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2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BOTTOM ASH SETTLING AREA
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

by Haley & Aldrich, Inc.
Cleveland, Ohio

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

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This Annual Groundwater Monitoring and Corrective Action Report documents the groundwater monitoring program for the Tecumseh Energy Center Bottom Ash Settling Area (BASA) 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 BASA is, to the best of my knowledge, accurate and complete.

Signed:_____
Professional Geologist

Print Name:	Mark Nicholls
Kansas License No.:	Professional Geologist No.
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 (BASA; also known as the Bottom Ash Settling Pond) at the Tecumseh Energy Center (TEC), 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 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 short 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 TEC BASA. The BASA is 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 TEC BASA as required by the Rule. Groundwater sampling and analysis was conducted per the requirements described in § 257.93, and the status of the groundwater monitoring program described in § 257.94 and § 257.95 is also 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 remained in the assessment 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 assessment monitoring sampling event. A successful alternate source demonstration (ASD) was completed and certified for the September 2018 assessment monitoring sampling event.

A semi-annual assessment monitoring sampling event was completed in March 2019 for detected Appendix IV constituents identified from the June 2018 annual assessment monitoring sampling event. Statistical evaluation was completed in July 2019 on analytical data for the March 2019 assessment monitoring sampling event. A successful ASD was completed and certified for the March 2019 assessment monitoring sampling event.

An annual assessment monitoring sampling event was completed in June 2019 to identify detected Appendix IV constituents for subsequent semi-annual sampling events in October 2019 and planned for March 2020. Groundwater protection standards for detected Appendix IV constituents were established or updated at this time. Semi-annual assessment monitoring sampling was completed in October 2019 for detected Appendix IV constituents identified during the June 2019 annual monitoring event. Statistical evaluation of the results from the October 2019 semi-annual assessment monitoring sampling event are due to be completed in January 2020 and will be reported in the next annual report.

During closure of the unit, substantial material around the monitoring well casings was removed to assist with closure activities. The monitoring well casings for downgradient wells MW-8, MW-9, and MW-10 were shortened accordingly between the June annual assessment monitoring sampling event and the October semi-annual assessment monitoring sampling event. Updated top of casing elevations are recorded in Table I.

An additional semi-annual assessment monitoring sampling event occurred in December 2019 associated with confirmation sampling for the closure of the BASA unit.

2.2.3 Problems Encountered

During the additional confirmation sampling event completed in December 2019, downgradient monitoring well MW-9 was identified as being dry. The monitoring well was unable to be sampled.

2.2.4 Actions to Resolve Problems

Evergy plans to monitor downgradient well MW-9 for the presence of groundwater in 2020. If sufficient groundwater is present at the well, an additional sample will be collected and analyzed for Appendix IV constituents to support closure of the unit.

2.2.5 Project Key Activities for Upcoming Year

Key activities planned for 2020 include the completion of the 2019 Annual Groundwater Monitoring and Corrective Action Report and statistical evaluation of semi-annual assessment monitoring analytical data collected in October and December 2019. Semi-annual assessment monitoring with subsequent statistical evaluations and annual assessment monitoring will be completed if necessary. Supplemental confirmation sampling and analysis is planned to support closure if sufficient groundwater is present at well MW-9.

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 TEC BASA 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 during 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 § 257.95(b) and § 257.95(d)(1), three independent assessment monitoring samples from each background and downgradient monitoring well were collected in 2019, along with an additional confirmation monitoring event in December 2019. A summary including sample names, dates of sample collection, field parameters, and monitoring data obtained for the groundwater monitoring program for the TEC BASA 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

The assessment monitoring program was established in June 2018 to meet the requirements of 40 CFR § 257.95. The BASA remained in assessment monitoring during 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 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.

This unit is in assessment monitoring; therefore, no detection monitoring alternative source 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).

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).

An assessment monitoring program has been implemented at the CCR unit since June 2018. Three rounds of assessment monitoring sampling were completed in 2019, along with an additional confirmation monitoring event in December 2019. Analytical results for both downgradient and upgradient wells are provided in Table I. The background concentrations (upper tolerance limits) and groundwater protection standards established for detected Appendix IV constituents for the TEC BASA are included in Table II. The background concentrations and groundwater protection standards provided in Table II were utilized for the statistical evaluations completed in 2019 for September 2018 and March 2019 semi-annual assessment monitoring sampling events.

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.

The successful assessment monitoring ASDs are included in this report as Attachments 1 and 2. The TEC BASA remained in assessment 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 during 2019; therefore, no demonstration or certification is applicable for this unit.

TABLES

TABLE I
SUMMARY OF ANALYTICAL RESULTS - ASSESSMENT MONITORING
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

Location	Upgradient					Downgradient										
	MW-7					MW-8				MW-9			MW-10			
Measure Point (TOC)	878.28					888.01		869.90*		886.98		865.60*	887.08		867.15*	
Sample Name	MW-7-032019	MW-7-062519	MW-7	MW-07-120519	DUP-120519	MW-8-032119	MW-8-062519	MW-8	MW-08-120519	MW-9-032119	MW-9-062519	MW-9	MW-10-032119	MW-10-062519	MW-10	MW-10-120519
Sample Date	3/20/2019	6/25/2019	10/10/2019	12/5/2019	12/5/2019	3/21/2019	6/25/2019	10/10/2019	12/5/2019	3/21/2019	6/25/2019	10/10/2019	3/21/2019	6/25/2019	10/9/2019	12/5/2019
Final Lab Report Date	4/1/2019	7/9/2019	10/22/2019	12/18/2019	12/18/2019	4/1/2019	7/9/2019	10/22/2019	12/18/2019	4/1/2019	7/9/2019	10/22/2019	4/1/2019	7/9/2019	10/22/2019	12/18/2019
Final Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Final Radiation Lab Report Date	4/3/2019	7/16/2019	11/8/2019	1/2/2020	1/2/2020	4/3/2019	7/16/2019	11/8/2019	1/2/2020	4/3/2019	7/16/2019	11/8/2019	4/3/2019	7/16/2019	11/8/2019	1/2/2020
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lab Data Reviewed and Accepted	5/3/2019	7/17/2019	12/6/2019	1/9/2020	1/9/2020	5/3/2019	7/17/2019	12/6/2019	1/9/2020	5/3/2019	7/17/2019	12/6/2019	5/3/2019	7/17/2019	12/6/2019	1/9/2020
Depth to Water (ft btoc)	23.55	16.18	23.50	25.04	--	35.29	27.43	18.50	18.41	36.14	30.39	18.46	34.58	28.95	17.57	18.01
Temperature (Deg C)	15.56	17.62	17.28	15.48	15.48	15.62	20.61	19.69	16.07	15.67	19.52	17.96	12.92	19.72	16.85	14.33
Conductivity (µS/cm)	1800	1740	1354	1559	1559	1920	2010	1874	1933	1960	2160	1797	1900	2110	1877	2082
Turbidity (NTU)	3.23	4.56	0.91	1.54	1.54	5.47	1.33	0.91	19.86	18.0	3.22	12.01	3.31	2.17	7.96	5.6
Boron, Total (mg/L)	**0.73**	--	**0.66**	**0.66**	**0.65**	**1.4**	--	**1.3**	**1.3**	**0.48**	--	**0.11**	**0.23**	--	**0.22**	**0.22**
Calcium, Total (mg/L)	**188**	--	**129**	**126**	**128**	**223**	--	**205**	**199**	**206**	--	**203**	**174**	--	**182**	**162**
Chloride (mg/L)	**268**	--	**172**	**197**	**199**	**271**	--	**216**	**220**	**261**	--	**206**	**252**	--	**222**	**228**
Fluoride (mg/L)	**0.26**	--	**0.34**	**0.22**	**0.21**	**0.23**	--	**0.25**	<0.20	**0.38**	--	**0.32**	**0.50**	--	**0.41**	**0.35**
Sulfate (mg/L)	**617**	--	**375**	**418**	**417**	**733**	--	**648**	**654**	**443**	--	**19.3**	**86.7**	--	**98.6**	**175**
pH (su)	**6.9**	--	**7.2**	**6.9**	**6.9**	**6.7**	--	**7.2**	**7.0**	**6.7**	--	**7.8**	**6.8**	--	**6.9**	**6.8**
TDS (mg/L)	**1,340**	--	**1,000**	**1,080**	**1,100**	**1,440**	--	**1,380**	**1,330**	**1,440**	--	**1,110**	**1,190**	--	**1,260**	**1,250**
Antimony, Total (mg/L)	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010
Arsenic, Total (mg/L)	**0.0016**	**0.0016**	**0.0016**	**0.0016**	**0.0015**	**0.0023**	**0.0029**	**0.0024**	**0.0039**	**0.040**	**0.093**	**0.051**	**0.028**	**0.029**	**0.021**	**0.026**
Barium, Total (mg/L)	**0.078**	**0.063**	**0.053**	**0.053**	**0.053**	**0.054**	**0.055**	**0.064**	**0.077**	**0.54**	**0.36**	**0.85**	**0.36**	**0.27**	**0.36**	**0.30**
Beryllium, Total (mg/L)	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010
Cadmium, Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	**0.0013**	**0.00053**	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Chromium, Total (mg/L)	<0.0050	<0.0050	--	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	<0.0050	<0.0050	--	<0.0050	<0.0050	--	<0.0050
Cobalt, Total (mg/L)	**0.0016**	**0.0016**	<0.0010	**0.0018**	**0.0016**	<0.0010	<0.0010	**0.0014**	**0.0025**	**0.048**	**0.032**	**0.016**	**0.0014**	**0.0091**	**0.002**	**0.0028**
Lead, Total (mg/L)	<0.010	<0.010	--	<0.010	<0.010	<0.010	<0.010	--	<0.010	<0.010	<0.010	--	<0.010	<0.010	--	<0.010
Lithium, Total (mg/L)	**0.028**	**0.027**	**0.017**	**0.024**	**0.024**	**0.017**	**0.019**	**0.017**	**0.024**	**0.021**	**0.020**	<0.010	<0.010	<0.010	<0.010	<0.010
Molybdenum, Total (mg/L)	**0.0050**	**0.0072**	**0.0110**	**0.0100**	**0.0110**	**0.031**	**0.025**	**0.039**	**0.046**	**0.0062**	**0.0024**	**0.0085**	**0.0029**	**0.0053**	**0.0041**	**0.0043**
Selenium, Total (mg/L)	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0050	<0.0010	--	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010
Thallium, Total	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010
Mercury, Total (mg/L)	<0.00020	<0.00020	--	<0.20	<0.20	<0.00020	<0.00020	--	<0.20	<0.00020	<0.00020	--	<0.00020	<0.00020	--	<0.20
Fluoride (mg/L)	**0.26**	**0.32**	**0.34**	**0.22**	**0.21**	**0.23**	<0.20	**0.25**	<0.20	**0.38**	<0.20	**0.32**	**0.50**	<0.20	**0.41**	**0.35**
Radium-226 & 228 Combined (pCi/L)	0.0990 ± 0.718 (1.59)	0.933 ± 0.772 (1.31)	0.403 ± 0.611 (1.25)	0.666 +/- 0.573 (0.873)	0.755 +/- 0.581 (0.988)	0.465 ± 0.962 (1.89)	**1.46 ± 0.891 (1.30)**	0.721 ± 0.842 (1.63)	0.569 +/- 0.668 (1.06)	0.663 ± 0.907 (1.70)	**1.01 ± 0.808 (1.35)**	**1.67 ± 1.01 (1.17)**	1.57 ± 1.04 (1.73)	**1.87 ± 0.973 (1.30)**	**2.64 ± 1.15 (1.50)**	1.60 +/- 0.752 (1.11)

Note:

The June 2019 sampling event was for Appendix IV constituents only. The September 2019 sampling event included Appendix IV constituents detected in the June 2019 sampling event, and all of the Appendix III constituents.

Radiological results are presented as activity plus or minus uncertainty with minimum detectable concentration (MDC).

Downgradient monitoring wells were shortened during closure of the unit, which occurred between the June annual assessment monitoring sampling event and the October semi-annual assessment monitoring sampling event.

**Top of Casing (TOC) elevations are estimated based on surveyed ground surface elevations plus 3 feet at monitoring wells MW-8, MW-9, and MW-10 for the October and December sampling events.*

***Bold value:** Detection above laboratory reporting limit or MDC .*

µS/cm = micro Siemens per centimeter

Deg C = degrees Celsius

ft btoc = feet below top of casing

mg/L = milligrams per liter

NTU = Nephelometric Turbidity Unit

pCi/L = picoCuries per liter

su = standard unit

TDS = total dissolved solids

TOC = top of casing

TABLE II
ANNUAL ASSESSMENT GROUNDWATER MONITORING - DETECTED APPENDIX IV GWPS
JUNE 2019 SAMPLING EVENT
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA

Well #	Background Value*	GWPS
CCR Appendix-IV Arsenic, Total (mg/L)		
MW-7 (upgradient)	0.002	NA
MW-10		0.118**
MW-8		0.010
MW-9		0.198**
CCR Appendix-IV Barium, Total (mg/L)		
MW-7 (upgradient)	0.095	NA
MW-10		2
MW-8		2
MW-9		2
CCR Appendix-IV Cadmium, Total (mg/L)		
MW-7 (upgradient)	0.001	NA
MW-10		0.005
MW-8		0.005
MW-9		0.005
CCR Appendix-IV Cobalt, Total (mg/L)		
MW-7 (upgradient)	0.002	NA
MW-10		0.006
MW-8		0.006
MW-9		0.0641**
CCR Appendix-IV Fluoride, Total (mg/L)		
MW-7 (upgradient)	0.371	NA
MW-10		4.0
MW-8		4.0
MW-9		4.0
CCR Appendix-IV Lithium, Total (mg/L)		
MW-7 (upgradient)	0.03	NA
MW-10		0.040
MW-8		0.040
MW-9		0.040
CCR Appendix-IV Molybdenum, Total (mg/L)		
MW-7 (upgradient)	0.014	NA
MW-10		0.100
MW-8		0.100
MW-9		0.100
CCR Appendix-IV Radium-226 & 228 Combined (pCi/L)		
MW-7 (upgradient)	5.9	NA
MW-10		5.9
MW-8		5.9
MW-9		5.9

Notes and Abbreviations:

** Background value for interwell evaluation based on data collected through June 2018.*
*** GWPS based on background value using intrawell evaluation based on data collected through June 2019.*
CCR = Coal Combustion Residuals
GWPS = Groundwater Protection Standard
MCL = Maximum Contaminant Level
mg/L = milligrams per Liter
NA = Not Applicable
pCi/L = picoCuries per Liter
RSL = Regional Screening Level

FIGURE

LEGEND

- MONITORING WELL
- PIEZOMETRIC OBSERVATION ONLY
- ASH SETTLING AREA

NOTE

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE, 11 APRIL 2017.

N

0 75 150

SCALE IN FEET

HALEY ALDRICH

EVERGY KANSAS CENTRAL, INC.
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

BOTTOM ASH SETTLING AREA MONITORING WELL LOCATION MAP

JANUARY 2020
SCALE: AS SHOWN

FIGURE 1

ATTACHMENT 1

Appendix IV SSL Alternate Source Demonstration for September 2018 Sampling Event for TEC Bottom Ash Settling Area

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REPORT ON

SEPTEMBER 2018 SAMPLING EVENT
APPENDIX IV STATISTICALLY SIGNIFICANT LEVEL
ALTERNATE SOURCE DEMONSTRATION
FOR THE BOTTOM ASH SETTLING AREA
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Westar Energy, Inc.
Topeka, Kansas

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Revision No.	Date	Notes
0	February 2019	Assessment Monitoring Program September 2018 Sampling Event Statistically Significant Level Notification and Alternate Source Demonstration Update
1	October 2019	September 2018 Sampling Event Appendix IV Statistically Significant Level Alternate Source Demonstration for the Bottom Ash Settling Area

1. Introduction

Haley & Aldrich, Inc. (Haley & Aldrich) was retained by Westar Energy, Inc. (Westar) to perform an evaluation of groundwater quality at the Bottom Ash Settling Area (BASA; Unit) at the Tecumseh Energy Center (TEC) located in Tecumseh, Kansas. The evaluation was performed to demonstrate if an alternate source caused the statistically significant level (SSL) above the groundwater protection standard of arsenic (at monitoring wells MW-9 and MW-10) and cobalt (at monitoring well MW-9) downgradient of the BASA. The arsenic concentrations observed for the September 2018 assessment monitoring sampling event is 0.099 milligrams per liter (mg/L) at well MW-9 and 0.040 mg/L at MW-10. The cobalt concentration observed for the September 2018 assessment monitoring sampling event is 0.011 mg/L at well MW-9. This report provides an overview of the site conditions and the results of the investigation activities conducted as part of the alternate source demonstration (ASD) for the Appendix IV constituents.

1.1 BACKGROUND

Consistent with Code of Federal Regulations Title 40 (40 CFR) §257.90 through §257.95, Westar has installed and certified a groundwater monitoring network at the BASA, has completed detection monitoring program activities including identifying statistically significant increases in Appendix III constituent concentrations, and established an assessment monitoring program. Westar conducted statistical analyses of the downgradient groundwater quality results from the September 2018 assessment monitoring sampling event to determine if any Appendix IV constituents were present at concentrations that exceeded groundwater protection standards set for the Unit. The analysis of the Appendix IV constituents resulted in a calculated SSL for arsenic (at monitoring wells MW-9 and MW-10) and cobalt (at monitoring well MW-9) downgradient of the BASA. The analyses described in this report were conducted to determine if alternate sources existed for the SSLs.

Pursuant to 40 CFR §257.95(g)(3)(ii), "*…the owner or operator must…demonstrate that a source other than the CCR unit [1] caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.*" The coal combustion residuals (CCR) Rule provides 90 days from determination of an SSL to complete an ASD[2] for applicable Appendix IV constituents. If a successful ASD is completed and certified by a qualified professional engineer, the CCR unit may continue in assessment monitoring. If, however, an alternate source of the Appendix IV SSL is not identified, the owner or operator must initiate an assessment of corrective measures and evaluation of the nature and extent of migration. This report documents the findings and conclusions of an investigation of the SSLs for arsenic at wells MW-9 and MW-10 and cobalt at MW-9.

[1] Referred to in this document as an "alternate source," and the demonstration for such is referred to as an ASD.

[2] For simplicity, this report utilizes the term ASD to account for any of the three possible explanations (allowed for in the CCR Rule) for why a calculated SSL is not related to the CCR unit being evaluated. Those include: 1) The source for the SSL originates from something other than the CCR unit in question; 2) the SSL resulted from an error in sampling, analysis, or statistical evaluation; or 3) the SSL resulted from a natural variation in groundwater quality.

1.2 PURPOSE AND SCOPE

The purpose of this ASD is to determine whether the concentrations of arsenic and cobalt detected in groundwater at MW-9 and MW-10 are from sources other than the Unit. The scope of the demonstration includes a review of the current regional geochemical and geologic conditions, a comparison of the groundwater quality at MW-9 and MW-10 and the other monitoring well locations, and analysis of geologic sources. This evaluation was completed using existing information describing the regional and site-specific geology and groundwater monitoring data collected during detection and assessment monitoring activities.

This analysis included:

- Review of well installation logs for the variability in the aquifer materials within screened intervals of the upgradient and downgradient groundwater monitoring well locations;
- Review of analytical results for the concentration of indicator parameters including chloride and sulfate from the upgradient and downgradient monitoring wells; and
- Collection and analysis of representative samples of the bottom ash stored within the Unit for the concentration of leachable Appendix IV constituents.

1.3 SITE SETTING

The TEC is located in a light industrial area located northeast of Tecumseh in Shawnee County, Kansas (Figure 1). The site is located within the Central Lowland physiographic province which includes rolling hills with substantial topographic relief and the relatively horizontal orientation of the thin alternating shale and limestone beds. Geologic units that underlie the BASA are roughly horizontal with a regional dip toward the northwest and consist of glacial till and the Scranton shale formation. The BASA consists of a surface impoundment that encompasses approximately 2 acres in the current configuration and is located on the TEC plant site. The TEC plant and BASA are located in an area with natural ground surface elevations varying from approximately 870 and 920 feet above mean sea level throughout the site property.

1.4 SITE DESCRIPTION

The TEC facility formerly operated a system of cycled bottom ash ponds collectively known as the BASA. The coal-fired boilers at the facility have been shut down. The BASA is a single CCR impoundment that utilized a middle dike for operational purposes to separate two separate settling areas. During operations, the plant alternated use of the settling areas. The bottom ash at TEC was sluiced via gravity to the BASA where it was allowed to settle out. Excess water from the BASA continues to decant via gravity to a polishing pond on the north side of Tecumseh Creek, where it then discharges into the creek. This discharge is permitted by Kansas Pollutant Discharge Elimination System. Bottom ash was recovered from the BASA and transported by truck to the on-site Ash Landfill No. 322. The TEC BASA and associated groundwater monitoring network are shown on Figure 2.

2. Site Geology, Hydrogeology, Geochemistry, and Regional Conditions

Geologic and hydrogeologic conditions beneath the BASA have been characterized based on information obtained during installation and testing of the monitoring wells installed as part of the CCR groundwater monitoring network.

2.1 SITE GEOLOGY

The TEC plant site and the BASA are located in the Central Lowland physiographic province. The Central Lowland is characterized by horizontal sequences of predominantly marine sedimentary rocks (interbedded shales and limestones). The TEC site and the BASA lie within the area of Pleistocene glacial activity in the Dissected Till Plains region of the Central Lowlands. Geologic units that underlie the site are roughly horizontal with a regional dip to the north and northwest (AMEC, 2011). The Scranton shale formation is the only lithologic unit encountered beneath the glacial till during geologic investigations at TEC.

Surficial geologic materials in the vicinity of and beneath the TEC site and BASA include thin deposits of Pleistocene glacial till deposits and Holocene alluvium. The poorly sorted glacial deposits are composed of Kansan and Nebraskan age clays, silts, and sands. The glacial till directly underlies most of the BASA. The glacial deposits have a local maximum thickness of approximately 100 feet (AMEC, 2011). Glacial erratics are observed to occur in the vicinity of the TEC site, often in the form of quartzite boulders (AMEC, 2011).

Locally, the till may yield minor quantities of water but is not typically used as an aquifer for water supply. The glacial till deposits do represent the uppermost aquifer at the CCR unit. The Pleistocene glacial deposits are underlain by strata representing transgressions and regressions of marine and near-shore depositional environments. Immediately above the shallowest bedrock unit, a thin clay layer, 10 feet or less in thickness, has been observed at the site.

The shallowest bedrock unit present at the TEC is the Pennsylvanian-age Scranton shale formation. The Scranton shale is predominantly grey to brown comprised of five members (Zeller, 1968). From shallowest to deepest the members of the Scranton formation include: the Silver Lake shale, Rulo limestone, Cedar Vale shale, Happy Hollow limestone, and White Cloud shale members. The total Scranton formation is of undefined thickness at the TEC site; however, a typical average thickness in other areas of the state is approximately 125 feet (Zeller, 1968).

A conceptual geologic cross section across the Unit is provided in Figure 3.

2.2 SITE HYDROGEOLOGY AND HYDROLOGY

The BASA is sited directly on the glacial deposits which contain low to high plasticity clay with trace silt, which will impede infiltration to deeper formations. In the area of the BASA, the glacial deposits are underlain by the Scranton shale at a depth of approximately 30 feet. Given the alternating transgressive/regressive nature of the deposition (interbedded shales and limestones), many of the deeper water-bearing bedrock formations are hydraulically isolated and some are confined. The permeability of the shale units varies but generally decrease with depth, further impeding vertical groundwater movement. Horizontal fluid migration is possible above the low permeability shale and within the glacial deposits.

The uppermost aquifer at TEC consists of unconsolidated glacial deposits, hereafter referred to as the glacial aquifer. Depth to groundwater in the monitoring wells ranges from approximately 16 to 35 feet below ground surface in the immediate vicinity of the BASA. Groundwater flow in the glacial aquifer below the BASA is to the west towards Tecumseh Creek, and ultimately north toward the Kansas River.

Based on groundwater elevations measured between August 2016 and September 2018, the groundwater flow direction is consistently toward the northwest. Available historical data indicate that seasonal groundwater elevation variation does not have a significant effect on groundwater flow direction.

Hydraulic conductivity of the glacial aquifer was calculated using data generated during slug testing of one monitoring well. The hydraulic conductivity of the glacial till is calculated to be approximately $1.6x10^{-3}$ centimeters per second (cm/sec).

The Silver Lake shale member of the Scranton shale formation comprises the confining unit underlying the uppermost aquifer at the BASA. The reported thickness of the confining shale at the BASA area is greater than 10 feet. The results of a packer test indicate that the hydraulic conductivity in the Silver Lake shale is $1x10^{-6}$ cm/sec. Based on the reported hydraulic conductivity, the Silver Lake member of the Scranton shale is characterized as an aquitard, meaning that the shale layer restricts flow of groundwater due its low hydraulic conductivity (i.e., prevents or inhibits vertical movement of groundwater).

3. Alternative Source Demonstration

Haley & Aldrich conducted an evaluation of arsenic and cobalt concentrations detected in downgradient wells at the BASA. The evaluation included review of possible alternative sources for the apparent SSLs of arsenic (MW-9 and MW-10) and cobalt (MW-9) determined by statistical analyses completed in January 2019 for the September 2018 assessment monitoring sampling event. The arsenic concentrations observed for the September 2018 assessment monitoring sampling event is 0.099 mg/L at well MW-9 and 0.040 mg/L at MW-10. The cobalt concentration observed for the September 2018 assessment monitoring sampling event is 0.011 mg/L at well MW-9.

Haley & Aldrich evaluated the following potential alternative sources in accordance with the CCR Rule:

1. The source for the SSL originates from something other than the CCR unit;
2. The SSL resulted from an error in sampling, analysis, or statistical evaluation; or
3. The SSL resulted from a natural variation in groundwater quality.

As part of that evaluation, Haley & Aldrich evaluated potential point and non-point sources of arsenic and/or cobalt in the vicinity of the BASA and evaluated natural geologic conditions and the effect of those conditions on native groundwater chemistry. Each of these analyses and the resulting findings are described below.

3.1 EVALUATION OF MATERIALS WITHIN THE UNIT

3.1.1 Bottom Ash Synthetic Precipitation Leaching Procedure Analyses

Representative samples of the bottom ash accumulated in the BASA were collected and analyzed for the Appendix IV constituents including two parameters that were determined to exhibit an SSL; arsenic and cobalt from the inter-well statistical evaluation with the upgradient monitoring well location (MW-7). Samples collected in July 2011 and April 2019 from multiple locations within the BASA were submitted to environmental laboratories accredited by the Kansas Department of Health and Environment (KDHE) for the analysis of leachable arsenic and cobalt after the bottom ash samples were extracted in accordance with the U.S. Environmental Protection Agency (USEPA) Method 1312 [Synthetic Precipitation Leaching Procedure (SPLP)].

The results of the SPLP analysis of the bottom ash samples collected from four locations within the Unit indicate that the leachable arsenic and cobalt concentrations were below the concentrations detected in samples collected from monitoring wells MW-8, MW-9, and MW-10. These data provide evidence that the bottom ash present in the BASA from 2011 and the second sample collected from the BASA in 2019 do not contain sufficient leachable arsenic and cobalt to produce the concentration of constituents detected in the downgradient groundwater. Westar has noted that the type of coal used for fuel and TEC plant operations have been consistent since the early 2000s.

A summary of the results of the bottom ash leachability analyses is provided in Table I and the laboratory reports are attached as Appendix A.

3.2 REVIEW OF SEPTEMBER 2018 FIELD SAMPLING, LABORATORY ANALYSIS, AND STATISTICAL PROCEDURES

3.2.1 Field Sampling Procedures

Westar and Haley & Aldrich conducted the field sampling activities in accordance with a Groundwater Sampling and Analysis Plan (SAP; Haley & Aldrich, 2017) that was prepared in accordance with §257.93 of the CCR Rule. The SAP prescribes the site-specific activities and methodologies for groundwater sampling and included procedures for field data collection, sample collection, sample preservation and shipment, interpretation, laboratory analytical methods, and reporting for groundwater sampling for the BASA. The administrative procedures and frequency for collection of groundwater elevation measurements, determination of flow directions, and gradients were also provided in the SAP.

Haley & Aldrich reviewed the field sampling and equipment calibration logs and the field indicator parameters and did not identify any apparent deviations or errors in sampling that would result in a potential SSL downgradient of the BASA.

3.2.2 Laboratory Analysis and Quality Control Documentation

The groundwater samples collected downgradient of the BASA were analyzed by Pace Analytical Services using USEPA analytical methods. The data generated from these laboratory analyses are stored in a project database that incorporates hydrogeologic and groundwater quality data and was established to allow efficient management of chemical and physical data collected in the field and produced in the laboratory.

Haley & Aldrich conducted a quality assurance/quality control review of each groundwater quality dataset generated for the BASA and did not identify apparent laboratory or data management errors that would result in the apparent arsenic or cobalt SSLs downgradient of the BASA.

3.2.3 Statistical Evaluation

Westar collected the initial assessment monitoring groundwater sample in June 2018, and a second assessment monitoring groundwater sample in September 2018 from each of the upgradient and downgradient monitoring wells at the BASA. To develop groundwater protection standards for use in the statistical analyses, data from the baseline sampling completed over a period spanning from August 2016 through June 2017 was also utilized. Statistical analysis of the analytical results was completed and reported as documented in the 2018 Annual Groundwater Monitoring and Corrective Action Report (Haley & Aldrich, 2019).

Haley & Aldrich has reviewed the statistical analysis of groundwater quality data from monitoring wells at the BASA for the September 2018 monitoring event and did not identify statistical calculation errors that would result in the apparent arsenic or cobalt SSLs. The statistical test method used met the performance standard established in the CCR Rule, and the statistical procedure complies with the requirements of the CCR Rule.

3.3 POTENTIAL SOURCES OTHER THAN THE BASA

Haley & Aldrich conducted a review of potential sources (both point and non-point) of arsenic and/or cobalt in the vicinity of the BASA to determine if previous or adjacent site activities, land uses, or practices might have caused, or are currently causing, elevated concentrations of arsenic and/or cobalt in groundwater downgradient of the BASA. Potential point sources would include discharging activities or other activities occurring at a discrete location that may be a source of arsenic and/or cobalt. Non-point sources would include diffuse discharging activities or practices that may result in a low level but wide-spread increase in concentrations detected at the downgradient side of the BASA.

3.3.1 Point Sources

Prior to construction of the BASA, the site and surrounding vicinity was undeveloped land. Review of historical United States Geological Survey (USGS) topographic maps shows undeveloped land prior to the construction of the BASA. No known industrial, agricultural, mining, or other activities were conducted at the BASA site prior to construction that would potentially constitute a point source. No point sources have been identified as a potential alternative source for arsenic and/or cobalt at the BASA.

3.3.2 Non-Point Sources

No mining, industrial, or other activities have been documented in the vicinity of the BASA that might constitute a non-point source of arsenic and/or cobalt in the vicinity of MW-9 and/or MW-10.

No agricultural activities have been identified upgradient of the BASA. Records reviewed included historical aerial photographs and historical topographic maps. No non-point sources have been identified as a potential alternative source for arsenic and/or cobalt at the BASA.

3.4 HISTORICAL LAND USE REVIEW

Haley & Aldrich assessed past usage of the site and adjoining properties through a review of the following records:

- Environmental Risk Information Services (ERIS) – Aerial Photographs dated 1948, 1950, 1970, 1975, 1982, 1991, 2003, 2004, 2005, 2006, 2008, 2010, 2012, 2014, 2015, and 2017 (Appendix B); and
- ERIS – Topographic Maps dated 1950, 1951, 1970, 1975, 1981, 1983, and 2012 (Appendix C).

Unless otherwise noted below, sources were reviewed dating back to 1940 or first developed use, whichever is earlier, and at 5-year intervals if the use of the property has changed within the time period.

3.4.1 Historical Aerial Photographs

Haley & Aldrich reviewed aerial photographs depicting the development of the site and vicinity as summarized in Table II. The historical aerial photograph search includes photographs from the Army Mapping Service, USGS, National High-Altitude Photography, and the National Agriculture Information Program (ERIS, 2018) and are included in Appendix B.

Photographs suggest that the BASA was undeveloped prior to 1970. The plant site and BASA appear to have been developed in their current configurations by 1982. Minor development continued until present day. The coal pile for the facility has been located immediately adjacent to and east of the BASA since the Unit's original construction. An above ground storage tank was also present east of the coal pile prior to the BASA construction. An historical aerial photograph review summary is included as Table II. No activities constituting potential sources of arsenic and/or cobalt (e.g., mining, smelting, etc.) have been identified based on aerial photograph review.

3.4.2 Historical Topographic Maps

Haley & Aldrich reviewed historical topographic maps depicting the development of the site and vicinity, as summarized in Table III. The topographic maps were provided for review by ERIS. Copies of the topographic maps are included in Appendix C. No historical development of other features constituting potential sources of arsenic and/or cobalt (e.g., mining) have been identified based on topographic map review.

3.5 NATURAL VARIABILITY OF ARSENIC AND/OR COBALT OCCURRENCE

Haley & Aldrich conducted an evaluation of the natural variability of groundwater quality at the BASA based on site-specific data; observations are described in the following sections.

3.5.1 Uppermost Groundwater Monitoring Interval Variability

Haley & Aldrich conducted an evaluation of the concentrations of the indicator parameters throughout the monitoring period from August 2016 through March 2018 to determine the natural variability of these parameters within the uppermost groundwater monitoring interval.

The average concentration of chloride and sulfate observed at the upgradient well (MW-7) were 194 and 470 mg/L, respectively. The average concentration of these indicator parameters within the downgradient monitoring wells MW-9 and MW-10 were 173 and 226 mg/L (MW-9) and 230 and 187 mg/L (MW-10), respectively. The difference in concentrations of chloride and sulfate between the upgradient and downgradient monitoring wells indicates that there is significant variability in the uppermost groundwater monitoring interval associated with the CCR Unit.

This conclusion is further supported by the difference in the boron concentrations observed during the reporting period. The average concentration of boron determined at the upgradient well (MW-7) was 0.73 mg/L while the average concentration of boron detected at the downgradient wells (MW-9 and MW-10) were significantly lower at 0.25 and 0.24 mg/L, respectively. Boron is a key Appendix III indicator parameter of potential impacts from a CCR Unit. Since boron concentrations down gradient of the Unit are lower than up gradient concentrations, it is further indicated that the BASA is not impacting groundwater quality.

