

2020 Annual CCR Rule Groundwater Monitoring and Corrective Action Report - Ash Pond Complex

Gallatin Fossil Plant
Gallatin, Tennessee

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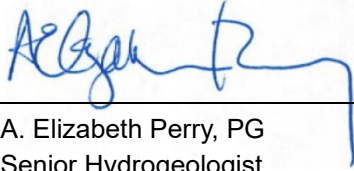
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1. Overview of Groundwater Monitoring Program Status

In August 2020, the United States Environmental Protection Agency (USEPA) issued updated regulations for management of coal combustion residuals (CCR). Among other requirements, 40 CFR 257.90 of the updated CCR Rule requires “A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit.” The specific regulatory requirements of that summary are provided here:

- 257.90(e)(6)(i): At the beginning of the 2020 annual reporting period the Ash Pond Complex (APC) CCR multi-unit was operating under the Assessment monitoring program in 257.95.
- 257.90(e)(6)(ii): At the end of the 2020 annual reporting period the APC CCR multi-unit was also operating under the Assessment monitoring program in 257.95.
- 257.90(e)(6)(iii): It was determined in 2018 that there were statistically significant increases (SSIs) over background for one or more constituents listed in Appendix III pursuant to 257.94(e):
 - (A): SSIs were identified in 2018 and are provided in the 2017 Annual Report (AECOM, 2018) and summarized on the table in Appendix D. Because the unit is currently in Assessment monitoring, SSIs are no longer routinely evaluated.
 - (B): The requirement for Assessment monitoring for the APC CCR unit was identified on April 12, 2018. The Assessment monitoring program was established within 90 days, by July 14, 2018.
- 257.90(e)(6)(iv): It has been determined that there is a statistically significant level (SSL) above the groundwater protection standard (GWPS) for one or more constituents listed in Appendix IV pursuant to 257.95(g):
 - (A): There is an SSL for arsenic in downgradient monitoring well GAF-410U. There have also been SSLs for cobalt (well GAF-450L) and lithium (GAF-452C), but these have been shown to be related to an alternate source and not to the APC, as detailed in the 2019 Annual Report (AECOM, 2020a).
 - (B): The Assessment of Corrective Measures was initiated for the APC CCR unit on April 15, 2019.
 - (C): The public meeting has not yet been held for the Assessment of Corrective Measures for the APC CCR unit.
 - (D): The Assessment of Corrective Measures was completed for the APC CCR unit on July 15, 2019.
- 257.90(e)(6)(v): The APC has been in the remedy selection process pursuant to 257.97 throughout the current annual reporting period. The remedy selection has not yet occurred, as described in the two Semi-Annual Remedy Selection Progress Reports for 2020 (AECOM, 2020a; AECOM, 2020c).
- 257.90(e)(6)(vi): Remedial activities were not initiated and are not on-going pursuant to 257.98 during the current annual reporting period.

2. Introduction

This report documents groundwater compliance monitoring and corrective action activities performed at the Tennessee Valley Authority (TVA) Gallatin Fossil Plant (GAF), Ash Pond Complex as required under the United States Environmental Protection Agency (USEPA) coal combustion residuals (CCR) Rule (40 Code of Federal Regulations [CFR] 257.90(e)). The groundwater monitoring system at the Ash Pond Complex is a multi-unit system (40 CFR 257.91(d)) designed to monitor the following four CCR surface impoundments: Ash Pond A, Ash Pond E, Middle Pond A, and the Bottom Ash Pond (**Figure 1**). This report covers the compliance activities performed in 2020 and presents the monitoring activities planned for 2021.

In 2020, the Ash Pond Complex was in the Remedy Selection process in accordance with 40 CFR 257.97. Assessment groundwater monitoring is on-going in accordance with 40 CFR 257.95. Statistically Significant Levels (SSLs) above Groundwater Protections Standards (GWPSs) have been found in three downgradient wells. As described in the 2019 Annual Report for the APC, the SSLs for cobalt and lithium in wells GAF-450L and GAF-452C, respectively, were successfully shown to originate from an Alternate Source (AECOM, 2020b). In response to the SSL for arsenic in well GAF-410U, TVA prepared an Assessment of Corrective Measures in 2019 and is currently in the remedy selection process.

To comply with the CCR Rule, the following actions were taken in 2020:

- The 2019 Annual CCR Rule Groundwater Monitoring Report (AECOM, 2020b) was completed in January 2020 and posted on TVA's publicly accessible CCR Rule website as required by 257.90(e) and 257.107(h)(1).
- Two Semiannual Reports on the Progress of Remedy Selection were completed in 2020, in January and July (AECOM, 2020a; AECOM, 2020c), and posted on TVA's publicly accessible CCR Rule website as required by 257.97(a) and 257.107(h)(9).
- Two semiannual Assessment monitoring events took place in April and September.
- Verification (confirmation) sampling was performed in June and November.
- Two additional wells continue to be sampled during the Assessment monitoring events (GAF-418L and GAF-454L) to evaluate potential migration off-site to other properties. The wells are located in the downgradient direction at the GAF facility boundary as required by 257.95(g)(1)(iii).
- Assessment monitoring results were evaluated in accordance with the CCR Rule (257.95).
- The CCR Rule groundwater monitoring system was recertified on September 10, 2020 pursuant to 257.91(f) to reflect the replacement of monitoring well GAF-451C with its replacement monitoring well GAF-451CR. The recertification occurred prior to the September Assessment monitoring event. In addition, well survey and pump intake depth information were updated, as necessary.

Problems encountered and resolution:

- The dedicated pumps from a number of CCR Rule monitoring system wells were removed to facilitate a dye trace study in the area. As a result, the April sampling event used non-dedicated pumps for the collection of groundwater samples in these wells. Upon completion of the dye trace study, the dedicated pumps were replaced in the wells. The dedicated pumps were in place for the September sampling event. **Table 1** reflects the current dedicated pump intake settings for all wells.
- No other problems were encountered during the 2020 CCR Rule groundwater monitoring at the APC.

The following activities are planned for 2021 to comply with CCR Rule groundwater monitoring and corrective action requirements:

- This 2020 Annual Groundwater Monitoring and Corrective Action Report will be posted on TVA's publicly accessible CCR Rule website, as required by 257.90(e) and 257.107(h)(1).
- Assessment monitoring will continue with two semiannual monitoring events in 2021, in accordance with 257.95. The groundwater analytical data obtained in 2021 will be evaluated using appropriate statistical methods.
- The remedy selection process will continue. Semiannual status reports on the progress of designing and selecting a remedy will be prepared in accordance with 257.97(a).
- Alternate source(s), including natural variability, will continue to be evaluated where applicable in accordance with 257.95(g)(3)(ii).
- TVA plans to perform down-hole well inspection and maintenance activities in 2021. The APC groundwater monitoring system may be recertified, if deemed necessary, to reflect the most accurate and up-to-date construction/survey information available for the wells.
- Further field and desktop Site-Characterization Investigations may be performed to improve the Conceptual Site Model (CSM).
- TVA's third-party Quality Assurance Program to evaluate groundwater analytical data will be continued and improved using best practices concerning field methods and validation techniques, as well as the application of the most appropriate statistical methods.
- Changes to the monitoring program will be implemented, as needed, to maintain compliance with 40 CFR 257.90 through 257.98.
- The APC groundwater monitoring system may be recertified, if deemed necessary, to reflect the most accurate and up-to-date construction/survey information available for the wells.
- TVA will comply with recordkeeping requirements as specified in 40 CFR 257.105(h), notification requirements specified in 40 CFR 257.106(h), and internet requirements as specified in 40 CFR 257.107(h).
- The next annual groundwater monitoring report, which will address groundwater monitoring activities undertaken in 2021, will be completed in January 2022.

3. Groundwater Monitoring System

GAF is located in north-central Tennessee, just south of Gallatin, Tennessee. The GAF property consists of approximately 1,950 acres of land encompassing the majority of Odoms Bend peninsula. GAF is surrounded by the Cumberland River between approximate river miles 240.5 and 246.

The GAF is a coal-fired steam plant that operates four turbo-generating units. Starting in the early 1970s, fly ash and bottom ash (CCR) were sluiced to the Ash Pond Complex (APC). Water from the APC was directed through a series of stilling ponds (Stilling Ponds B, C, and D), where it was clarified prior to discharge to the Cumberland River under a National Pollution Discharge Elimination System (NPDES) permit. In 2016, TVA converted to a dry ash handling process for fly ash and began trucking the combined fly ash and dry flue gas desulphurization (FGD) product from the newly constructed FGD 'scrubber' units to the newly constructed North Rail Loop (NRL) Landfill. In 2019, TVA completed its conversion to dry handling of bottom ash, and CCR and process waters are no longer routed through the APC. More information related to the history of construction for the CCR units comprising the APC can be found on TVA's publicly accessible CCR Rule website at the following links:

- Ash Pond A, Middle Pond A, and Bottom Ash Pond:
[https://ccr.tva.gov/Plants/GAF/Surface%20Impoundment%20-%20Ash%20Pond%20A/Design%20Criteria/History%20of%20Construction/257-73\(c\)%20History%20of%20Construction_GAF_Ash%20Pond%20A.pdf](https://ccr.tva.gov/Plants/GAF/Surface%20Impoundment%20-%20Ash%20Pond%20A/Design%20Criteria/History%20of%20Construction/257-73(c)%20History%20of%20Construction_GAF_Ash%20Pond%20A.pdf)
- Ash Pond E:
[https://ccr.tva.gov/Plants/GAF/Surface%20Impoundment%20-%20Ash%20Pond%20E/Design%20Criteria/History%20of%20Construction/257-73\(c\)%20History%20of%20Construction_GAF_Ash%20Pond%20E.pdf](https://ccr.tva.gov/Plants/GAF/Surface%20Impoundment%20-%20Ash%20Pond%20E/Design%20Criteria/History%20of%20Construction/257-73(c)%20History%20of%20Construction_GAF_Ash%20Pond%20E.pdf)

GAF is located within the Central Basin Aquifer area of Middle Tennessee. This aquifer system is formed in Devonian to Ordovician-aged carbonates and shales through the erosion of the Nashville Dome. This aquifer system is an important source of drinking water for Central Tennessee, as it supplies most of the rural domestic wells and many public drinking wells in the Central Basin and surrounding region (Brahana and Bradley, 1986). Groundwater in the Central Basin Aquifer system occurs primarily in a shallow flow system of solution channels. These channels are highly irregular in their distribution throughout the solid rock mass and generally occur within 300 feet of the land surface. The solution channels are openings along joints and bedding planes that locally may be enlarged by dissolution of the limestones. These channels represent zones of secondary porosity and permeability in an otherwise nonporous and impermeable rock mass. Bedding planes are thought to be the major control in the formation of solution cavities, which have typically been found to be horizontally elongated (Brahana and Bradley, 1986).

At Gallatin, the Devonian and Silurian formations have eroded, leaving the Ordovician formations present, including (from youngest to oldest), the Hermitage Formation, Carters Limestone, and Lebanon Limestone. The primary bedrock units at GAF that have developed water-bearing zones are the Carters and Lebanon Limestones. Bentonite zones in the Carters Limestone play a significant role in the hydrology of the Central Basin Aquifer system. In areas where the bentonite layers are present, the downward movement of groundwater is restricted. Where the bentonite zones are eroded or otherwise breached by open joints or intersecting stream valleys, solution openings can form in the underlying limestone. Groundwater in these openings can receive recharge from precipitation. In contrast, shale units within the formations comprising the aquifer system typically act as local confining units for groundwater (Brahana and Bradley, 1986).

The Ash Pond Complex multi-unit groundwater monitoring well system contains 23 monitoring wells: 7 background monitoring wells and 16 downgradient monitoring wells. The monitoring well locations are shown on **Figure 1** and monitoring well construction information is provided on **Table 1**.

The background monitoring wells (GAF-412C, GAF-412L, GAF-414L, GAF-426C, GAF-426L, GAF-427C, and GAF-427L) represent conditions unaffected by CCR (40 CFR 257.91 (a)(1) and (c)(1)). Four of the

wells monitor groundwater conditions in the Lebanon Limestone, and three wells monitor groundwater in the shallower Carters Limestone (see **Table 1**). These background wells are not located directly upgradient from the Ash Pond Complex. Per the CCR Rule 257.91(a)(1), establishing background water quality may include sampling of wells that are not hydraulically upgradient of the CCR management unit. In the case of the Ash Pond Complex, for the Carters Limestone, there is no groundwater present in the formation on the upgradient (south) side of the unit; for the Lebanon Limestone, flow is generally away from the ponds in all directions, so there is not an upgradient direction available for monitoring. As a result, it is necessary to use wells that are not directly hydraulically upgradient to establish background conditions. The background wells are hydraulically separated from the Ash Pond Complex by an area of low hydraulic head, so they represent conditions unaffected by CCR.

The downgradient monitoring wells (24, GAF-402C, GAF-402L, GAF-405C, GAF-406L, GAF-410U, GAF-416C, GAF-422C, GAF-446C, GAF-449L, GAF-450C, GAF-450L, GAF-451C/451CR, GAF-452C, GAF-452L, and GAF-453C) monitor groundwater downgradient near the waste boundary (40 CFR 257.91 (a)(2) and (c)(1)). There are ten downgradient monitoring wells completed in the Carters Limestone, five monitoring wells in the Lebanon Limestone, and one monitoring well screened in alluvium/unconsolidated materials (**Table 1**).

The primary target of monitoring is the Carters Limestone, with 10 wells located along the downgradient waste boundary of the unit. At least one well in the Lebanon Limestone on each downgradient side of the unit was also included in the monitoring system, typically paired with Carters wells, or where the first water-bearing zones were encountered in the Lebanon. Groundwater is typically not encountered in overburden in the area of the Ash Pond Complex, but the system does include one overburden well where groundwater was locally encountered.

Due to construction activities in the vicinity of well GAF-451C, the original above-grade well completion was converted to a flush-mount completion in 2018. As the well was then in a high traffic area, TVA installed a potential replacement well in 2019, GAF-451CR. The water levels and baseline samples collected from GAF-451CR (AECOM, 2020b) indicated that the groundwater conditions at this well were similar to GAF-451C and, as a result, it was found to be a suitable replacement for GAF-451C. In 2020, the monitoring well system was modified with GAF-451CR replacing GAF-451C. The construction specifications for well GAF-451CR are included in **Table 1**. The monitoring system was recertified on September 10, 2020 to reflect the well change. The recertification occurred prior to the September Assessment monitoring. Well GAF-451C was appropriately closed on October 14, 2020.

The certification of the groundwater monitoring system required under 40 CFR 257.91(f) is included in the facility operating record and on the facility CCR Rule website:
<https://www.tva.com/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Gallatin>.

4. Groundwater Sampling and Laboratory Analytical Results

The data obtained during the CCR Rule compliance monitoring in 2020 is presented in this section.

4.1 Groundwater Monitoring

Low-flow groundwater sampling and analysis activities were conducted in accordance with the sampling and analysis program developed per 40 CFR 257.93. The specifics of the sampling conducted in 2020 are presented on **Table 2**.

The 2020 semiannual Assessment monitoring events at the Ash Pond Complex took place in April and September. To meet the requirements of 257.95(g)(1)(iii) and (iv), two additional wells were sampled during the Assessment monitoring events (GAF-418L and GAF-454L, see **Figure 1**) to evaluate potential migration off-site to other properties. The wells are located in the downgradient direction at the GAF facility boundary as required by 257.95(g)(1)(iii). The results of this sampling are discussed below (**Section 4.5**).

Verification (confirmation) sampling was conducted in June and November 2020.

4.2 Groundwater Flow

Groundwater levels were measured in each monitoring well prior to well purging/sampling as required by 40 CFR 257.93(c). The water level gauging dates for each event are presented in **Table 2**, and tabulated water level data and calculated hydraulic heads are presented in **Table 3**. **Figure 2** and **Figure 3** present, respectively, maps for the Carters and Lebanon Limestones showing the generalized direction of the hydraulic gradient based on groundwater elevations measured in September 2020. Hydraulic gradients were characterized using the data in **Table 3** in addition to water levels measured in other wells at the site beyond those in the CCR Rule monitoring system.

As part of the environmental investigation conducted under Tennessee Department of Environment and Conservation (TDEC) oversight, dye trace studies have been performed which provide information on groundwater velocities in the vicinity of the Ash Pond Complex. When dye was detected in a potential receptor location, apparent groundwater velocities were calculated. The velocities calculated during the Phase 1 and Phase 2 dye trace studies are presented in **Appendix A**. During the studies, there were dyes introduced at some locations that did not appear to move away from the introduction locations and were not detected at receptor locations. Because the dyes were not detected, apparent velocities could not be calculated, but these results suggest little flow and low velocities in these areas. Overall, the results of both dye trace studies indicated a wide range of groundwater velocities in the vicinity of the APC.

