Pirkey Power Plant
FGD Stackout Area
Alternate Source Demonstration

The Pirkey FGD Stackout Area initiated an assessment monitoring program in accordance with 40 CFR 257.95 on April 3, 2018. Groundwater protection standards (GWPS) were set in accordance with 257.95(d)(2) and a statistical evaluation of the assessment monitoring data was conducted. The statistical evaluation revealed an exceedance of the mercury GWPS on December 26, 2018. A successful alternate source demonstration (ASD) was completed per 257.95(g)(3), therefore, the Pirkey Stackout Area will remain in assessment monitoring. An alternate source demonstration is documentation that shows a source other than the CCR unit was responsible for causing the statistics to exceed the GWPS. The ASD document will explain the alternate cause of the GWPS exceedance. The successful ASD is attached.

ALTERNATIVE SOURCE DEMONSTRATION REPORT FEDERAL CCR RULE

H.W. Pirkey Power Plant Flue Gas Desulfurization (FGD) Stackout Area Hallsville, Texas

Submitted to

1 Riverside Plaza
Columbus, Ohio 43215-2372

Submitted by

Geosyntec consultants

engineers | scientists | innovators

941 Chatham Lane
Suite 103
Columbus, OH 43221

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FIGURES

ATTACHMENTS

LIST OF ACRONYMS

AEP	American Electric Power
ASD	Alternative Source Demonstration
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPRI	Electric Power Research Institute
FGD	Flue Gas Desulfurization
GSC	Groundwater Stats Consulting, LLC
GWPS	Groundwater Protection Standard
LCL	Lower Confidence Limit
MCL	Maximum Contaminant Level
QA	Quality Assurance
QC	Quality Control
RSL	Regional Screening Level
SSL	Statistically Significant Level
UTL	Upper Tolerance Limit
USEPA	United States Environmental Protection Agency

SECTION 1

INTRODUCTION AND SUMMARY

In 2018, two assessment monitoring events were conducted at the FGD Stackout Area at the H.W. Pirkey Plant in accordance with 40 CFR 257.95. The monitoring data were submitted to Groundwater Stats Consulting, LLC (GSC) for statistical analysis. Groundwater protection standards (GWPSs) were established for each Appendix IV parameter in accordance with the statistical analysis plan developed for the facility (AEP, 2017) and United States Environmental Protection Agency's (USEPA) *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (Unified Guidance; USEPA, 2009). The GWPS for each parameter was established as the greater of the background concentration and the maximum contaminant level (MCL) or regional screening level (RSL). To determine background concentrations, an upper tolerance limit (UTL) was calculated using pooled data from the background wells collected during the background monitoring and assessment monitoring events.

Confidence intervals were calculated for Appendix IV parameters at the compliance wells to assess whether Appendix IV parameters were present at a statistically significant level (SSL) above the GWPSs. An SSL was concluded if the lower confidence limit (LCL) of a parameter exceeded the GWPS (i.e., if the entire confidence interval exceeded the GWPS). An SSL was identified for mercury at AD-22 at the FGD Stackout Area (Geosyntec, 2018).

1.1 CCR Rule Requirements

United States Environmental Protection Agency (USEPA) regulations regarding assessment monitoring programs for coal combustion residuals (CCR) landfills and surface impoundments provide owners and operators with the option to make an alternative source demonstration when an SSL is identified (40 CFR 257.95(g)(3)(ii)). An owner or operator may:

> *Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this section….*

Pursuant to 40 CFR 257.95(g)(3)(ii), Geosyntec Consultants, Inc. (Geosyntec) has prepared this Alternative Source Demonstration (ASD) report to document that the SSL identified for mercury at AD-22 should not be attributed to the Pirkey FGD Stackout Area.

1.2 Demonstration of Alternative Sources

An evaluation was completed to assess possible alternative sources to which the identified SSL could be attributed. Alternative sources were identified amongst five types, based on methodology provided by EPRI (2017):

- ASD Type I: Sampling Causes;
- ASD Type II: Laboratory Causes;
- ASD Type III: Statistical Evaluation Causes;
- ASD Type IV: Natural Variation; and
- ASD Type V: Alternative Sources.

