

2019 ANNUAL GROUNDWATER MONITORING  
AND CORRECTIVE ACTION REPORT  
BOTTOM ASH SETTLING AREA /BOTTOM ASH LANDFILL  
JEFFREY ENERGY CENTER  
ST. MARYS, KANSAS

by Haley & Aldrich, Inc.  
Cleveland, Ohio

for Evergy Kansas Central, Inc. (f/k/a Westar Energy, Inc.)  
Topeka, Kansas

File No. 129778-030  
January 2020



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Revision No.	Date	Notes
0	1/31/2020	Original

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**2019 Annual Groundwater Monitoring  
and Corrective Action Report**

This Annual Groundwater Monitoring and Corrective Action Report documents the groundwater monitoring program for the Jeffrey Energy Center (JEC) Bottom Ash Settling Area/Bottom Ash Landfill (BASA/BAL) consistent with applicable sections of § 257.90 through 257.98, and describes activities conducted in the prior calendar year (2019) and documents compliance with the United States Environmental Protection Agency Coal Combustion Residual Rule. I certify that the 2019 Annual Groundwater Monitoring and Corrective Action Report for the JEC BASA/BAL is, to the best of my knowledge, accurate and complete.

Signed:   
Professional Geologist

Print Name: Mark Nicholls  
Kansas License No.: Professional Geologist No. 881  
Title: Technical Expert 2  
Company: Haley & Aldrich, Inc.



## **1. Introduction**

This 2019 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) addresses the Bottom Ash Settling Area/Bottom Ash Landfill (BASA/BAL) at the Jeffrey Energy Center (JEC), operated by Evergy Kansas Central, Inc. (Evergy; f/k/a Westar Energy, Inc.). This Annual Report was developed in accordance with the United States Environmental Protection Agency Coal Combustion Residual (CCR) Rule (Rule) effective 19 October 2015, including subsequent revisions, specifically Code of Federal Regulations Title 40 (40 CFR), subsection § 257.90(e). The Annual Report documents the groundwater monitoring system for the BASA/BAL consistent with applicable sections of § 257.90 through 257.98, and describes activities conducted in the prior calendar year (2019) and documents compliance with the Rule. The specific requirements for the Annual Report listed in § 257.90(e) of the Rule are provided in Section 2 of this Annual Report and are in bold italic font, followed by a narrative describing how each Rule requirement has been met.

## 2. 40 CFR § 257.90 Applicability

### 2.1 40 CFR § 257.90(a)

***All CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under §257.90 through 257.99, except as provided in paragraph (g) [Suspension of groundwater monitoring requirements] of this section.***

Evergy has installed and certified a groundwater monitoring system at the JEC BASA/BAL. The BASA/BAL is a multi-unit system subject to the groundwater monitoring and corrective action requirements described under 40 CFR § 257.90 through 257.98. This document addresses the requirement for the Owner/Operator to prepare an Annual Report per § 257.90(e).

### 2.2 40 CFR § 257.90(e) – SUMMARY

***Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by §257.105(h)(1).***

This Annual Report describes monitoring completed and actions taken for the groundwater monitoring system at the JEC BASA/BAL as required by the Rule. Groundwater sampling and analysis was conducted in accordance with requirements described in § 257.93, and the status of the groundwater monitoring program described in § 257.94 is provided in this report. This Annual Report documents the applicable groundwater-related activities completed in the calendar year 2019.

#### 2.2.1 Status of the Groundwater Monitoring Program

The BASA/BAL remained in the detection monitoring program during 2019.

#### 2.2.2 Key Actions Completed

The 2018 Annual Groundwater Monitoring and Corrective Action Report was completed in January 2019. Statistical evaluation was completed in January 2019 on analytical data from the September 2018 detection monitoring sampling event. Semi-annual detection monitoring

## 2019 Annual Groundwater Monitoring and Corrective Action Report

events were completed in March and September of 2019. Statistical evaluation was completed in July 2019 on analytical data from the March 2019 detection monitoring sampling event. Statistical evaluation of the results from the September 2019 semi-annual detection monitoring sampling event are due to be completed in January 2020 and will be reported in the next annual report.

### 2.2.3 Problems Encountered

No noteworthy problems (i.e., problems could include damaged wells, issues with sample collection or lack of sampling, and problems with analytical analysis) were encountered at the JEC BASA/BAL in 2019.

### 2.2.4 Actions to Resolve Problems

No problems were encountered at the JEC BASA/BAL in 2019, therefore, no actions to resolve the problems were required.

### 2.2.5 Project Key Activities for Upcoming Year

Key activities planned for 2020 include completion of the 2019 Annual Groundwater Monitoring and Corrective Action Report, statistical evaluation of detection monitoring analytical data collected in September 2019, and semi-annual detection monitoring and subsequent statistical evaluations.

## 2.3 40 CFR § 257.90(e) – INFORMATION

***At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:***

### 2.3.1 40 CFR § 257.90(e)(1)

***A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;***

As required by § 257.90(e)(1), a map showing the locations of the CCR unit and associated upgradient and downgradient monitoring wells for the BASA/BAL is included in this report as Figure 1.

### 2.3.2 40 CFR § 257.90(e)(2) – Monitoring System Changes

***Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;***

No monitoring wells were installed or decommissioned in 2019.

### 2.3.3 40 CFR § 257.90(e)(3) – Summary of Sampling Events

***In addition to all the monitoring data obtained under §257.90 through §257.98, a summary including the number of groundwater samples that were collected for analysis for each***

***background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;***

In accordance with § 257.94(b), two independent detection monitoring samples from each background and downgradient monitoring well were collected during 2019. A summary including the sample names, dates of sample collection, field parameters, and monitoring data obtained for the groundwater monitoring program for the BASA/BAL is presented in Table I of this report.

#### **2.3.4 40 CFR § 257.90(e)(4) – Monitoring Transition Narrative**

***A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and***

There was no transition between monitoring programs in 2019. Only detection monitoring was conducted in 2019.

#### **2.3.5 40 CFR § 257.90(e)(5) – Other Requirements**

***Other information required to be included in the annual report as specified in §257.90 through §257.98.***

This Annual Report documents activities conducted to comply with § 257.90 through § 257.95 of the Rule. It is understood that there are supplemental references in § 257.90 through § 257.98 that must be placed in the Annual Report. The following requirements include relevant and required information in the Annual Report for the activities completed in calendar year 2019.

##### **2.3.5.1 40 CFR § 257.94(d)(3) – Demonstration for Alternative Detection Monitoring Frequency**

***The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).***

An alternative groundwater detection monitoring sampling and analysis frequency has not been established for this CCR unit; therefore, no demonstration or certification is applicable.

##### **2.3.5.2 40 CFR § 257.94(e)(2) – Detection Monitoring Alternate Source Demonstration**

***The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified***



***professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section. If a successful demonstration is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority.***

No alternative source demonstration or certification was required in 2019; therefore, no demonstration or certification is applicable.

- 2.3.5.3**     ***40 CFR § 257.95(c)(3) – Demonstration for Alternative Assessment Monitoring Frequency***  
***The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).***

The BASA/BAL remains in detection monitoring and an alternative groundwater assessment monitoring sampling and analysis frequency has not been established for this CCR unit; therefore, no demonstration or certification is applicable.

- 2.3.5.4**     ***40 CFR § 257.95(d)(3) – Assessment Monitoring Concentrations and Groundwater Protection Standards***  
***Include the recorded concentrations required by paragraph (d)(1) of this section, identify the background concentrations established under § 257.94(b), and identify the groundwater protection standards established under paragraph (d)(2) of this section in the annual groundwater monitoring and corrective action report required by § 257.90(e).***

The BASA/BAL remains in detection monitoring, and no assessment monitoring samples were collected or analyzed in 2019. Consequently, Evergy is not required to establish groundwater protection standards for this CCR unit, and this criterion is not applicable.

- 2.3.5.5**     ***40 CFR § 257.95(g)(3)(ii) – Assessment Monitoring Alternate Source Demonstration***  
***Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority. If a successful demonstration is made, the owner or operator must continue monitoring in***

***accordance with the assessment monitoring program pursuant to this section and may return to detection monitoring if the constituents in appendices III and IV to this part are at or below background as specified in paragraph (e) of this section. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.***

No assessment monitoring alternate source demonstration or certification was required in 2019. The BASA/BAL remained in detection monitoring during 2019.

**2.3.5.6**     **40 CFR § 257.96(a) – Demonstration for Additional Time for Assessment of Corrective Measures**

***Within 90 days of finding that any constituent listed in appendix IV to this part has been detected at a statistically significant level exceeding the groundwater protection standard defined under § 257.95(h), or immediately upon detection of a release from a CCR unit, the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases and to restore affected area to original conditions. The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for no longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.***

No assessment of corrective measures was required to be initiated in 2019; therefore, no demonstration or certification is applicable for this unit.