4.3 Sampling Results

Groundwater samples were submitted to TestAmerica Laboratories for analysis. The parameters measured in the field and the laboratory analytical results are presented in **Table 4**. A summary of background concentrations is provided in **Appendix C**, as specified by 257.95(d)(3).

4.4 Statistical Evaluation

Groundwater monitoring at the Ash Pond Complex is currently in the Assessment phase. Concentrations of Appendix IV constituents are compared to Groundwater Protection Standards (GWPSs) to identify Statistically Significant Levels (SSLs) above GWPSs in accordance with 257.95(g). GWPSs were established in 2018 (AECOM, 2019a), and are provided in **Appendix B**.

For each of the 2020 Assessment monitoring events, Appendix IV constituent results were compared to the established GWPSs to identify SSLs in accordance with 257.95(g). Based on recommendations in the USEPA's Unified Guidance (USEPA, 2009), SSLs were identified where there was 95% confidence that the mean concentration of an Appendix IV constituent in a well exceeded the GWPS. Where an individual Assessment monitoring result was greater than the GWPS, upper and lower confidence levels on the mean were calculated using the most recent two years of data at that well (e.g., for September 2020, the data from September 2018 to September 2020 (including any verification results) were used in the calculation). Where verification sampling was performed, the verification result was used in the initial comparison to the GWPS. The identified SSLs for April 2020 are provided on **Table 5**. The September 2020 SSLs are provided on **Table 6**.

The SSLs identified in the 2020 Assessment monitoring are the same as those identified in the 2018 and 2019 monitoring (AECOM, 2020b); there has been no change in 2020. The Ash Pond Complex has been shown not to be the source of the SSLs for cobalt and lithium in wells GAF-450L and GAF-452C, respectively, leaving only one SSL (arsenic in well GAF-410U) to be addressed in the Assessment of Corrective Measures (AECOM, 2020a).

4.5 Downgradient Boundary Wells

As part of the Assessment monitoring for the APC, two additional downgradient boundary wells (GAF-418L, and GAF-454L) were sampled in April and September. The results of the sampling and the comparisons to the established GWPS are provided on **Table 4**. All concentrations of Appendix IV constituents are below the established GWPS at these boundary locations. There is no indication that arsenic (the only remaining constituent with SSLs above GWPSs) is migrating to off-site properties.

4.6 Narrative Discussion of Transition between Monitoring Programs

There has been no change in the status of the monitoring program since the previous Annual Report. In 2020, the Ash Pond Complex was in the Remedy Selection process in accordance with 40 CFR 257.97. In response to the SSL for arsenic in well GAF-410U, TVA prepared an Assessment of Corrective Measures in 2019 and is currently in the remedy selection process.

The groundwater monitoring itself continues to follow the Assessment monitoring requirements of 257.95.

5. Corrective Measures and Remedy Selection

In April 2019, based on the finding of at least one SSL above GWPS in at least one downgradient well that was not attributed to an Alternate Source, TVA issued a notice initiating the Assessment of Corrective Measures in accordance with 257.95. The Assessment of Corrective Measures (AECOM, 2019b) was completed in July 2019 and placed on the publicly accessible CCR Rule website as specified in 257.107: <https://www.tva.com/Environment/Environmental-Stewardship/Coal-Combustion-Residuals/Gallatin>.

The SSLs identified in the 2020 Assessment monitoring are the same as those identified in the 2018 and 2019 monitoring (AECOM, 2020b); there has been no change in 2020. The APC is in the remedy selection process, including semiannual status reporting required by 257.97. Two Semiannual Reports on the Progress of Remedy Selection were completed in 2020, in January and July (AECOM, 2020a; AECOM, 2020c) and were placed on the publicly accessible CCR Rule website as specified in 257.107.

A revised Closure Plan has been prepared for the Ash Pond Complex Multiunit as a result of an agreement between TVA and the Tennessee Department of Environment and Conservation (TDEC) to close the Ash Pond Complex by removing the CCR. This Closure Plan was updated in July 2019 and is available on TVA's CCR Rule Compliance Data and Information website.

Based on conceptual plans, and subject to the completion of all necessary environmental reviews, TVA will close the Ash Pond Complex by following a closure-by-removal approach pursuant to 40 CFR § 257.102(c). Closure activities are anticipated to include pond water level drawdown, CCR dewatering, and CCR excavation and removal. At this time, CCR is expected to be transported and disposed of in an on-site permitted landfill, with the commitment to continue evaluating emerging technologies and best practices for beneficial reuse of CCR in the future.

Consistent with the requirements of 40 CFR § 257.102(c), potentially impacted underlying material will be addressed. Post-excavation surfaces will be graded to promote positive drainage, and permanent vegetation or permanent stabilization will be established.

6. Additional 257.95(g) Requirements

In addition to initiating an Assessment of Corrective Measures, when at least one SSL is found above GWPSs (that cannot be attributed to a source other than the CCR unit), 257.95(g) includes additional actions to be taken by the facility owner. These requirements and TVA's actions were presented in the 2019 Annual Report (AECOM, 2020b). Because there have been no changes (e.g., no additional SSLs or migration off-site), TVA has not taken additional actions related to these requirements in 2020.

257.95(g)(1)(i) – Install additional wells to define the contaminant plume(s):

As described in the Assessment of Corrective Measures (AECOM, 2019b), TVA has been conducting a site-wide environmental investigation since 2016 under oversight by TDEC. One of the objectives of the investigation is to characterize the extent of CCR constituents in environmental media, including groundwater, at GAF. Numerous additional monitoring wells have been installed in the vicinity of the Ash Pond Complex as part of the investigation. The results of the investigation will be provided in an Environmental Assessment Report anticipated to be issued in 2021.

257.95(g)(1)(ii) – Collect data on the nature and estimated quantity of material released

The environmental investigation included characterization of the porewater within the Ash Pond Complex (ash porewater) that would be the source of potential impacts to groundwater. Additional data needed to support remedy selection is discussed in the Assessment of Corrective Measures (AECOM, 2019b).

257.95(g)(1)(iii) – Install and sample at least one well at the downgradient property boundary

Two existing wells (GAF-418L and GAF-454L) located near the northern and northwestern property boundaries are being sampled to meet this requirement. These wells are located downgradient from the northern perimeter of the Ash Pond Complex (**Figures 2 and 3**), and the results of this sampling are discussed above (**Section 4.5**).

The well with the SSL (GAF-410U) is located close to the western downgradient property boundary, so no well further downgradient to the west was installed. Well GAF-446C is located adjacent to GAF-410U (**Figure 1**) and is screened in the underlying Carters Limestone. Data from this well helps define the vertical extent of the arsenic SSL (there is no SSL for arsenic at GAF-446C).

257.95(g)(1)(iv) – Sample wells to characterize nature and extent

The CCR Rule monitoring network plus the additional downgradient wells GAF-418L and GAF-454L will continue to be sampled as part of Assessment monitoring. The results of the 2020 sampling are provided in **Table 4**. Characterization of nature and extent will be part of the Environmental Assessment Report, anticipated to be issued in 2021 (see 257.95(g)(1)(i) above).

257.95(g)(2) – Notify surrounding property owners

Concentrations of arsenic above the GWPS that may be related to the CCR unit do not extend off-site beneath other properties. As a result, off-site property notification is not required.

257.95(g)(3) and (4) – Initiate Assessment of Corrective Measures or Alternate Source Demonstration

TVA initiated the Assessment of Corrective Measures (AECOM, 2019b) in April 2019 and completed an Alternate Source Demonstration in May 2019. The Alternate Source Demonstration is included in Appendix D of the 2019 Annual Report (AECOM, 2020b). The Assessment of Corrective Measures is available on TVA's publicly accessible CCR Rule website.

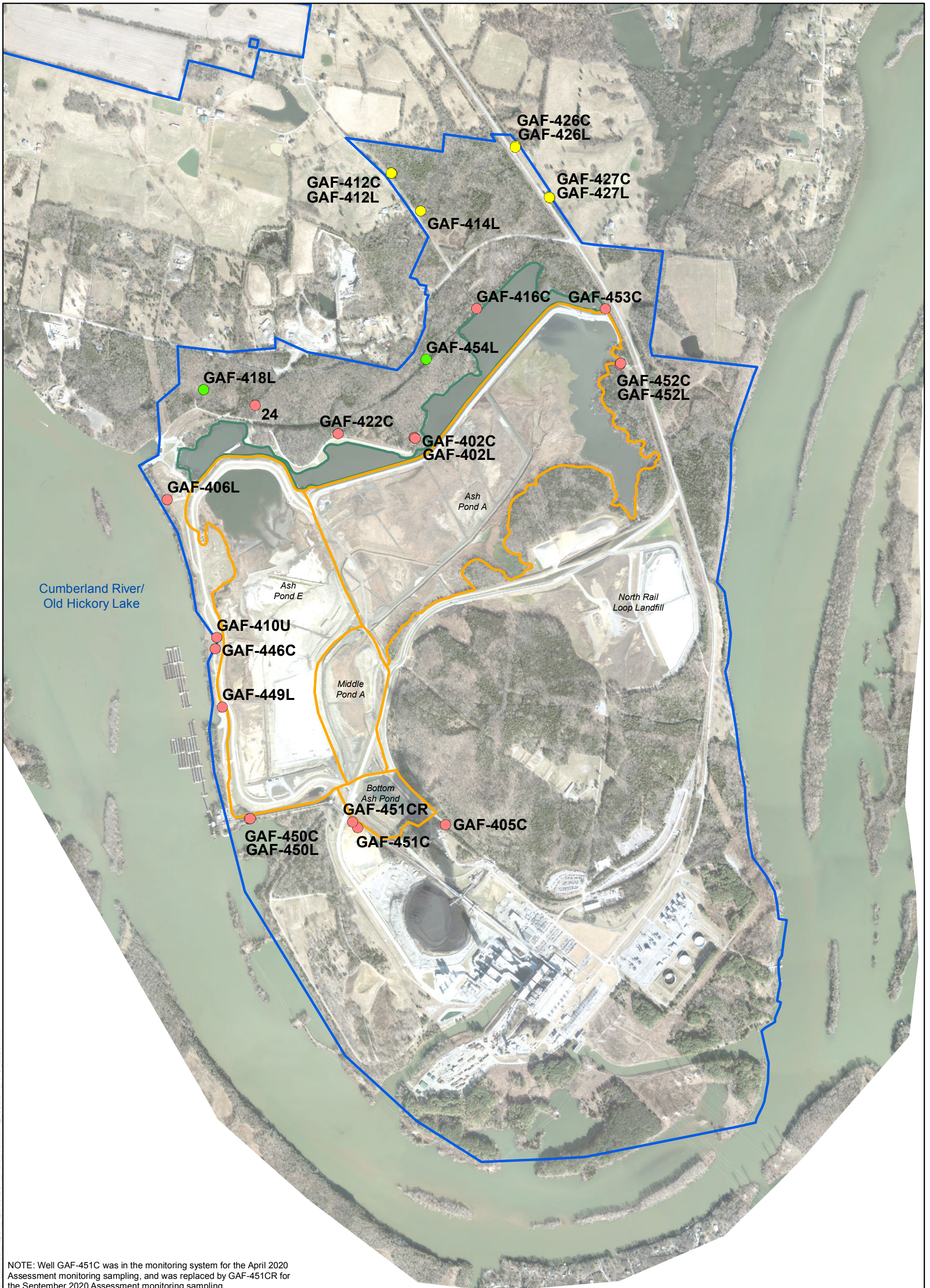
257.95(g)(5) – Closure requirements for unlined surface impoundments

The individual CCR units comprising the Ash Pond Complex are unlined surface impoundments. As noted in the Assessment of Corrective Measures (AECOM, 2019b), TVA has discontinued sending CCR and process flows to the Ash Pond Complex in anticipation of closure. TVA issued a Notification of Intent to Close in July 2019. The Closure Plan was updated in July 2019 and is available on TVA's publicly accessible CCR Rule website.

7. References

- AECOM, 2018. 2017 Annual CCR Rule Groundwater Monitoring Report – Ash Pond Complex, Gallatin Fossil Plant, Gallatin, Tennessee. January 2018.
- AECOM, 2019a. 2018 Annual CCR Rule Groundwater Monitoring Report – Ash Pond Complex, Gallatin Fossil Plant, Gallatin, Tennessee. January 2019.
- AECOM 2019b. Assessment of Corrective Measures Under the CCR Rule – Ash Pond Complex, Gallatin Fossil Plant, Gallatin, Tennessee. July 2019.
- AECOM, 2020a. Semiannual Report on the Progress of Remedy Selection – Ash Pond Complex, Gallatin Fossil Plant, Gallatin, Tennessee. January 2020.
- AECOM, 2020b. 2019 Annual CCR Rule Groundwater Monitoring and Corrective Action Report – Ash Pond Complex, Gallatin Fossil Plant, Gallatin, Tennessee. January 2020.
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- Brahana and Bradley, 1986. *Preliminary Delineation and Description of the Regional Aquifers of Tennessee – The Central Basin Aquifer System*. Prepared by the United States Geological Survey in cooperation with the USEPA. USGS Water Resources Investigations Report 82-4002.
- USEPA, 2009. Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. EPA 530/R-09-007. March 2009.

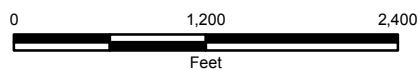
Figures



NOTE: Well GAF-451C was in the monitoring system for the April 2020 Assessment monitoring sampling, and was replaced by GAF-451CR for the September 2020 Assessment monitoring sampling.

LEGEND

- CCR Rule Monitoring System - Downgradient Well
- CCR Rule Monitoring System - Background Well
- Other Monitoring Well
- TVA Gallatin Fossil Plant Property Boundary (Approximate)
- Ash Pond Complex
- Stilling Ponds



AECOM

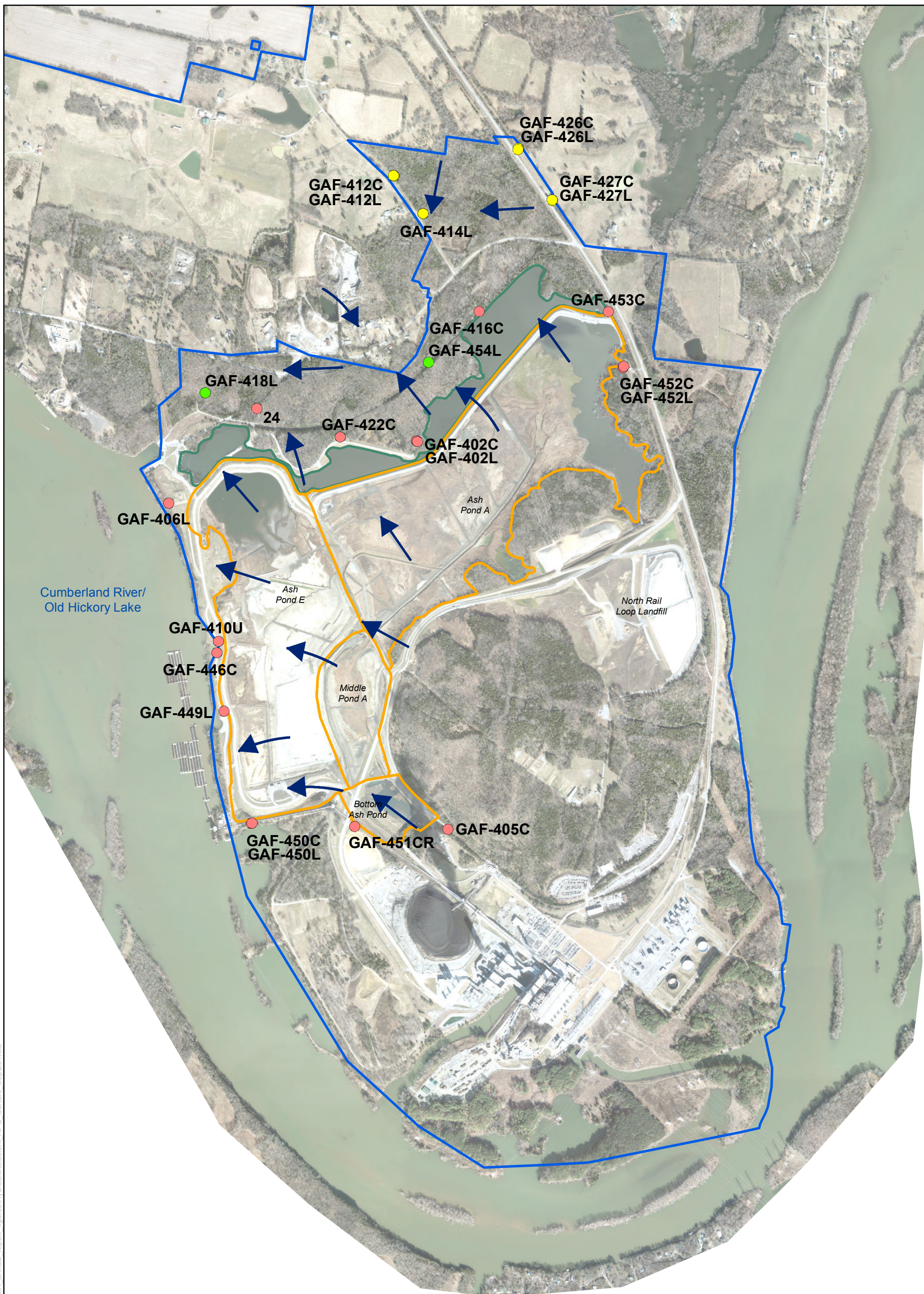
Figure 1

**ASH POND COMPLEX
MONITORING SYSTEM WELLS**

DRAWN BY: CARRIE.SMITH	REVIEWED BY: C.GARLINGTON	APPROVED BY: E.PERRY	REVISION NUMBER: REV. 1
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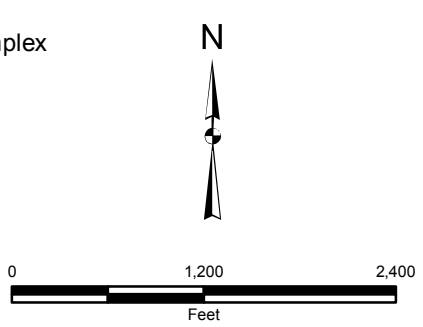
**GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY**

