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To:	Tennessee Valley Authority Chattanooga, TN	From:	Matthew Dagon, LPG Indianapolis, IN
File:	Updated GWPS and SSLs at the John Sevier Fossil Plant Bottom Ash Pond Vacatur CCR Unit	Date:	December 29, 2023

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**Reference: End of Year Update on Statistically Significant Levels (SSLs) (40 CFR § 257.95(g)) - CCR Rule Groundwater Monitoring - John Sevier Fossil Plant, Bottom Ash Pond Vacatur CCR Unit**

In accordance with the federal regulations for management of coal combustion residuals (CCR Rule; 40 Code of Federal Regulations [CFR] Part 257, Subpart D), the Tennessee Valley Authority (TVA) is currently conducting Assessment Monitoring at the Bottom Ash Pond CCR Unit at its John Sevier Fossil Plant (JSF) in Rogersville, Tennessee. The Bottom Ash Pond consists of one CCR surface impoundment subject to the CCR Rule with a single-unit groundwater monitoring system screened in residuum and bedrock.

As required by the CCR Rule, the owner or operator of a CCR unit shall establish groundwater protection standards (GWPS) for Appendix IV parameters detected during Assessment Monitoring and determine if one or more Appendix IV parameters are detected at statistically significant levels (SSLs) above their GWPS. GWPS for all Appendix IV parameters were originally established and documented in a notice dated April 14, 2020, as required by 40 CFR § 257.95(d)(2) and are provided on Tables 1 and 2 for the residuum and bedrock saturated zones, respectively.

As part of ongoing Assessment Monitoring, the second semiannual assessment monitoring event for 2023 occurred July 17-20, 2023, with the additional “resample” event occurring August 28-30, 2023. This technical memorandum presents GWPS and lower confidence bands (LCBs) that have been updated with the data collected as part of the second semiannual monitoring event and resample event for 2023, as well as any identified SSLs after incorporating the additional data collected in 2023. The identification of SSLs was performed as a two-step process:

1. Historical sampling results (January 2019 through August 2023) for Appendix IV parameters from each downgradient well were compared directly to the GWPS. If all sample concentrations were below the updated GWPS, no SSLs over the GWPS were identified.
2. Where the direct comparison indicated a concentration above the GWPS, further statistical analysis was performed to identify levels statistically greater than the GWPS, using procedures recommended in the United States Environmental Protection Agency (USEPA) Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA 530/R-09-007; March 2009). Comparisons were made against a fixed GWPS via LCBs. For each situation where the parameter concentration was greater than the GWPS in step one, the 99% LCB of the fitted line in that monitoring well was calculated using CCR Rule monitoring data collected from January 2019 to August 2023. As recommended in the Unified Guidance, where the 99% LCB exceeds the GWPS at the last sampling event, an SSL was identified for the constituent/well pair.

Based on the statistical analysis performed in 2023, no SSLs above the GWPS were identified during the second semiannual assessment monitoring and resample events in 2023, which is consistent with the assessment monitoring results for 2020 through 2022. TVA will continue to conduct groundwater monitoring and reporting pursuant to 40 CFR § 257.95.

Reference: End of Year Update on Statistically Significant Levels (SSLs) (40 CFR § 257.95(g)) - CCR Rule Groundwater Monitoring - John Sevier Fossil Plant, Bottom Ash Pond Vacatur CCR Unit

**TABLE 1: STATISTICALLY SIGNIFICANT LEVELS ABOVE GWPS - JSF BOTTOM ASH POND CCR UNIT - RESIDUUM**

Appendix IV Parameter	GWPS (a)	Updated GWPS (b)	Downgradient wells with analytical results above GWPS (c)	Updated LCBs (d)	SSL LCB > GWPS (e)
Antimony (µg/L)	6	6	None	NA	NA
Arsenic (µg/L)	10	10	None	NA	NA
Barium (µg/L)	2,000	2,000	None	NA	NA
Beryllium (µg/L)	4	4	None	NA	NA
Cadmium (µg/L)	5	5	None	NA	NA
Chromium (µg/L)	100	100	None	NA	NA
Cobalt (µg/L)	6	6	None	NA	NA
Fluoride (mg/L)	4	4	None	NA	NA
Lead (µg/L)	15	15	None	NA	NA
Lithium (µg/L)	40	40	None	NA	NA
Mercury (µg/L)	2	2	None	NA	NA
Molybdenum (µg/L)	100	100	None	NA	NA
Radium-226+228 (pCi/L)	5	5	None	NA	NA
Selenium (µg/L)	50	50	None	NA	NA
Thallium (µg/L)	2	2	None	NA	NA

NA – Not applicable

- (a) GWPS documented in notice dated April 14, 2020 [reported in micrograms per liter (µg/L) except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (b) GWPS updated as of December 12, 2023, with two additional sample results collected on July 17-20, 2023, and August 28-30, 2023 [reported in µg/L except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (c) Downgradient wells with analytical results above GWPS January 2019 through August 2023 (per 40 CFR § 257.95(b) and (d))
- (d) Most recent value of 99% LCB on the mean of Appendix IV groundwater sampling events between January 2019 and August 2023. Upper confidence band (UCB) not shown as it is greater than LCB
- (e) SSL: “statistically significant level over GWPS” occurs when the updated LCB value at the last sampling event exceeds the updated GWPS

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**TABLE 2: STATISTICALLY SIGNIFICANT LEVELS ABOVE GWPS - JSF BOTTOM ASH POND CCR UNIT - BEDROCK**

Appendix IV Parameter	GWPS (f)	Updated GWPS (g)	Downgradient wells with analytical results above GWPS (h)	Updated LCBs (i)	SSL LCB > GWPS (j)
Antimony (µg/L)	6	6	None	NA	NA
Arsenic (µg/L)	10	10	None	NA	NA
Barium (µg/L)	2,000	2,000	None	NA	NA
Beryllium (µg/L)	4	4	None	NA	NA
Cadmium (µg/L)	5	5	None	NA	NA
Chromium (µg/L)	100	100	None	NA	NA
Cobalt (µg/L)	6	6	None	NA	NA
Fluoride (mg/L)	4	4	None	NA	NA
Lead (µg/L)	15	15	None	NA	NA
Lithium (µg/L)	40	40	None	NA	NA
Mercury (µg/L)	2	2	None	NA	NA
Molybdenum (µg/L)	100	100	None	NA	NA
Radium-226+228 (pCi/L)	5	5	None	NA	NA
Selenium (µg/L)	50	50	None	NA	NA
Thallium (µg/L)	2	2	None	NA	NA

NA – Not applicable

- (f) GWPS documented in notice dated April 14, 2020 [reported in micrograms per liter (µg/L) except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (g) GWPS updated as of December 12, 2023, with two additional sample results collected on July 17-20, 2023, and August 28-30, 2023 [reported in µg/L except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (h) Downgradient wells with analytical results above GWPS January 2019 through August 2023 (per 40 CFR § 257.95(b) and (d))
- (i) Most recent value of 99% LCB on the mean of Appendix IV groundwater sampling events between January 2019 and August 2023. Upper confidence band (UCB) not shown as it is greater than LCB
- (j) SSL: “statistically significant level over GWPS” occurs when the updated LCB value at the last sampling event exceeds the updated GWPS