Public	0						NO
	WALL JOSEPHINE CRAFA &	OLD STATE HWY 70 1217	126 038.01	Public	0						NO
	ROBINETTE ELAINE	MCCLOUD CHURCH RD 261	126 038.02	Public	0						NO
	SETSER T A	OLD STATE HWY 70	126 038.03	Public	0						NO
	APPLE TREE CENTREE LLC	OLD STATE HWY 70 1231	126 039.00	Public	0						NO
	LUSTER GARY & ROBIN	OLD STATE HWY 70 1241	126 040.00	Public	0						NO
	METZ JOHN	OLD STATE HWY 70 1245	126 041.00	Public	0						NO
	FOSTER WALTER W	MCCLOUD CHURCH RD	126 042.00	Public	0						NO

Table H.9-2 – JSF Plant Parcel Data Inside Survey Area
John Sevier Fossil Plant

ASSIGNED WELL ID	OWNER	PARCEL ADDRESS	PARCEL ID	HAWKINS COUNTY GIS WATER SERVICE DESIGNATION	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA REPORT WELL ID	SCOTT SURVEY RECORD	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
	METZ JOHN ERVIN & LANA L	OLD STATE HWY 70 1265	126 042.01	Public	0						NO
	METZ JOHN & LANA	OLD STATE HWY 70 1265	126 042.02	Public	0						NO
	METZ JOHN C & ELIZABETH	OLD STATE HWY 70	126 042.03	Public	0						NO
	WEEMS PHILLIP IVAN II & BRANDY	MCCLOUD CHURCH RD 223	126 042.04	Public	0						NO
	CINNAMON NORMAN	OLD STATE HWY 70 1273	126 043.00	Public	0						NO
	MCLAIN RUSSELL S & BETTY R	OLD STATE HWY 70	126 044.00	Public	0						NO
	PENDLETON RALPH	OLD STATE HWY 70 1279	126 044.01	Public	0						NO
	MCLAIN RUSSELL S & BETTY R	OLD STATE HWY 70 1319	126 045.00	Public	0						NO
	MAUK HAROLD FRANKLIN JR &	OLD STATE HWY 70 1303	126 045.01	Public	0						NO
	MCLAIN RUSSELL S & BETTY R	OLD STATE HWY 70	126 046.00	Public	0						NO
	LUTZ RONALD A & BARBARA	OLD STATE HWY 70 1365	126 047.00	Public	0						NO
	LUTZ RONALD A & BARBARA	OLD STATE HWY 70	126 048.00	Public	0						NO
	WALKER WILLIAM LESLIE &	OLD STATE HWY 70 1344	126 056.00	Public	0						NO
	MILLER RAYMOND C & CYNTHIA	OLD STATE HWY 70 1286	126 058.00	Public	0						NO
JSFPV-010	APPLE TREE CENTRE LLC	OLD STATE HWY 70 1250	126 059.00	Public	1			Well #13 - 2009 TVA Report unlabeled well - 2015 TVA Report		house	NO
JSFPV-011	ETN CONSULT LLC	CUPP HOLLOW RD 174	126 060.00	Public	1			Well #12 - 2009 TVA Report unlabeled well - 2015 TVA Report		house	NO
	BODMAN PHILLIP D III	CUPP HOLLOW RD 215	126 061.00	Public	0; well, if present, likely near buildings and outside Survey Area			Well #11 - 2009 TVA Report unlabeled well - 2015 TVA Report		house + outbuildings	NO
	FOBBER TEX	CUPP HOLLOW RD	126 062.00	Public	0						NO
	PARKER VERNON & PEGGY	OLD STATE HWY 70 1212	126 063.00	Public	0						NO
	ROBINETTE ELAINE	OLD STATE HWY 70 1208	126 064.00	Public	0						NO
	MBM PACKAGING LABS	OLD STATE HWY 70	126 065.00	Public	0						NO
JSFPV-012	BRYAN HOMER CARL &	OLD STATE HWY 70	126 065.01	Public	1			Well #5 - 2009 TVA Report unlabeled well - 2015 TVA Report		none	NO
	MBM PACKAGING LABS	OLD STATE HWY 70 1120	126 065.02	Public	0						NO
	CEMETERY	OLD STATE HWY 70	126 066.00	Public	0						NO
