STATISTICAL METHOD CERTIFICATION
ASH LANDFILL GROUNDWATER MONITORING WELLS
SPRINGERVILLE GENERATING STATION
SPRINGERVILLE, ARIZONA

Prepared for

TUCSON ELECTRIC POWER COMPANY

OCTOBER 17, 2017

Prepared by

AMTECH Associates L.L.C.
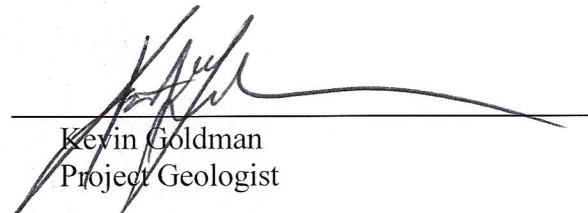8666 E. San Alberto Dr.
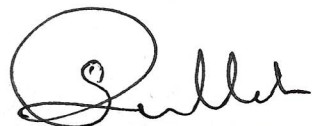Scottsdale, Arizona 85258

Project No. 1062.07

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Statistical Method Certification
Ash Landfill Groundwater Monitoring Wells
Springerville Generating Station
Tucson Electric Power Company
Springerville, Arizona

I hereby certify that the statistical method identified herein is appropriate for evaluating the groundwater monitoring data for the Ash Landfill Groundwater Monitoring Wells at the Springerville Generating Station and meets the requirements of 40 CFR §257.93(f), as included in 40 CFR Part 257, Subpart D, Disposal of Coal Combustion Residuals from Electric Utilities. The material and data in this report were prepared by me or under my supervision, and I am a duly Professional Engineer under the laws of the State of Arizona.

AMTECH Associates, L.L.C.

Kevin Goldman
Project Geologist

CERTIFICATE NO.
31173
SYED SHAH
AMANATULLAH
Date Signed 10/17/2017
Registered Professional Engineer (Environmental)
ARIZONA, U.S.A.

Expires: 3/31/2018

Syed S. Amanatullah, P.E.
Managing Member

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1   INTRODUCTION

1.1 Introduction

The US Environmental Protection Agency (UESPA) published the final rule for the Coal Combustion Residues (CCR) Rules under the Resource Conservation and Recovery Act (RCRA) on April 17, 2015. The CCR Rules are published as Subpart D to Title 40 of the US Code of Federal Regulations (40 CFR) Part 257, Sections §257.50 to §257.107.

AMTECH Associates L.L.C. (AMTECH) has prepared this report to comply with the groundwater sampling and analysis requirements pursuant to the CCR Rules for Landfill and Surface Impoundments of electric utilities. The Springerville Generating Station (SGS) is a four-unit, pulverized coal-fired, steam electric generating facility and these standards are applicable to the facility's Ash Landfill as an "Existing CCR landfill" as defined in 40 CFR §257.53.

This report certifies that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the Ash Landfill as per the groundwater sampling and analysis requirements of 40 CFR §257.93(f)(6).

1.2 Site Description and Location

The SGS is a four-unit, pulverized coal-fired, steam electric generating facility, operated by Tucson Electric Power Company (TEP), that began operations in 1985 and consists of a combined net generating output of approximately 1600-megawatts.

SGS is located approximately 15 miles northeast of Springerville, in Apache County, Arizona. The power plant area of SGS is located in Sections 27, 28, 33, and 34, of Township 11 North, Range 30 East of the Salt and Gila River Baseline and Meridian. The SGS site occupies 14,355 acres, which includes the power plant area, ash landfill area and the east and west well fields.

The Ash Landfill, located southwest of the power plant area, is primarily used for the disposal of fly and bottom ash, products of the coal-fired units at the plant. A delineated portion of the Ash Landfill is used for the disposal of other items in lesser quantities, i.e. reactivator sludge, construction debris and power plant outage refuse, sump sludges, demineralizer resins, PCS, cooling tower sludge, lime, soda ash, sewage pond sludge, evaporation pond solids, miscellaneous pond clean-outs, cooling tower treated lumber, and other inert and non-hazardous materials.

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2   STATISTICAL METHODOLOGY

The groundwater monitoring system at the SGS Ash Landfill consists of five (5) groundwater monitoring wells, with two (2) upgradient wells and (3) downgradient wells installed into the uppermost aquifer. The CCR Rules require an evaluation of groundwater monitoring data for statistically significant increases over background levels for the constituents listed in Appendix III of 40 CFR §257.

AMTECH has prepared this Statistical Method Certification to provide a narrative description of the statistical methods that will be used to evaluate groundwater quality data from upgradient (background) and downgradient (compliance) monitoring wells at the Ash Landfill. The chosen statistical method will be used to determine if there is "statistically significant evidence of contamination" in compliance monitor wells, pursuant to §257.93(h)(1), that might result from the solid waste disposal activities at the Ash Landfill.

2.1 Statistical Method Requirements §257.93(f)

The owner or operator of the CCR landfill must select one of the statistical methods specified in §257.93(f) (1) through (5) to be used in evaluating groundwater monitoring data for each specified constituent. The statistical test chosen shall be conducted separately for each constituent in each monitoring well.

