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Chattanooga, TN

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File: Updated GWPS and SSLs at the
Paradise Fossil Plant Gypsum Disposal
Area Multi-Unit CCR Unit

Date: October 2019

**Reference: Update on Statistically Significant Levels (SSLs)
CCR Rule Groundwater Monitoring
Paradise Fossil Plant Gypsum Disposal Area Multi-Unit CCR Unit**

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 Multi-unit CCR Unit at its Paradise Fossil Plant (PAF) in Drakesboro, Kentucky. The Gypsum Disposal Area Multi-Unit includes the Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1 and the Gypsum Disposal Area Stilling Pond 2. All units are all subject to the CCR Rule with a multi-unit monitoring system.

As required by the CCR Rule (40 CFR 257.95(g)), the owner or operator of a CCR unit shall establish groundwater protection standards (GWPSs) 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 GWPSs. GWPSs 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 semi-annual assessment monitoring event for 2019 occurred January 7-11, 2019, with the additional “resample” event occurring March 4-7, 2019. An additional sampling event occurred August 5-7, 2019 as part of the second semi-annual assessment monitoring event for 2019. This technical memorandum presents GWPSs and lower confidence bands (LCBs) that have been updated with the 3 samples collected as part of the first and second semi-annual assessment monitoring events of 2019, as well as any identified SSLs after incorporating the additional data collected in 2019. The identification of SSLs was performed as a two-step process:

1. Historical sampling results (November 2016 through August 5-7, 2019) for Appendix IV parameters from each downgradient well were compared directly to the GWPS. If all sample concentrations were below the 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 August 5-7, 2019. 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 SSLs above the GWPS were identified during assessment monitoring events in 2019, which is consistent with the assessment monitoring results for 2018. TVA will continue to conduct groundwater monitoring and reporting pursuant to 40 CFR. 257.95

Reference: Update on Statistically Significant Levels (SSLs) at the Paradise Fossil Plant Gypsum Disposal Area Multi-Unit

TABLE 1: Statistically Significant Levels (SSLs) Above GWPSs - PAF Gypsum Disposal Area Multi-Unit

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	None	NA	NA
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	0.17	PAF-116	0.112	No
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) GWPSs documented in notice dated 10/15/2018.
- (b) GWPSs updated as of 10/8/2019 with 3 additional sample results collected on January 7-11, 2019, March 4-7, 2019 and August 5-7, 2019.
- (c) Downgradient wells with analytical results above GWPS November 2016 through August 5-7, 2019 (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 August 5-7, 2019. 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.