	POWERS MICHAEL & SHIRLEY	OLD STATE HWY 70 1106	126 067.00	Public	0						NO
	BRYAN BRENDA C & HOMER C	OLD STATE HWY 70 1024	126 068.00	Public	0						NO
	BRYAN BRENDA & HOMER	OLD STATE HWY 70 1026	126 068.01	Public	0						NO
	ROBINETTE ELAINE	OLD STATE HWY 70 OFF	126 068.02	Public	0						NO
JSFPV-013	BRYAN SHALOAM IAN &	WAYNE RD 115	126 068.03	Public	1			Well #4 - 2009 TVA Report Well #5 - 2015 TVA Report		house	NO
	BRYAN BRENDA C & HOMER C	OLD STATE HWY 70 S OFF	126 068.04	Public	0						NO
	LASTER SHASHA M & CHAD	OLD STATE HWY 70 S OFF	126 068.05	Public	0						NO
	BAILEY JANET LYNNE	WAYNE RD	126 068.06	Public	0						NO
	WOODS SONJA D & ANDY	OLD STATE HWY 70 S	126 068.08	Public	0						NO
	WOLFE DAYNA LEE	WAYNE RD 118	126 071.00	Public	0						NO
	ROBINETTE ELAINE	WAYNE RD	126 072.00	Public	0						NO
	WALKER JOYCE	TEMPLE RD 128	126 075.01	Public	0				no well		NO
JSFPV-014	CATRON GARY LEON	TEMPLE RD	126 075.03	Public	1				130 feet deep well in addition to public water source	house	NO
JSFPV-015	HILTON TEMPLE ALLEN	TEMPLE RD 143	126 076.00	Public	1			Well #10 - 2009 TVA Report unlabeled well - 2015 TVA Report	25 feet deep well used by livestock and to fill small swimming pool	house + other buildings	NO
JSFPV-016	SCOTT JEFFRY PAUL &	TEMPLE RD 140	126 077.00	Public	1				120 feet deep in-use well	house	NO
JSFPV-017	CANNON MARCIA R	TEMPLE RD 138	126 077.01	Public	1			Well #3 - 2009 TVA Report unlabeled well - 2015 TVA Report	in-use well estimated depth 30 feet	house + other buildings	NO
	SNIDER JESSIE GRENNE LE	TEMPLE RD	126 078.00	Public	0						NO
	TIPTON DAVID	OLD STATE HWY 70 780	126 083.00	Public	0						NO
	PARROTT JOHN J & HEATHER	OLD STATE HWY 70 OFF	126 084.02	Public	0						NO
	LAWSON JASON S	DRU HANES RD 279	126 088.00	Public	0						NO
JSFPV-024	HOUCK BRADLEY	DRU HANES RD 169	126 088.01	Individual	1	20021812	495		495 foot deep well installed in 2002	house	NO
JSFPV-025	MCGREGOR JOSEPH A &	DRU HANES RD 293	126 088.02	Individual	1	20170634	165	Well #7 - 2009 TVA Report unlabeled well - 2015 TVA Report		house	NO
JSFPV-026	MULLINS JOE BLAINE &	FIREHALL RD 119	126 091.01	Individual	1	none				two houses/ apartments	NO
JSFPV-027	MULLINS JOE BLAINE &	FIREHALL RD 231	126 091.03	None	1	none				outbuilding and possible house	NO
JSFPV-028	MARKHAM TEDDY	FIREHALL RD	126 091.04	Public	1	20140508	245			large building	NO
	MARKHAM TEDDY	FIREHALL RD	126 091.05	None	0					vacant parcel - no buildings visible	NO
	MARKHAM TEDDY	OLD FIREHALL RD	126 091.07	None	0					vacant parcel - no buildings visible	NO
JSFPV-029	BISHOP NELL JUNE LE	OLD STATE HWY 70 334	126 091.08	None	1	none				house	NO
	MARKHAM TEDDY	OLD STATE HWY 70	126 091.09	None	0					vacant parcel - no buildings visible	NO
	REYNOLDS JOHN W & DAVID H	OLD STATE HWY 70	126 091.11	None	0					vacant parcel - no buildings visible	NO
JSFPV-030	DION CHARLES P & SUSAN	LANDSDOWNE DR 157	126 091.12	None	1	none				house	NO