4. Findings and Conclusions

Haley & Aldrich conducted an evaluation of groundwater quality data and information obtained as part of the detection and assessment monitoring programs and the materials contained within the BASA to identify potential sources of the arsenic and cobalt detected in the groundwater samples collected from monitoring wells MW-9 and MW-10 located downgradient of the BASA.

The evaluation included a review of sampling and analysis procedures, available laboratory analyses, and statistical analyses to determine if potential errors may have resulted in apparent SSL for arsenic and/or cobalt at the downgradient monitoring well locations. The evaluation also included a review of historical site activities based on aerial photographs and historical topographic maps, and consideration of potential point and non-point sources of arsenic and cobalt based on those activities.

To further evaluate if the materials stored within the BASA could be a source of arsenic and cobalt, results of the analysis of these materials for the concentration of leachable arsenic and cobalt from samples of bottom ash from the BASA for both past and current facility operations were reviewed and compared to the observed concentrations of these parameters within the downgradient wells during the monitoring period.

4.1 FINDINGS

Haley & Aldrich found no apparent errors in sampling, laboratory analysis, data management, or statistical analysis that would result in the apparent SSL for arsenic and cobalt at MW-9 and MW-10. Haley & Aldrich also found no evidence of historical point or non-point sources of arsenic and/or cobalt, or historical activities that affected the observed concentrations of arsenic and/or cobalt in groundwater downgradient of the BASA.

Haley & Aldrich evaluated available data to determine the potential for the materials stored within the BASA to be the source of the calculated SSL for arsenic and cobalt. Representative samples of bottom ash that had been stored within the BASA were obtained and submitted to a KDHE certified laboratory for the preparation of leachate samples in accordance with USEPA Method 1312, SPLP. The SPLP uses an acidic solution created using mineral acids consisting of nitric (HNO_3) and sulfuric (H_2SO_4) acids to evaluate the potential for contaminants to leach from materials exposed to acidic precipitation. The leaching procedure is performed over a period of 18 hours with constant agitation using an extraction fluid at a pH of less than 5, which is significantly lower than the pH of the groundwater conditions at the BASA. Based on the rigorous nature of the SPLP, the results provide a conservative or worst-case estimate of the concentration of the contaminants that are likely to leach from the material tested. Arsenic and cobalt should therefore leach from the CCR material in lower concentrations in the natural environmental condition as compared to the results of the SPLP leaching tests. The results of the SPLP testing of the materials stored in the BASA are presented in Table I.

Key findings regarding the potential for the bottom ash stored in the BASA to leach arsenic and cobalt and impact groundwater quality in the uppermost aquifer include:

- The results of SPLP analyses of bottom ash samples collected from the BASA from 2011 through 2018 exhibited concentrations of arsenic and cobalt below the levels observed in all of the site monitoring wells during the reporting period.

These findings indicate that the aggressive leaching procedure used in the laboratory to evaluate bottom ash samples from the BASA could not reproduce the concentrations observed in groundwater at MW-9 and MW-10. Groundwater conditions at the BASA have less potential to leach constituents from the bottom ash than the SPLP analysis. Consequently, based on available data and information, it is unlikely that the concentrations of arsenic and cobalt observed in groundwater at MW-9 and MW-10 were derived from leaching of bottom ash material contained at the BASA by interaction with groundwater[3].

4.2 CONCLUSIONS

Based on the direct analysis of the material stored in the BASA by an aggressive leaching procedure for the concentration of arsenic and cobalt , the natural variability in the uppermost groundwater monitoring interval observed during the monitoring period, and the absence of any errors in the sampling, analysis, and statistical evaluation of the monitoring results, the calculated SSLs for arsenic and cobalt identified at MW-9 and MW-10 are due to natural variability of the groundwater conditions around the BASA and not the materials either historically or currently stored in the Unit.

[3] Furthermore, we note that the concentration of cobalt detected in the bottom ash SPLP leachate and all of the monitoring wells installed at the unit were below the KDHE non-residential groundwater use standards. The concentration of arsenic detected in the bottom ash SPLP leachate were below the KDHE non-residential groundwater use standards.

5. Certification

Pursuant to 40 CFR §257.94(e)(2), Westar conducted an alternate source evaluation to demonstrate that a source other than the BASA caused the SSL above the groundwater protection standards of arsenic and cobalt downgradient of the BASA identified during assessment monitoring.

This certification and the underlying data and evaluation performed in this report support the conclusion that a source other than the CCR unit is the cause of the SSL above the groundwater protection standards of arsenic and cobalt found during assessment monitoring of this Unit (i.e., arsenic at monitoring wells MW-9 and MW-10 and cobalt at monitoring well MW-9 downgradient of the BASA). That source has been identified as natural variability of the groundwater conditions within the uppermost aquifer underlying the BASA.

I certify that this report and all attachments were prepared by me or under my direct supervision. The information contained in this evaluation is, to the best of my knowledge, true, accurate, and complete.

HALEY & ALDRICH, INC.

Signed: _____
Certifying Engineer

Print Name: Steven F. Putrich, P.E.
Kansas License No.: PE24363
Title: Principal Consultant
Company: Haley & Aldrich, Inc.

STEVEN F. PUTRICH LICENSED PE24363 10/10/19 KANSAS PROFESSIONAL ENGINEER

Signed: _____
Professional Geologist

Print Name: Mark D. Nicholls, P.G.
Kansas License No.: 881
Title: Lead Hydrogeologist
Company: Haley & Aldrich, Inc.

MARK D. NICHOLLS LICENSED 881 10/10/2019 KANSAS PROFESSIONAL GEOLOGIST

HALEY ALDRICH

6. References

1. AMEC, May 2011. Report of Dam Safety Assessment of Coal Combustion Surface Impoundments.

2. Environmental Risk Information Services. Database Report. March 2018.

3. Haley & Aldrich, Inc., 2017. Groundwater Sampling and Analysis Pan, Tecumseh Energy Center. October.

4. Haley & Aldrich, Inc., 2019. Annual Groundwater Monitoring and Corrective Action Report. January.

5. United States Geological Survey (USGS), 1950. Topographic Map, Grantville, 7.5-minute series.

6. USGS, 1951. Topographic Map, Grantville, 7.5-minute series.

7. USGS, 1970. Topographic Map, Grantville, 7.5-minute series.

8. USGS, 1975. Topographic Map, Grantville, 7.5-minute series.

9. USGS, 1981. Topographic Map, Grantville, 7.5-minute series.

10. USGS, 1983. Topographic Map, Grantville, 7.5-minute series.

11. USGS, 2012. Topographic Map, Grantville, 7.5-minute series.

12. Zeller, D.E., 1968. *The Stratigraphic Succession in Kansas*. Kansas Geological Survey Bulletin 189.

TABLES

TABLE I
SUMMARY OF BOTTOM ASH SPLP ANALYSIS FOR TOTAL LEACHABLE METALS
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

Sample Identification	Sample Location	Sample Date	Method of Analysis	Parameter	Reporting Limit (mg/L)	Concentration (mg/L)
TEC Bottom Ash*	Bottom Ash Settling Pond	7/14/2011	ICP-AES	Total Arsenic	0.005	ND
			ICP-AES	Total Cobalt	0.002	ND
TEC BA Inlet**	Bottom Ash Settling Pond Inlet	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0025***
			ICP-AES	Total Cobalt	0.005	ND
TEC BA Middle**	Bottom Ash Settling Pond Middle	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0055***
			ICP-AES	Total Cobalt	0.005	ND
TEC BA Outlet**	Bottom Ash Settling Pond Outlet	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0016***
			ICP-AES	Total Cobalt	0.005	ND

Notes:

ICP-AES = Inductively Coupled Plasma Atomic Emission Spectroscopy

ICP-MS = Inductively Coupled Plasma Mass Spectroscopy

mg/L = milligrams per liter or parts per million (ppm)

TEC = Tecumseh Energy Center

ND = Non-detect at the reporting limit

***Bold Values** = parameter detected at a concentration greater than the reporting limits*

** Sample analyzed by Continental Analytical Services, Inc. Salina KS (KDHE Accreditation #E-10146)*

*** Samples analyzed vt Pace Anayltical Services, LLC. Lenexa KS Kansas/NELAP Certification # E-10116/E10426*

TABLE II
HISTORICAL AERIAL PHOTOGRAPH REVIEW SUMMARY
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

Dates	Description of Site	Sources
1948 – 1950	Power plant present; no development of the Bottom Ash Settling Area (BASA). Residential use of land to the west and southwest of the BASA. Coal pile and oil tank to east of future BASA site.	Aerial photos – ASCS; AMS
1970 – 1982	Development of the BASA. Residential use of land to the west of the 322 Landfill.	Aerial photos – USGS; NHAP
1991 – 2010	Continued development of the 322 Landfill. Residential use of land to the west of the 322 Landfill.	Aerial photos – USGS; NAIP
2012 – 2017	Continued use of the 322 Landfill configurations with only minor variations. Residential use of land to the west of the 322 Landfill.	Aerial photos – NAIP

Notes:

AMS = Army Mapping Service

ASCS = Agricultural and Soil Conservation Service

NAIP = National Agriculture Information Program

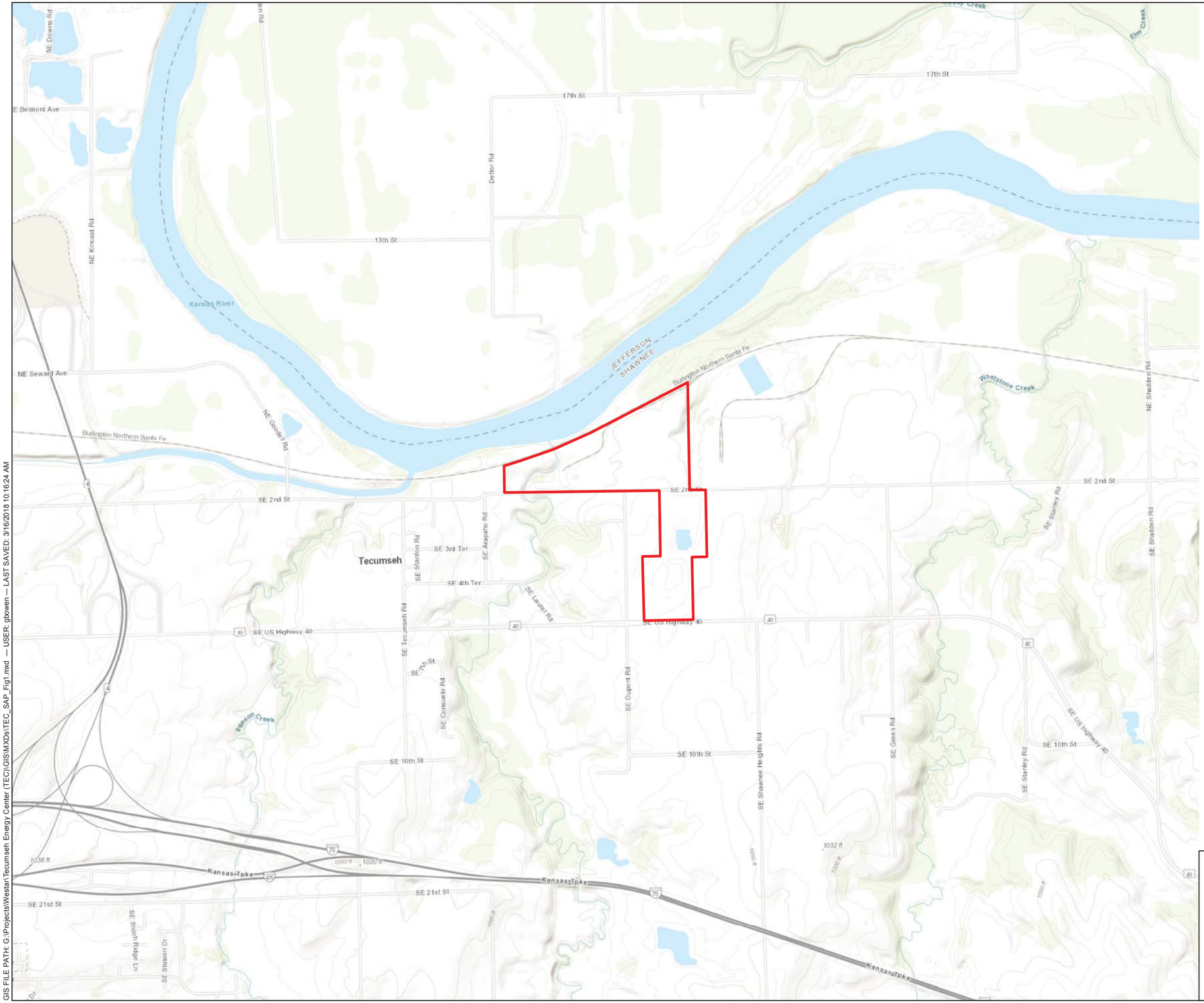
NHAP = National High Altitude Photography

USGS = United States Geological Survey

TABLE III
HISTORICAL TOPOGRAPHIC MAP REVIEW SUMMARY
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

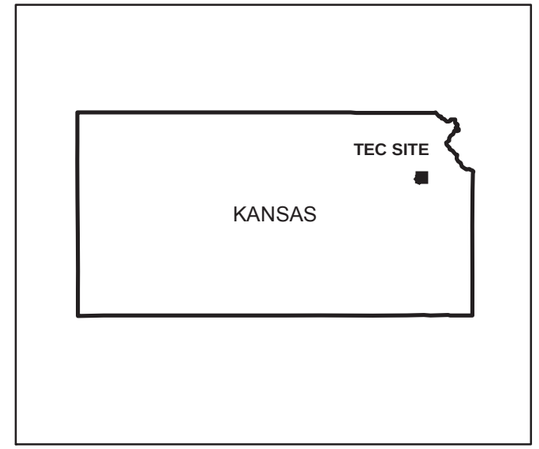
Dates	Description of Site and Adjacent Properties	Map Name
1950 – 1951	Power plant is indicated on the map. The Bottom Ash Settling Area (BASA) are undeveloped. Coal pile and above ground storage tank are due east of the BASA future area.	7.5-Minute Series, Grantville, Kansas Quadrangle
1970 – 1983	Development of the BASA. Significant development of structures and road to the east of the plant site.	7.5-Minute Series, Grantville, Kansas Quadrangle
1983	Development of the BASA.	7.5-Minute Series, Grantville, Kansas Quadrangle
2012	The plant site is no longer shown on the map. The BASA are shown on the map.	7.5-Minute Series, Grantville, Kansas Quadrangle

FIGURES



LEGEND

PROPERTY BOUNDARY



NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SITE COORDINATES: 39°3'13.53"N, 95°34'08.06"W
3. TOPOGRAPHIC IMAGERY SOURCE: ESRI.

N

0 2,000 4,000

SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

SITE LOCATION

OCTOBER 2019
SCALE: AS SHOWN

FIGURE 1

GIS FILE PATH: G:\Projects\Westar\Tecumseh Energy Center (TEC)\GIS\MXDs\TEC_SAP_Fig1.mxd — USER: gbowen — LAST SAVED: 3/16/2018 10:16:24 AM

LEGEND

- MONITORING WELL
- PIEZOMETRIC OBSERVATION WELL
- CROSS-SECTION
- BOTTOM ASH SETTLING AREA

NOTE

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AMSL = ABOVE MEAN SEA LEVEL.
3. AERIAL IMAGERY SOURCE: ESRI, 7 NOVEMBER 2015.
4. GROUNDWATER ELEVATIONS ARE FROM 26 JUNE 2017.

N

0 60 120

SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

BOTTOM ASH SETTLING AREA MONITORING WELL LOCATION MAP

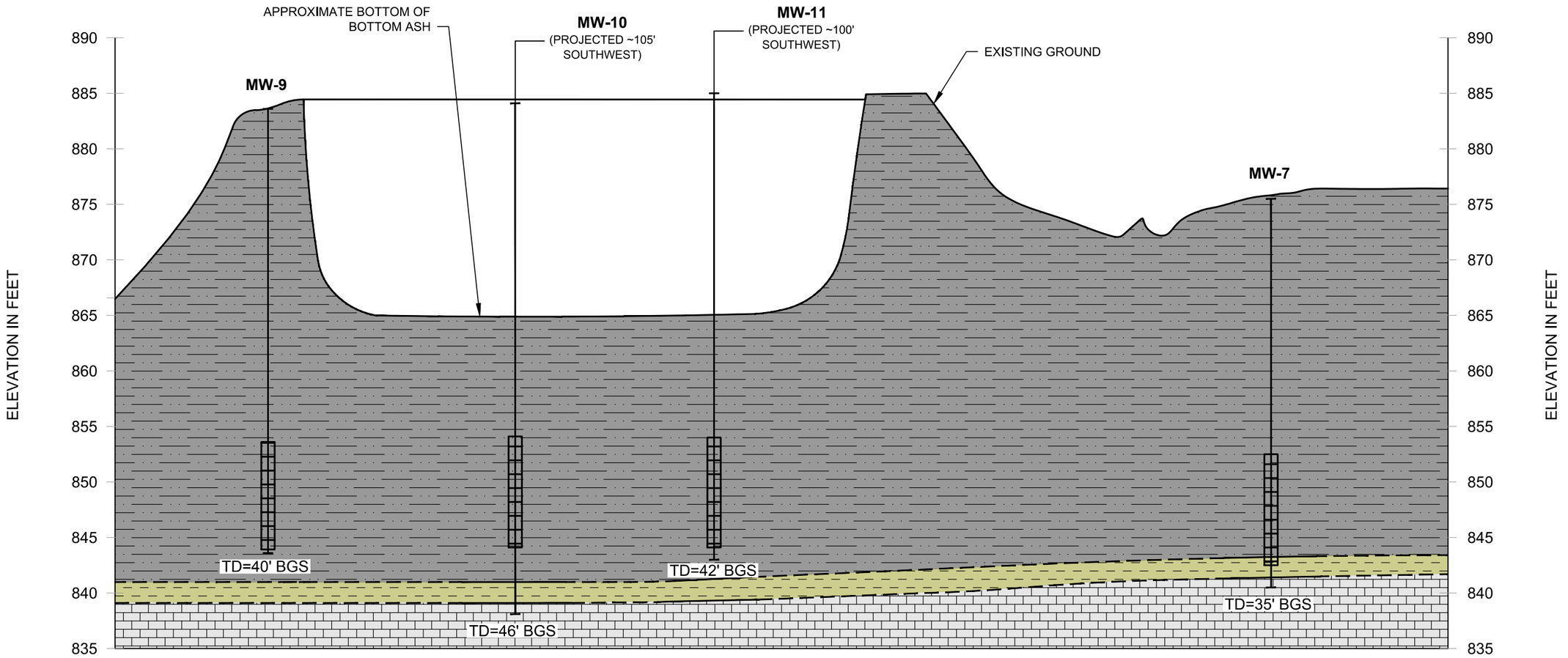
OCTOBER 2019
SCALE: AS SHOWN

FIGURE 2

GIS FILE PATH: G:\Projects\Westar\Tecumseh Energy Center (TEC)\GIS\MXDs\2019_04\CROSS SECTIONS - B-B' ASH SETTLING POND.mxd — USER: DZinsmaster — LAST SAVED: 6/24/2019 3:22:40 PM

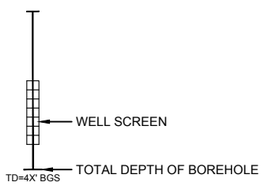
A
(NORTHWEST)

A'
(SOUTHEAST)



LEGEND

- GLACIAL DEPOSITS/OVERBURDEN
- SHALE MEMBER OF THE SCRANTON FORMATION
- LIMESTONE MEMBER OF THE SCRANTON SHALE FORMATION



NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. VERTICAL SCALE IS EXAGGERATED 5 TIMES.
3. PROJECTIONS ARE IN DIRECTION FROM ACTUAL LOCATION.

HORIZ. 0 50 100
VERT. 0 10 20
SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER (TEC)
TECUMSEH, KANSAS

BOTTOM ASH SETTLING AREA CONCEPTUAL GEOLOGIC CROSS SECTION A-A'

SCALE: AS SHOWN
OCTOBER 2019

FIGURE 3

APPENDIX A

Laboratory Reports

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

April 09, 2019

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

RE: Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Dear Brandon Griffin:
Enclosed are the analytical results for sample(s) received by the laboratory between April 02, 2019 and April 09, 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: Bob Beck, KCPL Lacygne Station
HEATH HORYNA, WESTAR ENERGY
Adam Kneeling, Haley & Aldrich, Inc.
JARED MORRISON, WESTAR ENERGY

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

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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(913)599-5665

SAMPLE SUMMARY

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60298624001	**TEC BA INLET**	Solid	04/02/19 12:45	04/02/19 15:30
60298624002	**TEC BA INLET LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624003	**TEC BA MIDDLE**	Solid	04/02/19 12:50	04/02/19 15:30
60298624004	**TEC BA MIDDLE LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624005	**TEC BA OUTLET**	Solid	04/02/19 12:55	04/02/19 15:30
60298624006	**TEC BA OUTLET LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624007	**TEC BA INLET LEACHATE 2**	Water	04/09/19 13:35	04/09/19 13:36
60298624008	**TEC BA MIDDLE LEACHATE 2**	Water	04/09/19 13:35	04/09/19 13:36
60298624009	**TEC BA OUTLET LEACHATE 3**	Water	04/09/19 13:35	04/09/19 13:36

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SAMPLE ANALYTE COUNT

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60298624001	**TEC BA INLET**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624002	**TEC BA INLET LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624003	**TEC BA MIDDLE**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624005	**TEC BA OUTLET**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624006	**TEC BA OUTLET LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624007	**TEC BA INLET LEACHATE 2**	EPA 7196	ZMH	1	PASI-K
60298624008	**TEC BA MIDDLE LEACHATE 2**	EPA 7196	ZMH	1	PASI-K
60298624009	**TEC BA OUTLET LEACHATE 3**	EPA 7196	ZMH	1	PASI-K

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET **Lab ID: 60298624001** Collected: 04/02/19 12:45 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	ND	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:18	7440-41-7	
Boron	**0.36**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-43-9	
Calcium	**12.7**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-50-8	
Iron	**0.22**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7439-92-1	
Magnesium	**3.2**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7439-95-4	
Manganese	**0.0088**	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:18	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-02-0	
Potassium	ND	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-09-7	
Silica	**6.9**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:18	7631-86-9	
Silicon	**3.2**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:18	7440-22-4	
Sodium	**7.3**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-23-5	B,M1
Strontium	**0.19**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:18	7440-24-6	
Titanium	**0.012**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-32-6	
Vanadium	**0.024**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**0.54**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:03	7429-90-5	M1
Antimony	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-36-0	
Arsenic	**0.0025**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-38-2	
Selenium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:37	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET LEACHATE **Lab ID: 60298624002** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	ND	mg/L	1.0	1		04/05/19 22:53	16887-00-6	
Fluoride	**0.29**	mg/L	0.20	1		04/05/19 22:53	16984-48-8	
Sulfate	**13.2**	mg/L	1.0	1		04/05/19 22:53	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**0.20**	mg/L	0.10	1		04/05/19 14:59		B
Nitrogen, Nitrite	ND	mg/L	0.10	1		04/05/19 14:59		
Nitrogen, NO2 plus NO3	**0.20**	mg/L	0.10	1		04/05/19 14:59		B
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	**0.16**	mg/L	0.10	1		04/06/19 10:53	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE **Lab ID: 60298624003** Collected: 04/02/19 12:50 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	ND	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:25	7440-41-7	
Boron	**0.17**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-43-9	
Calcium	**27.7**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-50-8	
Iron	**1.9**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7439-92-1	
Magnesium	**4.3**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7439-95-4	
Manganese	**0.019**	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:25	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-02-0	
Potassium	**4.4**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-09-7	
Silica	**20.5**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:25	7631-86-9	
Silicon	**9.6**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:25	7440-22-4	
Sodium	**31.4**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-23-5	B
Strontium	**0.25**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:25	7440-24-6	
Titanium	**0.036**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-32-6	
Vanadium	**0.015**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**1.9**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:08	7429-90-5	
Antimony	**0.0012**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-36-0	
Arsenic	**0.0055**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-38-2	
Selenium	**0.0016**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:44	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE LEACHATE **Lab ID: 60298624004** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**1.3**	mg/L	1.0	1		04/05/19 23:32	16887-00-6	
Fluoride	**0.39**	mg/L	0.20	1		04/05/19 23:32	16984-48-8	
Sulfate	**86.4**	mg/L	10.0	10		04/05/19 23:44	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**1.7**	mg/L	0.10	1		04/05/19 15:00		
Nitrogen, Nitrite	**1.4**	mg/L	0.10	1		04/05/19 15:00		
Nitrogen, NO2 plus NO3	**3.1**	mg/L	0.10	1		04/05/19 15:00		
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	**1.1**	mg/L	0.10	1		04/06/19 10:55	7723-14-0	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET **Lab ID: 60298624005** Collected: 04/02/19 12:55 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	**0.14**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:27	7440-41-7	
Boron	**0.39**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-43-9	
Calcium	**15.5**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-50-8	
Iron	**0.055**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7439-92-1	
Magnesium	**2.6**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7439-95-4	
Manganese	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:27	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-02-0	
Potassium	ND	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-09-7	
Silica	**7.2**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:27	7631-86-9	
Silicon	**3.3**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:27	7440-22-4	
Sodium	**5.5**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-23-5	B
Strontium	**0.38**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:27	7440-24-6	
Titanium	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-32-6	
Vanadium	**0.043**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**0.60**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:09	7429-90-5	
Antimony	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-36-0	
Arsenic	**0.0016**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-38-2	
Selenium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:46	7439-97-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET LEACHATE **Lab ID: 60298624006** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	ND	mg/L	1.0	1		04/06/19 00:10	16887-00-6	
Fluoride	**0.20**	mg/L	0.20	1		04/06/19 00:10	16984-48-8	
Sulfate	**16.4**	mg/L	1.0	1		04/06/19 00:10	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**0.15**	mg/L	0.10	1		04/05/19 15:03		B
Nitrogen, Nitrite	ND	mg/L	0.10	1		04/05/19 15:03		
Nitrogen, NO2 plus NO3	**0.15**	mg/L	0.10	1		04/05/19 15:03		B
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	ND	mg/L	0.10	1		04/06/19 10:58	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET LEACHATE 2 **Lab ID: 60298624007** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:19	18540-29-9	

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE LEACHATE 2 **Lab ID: 60298624008** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:21	18540-29-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET LEACHATE 3 **Lab ID: 60298624009** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:22	18540-29-9	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577594 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2370033 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	ND	0.0020	04/08/19 12:33	

LABORATORY CONTROL SAMPLE: 2370034

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	0.015	0.014	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2370036 2370035

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	0.015	0.015	0.014	0.015	96	97	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577491 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2369565 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Barium	mg/L	ND	0.10	04/08/19 12:04	
Beryllium	mg/L	ND	0.0010	04/08/19 12:04	
Boron	mg/L	ND	0.10	04/08/19 12:04	
Cadmium	mg/L	ND	0.0050	04/08/19 12:04	
Calcium	mg/L	0.90	0.10	04/08/19 13:32	
Chromium	mg/L	ND	0.0050	04/08/19 12:04	
Cobalt	mg/L	ND	0.0050	04/08/19 12:04	
Copper	mg/L	ND	0.010	04/08/19 12:04	
Iron	mg/L	ND	0.050	04/08/19 12:04	
Lead	mg/L	ND	0.0050	04/08/19 12:04	
Magnesium	mg/L	0.082	0.050	04/08/19 12:04	
Manganese	mg/L	ND	0.0050	04/08/19 12:04	
Molybdenum	mg/L	ND	0.020	04/08/19 12:04	
Nickel	mg/L	ND	0.0050	04/08/19 12:04	
Potassium	mg/L	ND	0.50	04/08/19 12:04	
Silica	mg/L	ND	1.1	04/08/19 12:04	
Silicon	mg/L	ND	0.50	04/08/19 12:04	
Silver	mg/L	ND	0.0070	04/08/19 12:04	
Sodium	mg/L	8.6	0.50	04/08/19 13:32	
Strontium	mg/L	ND	0.020	04/08/19 12:04	
Titanium	mg/L	ND	0.010	04/08/19 12:04	
Vanadium	mg/L	ND	0.010	04/08/19 12:04	
Zinc	mg/L	ND	0.050	04/08/19 12:04	

LABORATORY CONTROL SAMPLE: 2369566

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	mg/L	1	0.99	99	80-120	
Beryllium	mg/L	1	1.0	100	80-120	
Boron	mg/L	1	0.97	97	80-120	
Cadmium	mg/L	1	0.98	98	80-120	
Calcium	mg/L	10	10.2	102	80-120	
Chromium	mg/L	1	0.99	99	80-120	
Cobalt	mg/L	1	1.0	101	80-120	
Copper	mg/L	1	0.98	98	80-120	
Iron	mg/L	10	10.2	102	80-120	
Lead	mg/L	1	1.0	101	80-120	
Magnesium	mg/L	10	10	100	80-120	
Manganese	mg/L	1	0.98	98	80-120	
Molybdenum	mg/L	1	0.94	94	80-120	

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

LABORATORY CONTROL SAMPLE: 2369566

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nickel	mg/L	1	1.0	100	80-120	
Potassium	mg/L	10	10	100	80-120	
Silica	mg/L	1	10.6	1060		
Silicon	mg/L	5	5.0	99	80-120	
Silver	mg/L	0.5	0.50	100	80-120	
Sodium	mg/L	10	9.9	99	80-120	
Strontium	mg/L	1	1.0	100	80-120	
Titanium	mg/L	1	0.99	99	80-120	
Vanadium	mg/L	1	0.99	99	80-120	
Zinc	mg/L	1	0.99	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2369567 2369568

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Barium	mg/L	ND	1	1	1.1	1.1	103	103	75-125	1	20	
Beryllium	mg/L	ND	1	1	0.99	0.98	99	98	75-125	1	20	
Boron	mg/L	0.36	1	1	1.3	1.3	97	97	75-125	1	20	
Cadmium	mg/L	ND	1	1	0.97	0.97	97	97	93-110	1	20	
Calcium	mg/L	12.7	10	10	22.6	22.6	98	99	75-125	0	20	
Chromium	mg/L	ND	1	1	0.98	0.98	98	97	72-127	0	20	
Cobalt	mg/L	ND	1	1	1.0	0.99	99	99	90-116	0	20	
Copper	mg/L	ND	1	1	0.98	0.97	98	97	75-125	0	20	
Iron	mg/L	0.22	10	10	10.0	10	98	97	87-113	1	20	
Lead	mg/L	ND	1	1	1.0	0.99	100	99	75-125	1	20	
Magnesium	mg/L	3.2	10	10	13.4	13.4	102	101	75-125	0	20	
Manganese	mg/L	0.0088	1	1	0.98	0.97	97	96	58-158	1	20	
Molybdenum	mg/L	ND	1	1	0.93	0.93	93	93	75-125	0	20	
Nickel	mg/L	ND	1	1	0.99	0.99	99	98	75-125	1	20	
Potassium	mg/L	ND	10	10	9.9	9.7	99	97	75-125	1	20	
Silica	mg/L	6.9	1	1	16.5	16.3	965	944		1		
Silicon	mg/L	3.2	5	5	7.7	7.6	90	88	75-125	1	20	
Silver	mg/L	ND	0.5	0.5	0.50	0.49	99	98	75-125	1	20	
Sodium	mg/L	7.3	10	10	10.7	10.6	34	33	75-125	1	20	M1
Strontium	mg/L	0.19	1	1	1.2	1.2	100	100	75-125	0	20	
Titanium	mg/L	0.012	1	1	0.98	0.98	97	96	75-125	1	20	
Vanadium	mg/L	0.024	1	1	1.0	1.0	98	98	75-125	0	20	
Zinc	mg/L	ND	1	1	0.98	0.97	97	97	78-126	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577492 Analysis Method: EPA 6020
QC Batch Method: EPA 3020 Analysis Description: 6020 MET SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2369569 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/L	ND	0.050	04/08/19 12:00	
Antimony	mg/L	ND	0.0010	04/08/19 12:00	
Arsenic	mg/L	ND	0.0010	04/08/19 12:00	
Selenium	mg/L	ND	0.0010	04/08/19 12:00	
Thallium	mg/L	ND	0.0010	04/08/19 12:00	

LABORATORY CONTROL SAMPLE: 2369570

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/L	1	1.0	100	80-120	
Antimony	mg/L	0.04	0.038	94	80-120	
Arsenic	mg/L	0.04	0.036	91	80-120	
Selenium	mg/L	0.04	0.035	87	80-120	
Thallium	mg/L	0.04	0.037	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2369571 2369572

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/L	0.54	1	1	1.8	1.9	131	132	75-125	1	20	M1
Antimony	mg/L	ND	0.04	0.04	0.038	0.038	94	92	75-125	2	20	
Arsenic	mg/L	0.0025	0.04	0.04	0.039	0.038	90	89	75-125	1	20	
Selenium	mg/L	ND	0.04	0.04	0.035	0.035	85	85	75-125	0	20	
Thallium	mg/L	ND	0.04	0.04	0.037	0.037	94	92	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577578 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369968 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	04/05/19 22:02	
Fluoride	mg/L	ND	0.20	04/05/19 22:02	
Sulfate	mg/L	ND	1.0	04/05/19 22:02	

LABORATORY CONTROL SAMPLE: 2369969

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	100	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	5.3	105	90-110	

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577533 Analysis Method: EPA 353.2
QC Batch Method: EPA 353.2 Analysis Description: 353.2 Nitrate + Nitrite, Unpres.
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369705 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	0.14	0.10	04/05/19 14:57	
Nitrogen, Nitrite	mg/L	ND	0.10	04/05/19 14:57	
Nitrogen, NO2 plus NO3	mg/L	0.14	0.10	04/05/19 14:57	

LABORATORY CONTROL SAMPLE: 2369706

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	1	0.96	96	70-130	
Nitrogen, Nitrite	mg/L	1	1.1	106	90-110	
Nitrogen, NO2 plus NO3	mg/L	2	2.0	101	90-110	

MATRIX SPIKE SAMPLE: 2369707

Parameter	Units	60298624002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	0.20	1	1.2	97	70-130	
Nitrogen, Nitrite	mg/L	ND	1	1.1	110	90-110	
Nitrogen, NO2 plus NO3	mg/L	0.20	2	2.3	104	90-110	

SAMPLE DUPLICATE: 2369708

Parameter	Units	60298624006 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Nitrate	mg/L	0.15	0.15	0	20	
Nitrogen, Nitrite	mg/L	ND	ND		20	
Nitrogen, NO2 plus NO3	mg/L	0.15	0.15	0	20	

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577541 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369762 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	ND	0.10	04/06/19 10:51	

LABORATORY CONTROL SAMPLE: 2369763

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	2.1	105	90-110	

MATRIX SPIKE SAMPLE: 2369764

Parameter	Units	60298624002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.16	2	2.3	105	90-110	

SAMPLE DUPLICATE: 2369765

Parameter	Units	60298624004 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	1.1	1.0	3	10	

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 578184 Analysis Method: EPA 7196
QC Batch Method: EPA 7196 Analysis Description: 7196 Chromium, Hexavalent
Associated Lab Samples: 60298624007, 60298624008, 60298624009

METHOD BLANK: 2372388 Matrix: Water
Associated Lab Samples: 60298624007, 60298624008, 60298624009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent	mg/L	ND	0.010	04/09/19 14:13	

LABORATORY CONTROL SAMPLE: 2372389

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	0.1	0.096	96	90-110	

MATRIX SPIKE SAMPLE: 2372390

Parameter	Units	60298624007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	ND	0.1	0.090	90	85-115	

SAMPLE DUPLICATE: 2372391

Parameter	Units	60298624008 Result	Dup Result	RPD	Max RPD	Qualifiers
Chromium, Hexavalent	mg/L	ND	ND		20	

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QUALIFIERS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

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.

