

2019 ANNUAL GROUNDWATER MONITORING
AND CORRECTIVE ACTION REPORT
FLUE GAS DESULFURIZATION LANDFILL
JEFFREY ENERGY CENTER
ST. MARYS, KANSAS

by Haley & Aldrich, Inc.
Cleveland, Ohio

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

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Table of Contents

		Page
1.	Introduction	1
2.	40 CFR § 257.90 Applicability	2
2.1	40 CFR § 257.90(A)	2
2.2	40 CFR § 257.90(E) – SUMMARY	2
2.2.1	Status of the Groundwater Monitoring Program	2
2.2.2	Key Actions Completed	2
2.2.3	Problems Encountered	3
2.2.4	Actions to Resolve Problems	3
2.2.5	Projected Key Activities for Upcoming Year	3
2.3	40 CFR § 257.90(E) – INFORMATION	3
2.3.1	40 CFR § 257.90(e)(1)	4
2.3.2	40 CFR § 257.90(e)(2) – Monitoring System Changes	4
2.3.3	40 CFR § 257.90(e)(3) – Summary of Sampling Events	4
2.3.4	40 CFR § 257.90(e)(4) – Monitoring Transition Narrative	4
2.3.5	40 CFR § 257.90(e)(5) – Other Requirements	5

Revision No.	Date	Notes
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List of Tables

Table No.	Title
I	Summary of Baseline Analytical Results – FGD-6 & FGD-9
II	Summary of Analytical Results – Assessment Monitoring
III	Annual Assessment Groundwater Monitoring – Detected Appendix IV GWPS

List of Figures

Figure No.	Title
1	FGD Landfill Monitoring Well Location Map

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

This Annual Groundwater Monitoring and Corrective Action Report documents the groundwater monitoring program for the Jeffrey Energy Center Flue Gas Desulfurization (FGD) Landfill 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 FGD Landfill is, to the best of my knowledge, accurate and complete.

Signed: 
Professional Geologist

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



1. Introduction

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

2. 40 CFR § 257.90 Applicability

2.1 40 CFR § 257.90(a)

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

Evergy has installed and certified a groundwater monitoring system at the JEC FGD Landfill. The FGD Landfill 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 FGD Landfill 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 FGD Landfill 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.

2019 Annual Groundwater Monitoring and Corrective Action Report

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

The groundwater monitoring system was expanded in 2019. The groundwater system certification was updated in December 2019 to include two additional monitor wells, as discussed in Section 2.3.2.

2.2.3 Problems Encountered

The only problems encountered during groundwater monitoring activities in 2019 included laboratory errors that required re-sampling of selected wells. Well MW-FGD-6 was resampled in August 2019 due to the laboratory's inability to accurately analyze the fluoride concentration from the June 2019 sampling event. Radiochemistry was also reanalyzed at MW-FGD-6 in August 2019 due to a suspected erroneous reading in the June 2019 analytical results. These are the only issues that needed to be addressed at the FGD Landfill in 2019.

2.2.4 Actions to Resolve Problems

The resolution to problems encountered in conjunction with groundwater monitoring activities in 2019 include re-sampling of selected wells and additional laboratory analyses as described above. No other problems were encountered at the FGD Landfill in 2019; therefore, no actions to resolve problems were required.

2.2.5 Projected Key Activities for Upcoming Year

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

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 FGD Landfill is included in this report as Figure 1.

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

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

No monitoring wells were installed or decommissioned in 2019 for the certified monitor well system.

In 2018 and 2019, Evergy made preparations to expand the FGD Landfill. Upgradient (MW-FGD-6) and downgradient (MW-FGD-9) monitoring wells, installed March 2 and March 1, 2018, respectively, were added to the monitor well system in support of an ongoing expansion of the FGD Landfill. The Groundwater Monitoring Systems Certification was revised in December 2019 to reflect the inclusion of the additional monitoring wells to the FGD Landfill CCR management unit. Baseline sampling of the additional monitoring wells was completed in September 2018 and the monitoring wells were included in the sampling of the system beginning with the September 2019 semi-annual monitoring event. The baseline sampling data for MW-FGD-6 and MW-FGD-9 for 2018 and 2019 are provided in Table I. The September 2019 sampling data for the new wells are provided in Table II.

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. A summary including sample names, dates of sample collection, field parameters, and monitoring data obtained for the groundwater monitoring program for the JEC FGD Landfill is presented in Table II 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 FGD Landfill 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 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 alternate 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. Analytical results for both downgradient and upgradient wells are provided in Table II. The background concentrations (upper tolerance limits) and groundwater protection standards established for detected Appendix IV constituents for the FGD Landfill are included in Table III. The background concentrations and groundwater protection standards provided in Table III were utilized for the statistical evaluations completed in 2019 for September 2018 and March 2019 semi-annual assessment monitoring sampling events.

As discussed in Section 2.3.2, monitoring wells MW-FGD-6 and MW-FGD-9 were not included in the monitoring well network until September 2019; therefore, statistical evaluation was not completed for these monitoring wells in 2019.