Table H.9-2 – JSF Plant Parcel Data Inside Survey Area
John Sevier Fossil Plant

ASSIGNED WELL ID	OWNER	PARCEL ADDRESS	PARCEL ID	HAWKINS COUNTY GIS WATER SERVICE DESIGNATION	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA REPORT WELL ID	SCOTT SURVEY RECORD	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
JSFPV-031	MARKHAM THEODORE R	FIREHALL RD 257	126 091.13	None	1	none				two outbuildings	NO
JSFPV-032	NEWBERRY MICHAEL D	FIREHALL RD 237	126 091.14	None	1	none				house	NO
JSFPV-033	BEDNAR MICHAEL M	OLD HWY 70 S 340	126 091.15	None	1	none				house	NO
JSFPV-034	FERGUSON DEWEY & SHELLY	FIREHALL RD 251	126 091.16	None	1	none				house	NO
	FERGUSON DEWEY & SHELLY	FIREHALL RD	126 091.17	None	0					vacant parcel - no buildings visible	NO
	CHESNUTT FRANKIE	FIREHALL RD 262	126 091.18	Public	0						NO
	SIZEMORE THOMAS &	OLD STATE HWY 70	126 091.19	None	0					vacant parcel - no buildings visible	NO
	MULLINS JOE BLAINE &	FIREHALL RD	126 091.23	None	0					vacant parcel - no buildings visible	NO
	MARKHAM TEDDY	FIREHALL RD 255	126 091.24	None	0					vacant parcel - no buildings visible	NO
	MARKHAM TEDDY	FIREHALL RD	126 091.25	Public	0						NO
	MARKHAM TEDDY	FIREHALL RD	126 091.26	Public	0						NO
	BURTON WILLIAM T & ELLEN K	OLD STATE HWY 70 396	126 092.00	Public	0						NO
JSFPV-035	KNIGHT FRANCIS LE	OLD STATE HWY 70 412	126 093.00	Public	1			Well #18 - 2009 TVA Report unlabeled well - 2015 TVA Report		house + outbuildings	NO
	STANTON TERESA WRIGHT &	OLD PERSIA RD 639	126 093.01	Public	0						NO
	KNIGHT FRANCIS LE	OLD PERSIA RD	126 093.02	Public	0						NO
	MARKHAM THEODORE R	OLD PERSIA RD	126 094.00	Public	0						NO
	LAWSON STEVEN B & BREE A	BROOKS RD 143	126 095.01	Public	0						NO
	WILLIAMS KEITH ALAN &	BROOKS RD 131	126 095.02	Public	0						NO
	LINKOUS JENNIFER &	BROOKS RD 119	126 095.03	Public	0						NO
	MANIS WILLIAM EDWARD & STARR	OLD PERSIA RD 516	126 096.00	Public	0						NO
	MARKHAM THEODORE R JR	OLD PERSIA RD 511	126 097.00	Public	0						NO
	GREENE ZACHARY	HAGOOD DR 105	126 098.00	Public	0						NO
	WEEMS LOWELL & WANDA	BROOKS RD 128	126 099.00	Public	0						NO
	YOUNG JOHNATHON M & COURTNE	HAGOOD DR 109	126 099.01	Public	0						NO
	JOHNSON FRED JR & MARY R	HAGOOD DR 115	126 099.02	Public	0						NO
	COFFEY ANDREA P	HAGOOD DR 108	126 099.03	Public	0						NO
	HAWKINS DONALD E & JUDY	HAGOOD DR 114	126 099.04	Public	0						NO
	CHANDLER RONNIE E &	HAGOOD DR 120	126 099.05	Public	0						NO
	HOARD MIKE D	BROOKS RD 140	126 099.06	Public	0						NO
JSFPV-036	BROOKS DWIGHT & LISA	OLD PERSIA RD 526	126 099.07	Public	1	20053363	205	Well #17 - 2009 TVA Report unlabeled well - 2015 TVA Report			NO
	CHANDLER RONNIE E &	HAGOOD DR	126 099.08	Public	0						NO
	LAWSON GALE C & PHYLLIS	OLD PERSIA RD	126 099.09	Public	0						NO
	TRENT BRUCE A	SQUIRREL HILL RD OFF	126 099.10	Public	0						NO
	ENGLAND CLYDE R	BROOKS RD 146	126 099.11	Public	0						NO
	BROOKS DWIGHT & LISA LE	OLD PERSIA RD 520	126 099.12	Public	0						NO
	MARKHAM TEDDY R	OLD PERSIA RD 501	126 100.00	Public	0						NO
	WRIGHT DEREK	FIREHALL RD	126 101.00	Public	0						NO
	WRIGHT BRIDGET	FIREHALL RD	126 101.01	Public	0						NO
	WRIGHT LEON & SUE KNIGHT	WRIGHT LN 143	126 103.00	Public	0						NO
	WRIGHT WESLEE NORMAN &	WRIGHT LN 124	126 103.01	Public	0						NO
	WRIGHT NORMAN LEON JR	WRIGHT LN 125	126 104.01	Public	0						NO
	WRIGHT LEON & SUE	FIREHALL RD 208	126 105.00	Public	0						NO
	LASTER HELEN & JOHN	FIREHALL RD 212	126 106.00	Public	0						NO
	LASTER JAMES EDWARD &	FIREHALL RD 220	126 107.00	Public	0						NO
	MARKHAM TEDDY	FIREHALL RD 238	126 108.00	Public	0						NO
	PRIDEMORE CARRIE V	FIREHALL RD 250	126 109.00	Public	0						NO
	WALLACE BONNIE & JODA R	FIREHALL RD 260	126 110.00	Public	0						NO
	COOK MARGARET	FIREHALL RD 115	126 111.00	Public	0						NO
	COOK BONNIE J	FIREHALL RD 107	126 111.01	Public	0						NO
	PERSIA VOLUNTEER FIRE DEPT	OLD PERSIA RD	126 112.00	Public	0						NO
	MARKHAM TEDDY R	OLD PERSIA RD	126 113.01	Public	0						NO
JSFPV-037	TRENT BRUCE A	SQUIRREL HILL RD 108	126J A 004.00	Public	1			Well #8 - 2009 TVA Report unlabeled well - 2015 TVA Report		house	NO
JSFPV-038	ROLEN RALPH & JUDY R	SQUIRREL HILL RD 112	126J A 005.00	Public	1			Well #9 - 2009 TVA Report unlabeled well - 2015 TVA Report		house	NO
	SLATER DENNIS D LIFE TRUST AGR	SQUIRREL HILL RD 120	126J A 007.00	Public	0						NO
	MANIS MACK & AUDREY FAYE	SQUIRREL HILL RD 124	126J A 008.00	Public	0						NO
	TOLBERT SHERRY JANE &	SQUIRREL HILL RD 128	126J A 009.00	Public	0						NO
	DAY BILL E JR & DEBORAH L	SQUIRREL HILL RD	126J A 011.00	Public	0						NO
JSFPV-039	DAY BILL E JR & DEBORAH L	SQUIRREL HILL RD 103	126J A 012.00	Public	1	99005351	305			possible house	NO
	DAY BILL E JR	OLD PERSIA RD	126J A 012.01	Public	0						NO
	ROLEN MELISSA	OLD PERSIA RD 129	126J A 013.00	Public	0						NO
	FIELDS ROBIN R	SQUIRREL HILL RD 125	126J A 013.01	Public	0						NO