Statistical analytical methods and related performance standards that are applicable to CCR facilities are discussed at §257.93(f) and (g), respectively. Briefly:

o   Specific techniques named in the CCR Rule include: 1) parametric analysis of variance (ANOVA); 2) rank-based, non-parametric ANOVA; 3) prediction or tolerance interval approaches; and 4) a control chart approach. "Other methods" may be used, as long as they meet the required performance standards of §257.93(f); and

o   Generally, performance standards may include, where applicable: 1) considerations for false positives (Type I error) and false negatives (Type II error); 2) statistical tests to ensure the data fit the distribution (e.g., normal, log-normal, non-normal, etc.) required for that technique; 3) corrections for seasonal, spatial, and temporal variability; and 4) appropriate treatment of non-detections for the statistical method selected.

Statistical methods will be employed to establish background groundwater quality concentrations for all constituents in Appendix III of Part 257 (and Appendix IV, if

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appropriate), in accordance with §257.93(d). The USEPA's *Unified Guidance* (2009) discusses multiple techniques of statistical analysis and provides guidance for their application to the analysis of groundwater data at RCRA facilities. The *Unified Guidance* will serve as the guiding document to perform the statistical analyses of groundwater quality results from the SGS CCR monitoring network.

2.1.1 Statistical Method Selection

Pursuant to §257.94(b), a minimum of eight (8) groundwater samples is required in order to calculate the background groundwater quality concentrations. The required samples were collected from each background and compliance well within the SGS CCR monitoring well network and were analyzed by a qualified laboratory.

Technical guidance from the Arizona Department of Environmental Quality (ADEQ), from which the facility has an Aquifer Protection Permit, has favored the use of tolerance intervals for the analysis of groundwater monitor wells at solid waste facilities. Although prediction intervals and tolerance intervals are similar, the *Unified Guidance* favors prediction intervals. The groundwater results collected from the CCR monitoring well network will be used to calculate prediction intervals, in accordance with §257.93(f)(3). The specific methodology to be followed is detailed in the Sampling and Analysis Plan. Briefly, this will include evaluating the laboratory data:

1. for autocorrelation and outliers;

2. to determine their distribution so that the proper statistical analysis is performed;

3. to use non-detects as appropriate for the statistical analysis method; and

4. to correct for seasonal, spatial, and temporal variability, if necessary.

Review of statistical diagnostic test results will ultimately be used to determine if prediction intervals are appropriate for the SGS.

2.2 Professional Engineer Certification §257.93(f)(6)

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

The certification statement by a qualified professional engineer is included on Page ii of this document.

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2.3 Statistical Significant Increase Determination §257.93(h)

Once background concentrations are established for each constituent included in the Detection Monitoring program, statistical methods will be used to determine if there has been a statistically significant increase (SSI) in any of their concentrations, pursuant to §257.93(h). Should subsequent statistical analysis of a Detection Monitoring sample confirm that there is an SSI above the background concentration for any constituent in any compliance well, TEP will initiate an Assessment Monitoring program in accordance with §257.94(e)(1).

An initial groundwater sample must be collected from one or more wells following confirmation of the SSI; the number of samples to be collected shall be determined in accordance with the number required for the statistical method chosen (see §257.93(e)). This initial Assessment Monitoring sampling event is to be performed as discussed in §257.95(b) and (d); a groundwater protection standard (GWPS) will be assigned *for each constituent that is detected* during this event. In accordance with §257.95(h), the GWPS shall be set as:

1. Equal to the USEPA's maximum contaminant level (MCL) if one is established for that constituent;

2. Equal to background concentration calculated in accordance with §257.93(f) and (g); or

3. Equal to the background concentration calculated in accordance with §257.93(f) for any constituent with an MCL if the background concentration exceeds the MCL.

Statistical methods used to identify SSIs during the Assessment Monitoring program will be the same as those used for the Detection Monitoring program unless diagnostic tests suggest a need to re-evaluate the statistical method(s) used.

2.3.1 Revisions to Statistical Methods Employed

TEP reserves the right to use any statistical method(s) identified in §257.93(f) or any other that can meet the performance standards §257.93(g). If the statistical analysis method(s) are revised or replaced, the Statistical Method Certification, which is required by §257.93(f)(6), will be revised and a new notification will be submitted in accordance with §257.106(h)(3).

2.4 Recordkeeping, Notification, Internet Posting §257.93(j)

As per CFR Part §257.93(j), the owner or operator of the CCR landfill must comply with the recordkeeping requirements specified in §257.105(h)(4), the notifications requirements specified in §257.106(h)(3), and the internet requirements specified in §257.107(h)(3).

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In accordance with CFR Part §257.105(h)(4), TEP will place this Statistical Method Certification report in the facility's operating record.

In accordance with CFR Part §257.106(h)(3), TEP will provide notification of the availability of the Statistical Method Certification report to the relevant State Director and/or Tribal authority before the close of business on the day the notification is required to be completed.

In accordance with CFR Part §257.107(h)(3), TEP will place the Statistical Method Certification report on TEP's CCR web site.