## TABLE

**TABLE I**  
**SUMMARY OF ANALYTICAL RESULTS - DETECTION MONITORING**  
EVERGY KANSAS CENTRAL, INC.  
JEFFREY ENERGY CENTER  
BOTTOM ASH SETTLING AREA/BOTTOM ASH LANDFILL  
ST. MARYS, KANSAS

Location	Upgradient			Downgradient					
	MW-BAA-6			MW-BAA-2		MW-BAA-3		MW-BAA-7	
Measure Point (TOC)	1301.81			1226.56		1222.00		1213.15	
Sample Name	BAA-6-032719	MW-BAA-6	DUPLICATE	MW-BAA-2-032719	MW-BAA-2	BAA-3-032719	MW-BAA-3	BAA-7-032819	MW-BAA-7
Sample Date	3/27/2019	9/12/2019	9/12/2019	3/27/2019	9/13/2019	3/27/2019	9/13/2019	3/28/2019	9/13/2019
Final Lab Report Date	4/9/2019	9/23/2019	9/23/2019	4/9/2019	9/23/2019	4/9/2019	9/23/2019	4/9/2019	9/23/2019
Final Lab Report Revision Date	N/A	10/30/2019	10/30/2019	N/A	10/30/2019	N/A	10/30/2019	N/A	10/30/2019
Lab Data Reviewed and Accepted	4/15/2019	10/22/2019	10/22/2019	4/15/2019	10/22/2019	4/15/2019	10/22/2019	4/15/2019	10/22/2019
Depth to Water (ft btoc)	75.88	77.33	77.33	14.33	14.35	12.29	12.21	18.57	19.11
Temperature (Deg C)	14.7	15.09	15.09	16.0	16.95	14.2	14.81	13.3	15.91
Conductivity (µS/cm)	4247	2.441	2.441	2042	1803	3622	3587	2506	2462
Turbidity (NTU)	0.66	0.17	0.17	0.93	0.57	1.92	0.47	0.32	0.42
Boron, Total (mg/L)	5.55	1.7	1.6	1.16	1.3	2.28	2.2	0.616	0.60
Calcium, Total (mg/L)	540	369	371	191	188	531	488	207	209
Chloride (mg/L)	284	193	242	187.0	173	168	179	205	199
Fluoride (mg/L)	0.58	<0.20	<0.20	0.61	0.49	0.75	0.98	0.75	0.67
Sulfate (mg/L)	2080	1120	1210	749	751	2090	1950	934	958
pH (su)	7.1	7.3	7.1	7.4	7.6	7.1	7.2	7.3	7.4
TDS (mg/L)	3270	2680	2500	1440	1450	2810	3780	1790	1990




Notes:  
µS/cm = micro Siemens per centimeter  
ft btoc = feet below top of casing  
Deg C = degrees Celsius  
mg/L = milligrams per liter  
N/A = Not Applicable  
NTU = Nephelometric Turbidity Unit  
su = standard unit  
TDS = total dissolved solids  
TOC = top of casing  
**Bold value: Detection above laboratory reporting limit**

**FIGURE**



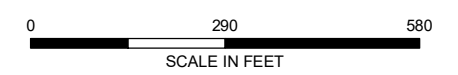


**LEGEND**

-  MONITORING WELL
-  PIEZOMETRIC OBSERVATION ONLY
-  BOTTOM ASH SETTLING AREA / BOTTOM ASH LANDFILL

**NOTES**

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE, 7 MAY 2018.



EVERGY KANSAS CENTRAL, INC.  
JEFFREY ENERGY CENTER  
ST. MARY'S, KANSAS

**BOTTOM ASH SETTLING AREA /  
BOTTOM ASH LANDFILL  
MONITORING WELL LOCATION MAP**

JANUARY 2020

FIGURE 1

November 3, 2022  
Project No. 0204993-000



TO: Evergy Kansas Central, Inc.  
Jared Morrison – Director, Water and Waste Programs

FROM: Haley & Aldrich, Inc.  
Steven F. Putrich, P.E., Principal Consultant – Engineering Principal  
Mark Nicholls, P.G., Senior Associate – Senior Hydrogeologist

SUBJECT: 2019 Annual Groundwater Monitoring and Corrective Action Report Addendum  
Evergy Kansas Central, Inc.  
Jeffrey Energy Center  
Bottom Ash Settling Area/Bottom Ash Landfill

The Evergy Kansas Central, Inc. (Evergy) Bottom Ash Settling Area/Bottom Ash Landfill (BASA/BAL) at the Jeffrey Energy Center is subject to the groundwater monitoring and corrective action requirements described under Code of Federal Regulations Title 40 (40 CFR) §257.90 through §257.98 (Rule). An Annual Groundwater Monitoring and Corrective Action (GWMCA) Report documenting the activities completed in 2019 for BASA/BAL was completed and placed in the facility's operating record on January 31, 2020, as required by the Rule. The Annual GWMCA Report contained the specific information listed in 40 CFR §257.90(e).

This report addendum has been prepared to supplement the operating record in recognition of comments received by Evergy from the U.S. Environmental Protection Agency (USEPA) on January 11, 2022. In addition to the information listed in 40 CFR §257.90(e), the USEPA indicated in their comments that the GWMCA Report should contain:

- Results of laboratory analysis of groundwater or other environmental media samples for the presence of constituents of Appendices III and IV to 40 CFR Part 257 (or of other constituents, such as those supporting characterization of site conditions that may ultimately affect a remedy);
- Required statistical analyses performed on those (laboratory analysis) results;
- Measured groundwater elevations; and
- Calculated groundwater flow rate and direction.

While this information is not specifically referred to in 40 CFR §257.90(e) for inclusion in the GWMCA Report, it has been routinely collected and maintained in Evergy's files and is being provided in the attachments to this addendum. The applicable laboratory analysis reports for 2019 sampling events are included in Attachment 1, and a discussion of the applicable statistical analyses completed in 2019 are included in Attachment 2 of this addendum. For each of the 2019 sampling events, the measured groundwater elevations, with calculated groundwater flow rates and directions, have been included in Attachment 3.



The Attachments to this addendum are described below:

- Attachment 1 – Laboratory Analytical Reports: Includes laboratory data packages with supporting information such as case narrative, sample and method summary, analytical results, quality control, and chain-of-custody documentation. The laboratory data packages for the sampling events completed in March and September 2019 are provided.
- Attachment 2 – Statistical Analyses: Includes a discussion of the statistical analyses utilized along with a table summarizing the statistical outputs (e.g., frequency of detection, maximum detection, variance, standard deviation, coefficient of variance, outlier tests, trends, upper and lower confidence limits, and comparison against Groundwater Protection Standards), and supporting backup for statistical analyses completed in 2019. Statistical analyses completed in 2019 included:
  - Overview of the January 2019 statistical analyses for data obtained in the September 2018 sampling event; and
    - The pH value collected from monitoring well MW-BAA-2 was identified as a statistically significant outlier and was subsequently removed from the dataset.
  - Overview of the July 2019 statistical analyses for data obtained in the March 2019 sampling event.
- Attachment 3 – Groundwater Potentiometric Maps: Includes the measured groundwater elevations at each well and the generalized groundwater flow direction and calculated flow rate. Maps for the sampling events completed in March and September 2019 are provided.



**ATTACHMENT 1**  
**Laboratory Analytical Reports**

**ATTACHMENT 1-1**  
**March 2019 Sampling Event**  
**Laboratory Analytical Report**

April 09, 2019

Brandon Griffin  
Westar Energy  
818 S. Kansas Ave  
Topeka, KS 66612

RE: Project: JEC BAA CCR  
Pace Project No.: 60298391

Dear Brandon Griffin:

Enclosed are the analytical results for sample(s) received by the laboratory on March 29, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Heather Wilson  
heather.wilson@pacelabs.com  
1(913)563-1407  
Project Manager

Enclosures

cc: HEATH HORYNA, WESTAR ENERGY  
Andrew Hare, Westar Energy  
Adam Kneeling, Haley & Aldrich, Inc.  
JARED MORRISON, WESTAR ENERGY  
Melissa Michels, Westar Energy  
JD Schlegel, KCP&L & Westar



## REPORT OF LABORATORY ANALYSIS

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## CERTIFICATIONS

Project: JEC BAA CCR

Pace Project No.: 60298391

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### **Kansas Certification IDs**

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Certification Number: 10090

Arkansas Drinking Water

WY STR Certification #: 2456.01

Arkansas Certification #: 18-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116 / E10426

Louisiana Certification #: 03055

Nevada Certification #: KS000212018-1

Oklahoma Certification #: 9205/9935

Texas Certification #: T104704407-18-11

Utah Certification #: KS000212018-8

Kansas Field Laboratory Accreditation: # E-92587

Missouri Certification: 10070

Missouri Certification Number: 10090

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: JEC BAA CCR

Pace Project No.: 60298391

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Lab ID	Sample ID	Matrix	Date Collected	Date Received
60298391001	BAA-6-032719	Water	03/27/19 16:17	03/29/19 15:00
60298391002	BAA-3-032719	Water	03/27/19 17:07	03/29/19 15:00
60298391003	BAA-2-032719	Water	03/27/19 18:00	03/29/19 15:00
60298391004	BAA-7-032819	Water	03/28/19 07:54	03/29/19 15:00

## REPORT OF LABORATORY ANALYSIS

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### SAMPLE ANALYTE COUNT

Project: JEC BAA CCR

Pace Project No.: 60298391

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60298391001	BAA-6-032719	EPA 200.7	JDE	2	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 4500-H+B	ZMH	1	PASI-K
		EPA 300.0	MGS, WNM	3	PASI-K
60298391002	BAA-3-032719	EPA 200.7	JDE	2	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 4500-H+B	ZMH	1	PASI-K
		EPA 300.0	MGS, WNM	3	PASI-K
60298391003	BAA-2-032719	EPA 200.7	JDE	2	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 4500-H+B	ZMH	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60298391004	BAA-7-032819	EPA 200.7	JDE	2	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 4500-H+B	ZMH	1	PASI-K
		EPA 300.0	MGS	3	PASI-K

### REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BAA CCR

Pace Project No.: 60298391

---

**Method:** EPA 200.7

**Description:** 200.7 Metals, Total

**Client:** WESTAR ENERGY

**Date:** April 09, 2019

**General Information:**

4 samples were analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**

The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**

The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**

All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**

All criteria were within method requirements with any exceptions noted below.