Table H.9-2 – JSF Plant Parcel Data Inside Survey Area
John Sevier Fossil Plant

ASSIGNED WELL ID	OWNER	PARCEL ADDRESS	PARCEL ID	HAWKINS COUNTY GIS WATER SERVICE DESIGNATION	POTENTIAL PRIVATE WELL/SPRING ON PARCEL AND INSIDE SURVEY AREA	TDEC WELL LOG NUMBER	TDEC WELL LOG WELL DEPTH (feet below ground surface)	TVA REPORT WELL ID	SCOTT SURVEY RECORD	RECENT AERIAL PHOTOGRAPH REVIEW NOTES	INCLUDE PARCEL IN DOOR-TO-DOOR SURVEY (YES/NO)
	GOLDEN RONNIE & JUDY	MORNINGSIDE CIR	126P B 013.00	Public	0						NO
	GREEN MOLLY	MORNINGSIDE CIR 131	126P B 014.00	Public	0						NO
	MILLER ROBERT & DONNA SUE	MORNINGSIDE CIR 125	126P B 015.00	Public	0						NO
	PARVIN RAYMOND A &	MORNINGSIDE CIR 121	126P B 016.00	Public	0						NO
	MATHES ROY & BRANDY	MORNINGSIDE CIR 117	126P B 017.00	Public	0						NO
	HERNDON PEGGY JEAN	MORNINGSIDE CIR 115	126P B 018.00	Public	0						NO
	SPEARS TABITHA LE	OLD PERSIA RD 414	126P B 032.00	Public	0						NO
	KING ROY	OLD PERSIA RD 418	126P B 033.00	Public	0						NO
	LAWSON GALE C	OLD PERSIA RD 422	126P B 034.00	Public	0						NO
	HARMON JEFFERY S	LANDSDOWNE DR 126	126P E 001.00	Public	0						NO
	BOWMAN JERRY WAYNE &	LANDSDOWNE DR 124	126P E 002.00	Public	0						NO
	COOPER CHANNING & MOLLY	LANDSDOWNE DR 120	126P E 003.00	Public	0						NO
	ELKINS WENDELL REED &	LANDSDOWNE DR 112	126P E 004.00	Public	0						NO
	LEE JERRY D & MARIAN R	LANDSDOWNE DR 128	126P F 001.00	Public	0						NO
	MARKHAM TEDDY	LANDSDOWNE DR	126P F 002.01	Public	0						NO
	ARRIGO JEWELL ANNA GALBREATH	LANDSDOWNE DR 134	126P F 003.00	Public	0						NO
	ANDREWS RICHARD & ROSEMARY	LANDSDOWNE DR 138	126P F 004.00	Public	0						NO
	PRICE CHARLES ALLEN &	LANDSDOWNE DR 142	126P F 005.00	Public	0						NO
	CLINCH POWELL RESOURCE	LANDSDOWNE DR 146	126P F 006.00	Public	0						NO
	BURTON RICHARD L &	LANDSDOWNE DR 150	126P F 007.00	Public	0						NO
	BROWN MARIAH VICTORIA &	LANDSDOWNE DR 153	126P F 008.00	Public	0						NO
	BURCHFIELD DELBERT H	LANDSDOWNE DR 149	126P F 009.00	Public	0						NO
	QUARLES CHARLES W & MEAGAN M	LANDSDOWNE DR 145	126P F 010.00	Public	0						NO
	BROWN JOSHUA L &	LANDSDOWNE DR 141	126P F 011.00	Public	0						NO

Table H.9-3 – Parcels Inside JSF Plant Survey Area with Likely Private Water Sources