2.3.5.5 40 CFR § 257.95(g)(3)(ii) – Assessment Monitoring Alternate Source Demonstration
Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this section, and may return to detection monitoring if the constituents in appendices III and IV to this part are at or below background as specified in paragraph (e) of this section. The owner or operator must also

include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

No assessment monitoring alternate source demonstration or certification was required in 2019. The JEC FGD Landfill 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 in 2019; therefore, no demonstration or certification is applicable for this unit.

TABLES

TABLE I
SUMMARY OF BASELINE ANALYTICAL RESULTS - FGD-6 AND FGD-9
 EVERGY KANSAS CENTRAL, INC.
 JEFFREY ENERGY CENTER
 FLUE GAS DESULFURIZATION LANDFILL
 ST. MARYS, KANSAS

Location	Up - Gradient													
	MW-FGD-6													
Measure Point (TOC)	1277.52													
Sample Name	FGD-6-041918	FGD-6-051118	FGD-6-053018	DUP-053018	FGD-6-070318	FGD-6-071618	FGD-6-080618	FGD-6-082318	FGD-6-091018	DUP-091018	FGD-6-032619	FGD-6-062319	FGD-6-080719	
Sample Date	4/19/2018	5/11/2018	5/30/2018	5/30/2018	7/3/2018	7/16/2018	8/6/2018	8/23/2018	9/10/2019	9/10/2018	3/26/2019	6/23/2019	8/7/2019	
Final Lab Report Date	5/23/2018	6/15/2018	6/19/2018	6/19/2018	7/27/2018	7/26/2018	8/20/2018	9/7/2018	9/21/2018	9/21/2018	4/8/2019	7/5/2019	9/16/2019	
Final Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	10/8/2018	N/A	N/A	N/A	N/A	9/16/2019	N/A	
Final Radiation Lab Report Date	5/23/2018	6/15/2018	6/22/2018	6/22/2018	7/31/2018	8/3/2018	8/21/2018	9/13/2018	9/27/2018	9/27/2018	4/9/2019	7/17/2019	10/15/2019	
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9/28/2018	9/28/2018	N/A	N/A	N/A	
Lab Data Reviewed and Accepted	5/31/2018	6/28/2018	6/29/2018	6/29/2018	8/6/2018	8/11/2018	9/1/2018	9/20/2018	10/3/2018	10/3/2018	4/9/2019	9/17/2019	8/5/2019	
Depth to Water (ft btoc)	102.96	102.06	101.95	--	101.90	102.66	102.27	102.41	102.37	--	100.44	99.33	100.80	
Temperature (Deg C)	15.67	16.57	16.26	--	18.54	17.88	17.73	15.56	17.17	--	15.2	16.88	17.03	
Conductivity (µS/cm)	5630	7330	7770	--	8300	8620	9130	9010	8990	--	9964	1014	9050	
Turbidity (NTU)	9.86	0.96	0.37	--	0.4	0.7	0.6	0.2	1.10	--	3.73	0.8	0.46	
Boron, Total (mg/L)	5.5	7.0	8.1	7.5	9.1	10.0	10.3	10.6	10.6	9.7	11.0	--	--	
Calcium, Total (mg/L)	550	552	585	569	582	598	589	627	587	566	658	--	--	
Chloride (mg/L)	657	1,330	1,770	1,180	1,640	1,690	1,940	1,910	2,120	1,700	2,110	--	--	
Fluoride (mg/L)	0.99	1.1	1.2	1.0	0.96	1.4	1.8	1.8	1.4	1.4	0.43	--	--	
Sulfate (mg/L)	1,790	2,530	3,090	2,540	2,560	3,070	2,760	2,760	3,190	2,870	2,780	--	--	
pH (su)	7.4	7.5	7.4	7.4	7.2	7.1	7.5	7.3	7.3	7.2	7.3	--	--	
TDS (mg/L)	3,680	8,140	6,290	5,580	7,060	7,170	7,770	7,750	7,620	6,520	6,900	--	--	
Antimony, Total (mg/L)	0.013	0.0073	0.0013	0.0021	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0050	<0.0010	--	
Arsenic (mg/L)	0.0036	0.0082	0.016	0.011	0.016	0.017	0.016	0.015	0.014	0.014	0.0078	0.019	--	
Barium, Total (mg/L)	0.047	0.036	0.036	0.038	0.031	0.028	0.026	0.026	0.025	0.029	0.025	0.020	--	
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	<0.0010	<0.0010	<0.0025	<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)	0.0087	0.0062	0.0044	0.0052	0.0036	0.0019	0.0016	0.0014	0.0012	0.0018	0.0011	0.0010	--	
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)	0.19	0.26	0.33	0.28	0.36	0.40	0.38	0.38	0.41	0.36	0.45	0.42	--	
Molybdenum, Total (mg/L)	0.52	0.25	0.18	0.23	0.13	0.089	0.062	0.044	0.042	<0.0020	0.039	0.023	--	
Selenium, Total (mg/L)	0.0046	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	--	
Thallium, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0020	<0.0020	<0.0050	<0.0020	--	
Mercury, Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	--	
Fluoride (mg/L)	0.99	1.10	1.2	1.0	0.96	1.4	1.8	1.8	1.4	1.4	0.43	3.4	1.6	
Radium-226 & 228 Combined (pCi/L)	1.34 +/- 0.878 (1.31)	4.43 +/- 1.43 (1.32)	4.98 +/- 1.60 (1.49)	4.38 +/- 1.55 (1.69)	6.35 +/- 2.06 (2.19)	5.03 +/- 1.65 (1.61)	5.90 +/- 2.05 (2.08)	7.79 +/- 2.11 (1.53)	3.76 +/- 1.56 (1.94)	3.35 +/- 1.38 (1.53)	4.92 +/- 1.75 (1.94)	9.02 +/- 2.38 (1.60)	5.00 +/- 1.50 (0.995)	