DATE: 12/11/2020	DEPT: FOSSIL AND HYDRO ENGINEERING
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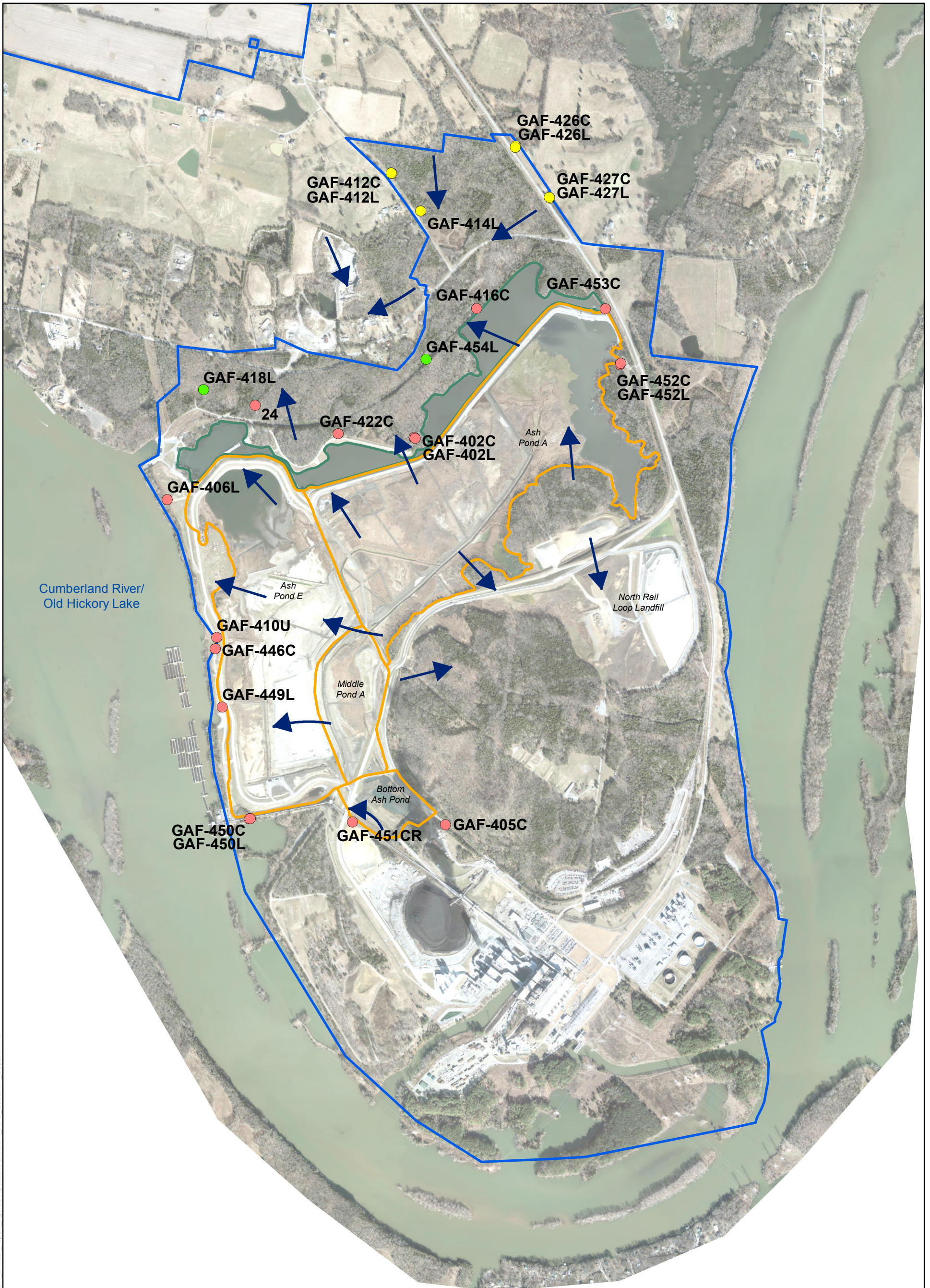
- LEGEND**
- Hydraulic Gradient
 - CCR Rule Monitoring System - Downgradient Well
 - CCR Rule Monitoring System - Background Well
 - Other Monitoring Well
 - TVA Gallatin Fossil Plant Property Boundary (Approximate)
 - Ash Pond Complex
 - Stilling Ponds

NOTE: Aerial image dated February 2017



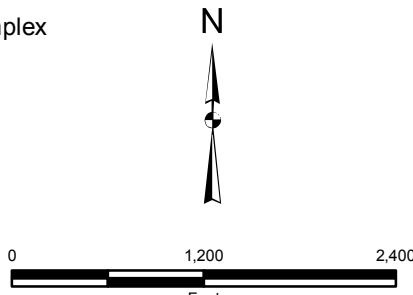
AECOM		Figure 2	
GENERALIZED HYDRAULIC GRADIENTS - CARTERS AQUIFER, SEPTEMBER 14, 2020			
<small>DRAWN BY:</small> CARRIE SMITH	<small>REVIEWED BY:</small> C. GARLINGTON	<small>APPROVED BY:</small> E. PERRY	<small>REVISION NUMBER:</small> REV. 1
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
<small>DATE:</small> 12/14/2020	<small>DEPT:</small> FOSSIL AND HYDRO ENGINEERING		

Document Path: M:\EmuData\2017\TVA_GAF\11.0 GIS\CCR_annual_report_figures\HydraulicGradient_APC_Carters_Sep14_2020.mxd



- LEGEND**
- Hydraulic Gradient
 - CCR Rule Monitoring System - Downgradient Well
 - CCR Rule Monitoring System - Background Well
 - Other Monitoring Well
 - TVA Gallatin Fossil Plant Property Boundary (Approximate)
 - Ash Pond Complex
 - Stilling Ponds

NOTE: Aerial image dated February 2017



AECOM

Figure 3

GENERALIZED HYDRAULIC GRADIENTS - LEBANON AQUIFER, SEPTEMBER 14, 2020

DRAWN BY: CARRIE SMITH	REVIEWED BY: C. GARLINGTON	APPROVED BY: E. PERRY	REVISION NUMBER: REV. 1
GALLATIN FOSSIL PLANT TENNESSEE VALLEY AUTHORITY			
DATE: 12/14/2020	DEPT: FOSSIL AND HYDRO ENGINEERING		

Tables

Table 1
Well Construction Information – Ash Pond Complex (Multi-Unit)
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Well ID	UNID #	Position Relative to CCR Unit	Top of Casing Elevation (ft)	Ground Elevation (ft)	Screened Interval (ft btoc)	Screened Formation	Pump Intake Depth (ft btoc)	Well Diameter (in) / Material	Well Coordinates	
									TN State Plane NAD27 Northing (ft)	TN State Plane NAD27 Easting (ft)
24	GAF-00-GW-43-005	Downgradient	464.13	461.6	19.6 - 29.6	Carters Limestone	25	2-in PVC	707910.94	1878249.28
GAF-402C	GAF-00-GW-43-010	Downgradient	464.03	460.3	18.7 - 28.7	Carters Limestone	24	4-in PVC	707480.95	1880331.92
GAF-402L	GAF-00-GW-43-011	Downgradient	464.93	460.8	75.2 - 85.2	Lebanon Limestone	80	2-in PVC	707495.09	1880320.44
GAF-405C	GAF-00-GW-43-014	Downgradient	486.46	482.7	23.1 - 43.1	Carters Limestone	31	2-in PVC	702448.24	1880731.00
GAF-406L	GAF-00-GW-43-015	Downgradient	471.54	467.5	48.0 - 58.0	Lebanon Limestone	52	2-in PVC	706682.96	1877107.19
GAF-410U	GAF-00-GW-43-017	Downgradient	458.51	455.2	21.8 - 31.8	Unconsolidated	27	2-in PVC	704889.21	1877749.93
GAF-412C	GAF-00-GW-43-018	Background	477.64	473.9	43.7 - 63.7	Carters Limestone	54	4-in PVC	710932.13	1880022.78
GAF-412L	GAF-00-GW-43-019	Background	477.58	473.7	109.9 - 129.9	Lebanon Limestone	123	4-in PVC	710930.63	1880028.39
GAF-414L	GAF-00-GW-43-021	Background	481.45	478.6	92.8 - 102.8	Lebanon Limestone	98	4-in PVC	710439.64	1880406.18
GAF-416C	GAF-00-GW-43-023	Downgradient	466.87	464.2	31.7 - 51.7	Carters Limestone	42	2-in PVC	709169.01	1881134.20
GAF-418L	GAF-00-GW-43-024	Downgradient at Facility Boundary	459.59	455.8	39.3 - 49.3	Lebanon Limestone	44	2-in PVC	708113.61	1877578.56
GAF-422C	GAF-00-GW-43-028	Downgradient	463.78	460.1	20.6 - 35.6	Carters Limestone	28	4-in PVC	707542.84	1879331.41
GAF-426C	GAF-00-GW-43-029	Background	505.58	501.7	39.9 - 59.9	Carters Limestone	57	4-in PVC	711269.23	1881638.95
GAF-426L	GAF-00-GW-43-030	Background	506.83	502.6	176.3 - 186.3	Lebanon Limestone	181	2-in PVC	711283.43	1881641.44
GAF-427C	GAF-00-GW-43-031	Background	489.76	485.7	61.0 - 71.0	Carters Limestone	68	4-in PVC	710615.35	1882082.78
GAF-427L	GAF-00-GW-43-032	Background	488.41	484.2	144.2 - 159.2	Lebanon Limestone	152	4-in PVC	710607.73	1882087.46
GAF-446C	GAF-00-GW-43-034	Downgradient	461.06	457.3	23.8 - 33.8	Carters Limestone	29	4-in PVC	704742.37	1877728.72
GAF-449L	GAF-00-GW-43-036	Downgradient	463.09	458.2	61.3 - 71.3	Lebanon Limestone	66	4-in PVC	703983.12	1877823.34
GAF-450C	GAF-00-GW-43-050	Downgradient	466.73	463.7	51.6 - 56.6	Carters Limestone	53	4-in PVC	702528.72	1878185.59
GAF-450L	GAF-00-GW-43-051	Downgradient	466.62	463.6	78.0 - 98.0	Lebanon Limestone	88	3-in PVC	702526.37	1878175.15
GAF-451C (a)	GAF-00-GW-43-037	Downgradient (Closed)	485.62	486.0	48.8 - 58.8	Carters Limestone	56	4-in PVC	702406.33	1879585.84
GAF-451CR	GAF-00-GW-43-087	Downgradient (Replacement for GAF-451C)	482.19	479.4	46.4 - 56.4	Carters Limestone	52	4-in PVC	702485.62	1879518.52
GAF-452C	GAF-00-GW-43-038	Downgradient	484.13	480.6	102.4 - 112.4	Carters Limestone	107	4-in PVC	708456.68	1883010.70
GAF-452L	GAF-00-GW-43-039	Downgradient	484.31	480.7	159.7 - 169.7	Lebanon Limestone	164	4-in PVC	708439.46	1883003.73
GAF-453C	GAF-00-GW-43-040	Downgradient	467.78	464.2	48.6 - 58.6	Carters Limestone	54	4-in PVC	709164.82	1882811.05
GAF-454L	GAF-00-GW-43-041	Downgradient at Facility Boundary	463.91	460.5	38.9 - 48.9	Lebanon Limestone	44	4-in PVC	708510.76	1880478.89

Notes:
Survey information from DDS Survey; elevation in National Geodetic Vertical Datum (NGVD) 1929, coordinates based on North America Datum (NAD) 1927.
ft btoc - feet below top of casing
in - inches (inside diameter)
(a) As of the 9/2020 re-certification, GAF-451C is no longer part of the certified CCR Rule monitoring system. It is replaced by GAF-451CR.

Table 2
Groundwater Sampling Summary - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Sample Dates	Groundwater Gauging Date	Monitoring Program	Constituents Analyzed	Number of Wells Sampled
April 14-21, 2020	April 13, 2020	Assessment Monitoring (257.95)	Appendix III, Appendix IV, Iron, Manganese, major ions, and field parameters	Background: 7 Downgradient: 17(a) Facility Boundary: 2
June 19, 2020	June 15, 2020	Verification (Confirmation) Sampling (257.94 (e)(2))	Arsenic, Cobalt, Iron, Manganese, and field parameters	Background: 0 Upgradient: 0 Downgradient: 2
September 15-18, 2020	September 14, 2020	Assessment Monitoring (257.95)	Appendix III, Appendix IV, Iron, Manganese, major ions, and field parameters	Background: 7 Downgradient: 16 Facility Boundary: 2
November 12, 2020	November 12, 2020	Verification (Confirmation) Sampling (257.94 (e)(2))	Arsenic, and field parameters	Background: 0 Upgradient: 0 Downgradient: 1

Notes:

Appendix III Constituents: Boron, Calcium, Chloride, Fluoride, pH, Sulfate, Total Dissolved Solids (TDS)

Appendix IV Constituents: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Fluoride, Lead, Lithium, Mercury, Molybdenum, Radium 226 + 228, Selenium, Thallium

(a) Both monitoring wells GAF-451C and GAF-451CR were sampled in the April Assessment monitoring event

Table 3
Groundwater Elevation Summary - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Gauging Date	4/13/2020			6/15/2020		
Well ID	Reference Elevation (ft AMSL)	Water Level Measurement (ft)	Hydraulic Head (ft AMSL)	Reference Elevation (ft AMSL)	Water Level Measurement (ft)	Hydraulic Head (ft AMSL)
24	464.13	14.65	449.48	464.13	19.06	445.07
GAF-402C	464.03	9.75	454.28	464.03	15.73	448.30
GAF-402L	464.93	11.98	452.95	464.93	16.67	448.26
GAF-405C	486.46	3.38	483.08	486.46	6.59	479.87
GAF-406L	471.54	24.76	446.78	471.54	26.47	445.07
GAF-410U	458.51	2.60	455.91	458.51	4.98	453.53
GAF-412C	477.64	24.05	453.59	477.64	31.41	446.23
GAF-412L	477.58	23.66	453.92	477.58	27.12	450.46
GAF-414L	481.45	27.41	454.04	481.45	34.38	447.07
GAF-416C	466.87	14.25	452.62	466.87	21.10	445.77
GAF-418L	459.59	10.85	448.74	459.59	14.73	444.86
GAF-422C	463.78	13.85	449.93	463.78	18.79	444.99
GAF-426C	505.58	33.78	471.80	505.58	42.42	463.16
GAF-426L	506.83	42.25	464.58	506.83	49.00	457.83
GAF-427C	489.76	31.97	457.79	489.76	43.55	446.21
GAF-427L	488.41	28.04	460.37	488.41	36.89	451.52
GAF-446C	461.06	5.43	455.63	461.06	7.82	453.24
GAF-449L	463.09	7.07	456.02	463.09	10.24	452.85
GAF-450C	466.73	18.25	448.48	466.73	20.12	446.61
GAF-450L	466.62	14.33	452.29	466.62	16.21	450.41
GAF-451C	485.62	8.05	477.57	485.62	9.14	476.48
GAF-451CR	482.19	5.78	476.41	482.19	7.21	474.98
GAF-452C	484.13	25.82	458.31	484.13	29.47	454.66
GAF-452L	484.31	26.01	458.30	484.31	29.60	454.71
GAF-453C	467.78	8.51	459.27	467.78	13.85	453.93
GAF-454L	463.91	8.89	455.02	463.91	18.89	445.02
Surface Water ID						
CUMBERLAND RIVER (a)	NA	NA	> 446.74	NA	NA	444.98