A demonstration was conducted to show that the SSL identified for mercury at AD-22 was based on a Type III cause at AD-22 and not by a release from the Pirkey FGD Stackout Area.

SECTION 2

ALTERNATIVE SOURCE DEMONSTRATION

The Federal CCR Rule allows the owner or operator 90 days from the determination of an SSL to demonstrate that a source other than the CCR unit caused the SSL. The methodology used to evaluate the SSL identified for mercury and the proposed alternative source are described below.

2.1 Proposed Alternative Source

Initial review of site geochemistry, site historical data, and laboratory QA/QC data did not identify ASDs due to a Type I (sampling causes) or Type II (laboratory causes) issue. As described below, the SSL was attributed to a statistical evaluation cause, which is a Type III issue.

A review of mercury results at AD-22 suggests that mercury concentrations have decreased at AD-22 over time (Figure 1). As indicated by the Unified Guidance (USEPA, 2009), collecting "data over time and successively re-computing confidence limits is appropriate for stable (i.e., stationary) populations", but "can give misleading or false results when the underlying population is changing". In such cases, Section 7.4.4 of the Unified Guidance recommends the following:

> *An important preliminary step is to track the individual compliance point measurements on a time series plot. If a discrete shift in concentration level is evident, a confidence limit should be computed on the most recent stable measurements. Limiting the observations in this fashion to a specific time period is often termed a 'moving window.' The reduction in sample size will often be more than offset by the gain in statistical power. More recent measurements may exhibit less variation around the shifted mean value, resulting in a shorter confidence interval. The sample size included in the moving window should be sufficient to achieve the desired statistical power…However, measurements that are clearly unrepresentative of the newly shifted distribution should not be included, even if the sample size suffers.*

Based on the above recommendations, the mercury results at AD-22 were visually inspected on a time series plot and were tested for statistically significant trends via Mann-Kendall analysis. While the Mann-Kendall analysis indicated no significant increasing or decreasing trend ($\alpha = 0.02$) using all of the data, decreasing concentrations over time were observed on the time series plot (Figure 1). As a result, the statistical evaluation was limited to the "moving window" of the seven most recent data points (i.e., results collected from October 2016 onward), which were observed to exhibit similar behavior in terms of trend, average concentration, and variance. A confidence interval was calculated using this truncated dataset. The calculated LCL for mercury at AD-22 is 0.22 µg/L ($\alpha = 0.008$), which is below the GWPS for mercury of 2 µg/L. This confidence limit is considered more representative of current conditions at AD-22, and therefore there is no SSL for mercury at AD-22. The results of the statistical tests are included as Appendix A.

2.2 Sampling Requirements

As the ASD described above supports the position that the identified SSL is not due to a release from the Pirkey FGD Stackout Area, the unit will remain in the assessment monitoring program. Groundwater at the unit will continue to be sampled for Appendix IV parameters on a semi-annual basis.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

The preceding information serves as the ASD prepared in accordance with 40 CFR 257.95(g)(3)(ii) and supports the position that the SSL of mercury for AD-22 identified during assessment monitoring in 2018 was not due to a release from the Pirkey FGD Stackout Area. The identified SSL was, instead, attributed to an error in the statistical evaluation. Therefore, no further action is warranted, and the Pirkey FGD Stackout Area will remain in the assessment monitoring program. Certification of this ASD by a qualified professional engineer is provided in Attachment B.

