

MEMORANDUM

DATE July 15, 2022
TO Tennessee Valley Authority, Chattanooga, Tennessee
CC Shawnee Fossil Plant Operating Record
FROM Jeffrey Frazier, WSP Golder

**REFERENCE: UPDATE ON STATISTICALLY SIGNIFICANT LEVELS (SSLs) / (40 CFR § 257.95(g))
SHAWNEE FOSSIL PLANT FOR CCR UNIT**

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 for the Ash Pond 2 (Main Ash Pond and Stilling Pond) and Consolidated Waste Dry Stack CCR Unit at its Shawnee Fossil Plant (SHF) in Paducah, Kentucky.

In accordance with 40 CFR § 257.95(d)(2), 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 per 40 CFR § 257.95(h) and documented in a notice dated October 15, 2018. Table 1 presents the original GWPS, along with the updated GWPS, and the results of a comparison of the February 2022 concentration to the lower confidence band (LCB) as explained below.

As part of ongoing Assessment Monitoring, the first semiannual assessment monitoring event for 2022 occurred January 4, 2022, with the additional “resample” event occurring February 10, 2022. This technical memorandum presents GWPS that have been updated with the samples collected as part of the first semiannual assessment monitoring events of 2022. The updated GWPS has been calculated using data collected at SHF-102G (background monitoring well) from November 2016 through February 2022. To statistically evaluate the Appendix IV constituents, concentration data is compared to the GWPS through the use of confidence bands. In assessment monitoring, a well is determined to be out of compliance, and has an SSL when the lower confidence limit (LCL), and thus the entire interval, exceeds the GWPS, as discussed in *Unified Guidance*. If the compliance data at a given well-constituent pair show evidence of a significant trend, a linear regression line will be fit to the data and a confidence band with (one-sided) 99% confidence level will be constructed around the trend line.

To evaluate compliance with regulatory standards, the lower edge of the confidence band at the most recent sampling event will be compared to the GWPS. If the lower edge exceeds the GWPS at that point in time (thus guaranteeing the entire vertical cross-section of the band also exceeds the GWPS at that point), an SSL will be recorded. If the lower edge of the band does not exceed the GWPS, no SSL will have occurred. As new sampling events are collected, the trend estimate will be updated along with the confidence band.

Based on the mid-year statistical analysis performed in 2022, an SSL for molybdenum at D-74B above the GWPS was identified following the first semi-annual monitoring event in 2022. TVA will continue to conduct groundwater monitoring and reporting pursuant to 40 CFR § 257.95.

TABLE 1: Statistically Significant Levels Above GWPS at the CCR Unit

Appendix IV Parameter	Original GWPS ^(a) (Notice Dated 10-15-18)	Updated GWPS ^(b)	Downgradient Well(s) with Analytical Results Above GWPS ^(c)	Updated LCBs ^(d)	SSL LCB > GWPS ^(e)
Antimony (ug/l)	6	6	None	NA	NA
Arsenic (ug/l)	10	10	None	NA	NA
Barium (ug/l)	2,000	2,000	None	NA	NA
Beryllium (ug/l)	4	4	None	NA	NA
Cadmium (ug/l)	5	5	None	NA	NA
Chromium (ug/l)	100	100	None	NA	NA
Cobalt (ug/l)	6	6	None	NA	NA
Fluoride (ug/l)	4,000	4,000	None	NA	NA
Lead (ug/l)	15	15	None	NA	NA
Lithium (ug/l)	40	40	None	NA	NA
Mercury (ug/l)	2	2	None	NA	NA
Molybdenum (ug/l)	105.3	100	D-74B	104 ^(f)	Yes
Radium-226+228 (pCi/l)	5	5	None	NA	NA
Selenium (ug/l)	50	50	None	NA	NA
Thallium (ug/l)	2	2	None	NA	NA

Notes:

- (a) GWPS documented in notice dated 10/15/2018 [reported in micrograms per liter (ug/L) or picocuries per liter (pCi/l)]
- (b) GWPS updated as of 6/15/2022 with two additional samples results collected on 1/4/2022 and 2/10/2022 [reported in ug/l or pCi/l]
- (c) Downgradient wells with analytical results above GWPS February 2022 (per 40 CFR § 257.95(b) and (d))
- (d) Most recent value of 99% lower confidence band (LCB) of the mean of Appendix IV groundwater sampling events between November 2016 and February 2022. Data is presented for well(s) with analytical results above GWPS. 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
- (f) The GWPS exceedance and LCB identified is for monitoring well D-74B. No SSLs are recorded for other site wells.