Assigned Well ID	Parcel ID	Hawkins County GIS Water Service Designation	Potential Well/Spring on the Parcel and Inside the Survey Area	Potential Well Record Source
JSFPV-001	115 002.00	Individual	1	Aerial Photo Review
JSFPV-002	115 009.00	Individual	1	Aerial Photo Review
JSFPV-003	115 010.01	Individual	1	Aerial Photo Review
JSFPV-004	115 011.01	Individual	1	Aerial Photo Review
JSFPV-005	126 023.00	Public	2	TDEC Well Log and TVA Report
JSFPV-006	126 024.00	Public	1	TDEC Well Log
JSFPV-007	126 027.00	Public	1	TVA Report
JSFPV-008	126 031.00	Public	1	TVA Report
JSFPV-009	126 035.01	Public	1	TVA Report
JSFPV-010	126 059.00	Public	1	TVA Report
JSFPV-011	126 060.00	Public	1	TVA Report
JSFPV-012	126 065.01	Public	1	TVA Report
JSFPV-013	126 068.03	Public	1	TVA Report
JSFPV-014	126 075.03	Public	1	Scott Well Survey
JSFPV-015	126 076.00	Public	1	TVA Report and Scott Well Survey
JSFPV-016	126 077.00	Public	1	Scott Well Survey
JSFPV-017	126 077.01	Public	1	TVA Report and Scott Well Survey
JSFPV-018	126 079.00	Public	1	Scott Well Survey
JSFPV-019	126 084.00	Public	2	TVA Report and Scott Well Survey
JSFPV-020	126 084.01	Public	1	TVA Report
JSFPV-021	126 085.00	Public	1	TDEC Well Log
JSFPV-022	126 086.00	Public	1	TDEC Well Log
JSFPV-023	126 087.00	Public	1	TDEC Well Log and TVA Report
JSFPV-024	126 088.01	Individual	1	TDEC Well Log and Scott Well Survey
JSFPV-025	126 088.02	Individual	1	TDEC Well Log and TVA Report
JSFPV-026	126 091.01	Individual	1	Aerial Photo Review
JSFPV-027	126 091.03	None	1	Aerial Photo Review
JSFPV-028	126 091.04	Public	1	TDEC Well Log
JSFPV-029	126 091.08	None	1	Aerial Photo Review
JSFPV-030	126 091.12	None	1	Aerial Photo Review
JSFPV-031	126 091.13	None	1	Aerial Photo Review
JSFPV-032	126 091.14	None	1	Aerial Photo Review
JSFPV-033	126 091.15	None	1	Aerial Photo Review
JSFPV-034	126 091.16	None	1	Aerial Photo Review
JSFPV-035	126 093.00	Public	1	TVA Report
JSFPV-036	126 099.07	Public	1	TDEC Well Log and TVA Report
JSFPV-037	126J A 004.00	Public	1	TVA Report
JSFPV-038	126J A 005.00	Public	1	TVA Report
JSFPV-039	126J A 012.00	Public	1	TDEC Well Log
		TOTAL	**41**	

Table H.9-4 – Parcels Identified for Water Use Survey
John Sevier Fossil Plant

Exhibit H.9-3 Map Label	Parcel ID	Owner	Parcel Address	Potential Private Wells/Springs Identified
1	126 023.00	TVA	OLD STATE HWY 70	2
2	126 086.00	UNITED STATES OF AMERICA	SANDERS RD 155	1

Table H.9-5 - Summary of Surveys Completed
Water Supply Well Survey
John Sevier Fossil Plant

Exhibit H.9-3 Map Label	Parcel ID	Owner	Parcel Address	Owner Mailing Address				Dwelling Building (YES/NO)	Comments	Status
1	126 023.00	TVA	OLD STATE HWY 70	3726 E MORRIS BLVD	MORRISTOWN	TN	37813	Yes	TVA owned property; no wells or springs reported as present	survey complete
2	126 086.00	UNITED STATES OF AMERICA	SANDERS RD 155	1101 MARKET ST SP 3L	CHATTANOOGA	TN	37402	No	TVA owned property; no wells or springs reported as present	survey complete

