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ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

TRANSMITTAL LETTER

September 23, 2024

Illinois Environmental Protection Agency
Compliance Assurance Section
Bureau of Water
1021 North Grand Avenue East
Springfield, IL 62702

Subject: Revised Attachment 9-5 Submittal
Midwest Generation, LLC, Powerton Generating Station
CCR Surface Impoundment Operating Permit No. 2024-CO-100029

Compliance Manager,

KPRG and Associates, Inc. (KPRG), on behalf of our client Midwest Generation, LLC, is submitting this Revised Attachment 9-5 in fulfillment of requirements set forth under CCR Surface Impoundment Operation Permit No. 2024-CO-100029, Special Condition No. 16. As currently required, included is an unbound original and two copies of the submittal. If there are any questions, please contact Ms. Jill Buckley of Midwest Generation at 724-448-9732 or me at 262-781-0475.

Sincerely,
KPRG and Associates, Inc.

Richard R. Gnat, P.G.
Principal

cc: Jill Buckley, Midwest Generation, LLC
Joseph Kotas, Midwest Generation, LLC
Sharene Shealey, Midwest Generation, LLC

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KPRG and Associates, Inc.

ILLINOIS STATE CCR RULE COMPLIANCE
REVISED STATISTICAL APPROACH FOR GROUNDWATER DATA EVALUATION

Midwest Generation, LLC
Powerton Generating Station
13082 Manito Rd.
Pekin, Illinois

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14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

September 23, 2024

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1.0 INTRODUCTION

On July 3, 2024, Illinois Environmental Protection Agency (IEPA) issued the final Coal Combustion Residual Surface Impoundment Operation Permit 2024-CO-100029 (Permit) for the Midwest Generation, LLC Powerton Generating Station in Pekin, Illinois. The Permit covers the operation of the Ash By-pass Basin (ABB), Ash Surge Basin (ASB), Metal Cleaning Basin (MCB) and the Former Ash Basin (FAB). All four basins are covered under one overall monitoring program as defined in Special Conditions 12 and 13. The groundwater monitoring program specified in those conditions is as follows:

- Background Monitoring Well - MW-16; this well is intended for background for both the silty clay/silt unit and the sand and gravel unit (screened in sand and gravel).

- Silty Clay/silt Unit Wells – MW-06, MW-14, MW-22 and MW-18A (see discussion below for MW-18A).

- Sand and Gravel Unit Wells – MW-01, MW-02, MW-03, MW-04, MW-05, MW-07, MW-10 and MW-21D.

It is noted that newly installed well MW-23 did not encounter the silty clay/silty layer and therefore, it is completed as a sand and gravel unit well. It is not included in Special Condition 13 for CCR sampling; however, it is included under Special Condition 14 for water level measurements. As further requested by the Agency, another silty clay/silt unit well was installed adjacent to existing well MW-18, the screen for which currently extends through the silty clay/silt unit into the underlying sand and gravel, and is screened strictly within the silty clay/silt unit. This well is identified as well MW-18A.

The well locations are shown on Figure 1.

Section 845.640(f) of the State CCR Rule requires the development of the statistical approach that will be used for assessing the data and determining whether a statistically significant increase over background concentrations in groundwater has occurred at identified downgradient monitoring points. Potential statistical methods that can be applied to the data are listed in Section 845.640(f) and performance standards are provided in 845.640(g).

This revised narrative of the statistical approach that will be used for the Powerton facility's groundwater monitoring data is intended to fulfill certification requirements under Section 845.640(f)(2) and Special Condition 16 of the Permit. The professional engineer's certification of this statistical approach is provided in Section 4.0 of this document.

2.0 STATISTICAL METHOD SELECTION and BACKGROUND DATA EVALUATION

Section 845.640(f)(1) identifies five statistical data evaluation methods that can be used for assessing site groundwater data. Relative to the subject site, the prediction interval procedure identified in 845.640(f)(1)(C) will be used. This approach is robust and conforms to varying data distributions and facilitates various non-detect frequencies. U.S. EPA identifies this method as preferred over establishment of tolerance intervals (Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance, March 2009 [Unified Guidance]).

Well MW-16 has been specified in the Permit as the background monitoring point. This well has not been previously sampled for CCR parameters for either the Federal CCR program or for the initial several years of sampling performed under the State CCR program prior to issuance of the Permit. Therefore, the initial eight rounds of samples collected from well MW-16 will eventually be used as the basis for the subsequent required background statistical calculations. The established, representative background concentration for the upgradient well location will be used to develop prediction limits for the regulated unit for each constituent listed in Section 845.600(a) and (b) as provided in Table 1.

Statistical evaluations will be performed with the assistance of the Sanitas^{TM} software package.

