MEMORANDUM

14 January 2019
File No. 129420

SUBJECT: Selection of Statistical Procedures Certification for the Ash Pond
             Southern Indiana Gas and Electric Company (SIGECO)
             A.B. Brown Generation Station

Pursuant to CFR Title 40 Chapter I Subchapter I Part 257 Subpart D §257.93 (f)(6)[1], I certify that the selected statistical method described herein will be appropriate for evaluating the groundwater monitoring data collected for detection and assessment monitoring for the CCR management area for the A.B. Brown Ash Pond. This certification and the underlying evaluation to select a statistical procedure were conducted under my direction or supervision according to a system designed to assure that qualified personnel selected the statistical procedure pursuant to 40 CFR §257.93. The certification submitted is, to the best of my knowledge, accurate and complete.

It is anticipated that a tolerance interval is a concentration range, with a specified confidence level, designed to contain a pre-specified proportion (e.g., 95 percent) of the underlying population from which the statistical sample is drawn (background). The upper endpoint of a tolerance interval is called the upper tolerance limit or UTL. Depending on the data distribution, parametric or non-parametric tolerance limits procedures are used to evaluate groundwater monitoring data using this method. Parametric tolerance limits utilize normally distributed data or normalized data via a transformation of the sample background data used to construct the limit. If the data are non-normal and a transformation is not indicated, non-parametric procedures (order statistics or bootstrap methods) are used to calculate the tolerance limit. If all the background data are non-detect, a reporting limit (RL) may serve as an approximate upper tolerance limit.

Groundwater protection standards (GWPS), generated pursuant to 40 CFR § 257.95(d)(2) and in accordance with Phase I, Part 1 CCR Rule Revisions dated 17 July 2018, effective 16 August 2018, were generated for each Appendix IV constituent detected during assessment monitoring at the A.B. Brown Ash Pond. Analytical results from downgradient wells will be compared to each respective GWPS. If a constituent is greater than the GWPS for that Unit, pursuant to 40 CFR § 257.93 (f)(5), the confidence interval method will be used to evaluate if that Appendix IV constituent is present at a statistically significant level (SSL). Specifically, the lower confidence limit (LCL) from each downgradient well will be compared to the GWPS. A confidence interval is an estimated concentration range intended to contain

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[1] "The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating the selected statistical method is appropriate for evaluating the groundwater for the CCR management area. The certification must include a narrative description of the statistical method selected to evaluate the groundwater monitoring data."

true mean or median of the population from which the sample is drawn. The confidence interval range is designed to locate the true population mean or median with a high degree of statistical confidence or conversely, with a low probability of error. The LCL is the lower end of the confidence interval range. An LCL greater than the GWPS would indicate an SSL for that constituent. By requiring that a LCL be used as the basis of comparison, the statistical test will account for data variability and ensure that the potential statistical exceedance is unlikely to have occurred by chance. A parametric confidence interval on the mean is used if the data is normal with or without transformation. If no transformation is appropriate, the non-parametric confidence interval on the median is used. Pursuant to 40 CFR § 257.93 (g)(2), if an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a groundwater protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparison procedure is used, the Type I experiment error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons will be maintained.

Any change in the statistical methods will be documented in a subsequent certification, if necessary and appropriate.

Signed:_____
                        Certifying Engineer

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Title:	Vice President
Company:	Haley & Aldrich, Inc.

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