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TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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Lenexa, KS 66219
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60298624001	**TEC BA INLET**	EPA 3010	577491	EPA 6010	577572
60298624003	**TEC BA MIDDLE**	EPA 3010	577491	EPA 6010	577572
60298624005	**TEC BA OUTLET**	EPA 3010	577491	EPA 6010	577572
60298624001	**TEC BA INLET**	EPA 3020	577492	EPA 6020	577571
60298624003	**TEC BA MIDDLE**	EPA 3020	577492	EPA 6020	577571
60298624005	**TEC BA OUTLET**	EPA 3020	577492	EPA 6020	577571
60298624001	**TEC BA INLET**	EPA 7470	577594	EPA 7470	577730
60298624003	**TEC BA MIDDLE**	EPA 7470	577594	EPA 7470	577730
60298624005	**TEC BA OUTLET**	EPA 7470	577594	EPA 7470	577730
60298624002	**TEC BA INLET LEACHATE**	EPA 300.0	577578		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 300.0	577578		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 300.0	577578		
60298624002	**TEC BA INLET LEACHATE**	EPA 353.2	577533		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 353.2	577533		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 353.2	577533		
60298624002	**TEC BA INLET LEACHATE**	EPA 365.4	577541		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 365.4	577541		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 365.4	577541		
60298624007	**TEC BA INLET LEACHATE 2**	EPA 7196	578184		
60298624008	**TEC BA MIDDLE LEACHATE 2**	EPA 7196	578184		
60298624009	**TEC BA OUTLET LEACHATE 3**	EPA 7196	578184		

Pace Analytical® www.pacelabs.com

Sample Condition Upon Receipt

WO#: 60298624

60298624

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** 2.5 **Corr. Factor** -1.0 **Corrected** 3.5

Date and initials of person examining contents: 4/12/19 KP

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☑Yes ☐No ☐N/A	3 Day
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: SL	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☐Yes ☐No ☑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)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State: OK	☐Yes ☑No ☐N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑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: _____

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www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 1

Section A Required Client Information:

Company:	WESTAR ENERGY
Address:	2nd Dupont Road
	Tecumseh, KS 66542
Email To:	
Phone:	Fax:
Requested Due Date/TAT:	3-5 Days

Section B Required Project Information:

Report To:	Brandon Griffin
Copy To:	Jared Morrison, Adam Kneeling
	Bob Beck
Purchase Order No.:	10TEC-0000007957
Project Name:	TEC Bottom Ash 2019
Project Number:	

Section C Invoice Information:

Attention:	Accounts Payable
Company Name:	WESTAR ENERGY
Address:	
Pace Quote Reference:	
Pace Project Manager:	Heather Wilson, 913-563-1407
Pace Profile #:	11973, 1 & 2

REGULATORY AGENCY

☑ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: KS

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	6010 SPLP Meatls*	6020 SPLP Metals**	7470 Hg	SPLP 300.0 Cl, F, SO4	SPLP 353.2 Nitrates	SPLP 365.4 Phosphorus	SPLP Hexavalent Chromi				Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	TEC BA Inlet	SL	G			4/2	1245		1	1		[illegible]		14												001, 002		60298624
2	TEC BA Middle	SL	G			4/2	1250		1	1				↓												003, 004		Receiving: Please note that the 300.0, 353.2, 365.4, and Hexavalent Chromium need to be logged as a leachate sample using line 2
3	TEL BA Outlet	SL	G			4/2	1255		1	1				↓												005, 006		
4																												
5																												
6																												
7																												
8																												
9																												
10																												
11																												
12																												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Si, silica, Ag, Na, St, Ti, V, Zn	[signature] / Westar	4/2/19	1330	[signature] / Pace	4/2/19	1530	4.5	Y	Y	Y
**Al, As, Sb, Se, Tl										
Receiving: Please note that the 300.0, 353.2, 365.4, and Hexavalent Chromium need to be logged as a leachate sample using line 2 of the profile										

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:	Brandon Griffin				
SIGNATURE of SAMPLER:	[signature]	DATE Signed (MM/DD/YY): 04/02/19			

*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.

F-ALL-Q-020rev.08, 12-Oct-2007

Continental Analytical Services, Inc.

08/04/2011 Page: 1

Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date and Time Received: 07/14/2011 09:00
Continental File No.: 7701
Continental Order No.: 57218
Project ID: TEC
Purchase Auth: 901836

Dear Mr. Junod:

This laboratory report containing the samples indicated below, includes 15 pages for the analytical report, 1 page(s) for the chain of custody and/or analysis request, and 1 page(s) for the sample receipt form.

CAS LAB ID #	SAMPLE DESCRIPTION	SAMPLE TYPE	DATE SAMPLED
11070963	TEC Fly Ash-SPLP	Liquid	7/13/2011
11070964	TEC Bottom Ash -SPLP	Liquid	7/13/2011

The Appendix and Quality Control sections are integral parts of this laboratory report and may contain important data qualifiers.

All results are reported on a wet weight basis unless otherwise stated.

Samples will be retained for 120 days unless Continental is otherwise notified.

Continental is accredited by the State of Kansas through the National Environmental Laboratory Accreditation Program (NELAP). The results contained in this report were obtained using Continental's Standard Operating Procedures. These procedures are in substantial compliance with the approved methods referenced and the standards published by NELAP unless otherwise noted in the Appendix and Quality Control sections of this report.

This report may not be reproduced, except in full, without written approval from Continental Analytical Services, Inc.

Thank you for choosing Continental for this project. If you have any questions please contact me at (800)535-3076.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Technical Manager

Petra M. Craddock
Project Manager

525 N. Eighth St. - P.O. Box 3737 - Salina, KS 67402-3737
785-827-1273 800-535-3076 Fax 785-823-7830
KDHE Environmental Laboratory Accreditation No. E-10146

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Lab Number: 11070963
Sample Description: TEC Fly Ash-SPLP

Date Sampled: 07/13/2011
Time Sampled: 1420

Analysis	Concentration	Units	Dilution Factor	LOQ
Aluminum, Tot. Rec., ICP-MS	83400	µg/L	1.0	0.03
Antimony, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Arsenic, Total, ICP	ND(5)	µg/L	1.0	5
Barium, Total, ICP	6980	µg/L	1.0	0.10
Beryllium, Total, ICP	ND(2)	µg/L	1.0	2
Boron, Total, ICP	ND(500)	µg/L	1.0	500
Cadmium, Total, ICP	ND(2)	µg/L	1.0	2
Calcium, Total, ICP	206	mg/L	1.0	0.5
Chromium, Total, ICP	92	µg/L	1.0	5
Cobalt, Total, ICP	ND(2)	µg/L	1.0	2
Copper, Total, ICP	ND(10)	µg/L	1.0	10
Final pH, SPLP Extract	11.3	Std. units	1.0	
Iron, Total, ICP	ND(0.10)	mg/L	1.0	0.10
Lead, Total, ICP	ND(5)	µg/L	1.0	3
Magnesium, Total, ICP	ND(0.1)	mg/L	1.0	0.1
Manganese, Total, ICP	ND(5)	µg/L	1.0	5
Mercury, Total	ND(0.2)	µg/L	1.0	0.2
Molybdenum, Total, ICP	110.	µg/L	1.0	5
Nickel, Total, ICP	ND(5)	µg/L	1.0	5
Potassium, Dissolved, ICP	0.9 B	mg/L	1.0	0.3
Selenium, Tot. Rec., ICP-MS	10.	µg/L	1.0	5
Silicon as Silica	1.04 BS 0.16	mg/L	1.0	0.04
Silver, Total, ICP	ND(5)	µg/L	1.0	5
Sodium, Dissolved, ICP	13.9 BS 2.6	mg/L	1.0	0.5
Strontium, Total, ICP	11900	µg/L	1.0	5
Thallium, Tot. Rec., ICP-MS	ND(2)	µg/L	1.0	2
Titanium, Total, ICP	6	µg/L	1.0	5
Vanadium, Total, ICP	10.	µg/L	1.0	5
Zinc, Total, ICP	15	µg/L	1.0	10
Chloride	1.2	mg/L	1.0	1.0
Chromium, Hexavalent	0.175	mg/L	1.0	0.010
Fluoride	2.7 E QC	mg/L	1.0	0.1
Nitrate, as N	ND(0.1)	mg/L	1.0	0.1
Nitrate/Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Phosphorus, Total, as P	ND(0.2)	mg/L	0	0
Sulfate	12.9	mg/L	1.0	1.0

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)

-Continued-

Client: **Westar Energy, Inc.**
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)
Aluminum, Tot. Rec., ICP-M	07/21/11 1200	08/02/11 1619	110721-3	2IP3214	JDL	6020A
Antimony, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Arsenic, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Barium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Beryllium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Boron, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Cadmium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Calcium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Chromium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Cobalt, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Copper, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Final pH, SPLP Extract	N/A	07/20/11	110720-1	720BLK1	ADK	9040B
Iron, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Lead, Total, ICP	07/21/11 1130	07/28/11 1351	110721-1	4IP4209	JDL	6010B
Magnesium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Manganese, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Mercury, Total	07/21/11 1126	07/22/11 1757	110721-1	3MA3203	JDL	7470A
Molybdenum, Total, ICP	07/21/11 1130	07/26/11 1807	110721-1	4IP4207	JDL	6010B
Nickel, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Potassium, Dissolved, ICP	07/22/11 1252	08/02/11 1955	110722-5	4IP4214	KMW	6010B
Selenium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Silicon as Silica	07/22/11 1200	08/01/11 1629	110722-3	3IP4213	KMW	6010B
Silver, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Sodium, Dissolved, ICP	07/22/11 1252	08/02/11 1955	110722-5	4IP4214	KMW	6010B
Strontium, Total, ICP	07/21/11 1130	07/28/11 1351	110721-1	4IP4209	JDL	6010B
Thallium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Titanium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Vanadium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Zinc, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Chloride	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Chromium, Hexavalent	N/A	07/21/11 1107	110721-1	110721-2	JND	7196A (Modified)
Fluoride	N/A	08/01/11 1437	1IC2213	1IC2213	MLL	300.0/9056A
Nitrate, as N	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Nitrate/Nitrite, as N	N/A	07/26/11				Calc.
Nitrite, as N	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Phosphorus, Total, as P	N/A	07/21/11 1422	110721-2	110721-3	KJH	SM 4500-P(B&F) (M
Sulfate	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
ICP Metals Total Preparation Method						3010A
Dissolved Metals Preparation Method						3005A
Mercury Total Preparation Method						7470A
Total Recoverable Metals Preparation Method						3005A

Conclusion of Lab Number: 11070963

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Lab Number: 11070964
Sample Description: TEC Bottom Ash -SPLP

Date Sampled: 07/13/2011
Time Sampled: 1430

Analysis	Concentration	Units	Dilution Factor	LOQ
Aluminum, Tot. Rec., ICP-MS	10400	µg/L	1.0	0.03
Antimony, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Arsenic, Total, ICP	ND(5)	µg/L	1.0	5
Barium, Total, ICP	546	µg/L	1.0	0.10
Beryllium, Total, ICP	ND(2)	µg/L	1.0	2
Boron, Total, ICP	900	µg/L	1.0	500
Cadmium, Total, ICP	ND(2)	µg/L	1.0	2
Calcium, Total, ICP	87.1	mg/L	1.0	0.5
Chromium, Total, ICP	16	µg/L	1.0	5
Cobalt, Total, ICP	ND(2)	µg/L	1.0	2
Copper, Total, ICP	ND(10)	µg/L	1.0	10
Final pH, SPLP Extract	10.4	Std. units	1.0	
Iron, Total, ICP	ND(0.10)	mg/L	1.0	0.10
Lead, Total, ICP	ND(5)	µg/L	1.0	3
Magnesium, Total, ICP	0.3	mg/L	1.0	0.1
Manganese, Total, ICP	ND(5)	µg/L	1.0	5
Mercury, Total	ND(0.2)	µg/L	1.0	0.2
Molybdenum, Total, ICP	12	µg/L	1.0	5
Nickel, Total, ICP	ND(5)	µg/L	1.0	5
Potassium, Dissolved, ICP	0.4 B	mg/L	1.0	0.3
Selenium, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Silicon as Silica	3.48	mg/L	1.0	0.04
Silver, Total, ICP	ND(5)	µg/L	1.0	5
Sodium, Dissolved, ICP	6.0 BS 2.6	mg/L	1.0	0.5
Strontium, Total, ICP	1360	µg/L	1.0	5
Thallium, Tot. Rec., ICP-MS	ND(2)	µg/L	1.0	2
Titanium, Total, ICP	ND(5)	µg/L	1.0	5
Vanadium, Total, ICP	51	µg/L	1.0	5
Zinc, Total, ICP	15	µg/L	1.0	10
Chloride	1.9	mg/L	1.0	1.0
Chromium, Hexavalent	0.018	mg/L	1.0	0.010
Fluoride	0.1	mg/L	1.0	0.1
Nitrate, as N	0.1	mg/L	1.0	0.1
Nitrate/Nitrite, as N	0.1	mg/L	1.0	0.1
Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Phosphorus, Total, as P	ND(0.2)	mg/L	0	0
Sulfate	148	mg/L	10	10

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)

-Continued-

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)
Aluminum, Tot. Rec., ICP-M	07/21/11 1200	08/02/11 1655	110721-3	3IP3214	JDL	6020A
Antimony, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Arsenic, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Barium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Beryllium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Boron, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Cadmium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Calcium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Chromium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Cobalt, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Copper, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Final pH, SPLP Extract	N/A	07/20/11	110720-1	720BLK1	ADK	9040B
Iron, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Lead, Total, ICP	07/21/11 1130	07/28/11 1355	110721-1	4IP4209	JDL	6010B
Magnesium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Manganese, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Mercury, Total	07/21/11 1126	07/22/11 1828	110721-1	4MA3203	JDL	7470A
Molybdenum, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Nickel, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Potassium, Dissolved, ICP	07/22/11 1252	08/02/11 2008	110722-5	5IP4214	KMW	6010B
Selenium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Silicon as Silica	07/22/11 1200	08/01/11 1633	110722-3	3IP4213	KMW	6010B
Silver, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Sodium, Dissolved, ICP	07/22/11 1252	08/02/11 2008	110722-5	5IP4214	KMW	6010B
Strontium, Total, ICP	07/21/11 1130	07/28/11 1355	110721-1	4IP4209	JDL	6010B
Thallium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Titanium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Vanadium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Zinc, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Chloride	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Chromium, Hexavalent	N/A	07/21/11 1107	110721-1	110721-2	JND	7196A (Modified)
Fluoride	N/A	07/26/11 2229	1IC2207	3IC2207	MLL	300.0/9056A
Nitrate, as N	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Nitrate/Nitrite, as N	N/A	07/26/11				Calc.
Nitrite, as N	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Phosphorus, Total, as P	N/A	07/21/11 1423	110721-2	110721-3	KJH	SM 4500-P(B&F) (M
Sulfate	N/A	07/21/11 1348	1IC1202	2IC1202	MLL	300.0/9056A
ICP Metals Total Preparation Method						3010A
Dissolved Metals Preparation Method						3005A
Mercury Total Preparation Method						7470A
Total Recoverable Metals Preparation Method						3005A

Conclusion of Lab Number: 11070964

APPENDIX

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

ND indicates not detected with the LOQ (Limit of Quantitation) in parentheses. The LOQ value has been adjusted for the dilution factor and percent solids, as applicable. Due to rounding of significant figures, the LOQ value may vary slightly from the reported concentration. The LOQ is the lowest concentration of the analytical standard that was used for calibrating the instrument. If an analytical standard is analyzed at the LOQ, an error of as much as +/- 50% can be expected.

Not all samples were received at a temperature of less than 6 degrees Celsius. Refer to the enclosed Cooler/Sample Receipt Form(s) for the affected cooler(s) and sample(s).

The following table presents the date and time sampled, the date and time analyzed, and the total time elapsed for each analysis with an EPA recommended holding time of seventy-two hours or less.

CAS LAB ID #	ANALYSIS	DATE/TIME SAMPLED	DATE/TIME ANALYZED	ELAPSED HRS:MIN
11070963	Chromium, Hexavalent	07/13/2011 1420	07/21/2011 1107	188:47
11070963	Nitrate, as N	07/13/2011 1420	07/21/2011 1215	189:55
11070963	Nitrite, as N	07/13/2011 1420	07/21/2011 1215	189:55
11070964	Chromium, Hexavalent	07/13/2011 1430	07/21/2011 1107	188:37
11070964	Nitrate, as N	07/13/2011 1430	07/21/2011 1229	189:59
11070964	Nitrite, as N	07/13/2011 1430	07/21/2011 1229	189:59

B - Analyte is also present in the method blank or load blank at the concentration indicated either to the right of the letter B and/or in the enclosed Quality Control Report. The reported sample concentration has not been blank corrected.

BS - This analyte was detected in a blank from the SPLP or TCLP procedure at the concentration indicated to the right of the qualifier. The sample result has not been blank corrected. The analytical method blank can be found in the QC report.

E - Concentration or reporting limit is an estimated value. Matrix interferences and/or sample heterogeneity were noted at the time of sample analysis.

QC - QC data qualifiers were noted. See the Quality Control Report.

Continental Analytical Services, Inc.
Accreditation Summary Report

Client: Westar Energy, Inc.
CAS Order Number: 57218

NELAP accreditation is issued under each EPA regulatory program for a given matrix/analyte/method combination. Continental is NELAP accredited for each matrix/analyte/method and EPA program cited in this Laboratory Report, except for those listed in the table below and analysis performed in the field. For most of the analyses listed in the table, NELAP accreditation is not offered under the listed EPA program and Continental is NELAP accredited for the analysis, using the same analytical technology, but under a different EPA program. Continental's full NELAP accreditation status may be viewed at www.kdheks.gov/envlab. Note that unless qualified otherwise in the Laboratory Report, Continental performs all analyses, including each analysis listed in the table below, utilizing NELAP protocol.

Test	Analysis	Matrix-Regulatory Program	Method	CAS NELAP Accredited in Other Reg. Program
GL218	Phosphorus, Total, as P	L-RCRA	SM 4500-P(B&F)(M)	Y
SL602	SPLP Prep	L-RCRA		N

Quality Control Report
Batch Summary

Client: **Westar Energy, Inc.**
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
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Test	Testname	QC Batch	Method Blank	LCS	MS Lab No.
SL470	Final pH, SPLP Extract	110720-1	110720BLK1	110720LCS1	
SL602	SPLP Prep	110720-1	110720BLK1		

Lab numbers associated with this batch:
11070963 11070964

SL802	Arsenic, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL303	Barium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL304	Beryllium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL305	Boron, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL306	Cadmium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL307	Calcium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL308	Chromium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL309	Cobalt, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL313	Copper, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL326	Iron, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL311	Lead, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL331	Magnesium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL332	Manganese, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL333	Mercury, Total	110721-1	110721BLK1	110721LCS1	11070963MS
SL334	Molybdenum, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL336	Nickel, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL353	Silver, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL357	Strontium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL366	Titanium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL368	Vanadium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL369	Zinc, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS

Lab numbers associated with this batch:
11070963 11070964

SL000	Aluminum, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL001	Antimony, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL023	Selenium, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL029	Thallium, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS

Lab numbers associated with this batch:
11070963 11070964

SL212	Silicon as Silica	110722-3	110722BLK3	110722LCS3	11070964MS

Lab numbers associated with this batch:
11070963 11070964

SL242	Potassium, Dissolved, ICP	110722-5	110722BLK5	110722LCS5	11070964MS
SL255	Sodium, Dissolved, ICP	110722-5	110722BLK5	110722LCS5	11070964MS

Lab numbers associated with this batch:
11070963 11070964

Quality Control Report
Batch Summary

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Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Test	Testname	QC Batch	Method Blank	LCS	MS Lab No.
GL502	Chloride	1IC1202	BLK1IC1202	LCS1IC1202	11071334MS
Lab numbers associated with this batch: 11070963 11070964					
GL147	Chromium, Hexavalent	110721-1	110721BLK1	110721LCS1	11071608MS
Lab numbers associated with this batch: 11070963 11070964					
GL501	Fluoride	1IC2207	BLK1IC2207	LCS1IC2207	
Lab numbers associated with this batch: 11070964					
GL501	Fluoride	1IC2213	BLK1IC2213	LCS1IC2213	
Lab numbers associated with this batch: 11070963					
GL505	Nitrate, as N	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					
GL510	Nitrate/Nitrite, as N				
Lab numbers associated with this batch: 11070963 11070964					
GL503	Nitrite, as N	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					
GL218	Phosphorus, Total, as P	110721-2	110721BLK2	110721LCS2	11071101MS
Lab numbers associated with this batch: 11070963 11070964					
GL506	Sulfate	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					

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Date Reported: 08/04/2011
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Continental Order No: 57218

Analysis	Blank Data	% Rec LCS	Limits	Spike Level	Units	Spiked Sample (% Recovery) MS	MSD	Limits	Spike Level	Units	Spiked Sample Precision Data RPD	Limit
QC Batch: 110721-1	For samples prepared on: 07/21/2011					Spiked sample: 11070963						
Mercury, Total	ND(0.2)	89.1	80.0-120	5.0	µg/L	90.2	91.9	80.0-120	5.0	µg/L	1.9	20.0
QC Batch: 110721-1	For samples prepared on: 07/21/2011					Spiked sample: 11070964						
Arsenic, Total, ICP	ND(5)	96.5	80.0-120	500	µg/L	98.6	97.1	80.0-120	500	µg/L	1.5	20.0
Barium, Total, ICP	ND(5)	98.0	80.0-120	1500	µg/L	101	110.	80.0-120	1500	µg/L	8.5	20.0
Beryllium, Total, ICP	ND(2)	96.9	80.0-120	500	µg/L	104	103	80.0-120	500	µg/L	1.0	20.0
Boron, Total, ICP	ND(500)	96.3	80.0-120	500	µg/L	91.3	89.4	80.0-120	500	µg/L	2.1	20.0
Cadmium, Total, ICP	ND(2)	95.6	80.0-120	500	µg/L	95.8	94.4	80.0-120	500	µg/L	1.5	20.0
Calcium, Total, ICP	ND(0.5)	97.7	80.0-120	51.0	mg/L	93.0	110.	80.0-120	51.0	mg/L	16.7	20.0
Chromium, Total, ICP	ND(5)	95.2	80.0-120	500	µg/L	95.3	94.4	80.0-120	500	µg/L	0.9	20.0
Cobalt, Total, ICP	ND(2)	94.8	80.0-120	500	µg/L	94.6	92.8	80.0-120	500	µg/L	1.9	20.0
Copper, Total, ICP	ND(10)	97.0	80.0-120	500	µg/L	99.4	98.3	80.0-120	500	µg/L	1.1	20.0
Iron, Total, ICP	ND(0.10)	93.1	80.0-120	20.5	mg/L	101	101	80.0-120	20.5	mg/L	0.0	20.0
Lead, Total, ICP	ND(5)	95.1	80.0-120	500	µg/L	96.2	94.9	80.0-120	500	µg/L	1.4	20.0
Magnesium, Total, ICP	ND(0.1)	91.3	80.0-120	51.0	mg/L	98.0	98.0	80.0-120	51.0	mg/L	0.0	20.0
Manganese, Total, ICP	ND(5)	97.1	80.0-120	500	µg/L	98.0	96.7	80.0-120	500	µg/L	1.3	20.0
Molybdenum, Total, ICP	ND(5)	97.5	80.0-120	500	µg/L	98.1	97.6	80.0-120	500	µg/L	0.5	20.0
Nickel, Total, ICP	ND(5)	94.6	80.0-120	500	µg/L	94.6	93.1	80.0-120	500	µg/L	1.6	20.0
Silver, Total, ICP	ND(5)	95.0	80.0-120	100	µg/L	96.9	95.5	80.0-120	100	µg/L	1.5	20.0
Strontium, Total, ICP	ND(5)	107	80.0-120	100	µg/L	I	I	80.0-120	100	µg/L	**	20.0
Titanium, Total, ICP	ND(5)	99.9	80.0-120	500	µg/L	102	101	80.0-120	500	µg/L	1.0	20.0
Vanadium, Total, ICP	ND(5)	95.2	80.0-120	500	µg/L	95.4	94.6	80.0-120	500	µg/L	0.8	20.0
Zinc, Total, ICP	ND(10)	92.9	80.0-120	500	µg/L	90.7	89.9	80.0-120	500	µg/L	0.9	20.0
QC Batch: 110721-1	For sample analyzed on: 07/21/2011					Spiked sample: 11071608						
Chromium, Hexavalent	ND(0.010)	99.9	90.0-110	0.50	mg/L	MN	MN	85.0-115	0.50	mg/L	**	20.0
QC Batch: 110721-2	For sample analyzed on: 07/21/2011					Spiked sample: 11071101						
Phosphorus, Total, as P	ND(0.20)	96.6	90.0-110	1.0	mg/L	MN	MN	71.2-135	1.0	mg/L	**	21.2
QC Batch: 110721-3	For samples prepared on: 07/21/2011					Spiked sample: 11070963						
Aluminum, Tot. Rec., ICP-MS	20 J	99.6	85.0-115	51000	µg/L	104	101	80.0-120	51000	µg/L	2.9	20.0
Aluminum, Tot. Rec., ICP-MS	ND(30)	104	85.0-115	51000	µg/L			80.0-120			**	20.0
Antimony, Tot. Rec., ICP-MS	ND(5)	94.7	85.0-115	500	µg/L	94.1	93.6	80.0-120	500	µg/L	0.5	20.0
Selenium, Tot. Rec., ICP-MS	ND(5)	102	85.0-115	500	µg/L	99.1	98.4	80.0-120	500	µg/L	0.7	20.0
Thallium, Tot. Rec., ICP-MS	ND(2)	101	85.0-115	500	µg/L	97.6	103	80.0-120	500	µg/L	5.4	20.0
QC Batch: 110722-3	For samples prepared on: 07/22/2011					Spiked sample: 11070964						
Silicon as Silica	ND(0.04)	97.0	80.0-120	1.1	mg/L	86.5	86.3	80.0-120	1.1	mg/L	0.2	20.0
QC Batch: 110722-5	For samples prepared on: 07/22/2011					Spiked sample: 11070964						
Potassium, Dissolved, ICP	0.7 BK	106	85.0-115	14.5	mg/L	107	108	80.0-120	14.5	mg/L	0.9	20.0
Sodium, Dissolved, ICP	1.5 BK	106	85.0-115	27.5	mg/L	105	106	80.0-120	27.5	mg/L	0.9	20.0
QC Batch: 1IC1202	For sample analyzed on: 07/21/2011					Spiked sample:						
Nitrite, as N	ND(0.1)	96.1	90.0-110	2.0	mg/L	MN	MN	78.5-127			**	10.1
Nitrate, as N	ND(0.1)	96.7	90.0-110	2.0	mg/L	MN	MN	79.3-118			**	12.1
Sulfate	ND(1.0)	101	90.0-110	8.0	mg/L	MN	MN	81.8-125			**	10.4
QC Batch: 1IC1202	For sample analyzed on: 07/21/2011					Spiked sample: 11071334						
Chloride	ND(1.0)	105	90.0-110	4.0	mg/L	MN	MN	82.1-126	80.0	mg/L	**	12.5

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Analysis	Blank Data	% Rec LCS	Limits	Spike Level	Units	Spiked Sample (% Recovery) MS	MSD	Limits	Spike Level	Units	Spiked Sample Precision Data RPD	Limit
QC Batch: 1IC2207	For sample analyzed on: 07/26/2011					Spiked sample:						
Fluoride	ND(0.1)	104	90.0-110	2.0	mg/L	MN	MN	67.3-113			**	9.8
QC Batch: 1IC2213	For sample analyzed on: 08/01/2011					Spiked sample:						
Fluoride	ND(0.1)	92.4	90.0-110	2.0	mg/L	MN	MN	67.3-113			**	9.8

Data Qualifiers:

I - Due to the concentration of analyte in the sample, the spike level is too low to allow accurate quantification of the spike recovery.

MN - The MS/MSD sample analyses were not performed on a sample from this Continental order number.

J - The concentration or not detected (ND) value is below the Limit of Quantitation (LOQ) and is considered an estimated value.

BK - This analyte did not meet method blank criteria. The associated sample results may be estimated.

** - RPD cannot be calculated.

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Analysis	Date of Analysis	Instrument Batch ID	Amount in Standard	Amount Detected	Units	Percent Recovery
Aluminum, Tot. Rec., ICP-MS	08/02/2011	2IP3214	CCV recovery acceptable for this Instrument Batch.			
Aluminum, Tot. Rec., ICP-MS	08/02/2011	3IP3214	CCV recovery acceptable for this Instrument Batch.			
Aluminum, Tot. Rec., ICP-MS	08/02/2011	4IP3214	CCV recovery acceptable for this Instrument Batch.			
Antimony, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.			
Antimony, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.			
Arsenic, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Arsenic, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Beryllium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Beryllium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Cadmium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Cadmium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Chromium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Chromium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Cobalt, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Cobalt, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Copper, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Copper, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Chromium, Hexavalent	07/21/2011	110721-2	CCV recovery acceptable for this Instrument Batch.			
Chromium, Hexavalent	07/21/2011	110721-3	CCV recovery acceptable for this Instrument Batch.			
Phosphorus, Total, as P	07/21/2011	110721-3	CCV recovery acceptable for this Instrument Batch.			
Phosphorus, Total, as P	07/21/2011	110721-4	CCV recovery acceptable for this Instrument Batch.			
Fluoride	07/26/2011	3IC2207	CCV recovery acceptable for this Instrument Batch.			
Fluoride	07/26/2011	4IC2207	CCV recovery acceptable for this Instrument Batch.			
Fluoride	08/01/2011	1IC2213	CCV recovery acceptable for this Instrument Batch.			
Fluoride	08/01/2011	2IC2213	2.00	1.70	mg/L	85.0 CL

Samples associated with this Continuing Calibration Verification:

Laboratory Number	Instrument Batch	Sample Description
11070963	1IC2213	TEC Fly Ash-SPLP

Analysis	Date of Analysis	Instrument Batch ID	Amount in Standard	Amount Detected	Units	Percent Recovery
Chloride	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.			

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Chloride	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrite, as N	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrite, as N	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrate, as N	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrate, as N	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	3IC1202	CCV recovery acceptable for this Instrument Batch.
Iron, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Iron, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Lead, Total, ICP	07/28/2011	4IP4209	CCV recovery acceptable for this Instrument Batch.
Lead, Total, ICP	07/28/2011	5IP4209	CCV recovery acceptable for this Instrument Batch.
Magnesium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Magnesium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Manganese, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Manganese, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	3MA3203	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	4MA3203	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	5MA3203	CCV recovery acceptable for this Instrument Batch.
Molybdenum, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.
Molybdenum, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.
Nickel, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Nickel, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	4IP4214	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	5IP4214	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	6IP4214	CCV recovery acceptable for this Instrument Batch.
Selenium, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.
Selenium, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.
Silicon as Silica	08/01/2011	3IP4213	CCV recovery acceptable for this Instrument Batch.
Silicon as Silica	08/01/2011	4IP4213	CCV recovery acceptable for this Instrument Batch.
Silver, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Silver, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	4IP4214	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	5IP4214	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	6IP4214	CCV recovery acceptable for this Instrument Batch.
Strontium, Total, ICP	07/28/2011	4IP4209	CCV recovery acceptable for this Instrument Batch.
Strontium, Total, ICP	07/28/2011	5IP4209	CCV recovery acceptable for this Instrument Batch.
Thallium, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.
Thallium, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.
Titanium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Titanium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Zinc, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Zinc, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.

Data Qualifiers:
CL - The continuing calibration verification (CCV) standard recovery for this analyte was below the method or SOP limit. The reported concentration for this analyte may be biased low.

- Laboratory Report Conclusion -

Continental Analytical Services, Inc.

