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To: Tennessee Valley Authority  
Chattanooga, TN

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File: Updated GWPS and SSLs at the  
Paradise Fossil Plant Gypsum Disposal  
Area CCR Units

Date: July 15, 2021

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**Reference: Update on Statistically Significant Levels (SSLs) (40 CFR § 257.95(g)) - CCR Rule  
Groundwater Monitoring - Paradise Fossil Plant Gypsum Disposal Area CCR Units**

In accordance with the federal regulations for management of coal combustion residuals (CCR Rule; 40 CFR § 257, Subpart D), the Tennessee Valley Authority (TVA) is currently conducting Assessment Monitoring at the Gypsum Disposal Area CCR Units at its Paradise Fossil Plant (PAF) in Drakesboro, Kentucky. The Gypsum Disposal Area CCR Units include the Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1, and Gypsum Disposal Area Stilling Pond 2. All units are all subject to the CCR Rule and share 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 2021 occurred February 23-24, 2021, with the additional "resample" event occurring March 23-31, 2021. This technical memorandum presents GWPS and lower confidence bands (LCBs) that have been updated with the sample collected as part of the first semiannual assessment monitoring event of 2021, as well as any identified SSLs after incorporating the additional data collected in 2021. The identification of SSLs was performed as a two-step process:

1. Historical sampling results (November 2016 through March 2021) 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 to March 2021. 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, no SSL above the GWPS was identified during the assessment monitoring events in 2021, which is consistent with the assessment monitoring results for 2018, 2019, and 2020. TVA will continue to conduct groundwater monitoring and reporting pursuant to 40 CFR §. 257.95.

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Reference: Update on Statistically Significant Levels (SSLs) at the Paradise Fossil Plant Gypsum Disposal Area CCR Units

**TABLE 1: Statistically Significant Levels Above GWPS - PAF Gypsum Disposal Area 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 (mg/l)	0.006	0.006	None	NA	NA
Arsenic (mg/l)	0.0136	0.0154	PAF-116	0.012	<b>No</b>
Barium (mg/l)	2	2	None	NA	NA
Beryllium (mg/l)	0.05	0.004	None	NA	NA
Cadmium (mg/l)	0.005	0.005	None	NA	NA
Chromium (mg/l)	0.1	0.1	None	NA	NA
Cobalt (mg/l)	0.0889	0.0995	None	NA	NA
Fluoride (mg/l)	4	4	None	NA	NA
Lead (mg/l)	0.015	0.015	None	NA	NA
Lithium (mg/l)	0.165	0.182	PAF-116	0.122	<b>No</b>
Mercury (mg/l)	0.002	0.002	None	NA	NA
Molybdenum (mg/l)	0.1	0.1	None	NA	NA
Radium-226+228 (pCi/l)	5	5	None	NA	NA
Selenium (mg/l)	0.05	0.05	None	NA	NA
Thallium (mg/l)	0.002	0.002	None	NA	NA

NA – Not applicable

- (a) GWPS documented in notice dated 10/15/2018 [reported in milligrams per liter (mg/L)]
- (b) GWPS updated as of 06/18/2021 with two additional sample results collected on February 23-24, 2021 and March 23-31, 2021 [reported in mg/L]
- (c) Downgradient wells with analytical results above GWPS November 2016 through March 2021 (per 40 CFR § 257.95(b) and (d))
- (d) Most recent value of 99% lower confidence band (LCB) on the mean of Appendix IV groundwater sampling events between November 2016 and March 2021. 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