SECTION 4

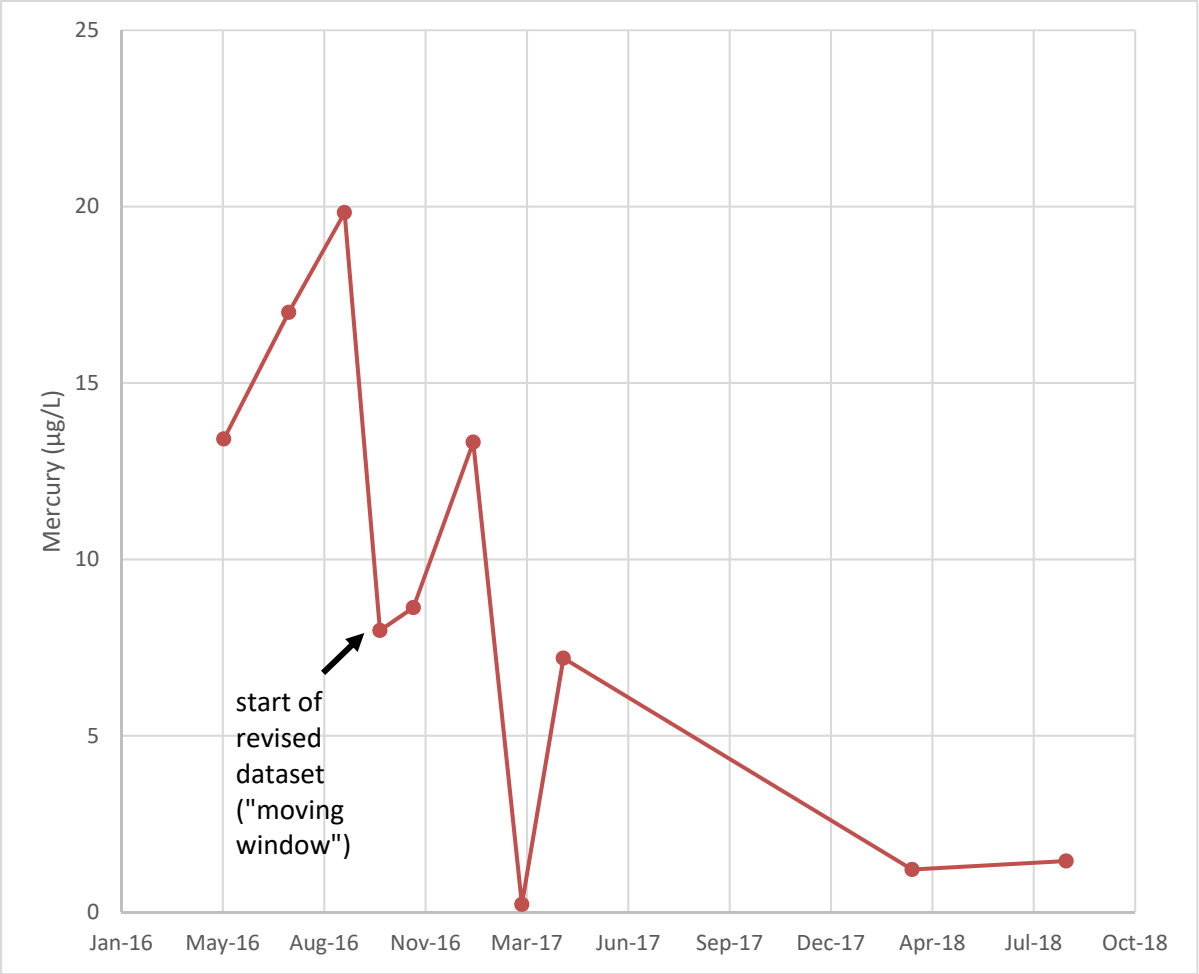
REFERENCES

AEP, 2017. Statistical Analysis Plan – H.W. Pirkey Power Plant. Hallsville, Texas. January.

EPRI, 2017. Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Site. 3002010920. October.

Geosyntec Consultants, 2018. Statistical Analysis Summary – H.W. Pirkey Power Plant. Hallsville, Texas. December.

United States Environmental Protection Agency (USEPA), 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance. EPA 530/R-09/007. March.



Notes: The dataset was truncated to all values after October 2016 based on similar behavior in terms of trend, average, concentration, and variance.