525 N. 8th Street, Salina, KS 67401
(785)827-1273 (800)535-3076 Fax (785)823-7830
www.cas-lab.com

CHAIN OF CUSTODY RECORD

Continental Order Number: 57218

Client/Reporting Information	Invoice Information
Company Name: Westar Energy	Company Name: Westar Energy
Address: 818 SOUTH KANSAS AVENUE	Address: 818 SOUTH KANSAS AVENUE
City: TOPEKA State: KS Zip: 66601	City: TOPEKA State: KS Zip: 66601
Contact: STONE JUNOD	Contact: DICK FINGER
E-mail: stone.junod@westarenergy.com	E-mail: dick.finger@westarenergy.com
Phone Number: 785-575-6435 Fax Number: 785-575-8039	Phone Number: 785-575-6517 Fax Number: 785-575-8039

Sampler's Name:(Printed) Stone Junod
Sampler's Name:(Signature) [signature]
Purchase Order Number: 901836
Project Number:
Project Name: Tecumseh Energy Center

SAMPLE IDENTIFICATION (30 Characters or less)	Matrix (Sample Type)	Regulatory Program	Date Sampled	Time Sampled	C-Composite G-Grab	Total Containers	HCl	NaOH	HNO3	H2SO4	Na2S2O3	OTHER: NONE	SPLP list (same as 10615)									COMMENTS
TEC Fly Ash	S	R	7/13/2011	14:20	C	1						X	X									
TEC Bottom Ash	S	R	7/13/2011	14:30	C	1						X	X									

07/14/11 - per Dick Finger Assign parameters same as Continental lab # 0903002A. DMC

Matrix (Sample Type): DW=Drinking Water, GW=Ground Water, WW=Waste Water, W=Wipe, S=Solid/Soil, SL=Sludge, A=Air, OL=Oil/Organic Liquid, O=Other

Regulatory Program: N=NPDES, R=RCRA, D=Drinking Water, SL=503 Sludge, O=Other

(Please note if non-standard turnaround. Rush & Emergency subject to additional charge) Standard TAT (15 working days) Rush TAT (5 working days) Emergency TAT (3 working days)

	DATE	TIME		DATE	TIME
RELINQUISHED BY: [signature]	7-13-11	16:30	RECEIVED BY:		
RELINQUISHED BY:			RECEIVED BY:		
RECEIVED AT LAB BY: [signature]	7-14-11	9:00	SHIPPED VIA: AIRBILL:	SEAL #: SEAL DATE:	

Continental Analytical Services Cooler/Sample Receipt Form

CAS Order No. S7218

Client Name: Worley CAS File No.: 7101

Sample ID's in cooler: See COC

Cooler 1 of 1 for this CAS Order No.

Cooler Identification: CAS Cooler #: _____ /Client's Cooler/Box/Letter/Hand Delivered
Other: _____

Date/Time Cooler Received: 7 / 14 / 17 9 : 00

Delivered By: (UPS)/FedX/AB Express/ASAP/Land Air Exp/Field Svcs/Mail/Walk-In/Other: _____

Custody Seal: Present: Intact / Broken Absent: X Seal No: _____
Seal Name: _____ Seal Date: _____
Seal matches Chain of Custody: Yes / No / (N/A)

Type of Packing Material: Blue Ice/Ice/Melted Ice/(Bubble)/Foam/Paper/Peanuts/Vermiculite/ None/Other: _____

Cooler Temperature (°C): Original Reading (°C) 27.4 Corrected Reading (°C) 26.4 - 28.4
Temp. By: Temp. Blank Surface: Glass/(Plastic)/Metal/Other: _____ Cooler
Thermo. ID No.: 557 Thermo. Correction Factor (°C): +/- 1.0

☐ Evidence of Cooling: date received=date sampled

Sample Receipt Discrepancies: ☒ No ☐ *Yes (see below for discrepancies)*

Note: CAS will proceed with sample analyses, addressing each discrepancy as shown, until/unless directed otherwise by the client.

☐ Chain of Custody not present information taken from:
Cover Letter ☐ Container ☐
PO ☐ CAS Proj. Mgr. ☐
☐ Container label absent
☐ Chain of Custody incomplete [see detail below]
☐ Chain of Custody missing date/time sampled (excl. TB or Dup)
☐ Date or Time sampled obtained from container label
☐ Chain of Custody missing sampler's name
☐ Chain of Custody missing matrix (sample type)
☐ Missing relinquished information: signature date time
☐ Sample excluded from Chain of Custody
☐ Sample listed on Chain of Custody, not received
☐ Sample description on container and Chain of Custody do not agree
☐ Air bubbles in Aqueous VOA vials larger than pea-size [approx. 6 mm]
☐ Cooler temperature exceeded 0.1 - 6.0 °C requirement
[Do not mark if samples do not require cooling to 0.1 - 6.0 °C.]
☐ Broken or leaking containers (detail actions below)
☐ Sample container type or labeled chemical preservation inappropriate
☐ Other discrepancies: _____

Detail to discrepancies/comments:

Completed by: mor Date Completed: 7-14-17

APPENDIX B

Aerial Photographs

ENVIRONMENTAL RISK INFORMATION SERVICES

HISTORICAL AERIAL REPORT

for the site:
TEC
5530 SE 2nd Street
Tecumseh, KS 66542
PO #:

Report ID: 20180302347
Completed: 3/14/2018

ERIS Information Inc.
Environmental Risk Information Services (ERIS)
A division of Glacier Media Inc.
T: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Search Results Summary

Date	Source	Scale	Comment
2017	**NAIP** - National Agriculture Information Program	1"=1300'	
2015	**NAIP** - National Agriculture Information Program	1"=1300'	
2014	**NAIP** - National Agriculture Information Program	1"=1300'	
2012	**NAIP** - National Agriculture Information Program	1"=1300'	
2010	**NAIP** - National Agriculture Information Program	1"=1300'	
2008	**NAIP** - National Agriculture Information Program	1"=1300'	
2006	**NAIP** - National Agriculture Information Program	1"=1300'	
2005	**NAIP** - National Agriculture Information Program	1"=1300'	
2004	**NAIP** - National Agriculture Information Program	1"=1300'	
2003	**NAIP** - National Agriculture Information Program	1"=1300'	
1991	**USGS** - US Geological Survey	1"=1300'	
1982	**NHAP** - National High Altitude Photography	1"=1300'	
1975	**USGS** - US Geological Survey	1"=1300'	
1970	**USGS** - US Geological Survey	1"=1300'	
1950	**AMS** - Army Mapping Service	1"=1300'	
1948	**ASCS** - Agriculture and Soil Conservation Service	1"=1300'	*BEST COPY AVAILABLE*

Date: **2017**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

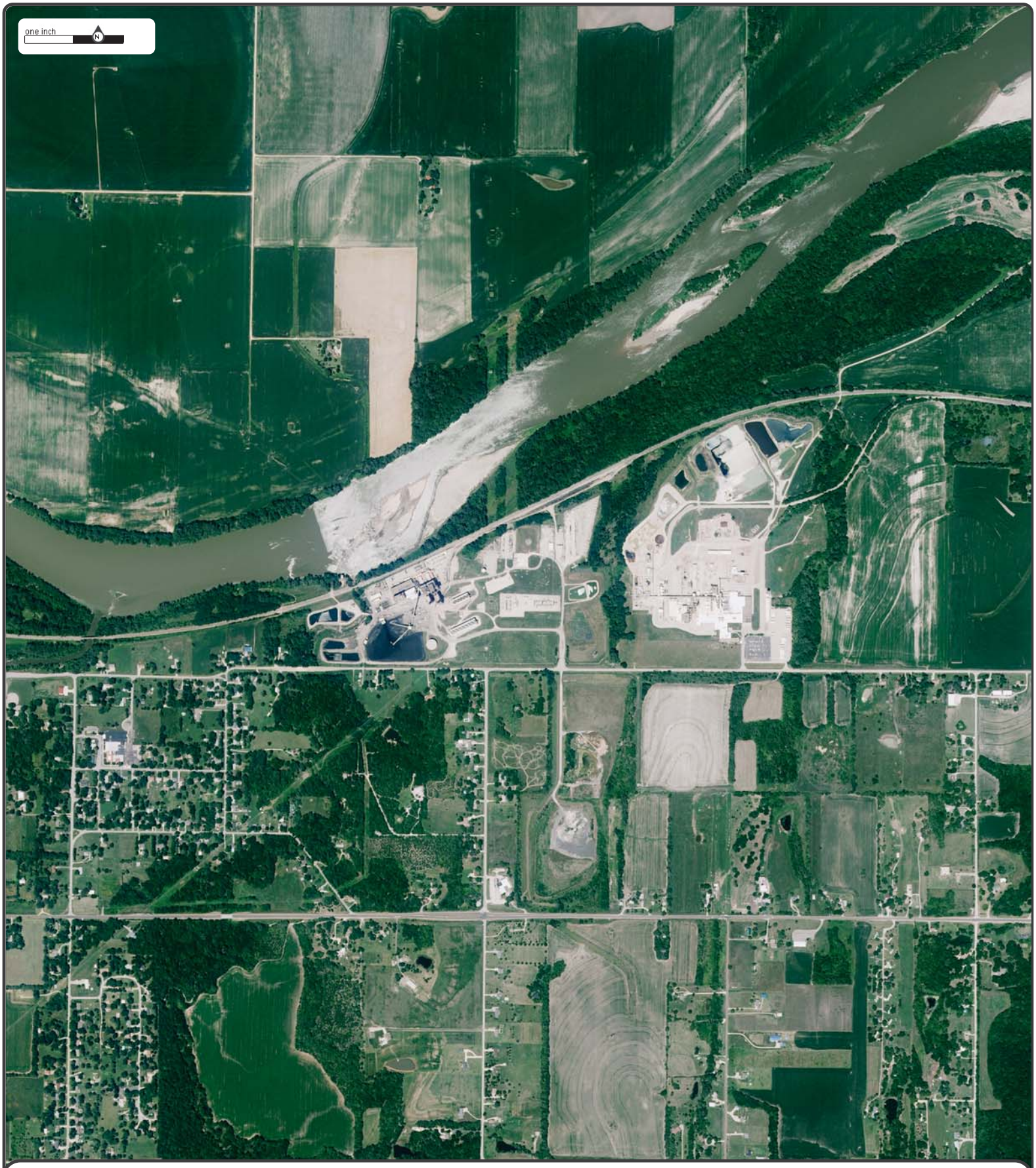
Date: **2015**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204



Date: **2014**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2012**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2010**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2008**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

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ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2006**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

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Date: **2005**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2004**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2003**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1991**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1982**
Source: **NHAP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1975**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1970**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1950**
Source: **AMS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

one inch

Date: **1948**
Source: **ASCS**
Scale: **1" to 1300'**
Comments: *BEST COPY AVAILABLE*

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

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ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

APPENDIX C

Topographic Maps

TOPOGRAPHIC MAP RESEARCH RESULTS

Date: 2018-03-02

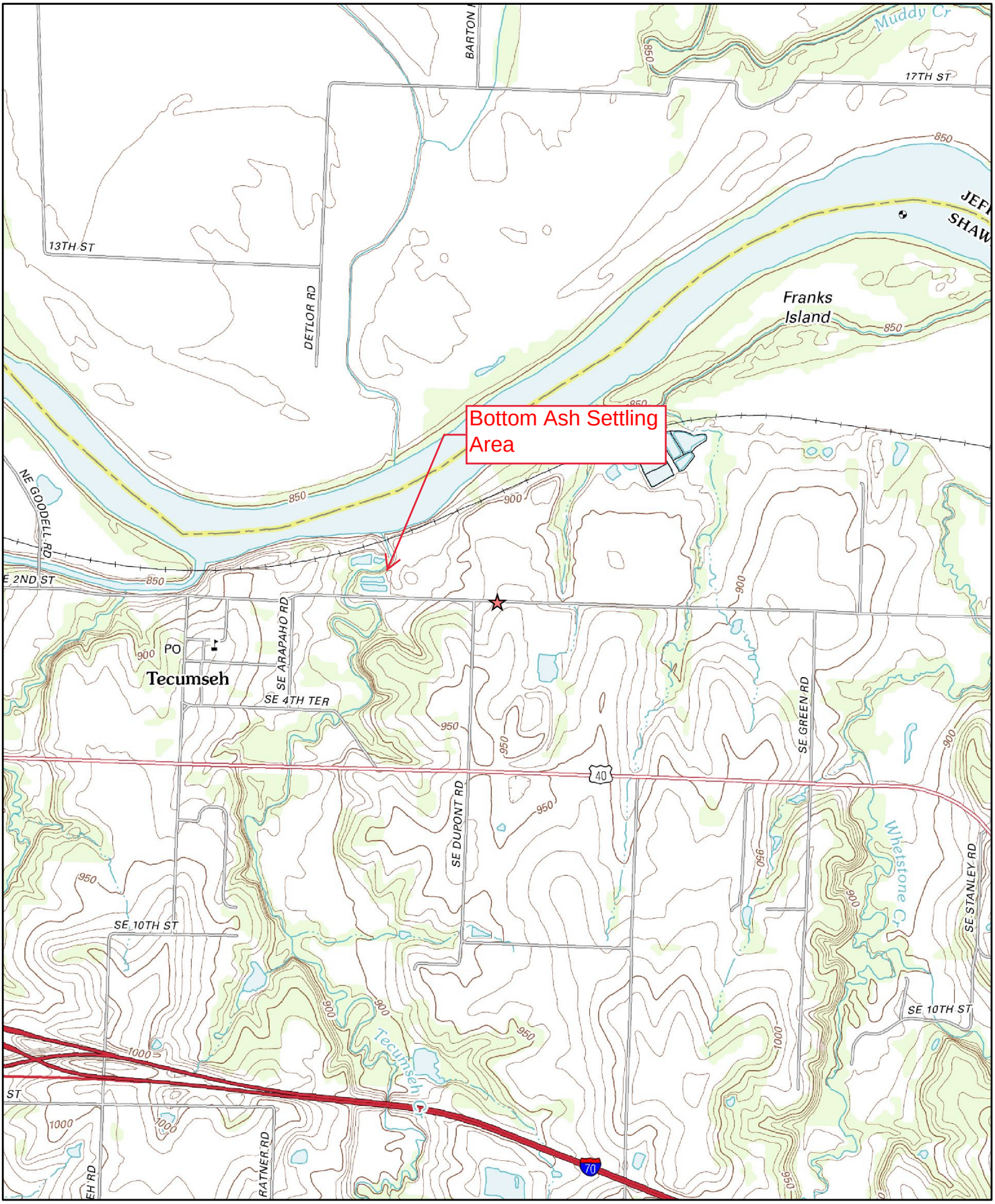
Project Property: 5530 Se 2Nd Street, Tecumseh, KS

ERIS Order Number: 20180302347

We have searched USGS collections of current topographic maps and historical topographic maps for the project property. Below is a list of maps found for the project property and adjacent area. Maps are from 7.5 and 15 minute topographic map series, if available.

Year	Map Series
2012	7.5
1983	7.5
1981	7.5
1975	7.5
1970	7.5
1951	7.5
1950	7.5

Address: 38 Lesmill Road Unit 2, Toronto, ON M3B 2T5
Phone: 1-866-517-5204 Fax: 416-447-7658
info@erisinfo.com www.erisinfo.com



2012

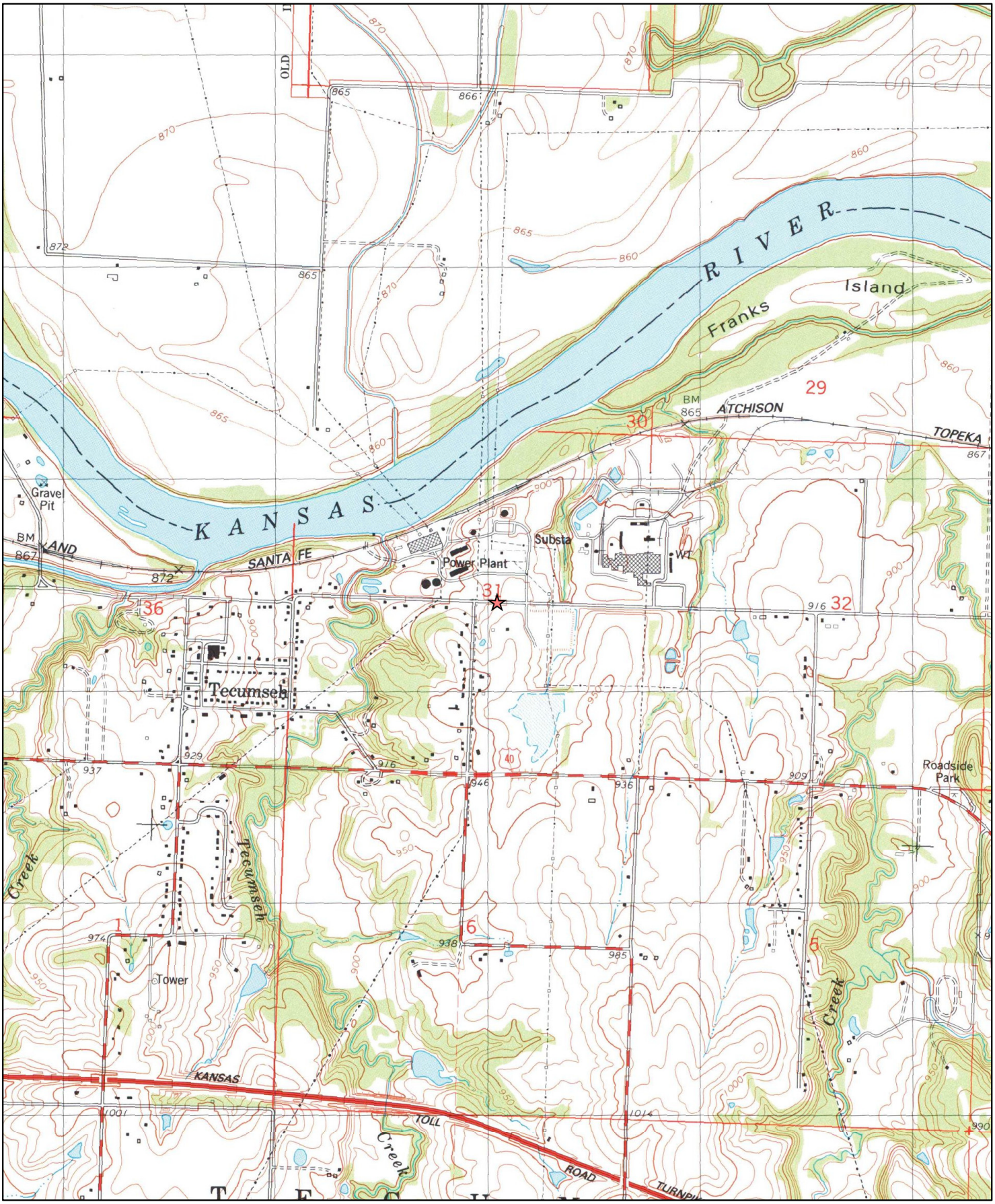
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1983

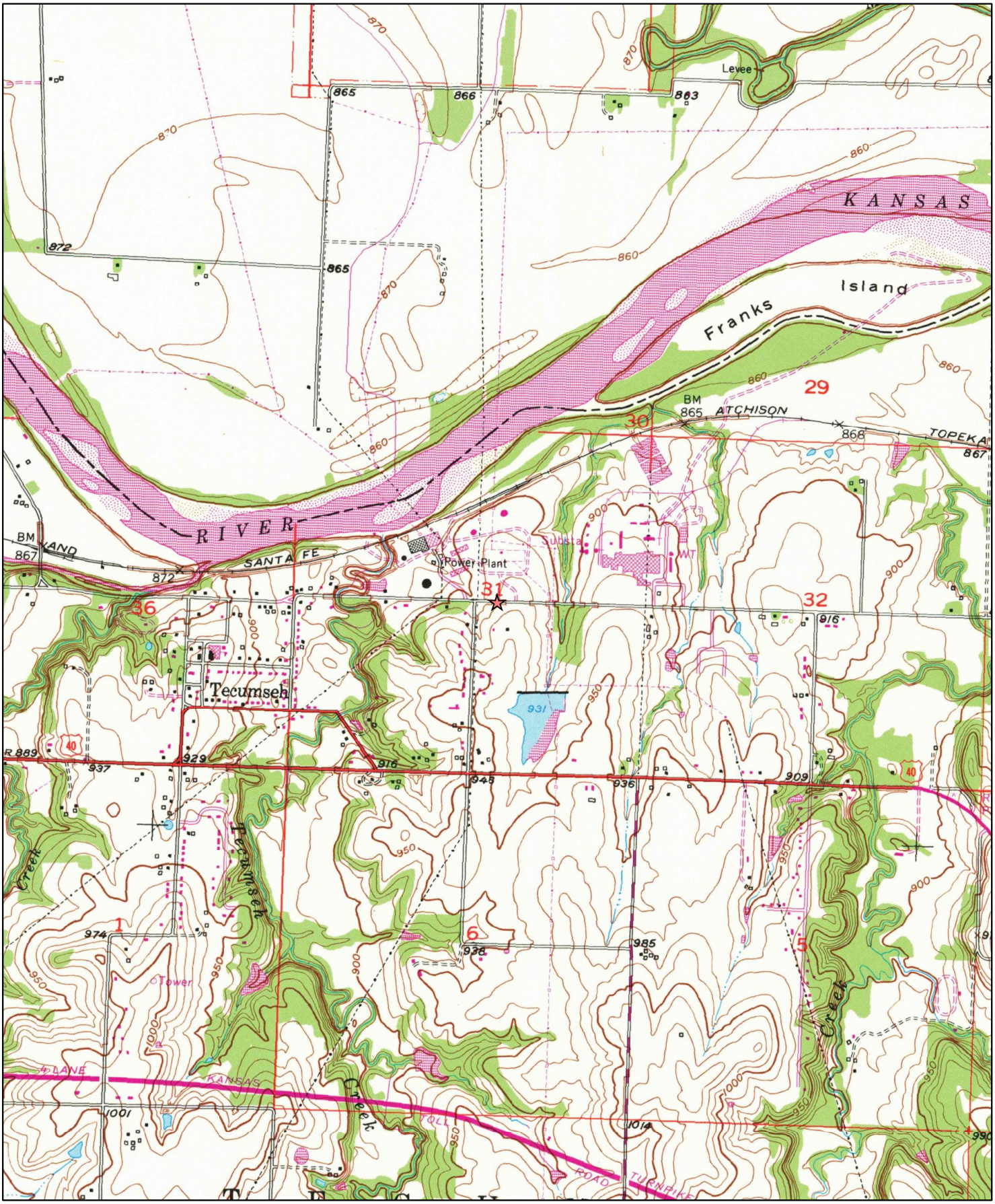
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1981

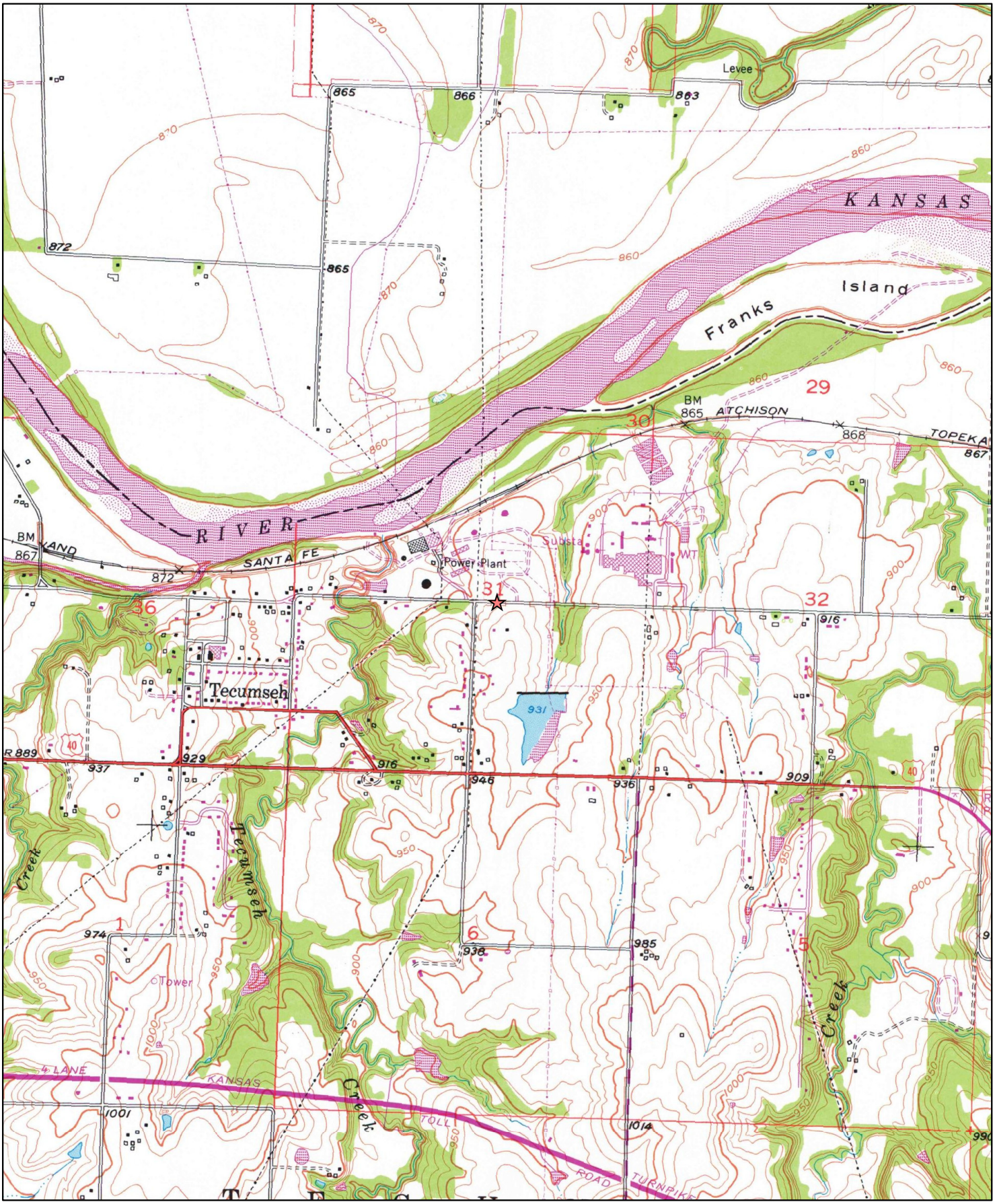
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1975

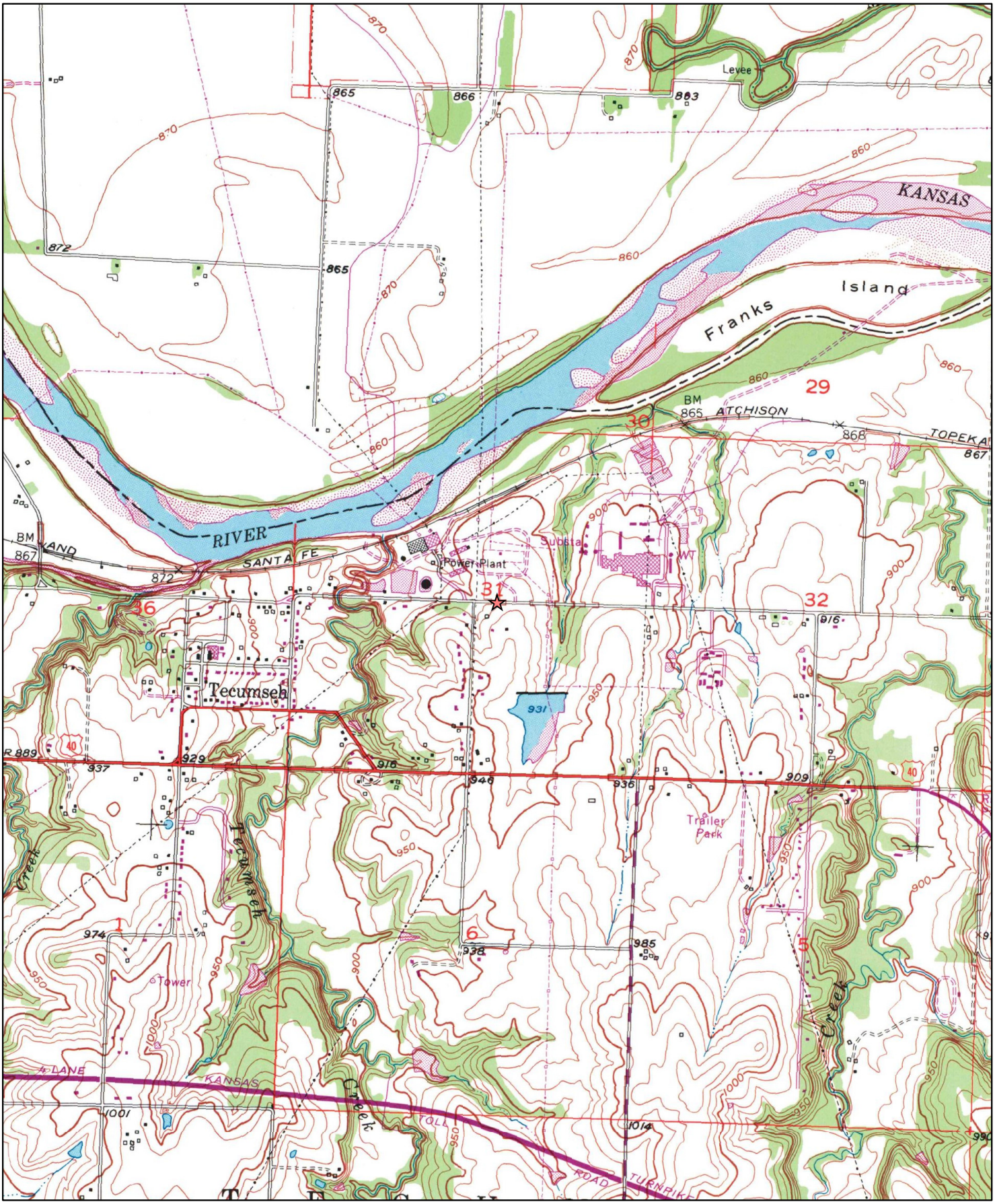
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICE



1970

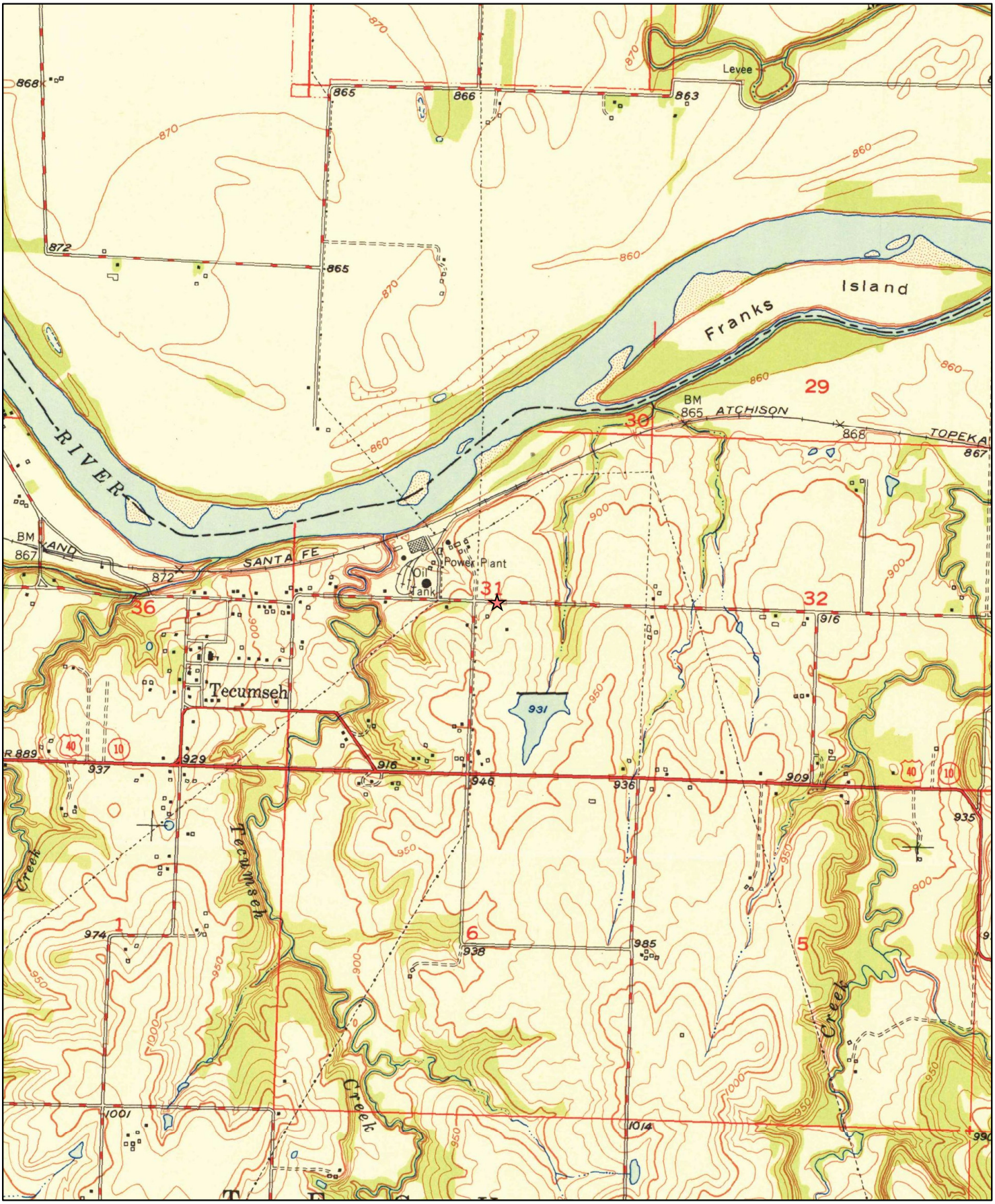
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1951

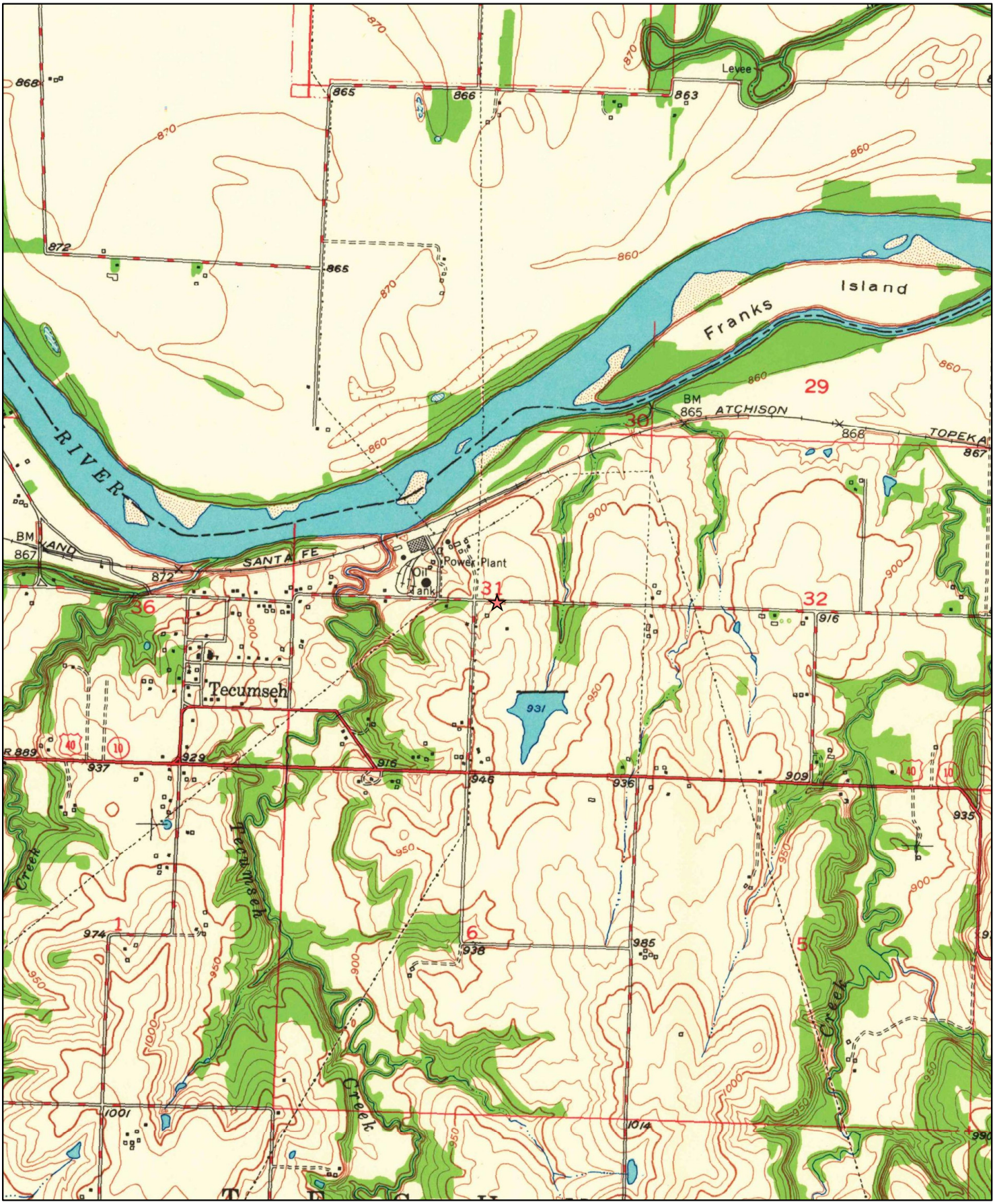
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1950

0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE

ATTACHMENT 2

Appendix IV SSL Alternate Source Demonstration for March 2019 Sampling Event for TEC Bottom Ash Settling Area

HALEY & ALDRICH, INC.
6500 Rockside Road
Suite 200
Independence, OH 44131
216.706.1303

14 October 2019
File No. 129778-020

Evergy Kansas Central, Inc.
818 South Kansas Avenue
Topeka, Kansas 66612

Attention: Jared Morrison – Manager, Water and Waste Programs

Subject: Assessment Monitoring Program March 2019 Sampling Event
Alternate Source Demonstration
Tecumseh Energy Center, Tecumseh, Kansas

Dear Mr. Morrison:

Haley & Aldrich, Inc. (Haley & Aldrich) was retained by Evergy Kansas Central, Inc. (Evergy; formerly Westar Energy, Inc.) to perform an evaluation of groundwater quality at the Bottom Ash Settling Area (BASA; Unit) at the Tecumseh Energy Center (TEC) located in Tecumseh, Kansas. The evaluation was performed to demonstrate if an alternative source caused the statistically significant level (SSL) above the groundwater protection standard of arsenic (at monitoring well MW-9 and MW-10) and cobalt (at monitoring well MW-9) for the March 2019 sampling event.