**Method Blank:**

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**

All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BAA CCR

Pace Project No.: 60298391

---

**Method:** SM 2540C

**Description:** 2540C Total Dissolved Solids

**Client:** WESTAR ENERGY

**Date:** April 09, 2019

**General Information:**

4 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**

The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**

All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BAA CCR

Pace Project No.: 60298391

---

**Method:** SM 4500-H+B

**Description:** 4500H+ pH, Electrometric

**Client:** WESTAR ENERGY

**Date:** April 09, 2019

### General Information:

4 samples were analyzed for SM 4500-H+B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- BAA-2-032719 (Lab ID: 60298391003)
- BAA-3-032719 (Lab ID: 60298391002)
- BAA-6-032719 (Lab ID: 60298391001)
- BAA-7-032819 (Lab ID: 60298391004)

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BAA CCR

Pace Project No.: 60298391

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**Method:** EPA 300.0

**Description:** 300.0 IC Anions 28 Days

**Client:** WESTAR ENERGY

**Date:** April 09, 2019

**General Information:**

4 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**

The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**

All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 577794

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60297992001,60298391001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2371230)
- Sulfate

**Additional Comments:**

This data package has been reviewed for quality and completeness and is approved for release.

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BAA CCR

Pace Project No.: 60298391

<b>Sample: BAA-6-032719</b>		<b>Lab ID: 60298391001</b>		Collected: 03/27/19 16:17	Received: 03/29/19 15:00	Matrix: Water		
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>5550</b>	ug/L	100	1	04/04/19 13:05	04/05/19 10:35	7440-42-8	
Calcium, Total Recoverable	<b>540000</b>	ug/L	200	1	04/04/19 13:05	04/05/19 10:35	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>3270</b>	mg/L	5.0	1		04/02/19 11:50		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.1</b>	Std. Units	0.10	1		04/05/19 11:12		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>284</b>	mg/L	50.0	50		04/06/19 17:10	16887-00-6	
Fluoride	<b>0.58</b>	mg/L	0.20	1		04/06/19 16:37	16984-48-8	
Sulfate	<b>2080</b>	mg/L	200	200		04/08/19 18:33	14808-79-8	M1

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BAA CCR

Pace Project No.: 60298391

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>Sample: BAA-3-032719</b>								
<b>Lab ID: 60298391002</b>								
Collected: 03/27/19 17:07 Received: 03/29/19 15:00 Matrix: Water								
<b>200.7 Metals, Total</b>								
Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron, Total Recoverable	<b>2280</b>	ug/L	100	1	04/04/19 13:05	04/05/19 10:38	7440-42-8	
Calcium, Total Recoverable	<b>531000</b>	ug/L	200	1	04/04/19 13:05	04/05/19 10:38	7440-70-2	
<b>2540C Total Dissolved Solids</b>								
Analytical Method: SM 2540C								
Total Dissolved Solids	<b>2810</b>	mg/L	5.0	1		04/02/19 11:50		
<b>4500H+ pH, Electrometric</b>								
Analytical Method: SM 4500-H+B								
pH at 25 Degrees C	<b>7.1</b>	Std. Units	0.10	1		04/05/19 11:13		H6
<b>300.0 IC Anions 28 Days</b>								
Analytical Method: EPA 300.0								
Chloride	<b>168</b>	mg/L	10.0	10		04/06/19 17:44	16887-00-6	
Fluoride	<b>0.75</b>	mg/L	0.20	1		04/06/19 17:27	16984-48-8	
Sulfate	<b>2090</b>	mg/L	200	200		04/08/19 19:04	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BAA CCR

Pace Project No.: 60298391

<b>Sample: BAA-2-032719</b>		<b>Lab ID: 60298391003</b>		Collected: 03/27/19 18:00	Received: 03/29/19 15:00	Matrix: Water		
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>1160</b>	ug/L	100	1	04/04/19 13:05	04/05/19 10:40	7440-42-8	
Calcium, Total Recoverable	<b>191000</b>	ug/L	200	1	04/04/19 13:05	04/05/19 10:40	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>1440</b>	mg/L	5.0	1		04/02/19 11:50		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.4</b>	Std. Units	0.10	1		04/05/19 11:15		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>187</b>	mg/L	10.0	10		04/06/19 19:08	16887-00-6	
Fluoride	<b>0.61</b>	mg/L	0.20	1		04/06/19 18:52	16984-48-8	
Sulfate	<b>749</b>	mg/L	50.0	50		04/06/19 19:25	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BAA CCR

Pace Project No.: 60298391

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>Sample: BAA-7-032819</b>								
<b>Lab ID: 60298391004</b>								
Collected: 03/28/19 07:54    Received: 03/29/19 15:00    Matrix: Water								
<b>200.7 Metals, Total</b> Analytical Method: EPA 200.7    Preparation Method: EPA 200.7								
Boron, Total Recoverable	<b>616</b>	ug/L	100	1	04/04/19 13:05	04/05/19 10:47	7440-42-8	
Calcium, Total Recoverable	<b>207000</b>	ug/L	200	1	04/04/19 13:05	04/05/19 10:47	7440-70-2	
<b>2540C Total Dissolved Solids</b> Analytical Method: SM 2540C								
Total Dissolved Solids	<b>1790</b>	mg/L	5.0	1		04/02/19 11:50		
<b>4500H+ pH, Electrometric</b> Analytical Method: SM 4500-H+B								
pH at 25 Degrees C	<b>7.3</b>	Std. Units	0.10	1		04/05/19 11:21		H6
<b>300.0 IC Anions 28 Days</b> Analytical Method: EPA 300.0								
Chloride	<b>205</b>	mg/L	50.0	50		04/06/19 20:16	16887-00-6	
Fluoride	<b>0.75</b>	mg/L	0.20	1		04/06/19 19:42	16984-48-8	
Sulfate	<b>934</b>	mg/L	50.0	50		04/06/19 20:16	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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**QUALITY CONTROL DATA**

Project: JEC BAA CCR

Pace Project No.: 60298391

QC Batch: 577239 Analysis Method: EPA 200.7  
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total  
 Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

METHOD BLANK: 2368378 Matrix: Water  
 Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<100	100	04/05/19 10:11	
Calcium	ug/L	<200	200	04/05/19 10:11	

LABORATORY CONTROL SAMPLE: 2368379

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	963	96	85-115	
Calcium	ug/L	10000	10200	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2368380 2368381

Parameter	Units	60298184001		2368380		2368381		% Rec Limits	RPD	Max RPD	Qual
		MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec				
Boron	ug/L	123	1000	1120	1120	100	99	70-130	1	20	
Calcium	ug/L	30500	10000	40100	39700	95	91	70-130	1	20	

MATRIX SPIKE SAMPLE: 2368382

Parameter	Units	60298203001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	427	1000	1430	101	70-130	
Calcium	ug/L	224000	10000	231000	79	70-130	

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### QUALITY CONTROL DATA

Project: JEC BAA CCR

Pace Project No.: 60298391

QC Batch: 576827

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

METHOD BLANK: 2366799

Matrix: Water

Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	04/02/19 11:50	

LABORATORY CONTROL SAMPLE: 2366800

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	985	98	80-120	

SAMPLE DUPLICATE: 2366801

Parameter	Units	60298378002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	106	110	4	10	

SAMPLE DUPLICATE: 2366802

Parameter	Units	60298258002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	583	571	2	10	

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**QUALITY CONTROL DATA**

Project: JEC BAA CCR

Pace Project No.: 60298391

QC Batch: 577337 Analysis Method: SM 4500-H+B

QC Batch Method: SM 4500-H+B Analysis Description: 4500H+B pH

Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

SAMPLE DUPLICATE: 2368911

Parameter	Units	60297940002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.5	7.5	0	5	H6

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### QUALITY CONTROL DATA

Project: JEC BAA CCR

Pace Project No.: 60298391

QC Batch: 577644

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

METHOD BLANK: 2370150

Matrix: Water

Associated Lab Samples: 60298391001, 60298391002, 60298391003, 60298391004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<1.0	1.0	04/06/19 10:54	
Fluoride	mg/L	<0.20	0.20	04/06/19 10:54	
Sulfate	mg/L	<1.0	1.0	04/06/19 10:54	

LABORATORY CONTROL SAMPLE: 2370151

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.4	97	90-110	
Sulfate	mg/L	5	5.0	101	90-110	

MATRIX SPIKE SAMPLE: 2370154

Parameter	Units	60298271007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	ND	25	23.8	90	90-110	
Sulfate	mg/L	132	50	181	98	90-110	

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### QUALITY CONTROL DATA

Project: JEC BAA CCR

Pace Project No.: 60298391

QC Batch: 577794

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60298391001, 60298391002

METHOD BLANK: 2371226

Matrix: Water

Associated Lab Samples: 60298391001, 60298391002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	<1.0	1.0	04/08/19 08:52	

LABORATORY CONTROL SAMPLE: 2371227

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	5.0	99	90-110	

MATRIX SPIKE SAMPLE: 2371230

Parameter	Units	60298391001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	2080	1000	3240	116	90-110	M1

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## QUALIFIERS

Project: JEC BAA CCR

Pace Project No.: 60298391

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### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-K Pace Analytical Services - Kansas City

### ANALYTE QUALIFIERS

H6 Analysis initiated outside of the 15 minute EPA required holding time.