2.1 Outlier Testing

The background dataset will be first checked for potential outliers for each constituent. Potential causes of outliers can be, but are not limited to:

- Changes in sampling technique;
- Changes in analytical methods;
- Data transcription errors;
- Unnatural localized event such as a spill; or
- Natural but extreme variations in constituent concentration.

The Unified Guidance does not recommend removing an outlier from the data set unless it can be shown that the outlier is not caused by extreme natural variation. Verified data from a NELAP laboratory is considered representative of the aquifer properties analyzed. Outliers will not be considered for exclusion from any dataset without explicit data validation identifying discrepancies from the laboratory and/or field procedures that would qualify a data point to be considered an outlier. USEPA data validation procedures would be used to determine when or if a data point is to be excluded from a data set. Prior to any such exclusion, agreement will be reached with IEPA regarding the method with which to adjust the dataset.

2.2 Spatial Variability

If more than one background well is being used for the monitored unit, an evaluation of spatial variability will be performed to determine whether the mean concentration of a constituent varies statistically between the background points. This is generally accomplished by performing an Analysis of Variance (ANOVA). If statistically significant spatial variation is determined to be

present, the background points will not be combined between the wells. If the spatial variability is determined to be natural, an intrawell data evaluation approach may be considered for both upgradient and downgradient wells. It is noted that at this time, only one background well is being considered, MW-16.

2.3 Temporal Variability

Temporal variability in groundwater data from a specific monitoring point occurs when a consistent fluctuation of constituent concentrations occurs over time. The most common example is seasonal variation. If such a variation is noted in the data, the dataset should be corrected to account for the trend; however, any such corrections must be applied judiciously and would be completed in accordance with the Unified Guidance recommended procedures.

2.4 Trend Testing

As additional data is generated after eight rounds of sampling, the background dataset may be considered for expansion. This is usually done only after at least three to five years of additional sampling (per Unified Guidance). The expanded background dataset for each upgradient well, for each constituent listed in Table 1, will undergo trend analysis to determine if there may be a potential statistically significant trend in the data. Linear regression will be the primary trend analysis tool, however, other methods such Sen's Slope Estimator may also be used. If a statistically significant trend is identified in the larger combined background dataset, the new data cannot be added to the initial background dataset, and only the original eight rounds of data can be used for that well in background development and associated subsequent calculations.

2.5 Test of Normality

The main underlying assumption in parametric data evaluations, such as establishing prediction limits, is that the underlying data distribution is normal. A quick approximation can be made by calculating the Coefficient of Variance (CV) which is the quotient of the standard deviation divided by the sample mean. In general, if this quotient is greater than 1, the underlying data distribution is probably not normal. The new Unified Guidance is more conservative and suggests that if this quotient is greater than 0.5, the dataset may not be normal and a more robust distribution evaluation should be performed. Therefore, for any CV value greater than 0.5 for a specific dataset, normality will be evaluated using the Shapiro-Wilk Test with an alpha (α) value of 0.05 (or 95%).

If the dataset does not pass this initial test, the data will undergo a log transformation and the test will be repeated for the natural log values of the dataset. If it is determined that this dataset is log-normal, statistical evaluations will be completed on those values and the result converted back to the standard value. If the underlying distribution is also determined not to be log-normal, the Unified Guidance provides for a number of other data transformations that can be performed to evaluate whether those underlying distributions may be normal at which point the entire dataset would be transformed for subsequent calculations.

If a normal underlying distribution cannot be determined, non-parametric statistical evaluations will need to be considered which do not rely on a specific underlying distribution.

2.6 Non-Detects

It is not uncommon in environmental datasets to have parameters being detected at low concentrations during one sampling event and being not detected in other sampling events. Having a consistent approach to the handling of non-detect values is an important part of the statistical evaluation process. The handling of non-detect values will be accomplished as follows:

- 100 Percent Non-Detects – Assumed that the constituent is not present and no statistical evaluations will be performed. The upper prediction limit will be set at the Reporting Limit (RL) established by the analytical laboratory.

- 50 Percent or Greater Non-Detects – A non-parametric evaluation will be performed where the confidence interval will be constructed using the highest detected concentration as the upper prediction limit.

- 15 to 50 Percent Non-Detects – Aitchison's Adjustment will be used with subsequent parametric or non-parametric evaluations, as appropriate, based on underlying distributions.

- 0 to 15 Percent Non-Detects - The non-detect values will be replaced with RL/2 and the dataset will be evaluated for distribution normality with subsequent parametric or non-parametric evaluations, as appropriate, based on underlying distributions.