Previously, Haley & Aldrich finalized statistical analysis of the groundwater quality data generated from the Assessment Monitoring event conducted in September 2018, which identified SSLs above the groundwater protection standard of arsenic (at monitoring well MW-9 and MW-10) and cobalt (at monitoring well MW-9) downgradient of the BASA. Following identification of the SSLs at the BASA, an Alternate Source Demonstration (ASD) evaluation, certified by a qualified Professional Engineer, titled "September 2018 Sampling Event, Appendix IV Statistically Significant Level, Alternate Source Demonstration for the Bottom Ash Settling Area, Tecumseh Energy Center" (September 2018 ASD), was completed and successful demonstration made in accordance with Title 40 Code of Federal Regulations § 257.95(g)(3)(ii). The ASD indicated that a source other than the coal combustion residuals unit caused the SSLs. This demonstration is attached.

The constituents identified as SSLs above the groundwater protection standards for the March 2019 sampling event are the same constituents found at similar concentrations in the same monitoring wells identified in the successful September 2018 ASD. The constituents and concentrations for both events are presented in Table 1 below. Haley & Aldrich certifies this evaluation to be the ASD required by § 257.95(g)(3)(ii).

TABLE I STATISTICALLY SIGNIFICANT LEVELS OF APPENDIX IV CONSTITUENTS

Well ID	Constituent	September 2018 Concentration (mg/L)	March 2019 Concentration (mg/L)
MW-9	Arsenic	0.099	0.04
	Cobalt	0.011	0.048
MW-10	Arsenic	0.04	0.028
Notes: *mg/L = milligrams per liter*			

We appreciate the opportunity to provide environmental consulting services on this project.

Sincerely yours,
HALEY & ALDRICH, INC.

Steve Putrich, P.E.
Project Principal

STEVEN F. PUTRICH LICENSED 10363 10/14/19 KANSAS PROFESSIONAL ENGINEER

Mark Nicholls, P.G.
Lead Hydrogeologist

MARK D. NICHOLAS LICENSED 881 10/14/19 KANSAS PROFESSIONAL GEOLOGIST

Attachment:
September 2018 Sampling Event, Appendix IV Statistically Significant Level, Alternate Source Demonstration for the Bottom Ash Settling Area, Tecumseh Energy Center, Tecumseh, Kansas

\\haleyaldrich.com\share\phx_common\Projects\Westar\Tecumseh Energy Center (TEC)\Deliverables\ASD_AppIV_Update\2019-1014_Westar_TEC_ASD Update Letter_Mar 2019 Event_F.docx

HALEY ALDRICH

www.haleyaldrich.com

REPORT ON

SEPTEMBER 2018 SAMPLING EVENT
APPENDIX IV STATISTICALLY SIGNIFICANT LEVEL
ALTERNATE SOURCE DEMONSTRATION
FOR THE BOTTOM ASH SETTLING AREA
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Westar Energy, Inc.
Topeka, Kansas

File No. 129778-023
Updated October 2019

Table of Contents

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List of Appendices

Revision No.	Date	Notes
0	February 2019	Assessment Monitoring Program September 2018 Sampling Event Statistically Significant Level Notification and Alternate Source Demonstration Update
1	October 2019	September 2018 Sampling Event Appendix IV Statistically Significant Level Alternate Source Demonstration for the Bottom Ash Settling Area

1. Introduction

Haley & Aldrich, Inc. (Haley & Aldrich) was retained by Westar Energy, Inc. (Westar) to perform an evaluation of groundwater quality at the Bottom Ash Settling Area (BASA; Unit) at the Tecumseh Energy Center (TEC) located in Tecumseh, Kansas. The evaluation was performed to demonstrate if an alternate source caused the statistically significant level (SSL) above the groundwater protection standard of arsenic (at monitoring wells MW-9 and MW-10) and cobalt (at monitoring well MW-9) downgradient of the BASA. The arsenic concentrations observed for the September 2018 assessment monitoring sampling event is 0.099 milligrams per liter (mg/L) at well MW-9 and 0.040 mg/L at MW-10. The cobalt concentration observed for the September 2018 assessment monitoring sampling event is 0.011 mg/L at well MW-9. This report provides an overview of the site conditions and the results of the investigation activities conducted as part of the alternate source demonstration (ASD) for the Appendix IV constituents.

1.1 BACKGROUND

Consistent with Code of Federal Regulations Title 40 (40 CFR) §257.90 through §257.95, Westar has installed and certified a groundwater monitoring network at the BASA, has completed detection monitoring program activities including identifying statistically significant increases in Appendix III constituent concentrations, and established an assessment monitoring program. Westar conducted statistical analyses of the downgradient groundwater quality results from the September 2018 assessment monitoring sampling event to determine if any Appendix IV constituents were present at concentrations that exceeded groundwater protection standards set for the Unit. The analysis of the Appendix IV constituents resulted in a calculated SSL for arsenic (at monitoring wells MW-9 and MW-10) and cobalt (at monitoring well MW-9) downgradient of the BASA. The analyses described in this report were conducted to determine if alternate sources existed for the SSLs.

Pursuant to 40 CFR §257.95(g)(3)(ii), "*…the owner or operator must…demonstrate that a source other than the CCR unit* [1] *caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.*" The coal combustion residuals (CCR) Rule provides 90 days from determination of an SSL to complete an ASD[2] for applicable Appendix IV constituents. If a successful ASD is completed and certified by a qualified professional engineer, the CCR unit may continue in assessment monitoring. If, however, an alternate source of the Appendix IV SSL is not identified, the owner or operator must initiate an assessment of corrective measures and evaluation of the nature and extent of migration. This report documents the findings and conclusions of an investigation of the SSLs for arsenic at wells MW-9 and MW-10 and cobalt at MW-9.

[1] Referred to in this document as an "alternate source," and the demonstration for such is referred to as an ASD.

[2] For simplicity, this report utilizes the term ASD to account for any of the three possible explanations (allowed for in the CCR Rule) for why a calculated SSL is not related to the CCR unit being evaluated. Those include: 1) The source for the SSL originates from something other than the CCR unit in question; 2) the SSL resulted from an error in sampling, analysis, or statistical evaluation; or 3) the SSL resulted from a natural variation in groundwater quality.

1.2 PURPOSE AND SCOPE

The purpose of this ASD is to determine whether the concentrations of arsenic and cobalt detected in groundwater at MW-9 and MW-10 are from sources other than the Unit. The scope of the demonstration includes a review of the current regional geochemical and geologic conditions, a comparison of the groundwater quality at MW-9 and MW-10 and the other monitoring well locations, and analysis of geologic sources. This evaluation was completed using existing information describing the regional and site-specific geology and groundwater monitoring data collected during detection and assessment monitoring activities.

This analysis included:

- Review of well installation logs for the variability in the aquifer materials within screened intervals of the upgradient and downgradient groundwater monitoring well locations;
- Review of analytical results for the concentration of indicator parameters including chloride and sulfate from the upgradient and downgradient monitoring wells; and
- Collection and analysis of representative samples of the bottom ash stored within the Unit for the concentration of leachable Appendix IV constituents.

1.3 SITE SETTING

The TEC is located in a light industrial area located northeast of Tecumseh in Shawnee County, Kansas (Figure 1). The site is located within the Central Lowland physiographic province which includes rolling hills with substantial topographic relief and the relatively horizontal orientation of the thin alternating shale and limestone beds. Geologic units that underlie the BASA are roughly horizontal with a regional dip toward the northwest and consist of glacial till and the Scranton shale formation. The BASA consists of a surface impoundment that encompasses approximately 2 acres in the current configuration and is located on the TEC plant site. The TEC plant and BASA are located in an area with natural ground surface elevations varying from approximately 870 and 920 feet above mean sea level throughout the site property.

1.4 SITE DESCRIPTION

The TEC facility formerly operated a system of cycled bottom ash ponds collectively known as the BASA. The coal-fired boilers at the facility have been shut down. The BASA is a single CCR impoundment that utilized a middle dike for operational purposes to separate two separate settling areas. During operations, the plant alternated use of the settling areas. The bottom ash at TEC was sluiced via gravity to the BASA where it was allowed to settle out. Excess water from the BASA continues to decant via gravity to a polishing pond on the north side of Tecumseh Creek, where it then discharges into the creek. This discharge is permitted by Kansas Pollutant Discharge Elimination System. Bottom ash was recovered from the BASA and transported by truck to the on-site Ash Landfill No. 322. The TEC BASA and associated groundwater monitoring network are shown on Figure 2.

2. Site Geology, Hydrogeology, Geochemistry, and Regional Conditions

Geologic and hydrogeologic conditions beneath the BASA have been characterized based on information obtained during installation and testing of the monitoring wells installed as part of the CCR groundwater monitoring network.

2.1 SITE GEOLOGY

The TEC plant site and the BASA are located in the Central Lowland physiographic province. The Central Lowland is characterized by horizontal sequences of predominantly marine sedimentary rocks (interbedded shales and limestones). The TEC site and the BASA lie within the area of Pleistocene glacial activity in the Dissected Till Plains region of the Central Lowlands. Geologic units that underlie the site are roughly horizontal with a regional dip to the north and northwest (AMEC, 2011). The Scranton shale formation is the only lithologic unit encountered beneath the glacial till during geologic investigations at TEC.

Surficial geologic materials in the vicinity of and beneath the TEC site and BASA include thin deposits of Pleistocene glacial till deposits and Holocene alluvium. The poorly sorted glacial deposits are composed of Kansan and Nebraskan age clays, silts, and sands. The glacial till directly underlies most of the BASA. The glacial deposits have a local maximum thickness of approximately 100 feet (AMEC, 2011). Glacial erratics are observed to occur in the vicinity of the TEC site, often in the form of quartzite boulders (AMEC, 2011).

Locally, the till may yield minor quantities of water but is not typically used as an aquifer for water supply. The glacial till deposits do represent the uppermost aquifer at the CCR unit. The Pleistocene glacial deposits are underlain by strata representing transgressions and regressions of marine and near-shore depositional environments. Immediately above the shallowest bedrock unit, a thin clay layer, 10 feet or less in thickness, has been observed at the site.

The shallowest bedrock unit present at the TEC is the Pennsylvanian-age Scranton shale formation. The Scranton shale is predominantly grey to brown comprised of five members (Zeller, 1968). From shallowest to deepest the members of the Scranton formation include: the Silver Lake shale, Rulo limestone, Cedar Vale shale, Happy Hollow limestone, and White Cloud shale members. The total Scranton formation is of undefined thickness at the TEC site; however, a typical average thickness in other areas of the state is approximately 125 feet (Zeller, 1968).

A conceptual geologic cross section across the Unit is provided in Figure 3.

2.2 SITE HYDROGEOLOGY AND HYDROLOGY

The BASA is sited directly on the glacial deposits which contain low to high plasticity clay with trace silt, which will impede infiltration to deeper formations. In the area of the BASA, the glacial deposits are underlain by the Scranton shale at a depth of approximately 30 feet. Given the alternating transgressive/regressive nature of the deposition (interbedded shales and limestones), many of the deeper water-bearing bedrock formations are hydraulically isolated and some are confined. The permeability of the shale units varies but generally decrease with depth, further impeding vertical groundwater movement. Horizontal fluid migration is possible above the low permeability shale and within the glacial deposits.

The uppermost aquifer at TEC consists of unconsolidated glacial deposits, hereafter referred to as the glacial aquifer. Depth to groundwater in the monitoring wells ranges from approximately 16 to 35 feet below ground surface in the immediate vicinity of the BASA. Groundwater flow in the glacial aquifer below the BASA is to the west towards Tecumseh Creek, and ultimately north toward the Kansas River.

Based on groundwater elevations measured between August 2016 and September 2018, the groundwater flow direction is consistently toward the northwest. Available historical data indicate that seasonal groundwater elevation variation does not have a significant effect on groundwater flow direction.

Hydraulic conductivity of the glacial aquifer was calculated using data generated during slug testing of one monitoring well. The hydraulic conductivity of the glacial till is calculated to be approximately $1.6x10^{-3}$ centimeters per second (cm/sec).

The Silver Lake shale member of the Scranton shale formation comprises the confining unit underlying the uppermost aquifer at the BASA. The reported thickness of the confining shale at the BASA area is greater than 10 feet. The results of a packer test indicate that the hydraulic conductivity in the Silver Lake shale is $1x10^{-6}$ cm/sec. Based on the reported hydraulic conductivity, the Silver Lake member of the Scranton shale is characterized as an aquitard, meaning that the shale layer restricts flow of groundwater due its low hydraulic conductivity (i.e., prevents or inhibits vertical movement of groundwater).

3. Alternative Source Demonstration

Haley & Aldrich conducted an evaluation of arsenic and cobalt concentrations detected in downgradient wells at the BASA. The evaluation included review of possible alternative sources for the apparent SSLs of arsenic (MW-9 and MW-10) and cobalt (MW-9) determined by statistical analyses completed in January 2019 for the September 2018 assessment monitoring sampling event. The arsenic concentrations observed for the September 2018 assessment monitoring sampling event is 0.099 mg/L at well MW-9 and 0.040 mg/L at MW-10. The cobalt concentration observed for the September 2018 assessment monitoring sampling event is 0.011 mg/L at well MW-9.

Haley & Aldrich evaluated the following potential alternative sources in accordance with the CCR Rule:

1. The source for the SSL originates from something other than the CCR unit;
2. The SSL resulted from an error in sampling, analysis, or statistical evaluation; or
3. The SSL resulted from a natural variation in groundwater quality.

As part of that evaluation, Haley & Aldrich evaluated potential point and non-point sources of arsenic and/or cobalt in the vicinity of the BASA and evaluated natural geologic conditions and the effect of those conditions on native groundwater chemistry. Each of these analyses and the resulting findings are described below.

3.1 EVALUATION OF MATERIALS WITHIN THE UNIT

3.1.1 Bottom Ash Synthetic Precipitation Leaching Procedure Analyses

Representative samples of the bottom ash accumulated in the BASA were collected and analyzed for the Appendix IV constituents including two parameters that were determined to exhibit an SSL; arsenic and cobalt from the inter-well statistical evaluation with the upgradient monitoring well location (MW-7). Samples collected in July 2011 and April 2019 from multiple locations within the BASA were submitted to environmental laboratories accredited by the Kansas Department of Health and Environment (KDHE) for the analysis of leachable arsenic and cobalt after the bottom ash samples were extracted in accordance with the U.S. Environmental Protection Agency (USEPA) Method 1312 [Synthetic Precipitation Leaching Procedure (SPLP)].

The results of the SPLP analysis of the bottom ash samples collected from four locations within the Unit indicate that the leachable arsenic and cobalt concentrations were below the concentrations detected in samples collected from monitoring wells MW-8, MW-9, and MW-10. These data provide evidence that the bottom ash present in the BASA from 2011 and the second sample collected from the BASA in 2019 do not contain sufficient leachable arsenic and cobalt to produce the concentration of constituents detected in the downgradient groundwater. Westar has noted that the type of coal used for fuel and TEC plant operations have been consistent since the early 2000s.

A summary of the results of the bottom ash leachability analyses is provided in Table I and the laboratory reports are attached as Appendix A.

3.2 REVIEW OF SEPTEMBER 2018 FIELD SAMPLING, LABORATORY ANALYSIS, AND STATISTICAL PROCEDURES

3.2.1 Field Sampling Procedures

Westar and Haley & Aldrich conducted the field sampling activities in accordance with a Groundwater Sampling and Analysis Plan (SAP; Haley & Aldrich, 2017) that was prepared in accordance with §257.93 of the CCR Rule. The SAP prescribes the site-specific activities and methodologies for groundwater sampling and included procedures for field data collection, sample collection, sample preservation and shipment, interpretation, laboratory analytical methods, and reporting for groundwater sampling for the BASA. The administrative procedures and frequency for collection of groundwater elevation measurements, determination of flow directions, and gradients were also provided in the SAP.

Haley & Aldrich reviewed the field sampling and equipment calibration logs and the field indicator parameters and did not identify any apparent deviations or errors in sampling that would result in a potential SSL downgradient of the BASA.

3.2.2 Laboratory Analysis and Quality Control Documentation

The groundwater samples collected downgradient of the BASA were analyzed by Pace Analytical Services using USEPA analytical methods. The data generated from these laboratory analyses are stored in a project database that incorporates hydrogeologic and groundwater quality data and was established to allow efficient management of chemical and physical data collected in the field and produced in the laboratory.

Haley & Aldrich conducted a quality assurance/quality control review of each groundwater quality dataset generated for the BASA and did not identify apparent laboratory or data management errors that would result in the apparent arsenic or cobalt SSLs downgradient of the BASA.

3.2.3 Statistical Evaluation

Westar collected the initial assessment monitoring groundwater sample in June 2018, and a second assessment monitoring groundwater sample in September 2018 from each of the upgradient and downgradient monitoring wells at the BASA. To develop groundwater protection standards for use in the statistical analyses, data from the baseline sampling completed over a period spanning from August 2016 through June 2017 was also utilized. Statistical analysis of the analytical results was completed and reported as documented in the 2018 Annual Groundwater Monitoring and Corrective Action Report (Haley & Aldrich, 2019).

Haley & Aldrich has reviewed the statistical analysis of groundwater quality data from monitoring wells at the BASA for the September 2018 monitoring event and did not identify statistical calculation errors that would result in the apparent arsenic or cobalt SSLs. The statistical test method used met the performance standard established in the CCR Rule, and the statistical procedure complies with the requirements of the CCR Rule.

3.3 POTENTIAL SOURCES OTHER THAN THE BASA

Haley & Aldrich conducted a review of potential sources (both point and non-point) of arsenic and/or cobalt in the vicinity of the BASA to determine if previous or adjacent site activities, land uses, or practices might have caused, or are currently causing, elevated concentrations of arsenic and/or cobalt in groundwater downgradient of the BASA. Potential point sources would include discharging activities or other activities occurring at a discrete location that may be a source of arsenic and/or cobalt. Non-point sources would include diffuse discharging activities or practices that may result in a low level but wide-spread increase in concentrations detected at the downgradient side of the BASA.

3.3.1 Point Sources

Prior to construction of the BASA, the site and surrounding vicinity was undeveloped land. Review of historical United States Geological Survey (USGS) topographic maps shows undeveloped land prior to the construction of the BASA. No known industrial, agricultural, mining, or other activities were conducted at the BASA site prior to construction that would potentially constitute a point source. No point sources have been identified as a potential alternative source for arsenic and/or cobalt at the BASA.

3.3.2 Non-Point Sources

No mining, industrial, or other activities have been documented in the vicinity of the BASA that might constitute a non-point source of arsenic and/or cobalt in the vicinity of MW-9 and/or MW-10.

No agricultural activities have been identified upgradient of the BASA. Records reviewed included historical aerial photographs and historical topographic maps. No non-point sources have been identified as a potential alternative source for arsenic and/or cobalt at the BASA.

3.4 HISTORICAL LAND USE REVIEW

Haley & Aldrich assessed past usage of the site and adjoining properties through a review of the following records:

- Environmental Risk Information Services (ERIS) – Aerial Photographs dated 1948, 1950, 1970, 1975, 1982, 1991, 2003, 2004, 2005, 2006, 2008, 2010, 2012, 2014, 2015, and 2017 (Appendix B); and
- ERIS – Topographic Maps dated 1950, 1951, 1970, 1975, 1981, 1983, and 2012 (Appendix C).

Unless otherwise noted below, sources were reviewed dating back to 1940 or first developed use, whichever is earlier, and at 5-year intervals if the use of the property has changed within the time period.

3.4.1 Historical Aerial Photographs

Haley & Aldrich reviewed aerial photographs depicting the development of the site and vicinity as summarized in Table II. The historical aerial photograph search includes photographs from the Army Mapping Service, USGS, National High-Altitude Photography, and the National Agriculture Information Program (ERIS, 2018) and are included in Appendix B.

Photographs suggest that the BASA was undeveloped prior to 1970. The plant site and BASA appear to have been developed in their current configurations by 1982. Minor development continued until present day. The coal pile for the facility has been located immediately adjacent to and east of the BASA since the Unit's original construction. An above ground storage tank was also present east of the coal pile prior to the BASA construction. An historical aerial photograph review summary is included as Table II. No activities constituting potential sources of arsenic and/or cobalt (e.g., mining, smelting, etc.) have been identified based on aerial photograph review.

3.4.2 Historical Topographic Maps

Haley & Aldrich reviewed historical topographic maps depicting the development of the site and vicinity, as summarized in Table III. The topographic maps were provided for review by ERIS. Copies of the topographic maps are included in Appendix C. No historical development of other features constituting potential sources of arsenic and/or cobalt (e.g., mining) have been identified based on topographic map review.

3.5 NATURAL VARIABILITY OF ARSENIC AND/OR COBALT OCCURRENCE

Haley & Aldrich conducted an evaluation of the natural variability of groundwater quality at the BASA based on site-specific data; observations are described in the following sections.

3.5.1 Uppermost Groundwater Monitoring Interval Variability

Haley & Aldrich conducted an evaluation of the concentrations of the indicator parameters throughout the monitoring period from August 2016 through March 2018 to determine the natural variability of these parameters within the uppermost groundwater monitoring interval.

The average concentration of chloride and sulfate observed at the upgradient well (MW-7) were 194 and 470 mg/L, respectively. The average concentration of these indicator parameters within the downgradient monitoring wells MW-9 and MW-10 were 173 and 226 mg/L (MW-9) and 230 and 187 mg/L (MW-10), respectively. The difference in concentrations of chloride and sulfate between the upgradient and downgradient monitoring wells indicates that there is significant variability in the uppermost groundwater monitoring interval associated with the CCR Unit.

This conclusion is further supported by the difference in the boron concentrations observed during the reporting period. The average concentration of boron determined at the upgradient well (MW-7) was 0.73 mg/L while the average concentration of boron detected at the downgradient wells (MW-9 and MW-10) were significantly lower at 0.25 and 0.24 mg/L, respectively. Boron is a key Appendix III indicator parameter of potential impacts from a CCR Unit. Since boron concentrations down gradient of the Unit are lower than up gradient concentrations, it is further indicated that the BASA is not impacting groundwater quality.

4. Findings and Conclusions

Haley & Aldrich conducted an evaluation of groundwater quality data and information obtained as part of the detection and assessment monitoring programs and the materials contained within the BASA to identify potential sources of the arsenic and cobalt detected in the groundwater samples collected from monitoring wells MW-9 and MW-10 located downgradient of the BASA.

The evaluation included a review of sampling and analysis procedures, available laboratory analyses, and statistical analyses to determine if potential errors may have resulted in apparent SSL for arsenic and/or cobalt at the downgradient monitoring well locations. The evaluation also included a review of historical site activities based on aerial photographs and historical topographic maps, and consideration of potential point and non-point sources of arsenic and cobalt based on those activities.

To further evaluate if the materials stored within the BASA could be a source of arsenic and cobalt, results of the analysis of these materials for the concentration of leachable arsenic and cobalt from samples of bottom ash from the BASA for both past and current facility operations were reviewed and compared to the observed concentrations of these parameters within the downgradient wells during the monitoring period.

4.1 FINDINGS

Haley & Aldrich found no apparent errors in sampling, laboratory analysis, data management, or statistical analysis that would result in the apparent SSL for arsenic and cobalt at MW-9 and MW-10. Haley & Aldrich also found no evidence of historical point or non-point sources of arsenic and/or cobalt, or historical activities that affected the observed concentrations of arsenic and/or cobalt in groundwater downgradient of the BASA.

Haley & Aldrich evaluated available data to determine the potential for the materials stored within the BASA to be the source of the calculated SSL for arsenic and cobalt. Representative samples of bottom ash that had been stored within the BASA were obtained and submitted to a KDHE certified laboratory for the preparation of leachate samples in accordance with USEPA Method 1312, SPLP. The SPLP uses an acidic solution created using mineral acids consisting of nitric (HNO_3) and sulfuric (H_2SO_4) acids to evaluate the potential for contaminants to leach from materials exposed to acidic precipitation. The leaching procedure is performed over a period of 18 hours with constant agitation using an extraction fluid at a pH of less than 5, which is significantly lower than the pH of the groundwater conditions at the BASA. Based on the rigorous nature of the SPLP, the results provide a conservative or worst-case estimate of the concentration of the contaminants that are likely to leach from the material tested. Arsenic and cobalt should therefore leach from the CCR material in lower concentrations in the natural environmental condition as compared to the results of the SPLP leaching tests. The results of the SPLP testing of the materials stored in the BASA are presented in Table I.

Key findings regarding the potential for the bottom ash stored in the BASA to leach arsenic and cobalt and impact groundwater quality in the uppermost aquifer include:

- The results of SPLP analyses of bottom ash samples collected from the BASA from 2011 through 2018 exhibited concentrations of arsenic and cobalt below the levels observed in all of the site monitoring wells during the reporting period.

These findings indicate that the aggressive leaching procedure used in the laboratory to evaluate bottom ash samples from the BASA could not reproduce the concentrations observed in groundwater at MW-9 and MW-10. Groundwater conditions at the BASA have less potential to leach constituents from the bottom ash than the SPLP analysis. Consequently, based on available data and information, it is unlikely that the concentrations of arsenic and cobalt observed in groundwater at MW-9 and MW-10 were derived from leaching of bottom ash material contained at the BASA by interaction with groundwater[3].

4.2 CONCLUSIONS

Based on the direct analysis of the material stored in the BASA by an aggressive leaching procedure for the concentration of arsenic and cobalt , the natural variability in the uppermost groundwater monitoring interval observed during the monitoring period, and the absence of any errors in the sampling, analysis, and statistical evaluation of the monitoring results, the calculated SSLs for arsenic and cobalt identified at MW-9 and MW-10 are due to natural variability of the groundwater conditions around the BASA and not the materials either historically or currently stored in the Unit.

[3] Furthermore, we note that the concentration of cobalt detected in the bottom ash SPLP leachate and all of the monitoring wells installed at the unit were below the KDHE non-residential groundwater use standards. The concentration of arsenic detected in the bottom ash SPLP leachate were below the KDHE non-residential groundwater use standards.

5. Certification

Pursuant to 40 CFR §257.94(e)(2), Westar conducted an alternate source evaluation to demonstrate that a source other than the BASA caused the SSL above the groundwater protection standards of arsenic and cobalt downgradient of the BASA identified during assessment monitoring.

This certification and the underlying data and evaluation performed in this report support the conclusion that a source other than the CCR unit is the cause of the SSL above the groundwater protection standards of arsenic and cobalt found during assessment monitoring of this Unit (i.e., arsenic at monitoring wells MW-9 and MW-10 and cobalt at monitoring well MW-9 downgradient of the BASA). That source has been identified as natural variability of the groundwater conditions within the uppermost aquifer underlying the BASA.

I certify that this report and all attachments were prepared by me or under my direct supervision. The information contained in this evaluation is, to the best of my knowledge, true, accurate, and complete.

HALEY & ALDRICH, INC.

Signed: _____
Certifying Engineer

Print Name: Steven F. Putrich, P.E.
Kansas License No.: PE24363
Title: Principal Consultant
Company: Haley & Aldrich, Inc.

STEVEN F. PUTRICH LICENSED PE24363 10/10/19 KANSAS PROFESSIONAL ENGINEER

Signed: _____
Professional Geologist

Print Name: Mark D. Nicholls, P.G.
Kansas License No.: 881
Title: Lead Hydrogeologist
Company: Haley & Aldrich, Inc.