EXHIBITS

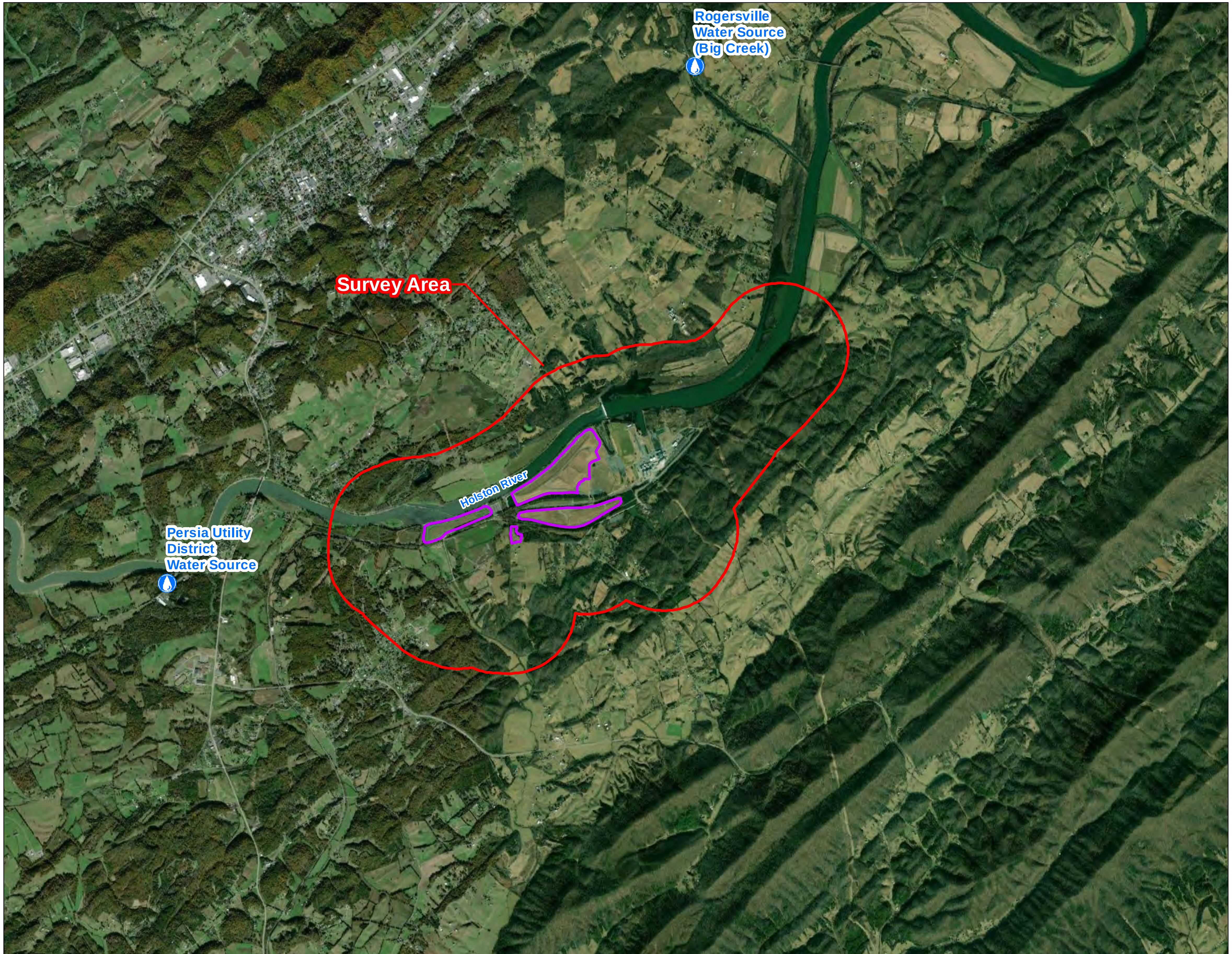

Exhibit No.

H.9-1

Title

Water Use Survey Area

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil Plant

Project Location

Rogersville, Tennessee

Prepared by LMB on 2019-11-20
TR by CH on 2019-11-20
IR Review by SG on 2019-11-20

N

0 3,200 6,400 Feet

(At original document size of 11x17)
1:48,000

Legend

Public Water Intake
Survey Area (1/2 Mile)
JSF Plant CCR Management Units

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Data Sources:
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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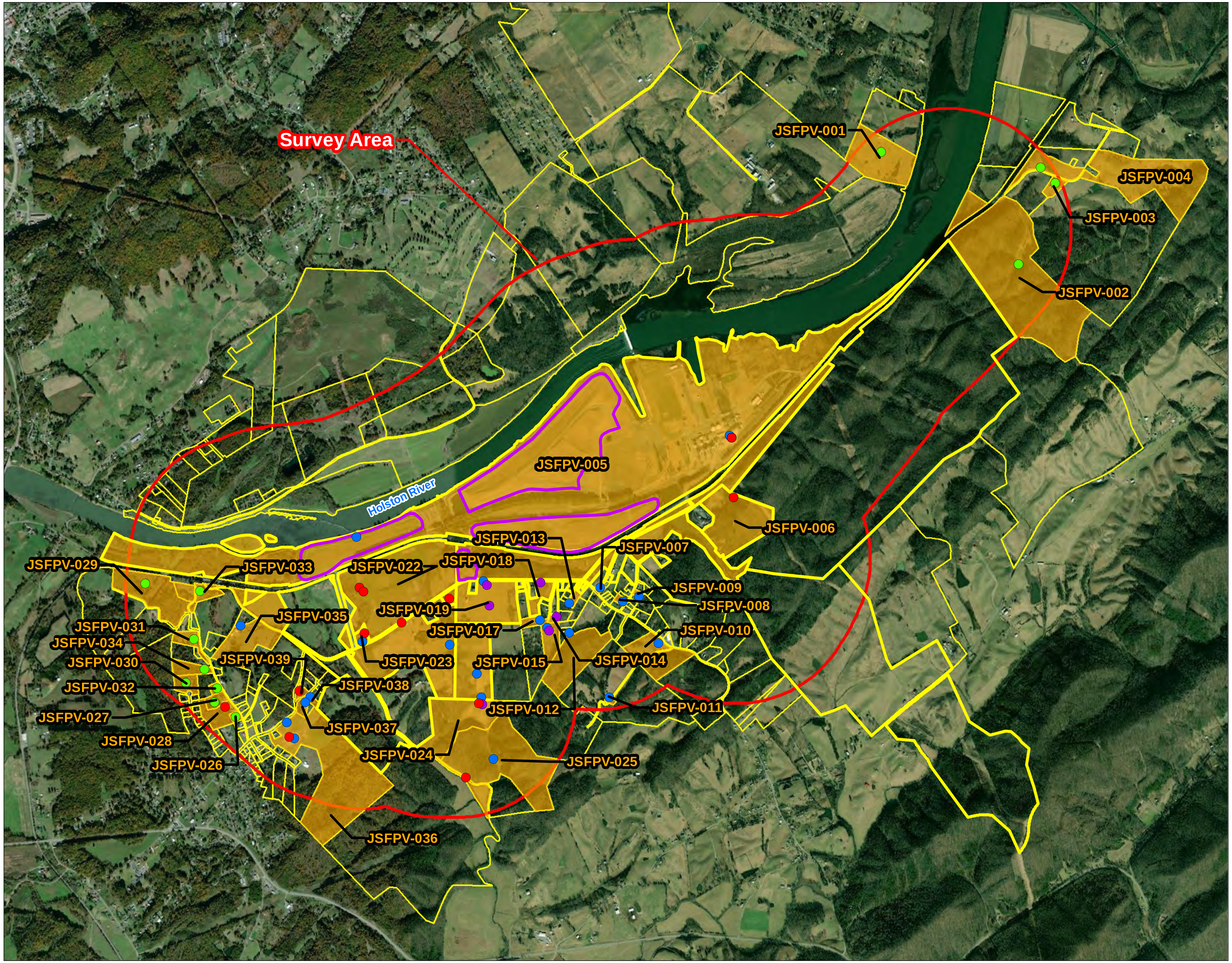