Mercury Time Series Graph for AD-22

Pirkey FGD Stackout Pad

Geosyntec consultants

AMERICAN ELECTRIC POWER

Figure 1

Columbus, Ohio

14-Feb-2019

internal info: path, date revised, author

ATTACHMENT A

Statistical Analysis Output

Trend Test Summary Table

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/5/2019, 8:16 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Mercury, total (mg/L)	AD-22	-0.00738	-25	-27	No	10	0	n/a	n/a	0.02	NP

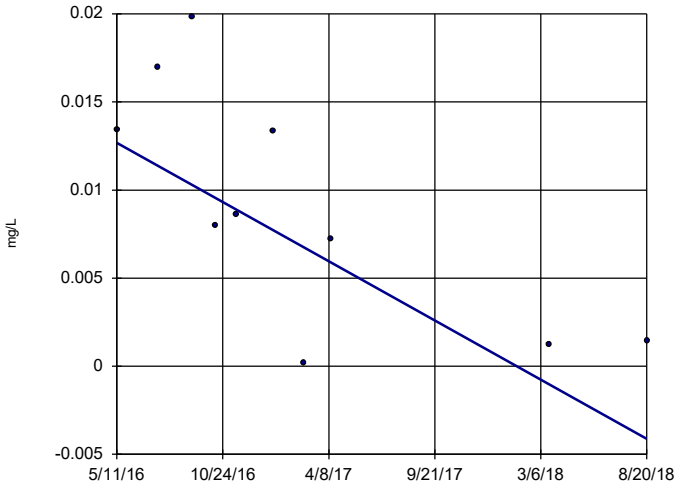
Confidence Interval Summary Table

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout Printed 2/5/2019, 8:16 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
Mercury, total (mg/L)	AD-22	0.01332	0.00022	0.002	No	7	0	No	0.008	NP (selected)

Sen's Slope Estimator

AD-22



n = 10

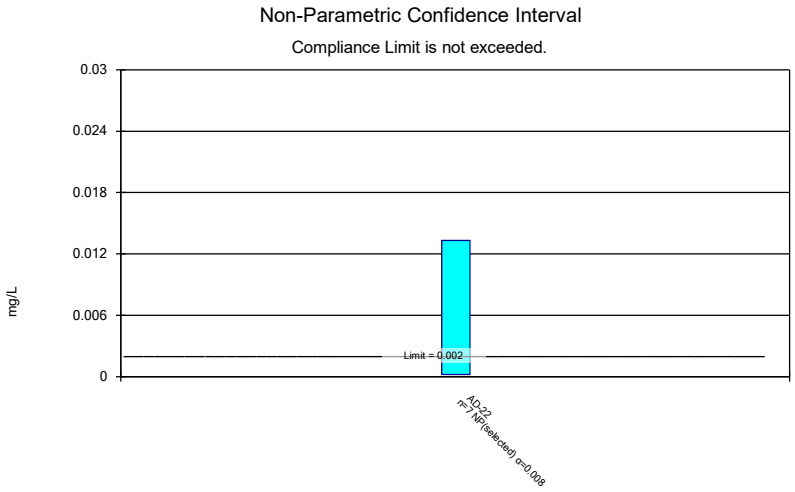
Slope = -0.00738 units per year.

Mann-Kendall statistic = -25 critical = -27

Trend not significant at 98% confidence level (α = 0.01 per tail).

Constituent: Mercury, total Analysis Run 2/5/2019 12:58 PM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout



Normality testing disabled.

Constituent: Mercury, total Analysis Run 2/5/2019 8:15 AM

Pirkey Stackout Client: Geosyntec Data: Pirkey Stackout

ATTACHMENT B
Certification by Qualified Professional Engineer

CERTIFICATION BY A QUALIFIED PROFESSIONAL ENGINEER

I certify that the selected and above described alternative source demonstration is appropriate for evaluating the groundwater monitoring data for the Pirkey FGD Stackout Area CCR management area and that the requirements of 40 CFR 257.95(g)(3)(ii) have been met.

Beth Ann Gross
Printed Name of Licensed Professional Engineer

Beth Ann Gross
Signature

Geosyntec Consultants
8217 Shoal Creek Blvd., Suite 200
Austin, TX 78757

Texas Registered Engineering Firm
No. F-1182

79864	Texas	February 18, 2019
License Number	Licensing State	Date