MARK D. NICHOLLS LICENSED 881 10/10/2019 KANSAS PROFESSIONAL GEOLOGIST

HALEY ALDRICH

6. References

1. AMEC, May 2011. Report of Dam Safety Assessment of Coal Combustion Surface Impoundments.

2. Environmental Risk Information Services. Database Report. March 2018.

3. Haley & Aldrich, Inc., 2017. Groundwater Sampling and Analysis Pan, Tecumseh Energy Center. October.

4. Haley & Aldrich, Inc., 2019. Annual Groundwater Monitoring and Corrective Action Report. January.

5. United States Geological Survey (USGS), 1950. Topographic Map, Grantville, 7.5-minute series.

6. USGS, 1951. Topographic Map, Grantville, 7.5-minute series.

7. USGS, 1970. Topographic Map, Grantville, 7.5-minute series.

8. USGS, 1975. Topographic Map, Grantville, 7.5-minute series.

9. USGS, 1981. Topographic Map, Grantville, 7.5-minute series.

10. USGS, 1983. Topographic Map, Grantville, 7.5-minute series.

11. USGS, 2012. Topographic Map, Grantville, 7.5-minute series.

12. Zeller, D.E., 1968. *The Stratigraphic Succession in Kansas*. Kansas Geological Survey Bulletin 189.

TABLES

TABLE I
SUMMARY OF BOTTOM ASH SPLP ANALYSIS FOR TOTAL LEACHABLE METALS
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

Sample Identification	Sample Location	Sample Date	Method of Analysis	Parameter	Reporting Limit (mg/L)	Concentration (mg/L)
TEC Bottom Ash*	Bottom Ash Settling Pond	7/14/2011	ICP-AES	Total Arsenic	0.005	ND
			ICP-AES	Total Cobalt	0.002	ND
TEC BA Inlet**	Bottom Ash Settling Pond Inlet	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0025***
			ICP-AES	Total Cobalt	0.005	ND
TEC BA Middle**	Bottom Ash Settling Pond Middle	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0055***
			ICP-AES	Total Cobalt	0.005	ND
TEC BA Outlet**	Bottom Ash Settling Pond Outlet	4/2/2019	ICP-MS	Total Arsenic	0.001	***0.0016***
			ICP-AES	Total Cobalt	0.005	ND

Notes:

ICP-AES = Inductively Coupled Plasma Atomic Emission Spectroscopy

ICP-MS = Inductively Coupled Plasma Mass Spectroscopy

mg/L = milligrams per liter or parts per million (ppm)

TEC = Tecumseh Energy Center

ND = Non-detect at the reporting limit

***Bold Values** = parameter detected at a concentration greater than the reporting limits*

** Sample analyzed by Continental Analytical Services, Inc. Salina KS (KDHE Accreditation #E-10146)*

*** Samples analyzed vt Pace Anayltical Services, LLC. Lenexa KS Kansas/NELAP Certification # E-10116/E10426*

TABLE II
HISTORICAL AERIAL PHOTOGRAPH REVIEW SUMMARY
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

Dates	Description of Site	Sources
1948 – 1950	Power plant present; no development of the Bottom Ash Settling Area (BASA). Residential use of land to the west and southwest of the BASA. Coal pile and oil tank to east of future BASA site.	Aerial photos – ASCS; AMS
1970 – 1982	Development of the BASA. Residential use of land to the west of the 322 Landfill.	Aerial photos – USGS; NHAP
1991 – 2010	Continued development of the 322 Landfill. Residential use of land to the west of the 322 Landfill.	Aerial photos – USGS; NAIP
2012 – 2017	Continued use of the 322 Landfill configurations with only minor variations. Residential use of land to the west of the 322 Landfill.	Aerial photos – NAIP

Notes:

AMS = Army Mapping Service

ASCS = Agricultural and Soil Conservation Service

NAIP = National Agriculture Information Program

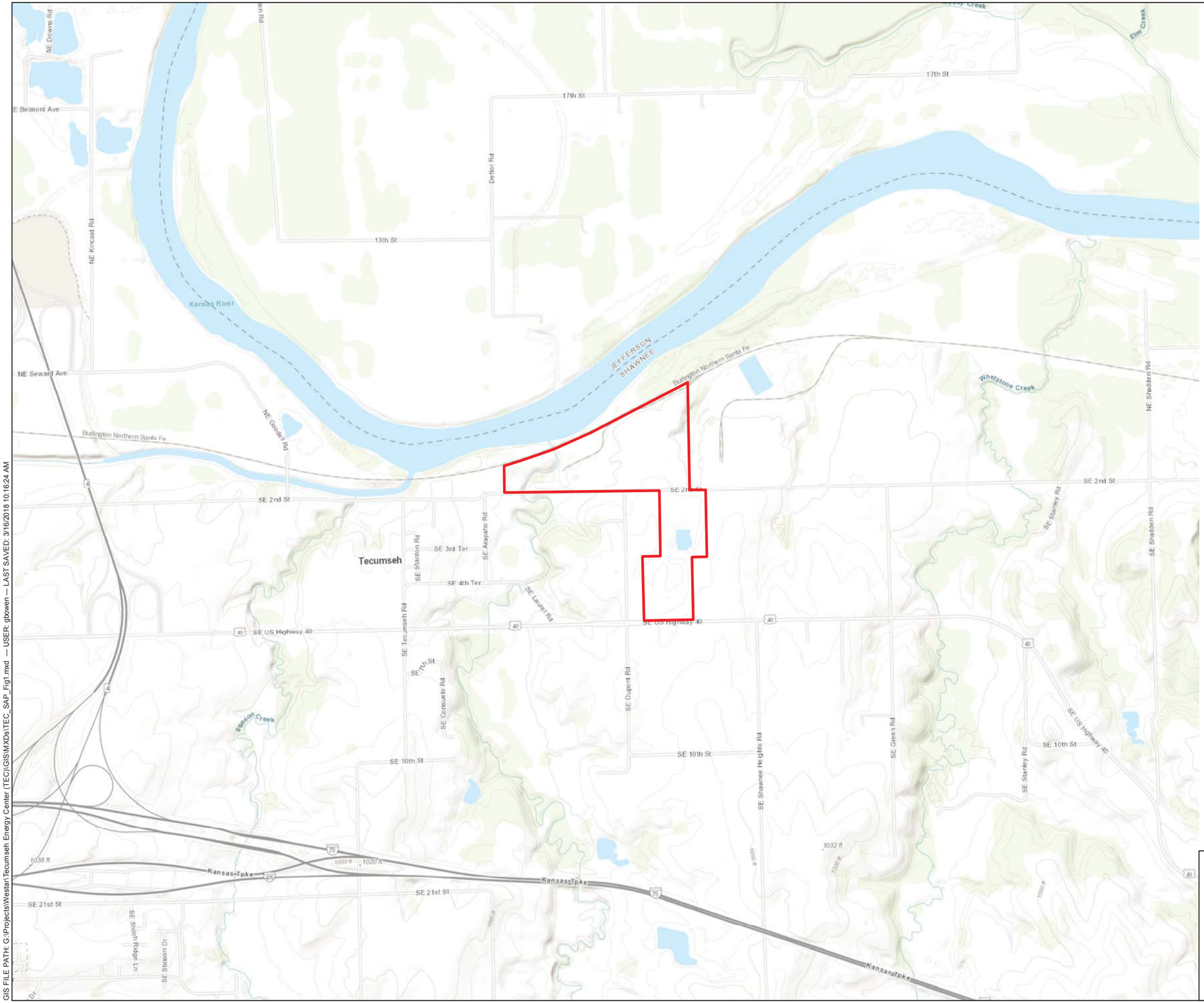
NHAP = National High Altitude Photography

USGS = United States Geological Survey

TABLE III
HISTORICAL TOPOGRAPHIC MAP REVIEW SUMMARY
WESTAR ENERGY, INC.
TECUMSEH ENERGY CENTER
BOTTOM ASH SETTLING AREA
TECUMSEH, KANSAS

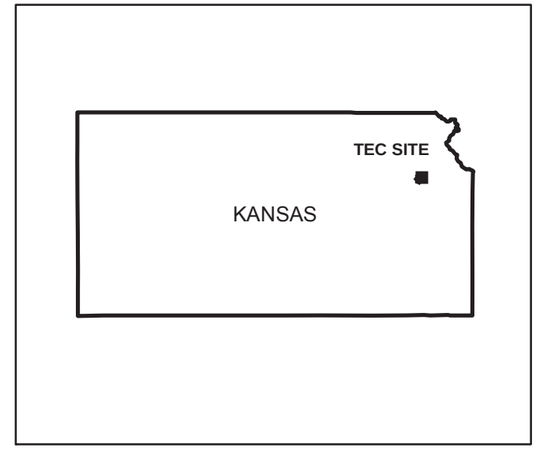
Dates	Description of Site and Adjacent Properties	Map Name
1950 – 1951	Power plant is indicated on the map. The Bottom Ash Settling Area (BASA) are undeveloped. Coal pile and above ground storage tank are due east of the BASA future area.	7.5-Minute Series, Grantville, Kansas Quadrangle
1970 – 1983	Development of the BASA. Significant development of structures and road to the east of the plant site.	7.5-Minute Series, Grantville, Kansas Quadrangle
1983	Development of the BASA.	7.5-Minute Series, Grantville, Kansas Quadrangle
2012	The plant site is no longer shown on the map. The BASA are shown on the map.	7.5-Minute Series, Grantville, Kansas Quadrangle

FIGURES



LEGEND

PROPERTY BOUNDARY



NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SITE COORDINATES: 39°3'13.53"N, 95°34'08.06"W
3. TOPOGRAPHIC IMAGERY SOURCE: ESRI.

N

0 2,000 4,000

SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

SITE LOCATION

OCTOBER 2019
SCALE: AS SHOWN

FIGURE 1

GIS FILE PATH: G:\Projects\Westar\Tecumseh Energy Center (TEC)\GIS\MXDs\TEC_SAP_Fig1.mxd — USER: gbowen — LAST SAVED: 3/16/2018 10:16:24 AM

LEGEND

- MONITORING WELL
- PIEZOMETRIC OBSERVATION WELL
- CROSS-SECTION
- BOTTOM ASH SETTLING AREA

NOTE

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AMSL = ABOVE MEAN SEA LEVEL.
3. AERIAL IMAGERY SOURCE: ESRI, 7 NOVEMBER 2015.
4. GROUNDWATER ELEVATIONS ARE FROM 26 JUNE 2017.

N

0 60 120

SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER
TECUMSEH, KANSAS

BOTTOM ASH SETTLING AREA MONITORING WELL LOCATION MAP

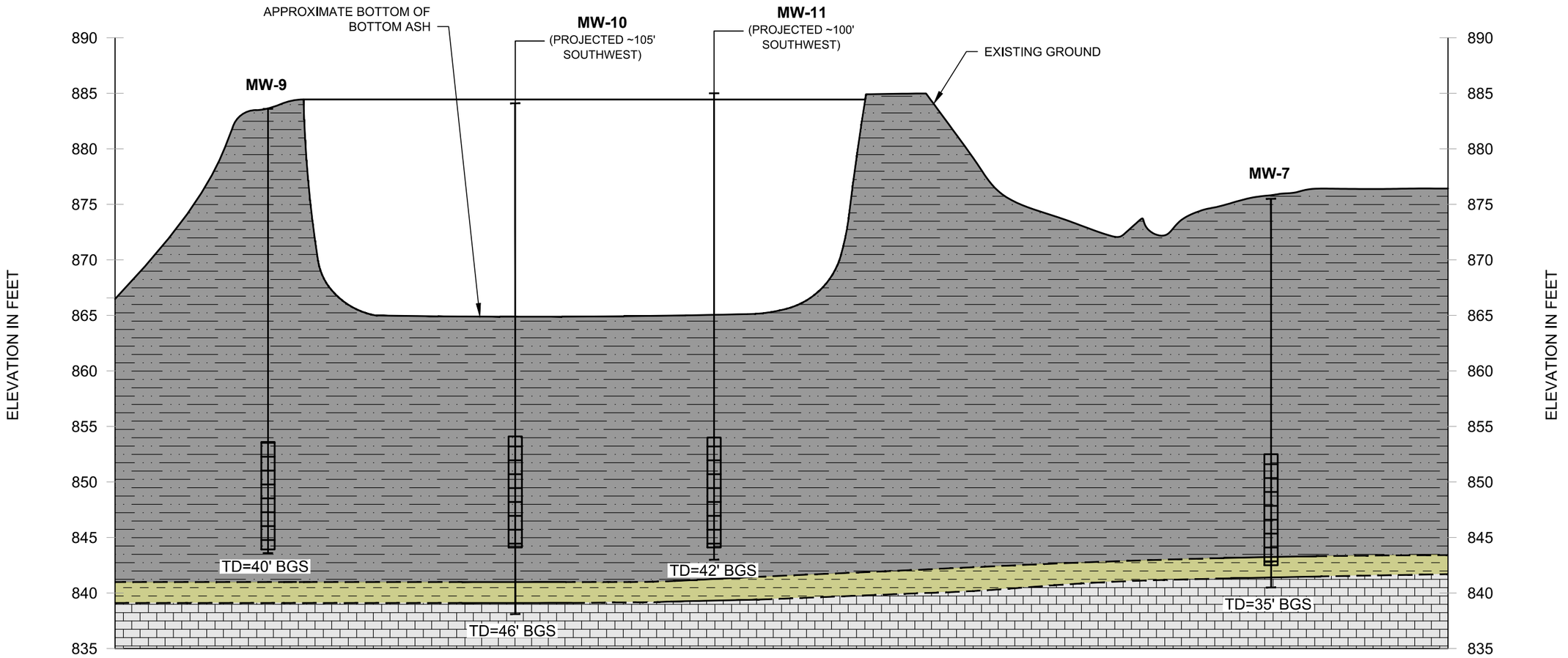
OCTOBER 2019
SCALE: AS SHOWN

FIGURE 2

GIS FILE PATH: G:\Projects\Westar\Tecumseh Energy Center (TEC)\GIS\MXDs\2019_04\CROSS SECTIONS - B-B' ASH SETTLING POND.mxd — USER: DZinsmaster — LAST SAVED: 6/24/2019 3:22:40 PM

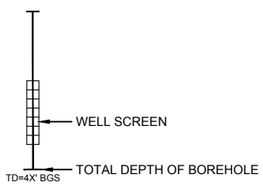
A
(NORTHWEST)

A'
(SOUTHEAST)



LEGEND

- GLACIAL DEPOSITS/OVERBURDEN
- SHALE MEMBER OF THE SCRANTON FORMATION
- LIMESTONE MEMBER OF THE SCRANTON SHALE FORMATION



NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. VERTICAL SCALE IS EXAGGERATED 5 TIMES.
3. PROJECTIONS ARE IN DIRECTION FROM ACTUAL LOCATION.

HORIZ. 0 50 100
VERT. 0 10 20
SCALE IN FEET

HALEY ALDRICH

WESTAR ENERGY
TECUMSEH ENERGY CENTER (TEC)
TECUMSEH, KANSAS

BOTTOM ASH SETTLING AREA CONCEPTUAL GEOLOGIC CROSS SECTION A-A'

SCALE: AS SHOWN
OCTOBER 2019

FIGURE 3

APPENDIX A

Laboratory Reports

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

April 09, 2019

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

RE: Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Dear Brandon Griffin:
Enclosed are the analytical results for sample(s) received by the laboratory between April 02, 2019 and April 09, 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: Bob Beck, KCPL Lacygne Station
HEATH HORYNA, WESTAR ENERGY
Adam Kneeling, Haley & Aldrich, Inc.
JARED MORRISON, WESTAR ENERGY

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

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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SAMPLE SUMMARY

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60298624001	**TEC BA INLET**	Solid	04/02/19 12:45	04/02/19 15:30
60298624002	**TEC BA INLET LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624003	**TEC BA MIDDLE**	Solid	04/02/19 12:50	04/02/19 15:30
60298624004	**TEC BA MIDDLE LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624005	**TEC BA OUTLET**	Solid	04/02/19 12:55	04/02/19 15:30
60298624006	**TEC BA OUTLET LEACHATE**	Water	04/05/19 10:15	04/05/19 10:16
60298624007	**TEC BA INLET LEACHATE 2**	Water	04/09/19 13:35	04/09/19 13:36
60298624008	**TEC BA MIDDLE LEACHATE 2**	Water	04/09/19 13:35	04/09/19 13:36
60298624009	**TEC BA OUTLET LEACHATE 3**	Water	04/09/19 13:35	04/09/19 13:36

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SAMPLE ANALYTE COUNT

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60298624001	**TEC BA INLET**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624002	**TEC BA INLET LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624003	**TEC BA MIDDLE**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624005	**TEC BA OUTLET**	EPA 6010	JDE	23	PASI-K
		EPA 6020	JGP	5	PASI-K
		EPA 7470	LRS	1	PASI-K
60298624006	**TEC BA OUTLET LEACHATE**	EPA 300.0	MGS	3	PASI-K
		EPA 353.2	BLA	3	PASI-K
		EPA 365.4	RAD	1	PASI-K
60298624007	**TEC BA INLET LEACHATE 2**	EPA 7196	ZMH	1	PASI-K
60298624008	**TEC BA MIDDLE LEACHATE 2**	EPA 7196	ZMH	1	PASI-K
60298624009	**TEC BA OUTLET LEACHATE 3**	EPA 7196	ZMH	1	PASI-K

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET **Lab ID: 60298624001** Collected: 04/02/19 12:45 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	ND	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:18	7440-41-7	
Boron	**0.36**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-43-9	
Calcium	**12.7**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:18	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-50-8	
Iron	**0.22**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7439-92-1	
Magnesium	**3.2**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7439-95-4	
Manganese	**0.0088**	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:18	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:18	7440-02-0	
Potassium	ND	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-09-7	
Silica	**6.9**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:18	7631-86-9	
Silicon	**3.2**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:18	7440-22-4	
Sodium	**7.3**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:18	7440-23-5	B,M1
Strontium	**0.19**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:18	7440-24-6	
Titanium	**0.012**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-32-6	
Vanadium	**0.024**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:18	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:18	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**0.54**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:03	7429-90-5	M1
Antimony	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-36-0	
Arsenic	**0.0025**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-38-2	
Selenium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:03	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:37	7439-97-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET LEACHATE **Lab ID: 60298624002** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	ND	mg/L	1.0	1		04/05/19 22:53	16887-00-6	
Fluoride	**0.29**	mg/L	0.20	1		04/05/19 22:53	16984-48-8	
Sulfate	**13.2**	mg/L	1.0	1		04/05/19 22:53	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**0.20**	mg/L	0.10	1		04/05/19 14:59		B
Nitrogen, Nitrite	ND	mg/L	0.10	1		04/05/19 14:59		
Nitrogen, NO2 plus NO3	**0.20**	mg/L	0.10	1		04/05/19 14:59		B
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	**0.16**	mg/L	0.10	1		04/06/19 10:53	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE **Lab ID: 60298624003** Collected: 04/02/19 12:50 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	ND	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:25	7440-41-7	
Boron	**0.17**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-43-9	
Calcium	**27.7**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:25	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-50-8	
Iron	**1.9**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7439-92-1	
Magnesium	**4.3**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7439-95-4	
Manganese	**0.019**	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:25	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:25	7440-02-0	
Potassium	**4.4**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-09-7	
Silica	**20.5**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:25	7631-86-9	
Silicon	**9.6**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:25	7440-22-4	
Sodium	**31.4**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:25	7440-23-5	B
Strontium	**0.25**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:25	7440-24-6	
Titanium	**0.036**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-32-6	
Vanadium	**0.015**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:25	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:25	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**1.9**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:08	7429-90-5	
Antimony	**0.0012**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-36-0	
Arsenic	**0.0055**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-38-2	
Selenium	**0.0016**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:08	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
	Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:44	7439-97-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE LEACHATE **Lab ID: 60298624004** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**1.3**	mg/L	1.0	1		04/05/19 23:32	16887-00-6	
Fluoride	**0.39**	mg/L	0.20	1		04/05/19 23:32	16984-48-8	
Sulfate	**86.4**	mg/L	10.0	10		04/05/19 23:44	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**1.7**	mg/L	0.10	1		04/05/19 15:00		
Nitrogen, Nitrite	**1.4**	mg/L	0.10	1		04/05/19 15:00		
Nitrogen, NO2 plus NO3	**3.1**	mg/L	0.10	1		04/05/19 15:00		
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	**1.1**	mg/L	0.10	1		04/06/19 10:55	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET **Lab ID: 60298624005** Collected: 04/02/19 12:55 Received: 04/02/19 15:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, SPLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Barium	**0.14**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-39-3	
Beryllium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:27	7440-41-7	
Boron	**0.39**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-42-8	
Cadmium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-43-9	
Calcium	**15.5**	mg/L	0.10	1	04/05/19 12:37	04/08/19 12:27	7440-70-2	
Chromium	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-47-3	
Cobalt	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-48-4	
Copper	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-50-8	
Iron	**0.055**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7439-89-6	
Lead	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7439-92-1	
Magnesium	**2.6**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7439-95-4	
Manganese	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7439-96-5	
Molybdenum	ND	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:27	7439-98-7	
Nickel	ND	mg/L	0.0050	1	04/05/19 12:37	04/08/19 12:27	7440-02-0	
Potassium	ND	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-09-7	
Silica	**7.2**	mg/L	1.1	1	04/05/19 12:37	04/08/19 12:27	7631-86-9	
Silicon	**3.3**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-21-3	
Silver	ND	mg/L	0.0070	1	04/05/19 12:37	04/08/19 12:27	7440-22-4	
Sodium	**5.5**	mg/L	0.50	1	04/05/19 12:37	04/08/19 12:27	7440-23-5	B
Strontium	**0.38**	mg/L	0.020	1	04/05/19 12:37	04/08/19 12:27	7440-24-6	
Titanium	ND	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-32-6	
Vanadium	**0.043**	mg/L	0.010	1	04/05/19 12:37	04/08/19 12:27	7440-62-2	
Zinc	ND	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:27	7440-66-6	
6020 MET ICPM, SPLP	Analytical Method: EPA 6020 Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Aluminum	**0.60**	mg/L	0.050	1	04/05/19 12:37	04/08/19 12:09	7429-90-5	
Antimony	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-36-0	
Arsenic	**0.0016**	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-38-2	
Selenium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7782-49-2	
Thallium	ND	mg/L	0.0010	1	04/05/19 12:37	04/08/19 12:09	7440-28-0	
7470 Mercury, SPLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Leachate Method/Date: EPA 1312; 04/04/19 00:00							
Mercury	ND	mg/L	0.0020	1	04/05/19 16:19	04/08/19 12:46	7439-97-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET LEACHATE **Lab ID: 60298624006** Collected: 04/05/19 10:15 Received: 04/05/19 10:16 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	ND	mg/L	1.0	1		04/06/19 00:10	16887-00-6	
Fluoride	**0.20**	mg/L	0.20	1		04/06/19 00:10	16984-48-8	
Sulfate	**16.4**	mg/L	1.0	1		04/06/19 00:10	14808-79-8	
353.2 Nitrogen, NO2/NO3 unpres	Analytical Method: EPA 353.2							
Nitrogen, Nitrate	**0.15**	mg/L	0.10	1		04/05/19 15:03		B
Nitrogen, Nitrite	ND	mg/L	0.10	1		04/05/19 15:03		
Nitrogen, NO2 plus NO3	**0.15**	mg/L	0.10	1		04/05/19 15:03		B
365.4 Total Phosphorus	Analytical Method: EPA 365.4							
Phosphorus	ND	mg/L	0.10	1		04/06/19 10:58	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA INLET LEACHATE 2 **Lab ID: 60298624007** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:19	18540-29-9	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA MIDDLE LEACHATE 2 **Lab ID: 60298624008** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:21	18540-29-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Sample: TEC BA OUTLET LEACHATE 3 **Lab ID: 60298624009** Collected: 04/09/19 13:35 Received: 04/09/19 13:36 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7196 Chromium, Hexavalent	Analytical Method: EPA 7196							
Chromium, Hexavalent	ND	mg/L	0.010	1		04/09/19 14:22	18540-29-9	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577594 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2370033 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	ND	0.0020	04/08/19 12:33	

LABORATORY CONTROL SAMPLE: 2370034

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	0.015	0.014	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2370036 2370035

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	0.015	0.015	0.014	0.015	96	97	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577491 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2369565 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Barium	mg/L	ND	0.10	04/08/19 12:04	
Beryllium	mg/L	ND	0.0010	04/08/19 12:04	
Boron	mg/L	ND	0.10	04/08/19 12:04	
Cadmium	mg/L	ND	0.0050	04/08/19 12:04	
Calcium	mg/L	0.90	0.10	04/08/19 13:32	
Chromium	mg/L	ND	0.0050	04/08/19 12:04	
Cobalt	mg/L	ND	0.0050	04/08/19 12:04	
Copper	mg/L	ND	0.010	04/08/19 12:04	
Iron	mg/L	ND	0.050	04/08/19 12:04	
Lead	mg/L	ND	0.0050	04/08/19 12:04	
Magnesium	mg/L	0.082	0.050	04/08/19 12:04	
Manganese	mg/L	ND	0.0050	04/08/19 12:04	
Molybdenum	mg/L	ND	0.020	04/08/19 12:04	
Nickel	mg/L	ND	0.0050	04/08/19 12:04	
Potassium	mg/L	ND	0.50	04/08/19 12:04	
Silica	mg/L	ND	1.1	04/08/19 12:04	
Silicon	mg/L	ND	0.50	04/08/19 12:04	
Silver	mg/L	ND	0.0070	04/08/19 12:04	
Sodium	mg/L	8.6	0.50	04/08/19 13:32	
Strontium	mg/L	ND	0.020	04/08/19 12:04	
Titanium	mg/L	ND	0.010	04/08/19 12:04	
Vanadium	mg/L	ND	0.010	04/08/19 12:04	
Zinc	mg/L	ND	0.050	04/08/19 12:04	

LABORATORY CONTROL SAMPLE: 2369566

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	mg/L	1	0.99	99	80-120	
Beryllium	mg/L	1	1.0	100	80-120	
Boron	mg/L	1	0.97	97	80-120	
Cadmium	mg/L	1	0.98	98	80-120	
Calcium	mg/L	10	10.2	102	80-120	
Chromium	mg/L	1	0.99	99	80-120	
Cobalt	mg/L	1	1.0	101	80-120	
Copper	mg/L	1	0.98	98	80-120	
Iron	mg/L	10	10.2	102	80-120	
Lead	mg/L	1	1.0	101	80-120	
Magnesium	mg/L	10	10	100	80-120	
Manganese	mg/L	1	0.98	98	80-120	
Molybdenum	mg/L	1	0.94	94	80-120	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

LABORATORY CONTROL SAMPLE: 2369566

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nickel	mg/L	1	1.0	100	80-120	
Potassium	mg/L	10	10	100	80-120	
Silica	mg/L	1	10.6	1060		
Silicon	mg/L	5	5.0	99	80-120	
Silver	mg/L	0.5	0.50	100	80-120	
Sodium	mg/L	10	9.9	99	80-120	
Strontium	mg/L	1	1.0	100	80-120	
Titanium	mg/L	1	0.99	99	80-120	
Vanadium	mg/L	1	0.99	99	80-120	
Zinc	mg/L	1	0.99	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2369567 2369568

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Barium	mg/L	ND	1	1	1.1	1.1	103	103	75-125	1	20	
Beryllium	mg/L	ND	1	1	0.99	0.98	99	98	75-125	1	20	
Boron	mg/L	0.36	1	1	1.3	1.3	97	97	75-125	1	20	
Cadmium	mg/L	ND	1	1	0.97	0.97	97	97	93-110	1	20	
Calcium	mg/L	12.7	10	10	22.6	22.6	98	99	75-125	0	20	
Chromium	mg/L	ND	1	1	0.98	0.98	98	97	72-127	0	20	
Cobalt	mg/L	ND	1	1	1.0	0.99	99	99	90-116	0	20	
Copper	mg/L	ND	1	1	0.98	0.97	98	97	75-125	0	20	
Iron	mg/L	0.22	10	10	10.0	10	98	97	87-113	1	20	
Lead	mg/L	ND	1	1	1.0	0.99	100	99	75-125	1	20	
Magnesium	mg/L	3.2	10	10	13.4	13.4	102	101	75-125	0	20	
Manganese	mg/L	0.0088	1	1	0.98	0.97	97	96	58-158	1	20	
Molybdenum	mg/L	ND	1	1	0.93	0.93	93	93	75-125	0	20	
Nickel	mg/L	ND	1	1	0.99	0.99	99	98	75-125	1	20	
Potassium	mg/L	ND	10	10	9.9	9.7	99	97	75-125	1	20	
Silica	mg/L	6.9	1	1	16.5	16.3	965	944		1		
Silicon	mg/L	3.2	5	5	7.7	7.6	90	88	75-125	1	20	
Silver	mg/L	ND	0.5	0.5	0.50	0.49	99	98	75-125	1	20	
Sodium	mg/L	7.3	10	10	10.7	10.6	34	33	75-125	1	20	M1
Strontium	mg/L	0.19	1	1	1.2	1.2	100	100	75-125	0	20	
Titanium	mg/L	0.012	1	1	0.98	0.98	97	96	75-125	1	20	
Vanadium	mg/L	0.024	1	1	1.0	1.0	98	98	75-125	0	20	
Zinc	mg/L	ND	1	1	0.98	0.97	97	97	78-126	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577492 Analysis Method: EPA 6020
QC Batch Method: EPA 3020 Analysis Description: 6020 MET SPLP
Associated Lab Samples: 60298624001, 60298624003, 60298624005

METHOD BLANK: 2369569 Matrix: Water
Associated Lab Samples: 60298624001, 60298624003, 60298624005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/L	ND	0.050	04/08/19 12:00	
Antimony	mg/L	ND	0.0010	04/08/19 12:00	
Arsenic	mg/L	ND	0.0010	04/08/19 12:00	
Selenium	mg/L	ND	0.0010	04/08/19 12:00	
Thallium	mg/L	ND	0.0010	04/08/19 12:00	

LABORATORY CONTROL SAMPLE: 2369570

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/L	1	1.0	100	80-120	
Antimony	mg/L	0.04	0.038	94	80-120	
Arsenic	mg/L	0.04	0.036	91	80-120	
Selenium	mg/L	0.04	0.035	87	80-120	
Thallium	mg/L	0.04	0.037	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2369571 2369572

Parameter	Units	60298624001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/L	0.54	1	1	1.8	1.9	131	132	75-125	1	20	M1
Antimony	mg/L	ND	0.04	0.04	0.038	0.038	94	92	75-125	2	20	
Arsenic	mg/L	0.0025	0.04	0.04	0.039	0.038	90	89	75-125	1	20	
Selenium	mg/L	ND	0.04	0.04	0.035	0.035	85	85	75-125	0	20	
Thallium	mg/L	ND	0.04	0.04	0.037	0.037	94	92	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577578 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369968 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	04/05/19 22:02	
Fluoride	mg/L	ND	0.20	04/05/19 22:02	
Sulfate	mg/L	ND	1.0	04/05/19 22:02	

LABORATORY CONTROL SAMPLE: 2369969

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	100	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	5.3	105	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577533 Analysis Method: EPA 353.2
QC Batch Method: EPA 353.2 Analysis Description: 353.2 Nitrate + Nitrite, Unpres.
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369705 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Nitrate	mg/L	0.14	0.10	04/05/19 14:57	
Nitrogen, Nitrite	mg/L	ND	0.10	04/05/19 14:57	
Nitrogen, NO2 plus NO3	mg/L	0.14	0.10	04/05/19 14:57	

LABORATORY CONTROL SAMPLE: 2369706

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	1	0.96	96	70-130	
Nitrogen, Nitrite	mg/L	1	1.1	106	90-110	
Nitrogen, NO2 plus NO3	mg/L	2	2.0	101	90-110	

MATRIX SPIKE SAMPLE: 2369707

Parameter	Units	60298624002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Nitrate	mg/L	0.20	1	1.2	97	70-130	
Nitrogen, Nitrite	mg/L	ND	1	1.1	110	90-110	
Nitrogen, NO2 plus NO3	mg/L	0.20	2	2.3	104	90-110	

SAMPLE DUPLICATE: 2369708

Parameter	Units	60298624006 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Nitrate	mg/L	0.15	0.15	0	20	
Nitrogen, Nitrite	mg/L	ND	ND		20	
Nitrogen, NO2 plus NO3	mg/L	0.15	0.15	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 577541 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60298624002, 60298624004, 60298624006

METHOD BLANK: 2369762 Matrix: Water
Associated Lab Samples: 60298624002, 60298624004, 60298624006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	ND	0.10	04/06/19 10:51	

LABORATORY CONTROL SAMPLE: 2369763

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	2.1	105	90-110	

MATRIX SPIKE SAMPLE: 2369764

Parameter	Units	60298624002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.16	2	2.3	105	90-110	

SAMPLE DUPLICATE: 2369765

Parameter	Units	60298624004 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	1.1	1.0	3	10	

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QUALITY CONTROL DATA

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

QC Batch: 578184 Analysis Method: EPA 7196
QC Batch Method: EPA 7196 Analysis Description: 7196 Chromium, Hexavalent
Associated Lab Samples: 60298624007, 60298624008, 60298624009

METHOD BLANK: 2372388 Matrix: Water
Associated Lab Samples: 60298624007, 60298624008, 60298624009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chromium, Hexavalent	mg/L	ND	0.010	04/09/19 14:13	

LABORATORY CONTROL SAMPLE: 2372389

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	0.1	0.096	96	90-110	

MATRIX SPIKE SAMPLE: 2372390

Parameter	Units	60298624007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/L	ND	0.1	0.090	90	85-115	

SAMPLE DUPLICATE: 2372391

Parameter	Units	60298624008 Result	Dup Result	RPD	Max RPD	Qualifiers
Chromium, Hexavalent	mg/L	ND	ND		20	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

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

B	Analyte was detected in the associated method blank.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: TEC BOTTOM ASH SPLP 2019
Pace Project No.: 60298624

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60298624001	**TEC BA INLET**	EPA 3010	577491	EPA 6010	577572
60298624003	**TEC BA MIDDLE**	EPA 3010	577491	EPA 6010	577572
60298624005	**TEC BA OUTLET**	EPA 3010	577491	EPA 6010	577572
60298624001	**TEC BA INLET**	EPA 3020	577492	EPA 6020	577571
60298624003	**TEC BA MIDDLE**	EPA 3020	577492	EPA 6020	577571
60298624005	**TEC BA OUTLET**	EPA 3020	577492	EPA 6020	577571
60298624001	**TEC BA INLET**	EPA 7470	577594	EPA 7470	577730
60298624003	**TEC BA MIDDLE**	EPA 7470	577594	EPA 7470	577730
60298624005	**TEC BA OUTLET**	EPA 7470	577594	EPA 7470	577730
60298624002	**TEC BA INLET LEACHATE**	EPA 300.0	577578		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 300.0	577578		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 300.0	577578		
60298624002	**TEC BA INLET LEACHATE**	EPA 353.2	577533		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 353.2	577533		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 353.2	577533		
60298624002	**TEC BA INLET LEACHATE**	EPA 365.4	577541		
60298624004	**TEC BA MIDDLE LEACHATE**	EPA 365.4	577541		
60298624006	**TEC BA OUTLET LEACHATE**	EPA 365.4	577541		
60298624007	**TEC BA INLET LEACHATE 2**	EPA 7196	578184		
60298624008	**TEC BA MIDDLE LEACHATE 2**	EPA 7196	578184		
60298624009	**TEC BA OUTLET LEACHATE 3**	EPA 7196	578184		

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Sample Condition Upon Receipt

WO#: 60298624

60298624

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** 2.5 **Corr. Factor** -1.0 **Corrected** 3.5

Date and initials of person examining contents: 4/12/19 KP

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☑Yes ☐No ☐N/A	3 Day
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: SL	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☐Yes ☐No ☑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)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State: OK	☐Yes ☑No ☐N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑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: _____

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CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 1

Section A Required Client Information:

Company:	WESTAR ENERGY
Address:	2nd Dupont Road
	Tecumseh, KS 66542
Email To:	
Phone:	Fax:
Requested Due Date/TAT:	3-5 Days

Section B Required Project Information:

Report To:	Brandon Griffin
Copy To:	Jared Morrison, Adam Kneeling
	Bob Beck
Purchase Order No.:	10TEC-0000007957
Project Name:	TEC Bottom Ash 2019
Project Number:	

Section C Invoice Information:

Attention:	Accounts Payable
Company Name:	WESTAR ENERGY
Address:	
Pace Quote Reference:	
Pace Project Manager:	Heather Wilson, 913-563-1407
Pace Profile #:	11973, 1 & 2

REGULATORY AGENCY

☑ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: KS

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	6010 SPLP Meatls*	6020 SPLP Metals**	7470 Hg	SPLP 300.0 Cl, F, SO4	SPLP 353.2 Nitrates	SPLP 365.4 Phosphorus	SPLP Hexavalent Chromi				Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	TEC BA Inlet	SL	G			4/2	1245		1	1		[illegible]		14												001, 002		60298624
2	TEC BA Middle	SL	G			4/2	1250		1	1				↓												003, 004		Receiving: Please note that the 300.0, 353.2, 365.4, and Hexavalent Chromium need to be logged as a leachate sample using line 2
3	TEL BA Outlet	SL	G			4/2	1255		1	1				↓												005, 006		
4																												
5																												
6																												
7																												
8																												
9																												
10																												
11																												
12																												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Si, silica, Ag, Na, St, Ti, V, Zn	[signature] / Westar	4/2/19	1330	[signature] / Pace	4/2/19	1530	4.5	Y	Y	Y
**Al, As, Sb, Se, Tl										
Receiving: Please note that the 300.0, 353.2, 365.4, and Hexavalent Chromium need to be logged as a leachate sample using line 2 of the profile										

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:	Brandon Griffin				
SIGNATURE of SAMPLER:	[signature]	DATE Signed (MM/DD/YY): 04/02/19			

*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.

F-ALL-Q-020rev.08, 12-Oct-2007

Continental Analytical Services, Inc.