2.7 Prediction Limit Calculation for Normally Distributed Data

For datasets where the distribution or underlying transformed distribution is normal, a parametric statistical approach will be used for establishing the prediction limit at the required 95% statistical confidence. In accordance with Unified Guidance, the following equation will be used:

$$95\%\ Prediction\ Limit = \bar{x} + t_{1-0.05/m,n-1} s \sqrt{1+\frac{1}{n}}$$

Where:

$\bar{x}$ = the sample mean of the detected or adjusted results
S = sample standard deviation of the detected or adjusted results
$t_{1-0.05/m,n-1}$ = the students t-coefficient for degrees of freedom (n-1) and confidence level (1-0.05/m)
n = the number of samples
m = the number of future samples

The number of future sampling events (*m*) will be set at 2 which will account for one sampling event and a confirmation resampling. This will assist in limiting the potential number of false positives. An acceptable site-wide false positive (SWFP) rate of 10% or less is acceptable under the Unified Guidance.

2.8 Prediction Limit Calculation for Non-Normally Distributed Data

If the dataset distribution or underlying distribution is determined not to be normal, a non-parametric approach will need to be used for the establishment of the prediction limit. The non-parametric evaluation will use the highest detected concentration as the upper prediction limit for the specific constituent. Any prediction limits which will be based on non-parametric evaluations will be highlighted for IEPA review and approval any time a background statistic is recalculated.

3.0 GROUNDWATER MONITORING

The State CCR Rule does not distinguish between detection monitoring or assessment monitoring as was defined under the Federal CCR Rule. To meet the requirements set forth in Section 845.650(b), a minimum of eight rounds of groundwater data need to be collected for establishing background. As noted above, if more than eight rounds of data are available, then the larger dataset will be evaluated to determine whether the background dataset can be expanded to provide a more robust statistical assessment. At that point, statistical evaluation of the background dataset will be performed to establish the upper prediction limits for each Section 845.600(a) and (b) constituent. It is noted that in the case of pH, a lower prediction limit will also be established since this parameter has an established upper and lower value range for compliance.

Site specific Groundwater Protection Standards (GWPSs) will be developed in accordance with Section 845.600(a)(2) as follows:

- If the constituent has an established State standard listed in Section 845.600(a)(1) and the standard is greater than the calculated background upper prediction limit, then the standard will serve as the GWPS. If the background upper prediction limit is greater than the standard, the upper prediction limit will serve as the GWPS.

- If the constituent does not have an established standard (i.e., calcium and turbidity) then the calculated upper prediction limit will serve as the GWPS.

Once the proposed GWPSs are determined and approved by Illinois EPA, subsequent downgradient well concentrations will be compared against the upper prediction limit (and lower prediction limit in the case of pH), and the GWPSs. If an exceedance of the GWPS is identified during a quarterly sampling event, an immediate resampling of the specific well(s) will be completed for those specific parameters. If the exceedance is confirmed by the resampling, the Illinois EPA will be notified of the exceedance(s) and the notification will be placed in the facility's operating record in accordance with 845.800(d)(16). It is noted that there are some constituents that historically may have had no detections (i.e., 100% non-detects). In this case, in accordance with the Unified Guidance, if there is a detection of such a constituent, then the Double Quantification Rule will be applied. Under this rule, a confirmed exceedance is registered if any well-constituent pair in the 100% non-detect group exhibits quantified measurements (i.e., at or above the Reporting Limit in two consecutive sample and resample events).

If an exceedance of the GWPS is recorded and reported to Illinois EPA, an Alternate Source Demonstration (ASD) may be completed within 60-days of the confirmed exceedance in accordance with Section 845.650(e) and submitted to the Illinois EPA as well as placing the ASD on the facility's publically accessible CCR website. Illinois EPA will review and approve or disapprove the ASD.

If it is decided not to complete an ASD or if Illinois EPA does not concur with and approve the ASD, a characterization of the nature and extent of the potential release must be completed in

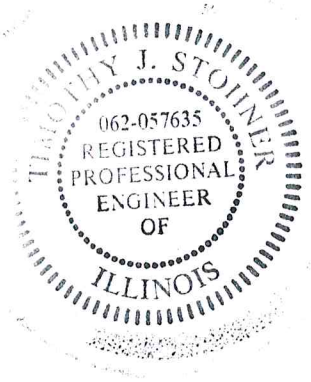
accordance with Section 845.650(d)(1) as well as meeting the requirements of Sections 845.660, 845.670 and 845.680.

4.0 CERTIFICATION

In accordance with Section 845.640(f)(2) of the State CCR Rule, I hereby certify based on a review of the information contained within this Illinois State CCR Rule Compliance Statistical Approach for Groundwater Data Evaluation dated August 23, 2021, the statistical procedures developed and selected for evaluation of groundwater data associated with the Midwest Generation Powerton Station CCR Units are adequate and appropriate for evaluating the groundwater data.