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

## REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: JEC BAA CCR

Pace Project No.: 60298391

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60298391001	BAA-6-032719	EPA 200.7	577239	EPA 200.7	577348
60298391002	BAA-3-032719	EPA 200.7	577239	EPA 200.7	577348
60298391003	BAA-2-032719	EPA 200.7	577239	EPA 200.7	577348
60298391004	BAA-7-032819	EPA 200.7	577239	EPA 200.7	577348
60298391001	BAA-6-032719	SM 2540C	576827		
60298391002	BAA-3-032719	SM 2540C	576827		
60298391003	BAA-2-032719	SM 2540C	576827		
60298391004	BAA-7-032819	SM 2540C	576827		
60298391001	BAA-6-032719	SM 4500-H+B	577337		
60298391002	BAA-3-032719	SM 4500-H+B	577337		
60298391003	BAA-2-032719	SM 4500-H+B	577337		
60298391004	BAA-7-032819	SM 4500-H+B	577337		
60298391001	BAA-6-032719	EPA 300.0	577644		
60298391001	BAA-6-032719	EPA 300.0	577794		
60298391002	BAA-3-032719	EPA 300.0	577644		
60298391002	BAA-3-032719	EPA 300.0	577794		
60298391003	BAA-2-032719	EPA 300.0	577644		
60298391004	BAA-7-032819	EPA 300.0	577644		

### REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60298391



Client Name: Westar Energy

Courier: FedEx  UPS  VIA  Clay  PEX  ECI  Pace  Xroads  Client  Other

Tracking #: \_\_\_\_\_ Pace Shipping Label Used? Yes  No

Custody Seal on Cooler/Box Present: Yes  No  Seals intact: Yes  No

Packing Material: Bubble Wrap  Bubble Bags  Foam  None  Other

Thermometer Used: T-296 Type of Ice: Wet Blue  None

Cooler Temperature (°C): As-read 2-3 Corr. Factor -1.0 Corrected 1.3

Date and initials of person examining contents:

2/3/29/19

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:		
Lead acetate strip turns dark? (Record only)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

Client Notification/ Resolution: Copy COC to Client? Y  N  Field Data Required? Y  N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review: \_\_\_\_\_ Date: \_\_\_\_\_



# Pace Container Order #468014

Order By :	Ship To :	Return To:
Company <u>WESTAR ENERGY</u>	Company <u>WESTAR ENERGY</u>	Company <u>Pace Analytical Kansas</u>
Contact <u>Griffin, Brandon</u>	Contact <u>Griffin, Brandon</u>	Contact <u>Wilson, Heather</u>
Email <u>brandon.l.griffin@westarenergy.</u>	Email <u>brandon.l.griffin@westarenergy.</u>	Email <u>heather.wilson@pacelabs.com</u>
Address <u>818 S. Kansas Ave</u>	Address <u>818 S. Kansas Ave</u>	Address <u>9608 Loiret Blvd.</u>
Address 2 _____	Address 2 _____	Address 2 _____
City <u>Topeka</u>	City <u>Topeka</u>	City <u>Lenexa</u>
State <u>KS</u> Zip <u>66612</u>	State <u>KS</u> Zip <u>66612</u>	State <u>KS</u> Zip <u>66219</u>
Phone <u>785-575-8135</u>	Phone <u>785-575-8135</u>	Phone <u>1(913)563-1407</u>

Info			
<b>Project Name</b> <u>JEC BAA CCR- App III</u>	<b>Due Date</b> <u>02/27/2019</u>	<b>Profile</b> <u>9657</u>	<b>Quote</b> _____
<b>Project</b> <u>Wilson, Heather</u>	<b>Return</b> _____	<b>Carrier</b> <u>Most Economical</u>	<b>Locatio</b> <u>KS</u>

**Trip Blanks**

Include Trip Blanks

**Bottle**

Blank

Pre-Printed No Sample IDs

Pre-Printed With Sample IDs

Boxed Cases

Individually Wrapped

Grouped By Sample

**Return Shipping**

No Shipper

With Shipper

**Misc**

Sampling Instructions

Custody Seal

Temp. Blanks

Coolers \_\_\_\_\_

Syringes \_\_\_\_\_

Extra Bubble Wrap

Short Hold/Rush

DI

USDA Regulated Soils

**COC Options**

Number of Blanks \_\_\_\_\_

Pre-Printed

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
4	WT	Metals	1-1L plastic w/HNO3	4	0	121718-2AJN	
4	WT	300.0 Anions/pH/TDS	1L plastic unpreserved	4	0	010719-2APJ	

**Hazard Shipping Placard In Place : NO**

- \*Sample receiving hours are Mon-Fri 7:00am-6:00pm and Sat 8:00am-2:00pm unless special arrangements are made with your project manager.
- \*Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
- \*Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage and disposal.
- \*Payment term are net 30 days.
- \*Please include the proposal number on the chain of custody to insure proper billing.

**Sample**

PP COC (1), PP labels w/o sample IDs  
 Lenexa return  
 Scott to take on 2/28/19

<b>Ship Date :</b>	<u>02/27/2019</u>
<b>Prepared</b>	<u>JEIMY</u>
<b>Verified By:</b>	_____



**ATTACHMENT 1-2**  
**September 2019 Sampling Event**  
**Laboratory Analytical Report**

October 30, 2019

JD Schlegel  
KCP&L and Westar, Evergy Companies  
818 Kansas Avenue  
Topeka, KS 66612

RE: Project: JEC BASA/BAL CCR  
Pace Project No.: 60314890

Dear JD Schlegel:

Enclosed are the analytical results for sample(s) received by the laboratory on September 13, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revised Report\_rev.1 Client requested metals in mg/L.

Revised Report\_rev.2 The chloride result was re-analyzed to confirm the original reported result on 60314890003. This result has been revised.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Heather Wilson  
heather.wilson@pacelabs.com  
1(913)563-1407  
Project Manager

Enclosures

cc: Bob Beck, Kansas City Power & Light Company  
HEATH HORYNA, WESTAR ENERGY  
Sarah Hazelwood, KCP&L and Westar, Evergy Companies  
Laura Hines, KCP&L & Westar, Evergy Companies

Jake Humphrey, KCP&L and Westar, Evergy Companies  
Adam Kneeling, Haley & Aldrich, Inc.  
JARED MORRISON, KCP&L and Westar, Evergy  
Companies



## REPORT OF LABORATORY ANALYSIS

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October 30, 2019

Page 2

cc: Melissa Michels, KCP&L & Westar, Evergy Companies  
Brandon Will, KCP&L and Westar, Evergy Companies  
Danielle Zinmaster, Haley & Aldrich



## **REPORT OF LABORATORY ANALYSIS**

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## CERTIFICATIONS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

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### **Kansas Certification IDs**

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-19-12

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

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Lab ID	Sample ID	Matrix	Date Collected	Date Received
60314890001	MW-BAA-2	Water	09/13/19 13:54	09/13/19 16:20
60314890002	MW-BAA-3	Water	09/13/19 10:28	09/13/19 16:20
60314890003	MW-BAA-6	Water	09/12/19 19:03	09/13/19 16:20
60314890004	MW-BAA-7	Water	09/13/19 12:22	09/13/19 16:20
60314890005	DUPLICATE	Water	09/12/19 19:03	09/13/19 16:20

## REPORT OF LABORATORY ANALYSIS

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### SAMPLE ANALYTE COUNT

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60314890001	MW-BAA-2	EPA 200.7	JDE	2	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 4500-H+B	AJS2	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60314890002	MW-BAA-3	EPA 200.7	JDE	2	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 4500-H+B	AJS2	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60314890003	MW-BAA-6	EPA 200.7	JDE	2	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 4500-H+B	AJS2	1	PASI-K
		EPA 300.0	MGS, MJK	3	PASI-K
60314890004	MW-BAA-7	EPA 200.7	JDE	2	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 4500-H+B	AJS2	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60314890005	DUPLICATE	EPA 200.7	JDE	2	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 4500-H+B	AJS2	1	PASI-K
		EPA 300.0	MJK	3	PASI-K

### REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

---

**Method:** EPA 200.7

**Description:** 200.7 Metals, Total

**Client:** Evergy Kansas Central, Inc.

**Date:** October 30, 2019

**General Information:**

5 samples were analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**

The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**

The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**

All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**

All criteria were within method requirements with any exceptions noted below.