08/04/2011 Page: 1

Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date and Time Received: 07/14/2011 09:00
Continental File No.: 7701
Continental Order No.: 57218
Project ID: TEC
Purchase Auth: 901836

Dear Mr. Junod:

This laboratory report containing the samples indicated below, includes 15 pages for the analytical report, 1 page(s) for the chain of custody and/or analysis request, and 1 page(s) for the sample receipt form.

CAS LAB ID #	SAMPLE DESCRIPTION	SAMPLE TYPE	DATE SAMPLED
11070963	TEC Fly Ash-SPLP	Liquid	7/13/2011
11070964	TEC Bottom Ash -SPLP	Liquid	7/13/2011

The Appendix and Quality Control sections are integral parts of this laboratory report and may contain important data qualifiers.

All results are reported on a wet weight basis unless otherwise stated.

Samples will be retained for 120 days unless Continental is otherwise notified.

Continental is accredited by the State of Kansas through the National Environmental Laboratory Accreditation Program (NELAP). The results contained in this report were obtained using Continental's Standard Operating Procedures. These procedures are in substantial compliance with the approved methods referenced and the standards published by NELAP unless otherwise noted in the Appendix and Quality Control sections of this report.

This report may not be reproduced, except in full, without written approval from Continental Analytical Services, Inc.

Thank you for choosing Continental for this project. If you have any questions please contact me at (800)535-3076.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Technical Manager

Petra M. Craddock
Project Manager

525 N. Eighth St. - P.O. Box 3737 - Salina, KS 67402-3737
785-827-1273 800-535-3076 Fax 785-823-7830
KDHE Environmental Laboratory Accreditation No. E-10146

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Lab Number: 11070963
Sample Description: TEC Fly Ash-SPLP

Date Sampled: 07/13/2011
Time Sampled: 1420

Analysis	Concentration	Units	Dilution Factor	LOQ
Aluminum, Tot. Rec., ICP-MS	83400	µg/L	1.0	0.03
Antimony, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Arsenic, Total, ICP	ND(5)	µg/L	1.0	5
Barium, Total, ICP	6980	µg/L	1.0	0.10
Beryllium, Total, ICP	ND(2)	µg/L	1.0	2
Boron, Total, ICP	ND(500)	µg/L	1.0	500
Cadmium, Total, ICP	ND(2)	µg/L	1.0	2
Calcium, Total, ICP	206	mg/L	1.0	0.5
Chromium, Total, ICP	92	µg/L	1.0	5
Cobalt, Total, ICP	ND(2)	µg/L	1.0	2
Copper, Total, ICP	ND(10)	µg/L	1.0	10
Final pH, SPLP Extract	11.3	Std. units	1.0	
Iron, Total, ICP	ND(0.10)	mg/L	1.0	0.10
Lead, Total, ICP	ND(5)	µg/L	1.0	3
Magnesium, Total, ICP	ND(0.1)	mg/L	1.0	0.1
Manganese, Total, ICP	ND(5)	µg/L	1.0	5
Mercury, Total	ND(0.2)	µg/L	1.0	0.2
Molybdenum, Total, ICP	110.	µg/L	1.0	5
Nickel, Total, ICP	ND(5)	µg/L	1.0	5
Potassium, Dissolved, ICP	0.9 B	mg/L	1.0	0.3
Selenium, Tot. Rec., ICP-MS	10.	µg/L	1.0	5
Silicon as Silica	1.04 BS 0.16	mg/L	1.0	0.04
Silver, Total, ICP	ND(5)	µg/L	1.0	5
Sodium, Dissolved, ICP	13.9 BS 2.6	mg/L	1.0	0.5
Strontium, Total, ICP	11900	µg/L	1.0	5
Thallium, Tot. Rec., ICP-MS	ND(2)	µg/L	1.0	2
Titanium, Total, ICP	6	µg/L	1.0	5
Vanadium, Total, ICP	10.	µg/L	1.0	5
Zinc, Total, ICP	15	µg/L	1.0	10
Chloride	1.2	mg/L	1.0	1.0
Chromium, Hexavalent	0.175	mg/L	1.0	0.010
Fluoride	2.7 E QC	mg/L	1.0	0.1
Nitrate, as N	ND(0.1)	mg/L	1.0	0.1
Nitrate/Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Phosphorus, Total, as P	ND(0.2)	mg/L	0	0
Sulfate	12.9	mg/L	1.0	1.0

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)

-Continued-

Client: **Westar Energy, Inc.**
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)
Aluminum, Tot. Rec., ICP-M	07/21/11 1200	08/02/11 1619	110721-3	2IP3214	JDL	6020A
Antimony, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Arsenic, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Barium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Beryllium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Boron, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Cadmium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Calcium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Chromium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Cobalt, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Copper, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Final pH, SPLP Extract	N/A	07/20/11	110720-1	720BLK1	ADK	9040B
Iron, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Lead, Total, ICP	07/21/11 1130	07/28/11 1351	110721-1	4IP4209	JDL	6010B
Magnesium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Manganese, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Mercury, Total	07/21/11 1126	07/22/11 1757	110721-1	3MA3203	JDL	7470A
Molybdenum, Total, ICP	07/21/11 1130	07/26/11 1807	110721-1	4IP4207	JDL	6010B
Nickel, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Potassium, Dissolved, ICP	07/22/11 1252	08/02/11 1955	110722-5	4IP4214	KMW	6010B
Selenium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Silicon as Silica	07/22/11 1200	08/01/11 1629	110722-3	3IP4213	KMW	6010B
Silver, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Sodium, Dissolved, ICP	07/22/11 1252	08/02/11 1955	110722-5	4IP4214	KMW	6010B
Strontium, Total, ICP	07/21/11 1130	07/28/11 1351	110721-1	4IP4209	JDL	6010B
Thallium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1914	110721-3	4IP3202	JDL	6020A
Titanium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Vanadium, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Zinc, Total, ICP	07/21/11 1130	07/25/11 1338	110721-1	3IP4206	JDL	6010B
Chloride	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Chromium, Hexavalent	N/A	07/21/11 1107	110721-1	110721-2	JND	7196A (Modified)
Fluoride	N/A	08/01/11 1437	1IC2213	1IC2213	MLL	300.0/9056A
Nitrate, as N	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Nitrate/Nitrite, as N	N/A	07/26/11				Calc.
Nitrite, as N	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
Phosphorus, Total, as P	N/A	07/21/11 1422	110721-2	110721-3	KJH	SM 4500-P(B&F) (M
Sulfate	N/A	07/21/11 1215	1IC1202	1IC1202	MLL	300.0/9056A
ICP Metals Total Preparation Method						3010A
Dissolved Metals Preparation Method						3005A
Mercury Total Preparation Method						7470A
Total Recoverable Metals Preparation Method						3005A

Conclusion of Lab Number: 11070963

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Lab Number: 11070964
Sample Description: TEC Bottom Ash -SPLP

Date Sampled: 07/13/2011
Time Sampled: 1430

Analysis	Concentration	Units	Dilution Factor	LOQ
Aluminum, Tot. Rec., ICP-MS	10400	µg/L	1.0	0.03
Antimony, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Arsenic, Total, ICP	ND(5)	µg/L	1.0	5
Barium, Total, ICP	546	µg/L	1.0	0.10
Beryllium, Total, ICP	ND(2)	µg/L	1.0	2
Boron, Total, ICP	900	µg/L	1.0	500
Cadmium, Total, ICP	ND(2)	µg/L	1.0	2
Calcium, Total, ICP	87.1	mg/L	1.0	0.5
Chromium, Total, ICP	16	µg/L	1.0	5
Cobalt, Total, ICP	ND(2)	µg/L	1.0	2
Copper, Total, ICP	ND(10)	µg/L	1.0	10
Final pH, SPLP Extract	10.4	Std. units	1.0	
Iron, Total, ICP	ND(0.10)	mg/L	1.0	0.10
Lead, Total, ICP	ND(5)	µg/L	1.0	3
Magnesium, Total, ICP	0.3	mg/L	1.0	0.1
Manganese, Total, ICP	ND(5)	µg/L	1.0	5
Mercury, Total	ND(0.2)	µg/L	1.0	0.2
Molybdenum, Total, ICP	12	µg/L	1.0	5
Nickel, Total, ICP	ND(5)	µg/L	1.0	5
Potassium, Dissolved, ICP	0.4 B	mg/L	1.0	0.3
Selenium, Tot. Rec., ICP-MS	ND(5)	µg/L	1.0	5
Silicon as Silica	3.48	mg/L	1.0	0.04
Silver, Total, ICP	ND(5)	µg/L	1.0	5
Sodium, Dissolved, ICP	6.0 BS 2.6	mg/L	1.0	0.5
Strontium, Total, ICP	1360	µg/L	1.0	5
Thallium, Tot. Rec., ICP-MS	ND(2)	µg/L	1.0	2
Titanium, Total, ICP	ND(5)	µg/L	1.0	5
Vanadium, Total, ICP	51	µg/L	1.0	5
Zinc, Total, ICP	15	µg/L	1.0	10
Chloride	1.9	mg/L	1.0	1.0
Chromium, Hexavalent	0.018	mg/L	1.0	0.010
Fluoride	0.1	mg/L	1.0	0.1
Nitrate, as N	0.1	mg/L	1.0	0.1
Nitrate/Nitrite, as N	0.1	mg/L	1.0	0.1
Nitrite, as N	ND(0.1)	mg/L	1.0	0.1
Phosphorus, Total, as P	ND(0.2)	mg/L	0	0
Sulfate	148	mg/L	10	10

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)

-Continued-

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Analysis	Date/Time Prepared	Date/Time Analyzed	QC Batch	Inst. Batch	Analyst	Method(s)
Aluminum, Tot. Rec., ICP-M	07/21/11 1200	08/02/11 1655	110721-3	3IP3214	JDL	6020A
Antimony, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Arsenic, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Barium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Beryllium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Boron, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Cadmium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Calcium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Chromium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Cobalt, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Copper, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Final pH, SPLP Extract	N/A	07/20/11	110720-1	720BLK1	ADK	9040B
Iron, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Lead, Total, ICP	07/21/11 1130	07/28/11 1355	110721-1	4IP4209	JDL	6010B
Magnesium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Manganese, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Mercury, Total	07/21/11 1126	07/22/11 1828	110721-1	4MA3203	JDL	7470A
Molybdenum, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Nickel, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Potassium, Dissolved, ICP	07/22/11 1252	08/02/11 2008	110722-5	5IP4214	KMW	6010B
Selenium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Silicon as Silica	07/22/11 1200	08/01/11 1633	110722-3	3IP4213	KMW	6010B
Silver, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Sodium, Dissolved, ICP	07/22/11 1252	08/02/11 2008	110722-5	5IP4214	KMW	6010B
Strontium, Total, ICP	07/21/11 1130	07/28/11 1355	110721-1	4IP4209	JDL	6010B
Thallium, Tot. Rec., ICP-M	07/21/11 1200	07/21/11 1941	110721-3	4IP3202	JDL	6020A
Titanium, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Vanadium, Total, ICP	07/21/11 1130	07/26/11 1811	110721-1	4IP4207	JDL	6010B
Zinc, Total, ICP	07/21/11 1130	07/25/11 1343	110721-1	3IP4206	JDL	6010B
Chloride	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Chromium, Hexavalent	N/A	07/21/11 1107	110721-1	110721-2	JND	7196A (Modified)
Fluoride	N/A	07/26/11 2229	1IC2207	3IC2207	MLL	300.0/9056A
Nitrate, as N	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Nitrate/Nitrite, as N	N/A	07/26/11				Calc.
Nitrite, as N	N/A	07/21/11 1229	1IC1202	1IC1202	MLL	300.0/9056A
Phosphorus, Total, as P	N/A	07/21/11 1423	110721-2	110721-3	KJH	SM 4500-P(B&F) (M
Sulfate	N/A	07/21/11 1348	1IC1202	2IC1202	MLL	300.0/9056A
ICP Metals Total Preparation Method						3010A
Dissolved Metals Preparation Method						3005A
Mercury Total Preparation Method						7470A
Total Recoverable Metals Preparation Method						3005A

Conclusion of Lab Number: 11070964

APPENDIX

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

ND indicates not detected with the LOQ (Limit of Quantitation) in parentheses. The LOQ value has been adjusted for the dilution factor and percent solids, as applicable. Due to rounding of significant figures, the LOQ value may vary slightly from the reported concentration. The LOQ is the lowest concentration of the analytical standard that was used for calibrating the instrument. If an analytical standard is analyzed at the LOQ, an error of as much as +/- 50% can be expected.

Not all samples were received at a temperature of less than 6 degrees Celsius. Refer to the enclosed Cooler/Sample Receipt Form(s) for the affected cooler(s) and sample(s).

The following table presents the date and time sampled, the date and time analyzed, and the total time elapsed for each analysis with an EPA recommended holding time of seventy-two hours or less.

CAS LAB ID #	ANALYSIS	DATE/TIME SAMPLED	DATE/TIME ANALYZED	ELAPSED HRS:MIN
11070963	Chromium, Hexavalent	07/13/2011 1420	07/21/2011 1107	188:47
11070963	Nitrate, as N	07/13/2011 1420	07/21/2011 1215	189:55
11070963	Nitrite, as N	07/13/2011 1420	07/21/2011 1215	189:55
11070964	Chromium, Hexavalent	07/13/2011 1430	07/21/2011 1107	188:37
11070964	Nitrate, as N	07/13/2011 1430	07/21/2011 1229	189:59
11070964	Nitrite, as N	07/13/2011 1430	07/21/2011 1229	189:59

B - Analyte is also present in the method blank or load blank at the concentration indicated either to the right of the letter B and/or in the enclosed Quality Control Report. The reported sample concentration has not been blank corrected.

BS - This analyte was detected in a blank from the SPLP or TCLP procedure at the concentration indicated to the right of the qualifier. The sample result has not been blank corrected. The analytical method blank can be found in the QC report.

E - Concentration or reporting limit is an estimated value. Matrix interferences and/or sample heterogeneity were noted at the time of sample analysis.

QC - QC data qualifiers were noted. See the Quality Control Report.

Continental Analytical Services, Inc.
Accreditation Summary Report

Client: Westar Energy, Inc.
CAS Order Number: 57218

NELAP accreditation is issued under each EPA regulatory program for a given matrix/analyte/method combination. Continental is NELAP accredited for each matrix/analyte/method and EPA program cited in this Laboratory Report, except for those listed in the table below and analysis performed in the field. For most of the analyses listed in the table, NELAP accreditation is not offered under the listed EPA program and Continental is NELAP accredited for the analysis, using the same analytical technology, but under a different EPA program. Continental's full NELAP accreditation status may be viewed at www.kdheks.gov/envlab. Note that unless qualified otherwise in the Laboratory Report, Continental performs all analyses, including each analysis listed in the table below, utilizing NELAP protocol.

Test	Analysis	Matrix-Regulatory Program	Method	CAS NELAP Accredited in Other Reg. Program
GL218	Phosphorus, Total, as P	L-RCRA	SM 4500-P(B&F)(M)	Y
SL602	SPLP Prep	L-RCRA		N

Quality Control Report
Batch Summary

Client: **Westar Energy, Inc.**
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Test	Testname	QC Batch	Method Blank	LCS	MS Lab No.
SL470	Final pH, SPLP Extract	110720-1	110720BLK1	110720LCS1	
SL602	SPLP Prep	110720-1	110720BLK1		

Lab numbers associated with this batch:
11070963 11070964

SL802	Arsenic, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL303	Barium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL304	Beryllium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL305	Boron, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL306	Cadmium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL307	Calcium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL308	Chromium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL309	Cobalt, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL313	Copper, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL326	Iron, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL311	Lead, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL331	Magnesium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL332	Manganese, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL333	Mercury, Total	110721-1	110721BLK1	110721LCS1	11070963MS
SL334	Molybdenum, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL336	Nickel, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL353	Silver, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL357	Strontium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL366	Titanium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL368	Vanadium, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS
SL369	Zinc, Total, ICP	110721-1	110721BLK1	110721LCS1	11070964MS

Lab numbers associated with this batch:
11070963 11070964

SL000	Aluminum, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL001	Antimony, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL023	Selenium, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS
SL029	Thallium, Tot. Rec., ICP-MS	110721-3	110721BLK3	110721LCS3	11070963MS

Lab numbers associated with this batch:
11070963 11070964

SL212	Silicon as Silica	110722-3	110722BLK3	110722LCS3	11070964MS

Lab numbers associated with this batch:
11070963 11070964

SL242	Potassium, Dissolved, ICP	110722-5	110722BLK5	110722LCS5	11070964MS
SL255	Sodium, Dissolved, ICP	110722-5	110722BLK5	110722LCS5	11070964MS

Lab numbers associated with this batch:
11070963 11070964

Quality Control Report
Batch Summary

Client: Westar Energy, Inc.
Attn: Stone Junod
P.O. Box 889
Topeka, KS 66601

Date Reported: 08/04/2011
Date Received: 07/14/2011
Continental File No: 7701
Continental Order No: 57218

Test	Testname	QC Batch	Method Blank	LCS	MS Lab No.
GL502	Chloride	1IC1202	BLK1IC1202	LCS1IC1202	11071334MS
Lab numbers associated with this batch: 11070963 11070964					
GL147	Chromium, Hexavalent	110721-1	110721BLK1	110721LCS1	11071608MS
Lab numbers associated with this batch: 11070963 11070964					
GL501	Fluoride	1IC2207	BLK1IC2207	LCS1IC2207	
Lab numbers associated with this batch: 11070964					
GL501	Fluoride	1IC2213	BLK1IC2213	LCS1IC2213	
Lab numbers associated with this batch: 11070963					
GL505	Nitrate, as N	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					
GL510	Nitrate/Nitrite, as N				
Lab numbers associated with this batch: 11070963 11070964					
GL503	Nitrite, as N	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					
GL218	Phosphorus, Total, as P	110721-2	110721BLK2	110721LCS2	11071101MS
Lab numbers associated with this batch: 11070963 11070964					
GL506	Sulfate	1IC1202	BLK1IC1202	LCS1IC1202	
Lab numbers associated with this batch: 11070963 11070964					

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Date Reported: 08/04/2011
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Continental File No: 7701
Continental Order No: 57218

Analysis	Blank Data	% Rec LCS	Limits	Spike Level	Units	Spiked Sample (% Recovery) MS	MSD	Limits	Spike Level	Units	Spiked Sample Precision Data RPD	Limit
QC Batch: 110721-1	For samples prepared on: 07/21/2011					Spiked sample: 11070963						
Mercury, Total	ND(0.2)	89.1	80.0-120	5.0	µg/L	90.2	91.9	80.0-120	5.0	µg/L	1.9	20.0
QC Batch: 110721-1	For samples prepared on: 07/21/2011					Spiked sample: 11070964						
Arsenic, Total, ICP	ND(5)	96.5	80.0-120	500	µg/L	98.6	97.1	80.0-120	500	µg/L	1.5	20.0
Barium, Total, ICP	ND(5)	98.0	80.0-120	1500	µg/L	101	110.	80.0-120	1500	µg/L	8.5	20.0
Beryllium, Total, ICP	ND(2)	96.9	80.0-120	500	µg/L	104	103	80.0-120	500	µg/L	1.0	20.0
Boron, Total, ICP	ND(500)	96.3	80.0-120	500	µg/L	91.3	89.4	80.0-120	500	µg/L	2.1	20.0
Cadmium, Total, ICP	ND(2)	95.6	80.0-120	500	µg/L	95.8	94.4	80.0-120	500	µg/L	1.5	20.0
Calcium, Total, ICP	ND(0.5)	97.7	80.0-120	51.0	mg/L	93.0	110.	80.0-120	51.0	mg/L	16.7	20.0
Chromium, Total, ICP	ND(5)	95.2	80.0-120	500	µg/L	95.3	94.4	80.0-120	500	µg/L	0.9	20.0
Cobalt, Total, ICP	ND(2)	94.8	80.0-120	500	µg/L	94.6	92.8	80.0-120	500	µg/L	1.9	20.0
Copper, Total, ICP	ND(10)	97.0	80.0-120	500	µg/L	99.4	98.3	80.0-120	500	µg/L	1.1	20.0
Iron, Total, ICP	ND(0.10)	93.1	80.0-120	20.5	mg/L	101	101	80.0-120	20.5	mg/L	0.0	20.0
Lead, Total, ICP	ND(5)	95.1	80.0-120	500	µg/L	96.2	94.9	80.0-120	500	µg/L	1.4	20.0
Magnesium, Total, ICP	ND(0.1)	91.3	80.0-120	51.0	mg/L	98.0	98.0	80.0-120	51.0	mg/L	0.0	20.0
Manganese, Total, ICP	ND(5)	97.1	80.0-120	500	µg/L	98.0	96.7	80.0-120	500	µg/L	1.3	20.0
Molybdenum, Total, ICP	ND(5)	97.5	80.0-120	500	µg/L	98.1	97.6	80.0-120	500	µg/L	0.5	20.0
Nickel, Total, ICP	ND(5)	94.6	80.0-120	500	µg/L	94.6	93.1	80.0-120	500	µg/L	1.6	20.0
Silver, Total, ICP	ND(5)	95.0	80.0-120	100	µg/L	96.9	95.5	80.0-120	100	µg/L	1.5	20.0
Strontium, Total, ICP	ND(5)	107	80.0-120	100	µg/L	I	I	80.0-120	100	µg/L	**	20.0
Titanium, Total, ICP	ND(5)	99.9	80.0-120	500	µg/L	102	101	80.0-120	500	µg/L	1.0	20.0
Vanadium, Total, ICP	ND(5)	95.2	80.0-120	500	µg/L	95.4	94.6	80.0-120	500	µg/L	0.8	20.0
Zinc, Total, ICP	ND(10)	92.9	80.0-120	500	µg/L	90.7	89.9	80.0-120	500	µg/L	0.9	20.0
QC Batch: 110721-1	For sample analyzed on: 07/21/2011					Spiked sample: 11071608						
Chromium, Hexavalent	ND(0.010)	99.9	90.0-110	0.50	mg/L	MN	MN	85.0-115	0.50	mg/L	**	20.0
QC Batch: 110721-2	For sample analyzed on: 07/21/2011					Spiked sample: 11071101						
Phosphorus, Total, as P	ND(0.20)	96.6	90.0-110	1.0	mg/L	MN	MN	71.2-135	1.0	mg/L	**	21.2
QC Batch: 110721-3	For samples prepared on: 07/21/2011					Spiked sample: 11070963						
Aluminum, Tot. Rec., ICP-MS	20 J	99.6	85.0-115	51000	µg/L	104	101	80.0-120	51000	µg/L	2.9	20.0
Aluminum, Tot. Rec., ICP-MS	ND(30)	104	85.0-115	51000	µg/L			80.0-120			**	20.0
Antimony, Tot. Rec., ICP-MS	ND(5)	94.7	85.0-115	500	µg/L	94.1	93.6	80.0-120	500	µg/L	0.5	20.0
Selenium, Tot. Rec., ICP-MS	ND(5)	102	85.0-115	500	µg/L	99.1	98.4	80.0-120	500	µg/L	0.7	20.0
Thallium, Tot. Rec., ICP-MS	ND(2)	101	85.0-115	500	µg/L	97.6	103	80.0-120	500	µg/L	5.4	20.0
QC Batch: 110722-3	For samples prepared on: 07/22/2011					Spiked sample: 11070964						
Silicon as Silica	ND(0.04)	97.0	80.0-120	1.1	mg/L	86.5	86.3	80.0-120	1.1	mg/L	0.2	20.0
QC Batch: 110722-5	For samples prepared on: 07/22/2011					Spiked sample: 11070964						
Potassium, Dissolved, ICP	0.7 BK	106	85.0-115	14.5	mg/L	107	108	80.0-120	14.5	mg/L	0.9	20.0
Sodium, Dissolved, ICP	1.5 BK	106	85.0-115	27.5	mg/L	105	106	80.0-120	27.5	mg/L	0.9	20.0
QC Batch: 1IC1202	For sample analyzed on: 07/21/2011					Spiked sample:						
Nitrite, as N	ND(0.1)	96.1	90.0-110	2.0	mg/L	MN	MN	78.5-127			**	10.1
Nitrate, as N	ND(0.1)	96.7	90.0-110	2.0	mg/L	MN	MN	79.3-118			**	12.1
Sulfate	ND(1.0)	101	90.0-110	8.0	mg/L	MN	MN	81.8-125			**	10.4
QC Batch: 1IC1202	For sample analyzed on: 07/21/2011					Spiked sample: 11071334						
Chloride	ND(1.0)	105	90.0-110	4.0	mg/L	MN	MN	82.1-126	80.0	mg/L	**	12.5

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Date Reported: 08/04/2011
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Continental File No: 7701
Continental Order No: 57218

Analysis	Blank Data	% Rec LCS	Limits	Spike Level	Units	Spiked Sample (% Recovery) MS	MSD	Limits	Spike Level	Units	Spiked Sample Precision Data RPD	Limit
QC Batch: 1IC2207	For sample analyzed on: 07/26/2011					Spiked sample:						
Fluoride	ND(0.1)	104	90.0-110	2.0	mg/L	MN	MN	67.3-113			**	9.8
QC Batch: 1IC2213	For sample analyzed on: 08/01/2011					Spiked sample:						
Fluoride	ND(0.1)	92.4	90.0-110	2.0	mg/L	MN	MN	67.3-113			**	9.8

Data Qualifiers:

I - Due to the concentration of analyte in the sample, the spike level is too low to allow accurate quantification of the spike recovery.

MN - The MS/MSD sample analyses were not performed on a sample from this Continental order number.

J - The concentration or not detected (ND) value is below the Limit of Quantitation (LOQ) and is considered an estimated value.

BK - This analyte did not meet method blank criteria. The associated sample results may be estimated.

** - RPD cannot be calculated.

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Continental Order No: 57218

Analysis	Date of Analysis	Instrument Batch ID	Amount in Standard	Amount Detected	Units	Percent Recovery
Aluminum, Tot. Rec., ICP-MS	08/02/2011	2IP3214	CCV recovery acceptable for this Instrument Batch.			
Aluminum, Tot. Rec., ICP-MS	08/02/2011	3IP3214	CCV recovery acceptable for this Instrument Batch.			
Aluminum, Tot. Rec., ICP-MS	08/02/2011	4IP3214	CCV recovery acceptable for this Instrument Batch.			
Antimony, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.			
Antimony, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.			
Arsenic, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Arsenic, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Barium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Beryllium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Beryllium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Boron, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Cadmium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Cadmium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.			
Calcium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.			
Chromium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Chromium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Cobalt, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Cobalt, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Copper, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.			
Copper, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.			
Chromium, Hexavalent	07/21/2011	110721-2	CCV recovery acceptable for this Instrument Batch.			
Chromium, Hexavalent	07/21/2011	110721-3	CCV recovery acceptable for this Instrument Batch.			
Phosphorus, Total, as P	07/21/2011	110721-3	CCV recovery acceptable for this Instrument Batch.			
Phosphorus, Total, as P	07/21/2011	110721-4	CCV recovery acceptable for this Instrument Batch.			
Fluoride	07/26/2011	3IC2207	CCV recovery acceptable for this Instrument Batch.			
Fluoride	07/26/2011	4IC2207	CCV recovery acceptable for this Instrument Batch.			
Fluoride	08/01/2011	1IC2213	CCV recovery acceptable for this Instrument Batch.			
Fluoride	08/01/2011	2IC2213	2.00	1.70	mg/L	85.0 CL

Samples associated with this Continuing Calibration Verification:

Laboratory Number	Instrument Batch	Sample Description
11070963	1IC2213	TEC Fly Ash-SPLP

Analysis	Date of Analysis	Instrument Batch ID	Amount in Standard	Amount Detected	Units	Percent Recovery
Chloride	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.			

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Chloride	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrite, as N	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrite, as N	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrate, as N	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Nitrate, as N	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	1IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	2IC1202	CCV recovery acceptable for this Instrument Batch.
Sulfate	07/21/2011	3IC1202	CCV recovery acceptable for this Instrument Batch.
Iron, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Iron, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Lead, Total, ICP	07/28/2011	4IP4209	CCV recovery acceptable for this Instrument Batch.
Lead, Total, ICP	07/28/2011	5IP4209	CCV recovery acceptable for this Instrument Batch.
Magnesium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Magnesium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Manganese, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Manganese, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	3MA3203	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	4MA3203	CCV recovery acceptable for this Instrument Batch.
Mercury, Total	07/22/2011	5MA3203	CCV recovery acceptable for this Instrument Batch.
Molybdenum, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.
Molybdenum, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.
Nickel, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Nickel, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	4IP4214	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	5IP4214	CCV recovery acceptable for this Instrument Batch.
Potassium, Dissolved, ICP	08/02/2011	6IP4214	CCV recovery acceptable for this Instrument Batch.
Selenium, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.
Selenium, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.
Silicon as Silica	08/01/2011	3IP4213	CCV recovery acceptable for this Instrument Batch.
Silicon as Silica	08/01/2011	4IP4213	CCV recovery acceptable for this Instrument Batch.
Silver, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Silver, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	4IP4214	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	5IP4214	CCV recovery acceptable for this Instrument Batch.
Sodium, Dissolved, ICP	08/02/2011	6IP4214	CCV recovery acceptable for this Instrument Batch.
Strontium, Total, ICP	07/28/2011	4IP4209	CCV recovery acceptable for this Instrument Batch.
Strontium, Total, ICP	07/28/2011	5IP4209	CCV recovery acceptable for this Instrument Batch.
Thallium, Tot. Rec., ICP-MS	07/21/2011	4IP3202	CCV recovery acceptable for this Instrument Batch.
Thallium, Tot. Rec., ICP-MS	07/21/2011	5IP3202	CCV recovery acceptable for this Instrument Batch.
Titanium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Titanium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/26/2011	4IP4207	CCV recovery acceptable for this Instrument Batch.
Vanadium, Total, ICP	07/26/2011	5IP4207	CCV recovery acceptable for this Instrument Batch.

Client: Westar Energy, Inc.
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Zinc, Total, ICP	07/25/2011	3IP4206	CCV recovery acceptable for this Instrument Batch.
Zinc, Total, ICP	07/25/2011	4IP4206	CCV recovery acceptable for this Instrument Batch.

Data Qualifiers:
CL - The continuing calibration verification (CCV) standard recovery for this analyte was below the method or SOP limit. The reported concentration for this analyte may be biased low.

- Laboratory Report Conclusion -

Continental Analytical Services, Inc.

525 N. 8th Street, Salina, KS 67401
(785)827-1273 (800)535-3076 Fax (785)823-7830
www.cas-lab.com

CHAIN OF CUSTODY RECORD

Continental Order Number: 57218

Client/Reporting Information	Invoice Information
Company Name: Westar Energy	Company Name: Westar Energy
Address: 818 SOUTH KANSAS AVENUE	Address: 818 SOUTH KANSAS AVENUE
City: TOPEKA State: KS Zip: 66601	City: TOPEKA State: KS Zip: 66601
Contact: STONE JUNOD	Contact: DICK FINGER
E-mail: stone.junod@westarenergy.com	E-mail: dick.finger@westarenergy.com
Phone Number: 785-575-6435 Fax Number: 785-575-8039	Phone Number: 785-575-6517 Fax Number: 785-575-8039
Sampler's Name:(Printed) Stone Junod	Sampler's Name:(Signature) [signature]
Project Number:	Project Name: Tecumseh Energy Center
Purchase Order Number: 901836	

PARAMETERS/CONTAINER TYPE: SPLP list (same as 10615)

SAMPLE IDENTIFICATION (30 Characters or less)	Matrix (Sample Type)	Regulatory Program	Date Sampled	Time Sampled	C-Composite G-Grab	Total Containers	HCl	NaOH	HNO3	H2SO4	Na2S2O3	OTHER: NONE	SPLP list (same as 10615)	COMMENTS
TEC Fly Ash	S	R	7/13/2011	14:20	C	1						X	X	
TEC Bottom Ash	S	R	7/13/2011	14:30	C	1						X	X	

07/14/11 - per Dick Finger Assign parameters same as Continental lab # 0903004. PMC

Matrix (Sample Type): DW=Drinking Water, GW=Ground Water, WW=Waste Water, W=Wipe, S=Solid/Soil, SL=Sludge, A=Air, OL=Oil/Organic Liquid, O=Other

Regulatory Program. N=NPDES, R=RCRA, D=Drinking Water, SL=503 Sludge, O=Other

(Please note if non-standard turnaround. Rush & Emergency subject to additional charge) Standard TAT (15 working days) Rush TAT (5 working days) Emergency TAT (3 working days)

	DATE	TIME		DATE	TIME
RELINQUISHED BY: [signature]	7-13-11	16:30	RECEIVED BY:		
RELINQUISHED BY			RECEIVED BY		
RECEIVED AT LAB BY: [signature]	7-14-11	9:00	SHIPPED VIA: AIRBILL:	SEAL #: SEAL DATE:	

Continental Analytical Services Cooler/Sample Receipt Form

CAS Order No. S7218

Client Name: Worley CAS File No.: 7101

Sample ID's in cooler: See COC

Cooler 1 of 1 for this CAS Order No.

Cooler Identification: CAS Cooler #: _____ /Client's Cooler/Box/Letter/Hand Delivered
Other: _____

Date/Time Cooler Received: 7 / 14 / 17 9 : 00

Delivered By: (UPS)/FedX/AB Express/ASAP/Land Air Exp/Field Svcs/Mail/Walk-In/Other: _____

Custody Seal: Present: Intact / Broken Absent: X Seal No: _____
Seal Name: _____ Seal Date: _____
Seal matches Chain of Custody: Yes / No / (N/A)

Type of Packing Material: Blue Ice/Ice/Melted Ice/(Bubble)/Foam/Paper/Peanuts/Vermiculite/ None/Other: _____

Cooler Temperature (°C): Original Reading (°C) 27.4 Corrected Reading (°C) 26.4 - 28.4
Temp. By: Temp. Blank Surface: Glass/(Plastic)/Metal/Other: _____ Cooler
Thermo. ID No.: 557 Thermo. Correction Factor (°C): +/- 1.0

☐ Evidence of Cooling: date received=date sampled

Sample Receipt Discrepancies: ☒ No ☐ *Yes (see below for discrepancies)*

Note: CAS will proceed with sample analyses, addressing each discrepancy as shown, until/unless directed otherwise by the client.

