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Building Trust. Engineering Success.

Mr. Allan G. Palmer   May 4, 2018
GSP Merrimack LLC   File No. 2025.07
431 River Road
Bow, NH 03304

Re: Statistical Method Selection Certification
        Data Collected November 2017 and January 2018
        Merrimack Station Coal Ash Landfill
        Bow, New Hampshire

Dear Allan:

Sanborn, Head & Associates, Inc. (Sanborn Head) prepared this Statistical Method Selection Certification (Certification) for Detection Monitoring at the Merrimack Station Coal Ash Landfill (landfill) located in Bow, New Hampshire. This Certification was prepared in accordance with our December 20, 2016 Proposal for Compliance Services for the Coal Combustion Residual (CCR) Rules (40 CFR Part 257.93) and is applicable to the statistical analysis completed on the groundwater analytical data collected on November 17, 2017 and collected during a resampling event on January 31, 2018 (per the prediction limit approach and strategy for retesting incorporated into the statistical analysis). November 2017 data were received from the laboratory on December 8, 2017, and January 2018 data were received from the laboratory on February 15, 2018.

This letter certifies that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR landfill, as required by 40 CFR Part 257.93(f)(6).

Pursuant to 40 CFR Part 257.93(f) and (g), the statistical methods specified in 40 CFR Part 257.93(f)(1) through (5) were assessed for applicability for detection monitoring using the groundwater monitoring data collected through January 31, 2018. The CCR Rules provide some framework for available statistical methods, but do not prescribe specific methods or discuss which method may be appropriate for a given data set. For additional guidance on the selection and implementation of statistical methods under these rules, Sanborn Head referenced the USEPA Unified Guidance Document for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, dated March 2009 (USEPA Unified Guidance). Future statistical analyses of additional groundwater monitoring data reviewed by Sanborn Head under 40 CFR Part 257.93 may result in a change to the statistical method used (e.g., due to changes in data distributions or data trends), and future certifications will need to be revised accordingly.

The prediction interval procedure specified in 40 CFR Part 257.93(f)(3) was selected for evaluation of the most recent parameter values for the site wells (i.e., SB-1, SB-4, SB-6, SB-13, and SB-14). The statistical method was revised from the previously used parametric analysis of variance to the current prediction interval approach because, while the prediction

interval approach is preferred to allow for intrawell analysis to account for natural spatial variation in data, prediction intervals could not be used during the last statistical analysis because a full eight-sample background data set was not collected at the time.

The prediction interval procedures were performed on parameters specified in Appendix III (i.e., boron, calcium, chloride, fluoride, pH, Sulfate, and total dissolved solids) using the multiple well and multiple parameter prediction limit equation provided in the USEPA Unified Guidance.[1] For each parameter, monitoring wells were sorted into background groups based on two criteria: 1) mean parameter concentrations were not significantly different between wells within the group; and 2) data for the group passed normal distribution and equal variance tests.[2] Additionally, Mann-Kendall tests were completed to test for temporal trends in data.[3]

Thank you for the opportunity to be of service to GSP Merrimack LLC. We look forward to continuing to work with you on this project.

Sincerely,
SANBORN, HEAD & ASSOCIATES, INC.

Harrison R. Roakes   Eric S. Steinhauser, P.E., CPESC, CPSWQ
Senior Project Engineer   *Principal*

HRR/LLD/AEA/ESS:hrr

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[1] Equation 18.4 of the USEPA Unified Guidance. A retesting strategy using two individual future observations was employed and the prediction limit "κ-multipliers" were selected using the intrawell prediction limits for future observations tables for semi-annual sampling in Appendix D of the USEPA Unified Guidance.

[2] Tests were performed using the statistical software ProUCL 5.1.002.
      - Means were tested using one-way parametric analysis of variance.
      - Normality was tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests.
      - Equal variance was tested using the Levene test.
   In the two instances where data that did not pass normal distribution tests (i.e., pH across all locations and chloride at SB-6), data were assessed using nonparametric one-way analysis of variance using ProUCL 5.1.002.

[3] Mann-Kendall tests were completed using the statistical software ProUCL 5.1.002.

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