**Method Blank:**

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**

All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 609870

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60314889001,60314889004

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2491452)
  - Calcium
- MSD (Lab ID: 2491453)
  - Calcium

**Additional Comments:**

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## PROJECT NARRATIVE

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

---

**Method:** SM 2540C

**Description:** 2540C Total Dissolved Solids

**Client:** Evergy Kansas Central, Inc.

**Date:** October 30, 2019

**General Information:**

5 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**

The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**

All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

---

**Method:** SM 4500-H+B

**Description:** 4500H+ pH, Electrometric

**Client:** Evergy Kansas Central, Inc.

**Date:** October 30, 2019

### General Information:

5 samples were analyzed for SM 4500-H+B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- DUPLICATE (Lab ID: 60314890005)
- MW-BAA-2 (Lab ID: 60314890001)
- MW-BAA-3 (Lab ID: 60314890002)
- MW-BAA-6 (Lab ID: 60314890003)
- MW-BAA-7 (Lab ID: 60314890004)

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

---

**Method:** EPA 300.0

**Description:** 300.0 IC Anions 28 Days

**Client:** Evergy Kansas Central, Inc.

**Date:** October 30, 2019

### General Information:

5 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

H1: Analysis conducted outside the EPA method holding time.

- MW-BAA-6 (Lab ID: 60314890003)

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 609891

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60314427001,60314889005

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2491579)
  - Chloride
- MSD (Lab ID: 2491578)
  - Chloride

### Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

<b>Sample: MW-BAA-2</b>		<b>Lab ID: 60314890001</b>	Collected: 09/13/19 13:54	Received: 09/13/19 16:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>1.3</b>	mg/L	0.10	1	09/17/19 12:39	09/18/19 11:01	7440-42-8	
Calcium, Total Recoverable	<b>188</b>	mg/L	0.20	1	09/17/19 12:39	09/18/19 11:01	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>1450</b>	mg/L	13.3	1		09/17/19 09:51		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.6</b>	Std. Units	0.10	1		09/17/19 16:22		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>173</b>	mg/L	20.0	20		09/17/19 23:49	16887-00-6	
Fluoride	<b>0.49</b>	mg/L	0.20	1		09/17/19 23:34	16984-48-8	
Sulfate	<b>751</b>	mg/L	100	100		09/18/19 00:04	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

<b>Sample: MW-BAA-3</b>		<b>Lab ID: 60314890002</b>		Collected: 09/13/19 10:28	Received: 09/13/19 16:20	Matrix: Water		
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>2.2</b>	mg/L	0.10	1	09/17/19 12:39	09/18/19 11:04	7440-42-8	
Calcium, Total Recoverable	<b>488</b>	mg/L	0.20	1	09/17/19 12:39	09/18/19 11:04	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>3780</b>	mg/L	40.0	1		09/17/19 09:52		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.2</b>	Std. Units	0.10	1		09/17/19 16:23		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>179</b>	mg/L	20.0	20		09/18/19 00:34	16887-00-6	
Fluoride	<b>0.98</b>	mg/L	0.20	1		09/18/19 00:19	16984-48-8	
Sulfate	<b>1950</b>	mg/L	200	200		09/18/19 20:26	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

<b>Sample: MW-BAA-6</b>		<b>Lab ID: 60314890003</b>	Collected: 09/12/19 19:03	Received: 09/13/19 16:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>1.7</b>	mg/L	0.10	1	09/17/19 12:39	09/18/19 11:06	7440-42-8	
Calcium, Total Recoverable	<b>369</b>	mg/L	0.20	1	09/17/19 12:39	09/18/19 11:06	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>2680</b>	mg/L	20.0	1		09/17/19 09:51		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.3</b>	Std. Units	0.10	1		09/17/19 16:24		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>193</b>	mg/L	20.0	20		10/28/19 10:48	16887-00-6	H1
Fluoride	<b>&lt;0.20</b>	mg/L	0.20	1		09/18/19 01:04	16984-48-8	
Sulfate	<b>1120</b>	mg/L	100	100		10/28/19 11:04	14808-79-8	

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## ANALYTICAL RESULTS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

<b>Sample: MW-BAA-7</b>		<b>Lab ID: 60314890004</b>		Collected: 09/13/19 12:22	Received: 09/13/19 16:20	Matrix: Water		
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>0.60</b>	mg/L	0.10	1	09/17/19 12:39	09/18/19 11:09	7440-42-8	
Calcium, Total Recoverable	<b>209</b>	mg/L	0.20	1	09/17/19 12:39	09/18/19 11:09	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>1990</b>	mg/L	20.0	1		09/17/19 09:52		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.4</b>	Std. Units	0.10	1		09/17/19 16:26		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>199</b>	mg/L	20.0	20		09/18/19 02:34	16887-00-6	
Fluoride	<b>0.67</b>	mg/L	0.20	1		09/18/19 02:19	16984-48-8	
Sulfate	<b>958</b>	mg/L	100	100		09/18/19 02:49	14808-79-8	

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## ANALYTICAL RESULTS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

<b>Sample: DUPLICATE</b>		<b>Lab ID: 60314890005</b>		Collected: 09/12/19 19:03	Received: 09/13/19 16:20	Matrix: Water		
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
<b>200.7 Metals, Total</b>		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Boron, Total Recoverable	<b>1.6</b>	mg/L	0.10	1	09/17/19 12:39	09/18/19 11:11	7440-42-8	
Calcium, Total Recoverable	<b>371</b>	mg/L	0.20	1	09/17/19 12:39	09/18/19 11:11	7440-70-2	
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C						
Total Dissolved Solids	<b>2500</b>	mg/L	20.0	1		09/17/19 09:51		
<b>4500H+ pH, Electrometric</b>		Analytical Method: SM 4500-H+B						
pH at 25 Degrees C	<b>7.1</b>	Std. Units	0.10	1		09/17/19 16:27		H6
<b>300.0 IC Anions 28 Days</b>		Analytical Method: EPA 300.0						
Chloride	<b>242</b>	mg/L	20.0	20		09/18/19 03:19	16887-00-6	
Fluoride	<b>&lt;0.20</b>	mg/L	0.20	1		09/18/19 03:04	16984-48-8	
Sulfate	<b>1210</b>	mg/L	100	100		09/18/19 03:34	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch: 609870

Analysis Method: EPA 200.7

QC Batch Method: EPA 200.7

Analysis Description: 200.7 Metals, Total

Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

METHOD BLANK: 2491450

Matrix: Water

Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	mg/L	<0.10	0.10	09/18/19 10:32	
Calcium	mg/L	<0.20	0.20	09/18/19 10:32	

LABORATORY CONTROL SAMPLE: 2491451

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	mg/L	1	0.93	93	85-115	
Calcium	mg/L	10	10	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2491452 2491453

Parameter	Units	60314889001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	mg/L	0.93	1	1	2.0	2.0	104	103	70-130	1	20	
Calcium	mg/L	204	10	10	223	220	194	158	70-130	2	20 M1	

MATRIX SPIKE SAMPLE: 2491454

Parameter	Units	60314889004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	mg/L	1.5	1	2.4	94	70-130	
Calcium	mg/L	313	10	323	97	70-130	

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### QUALITY CONTROL DATA

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch: 609756

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

METHOD BLANK: 2491030

Matrix: Water

Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	09/17/19 09:49	

LABORATORY CONTROL SAMPLE: 2491031

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1040	104	80-120	

SAMPLE DUPLICATE: 2491032

Parameter	Units	60314889001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1570	1550	1	10	

SAMPLE DUPLICATE: 2491033

Parameter	Units	60314890001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1450	1480	2	10	

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### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch: 609905 Analysis Method: SM 4500-H+B

QC Batch Method: SM 4500-H+B Analysis Description: 4500H+B pH

Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

SAMPLE DUPLICATE: 2491637

Parameter	Units	60314260003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.9	9.0	1	5	H6

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### REPORT OF LABORATORY ANALYSIS

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**QUALITY CONTROL DATA**

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch: 609891 Analysis Method: EPA 300.0  
 QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions  
 Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

METHOD BLANK: 2491575 Matrix: Water  
 Associated Lab Samples: 60314890001, 60314890002, 60314890003, 60314890004, 60314890005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<1.0	1.0	09/17/19 10:36	
Fluoride	mg/L	<0.20	0.20	09/17/19 10:36	
Sulfate	mg/L	<1.0	1.0	09/17/19 10:36	

LABORATORY CONTROL SAMPLE: 2491576

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	99	90-110	
Fluoride	mg/L	2.5	2.6	105	90-110	
Sulfate	mg/L	5	5.5	110	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2491577 2491578

Parameter	Units	60314427001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	381	250	250	594	551	85	68	80-120	7	15	M1
Fluoride	mg/L	ND	125	125	140	132	110	104	80-120	6	15	
Sulfate	mg/L	ND	250	250	292	275	109	103	80-120	6	15	

MATRIX SPIKE SAMPLE: 2491579

Parameter	Units	60314889005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	<1.0	250	449	179	80-120	M1
Fluoride	mg/L	<0.20	125	132	105	80-120	
Sulfate	mg/L	17.5	250	310	117	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

**REPORT OF LABORATORY ANALYSIS**

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**QUALITY CONTROL DATA**

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch:	610154	Analysis Method:	EPA 300.0
QC Batch Method:	EPA 300.0	Analysis Description:	300.0 IC Anions
Associated Lab Samples:	60314890002		

METHOD BLANK: 2492503 Matrix: Water  
Associated Lab Samples: 60314890002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	<1.0	1.0	09/18/19 16:52	

LABORATORY CONTROL SAMPLE: 2492504

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	5.1	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2492505 2492506

Parameter	Units	60315155001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	85.3	250	250	382	371	119	114	80-120	3	15	

MATRIX SPIKE SAMPLE: 2492507

Parameter	Units	60314496001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	19.1	25	46.8	111	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