Notes:

AMSL - above mean sea level

ft - feet

NA - Not applicable or data not available

(a) Data downloaded from TVA's iSite Central Database

Table 3
Groundwater Elevation Summary - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Gauging Date	9/14/2020			11/12/2020		
Well ID	Reference Elevation (ft AMSL)	Water Level Measurement (ft)	Hydraulic Head (ft AMSL)	Reference Elevation (ft AMSL)	Water Level Measurement (ft)	Hydraulic Head (ft AMSL)
24	464.13	16.92	447.21	464.13	19.73	444.40
GAF-402C	464.03	12.04	451.99	464.03	16.27	447.76
GAF-402L	464.93	14.07	450.86	464.93	17.14	447.79
GAF-405C	486.46	3.29	483.17	486.46	6.45	480.01
GAF-406L	471.54	25.03	446.51	471.54	27.08	444.46
GAF-410U	458.51	3.14	455.37	458.51	5.06	453.45
GAF-412C	477.64	26.64	451.00	477.64	31.77	445.87
GAF-412L	477.58	25.20	452.38	477.58	27.25	450.33
GAF-414L	481.45	30.87	450.58	481.45	34.73	446.72
GAF-416C	466.87	14.33	452.54	466.87	21.92	444.95
GAF-418L	459.59	13.70	445.89	459.59	15.20	444.39
GAF-422C	463.78	15.54	448.24	463.78	19.27	444.51
GAF-426C	505.58	38.69	466.89	505.58	45.23	460.35
GAF-426L	506.83	47.00	459.83	506.83	51.72	455.11
GAF-427C	489.76	36.11	453.65	489.76	44.46	445.30
GAF-427L	488.41	33.62	454.79	488.41	39.99	448.42
GAF-446C	461.06	5.95	455.11	461.06	7.82	453.24
GAF-449L	463.09	8.14	454.95	463.09	10.45	452.64
GAF-450C	466.73	18.85	447.88	466.73	20.05	446.68
GAF-450L	466.62	14.61	452.01	466.62	15.90	450.72
GAF-451C	NA	NA	NA	NA	NA	NA
GAF-451CR	482.19	6.53	475.66	482.19	8.52	473.67
GAF-452C	484.13	28.65	455.48	484.13	30.42	453.71
GAF-452L	484.31	28.75	455.56	484.31	30.52	453.79
GAF-453C	467.78	12.53	455.25	467.78	15.77	452.01
GAF-454L	463.91	15.22	448.69	463.91	19.00	444.91
Surface Water ID						
CUMBERLAND RIVER (a)	NA	NA	445.68	NA	NA	444.42

Notes:

AMSL - above mean sea level

ft - feet

NA - Not applicable or data not available

(a) Data downloaded from TVA's iSite Central Database

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			24	24	GAF-402C	GAF-402C	GAF-402C
Sample Date			4/14/2020	9/15/2020	4/14/2020	4/14/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-24-04142020	GAF-GW-24-09152020	GAF-GW-402C-04142020	GAF-GW-903B-04142020	GAF-GW-402C-09152020
Sample Type			N	N	N	FD	N
Analyte	CAS	Units	Result	Result	Result	Result	Result
Field Parameters							
Dissolved Oxygen	DO	MG/L	3.11	1.12	0.40	--	0.98
ORP	ORP	MV	152.9	153.6	39.9	--	96.5
pH, Field	PHFLD	pH units	6.84	6.57	7.18	--	6.97
Specific Conductance, Field	CONDSPECFLD	umhos/cm	890	1785	516.9	--	551
Temperature	TEMP	deg c	13.3	15.5	13.9	--	16.8
Turbidity, field	TURB-FIELD	NTU	1.25	0.23	2.20	--	0.45
General Chemistry							
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	286	329	188	189	181
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	286	329	188	189	181
Total Dissolved Solids	TDS	MG/L	566	706	298	304	388
Chloride	16887-00-6	MG/L	0.692 J	0.809 J	1.57	1.60	4.57
Fluoride	16984-48-8	MG/L	0.0454 U*	0.0437 J	0.199 U*	0.192 U*	0.230
Sulfate	14808-79-8	MG/L	178	255	64.4	64.1	107
Metals, Total							
Antimony	7440-36-0	MG/L	0.000378 U	0.000378 U	0.000378 U	0.000378 U	0.000378 U
Arsenic	7440-38-2	MG/L	0.000313 U	0.000313 U	0.000712 J	0.000739 J	0.00295
Barium	7440-39-3	MG/L	0.00887 J	0.0123	0.0497	0.0512	0.0834
Beryllium	7440-41-7	MG/L	0.000182 U	0.000260 U*	0.000182 U	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.0570 U*	0.0978 U*	0.246 U*	0.253	0.530
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	178	214	92.8	96.4	93.1
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000134 U	0.000134 U	0.000181 J	0.000172 J	0.000832
Iron	7439-89-6	MG/L	0.0195 U	0.0195 U	0.197	0.211	0.178
Lead	7439-92-1	MG/L	0.000148 U*	0.000128 U	0.000128 U	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.00339 U	0.00339 U	0.00339 U	0.00339 U	0.00339 U
Magnesium	7439-95-4	MG/L	6.70	8.26	5.73	6.04	7.34
Manganese	7439-96-5	MG/L	0.936	0.472	0.248	0.228	1.73
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00279 J	0.00243 J	0.0110	0.0112	0.0224
Potassium	7440-09-7	MG/L	0.799	0.939	2.71	2.94	1.96
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	1.02	1.29	5.67	6.01	9.02
Thallium	7440-28-0	MG/L	0.000237 U*	0.000208 U*	0.000148 U	0.000148 U	0.000148 U
Radiological							
Radium 226 + Radium 228	RA226/228	pCi/L	0.477 U	0.195 U	0.0188 U	0.0463 U	0.236 U
Radium 228	15262-20-1	pCi/L	0.454 U	-0.0678 U	-0.0885 U	-0.0192 U	0.0898 U
Radium-226	13982-63-3	pCi/L	0.0234 U	0.195 U	0.0188 U	0.0463 U	0.146 U

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			24	24	GAF-402C	GAF-402C	GAF-402C
Sample Date			4/14/2020	9/15/2020	4/14/2020	4/14/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-24-04142020	GAF-GW-24-09152020	GAF-GW-402C-04142020	GAF-GW-903B-04142020	GAF-GW-402C-09152020
Sample Type			N	N	N	FD	N
Analyte	CAS	Units	Result	Result	Result	Result	Result
Metals, Dissolved							
Antimony	7440-36-0	MG/L	--	--	--	--	--
Arsenic	7440-38-2	MG/L	--	--	--	--	--
Barium	7440-39-3	MG/L	--	--	--	--	--
Beryllium	7440-41-7	MG/L	--	--	--	--	--
Boron	7440-42-8	MG/L	--	--	--	--	--
Cadmium	7440-43-9	MG/L	--	--	--	--	--
Calcium	7440-70-2	MG/L	--	--	--	--	--
Chromium	7440-47-3	MG/L	--	--	--	--	--
Cobalt	7440-48-4	MG/L	--	--	--	--	--
Iron	7439-89-6	MG/L	--	--	--	--	--
Lead	7439-92-1	MG/L	--	--	--	--	--
Lithium	7439-93-2	MG/L	--	--	--	--	--
Magnesium	7439-95-4	MG/L	--	--	--	--	--
Manganese	7439-96-5	MG/L	--	--	--	--	--
Mercury	7439-97-6	MG/L	--	--	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	--	--	--
Potassium	7440-09-7	MG/L	--	--	--	--	--
Selenium	7782-49-2	MG/L	--	--	--	--	--
Sodium	7440-23-5	MG/L	--	--	--	--	--
Thallium	7440-28-0	MG/L	--	--	--	--	--
Radiological Dissolved							
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-402L	GAF-402L	GAF-402L	GAF-405C	GAF-405C
Sample Date			4/14/2020	9/15/2020	9/15/2020	4/16/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-402L-04142020	GAF-GW-402L-09152020	GAF-GW-903A-09152020	GAF-GW-405C-04162020	GAF-GW-405C-09152020
Sample Type			N	N	FD	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result
Field Parameters							
Dissolved Oxygen	DO	MG/L	0.29	0.21	--	0.38	0.14
ORP	ORP	MV	-82.9	-62.3	--	71.1	58.1
pH, Field	PHFLD	pH units	7.26	7.10	--	6.73	6.89
Specific Conductance, Field	CONDSPECFLD	umhos/cm	608	647	--	777	727
Temperature	TEMP	deg c	15.5	16.6	--	17.1	19.8
Turbidity, field	TURB-FIELD	NTU	29.1	5.21	--	21.3	20.4
General Chemistry							
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	217	228	239	234	275
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	217	228	239	234	275
Total Dissolved Solids	TDS	MG/L	426	373	373	521	502
Chloride	16887-00-6	MG/L	14.2	14.6	14.1	5.94	8.26
Fluoride	16984-48-8	MG/L	0.292	0.304	0.294	0.151 U*	0.133
Sulfate	14808-79-8	MG/L	61.6	79.3	77.3	149	135
Metals, Total							
Antimony	7440-36-0	MG/L	0.000378 U	0.000378 U	0.000378 U	0.000378 U	0.000378 U
Arsenic	7440-38-2	MG/L	0.00136	0.00173	0.00140	0.000399 J	0.000534 J
Barium	7440-39-3	MG/L	0.257	0.299	0.300	0.0587	0.0679
Beryllium	7440-41-7	MG/L	0.000182 U	0.000254 U*	0.000182 U	0.000182 U	0.000188 U*
Boron	7440-42-8	MG/L	0.234 U*	0.387 J	0.283 J	0.0683 U*	0.109 U*
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	80.1	85.3	85.6	146	143
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000404 J	0.000294 J	0.000289 J	0.000134 U	0.000263 J
Iron	7439-89-6	MG/L	1.26	0.974	0.939	0.931	1.45
Lead	7439-92-1	MG/L	0.000621 U*	0.000195 J	0.000159 J	0.00168	0.00227
Lithium	7439-93-2	MG/L	0.00909 U*	0.0102	0.0100	0.00556 U*	0.00339 U
Magnesium	7439-95-4	MG/L	21.9	24.4	24.7	11.0	12.8
Manganese	7439-96-5	MG/L	0.226	0.295	0.303	0.0642	0.286
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00398 J	0.00518	0.00527	0.000610 U	0.000610 U
Potassium	7440-09-7	MG/L	2.92	2.47	2.48	1.31	1.99
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	15.1	15.8	16.1	7.06	9.26
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U*	0.000148 U	0.000148 U	0.000148 U
Radiological							
Radium 226 + Radium 228	RA226/228	pCi/L	0.370 J	0.952 J	0.657 U*	0.278 UJ	3.22
Radium 228	15262-20-1	pCi/L	0.215 U	0.544	0.388 U	0.210 U	2.05
Radium-226	13982-63-3	pCi/L	0.155	0.407 U*	0.269 U*	0.0679 UJ	1.18