Certified by: _____

Date: 9/23/24

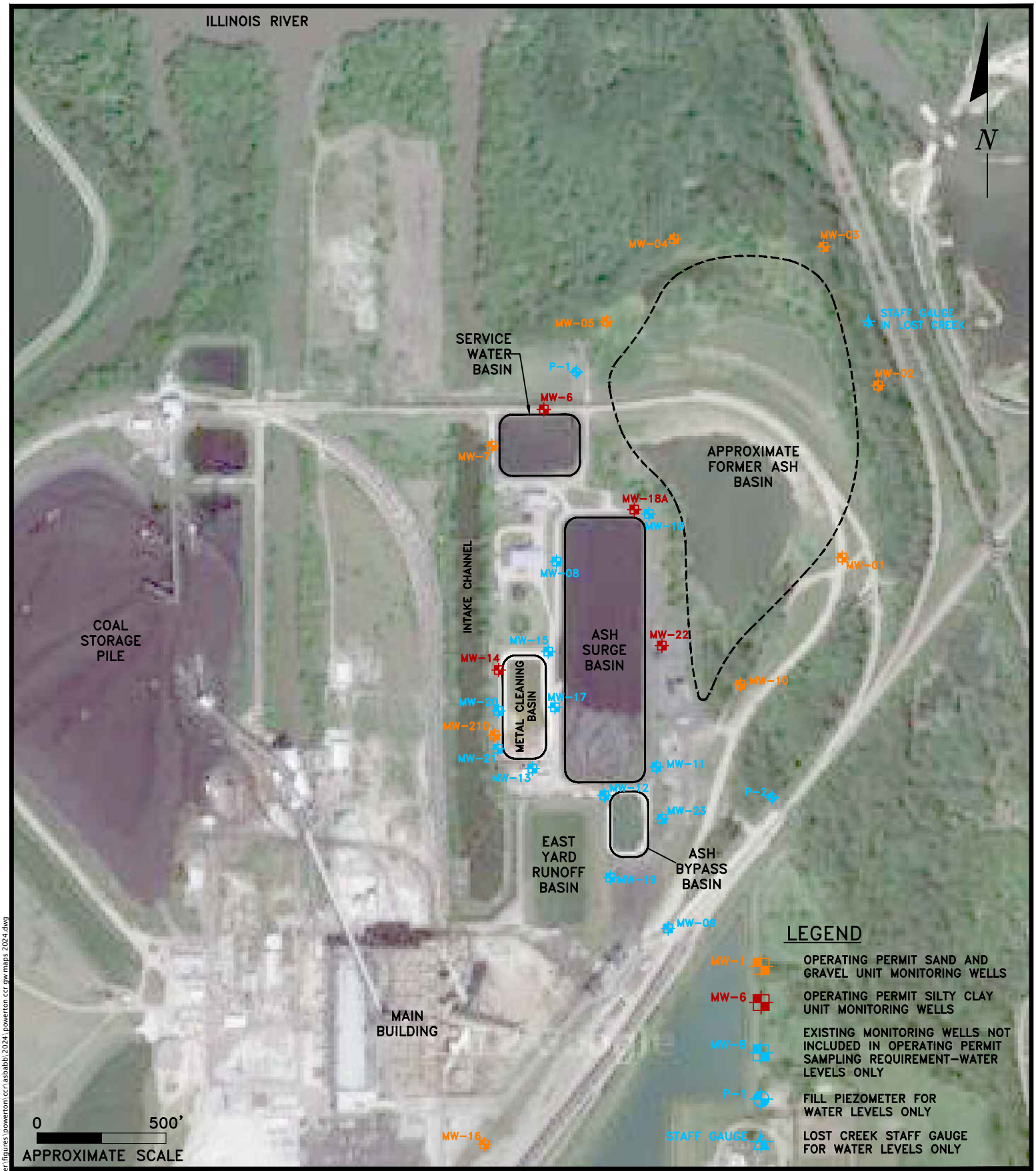


Timothy Stohner, P.E.

Professional Engineer Registration No. 062.057635

KPRG and Associates, Inc.

FIGURE



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OPERATING PERMIT MONITORING WELLS, STAFF GAUGE & PIEZOMETERS SITE MAP

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 500' | Date: July 30, 2024

KPRG Project No. 19520.1 | FIGURE 1

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TABLE

Table 1. Section 845.600 Groundwater Monitoring Parameter List

Parameter	Section 845.600 Standards
Antimony	0.006
Arsenic	0.01
Barium	2
Beryllium	0.004
Boron	2.0
Cadmium	0.005
Chloride	200
Chromium	0.1
Cobalt	0.006
Combined Radium 226 + 228 (pCi/L)	5.0
Fluoride	4.0
Lead	0.0075
Lithium	0.04
Mercury	0.002
Molybdenum	0.10
pH (standard units)	6.5-9.0
Selenium	0.05
Sulfate	400
Thallium	0.002
Total Dissolved Solids	1200
Calcium	NE
Turbidity	NE

All vaues in mg/l unless otherwise specified.
NE- Not Established