**REPORT OF LABORATORY ANALYSIS**

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### QUALITY CONTROL DATA

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

QC Batch: 618574

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60314890003

METHOD BLANK: 2524250

Matrix: Water

Associated Lab Samples: 60314890003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<1.0	1.0	10/28/19 09:48	
Sulfate	mg/L	<1.0	1.0	10/28/19 09:48	

LABORATORY CONTROL SAMPLE: 2524251

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	93	90-110	
Sulfate	mg/L	5	4.9	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2524252 2524253

Parameter	Units	60317792001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	2.0	5	5	6.7	6.7	93	94	80-120	1	15	H1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

### REPORT OF LABORATORY ANALYSIS

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## QUALIFIERS

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

---

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-K Pace Analytical Services - Kansas City

### ANALYTE QUALIFIERS

H1 Analysis conducted outside the EPA method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

## REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: JEC BASA/BAL CCR

Pace Project No.: 60314890

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60314890001	MW-BAA-2	EPA 200.7	609870	EPA 200.7	609918
60314890002	MW-BAA-3	EPA 200.7	609870	EPA 200.7	609918
60314890003	MW-BAA-6	EPA 200.7	609870	EPA 200.7	609918
60314890004	MW-BAA-7	EPA 200.7	609870	EPA 200.7	609918
60314890005	DUPLICATE	EPA 200.7	609870	EPA 200.7	609918
60314890001	MW-BAA-2	SM 2540C	609756		
60314890002	MW-BAA-3	SM 2540C	609756		
60314890003	MW-BAA-6	SM 2540C	609756		
60314890004	MW-BAA-7	SM 2540C	609756		
60314890005	DUPLICATE	SM 2540C	609756		
60314890001	MW-BAA-2	SM 4500-H+B	609905		
60314890002	MW-BAA-3	SM 4500-H+B	609905		
60314890003	MW-BAA-6	SM 4500-H+B	609905		
60314890004	MW-BAA-7	SM 4500-H+B	609905		
60314890005	DUPLICATE	SM 4500-H+B	609905		
60314890001	MW-BAA-2	EPA 300.0	609891		
60314890002	MW-BAA-3	EPA 300.0	609891		
60314890002	MW-BAA-3	EPA 300.0	610154		
60314890003	MW-BAA-6	EPA 300.0	609891		
60314890003	MW-BAA-6	EPA 300.0	618574		
60314890004	MW-BAA-7	EPA 300.0	609891		
60314890005	DUPLICATE	EPA 300.0	609891		

### REPORT OF LABORATORY ANALYSIS

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**Sample Condition Upon Receipt**

**WO# : 60314890**  
  
**60314890**

Client Name: Westar Energy

Courier: FedEx  UPS  VIA  Clay  PEX  ECI  Pace  Xroads  Client  Other

Tracking #: \_\_\_\_\_ Pace Shipping Label Used? Yes  No

Custody Seal on Cooler/Box Present: Yes  No  Seals intact: Yes  No

Packing Material: Bubble Wrap  Bubble Bags  Foam  None  Other

Thermometer Used: T-300 Type of Ice: Wet Blue  None

Cooler Temperature (°C): As-read 0.9 Corr. Factor 0.0 Corrected 0.9

Date and initials of person examining contents:  
pug/12/19

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:		
Lead acetate strip turns dark? (Record only)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review: \_\_\_\_\_ Date: \_\_\_\_\_



# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: \_\_\_\_\_ of \_\_\_\_\_

**Section A**

Required Client Information:

Company: WESTAR ENERGY  
 Address: 818 Kansas Ave  
 Topeka, KS 66612  
 Email To: brandon.l.griffin@westarenergy.com  
 Phone: 785-575-8135 Fax: \_\_\_\_\_  
 Requested Due Date/TAT: 7 day

**Section B**

Required Project Information:

Report To: Adam Kneeling (Haley & Aldrich)  
 Copy To: Jared Morrison  
 Purchase Order No.: 10JEC-0000040819  
 Project Name: JEC BASA/BAL CCR  
 Project Number: \_\_\_\_\_

**Section C**

Invoice Information:

Attention: Westar Energy  
 Company Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Pace Quote Reference: Heather Wilson 913-563-1407  
 Pace Project Manager: \_\_\_\_\_  
 Pace Profile #: 9657, 4

**REGULATORY AGENCY**

NPDES  GROUND WATER  DRINKING WATER  
 UST  RCRA  OTHER \_\_\_\_\_

Site Location: \_\_\_\_\_  
 STATE: KS

ITEM #	Section D Required Client Information  SAMPLE ID (A-Z, 0-9 / . -) Sample IDs MUST BE UNIQUE	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Requested Analysis Filtered (Y/N)				Residual Chlorine (Y/N)	Pace Project No. / Lab I.D.		
					COMPOSITE START		COMPOSITE END/GRAB				Unpreserved	H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other	Analysis Test↓	200.7 Total Metals*	300: Cl, F, SO <sub>4</sub>	2540C TDS			4500 H+B	
					DATE	TIME	DATE	TIME																		
1	MW-BAA-2		WT	G			9/13/19	1354	3	2	1								X	X	X	X			2BPI4 BPIN 001	
2	MW-BAA-3		WT	G			9/13/19	1028	3	2	1								X	X	X	X			002	
3	MW-BAA-6		WT	G			9/12/19	1903	3	2	1								X	X	X	X			003	
4	MW-BAA-7		WT	G			9/13/19	1222	3	2	1								X	X	X	X			004	
5	Duplicate		WT	G			9/12/19	1903	3	2	1								X	X	X	X			005	
6																										
7																										
8																										
9																										
10																										
11																										
12																										

Page 24 of 24

SAMPLER NAME AND SIGNATURE			Temp in °C	Received on ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:		<i>John Knightley</i>				
SIGNATURE of SAMPLER:		<i>John Knightley</i>				
DATE Signed (MM/DD/YY):			9/12/19			

\*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

**ATTACHMENT 2**  
**Statistical Analyses**

**ATTACHMENT 2-1**  
**September 2018 Statistical Analyses**



HALEY & ALDRICH, INC.  
6500 Rockside Road  
Suite 200  
Cleveland, OH 44131  
216.739.0555

## TECHNICAL MEMORANDUM

November 3, 2022  
File No. 129778

TO: Evergy Kansas Central, Inc.  
Jared Morrison – Director, Water and Waste Programs

FROM: Haley & Aldrich, Inc.  
Steven F. Putrich, P.E., Senior Associate – Engineering Principal  
Mark Nicholls, P.G., Senior Associate – Senior Hydrogeologist

SUBJECT: September 2018 Semi-Annual Groundwater Detection Monitoring Data  
Statistical Evaluation  
**Completed January 14, 2019**  
Jeffrey Energy Center  
Bottom Ash Settling Area/Bottom Ash Landfill

Pursuant to Title 40 Code of Federal Regulations (40 CFR) §§ 257.93 and 257.94 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the **September 2018** semi-annual detection monitoring groundwater sampling event for the Lawrence Energy Center (LEC) Bottom Ash Settling Area/Bottom Ash Landfill (BASA/BAL). This semi-annual detection monitoring groundwater sampling event was completed on **September 12, 2018**, with laboratory results received and accepted on **October 15, 2018**.

The statistical evaluation discussed in this memorandum was conducted to determine if Appendix III groundwater monitoring constituents have been detected in downgradient wells at concentrations that represent a statistically significant increase (SSI) above background or upgradient wells consistent with the requirements in 40 CFR § 257.94.

### Statistical Evaluation of Appendix III Constituents

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR § 257.93(f)(1-4)). The two statistical methods used for these evaluations, prediction limits (PLs) and Parametric Analysis of Variance, were certified by Haley & Aldrich, Inc. on October 17, 2017. The PL method, as determined applicable for this sampling event, was used to evaluate potential SSIs above background. Background levels for each constituent listed in Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids) were computed as upper prediction limits (UPLs), considering one future observation, and a minimum 95 percent confidence coefficient. The most recent groundwater sampling event from each compliance well was compared to the corresponding background PL to determine if an SSI existed.

## STATISTICAL ANALYSIS

An interwell evaluation using the PL method was used to complete the statistical evaluation of the referenced dataset. Interwell evaluation compares the most recent values from downgradient compliance wells against a background dataset composed of upgradient well data (MW-BAA-6). A PL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a specified confidence level (e.g., 95 percent). The upper endpoint of a concentration limit is called the UPL. Depending on the background data distribution, parametric or non-parametric PL procedures are used to evaluate groundwater monitoring data using this method. Parametric PLs 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 PL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UPL.

The statistical evaluation was conducted using the background dataset for all Appendix III constituents. The UPLs were calculated from the background well dataset using Chemstat software after testing for outlier sample results that would warrant removal from the dataset based on likely error in sampling or measurement. Both visual and statistical outlier tests for the background data were performed using Chemstat and U.S. Environmental Protection Agency's ProUCL 5.1 software, and a visual inspection of the data was performed using box plots and distribution plots for the downgradient sample data. The pH value collected from monitoring well MW-BAA-2 was identified as a statistically significant outlier and was subsequently removed from the dataset, as outlined in Attachment 1.

## BACKGROUND DISTRIBUTIONS

The groundwater analytical results for each sampling event from the background sample location MW-BAA-6 were combined to calculate the UPL for each Appendix III constituent. The variability and distribution of the pooled dataset were evaluated to determine the method for UPL calculation. Per the document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*, March 2009, background concentrations were updated based on statistical evaluation of analytical results collected through **June 2017**.