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-402L	GAF-402L	GAF-402L	GAF-405C	GAF-405C
Sample Date			4/14/2020	9/15/2020	9/15/2020	4/16/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-402L-04142020	GAF-GW-402L-09152020	GAF-GW-903A-09152020	GAF-GW-405C-04162020	GAF-GW-405C-09152020
Sample Type			N	N	FD	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result
Metals, Dissolved							
Antimony	7440-36-0	MG/L	0.000378 U	0.000378 U	0.000378 U	0.000645 U*	0.000378 U
Arsenic	7440-38-2	MG/L	0.00120	0.00148	0.00139	0.000313 U	0.000313 U
Barium	7440-39-3	MG/L	0.261	0.300	0.306	0.0567	0.0636
Beryllium	7440-41-7	MG/L	0.000182 U	0.000191 U*	0.000182 U	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.258	0.283 U*	0.260 U*	0.0701 J	0.105 U*
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	82.9	84.0	84.5	144	141
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000255 J	0.000248 J	0.000249 J	0.000134 U	0.000141 J
Iron	7439-89-6	MG/L	0.747	0.910	0.892	0.190	0.152
Lead	7439-92-1	MG/L	0.000128 U	0.000128 U	0.000128 U	0.000318 J	0.000267 J
Lithium	7439-93-2	MG/L	0.00921	0.00982	0.0100	0.00877 U*	0.00339 U
Magnesium	7439-95-4	MG/L	23.0	25.2	25.3	10.8	12.8
Manganese	7439-96-5	MG/L	0.236	0.260	0.260	0.0530	0.266
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00451 J	0.00440 J	0.00452 J	0.000610 U	0.000610 U
Potassium	7440-09-7	MG/L	2.94	2.59	2.59	1.37	2.00
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	15.8	15.4	15.3	7.08	9.26
Thallium	7440-28-0	MG/L	0.000191 J	0.000148 U	0.000148 U	0.000148 U	0.000148 U
Radiological Dissolved							
Radium 226 + Radium 228	RA226/228	pCi/L	0.304 J	1.07 J	0.886 U*	0.120 U	0.651 U*
Radium 228	15262-20-1	pCi/L	0.113 U	0.254 U	0.265 U	0.0340 U	0.151 U
Radium-226	13982-63-3	pCi/L	0.191	0.821 J	0.621 U*	0.0863 U	0.500 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-406L	GAF-406L	GAF-406L	GAF-406L	GAF-410U	GAF-410U
Sample Date			4/15/2020	4/15/2020	9/15/2020	9/15/2020	4/16/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-406L-04152020	GAF-GW-903B-04152020	GAF-GW-406L-09152020	GAF-GW-903C-09152020	GAF-GW-410U-04162020	GAF-GW-410U-09152020
Sample Type			N	FD	N	FD	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Field Parameters								
Dissolved Oxygen	DO	MG/L	0.15	--	2.08	--	0.17	0.29
ORP	ORP	MV	39.1	--	98.1	--	-90.8	-75.1
pH, Field	PHFLD	pH units	6.97	--	6.89	--	6.71	6.85
Specific Conductance, Field	CONDSPECFLD	umhos/cm	703	--	806	--	673	656
Temperature	TEMP	deg c	16.8	--	18.4	--	16.3	21.4
Turbidity, field	TURB-FIELD	NTU	4.22	--	3.66	--	3.88	0.23
General Chemistry								
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	236	240	251	246	233	248
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	236	240	251	246	233	248
Total Dissolved Solids	TDS	MG/L	547	550	604	585	475	447
Chloride	16887-00-6	MG/L	4.28	4.26	5.74	5.65	6.23	6.65
Fluoride	16984-48-8	MG/L	0.127 U*	0.120 U*	0.0984 J	0.0931 J	0.137 U*	0.112
Sulfate	14808-79-8	MG/L	191	194	209	202	88.0	98.2
Metals, Total								
Antimony	7440-36-0	MG/L	0.00145 U*	0.00193 U*	0.000378 U	0.000378 U	0.000819 U*	0.000378 U
Arsenic	7440-38-2	MG/L	0.000407 J	0.000502 J	0.000313 U	0.000313 U	0.0339	0.0263
Barium	7440-39-3	MG/L	0.0354	0.0362	0.0358	0.0351	0.0625	0.0663
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000441 U*
Boron	7440-42-8	MG/L	0.341	0.320	0.317	0.314	8.28	7.58
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	164	166	170	167	94.7	99.0
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000177 J	0.000181 J	0.000140 J	0.000145 J	0.00131	0.00146
Iron	7439-89-6	MG/L	0.118	0.125	0.0851	0.0883	2.65	2.75
Lead	7439-92-1	MG/L	0.000305 U*	0.000346 U*	0.000255 J	0.000254 J	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.0100 U*	0.00839 U*	0.00339 U	0.00339 U	0.0137 U*	0.00339 U
Magnesium	7439-95-4	MG/L	9.72	9.78	9.99	9.89	5.00	5.48
Manganese	7439-96-5	MG/L	0.287	0.286	0.147	0.144	5.00	5.83
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00181 J	0.00182 J	0.00153 J	0.00150 J	0.0576	0.0495
Potassium	7440-09-7	MG/L	2.62	2.66	2.20	2.12	1.56 U	1.99
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	7.78	7.86	8.22	8.14	44.2	43.1
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000366 U*
Radiological								
Radium 226 + Radium 228	RA226/228	pCi/L	0.505 U*	0.258 U*	1.10 U*	0.478 U	0.339 U	0.748 U*
Radium 228	15262-20-1	pCi/L	0.349 U	0.0208 U	0.253 U	0.361 U	0.327 U	0.237 U
Radium-226	13982-63-3	pCi/L	0.156 U*	0.237 U*	0.848 U*	0.117 U	0.0123 U	0.512 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-406L	GAF-406L	GAF-406L	GAF-406L	GAF-410U	GAF-410U
Sample Date			4/15/2020	4/15/2020	9/15/2020	9/15/2020	4/16/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-406L-04152020	GAF-GW-903B-04152020	GAF-GW-406L-09152020	GAF-GW-903C-09152020	GAF-GW-410U-04162020	GAF-GW-410U-09152020
Sample Type			N	FD	N	FD	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Metals, Dissolved								
Antimony	7440-36-0	MG/L	--	--	--	--	--	--
Arsenic	7440-38-2	MG/L	--	--	--	--	--	--
Barium	7440-39-3	MG/L	--	--	--	--	--	--
Beryllium	7440-41-7	MG/L	--	--	--	--	--	--
Boron	7440-42-8	MG/L	--	--	--	--	--	--
Cadmium	7440-43-9	MG/L	--	--	--	--	--	--
Calcium	7440-70-2	MG/L	--	--	--	--	--	--
Chromium	7440-47-3	MG/L	--	--	--	--	--	--
Cobalt	7440-48-4	MG/L	--	--	--	--	--	--
Iron	7439-89-6	MG/L	--	--	--	--	--	--
Lead	7439-92-1	MG/L	--	--	--	--	--	--
Lithium	7439-93-2	MG/L	--	--	--	--	--	--
Magnesium	7439-95-4	MG/L	--	--	--	--	--	--
Manganese	7439-96-5	MG/L	--	--	--	--	--	--
Mercury	7439-97-6	MG/L	--	--	--	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	--	--	--	--
Potassium	7440-09-7	MG/L	--	--	--	--	--	--
Selenium	7782-49-2	MG/L	--	--	--	--	--	--
Sodium	7440-23-5	MG/L	--	--	--	--	--	--
Thallium	7440-28-0	MG/L	--	--	--	--	--	--
Radiological Dissolved								
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	--	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	--	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	--	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-412C	GAF-412C	GAF-412L	GAF-412L	GAF-414L	GAF-414L
Sample Date			4/15/2020	9/16/2020	4/16/2020	9/16/2020	4/16/2020	9/16/2020
Well Location			Background	Background	Background	Background	Background	Background
Sample ID			GAF-GW-412C-04152020	GAF-GW-412C-09162020	GAF-GW-412L-04162020	GAF-GW-412L-09162020	GAF-GW-414L-04162020	GAF-GW-414L-09162020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Field Parameters								
Dissolved Oxygen	DO	MG/L	0.39	0.01	0.18	0.48	0.29	0.01
ORP	ORP	MV	24.2	-94.1	-251.0	-276.5	-125.8	-136.9
pH, Field	PHFLD	pH units	6.81	6.94	8.30	8.04	7.34	7.53
Specific Conductance, Field	CONDSPECFLD	umhos/cm	514	690	627	730	880	900
Temperature	TEMP	deg c	16.3	17.7	13.9	17.5	14.5	15.7
Turbidity, field	TURB-FIELD	NTU	8.59	1.41	1.97	3.93	1.57	0.28
General Chemistry								
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	274	332	241	291	250	298
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	274	332	241	291	250	298
Total Dissolved Solids	TDS	MG/L	359	425	356	543	638	660
Chloride	16887-00-6	MG/L	3.65	4.38	29.3	59.9	110	125
Fluoride	16984-48-8	MG/L	0.182 U*	0.176	1.36	1.43	0.540	0.653
Sulfate	14808-79-8	MG/L	38.3	46.7	22.4	27.0	8.85	17.9
Metals, Total								
Antimony	7440-36-0	MG/L	0.000378 U	0.000378 U	0.000908 U*	0.000378 U	0.000378 U	0.000378 U
Arsenic	7440-38-2	MG/L	0.000313 U	0.000335 J	0.000929 J	0.000313 U	0.000401 J	0.000468 J
Barium	7440-39-3	MG/L	0.0972	0.137	0.145	0.272	0.303	0.341
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.0386 U	0.0455 J	0.261	0.278	0.180 U*	0.183
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	103	133	22.1	30.0	61.7	65.9
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000134 U	0.000242 J	0.000134 U	0.000134 U	0.000134 U	0.000134 U
Iron	7439-89-6	MG/L	0.185	0.753	0.0195 U	0.0195 U	0.629	1.14
Lead	7439-92-1	MG/L	0.000136 U*	0.000128 U	0.000128 U	0.000128 U	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.00500 U*	0.00688	0.134	0.130	0.0798	0.0725
Magnesium	7439-95-4	MG/L	9.14	15.3	16.3	18.1	25.8	27.2
Manganese	7439-96-5	MG/L	0.0645	0.239	0.000959 U*	0.00214 J	0.00548 U*	0.0102
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.000610 U	0.000610 U	0.00111 J	0.000610 U	0.000610 U	0.000610 U
Potassium	7440-09-7	MG/L	1.02	1.45	31.6	13.5	1.97	2.33
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	4.31	7.03	85.2	113	91.0	97.0
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000342 J	0.000148 U	0.000297 J	0.000148 U
Radiological								
Radium 226 + Radium 228	RA226/228	pCi/L	0.152 U*	0.648 U	0.579 J	0.730 U*	0.361 U*	0.636 U*
Radium 228	15262-20-1	pCi/L	-0.0574 U	0.452 U	0.237 U	0.287 U	0.183 U	0.0780 U
Radium-226	13982-63-3	pCi/L	0.152 U*	0.196 U	0.342	0.444 U*	0.178 U*	0.557 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-412C	GAF-412C	GAF-412L	GAF-412L	GAF-414L	GAF-414L
Sample Date			4/15/2020	9/16/2020	4/16/2020	9/16/2020	4/16/2020	9/16/2020
Well Location			Background	Background	Background	Background	Background	Background
Sample ID			GAF-GW-412C-04152020	GAF-GW-412C-09162020	GAF-GW-412L-04162020	GAF-GW-412L-09162020	GAF-GW-414L-04162020	GAF-GW-414L-09162020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Metals, Dissolved								
Antimony	7440-36-0	MG/L	0.000378 U	--	--	--	--	--
Arsenic	7440-38-2	MG/L	0.000313 U	--	--	--	--	--
Barium	7440-39-3	MG/L	0.0869	--	--	--	--	--
Beryllium	7440-41-7	MG/L	0.000182 U	--	--	--	--	--
Boron	7440-42-8	MG/L	0.0386 U	--	--	--	--	--
Cadmium	7440-43-9	MG/L	0.000217 U	--	--	--	--	--
Calcium	7440-70-2	MG/L	111	--	--	--	--	--
Chromium	7440-47-3	MG/L	0.00153 U	--	--	--	--	--
Cobalt	7440-48-4	MG/L	0.000134 U	--	--	--	--	--
Iron	7439-89-6	MG/L	0.0679	--	--	--	--	--
Lead	7439-92-1	MG/L	0.000128 U	--	--	--	--	--
Lithium	7439-93-2	MG/L	0.00441 U*	--	--	--	--	--
Magnesium	7439-95-4	MG/L	9.74	--	--	--	--	--
Manganese	7439-96-5	MG/L	0.0690	--	--	--	--	--
Mercury	7439-97-6	MG/L	0.000130 U	--	--	--	--	--
Molybdenum	7439-98-7	MG/L	0.000610 U	--	--	--	--	--
Potassium	7440-09-7	MG/L	1.14	--	--	--	--	--
Selenium	7782-49-2	MG/L	0.00151 U	--	--	--	--	--
Sodium	7440-23-5	MG/L	4.71	--	--	--	--	--
Thallium	7440-28-0	MG/L	0.000148 U	--	--	--	--	--
Radiological Dissolved								
Radium 226 + Radium 228	RA226/228	pCi/L	0.185 U	--	--	--	--	--
Radium 228	15262-20-1	pCi/L	0.0888 U	--	--	--	--	--
Radium-226	13982-63-3	pCi/L	0.0963 U	--	--	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-416C	GAF-416C	GAF-418L	GAF-418L	GAF-422C	GAF-422C	GAF-422C
Sample Date			4/15/2020	9/15/2020	4/14/2020	9/15/2020	4/15/2020	6/19/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient at Facility Boundary	Downgradient at Facility Boundary	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-416C-04152020	GAF-GW-416C-09152020	GAF-GW-418L-04142020	GAF-GW-418L-09152020	GAF-GW-422C-04152020	GAF-GW-422C-06192020	GAF-GW-422C-09152020
Sample Type			N	N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result	Result
Field Parameters									
Dissolved Oxygen	DO	MG/L	0.18	0.11	0.33	1.07	0.16	0.93	0.44
ORP	ORP	MV	-41.0	3.9	47.9	36.9	-58.2	18.3	-34.2
pH, Field	PHFLD	pH units	7.19	6.99	6.90	6.71	6.86	7.07	7.62
Specific Conductance, Field	CONDSPECFLD	umhos/cm	351	747	830	1568	1181	890	1053
Temperature	TEMP	deg c	16.4	18.9	13.7	15.6	14.7	15.8	17.0
Turbidity, field	TURB-FIELD	NTU	49.2	3.49	4.08	2.36	16.8	4.51	4.62
General Chemistry									
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	--	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	171	173	259	281	220	--	250
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	171	173	259	281	220	--	250
Total Dissolved Solids	TDS	MG/L	244	286	552	609	873	--	772
Chloride	16887-00-6	MG/L	3.10	4.23	1.44	1.90	2.81	--	3.33
Fluoride	16984-48-8	MG/L	0.189 U*	0.174	0.0838 U*	0.0581 J	0.233	--	0.211
Sulfate	14808-79-8	MG/L	28.0	36.0	170	195	412	--	304
Metals, Total									
Antimony	7440-36-0	MG/L	0.000742 U*	0.000378 U	0.000456 U*	0.000378 U	0.00108 U*	--	0.000378 U
Arsenic	7440-38-2	MG/L	0.00173	0.00238	0.000440 J	0.000359 J	0.00338	--	0.00211
Barium	7440-39-3	MG/L	0.0508	0.0540	0.0296	0.0343	0.0437	--	0.0428
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U	--	0.000182 U
Boron	7440-42-8	MG/L	0.369	0.435	0.0477 U*	0.0812 U*	0.459	--	0.410
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	--	0.000217 U
Calcium	7440-70-2	MG/L	70.2	68.2	166	184	255	--	204
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	--	0.00153 U
Cobalt	7440-48-4	MG/L	0.000424 J	0.000387 J	0.000879	0.00120	0.00806	0.00245	0.00184
Iron	7439-89-6	MG/L	0.195	0.213	0.162	0.393	10.6	4.36	2.41
Lead	7439-92-1	MG/L	0.000252 U*	0.000128 U	0.000152 U*	0.000128 U	0.000128 U	--	0.000128 U
Lithium	7439-93-2	MG/L	0.00709 U*	0.00339 U	0.00339 U	0.00339 U	0.00816 U*	--	0.00339 U
Magnesium	7439-95-4	MG/L	5.72	5.91	7.26	8.60	12.9	--	10.4
Manganese	7439-96-5	MG/L	2.79	2.88	1.50	2.68	2.19	1.26	1.04
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	--	0.000130 U
Molybdenum	7439-98-7	MG/L	0.0475	0.0493	0.000689 J	0.00156 J	0.0191	--	0.0266
Potassium	7440-09-7	MG/L	2.74	2.48	2.52	1.56	3.05	--	2.45
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	--	0.00151 U
Sodium	7440-23-5	MG/L	6.66	9.00	5.04	4.22	5.86	--	8.83
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000148 U	--	0.000148 U
Radiological									
Radium 226 + Radium 228	RA226/228	pCi/L	0.181 U	0.517 U*	0.0206 U	0.427 U*	0.172 U	--	0.629 U*
Radium 228	15262-20-1	pCi/L	0.122 U	0.242 U	-0.211 U	0.180 U	0.0584 U	--	0.220 U
Radium-226	13982-63-3	pCi/L	0.0591 U	0.274 U*	0.0206 U	0.247 U*	0.114 U	--	0.409 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-416C	GAF-416C	GAF-418L	GAF-418L	GAF-422C	GAF-422C	GAF-422C
Sample Date			4/15/2020	9/15/2020	4/14/2020	9/15/2020	4/15/2020	6/19/2020	9/15/2020
Well Location			Downgradient	Downgradient	Downgradient at Facility Boundary	Downgradient at Facility Boundary	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-416C-04152020	GAF-GW-416C-09152020	GAF-GW-418L-04142020	GAF-GW-418L-09152020	GAF-GW-422C-04152020	GAF-GW-422C-06192020	GAF-GW-422C-09152020
Sample Type			N	N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result	Result
Metals, Dissolved									
Antimony	7440-36-0	MG/L	0.000425 U*	--	--	--	0.000714 U*	--	--
Arsenic	7440-38-2	MG/L	0.00194	--	--	--	0.00317	--	--
Barium	7440-39-3	MG/L	0.0471	--	--	--	0.0441	--	--
Beryllium	7440-41-7	MG/L	0.000182 U	--	--	--	0.000182 U	--	--
Boron	7440-42-8	MG/L	0.386	--	--	--	0.491	--	--
Cadmium	7440-43-9	MG/L	0.000217 U	--	--	--	0.000217 U	--	--
Calcium	7440-70-2	MG/L	68.8	--	--	--	250	--	--
Chromium	7440-47-3	MG/L	0.00153 U	--	--	--	0.00153 U	--	--
Cobalt	7440-48-4	MG/L	0.000317 J	--	--	--	0.00819	0.00246	--
Iron	7439-89-6	MG/L	0.0725	--	--	--	10.2	4.03	--
Lead	7439-92-1	MG/L	0.000128 U	--	--	--	0.000128 U	--	--
Lithium	7439-93-2	MG/L	0.00434 U*	--	--	--	0.00603 U*	--	--
Magnesium	7439-95-4	MG/L	5.68	--	--	--	12.6	--	--
Manganese	7439-96-5	MG/L	2.85	--	--	--	2.26	1.22	--
Mercury	7439-97-6	MG/L	0.000130 U	--	--	--	0.000130 U	--	--
Molybdenum	7439-98-7	MG/L	0.0500	--	--	--	0.0199	--	--
Potassium	7440-09-7	MG/L	2.70	--	--	--	3.02	--	--
Selenium	7782-49-2	MG/L	0.00151 U	--	--	--	0.00151 U	--	--
Sodium	7440-23-5	MG/L	6.48	--	--	--	5.74	--	--
Thallium	7440-28-0	MG/L	0.000148 U	--	--	--	0.000148 U	--	--
Radiological Dissolved									
Radium 226 + Radium 228	RA226/228	pCi/L	0.136 U	--	--	--	0.146 U	--	--
Radium 228	15262-20-1	pCi/L	0.123 U	--	--	--	0.119 U	--	--
Radium-226	13982-63-3	pCi/L	0.0129 U	--	--	--	0.0275 U	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-426C	GAF-426C	GAF-426L	GAF-426L	GAF-427C	GAF-427C
Sample Date			4/15/2020	9/16/2020	4/15/2020	9/16/2020	4/16/2020	9/16/2020
Well Location			Background	Background	Background	Background	Background	Background
Sample ID			GAF-GW-426C-04152020	GAF-GW-426C-09162020	GAF-GW-426L-04152020	GAF-GW-426L-09162020	GAF-GW-427C-04162020	GAF-GW-427C-09162020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Field Parameters								
Dissolved Oxygen	DO	MG/L	0.37	3.21	0.43	3.12	0.27	0.14
ORP	ORP	MV	19.3	203.7	-1.4	124.9	-34.5	-53.6
pH, Field	PHFLD	pH units	6.86	6.64	6.86	6.87	7.00	6.43
Specific Conductance, Field	CONDSPECFLD	umhos/cm	1160	1078	900	726	820	849
Temperature	TEMP	deg c	16.9	18.0	16.1	17.9	16.0	16.6
Turbidity, field	TURB-FIELD	NTU	14.3	0.74	16.8	2.31	4.30	0.21
General Chemistry								
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	347	429	343	313	344	410
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	347	429	343	313	344	410
Total Dissolved Solids	TDS	MG/L	670	702	446	435	425	473
Chloride	16887-00-6	MG/L	13.9	9.22	12.5	8.24	7.89	12.6
Fluoride	16984-48-8	MG/L	0.292	0.270	0.328	0.415	0.568	0.658
Sulfate	14808-79-8	MG/L	190	188	47.2	80.5	32.0	36.7
Metals, Total								
Antimony	7440-36-0	MG/L	0.00215 U*	0.000378 U	0.00148 U*	0.000378 U	0.000974 U*	0.000378 U
Arsenic	7440-38-2	MG/L	0.000313 U	0.000313 U	0.00104	0.000313 U	0.00106	0.000448 J
Barium	7440-39-3	MG/L	0.0337	0.0405	0.121	0.0247	0.311	0.395
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.0612 U*	0.0613 J	0.0418 U*	0.0792 J	0.161 U*	0.160
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	133	159	117	135	113	134
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00249	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.00103	0.000134 U	0.000382 J	0.000134 U	0.000816	0.000838
Iron	7439-89-6	MG/L	0.311	0.0195 U	0.653	0.0195 U	0.472	0.651
Lead	7439-92-1	MG/L	0.000149 U*	0.00116	0.000305 U*	0.000128 U	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.0237 U*	0.0153	0.0194 U*	0.00670	0.0369	0.0306
Magnesium	7439-95-4	MG/L	44.2	55.4	24.4	16.4	30.3	31.3
Manganese	7439-96-5	MG/L	0.110	0.0122	0.128	0.00371 J	0.0322	0.0413
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00146 J	0.00122 J	0.00313 J	0.00210 J	0.000787 J	0.000752 J
Potassium	7440-09-7	MG/L	4.09	3.49	4.30 J	2.42	12.3	8.87
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	35.3	10.8	18.8 J	9.58	9.83	10.8
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000148 U
Radiological								
Radium 226 + Radium 228	RA226/228	pCi/L	0.144 U	0.470 U	0.287 U*	0.656 U*	0.692 U*	1.24 U*
Radium 228	15262-20-1	pCi/L	-0.0579 U	0.410 U	0.0953 U	0.428 U	0.402 U	0.938 U*
Radium-226	13982-63-3	pCi/L	0.144 U	0.0602 U	0.192 U*	0.228 U*	0.290 U*	0.301 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-426C	GAF-426C	GAF-426L	GAF-426L	GAF-427C	GAF-427C
Sample Date			4/15/2020	9/16/2020	4/15/2020	9/16/2020	4/16/2020	9/16/2020
Well Location			Background	Background	Background	Background	Background	Background
Sample ID			GAF-GW-426C-04152020	GAF-GW-426C-09162020	GAF-GW-426L-04152020	GAF-GW-426L-09162020	GAF-GW-427C-04162020	GAF-GW-427C-09162020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Metals, Dissolved								
Antimony	7440-36-0	MG/L	0.000378 U	--	0.00136 U*	--	--	--
Arsenic	7440-38-2	MG/L	0.000313 U	--	0.000910 J	--	--	--
Barium	7440-39-3	MG/L	0.0306	--	0.129	--	--	--
Beryllium	7440-41-7	MG/L	0.000194 J	--	0.000182 U	--	--	--
Boron	7440-42-8	MG/L	0.0660 J	--	0.0459 J	--	--	--
Cadmium	7440-43-9	MG/L	0.000217 U	--	0.000217 U	--	--	--
Calcium	7440-70-2	MG/L	131	--	124	--	--	--
Chromium	7440-47-3	MG/L	0.00153 U	--	0.00153 U	--	--	--
Cobalt	7440-48-4	MG/L	0.000957	--	0.000280 J	--	--	--
Iron	7439-89-6	MG/L	0.0649	--	0.442	--	--	--
Lead	7439-92-1	MG/L	0.000128 U	--	0.000128 U	--	--	--
Lithium	7439-93-2	MG/L	0.0161 U*	--	0.0201 U*	--	--	--
Magnesium	7439-95-4	MG/L	42.0	--	25.8	--	--	--
Manganese	7439-96-5	MG/L	0.101	--	0.137	--	--	--
Mercury	7439-97-6	MG/L	0.000130 U	--	0.000130 U	--	--	--
Molybdenum	7439-98-7	MG/L	0.00164 J	--	0.00406 J	--	--	--
Potassium	7440-09-7	MG/L	4.08	--	5.18 J	--	--	--
Selenium	7782-49-2	MG/L	0.00151 U	--	0.00151 U	--	--	--
Sodium	7440-23-5	MG/L	33.4	--	21.6 J	--	--	--
Thallium	7440-28-0	MG/L	0.000289 J	--	0.000148 U	--	--	--
Radiological Dissolved								
Radium 226 + Radium 228	RA226/228	pCi/L	0.181 J	--	0.351 J	--	--	--
Radium 228	15262-20-1	pCi/L	-0.0760 U	--	0.143 U	--	--	--
Radium-226	13982-63-3	pCi/L	0.181	--	0.208	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-427L	GAF-427L	GAF-446C	GAF-446C	GAF-449L	GAF-449L
Sample Date			4/20/2020	9/16/2020	4/16/2020	9/17/2020	4/20/2020	9/17/2020
Well Location			Background	Background	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-427L-04202020	GAF-GW-427L-09162020	GAF-GW-446C-04162020	GAF-GW-446C-09172020	GAF-GW-449L-04202020	GAF-GW-449L-09172020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Field Parameters								
Dissolved Oxygen	DO	MG/L	0.45	0.42	0.08	0.53	0.37	0.19
ORP	ORP	MV	3.6	25.0	-40.6	-42.7	1.5	-18.5
pH, Field	PHFLD	pH units	7.07	7.04	6.76	6.80	7.28	6.77
Specific Conductance, Field	CONDSPECFLD	umhos/cm	710	647	910	823	568	652
Temperature	TEMP	deg c	14.7	17.0	15.7	20.4	17.6	20.8
Turbidity, field	TURB-FIELD	NTU	0.45	0.26	5.07	0.38	3.32	0.74
General Chemistry								
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	285	301	254	288	164	173
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	285	301	254	288	164	173
Total Dissolved Solids	TDS	MG/L	403	371	533	527	451	427
Chloride	16887-00-6	MG/L	11.9	11.5	7.14	7.43	7.01	7.39
Fluoride	16984-48-8	MG/L	0.362	0.302	0.0875 U*	0.0776 J	0.130	0.0918 J
Sulfate	14808-79-8	MG/L	42.3	44.2	140	148	137	142
Metals, Total								
Antimony	7440-36-0	MG/L	0.000378 U	0.000378 U	0.000406 U*	0.000378 U	0.000378 U	0.000378 U
Arsenic	7440-38-2	MG/L	0.000313 U	0.000313 U	0.00784	0.00622	0.00194	0.00204
Barium	7440-39-3	MG/L	0.0996	0.0974	0.0651	0.0679	0.0374	0.0371
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000362 U*	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.0656 U*	0.0749 J	6.66	6.87	11.6	6.08
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	86.2	95.3	104	111	82.0	87.7
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000602	0.000527	0.00257	0.00241	0.00428	0.00301
Iron	7439-89-6	MG/L	0.0431 J	0.0305 J	3.02	2.79	0.700	0.698
Lead	7439-92-1	MG/L	0.000128 U	0.000128 U	0.000128 U	0.000128 U	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.0108 U*	0.00946	0.00760 U*	0.00339 U	0.00339 U	0.00339 U
Magnesium	7439-95-4	MG/L	25.0	28.4	6.57	6.73	3.00	3.29
Manganese	7439-96-5	MG/L	0.118	0.130	5.95	5.86	4.42	3.72
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.000610 U	0.000610 U	0.0613	0.0635	0.0468	0.0489
Potassium	7440-09-7	MG/L	1.49	1.62	2.45	2.41	2.59	2.63
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	8.94	9.68	60.3	60.5	42.8	48.5
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000355 J	0.000148 U	0.000148 U
Radiological								
Radium 226 + Radium 228	RA226/228	pCi/L	0.138 U	0.347 U	0.481 J	0.506 U*	0.291 U	0.350 U*
Radium 228	15262-20-1	pCi/L	0.0676 U	0.194 U	0.0936 U	0.150 U	0.228 U	0.131 U
Radium-226	13982-63-3	pCi/L	0.0703 U	0.153 U	0.387	0.356 U*	0.0624 U	0.219 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-427L	GAF-427L	GAF-446C	GAF-446C	GAF-449L	GAF-449L
Sample Date			4/20/2020	9/16/2020	4/16/2020	9/17/2020	4/20/2020	9/17/2020
Well Location			Background	Background	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-427L-04202020	GAF-GW-427L-09162020	GAF-GW-446C-04162020	GAF-GW-446C-09172020	GAF-GW-449L-04202020	GAF-GW-449L-09172020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Metals, Dissolved								
Antimony	7440-36-0	MG/L	--	--	0.000838 U*	--	--	--
Arsenic	7440-38-2	MG/L	--	--	0.00626	--	--	--
Barium	7440-39-3	MG/L	--	--	0.0656	--	--	--
Beryllium	7440-41-7	MG/L	--	--	0.000182 U	--	--	--
Boron	7440-42-8	MG/L	--	--	6.80	--	--	--
Cadmium	7440-43-9	MG/L	--	--	0.000217 U	--	--	--
Calcium	7440-70-2	MG/L	--	--	108	--	--	--
Chromium	7440-47-3	MG/L	--	--	0.00153 U	--	--	--
Cobalt	7440-48-4	MG/L	--	--	0.00259	--	--	--
Iron	7439-89-6	MG/L	--	--	2.28	--	--	--
Lead	7439-92-1	MG/L	--	--	0.000128 U	--	--	--
Lithium	7439-93-2	MG/L	--	--	0.0125 U*	--	--	--
Magnesium	7439-95-4	MG/L	--	--	6.77	--	--	--
Manganese	7439-96-5	MG/L	--	--	6.18	--	--	--
Mercury	7439-97-6	MG/L	--	--	0.000130 U	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	0.0621	--	--	--
Potassium	7440-09-7	MG/L	--	--	2.76	--	--	--
Selenium	7782-49-2	MG/L	--	--	0.00151 U	--	--	--
Sodium	7440-23-5	MG/L	--	--	63.3	--	--	--
Thallium	7440-28-0	MG/L	--	--	0.000148 U	--	--	--
Radiological Dissolved								
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	0.418 J	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	0.254 U	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	0.164	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-450C	GAF-450C	GAF-450L	GAF-450L	GAF-450L	GAF-450L
Sample Date			4/17/2020	9/17/2020	4/17/2020	6/19/2020	9/17/2020	11/12/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-450C-04172020	GAF-GW-450C-09172020	GAF-GW-450L-04172020	GAF-GW-450L-06192020	GAF-GW-450L-09172020	GAF-GW-450L-11122020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Field Parameters								
Dissolved Oxygen	DO	MG/L	0.15	0.75	0.27	0.13	0.25	0.25
ORP	ORP	MV	-59.9	-28.1	-70.5	-96.1	-115.0	-90.7
pH, Field	PHFLD	pH units	7.15	6.80	6.91	6.98	6.78	6.99
Specific Conductance, Field	CONDSPECFLD	umhos/cm	1029	1012	950	977	979	992
Temperature	TEMP	deg c	17.3	20.9	17.7	20.3	19.3	17.3
Turbidity, field	TURB-FIELD	NTU	4.71	0.64	3.18	3.64	0.18	0.13
General Chemistry								
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	--	5.00 U	--
Alkalinity, Total as CaCO3	ALK	MG/L	235	238	204	--	224	--
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	235	238	204	--	224	--
Total Dissolved Solids	TDS	MG/L	714	693	641	--	678	--
Chloride	16887-00-6	MG/L	16.5	16.2	18.9	--	17.4	--
Fluoride	16984-48-8	MG/L	0.152	0.168	0.196	--	0.145	--
Sulfate	14808-79-8	MG/L	263	262	228	--	255	--
Metals, Total								
Antimony	7440-36-0	MG/L	0.00262 U*	0.00227	0.000451 U*	--	0.000378 U	--
Arsenic	7440-38-2	MG/L	0.00477 U*	0.00450	0.0128	0.0115	0.0106	0.0103
Barium	7440-39-3	MG/L	0.0435	0.0373	0.0371	--	0.0378	--
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	--	0.000245 U*	--
Boron	7440-42-8	MG/L	5.86	14.7	7.81	--	7.22	--
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	--	0.000217 U	--
Calcium	7440-70-2	MG/L	156	145	111	--	117	--
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	--	0.00153 U	--
Cobalt	7440-48-4	MG/L	0.00412	0.00375	0.00700	--	0.00708	--
Iron	7439-89-6	MG/L	2.01	1.90	3.63	--	3.80	--
Lead	7439-92-1	MG/L	0.000128 U	0.000128 U	0.000128 U	--	0.000128 U	--
Lithium	7439-93-2	MG/L	0.00660 U*	0.00339 U	0.00461 U*	--	0.00339 U	--
Magnesium	7439-95-4	MG/L	8.84	7.93	5.20	--	5.70	--
Manganese	7439-96-5	MG/L	4.27	3.17	2.91	--	3.22	--
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	--	0.000130 U	--
Molybdenum	7439-98-7	MG/L	0.0272	0.0283	0.0627	--	0.0546	--
Potassium	7440-09-7	MG/L	8.74	6.57	4.65	--	4.67	--
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	--	0.00151 U	--
Sodium	7440-23-5	MG/L	65.0	63.9	87.0	--	85.0	--
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	--	0.000191 J	--
Radiological								
Radium 226 + Radium 228	RA226/228	pCi/L	0.331 UJ	0.591 U*	0.0403 UJ	--	0.462 U*	--
Radium 228	15262-20-1	pCi/L	0.238 U	0.275 U	-0.0937 U	--	-0.169 U	--
Radium-226	13982-63-3	pCi/L	0.0936 UJ	0.316 U*	0.0403 UJ	--	0.462 U*	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-450C	GAF-450C	GAF-450L	GAF-450L	GAF-450L	GAF-450L
Sample Date			4/17/2020	9/17/2020	4/17/2020	6/19/2020	9/17/2020	11/12/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-450C-04172020	GAF-GW-450C-09172020	GAF-GW-450L-04172020	GAF-GW-450L-06192020	GAF-GW-450L-09172020	GAF-GW-450L-11122020
Sample Type			N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result
Metals, Dissolved								
Antimony	7440-36-0	MG/L	--	--	--	--	--	--
Arsenic	7440-38-2	MG/L	--	--	--	0.0113	--	0.0104
Barium	7440-39-3	MG/L	--	--	--	--	--	--
Beryllium	7440-41-7	MG/L	--	--	--	--	--	--
Boron	7440-42-8	MG/L	--	--	--	--	--	--
Cadmium	7440-43-9	MG/L	--	--	--	--	--	--
Calcium	7440-70-2	MG/L	--	--	--	--	--	--
Chromium	7440-47-3	MG/L	--	--	--	--	--	--
Cobalt	7440-48-4	MG/L	--	--	--	--	--	--
Iron	7439-89-6	MG/L	--	--	--	--	--	--
Lead	7439-92-1	MG/L	--	--	--	--	--	--
Lithium	7439-93-2	MG/L	--	--	--	--	--	--
Magnesium	7439-95-4	MG/L	--	--	--	--	--	--
Manganese	7439-96-5	MG/L	--	--	--	--	--	--
Mercury	7439-97-6	MG/L	--	--	--	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	--	--	--	--
Potassium	7440-09-7	MG/L	--	--	--	--	--	--
Selenium	7782-49-2	MG/L	--	--	--	--	--	--
Sodium	7440-23-5	MG/L	--	--	--	--	--	--
Thallium	7440-28-0	MG/L	--	--	--	--	--	--
Radiological Dissolved								
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	--	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	--	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	--	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-451C	GAF-451CR	GAF-451CR	GAF-452C	GAF-452C	GAF-452L	GAF-452L
Sample Date			4/16/2020	4/16/2020	9/16/2020	4/17/2020	9/17/2020	4/17/2020	9/17/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-451C-04162020	GAF-GW-451CR-04162020	GAF-GW-451CR-09162020	GAF-GW-452C-04172020	GAF-GW-452C-09172020	GAF-GW-452L-04172020	GAF-GW-452L-09172020
Sample Type			N	N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result	Result
Field Parameters									
Dissolved Oxygen	DO	MG/L	0.31	0.53	0.29	0.36	0.48	0.25	0.77
ORP	ORP	MV	-26.3	-42.6	-10.2	-153.1	-190.6	-108.9	-117.9
pH, Field	PHFLD	pH units	6.78	6.83	6.76	7.31	7.30	7.28	7.26
Specific Conductance, Field	CONDSPECFLD	umhos/cm	1300	1450	1420	740	770	528	531
Temperature	TEMP	deg c	17.4	16.5	19.0	16.5	18.3	15.8	17.9
Turbidity, field	TURB-FIELD	NTU	3.01	1.24	0.76	6.83	1.33	1.80	0.48
General Chemistry									
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	377	332	367	433	425	292	283
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	377	332	367	433	425	292	283
Total Dissolved Solids	TDS	MG/L	95.0	1070	1060	495	471	437	337
Chloride	16887-00-6	MG/L	17.5	20.5	22.3	9.45	8.10	5.45	5.19
Fluoride	16984-48-8	MG/L	0.479	0.254	0.228	0.689	0.652	0.381	0.375
Sulfate	14808-79-8	MG/L	325	441	414	36.4	36.0	28.9	30.5
Metals, Total									
Antimony	7440-36-0	MG/L	0.000580 U*	0.000378 U	0.000378 U	0.000447 U*	0.000378 U	0.000797 U*	0.000378 U
Arsenic	7440-38-2	MG/L	0.00205	0.000962 J	0.000766 J	0.00105 U*	0.000723 J	0.00124 U*	0.000442 J
Barium	7440-39-3	MG/L	0.0648	0.0343	0.0347	0.219	0.239	0.0854	0.0809
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U	0.000244 U*	0.000257 U*	0.000182 U
Boron	7440-42-8	MG/L	0.0685 U*	0.0784 U*	0.0872	0.258 U*	0.274	0.127 U*	0.115 U*
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	196	226	213	84.1	78.4	86.5	80.2
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000134 U	0.000134 U	0.000142 J	0.000134 U	0.000134 U	0.00114 U*	0.000198 J
Iron	7439-89-6	MG/L	0.842	1.40	1.32	0.0749	0.173	1.23	1.17
Lead	7439-92-1	MG/L	0.000485 J	0.000128 U	0.000128 U	0.000128 U	0.000128 U	0.000264 U*	0.000128 U
Lithium	7439-93-2	MG/L	0.0190 U*	0.0138 U*	0.00818	0.0952	0.0951	0.0224 U*	0.0150
Magnesium	7439-95-4	MG/L	63.9	62.3	63.6	28.9	29.4	27.5	26.8
Manganese	7439-96-5	MG/L	0.0264	0.0136	0.0118	0.116	0.0875	0.0761	0.0600
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.000764 J	0.000702 J	0.000610 U	0.000610 U	0.000610 U	0.000682 U*	0.000610 U
Potassium	7440-09-7	MG/L	7.80	2.38	2.24	7.47	6.64	6.25	3.50
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	20.4	35.3	37.9	82.9	81.8	10.0	8.31
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000148 U	0.000462 U*	0.000148 U
Radiological									
Radium 226 + Radium 228	RA226/228	pCi/L	0.799 J	0.383 J	0.454 U*	1.12 J	1.97 J	0.208 J	1.28 U*
Radium 228	15262-20-1	pCi/L	0.414 U	-0.119 U	-0.0480 U	0.492 J	0.866 U*	0.0540 U	0.726 U*
Radium-226	13982-63-3	pCi/L	0.385 J	0.383	0.454 U*	0.625 J	1.10	0.154 J	0.551 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-451C	GAF-451CR	GAF-451CR	GAF-452C	GAF-452C	GAF-452L	GAF-452L
Sample Date			4/16/2020	4/16/2020	9/16/2020	4/17/2020	9/17/2020	4/17/2020	9/17/2020
Well Location			Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Sample ID			GAF-GW-451C-04162020	GAF-GW-451CR-04162020	GAF-GW-451CR-09162020	GAF-GW-452C-04172020	GAF-GW-452C-09172020	GAF-GW-452L-04172020	GAF-GW-452L-09172020
Sample Type			N	N	N	N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result	Result	Result	Result
Metals, Dissolved									
Antimony	7440-36-0	MG/L	--	--	--	0.000441 U*	--	--	--
Arsenic	7440-38-2	MG/L	--	--	--	0.000843 J	--	--	--
Barium	7440-39-3	MG/L	--	--	--	0.227	--	--	--
Beryllium	7440-41-7	MG/L	--	--	--	0.000182 U	--	--	--
Boron	7440-42-8	MG/L	--	--	--	0.233	--	--	--
Cadmium	7440-43-9	MG/L	--	--	--	0.000217 U	--	--	--
Calcium	7440-70-2	MG/L	--	--	--	86.0	--	--	--
Chromium	7440-47-3	MG/L	--	--	--	0.00153 U	--	--	--
Cobalt	7440-48-4	MG/L	--	--	--	0.000134 U	--	--	--
Iron	7439-89-6	MG/L	--	--	--	0.0911	--	--	--
Lead	7439-92-1	MG/L	--	--	--	0.000128 U	--	--	--
Lithium	7439-93-2	MG/L	--	--	--	0.0934	--	--	--
Magnesium	7439-95-4	MG/L	--	--	--	29.6	--	--	--
Manganese	7439-96-5	MG/L	--	--	--	0.112	--	--	--
Mercury	7439-97-6	MG/L	--	--	--	0.000130 U	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	--	0.000610 U	--	--	--
Potassium	7440-09-7	MG/L	--	--	--	7.13	--	--	--
Selenium	7782-49-2	MG/L	--	--	--	0.00151 U	--	--	--
Sodium	7440-23-5	MG/L	--	--	--	83.5	--	--	--
Thallium	7440-28-0	MG/L	--	--	--	0.000148 U	--	--	--
Radiological Dissolved									
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	--	0.936 J	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	--	0.404 U	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	--	0.532	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-453C	GAF-453C	GAF-454L	GAF-454L
Sample Date			4/16/2020	9/16/2020	4/17/2020	9/17/2020
Well Location			Downgradient	Downgradient	Downgradient at Facility Boundary	Downgradient at Facility Boundary
Sample ID			GAF-GW-453C-04162020	GAF-GW-453C-09162020	GAF-GW-454L-04172020	GAF-GW-454L-09172020
Sample Type			N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result
Field Parameters						
Dissolved Oxygen	DO	MG/L	0.34	0.39	1.83	0.45
ORP	ORP	MV	-53.6	-80.6	176.2	-1.0
pH, Field	PHFLD	pH units	7.21	7.03	7.45	7.05
Specific Conductance, Field	CONDSPECFLD	umhos/cm	910	765	565.3	577
Temperature	TEMP	deg c	18.0	19.3	14.0	19.9
Turbidity, field	TURB-FIELD	NTU	3.88	2.40	1.69	0.63
General Chemistry						
Alkalinity, Carbonate (CaCO3)	ALKC	MG/L	5.00 U	5.00 U	5.00 U	5.00 U
Alkalinity, Total as CaCO3	ALK	MG/L	258	269	239	249
Alkalinity, Bicarbonate (CaCO3)	ALKB	MG/L	258	269	239	249
Total Dissolved Solids	TDS	MG/L	588	487	330	338
Chloride	16887-00-6	MG/L	7.60	6.69	3.10	3.32
Fluoride	16984-48-8	MG/L	0.249	0.226	0.232	0.256
Sulfate	14808-79-8	MG/L	126	139	50.1	51.2
Metals, Total						
Antimony	7440-36-0	MG/L	0.00125 U*	0.000378 U	0.000950 U*	0.000378 U
Arsenic	7440-38-2	MG/L	0.00153	0.00111	0.000803 U*	0.00124
Barium	7440-39-3	MG/L	0.103	0.103	0.0842	0.0968
Beryllium	7440-41-7	MG/L	0.000182 U	0.000182 U	0.000182 U	0.000182 U
Boron	7440-42-8	MG/L	0.0687 U*	0.0669 J	0.399	0.239
Cadmium	7440-43-9	MG/L	0.000217 U	0.000217 U	0.000217 U	0.000217 U
Calcium	7440-70-2	MG/L	111	118	95.3	92.5
Chromium	7440-47-3	MG/L	0.00153 U	0.00153 U	0.00153 U	0.00153 U
Cobalt	7440-48-4	MG/L	0.000134 U	0.000134 U	0.000134 U	0.00115
Iron	7439-89-6	MG/L	0.521	0.992	0.147	0.145
Lead	7439-92-1	MG/L	0.000128 U	0.000128 U	0.000128 U	0.000128 U
Lithium	7439-93-2	MG/L	0.0103 U*	0.00500	0.00533 U*	0.00339 U
Magnesium	7439-95-4	MG/L	15.7	16.5	12.9	15.5
Manganese	7439-96-5	MG/L	0.127	0.158	0.0101	0.248
Mercury	7439-97-6	MG/L	0.000130 U	0.000130 U	0.000130 U	0.000130 U
Molybdenum	7439-98-7	MG/L	0.00213 J	0.00128 J	0.00599	0.00528
Potassium	7440-09-7	MG/L	14.7	5.28	5.85	4.80
Selenium	7782-49-2	MG/L	0.00151 U	0.00151 U	0.00151 U	0.00151 U
Sodium	7440-23-5	MG/L	36.9	29.9	7.93	8.57
Thallium	7440-28-0	MG/L	0.000148 U	0.000148 U	0.000148 U	0.000148 U
Radiological						
Radium 226 + Radium 228	RA226/228	pCi/L	0.113 U	0.921 U*	0.323 UJ	0.725 U*
Radium 228	15262-20-1	pCi/L	-0.0415 U	0.576 U*	0.280 U	0.330 U
Radium-226	13982-63-3	pCi/L	0.113 U	0.345 U*	0.0431 UJ	0.395 U*