☐ Chain of Custody not present information taken from:
Cover Letter ☐ Container ☐
PO ☐ CAS Proj. Mgr. ☐
☐ Container label absent
☐ Chain of Custody incomplete [see detail below]
☐ Chain of Custody missing date/time sampled (excl. TB or Dup)
☐ Date or Time sampled obtained from container label
☐ Chain of Custody missing sampler's name
☐ Chain of Custody missing matrix (sample type)
☐ Missing relinquished information: signature date time
☐ Sample excluded from Chain of Custody
☐ Sample listed on Chain of Custody, not received
☐ Sample description on container and Chain of Custody do not agree
☐ Air bubbles in Aqueous VOA vials larger than pea-size [approx. 6 mm]
☐ Cooler temperature exceeded 0.1 - 6.0 °C requirement
[Do not mark if samples do not require cooling to 0.1 - 6.0 °C.]
☐ Broken or leaking containers (detail actions below)
☐ Sample container type or labeled chemical preservation inappropriate
☐ Other discrepancies: _____

Detail to discrepancies/comments:

Completed by: mor Date Completed: 7-14-17

APPENDIX B

Aerial Photographs

ENVIRONMENTAL RISK INFORMATION SERVICES

HISTORICAL AERIAL REPORT

for the site:
TEC
5530 SE 2nd Street
Tecumseh, KS 66542
PO #:

Report ID: 20180302347
Completed: 3/14/2018

ERIS Information Inc.
Environmental Risk Information Services (ERIS)
A division of Glacier Media Inc.
T: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Search Results Summary

Date	Source	Scale	Comment
2017	**NAIP** - National Agriculture Information Program	1"=1300'	
2015	**NAIP** - National Agriculture Information Program	1"=1300'	
2014	**NAIP** - National Agriculture Information Program	1"=1300'	
2012	**NAIP** - National Agriculture Information Program	1"=1300'	
2010	**NAIP** - National Agriculture Information Program	1"=1300'	
2008	**NAIP** - National Agriculture Information Program	1"=1300'	
2006	**NAIP** - National Agriculture Information Program	1"=1300'	
2005	**NAIP** - National Agriculture Information Program	1"=1300'	
2004	**NAIP** - National Agriculture Information Program	1"=1300'	
2003	**NAIP** - National Agriculture Information Program	1"=1300'	
1991	**USGS** - US Geological Survey	1"=1300'	
1982	**NHAP** - National High Altitude Photography	1"=1300'	
1975	**USGS** - US Geological Survey	1"=1300'	
1970	**USGS** - US Geological Survey	1"=1300'	
1950	**AMS** - Army Mapping Service	1"=1300'	
1948	**ASCS** - Agriculture and Soil Conservation Service	1"=1300'	*BEST COPY AVAILABLE*

Date: **2017**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

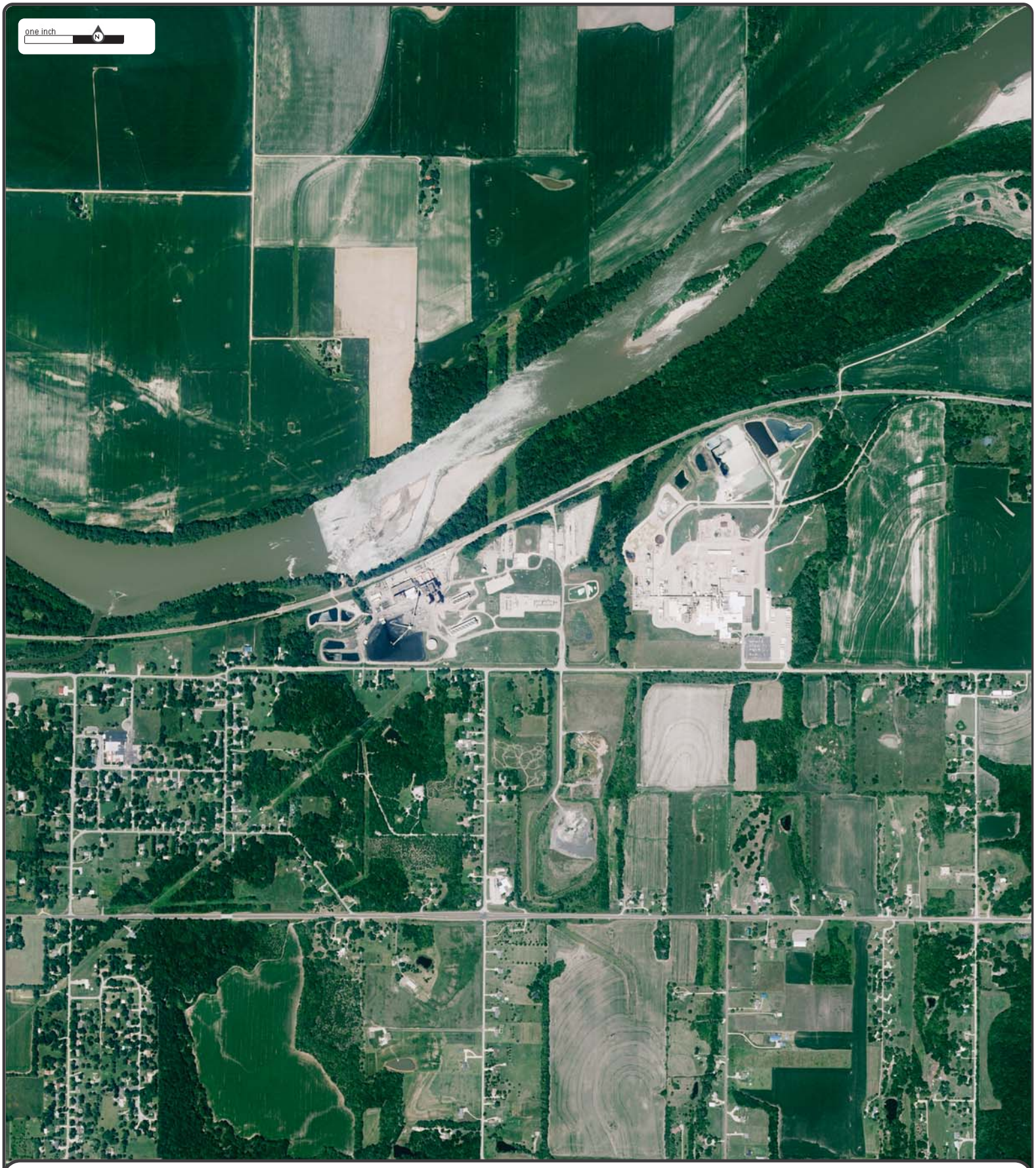
Date: **2015**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204



Date: **2014**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2012**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2010**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **2008**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

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Date: **2006**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
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Date: **2005**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

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Date: **2004**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

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Date: **2003**
Source: **NAIP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1991**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1982**
Source: **NHAP**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1975**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1970**
Source: **USGS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

Date: **1950**
Source: **AMS**
Scale: **1" to 1300'**
Comments:

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

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one inch

Date: **1948**
Source: **ASCS**
Scale: **1" to 1300'**
Comments: *BEST COPY AVAILABLE*

Subject: 5530 Se 2Nd Street Tecumseh KS
Approx Center: 39.05151 / -95.56510

N

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ENVIRONMENTAL RISK INFORMATION SERVICES

www.erisinfo.com | 1.866.517.5204

APPENDIX C

Topographic Maps

TOPOGRAPHIC MAP RESEARCH RESULTS

Date: 2018-03-02

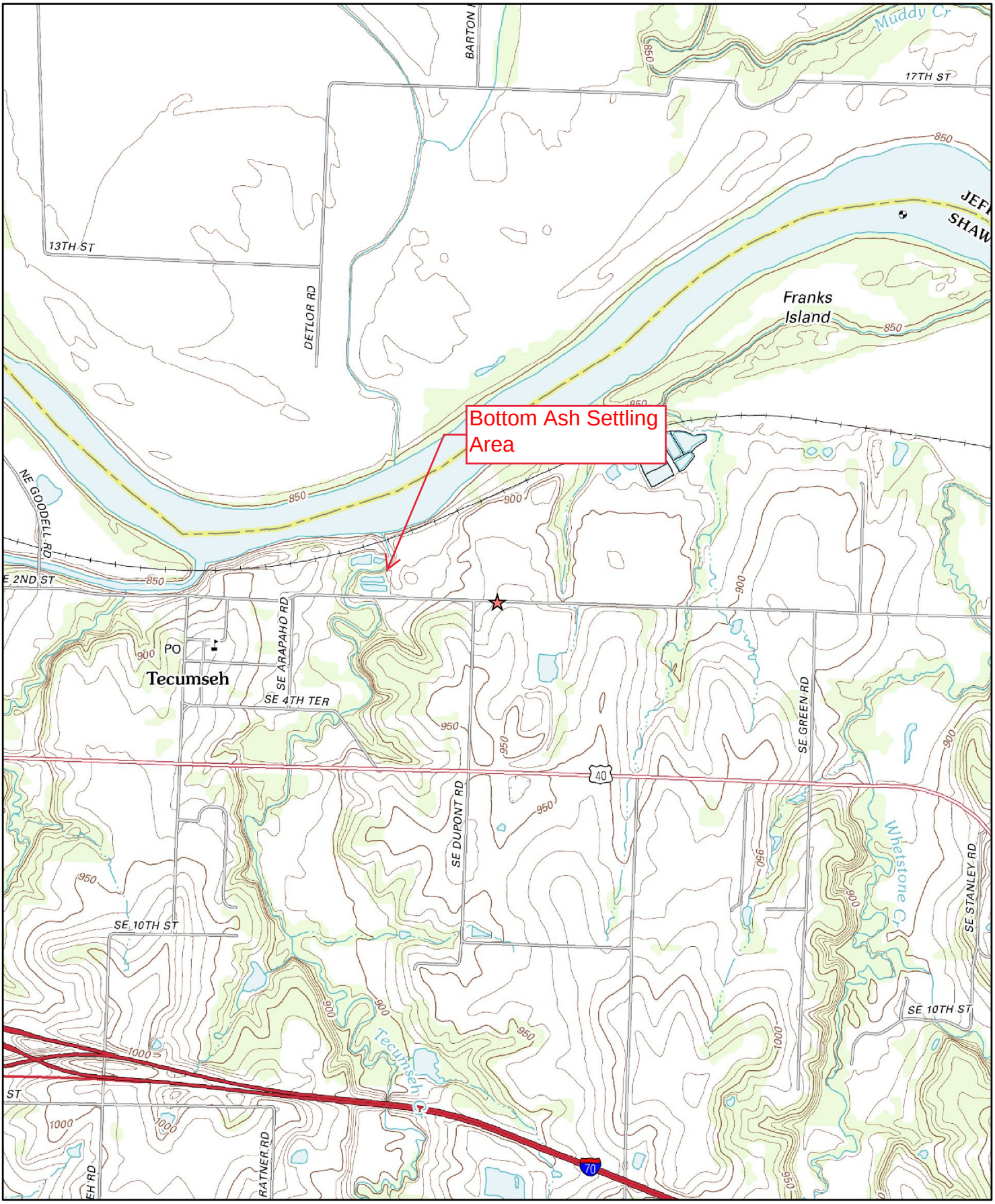
Project Property: 5530 Se 2Nd Street, Tecumseh, KS

ERIS Order Number: 20180302347

We have searched USGS collections of current topographic maps and historical topographic maps for the project property. Below is a list of maps found for the project property and adjacent area. Maps are from 7.5 and 15 minute topographic map series, if available.

Year	Map Series
2012	7.5
1983	7.5
1981	7.5
1975	7.5
1970	7.5
1951	7.5
1950	7.5

Address: 38 Lesmill Road Unit 2, Toronto, ON M3B 2T5
Phone: 1-866-517-5204 Fax: 416-447-7658
info@erisinfo.com www.erisinfo.com



2012

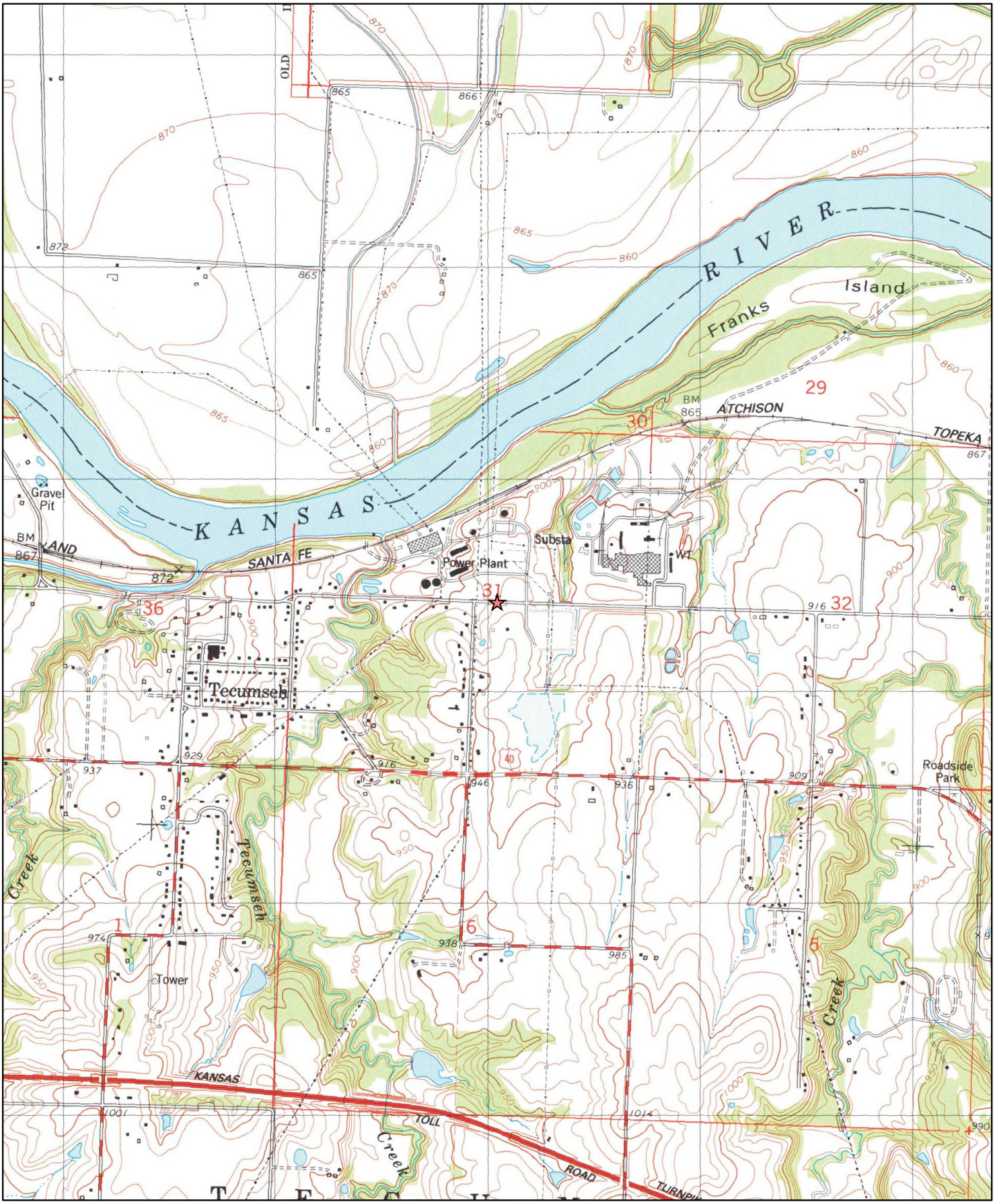
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1983

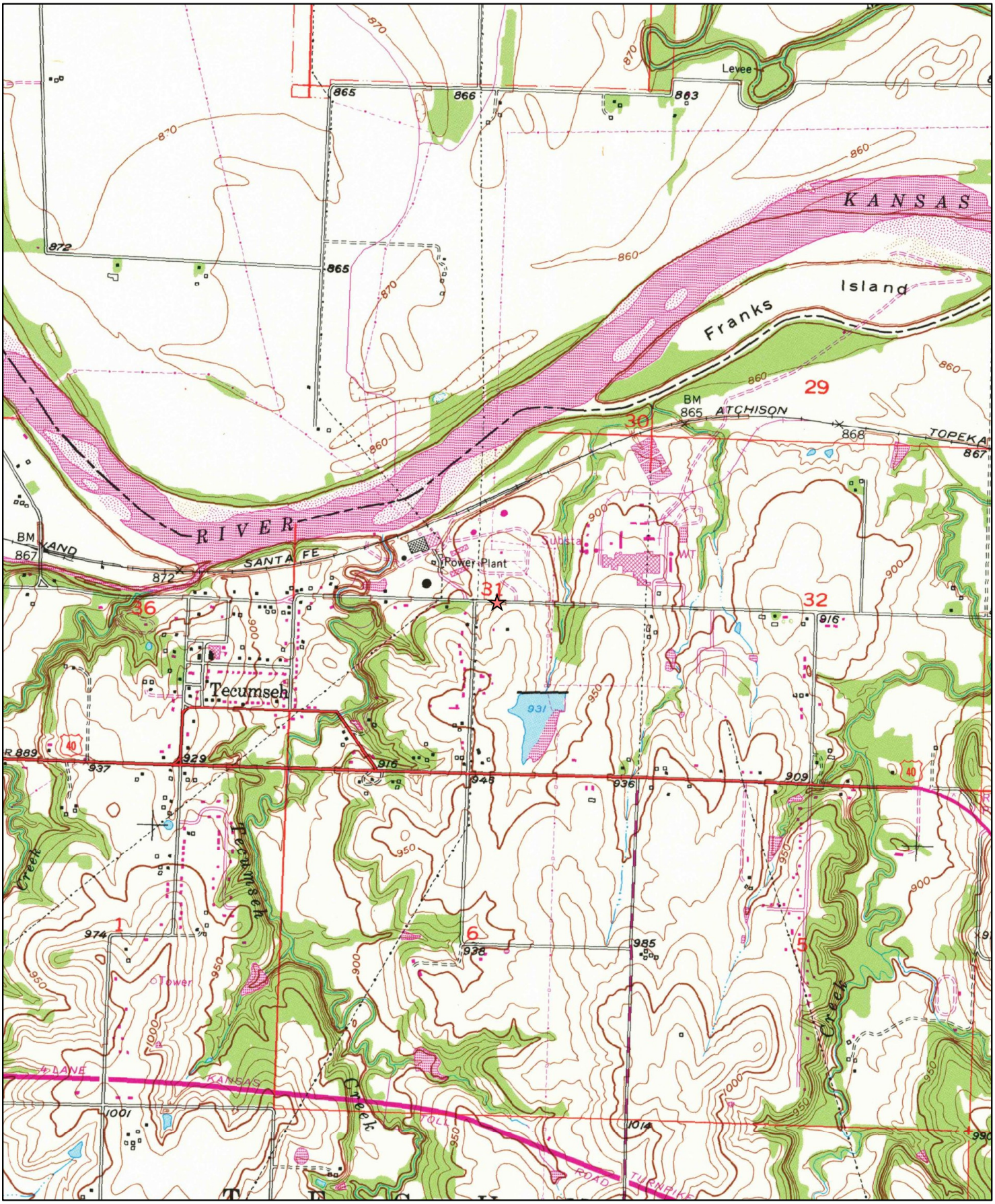
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1981

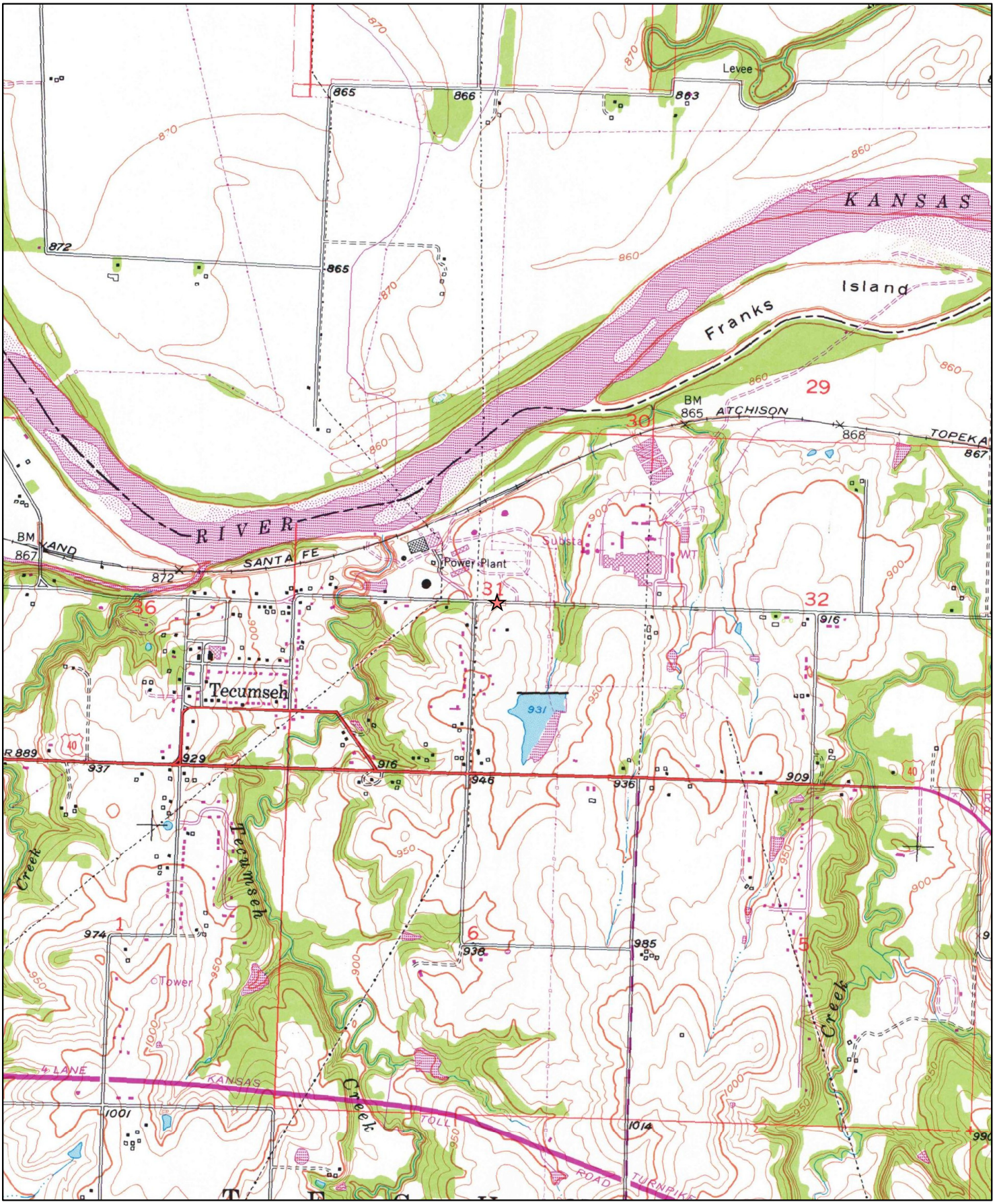
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1975

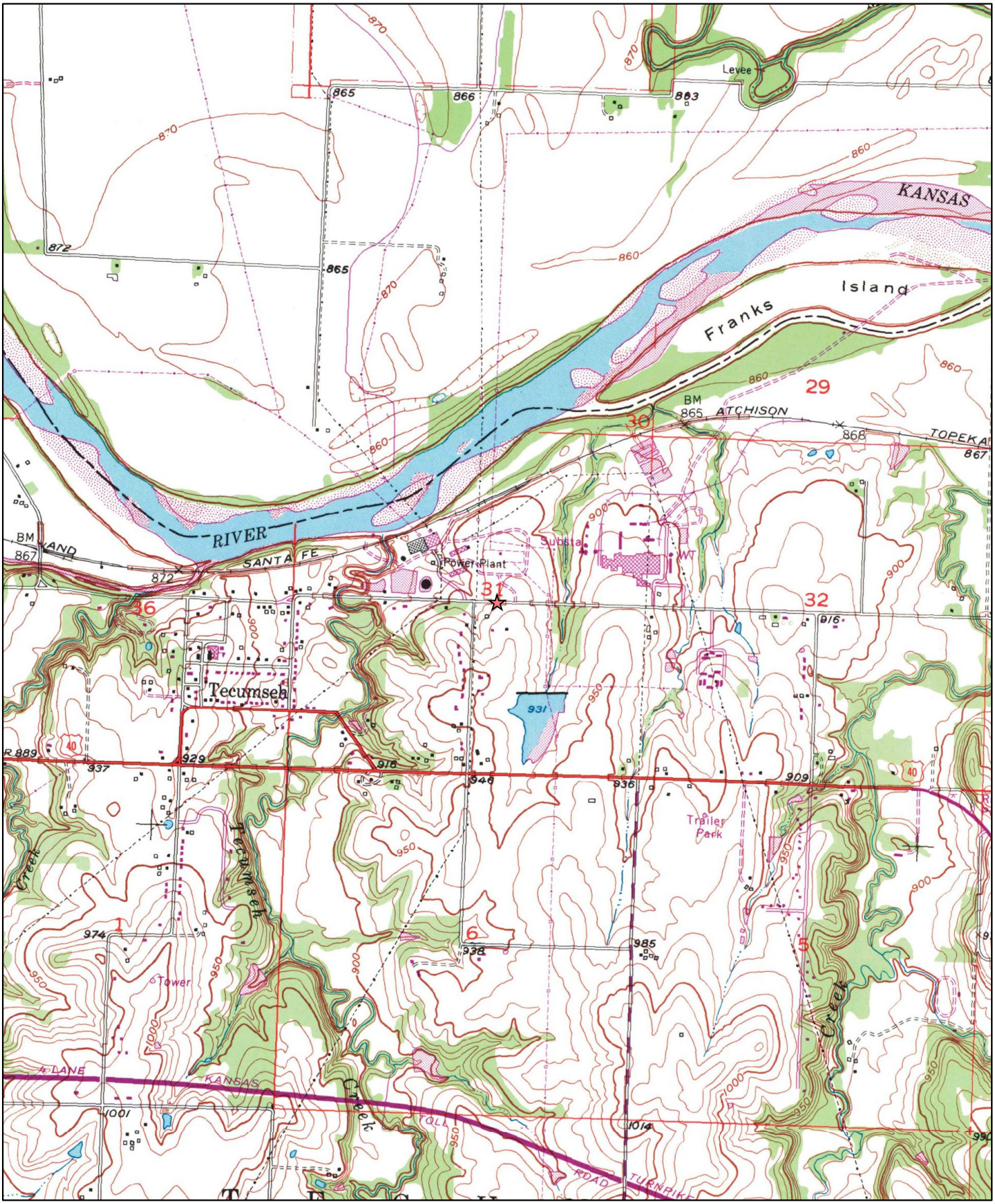
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICE



1970

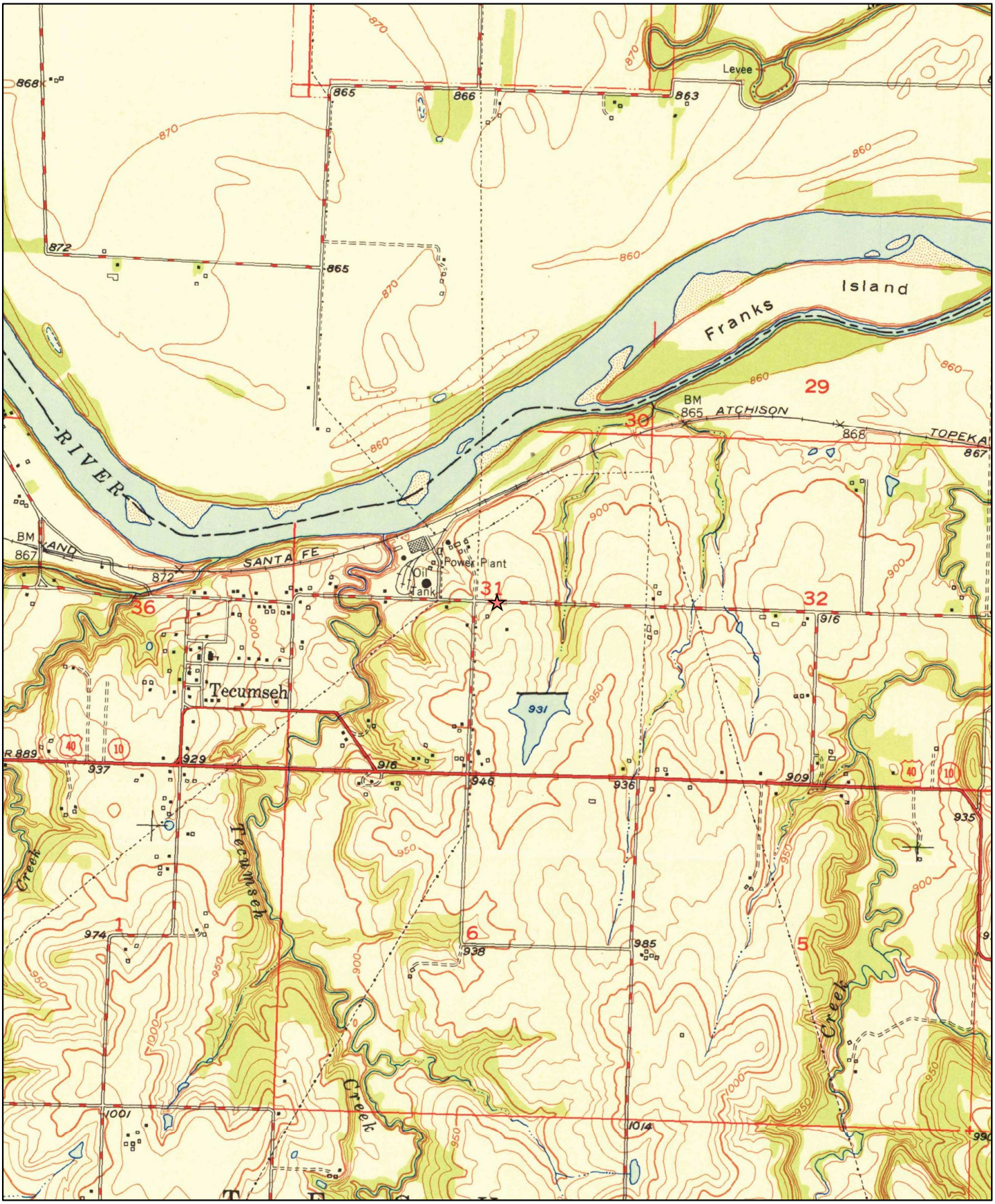
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1951

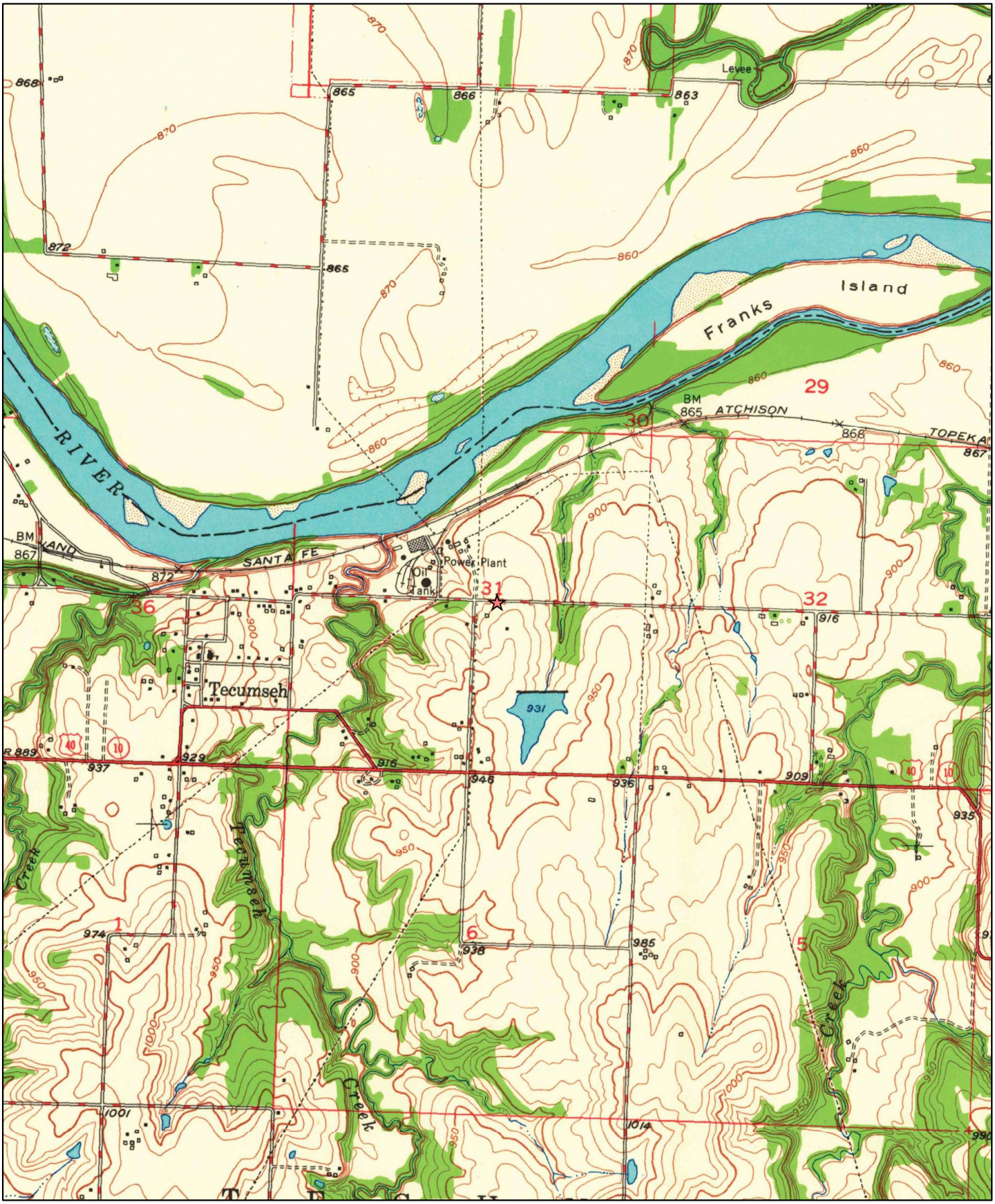
0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE



1950

0 0.2 0.4 0.8 Miles

Order No. 20180302347

Quadrangle(s): Grantville,KS

Source: USGS 7.5 Minute Topographic Map

ERIS ENVIRONMENTAL RISK INFORMATION SERVICE