## RESULTS OF APPENDIX III DOWNGRADIANT STATISTICAL COMPARISONS

Sample concentrations from the downgradient wells for each of the Appendix III constituents from the **September 2018** semi-annual detection monitoring sampling event were compared to their respective background UPLs (Table I). A sample concentration greater than the background UPL is considered to represent an SSI. The results of the groundwater detection monitoring statistical evaluation are provided in Table I. **Based on this statistical evaluation of groundwater sampling data collected in September 2018, no SSIs above background PLs occurred at the JEC BASA/BAL.**

Enclosures:

Table I – September 2018 Detection Monitoring Statistical Analysis Summary

## **TABLE**

**TABLE I**  
**SUMMARY OF SEMI-ANNUAL DETECTION GROUNDWATER MONITORING STATISTICAL EVALUATION**  
 SEPTEMBER 2018 SAMPLING EVENT  
 JEFFREY ENERGY CENTER BOTTOM ASH SETTLING AREA/BOTTOM ASH LANDFILL  
 ST. MARYS, KANSAS

Location Id	Frequency of Detection	Percent Non-Detects	Range of Non-Detect	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	Outlier Presence	Outlier Removed	Trend	Distribution Well	September 2018 Concentration (mg/L)	Interwell Analysis	
													Background Limits <sup>1</sup> (UPL) mg/L	SSI
<b>CCR Appendix-III: Boron, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	5.92	1.868	1.367	0.3633	No	No	Stable			8.93	
MW-BAA-2	10/10	0%	-	1.38	0.03925	0.1981	0.1885	No	No	Stable	Normal	1.38		No
MW-BAA-3	10/10	0%	-	2.4	0.009333	0.09661	0.04275	No	No	Stable	Normal	2.3		No
MW-BAA-7	10/10	0%	-	1.3	0.04495	0.212	0.1872	No	No	Stable	Non-parametric	0.837		No
<b>CCR Appendix-III: Calcium, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	551	2656	51.53	0.1044	Yes	No	Stable			756	
MW-BAA-2	10/10	0%	-	224	701.3	26.48	0.1463	No	No	Stable	Normal	214		No
MW-BAA-3	10/10	0%	-	539	659.1	25.67	0.05041	Yes	No	Stable	Normal	487		No
MW-BAA-7	10/10	0%	-	260	274.3	16.56	0.07123	No	No	Decreasing	Normal	208		No
<b>CCR Appendix-III: Chloride, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	314	1778	42.16	0.1828	No	No	Stable			364	
MW-BAA-2	10/10	0%	-	220	1732	41.62	0.3226	No	No	Stable	Normal	220		No
MW-BAA-3	10/10	0%	-	172	46.62	6.828	0.04371	Yes	No	Stable	Normal	172		No
MW-BAA-7	10/10	0%	-	211	982.9	31.35	0.1693	No	No	Stable	Non-parametric	211		No
<b>CCR Appendix-III: Fluoride, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	0.88	0.02744	0.1657	0.2638	No	No	Stable			1.4	
MW-BAA-2	10/10	0%	-	0.63	0.003484	0.05903	0.114	No	No	Stable	Normal	0.63		No
MW-BAA-3	10/10	0%	-	1.5	0.03701	0.1924	0.1953	Yes	No	Stable	Non-parametric	0.92		No
MW-BAA-7	10/10	0%	-	0.9	0.005404	0.07351	0.09353	No	No	Stable	Normal	0.79		No
<b>CCR Appendix-III: pH (lab), Total (SU)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	7.2	0.01822	0.135	0.01917	No	No	Stable			7.79	
MW-BAA-2	10/10	0%	-	8.5	0.1333	0.3651	0.04869	Yes	Yes <sup>2</sup>	Stable	Non-parametric	8.5 <sup>2</sup>		No
MW-BAA-3	10/10	0%	-	7.6	0.03567	0.1889	0.02634	Yes	No	Stable	Normal	6.9		No
MW-BAA-7	10/10	0%	-	7.5	0.01167	0.108	0.0147	Yes	No	Stable	Normal	7.4		No
<b>CCR Appendix-III: Sulfate, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	2190	95530	309.1	0.1701	Yes	No	Stable			3037	
MW-BAA-2	10/10	0%	-	983	37180	192.8	0.2809	No	No	Stable	Normal	983		No
MW-BAA-3	10/10	0%	-	2290	15200	123.3	0.06023	Yes	No	Stable	Normal	2170		No
MW-BAA-7	10/10	0%	-	950	624.9	25	0.02731	No	No	Stable	Normal	914		No
<b>CCR Appendix-III: Total Dissolved Solids (TDS) (mg/L)</b>														
MW-BAA-6 (upgradient)	10/10	0%	-	3630	185000	430.1	0.1344	Yes	No	Stable			5039	
MW-BAA-2	10/10	0%	-	1790	54130	232.7	0.1788	No	No	Stable	Normal	1790		No
MW-BAA-3	10/10	0%	-	3630	23740	154.1	0.04676	No	No	Stable	Normal	3430		No
MW-BAA-7	10/10	0%	-	1960	4361	66.04	0.03659	Yes	No	Stable	Normal	1800		No

**Notes and Abbreviations:**

<sup>1</sup> Based on background data collected from 08/25/2016 through 06/29/2017.

<sup>2</sup> The pH value from monitoring well MW-BAA-2 was identified as an outlier and was removed from the statistical analysis.

CCR = coal combustion residual

mg/L = milligrams per liter

SSI = statistically significant increase

SU = standard unit

UPL = upper prediction limit

**ATTACHMENT 2-2**  
**March 2019 Statistical Analysis**





HALEY & ALDRICH, INC.  
6500 Rockside Road  
Suite 200  
Cleveland, OH 44131  
216.739.0555

## TECHNICAL MEMORANDUM

November 3, 2022  
File No. 129778

TO: Evergy Kansas Central, Inc.  
Jared Morrison – Director, Water and Waste Programs

FROM: Haley & Aldrich, Inc.  
Steven F. Putrich, P.E., Senior Associate – Engineering Principal  
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SUBJECT: March 2019 Semi-Annual Groundwater Detection Monitoring Data  
Statistical Evaluation  
**Completed July 15, 2019**  
Jeffrey Energy Center  
Bottom Ash Settling Area/Bottom Ash Landfill

Pursuant to Title 40 Code of Federal Regulations (40 CFR) §§ 257.93 and 257.94 (Rule), this memorandum summarizes the statistical evaluation of the analytical results for the **March 2019** semi-annual detection monitoring groundwater sampling event for the Jeffrey Energy Center (JEC) Bottom Ash Settling Area/Bottom Ash Landfill (BASA/BAL). This semi-annual detection monitoring groundwater sampling event was completed on **March 27 and 28, 2019**, with laboratory results received and accepted on **April 15, 2019**.

The statistical evaluation discussed in this memorandum was conducted to determine if Appendix III groundwater monitoring constituents have been detected in downgradient wells at concentrations that represent a statistically significant increase (SSI) above background or upgradient wells consistent with the requirements in 40 CFR § 257.94.

### Statistical Evaluation of Appendix III Constituents

The Rule provides four specific options for statistical evaluation of groundwater quality data collected at a coal combustion residual (CCR) unit (40 CFR § 257.93(f)(1-4)). The two statistical methods used for these evaluations, prediction limits (PLs) and Parametric Analysis of Variance, were certified by Haley & Aldrich, Inc. on April 17, 2019. The PL method, as determined applicable for this sampling event, was used to evaluate potential SSIs above background. Background levels for each constituent listed in Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids) were computed as upper prediction limits (UPLs), considering one future observation, and a minimum 95 percent confidence coefficient. The most recent groundwater sampling event from each compliance well was compared to the corresponding background PL to determine if an SSI existed.

## STATISTICAL ANALYSIS

An interwell evaluation using the PL method was used to complete the statistical evaluation of the referenced dataset. Interwell evaluation compares the most recent values from downgradient compliance wells against a background dataset composed of upgradient well data (MW-BAA-6). A PL procedure is one in which a concentration limit for each constituent is established from the distribution of the background data, with a specified confidence level (e.g., 95 percent). The upper endpoint of a concentration limit is called the UPL. Depending on the background data distribution, parametric or non-parametric PL procedures are used to evaluate groundwater monitoring data using this method. Parametric PLs 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 PL. If all the background data are non-detect, a maximum reporting limit may serve as an appropriate UPL.

The statistical evaluation was conducted using the background dataset for all Appendix III constituents. The UPLs were calculated from the background well dataset using Chemstat software after testing for outlier sample results that would warrant removal from the dataset based on likely error in sampling or measurement. Both visual and statistical outlier tests for the background data were performed using Chemstat and U.S. Environmental Protection Agency's ProUCL 5.1 software, and a visual inspection of the data was performed using box plots and distribution plots for the downgradient sample data. No sample data were identified as outliers that warranted removal from the dataset.

## BACKGROUND DISTRIBUTIONS

The groundwater analytical results for each sampling event from the background sample location MW-BAA-6 were combined to calculate the UPL for each Appendix III constituent. The variability and distribution of the pooled dataset were evaluated to determine the method for UPL calculation. Per the document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*, March 2009, background concentrations were updated based on statistical evaluation of analytical results collected through **June 2017**.