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Monitoring Well ID			GAF-453C	GAF-453C	GAF-454L	GAF-454L
Sample Date			4/16/2020	9/16/2020	4/17/2020	9/17/2020
Well Location			Downgradient	Downgradient	Downgradient at Facility Boundary	Downgradient at Facility Boundary
Sample ID			GAF-GW-453C-04162020	GAF-GW-453C-09162020	GAF-GW-454L-04172020	GAF-GW-454L-09172020
Sample Type			N	N	N	N
Analyte	CAS	Units	Result	Result	Result	Result
Metals, Dissolved						
Antimony	7440-36-0	MG/L	--	--	--	--
Arsenic	7440-38-2	MG/L	--	--	--	--
Barium	7440-39-3	MG/L	--	--	--	--
Beryllium	7440-41-7	MG/L	--	--	--	--
Boron	7440-42-8	MG/L	--	--	--	--
Cadmium	7440-43-9	MG/L	--	--	--	--
Calcium	7440-70-2	MG/L	--	--	--	--
Chromium	7440-47-3	MG/L	--	--	--	--
Cobalt	7440-48-4	MG/L	--	--	--	--
Iron	7439-89-6	MG/L	--	--	--	--
Lead	7439-92-1	MG/L	--	--	--	--
Lithium	7439-93-2	MG/L	--	--	--	--
Magnesium	7439-95-4	MG/L	--	--	--	--
Manganese	7439-96-5	MG/L	--	--	--	--
Mercury	7439-97-6	MG/L	--	--	--	--
Molybdenum	7439-98-7	MG/L	--	--	--	--
Potassium	7440-09-7	MG/L	--	--	--	--
Selenium	7782-49-2	MG/L	--	--	--	--
Sodium	7440-23-5	MG/L	--	--	--	--
Thallium	7440-28-0	MG/L	--	--	--	--
Radiological Dissolved						
Radium 226 + Radium 228	RA226/228	pCi/L	--	--	--	--
Radium 228	15262-20-1	pCi/L	--	--	--	--
Radium-226	13982-63-3	pCi/L	--	--	--	--