Exhibit No.

H.9-2

Title

Parcels in Survey Area with Potential Wells or Springs

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil Plant

Project Location

Rogersville, Tennessee

Prepared by LB on 2021-11-11
Technical Review by CHH on 2021-11-11
Internal Review by CF on 2021-11-11

N

0 2,200 4,400 Feet

(At original document size of 11x17)
1:26,400

Legend

- TDEC Well Logs
- Scott Survey Wells
- Well or Spring Location Based on Historical Report
- Possible Well Location (recent or current building present and private/individual water source in County parcel records)
- Parcels with Potential Wells and/or Springs
- Survey Area (1/2 Mile)
- JSF Plant CCR Management Units
- Parcel Boundaries

JSFPV-### Assigned ID for Parcel with Potential Well and/or Spring

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Data Sources:
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Stantec

TVA

U:\TVA-EIP\175568225_JSF_Phase2\gis\mxd\Water_Use_Series\EAR\JSF_EAR_ExH.9-2_Parcels_in_Survey_Area.mxd Revised: 2021-11-11 By: lblackman

Exhibit No.

H.9-3

Title

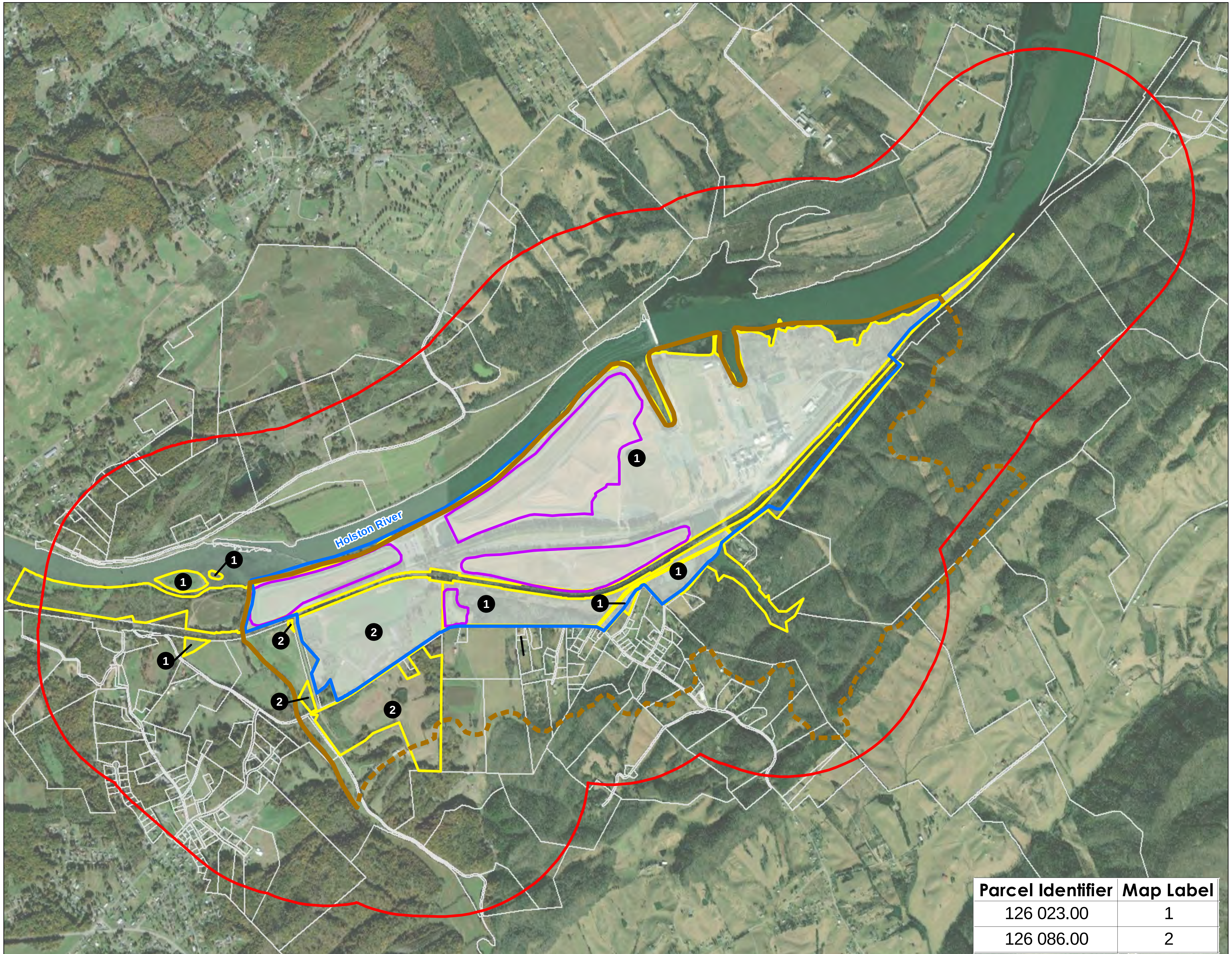
Parcels in Area of Interest and Hydrogeologically Downgradient of JSF Plant CCR Management Units