## RESULTS OF APPENDIX III DOWNGRADIANT STATISTICAL COMPARISONS

Sample concentrations from the downgradient wells for each of the Appendix III constituents from the **March 2019** semi-annual detection monitoring sampling event were compared to their respective background UPLs (Table I). A sample concentration greater than the background UPL is considered to represent an SSI. The results of the groundwater detection monitoring statistical evaluation are provided in Table I. **Based on this statistical evaluation of groundwater sampling data collected in March 2019, no SSIs above background PLs occurred at the JEC BASA/BAL.**

Enclosures:

Table I – Summary of Semi-Annual Detection Groundwater Monitoring Statistical Evaluation

## TABLE

**TABLE I**  
**SUMMARY OF SEMI-ANNUAL DETECTION GROUNDWATER MONITORING STATISTICAL EVALUATION**  
MARCH 2019 SAMPLING EVENT  
JEFFREY ENERGY CENTER BOTTOM ASH SETTLING AREA/BOTTOM ASH LANDFILL  
ST. MARYS, KANSAS

Location Id	Frequency of Detection	Percent Non-Detects	Range of Non-Detect	Maximum Detect	Variance	Standard Deviation	Coefficient of Variance	Outlier Presence	Outlier Removed	Trend	Distribution Well	March 2019 Concentration (mg/L)	Interwell Analysis	
													Background Limits <sup>1</sup> (UPL) mg/L	SSI
<b>CCR Appendix-III: Boron, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	5.92	1.868	1.367	0.3633	No	No	Stable			8.93	
MW-BAA-2	11/11	0%	-	1.38	0.03925	0.1981	0.1885	No	No	Stable	Normal	1.16		No
MW-BAA-3	11/11	0%	-	2.4	0.009333	0.09661	0.04275	No	No	Stable	Normal	2.28		No
MW-BAA-7	11/11	0%	-	1.3	0.04495	0.212	0.1872	No	No	Stable	Non-parametric	0.616		No
<b>CCR Appendix-III: Calcium, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	551	2656	51.53	0.1044	Yes	No	Stable			756	
MW-BAA-2	11/11	0%	-	224	701.3	26.48	0.1463	No	No	Stable	Normal	191		No
MW-BAA-3	11/11	0%	-	539	659.1	25.67	0.05041	Yes	No	Stable	Normal	531		No
MW-BAA-7	11/11	0%	-	260	274.3	16.56	0.07123	No	No	Decreasing	Normal	207		No
<b>CCR Appendix-III: Chloride, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	314	1778	42.16	0.1828	No	No	Stable			364	
MW-BAA-2	11/11	0%	-	220	1732	41.62	0.3226	No	No	Stable	Normal	187		No
MW-BAA-3	11/11	0%	-	172	46.62	6.828	0.04371	Yes	No	Stable	Normal	168		No
MW-BAA-7	11/11	0%	-	211	982.9	31.35	0.1693	No	No	Stable	Non-parametric	205		No
<b>CCR Appendix-III: Fluoride, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	0.88	0.02744	0.1657	0.2638	No	No	Stable			1.4	
MW-BAA-2	11/11	0%	-	0.63	0.003484	0.05903	0.114	No	No	Stable	Normal	0.61		No
MW-BAA-3	11/11	0%	-	1.5	0.03701	0.1924	0.1953	Yes	No	Stable	Non-parametric	0.75		No
MW-BAA-7	11/11	0%	-	0.9	0.005404	0.07351	0.09353	No	No	Stable	Normal	0.75		No
<b>CCR Appendix-III: pH (lab), Total (SU)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	7.2	0.01822	0.135	0.01917	No	No	Stable			7.79	
MW-BAA-2	11/11	0%	-	8.5	0.1333	0.3651	0.04869	Yes	No	Stable	Non-parametric	7.4		No
MW-BAA-3	11/11	0%	-	7.6	0.03567	0.1889	0.02634	Yes	No	Stable	Normal	7.1		No
MW-BAA-7	11/11	0%	-	7.5	0.01167	0.108	0.0147	Yes	No	Stable	Normal	7.3		No
<b>CCR Appendix-III: Sulfate, Total (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	2190	95530	309.1	0.1701	Yes	No	Stable			3037	
MW-BAA-2	11/11	0%	-	983	37180	192.8	0.2809	No	No	Stable	Normal	749		No
MW-BAA-3	11/11	0%	-	2290	15200	123.3	0.06023	Yes	No	Stable	Normal	2090		No
MW-BAA-7	11/11	0%	-	950	624.9	25	0.02731	No	No	Stable	Normal	934		No
<b>CCR Appendix-III: Total Dissolved Solids (TDS) (mg/L)</b>														
MW-BAA-6 (upgradient)	11/11	0%	-	3,630	185,000	430.1	0.1344	Yes	No	Stable			5039	
MW-BAA-2	11/11	0%	-	1,790	54,130	232.7	0.1788	No	No	Stable	Normal	1440		No
MW-BAA-3	11/11	0%	-	3,630	23,740	154.1	0.04676	No	No	Stable	Normal	2810		No
MW-BAA-7	11/11	0%	-	1,960	4,361	66.04	0.03659	Yes	No	Stable	Normal	1790		No

**Notes and Abbreviations:**

<sup>1</sup> Based on background data collected from 08/25/2016 through 06/29/2017.

CCR = coal combustion residual

mg/L = milligrams per liter

SSI = statistically significant increase

SU = standard unit

UPL = upper prediction limit






**ATTACHMENT 3**  
**Groundwater Potentiometric Maps**



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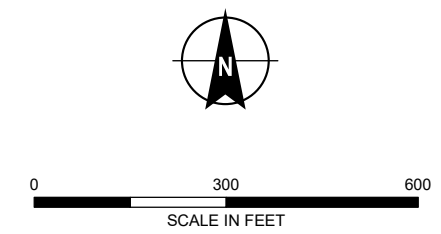


**LEGEND**

- MW-BAA-1** 1219.84 WELL NAME AND GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (AMSL), MARCH 2019
-  MONITORING WELL
-  PIEZOMETER OBSERVATION ONLY
-  ESTIMATED GROUNDWATER POTENTIOMETRIC OBSERVATION ELEVATION CONTOUR, 5-FT INTERVAL (AMSL), DASHED WHERE INFERRED
-  GROUNDWATER FLOW DIRECTION AND APPROXIMATE GROUNDWATER FLOW RATE (FEET/YEAR)
-  BOTTOM ASH SETTLING AREA / BOTTOM ASH LANDFILL

**NOTES**

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. GROUNDWATER POTENTIOMETRIC ELEVATIONS WERE MEASURED 22 MARCH 2019.
3. THE GROUNDWATER FLOW RATE WAS APPROXIMATED USING THE HYDRAULIC GRADIENT CALCULATED FROM GROUNDWATER POTENTIOMETRIC ELEVATIONS MEASURED 22 MARCH 2019 AND THE CONDUCTIVITY VALUES AND EFFECTIVE POROSITY VALUES OBTAINED FROM SLUG TESTS COMPLETED APRIL 2016.
4. AERIAL IMAGERY SOURCE: ESRI, 3 SEPTEMBER 2019



EVERGY KANSAS CENTRAL, INC.  
JEFFREY ENERGY CENTER  
ST. MARY'S, KANSAS

**BOTTOM ASH SETTLING AREA /  
BOTTOM ASH LANDFILL  
GROUNDWATER POTENTIOMETRIC  
ELEVATION CONTOUR MAP  
MARCH 22, 2019**








NOVEMBER 2022

FIGURE 2



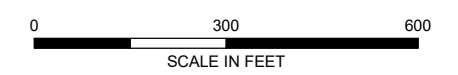


**LEGEND**

- MW-BAA-1** WELL NAME AND GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (AMSL), SEPTEMBER 2019
- 1219.84**
-  MONITORING WELL
-  PIEZOMETER OBSERVATION ONLY
-  ESTIMATED GROUNDWATER POTENTIOMETRIC OBSERVATION ELEVATION CONTOUR, 5-FT INTERVAL (AMSL), DASHED WHERE INFERRED
-  GROUNDWATER FLOW DIRECTION AND APPROXIMATE GROUNDWATER FLOW RATE (FEET/YEAR)
-  BOTTOM ASH SETTLING AREA / BOTTOM ASH LANDFILL

**NOTES**

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. GROUNDWATER POTENTIOMETRIC ELEVATIONS WERE MEASURED 09 SEPTEMBER 2019.
3. THE GROUNDWATER FLOW RATE WAS APPROXIMATED USING THE HYDRAULIC GRADIENT CALCULATED FROM GROUNDWATER POTENTIOMETRIC ELEVATIONS MEASURED 09 SEPTEMBER 2019 AND THE CONDUCTIVITY VALUES AND EFFECTIVE POROSITY VALUES OBTAINED FROM SLUG TESTS COMPLETED APRIL 2016.
4. AERIAL IMAGERY SOURCE: ESRI, 3 SEPTEMBER 2019



EVERGY KANSAS CENTRAL, INC.  
JEFFREY ENERGY CENTER  
ST. MARY'S, KANSAS

**BOTTOM ASH SETTLING AREA /  
BOTTOM ASH LANDFILL  
GROUNDWATER POTENTIOMETRIC  
ELEVATION CONTOUR MAP  
SEPTEMBER 9, 2019**



NOVEMBER 2022

FIGURE 3