Table 4
Assessment Monitoring and Verification Sampling Groundwater Analytical Results - Ash Pond Complex, 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Notes and Acronyms

--	-	not analyzed for the specified analysis or insufficient sample volume for analysis
FD	-	field duplicate sample
MG/L	-	milligrams per liter
MV	-	millivolts
N	-	primary sample
NTU	-	nephelometric turbidity units
pCi/L	-	picoCuries per liter
umhos/cm	-	microMhos per centimeter

Qualifier Definitions

U	-	The analyte was analyzed for but not detected. The associated numerical value is at or below the reporting limit.
U*	-	This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level.
J	-	Quantitation is approximate due to limitations identified during data validation.
UJ	-	This analyte was not detected, but the reporting or detection limit may or may not be higher due to a bias identified during data validation.

Table 5
Statistically Significant Levels (SSLs) Above GWPSs - Ash Pond Complex, April 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Appendix IV Constituent	GWPS (a)	Downgradient wells with results above GWPSs (b)	Calculated LCL on the mean (c)	SSL (d) LCL>GWPS
Antimony (mg/l)	0.006	None	NA	NA
Arsenic (mg/l)	0.010	GAF-410U	0.0233	Yes
		GAF-450L	0.00902	No
Barium (mg/l)	2	None	NA	NA
Beryllium (mg/l)	0.004	None	NA	NA
Cadmium (mg/l)	0.005	None	NA	NA
Chromium (mg/l)	0.100	None	NA	NA
Cobalt (mg/l)	0.006	GAF-450L	0.00836	Yes
Fluoride (mg/l)	4	None	NA	NA
Lead (mg/l)	0.015	None	NA	NA
Lithium (mg/l)	Carters: 0.045	GAF-452C	0.0914	Yes
	Lebanon: 0.189	None	NA	NA
Mercury (mg/l)	0.002	None	NA	NA
Molybdenum (mg/l)	0.100	None	NA	NA
Radium-226+228 (pCi/l)	5	None	NA	NA
Selenium (mg/l)	0.050	None	NA	NA
Thallium (mg/l)	0.002	None	NA	NA

Notes:

NA – Not applicable

(a) GWPSs documented in notice dated 10/15/2018.

(b) Semi-annual Assessment monitoring event in April 2020 with results from verification sampling in June 2020 where available.

(c) Lower confidence limit (LCL) on the mean of CCR Rule sampling events between April 2018 and April 2020 plus the June 2020 verification sample results where available. Upper confidence limit (UCL) not shown as it is greater than LCL.

(d) SSL is statistically significant level over GWPS.

Table 6
Statistically Significant Levels (SSLs) Above GWPSs - Ash Pond Complex, September 2020
CCR Rule Groundwater Monitoring
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Appendix IV Constituent	GWPS (a)	Downgradient wells with results above GWPSs (b)	Calculated LCL on the mean (c)	SSL (d) LCL>GWPS
Antimony (mg/l)	0.006	None	NA	NA
Arsenic (mg/l)	0.010	GAF-410U	0.0234	Yes
		GAF-450L	0.00970	No
Barium (mg/l)	2	None	NA	NA
Beryllium (mg/l)	0.004	None	NA	NA
Cadmium (mg/l)	0.005	None	NA	NA
Chromium (mg/l)	0.100	None	NA	NA
Cobalt (mg/l)	0.006	GAF-450L	0.00704	Yes
Fluoride (mg/l)	4	None	NA	NA
Lead (mg/l)	0.015	None	NA	NA
Lithium (mg/l)	Carters: 0.045	GAF-452C	0.0938	Yes
	Lebanon: 0.189	None	NA	NA
Mercury (mg/l)	0.002	None	NA	NA
Molybdenum (mg/l)	0.100	None	NA	NA
Radium-226+228 (pCi/l)	5	None	NA	NA
Selenium (mg/l)	0.050	None	NA	NA
Thallium (mg/l)	0.002	None	NA	NA

Notes:

NA – Not applicable

(a) GWPSs documented in notice dated 10/15/2018.

(b) Semi-annual Assessment monitoring event in September 2020 with results from verification sampling in November 2020 where available.

(c) Lower confidence limit (LCL) on the mean of CCR Rule sampling events between September 2018 and September 2020 plus the November 2020 verification results where available. Upper confidence limit (UCL) not shown as it is greater than LCL.

(d) SSL is statistically significant level over GWPS.

