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Chattanooga, TN

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File: Updated GWPS and SSLs at the  
Cumberland Fossil Plant Bottom Ash  
Pond, Gypsum Storage Area, and  
Dry Ash Stack CCR Units

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**Reference: Mid-Year Update on Statistically Significant Levels (SSLs) (40 CFR § 257.95(g)) - CCR Rule Groundwater Monitoring - Cumberland Fossil Plant, Bottom Ash Pond, Gypsum Storage Area & Dry Ash Stack CCR Units**

In accordance with the federal regulations for management of coal combustion residuals (CCR Rule; 40 CFR Part 257, Subpart D), the Tennessee Valley Authority (TVA) is currently conducting Assessment Monitoring at the Bottom Ash Pond, Gypsum Storage Area, and Dry Ash Stack CCR Units at its Cumberland Fossil Plant (CUF) in Cumberland City, Tennessee. The Bottom Ash Pond, Gypsum Storage Area, and Dry Ash Stack are all subject to the CCR Rule and are monitored by a common, multiunit groundwater monitoring system.

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 October 15, 2018 as required by 40 CFR § 257.95(d)(2) and are provided on Table 1.

As part of ongoing Assessment Monitoring, the first semiannual assessment monitoring event for 2023 occurred January 31-February 7, 2023, with the additional “resample” event occurring March 7-15, 2023. This technical memorandum presents GWPS and lower confidence bands (LCBs) that have been updated with data collected during the first 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 (November 2016 through March 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 November 2016 through March 2023. Note that monitoring well 93-3 was incorporated into the monitoring well network and sampled beginning in June 2018. 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, there continues to be SSLs above the GWPS for cobalt in wells CUF-211 and CUF-212, lithium in well 93-3, and molybdenum in well CUF-209. These are the same SSLs at the same wells as previously identified. TVA will continue to conduct groundwater monitoring and reporting pursuant to 40 CFR § 257.95.

**TABLE 1: Statistically Significant Levels Above GWPS - CUF Bottom Ash Pond, Gypsum Storage Area & Dry Ash Stack CCR Units**

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	CUF-209 <sup>(f)</sup>	0.0	<b>No</b>
			CUF-211	8.02	<b>No</b>
Barium (µg/L)	2,000	2,000	None	NA	NA
Beryllium (µg/L)	4	4	None	NA	NA
Cadmium (µg/L)	5	5	CUF-211	0.66	<b>No</b>
Chromium (µg/L)	100	100	None	NA	NA
Cobalt (µg/L)	6	6	CUF-211	10.5	<b>Yes</b>
			CUF-212	17.2	<b>Yes</b>
Fluoride (mg/L)	4	4	None	NA	NA
Lead (µg/L)	15	15	None	NA	NA
Lithium (µg/L)	40	40	93-3	63.1	<b>Yes</b>
Mercury (µg/L)	2	2	None	NA	NA
Molybdenum (µg/L)	100	100	CUF-209	268	<b>Yes</b>
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 October 15, 2018 [reported in micrograms per liter (µg/L) except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (b) GWPS updated as of June 1, 2023, with results from two additional sampling events collected on January 31-February 7, 2023, and March 7-15, 2023 [reported in µg/L except fluoride (mg/L) and radium 226+228 (pCi/L)]
- (c) Downgradient wells with analytical results above GWPS November 2016 through March 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 November 2016 and March 2023. Upper confidence band (UCB) not shown as it is greater than LCB [reported in µg/L]
- (e) SSL: “statistically significant level” over GWPS occurs when the updated LCB value at the last sampling event exceeds the updated GWPS
- (f) Negative lower confidence bands were reported as 0.0 µg/L