



October 16, 2017

Tyler Esplin, PE
Environmental Superintendent
Bonanza Power Plant
12500 East 25500 South
Vernal, UT 84078-8525

Re: Selected Statistical Method Certification
Deseret Generation and Transmission Cooperative – Bonanza Power Plant, Vernal, Utah

Dear Mr. Esplin:

Deseret Generation and Transmission Cooperative (Deseret Power) retained Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to review the selection of a statistical method for evaluating groundwater monitoring data from the groundwater monitoring systems associated with two (2) coal combustion residual (CCR) units at the Bonanza Power Plant located near Vernal, Utah (Bonanza or Site). The CCR units located at Bonanza meet the definition of existing CCR landfills presented in the United States Environmental Protection Agency's (EPA's) *Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments* (40 CFR Part 257) and are therefore subject to groundwater monitoring requirements identified in 40 CFR §257.90 through 40 CFR §257.95. The statistical method selection review included an assessment of compliance with 40 CFR §257.93 – Groundwater sampling and analysis requirements.

Bonanza is operated by Deseret Generation and Transmission Cooperative (Deseret Power) and is located approximately 35 miles southeast of Vernal, Utah. Bonanza is a 500 megawatt (MW) gross coal-fired steam turbine and generator with two existing CCR landfills. These landfills contain fly ash, bottom ash, boiler slag, and flue gas desulfurization (FGD) materials. One of the existing landfills, located on the north end of the Site, mainly contains fly ash and FGD material and is referred to as the Fly Ash and FGD Sludge Landfill. The other existing landfill, located on the south end of the Site, mainly contains bottom ash and boiler slag and is referred to as the Bottom Ash Landfill.

On behalf of Deseret Power, Burns & McDonnell is submitting certification that the selected statistical method is appropriate for evaluating groundwater monitoring data associated with the two (2) CCR landfills located at Bonanza and meets the requirements set forth in 40 CFR §257.93. This certification is intended to fulfill the requirements presented in 40 CFR §257.93(f)(6).

Deseret Generation and Transmission Cooperative

October 16, 2017

Page 2

Statistical Method Description

An initial statistical evaluation of analytical results of 40 CFR §257 Appendix III and Appendix IV constituents for groundwater samples collected from the groundwater monitoring systems associated with the two (2) CCR landfills located at Bonanza was performed to support selection of an appropriate statistical method. Data included in this initial statistical evaluation consisted of eight independent baseline detection monitoring samples collected prior to October 2017 at the Site. This evaluation included the use of Sen's Slope/Mann-Kendall and Outliers Screening tests to assess data for trends and outliers, respectively. These were followed by a review of analysis of variance (ANOVA) tests and Box and Whisker plots to evaluate spatial variability in groundwater constituent concentrations at the Site. Based on this initial statistical evaluation and an assessment of hydrogeologic conditions at the Site, the statistical methods described in 40 CFR §257.93 (f)(3), prediction limits, have been selected to assess detection monitoring program groundwater sample results to determine if there has been a statistically significant increase (SSI) over background.

Prediction intervals were selected due to their power to detect true contamination and their low false positive rates. The statistical analyses noted above were performed utilizing the statistical software Sanitas™ and in general accordance with USEPA's guidance document titled *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* dated March 2009 (Unified Guidance)¹.

The following presents a general summary of the process for performing prediction intervals:

1. Analytical data are formatted and uploaded to the Sanitas™ software (or equivalent) for data translation.
2. To establish background, data are reviewed for trends (typically using the Sen's Slope/Mann-Kendall test) and outlier values (typically using the Outlier Screening test). Provided trends are not encountered, and outliers are excluded, background is established and used to calculate the prediction limits for each constituent.
3. Prediction intervals evaluations are performed for each constituent in each well. To perform the prediction interval evaluations, the software statistically compares the compliance data to background to determine if there has been an SSI over background for any constituent at each groundwater monitoring system well.
4. An exceedance of the prediction limit would be considered a SSI over background. The first occurrence would be considered an initial SSI, while a repeat SSI would be considered a verified SSI. Initial SSI will be resampled and analyzed in a subsequent