Appendix A
Dye Trace Velocity Tables

Table 3
Phase 1 Dye Trace Summary
TVA Gallatin Fossil Plant

Injection Point	Injection Date	Dye	Dye Recovery Location	Dye Recovery Confidence Level	Detection Date	Number Of Detections	Previous Non-detect Sample Date	Straight-line Distance (ft)	Travel Time - Low (days)	Travel Time - High (days)	Apparent Velocity Low (ft/day)	Apparent Velocity High (ft/day)
A0-SH-3	4/11/2017 17:55	Rhodamine WT (3 gallons)	DS-31-1	HIGH	4/12/17 7:30	1	NA	1,311	NA	0.6	2,316	NA
			DS-32-1	HIGH	4/12/2017 7:30	2	NA	1,540	NA	0.6	2,721	NA
			DS-26-3	HIGH	4/14/2017 13:50	1	NA	9,134	NA	2.8	3,228	NA
			DS-26-6	HIGH	4/14/2017 13:50	1	NA	9,134	NA	2.8	3,228	NA
C1-SH-15	4/12/17 7:50	Fluorescein (2 gallons)	DS-1	HIGH	4/20/17 8:40	2	4/14/17 9:40	11,657	8.03	2.1	1,451	5,614
			DS-2	HIGH	4/20/17 8:50	1	4/14/17 9:55	8,147	8.04	2.1	1,013	3,904
			DS-7	HIGH	4/20/17 9:00	1	4/14/17 10:05	6,747	8.05	2.1	838	3,222
			DS-3	HIGH	4/20/17 9:10	2	4/14/17 10:30	6,217	8.06	2.1	772	2,945
			DS-4	HIGH	4/20/17 9:15	2	4/14/17 10:25	6,077	8.06	2.1	754	2,883
			DS-6	HIGH	4/20/17 9:25	2	4/14/17 10:20	6,247	8.07	2.1	774	2,969
			DS-8	HIGH	4/20/17 9:30	2	4/14/17 10:05	5,547	8.07	2.1	687	2,649
			DS-9	HIGH	5/17/17 11:45	1	5/9/17 13:30	5,552	35.16	27.2	158	204
			GAF-414C	HIGH	4/24/2017 13:15	8	4/14/2017 13:18	420	12.23	2.2	34	189
			GAF-415C	HIGH	4/24/2017 12:35	1	4/14/2017 15:45	1,320	12.20	2.3	108	567
			GAF-421L	HIGH	4/24/2017 13:15	11	4/14/2017 16:15	3,020	12.23	2.4	247	1,285
			GAF-419L	HIGH	5/22/2017 9:45	2	5/15/2017 10:05	3,520	40.08	33.1	88	106
			GAF-428L	LOW	5/22/17 11:15	1	5/15/17 11:55	5,150	40.14	33.2	128	155
			D2-CV-1	HIGH	5/31/17 8:15	5	5/22/17 9:45	3,690	49.02	40.1	75	92
GAF-416C	LOW	6/28/17 9:10	1	6/14/17 10:25	1,625	77.06	63.1	21	26			
GAF-407L	LOW	6/28/17 16:10	1	6/15/17 10:30	2,173	77.35	64.1	28	34			
D2-SH-22	4/19/17 10:00	Eosine (2 gallons)	D2-CV-1	HIGH	4/24/17 11:20	7	4/19/17 13:55	230	5.06	0.2	45	1,409
			GAF-23	LOW	5/31/17 16:15	1	5/22/17 11:55	1,960	42.26	33.1	46	59
			DS-16-6	LOW	6/28/17 10:15	1	6/21/17 10:10	6,640	70.01	63.0	95	105
GAF-405C	5/12/17 8:55	Sulphorhodamine B (2 gallons)	Dye Not Recovered as of 7/6/17	NA	NA	NA	NA	NA	NA	NA	NA	
GAF-459C	5/10/17 9:40	Pyranine (2 gallons)	GAF-410U	HIGH	5/15/2017 12:20	7	5/8/2017 13:50	1,120	5.11	NA	219	NA
			GAF-446C	HIGH	5/22/2017 12:05	6	5/15/2017 12:30	1,160	12.10	5.1	96	227
			GAF-458C	HIGH	6/21/2017 12:00	2	6/14/2017 11:50	1,100	42.10	35.1	26	31
GAF-456C	5/23/17 8:55	Phloxine B (8 pounds)	Dye Not Recovered as of 7/6/17	NA	NA	NA	NA	NA	NA	NA	NA	

Table Source:
Hydrogeology Inc, September 2017. *TVA Gallatin Phase Zero/Phase 1 Dye Trace Study*,
Table 3, Prepared for AECOM

Estimated Velocities - Phase 2 Dye Trace Study

TVA Gallatin Fossil Plant

Dye Introduction Location and Date	Dye Introduced and Quantity	Dye Recovery Location	Initial Detection Date	Straight-Line Distance from Introduction to Receptor (ft)	Velocity of Initial Dye Arrival (ft/day)	Number of Detections	Final Detection Date
Northeast Trace 3/25/2020	Fluorescein (14 lbs)	DS-4	3/31/2020 9:52	6140	2047	5	4/29/2020 9:34
		DS-6	3/31/2020 9:50	5920 (a)	1973 (a)	5	4/29/2020 9:33
		DS-7	3/31/2020 9:43	6620	2207	3	4/21/2020 9:42
		DS-7C	3/31/2020 9:46	6570	2170	3	4/21/2020 10:01
		DS-47	3/31/2020 9:54	6220	2073	7	5/26/2020 9:29
		DS-47C	3/31/2020 9:56	6210	2070	8	5/26/2020 9:31
		GAF-421L	4/14/2020 8:57	3500	206	5	6/9/2020 9:35
		GAF-511C	4/14/2020 10:30	270	16	2	6/9/2020 10:52
C1-SS-1/C1-SH-15 3/25/2020	Eosine (12 lbs)	C-7	5/11/2020 9:55	4800	109	2	6/16/2020 11:32
		DS-4	3/31/2020 9:52	5470 (a)	1823 (a)	1	4/29/2020 9:34
		DS-6	3/31/2020 9:50	5240 (a)	1733 (a)	1	3/31/2020 9:50
		DS-7	3/31/2020 9:43	5690	1897	1	4/21/2020 9:42
		DS-7C	3/31/2020 9:46	5630	1877	1	4/21/2020 10:01
		DS-10	6/16/2020 9:46	5860	73	1	6/16/2020 9:46
		DS-10C	6/16/2020 9:48	5900	74	1	6/16/2020 9:48
		DS-47	3/31/2020 9:54	5530	1843	1	5/26/2020 9:29
		DS-47C	3/31/2020 9:56	5570	1857	1	5/26/2020 9:31
		GAF-414C	4/14/2020 11:05	430	22	1	4/14/2020 11:05
GAF-455C 3/25/2020	Rhodamine WT (40 lbs)	GAF-401L	4/6/2020 8:26	1690	282	10	6/22/2020 11:50 (b)
		GAF-407L	5/18/2020 11:40	800	16	6	6/23/2020 9:21 (b)
		GAF-415C	4/14/2020 9:38	2240	204	1	4/14/2020 9:38
		GAF-418L	4/13/2020 8:35	5700	356	7	5/26/2020 8:55
		GAF-419L	3/30/2020 8:57	5070	2028	13	6/23/2020 8:40 (b)
		GAF-455N	4/6/2020 11:05	10	NA	12	6/22/2020 11:05 (b)
		GAF-514L	5/12/2020 12:20	6260	142	1	5/12/2020 12:20
D3-SH-42 3/25/2020	Sulforodamine B (16 lbs)	No Detections from Trace					

Notes:

All results are reported in the Phase 2 Dye Trace Report (Rev 1) by the Ozark Underground Laboratory (OUL).

Velocities provided for traces through Lower Carters and/or Lebanon Limestones.

(a) Corrected straight-line travel distances and velocities are shown on OUL's Detection Timeline figures; the values in the text portion of the OUL report reflect the original (uncorrected) distances reported by OUL.

(b) Dye detected on the final sampling event.

Appendix B
Memorandum: Groundwater Protection Standards

Memorandum

To	Tennessee Valley Authority	Page	1
CC			
Subject	Gallatin Fossil Plant, Ash Pond Complex CCR Rule Groundwater Protection Standards		
From	A Elizabeth Perry, PG Chris Garlington		
Date	October 15, 2018		

In accordance with federal regulations for management of coal combustion residuals (the CCR Rule; 40 CFR 257), the Tennessee Valley Authority (TVA) is monitoring groundwater at the Ash Pond Complex at its Gallatin Fossil Plant (GAF) in Gallatin, Tennessee. The first Assessment groundwater monitoring event was conducted at GAF in June 2018. The CCR Rule requires TVA to develop groundwater protection standards (GWPSs) for Appendix IV parameters that were detected during that sampling event. This memorandum presents those GWPSs.

The samples collected during the Assessment monitoring event in June 2018 were analyzed for (among other things) the parameters listed in the CCR Rule Appendix IV. GWPSs have been developed for all Appendix IV parameters, including those that were detected and those that were not detected. Table 1 lists the Appendix IV parameters, and notes which were detected in at least one monitoring well.

The CCR Rule specifies that the GWPS is the published Maximum Contaminant Level (MCL). For parameters without a MCL, the CCR Rule provides published values of the GWPS. Both the MCLs and published GWPSs are provided on Table 1. However, the CCR Rule states that if background is higher than these published values, then the GWPS becomes background.

Background concentrations were calculated using the statistical methods as certified under the CCR Rule for the GAF Ash Pond Complex (dated November 14, 2017). As a result, the GWPS for lithium is the background value, as shown on Table 1. GWPSs for all other Appendix IV parameters are the published GWPS/MCL.

Table 1: Groundwater Protection Standards, GAF Ash Pond Complex

Appendix IV Parameter	Detected June 2018	MCL	Published GWPS (a)	Background	Final GWPS (b)
Antimony (mg/l)	Yes	0.006	NA	NA	0.006
Arsenic (mg/l)	Yes	0.010	NA	NA	0.010
Barium (mg/l)	Yes	2	NA	NA	2
Beryllium (mg/l)	Yes	0.004	NA	NA	0.004
Cadmium (mg/l)	No	0.005	NA	NA	0.005
Chromium (mg/l)	No	0.100	NA	NA	0.100
Cobalt (mg/l)	Yes	NA	0.006	NA	0.006
Fluoride (mg/l)	Yes	4	NA	NA	4
Lead (mg/l)	Yes	NA	0.015	NA	0.015
Lithium (mg/l)	Yes	NA	0.040	0.045/0.189 (c)	0.045/0.189 (c)
Mercury (mg/l)	No	0.002	NA	NA	0.002
Molybdenum (mg/l)	Yes	NA	0.100	NA	0.100
Radium-226+228 (pCi/l)	Yes	5	NA	NA	5
Selenium (mg/l)	No	0.050	NA	NA	0.050
Thallium (mg/l)	Yes	0.002	NA	NA	0.002

NA – Not applicable

(a) As published in the Federal Register July 30, 2018; 257.95(h)(2).

(b) Final GWPS is the maximum of background or the published GWPS/MCL (257.95(h)(3)).

(c) Separate background values are calculated for the two different geologic units: the Carters Limestone and Lebanon Limestone, respectively.

Appendix C

Appendix III and IV Background Concentration Ranges

Appendix C
Appendix III and IV Background Concentration Ranges
CCR Rule Groundwater Monitoring - Ash Pond Complex, 2016-2020
TVA Gallatin Fossil Plant
Gallatin, Tennessee

Appendix III & Appendix IV Constituents	Units	Lebanon		Carters	
		Minimum Concentration	Maximum Concentration	Minimum Concentration	Maximum Concentration
Antimony	mg/l	ND	0.000929 J	ND	0.00446
Arsenic	mg/l	ND	0.00260 J	ND	0.00173
Barium	mg/l	0.0247	0.518	0.0327	0.733
Beryllium	mg/l	All not detected		All not detected	
Boron	mg/l	0.0326 J	0.455	0.0325 J	0.404
Cadmium	mg/l	All not detected		All not detected	
Calcium	mg/l	22.1	160	84.5	159
Chloride	mg/l	5.89	330	3.65	65.3
Chromium	mg/l	ND	0.00774	ND	0.00266
Cobalt	mg/l	ND	0.00212	ND	0.0025
Fluoride	mg/l	0.203	2.30	0.176	1.17
Lead	mg/l	ND	0.00245	ND	0.00116
Lithium	mg/l	0.0067	0.189	ND	0.0607
Mercury	mg/l	ND	0.00281	All not detected	
Molybdenum	mg/l	ND	0.00757	ND	0.00931
pH, Field	mg/l	6.52	8.30	6.43	7.71
Radium-226 + Radium-228	pCi/l	ND	2.35	ND	1.28
Selenium	mg/l	ND	0.000443 J	ND	0.00086 J
Sulfate	mg/l	4.49	275	26.2	322
Thallium	mg/l	ND	0.000342 J	ND	0.000065 J
Total Dissolved Solids	mg/l	332	864	319	843

Notes

ND – minimum concentration is not detected. Detection limits vary.
Specific sample results are provided in Table 4 of this report and in the 2017, 2018, and 2019 Annual Reports.
Concentration ranges based on samples collected from November 2016 through September 2020.
Results from unfiltered samples only.

Appendix D
Evaluation of SSIs - January 2018

Date: January 15, 2018
To: Tennessee Valley Authority
From: Elizabeth Perry, PG, AECOM
Subject: Summary of Statistical Analysis and Evaluation of SSIs
Gallatin Fossil Plant - Ash Pond Complex
CCR Groundwater Monitoring Network

The Tennessee Valley Authority (TVA) Gallatin Fossil Plant (GAF), located in the town of Gallatin in Sumner County, Tennessee, has four Coal Combustion Residual (CCR) surface impoundments within the Ash Pond Complex that are subject to the U.S. Environmental Protection Agency's (USEPA's) final CCR Rule (40 Code of Federal Regulations [CFR] 257.90): Ash Pond A, Ash Pond E, Middle Pond A, and the Bottom Ash Pond. As required by the CCR Rule, the owner or operator of a CCR unit shall accurately establish background groundwater quality for the detection monitoring program and determine if a statistically significant increase (SSI) over background has occurred in downgradient monitoring wells. This memorandum reports on the statistically-derived background values for the Appendix III constituents, and summarizes the results of testing for SSIs for the Appendix III constituents collected during the detection monitoring rounds at designated in-network downgradient monitoring wells.

The statistical analysis was performed in accordance with the methods described in the *Statistical Methods Certification for Compliance with the Final Coal Combustion Residuals Rule (40 CFR §257.93)* for the GAF Ash Pond Complex. As per the statistical method certification for the Ash Pond Complex (November 14, 2017), background concentrations of Appendix III parameters were calculated using an Upper Prediction Limit (UPL) statistic. UPLs were calculated using the ProUCL software version 5.1.002 (USEPA, May 2016), with a 99% confidence level. Separate background UPLs were calculated for the Carters and Lebanon Limestone formations. Sampling results used to establish background values were obtained during ten monitoring events performed between November 2016 and August 2017. Downgradient sampling results from the first detection monitoring round (October 2017) were used to test for SSIs. The calculated background values and the evaluation for SSIs over background for the Appendix III constituents are provided in Table 1.

Table 1. Summary of Evaluation for SSIs over Background for Appendix III Constituents

Appendix III Constituent:	Boron	Calcium	pH	Sulfate	TDS
Unit	mg/L	mg/L	SU	mg/L	mg/L
Background Value (UPL)	0.173	147	7.71	322	843
Well ID	<i>First Detection Monitoring Round Results: Carters</i>				
24	0.0728 J	<u>246</u>	6.61	271 J	811
GAF-402C	<u>0.365</u>	76.6	7.12	50.5	276
GAF-405C	0.118	118	7.00	87.7	411
GAF-410U	<u>7.09</u>	105	6.73	80.8	437
GAF-416C	<u>0.523</u>	54.9	<u>8.08</u>	16.2	206
GAF-422C	<u>0.473</u>	121	7.05	144 J	421
GAF-446C	<u>6.11</u>	129	6.68	138	553
GAF-450C	<u>6.50</u>	<u>185</u>	6.76	<u>361</u>	797
GAF-451C	0.0605 J	<u>183</u>	6.82	248	<u>949</u>
GAF-452C	<u>0.247</u>	77.8	6.98	56.0	506
GAF-453C	0.0913	111	7.32	144	586
Appendix III Constituent:	Boron	Calcium	pH	Sulfate	TDS
Unit	mg/L	mg/L	SU	mg/L	mg/L
Background Value (UPL)	0.455	154	8.09	275	864
Well ID	<i>First Detection Monitoring Round Results: Lebanon</i>				
GAF-402L	0.290	90.7	7.19	53.5	398
GAF-406L	0.366	138	6.94	143	510
GAF-449L	<u>12.1</u>	98.8	6.78	170	482
GAF-450L	<u>7.95</u>	<u>170</u>	6.83	<u>332</u>	783
GAF-452L	0.0983	79.0	6.97	30.3	341

Bold and underlined concentration indicates an SSI over background (by aquifer).

UPL = Upper Prediction Limit

mg/L = milligrams per liter

Clarification (January 2021): Fluoride and chloride are not shown on this table as there were no SSIs for these constituents. See the 2017 Annual Report (AECOM, 2018) for the complete analytical results.

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