Client/Project 175568225

Tennessee Valley Authority
John Sevier Fossil Plant

Project Location
Rogersville, Tennessee

Prepared by LB on 2023-01-09
Technical Review by CHH on 2023-01-09
Internal Review by CF on 2023-01-09



Parcel Identifier	Map Label
126 023.00	1
126 086.00	2

N

0 1,800 3,600 Feet
(At original document size of 11x17)
1:21,600

Legend

- Hydrogeological Divide
- Surface stream that bounds groundwater flow
- WUS Survey Area
- Water Use Survey Area of Interest
- Parcel Identified for Water Use Survey
- Parcel
- JSF Plant CCR Management Units

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Data Sources:
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Stantec

TVA

U:\TVA-EIP\175568225_JSF_Phase2\gis\mxd\Water_Use_Series\EAR\JSF_EAR_Exh-9-3_AOI_Parcels.mxd Revised: 2023-01-09 By: mbough

APPENDIX H.9-A - POSTCARDS

KNOXVILLE TN 377

10 MAY 2023PM 3 L

FIRST-CLASS

US POSTAGE IMI PITNEY BOWES

ZIP 37203
02 7H
0006105257

$ 000.48[0]

MAY 02 2023

Tennessee Valley Authority
c/o Stantec Consulting Services Inc.
601 Grassmere Park, Suite 22
Nashville, Tennessee 37211

37211-368122

As the legal owner of the parcel # 126 023.00, TVA is requesting your assistance answering the following questions:

1. Does a private water supply well and/or spring exist on your parcel?
   (circle one) **YES** **NO**

2. If you answered YES to 1., is the water supply well or spring for any of the following uses:
   ☐ Drinking Water ☐ Irrigation ☐ Water or Livestock
   ☐ Other ______________________

Form completed by (signature): Melissa Allen

Form completed by (printed name): Melissa Allen

Date signed: 3/10/2023

Contact Telephone Number: 423-883-4577

Contact Email: maallen1@tva.gov

Owner's Mailing Address: 611 Old Highway 70S, Rogersville, TN

If you have any questions, please contact us at **tvainfo@tva.gov**.
For more information, go to **tva.gov/watersurvey**.

KNOXVILLE TN 377

10 MAY 2023PM 3 L

FIRST-CLASS

US POSTAGE IMI PITNEY BOWES

ZIP 37203
02 7H
0006105257

$ 000.48⁰

MAY 02 2023

Tennessee Valley Authority
c/o Stantec Consulting Services Inc.
601 Grassmere Park, Suite 22
Nashville, Tennessee 37211

37211-368122

As the legal owner of the parcel # 126 086.00, TVA is requesting your assistance answering the following questions:

1. Does a private water supply well and/or spring exist on your parcel?
   (circle one) YES NO

2. If you answered YES to 1., is the water supply well or spring for any of the following uses:
   ☐ Drinking Water ☐ Irrigation ☐ Water or Livestock
   ☐ Other ______________________

Form completed by (signature): Melissa Allen

Form completed by (printed name): Melissa Allen

Date signed: 3/10/23

Contact Telephone Number: 423-883-4577

Contact Email: maallen1@tva.gov

Owner's Mailing Address: 622 Old Highway 70S, Rogersville, TN

If you have any questions, please contact us at **tvainfo@tva.gov**.
For more information, go to **tva.gov/watersurvey**.