¹EPA, *Unified Guidance Document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities*, U.S. Environmental Protection Agency, EPA 530/R-09-007, March 2009



Deseret Generation and Transmission Cooperative

October 16, 2017

Page 3

sampling event (within 90 days) to confirm if they are verified SSIs or were the result of an anomaly for said sampling event, laboratory or sampling error, or an isolated increase in concentration due to transient Site conditions. Trend tests and outlier tests are also typically performed to assess a SSIs

5. In accordance with the Unified Guidance, background is reevaluated approximately every two years to include the most recent data.

Should any constituent exhibit a verified SSI above background in detection monitoring that results in initiation of assessment monitoring, the statistical method used to evaluate data relative to background and established groundwater protection standards (GPS) in the assessment monitoring program may include the use confidence intervals, another statistical method considered compliant with the performance standard described in 40 CFR §257.93 (g) [as permitted by 40 CFR §257.93 (f)(5)]. Trend tests would also be routinely performed for any applicable constituents.

In the event statistical methods other than those presented in this certification letter are used to assess groundwater monitoring data at the Site, a subsequent certification will be prepared in accordance with 40 CFR §257.93.

Statistical Method Requirements

Requirements stated in 40 CFR §257.93(g) specify the performance standards, as appropriate, applicable to the selected statistical method. The performance standards are summarized as follows:

- The statistical method shall be appropriate for the distribution of groundwater constituents.
- Type I error level no less than 0.01 shall be used for comparison of individual compliance well constituent concentrations to background or GPS (not applicable to tolerance intervals, prediction intervals or control charts).
- Type I experiment wise error level no less than 0.05 shall be used for multiple comparison procedures and the Type I error level no less than 0.01 individual well comparisons must be maintained (not applicable to tolerance intervals, prediction intervals or control charts).
- If control chart approach is used, the specific type and associated parameter values used shall be such that the approach is as least as effective as other approaches for evaluating groundwater data in 40 CFR §257.93.
- If tolerance or prediction interval is used, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval contain, shall be such that the



Deseret Generation and Transmission Cooperative
October 16, 2017
Page 4

approach is as least as effective as other approaches for evaluating groundwater data in 40 CFR §257.93.

- The statistical method must account for data below the limit of detection with one or more statistical procedures that shall be at least as effective as other approaches for evaluating groundwater data in 40 CFR §257.93.
- If necessary, the statistical method must include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

Through a review of site-specific technical information, and applicable guidance¹ Burns & McDonnell confirmed that the selected statistical method meets these requirements and is appropriate for evaluating the groundwater monitoring data associated with the CCR landfills at the Site.

Limitations

Burns & McDonnell has prepared this selected statistical method certification letter with reasonable skill, care, and diligence in accordance with customarily accepted professional practices in effect at the time it was prepared. Conclusions are interpretation of available data and constitute a professional opinion based on that data.

If you have questions regarding the information presented herein please contact me at 816-349-6796 or bandrews@burnsmcd.com.

Sincerely,

A handwritten signature in black ink that reads "Block Andrews".

Mr. Block Andrews
Project Manager

A handwritten signature in black ink that reads "Wayne A. Weber".

Mr. Wayne A. Weber, PE, PG
Project Engineer

WAW/waw

cc: David Crabtree (Deseret Power)
Katie Bland (Burns & McDonnell)

Certification

I hereby certify, as a Professional Engineer in the State of Utah, that the selected statistical method meets the requirements in 40 CFR §257.93, and is appropriate for evaluating the groundwater monitoring data associated with the two (2) CCR Landfills at the Bonanza Power Plant located near Vernal, Utah operated by Deseret Generation and Transmission Cooperative based on information provided in this letter, and a review of groundwater monitoring system documentation placed in the facility's operating record.

Wayne Weber, Utah PE License No. 10492075-2202

Date: 10/16/2017