Notes:

Radiological results are presented as activity plus or minus uncertainty with MDC.
 MW-FGD-6 was resampled in August 2019 due to the laboratory's inability to accurately analyze the fluoride concentration from the June 2019 sampling event.
 Radiochemistry was also reanalyzed at MW-FGD-6 in August 2019 due to a suspected erroneous reading in the June 2019 analytical results.
Bold value: Detection above laboratory reporting limit or minimum detectable concentration (MDC)
 µS/cm = micro Siemens per centimeter
 ft btoc = feet below top of casing
 Deg C = degrees Celsius
 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 I
SUMMARY OF BASELINE ANALYTICAL RESULTS - FGD-6 AND FGD-9
 EVERGY KANSAS CENTRAL, INC.
 JEFFREY ENERGY CENTER
 FLUE GAS DESULFURIZATION LANDFILL
 ST. MARYS, KANSAS

Location	Down - Gradient									
	MW-FGD-9									
Measure Point (TOC)	1175.51									
Sample Name	FGD-9-042018	FGD-9-051118	FGD-9-053018	FGD-9-070318	FGD-9-071618	FGD-9-080618	FGD-9-082318	FGD-9-091118	FGD-9-032719	FGD-9-062319
Sample Date	4/20/2018	5/11/2018	5/30/2018	7/3/2018	7/16/2018	8/6/2018	8/23/2018	9/11/2018	3/27/2019	6/23/2019
Final Lab Report Date	5/23/2018	6/15/2018	6/19/2018	7/27/2018	7/26/2018	8/21/2018	9/7/2018	9/21/2018	4/8/2019	7/5/2019
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
Final Radiation Lab Report Date	5/23/2018	6/15/2018	6/22/2018	7/31/2018	8/3/2018	8/20/2018	9/13/2018	9/27/2018	4/9/2019	7/17/2019
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	10/8/2018	N/A	9/28/2018	N/A	N/A
Lab Data Reviewed and Accepted	5/31/2018	6/28/2018	6/29/2018	8/6/2018	8/11/2018	9/1/2018	9/20/2018	10/3/2018	4/9/2019	8/5/2019
Depth to Water (ft btoc)	11.52	9.43	9.42	12.70	12.90	13.44	14.86	17.02	8.19	6.26
Temperature (Deg C)	14.55	17.18	17.53	19.55	19.14	19.03	17.56	18.17	13.4	16.48
Conductivity (µS/cm)	866	849	806	788.00	784	826	799.00	827	890	895
Turbidity (NTU)	3.30	0.98	0.69	0.19	0.12	0.03	0.01	0.17	1.56	6.68
Boron, Total (mg/L)	0.54	0.50	0.51	0.50	0.54	0.58	0.59	0.51	0.39	--
Calcium, Total (mg/L)	113	99.6	103	96.2	100	94	102	99.2	112	--
Chloride (mg/L)	41.3	42.5	40.6	39.7	39.8	41.5	39.5	39.9	39.1	--
Fluoride (mg/L)	0.49	0.56	0.48	0.49	0.50	0.51	0.55	0.53	0.55	--
Sulfate (mg/L)	172	179	179	179	168	180	173	171	179	--
pH (su)	7.3	7.4	7.4	7.6	7.2	7.4	7.3	7.3	7.5	--
TDS (mg/L)	557	585	558	578	557	582	604	577	666	--
Antimony, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Arsenic (mg/L)	0.0032	0.0026	0.0039	0.0035	0.0034	0.0027	0.0035	0.0039	0.0017	0.0020
Barium, Total (mg/L)	0.082	0.081	0.085	0.083	0.081	0.072	0.083	0.088	0.091	0.092
Beryllium, Total (mg/L)	<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	<0.00050
Chromium, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cobalt, Total (mg/L)	<0.0010	0.0011	0.0012	0.0012	0.0011	0.0012	0.0012	0.0010	<0.0010	<0.0010
Lead, Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lithium, Total (mg/L)	0.014	<0.010	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Molybdenum, Total (mg/L)	0.016	0.013	0.012	0.012	0.012	0.0110	0.011	0.0086	0.0096	0.011
Selenium, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Thallium, Total (mg/L)	<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	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Fluoride (mg/L)	0.49	0.56	0.48	0.49	0.50	0.51	0.55	0.53	0.55	0.53
Radium-226 & 228 Combined (pCi/L)	0.219 +/- 0.775 (1.62)	0.852 +/- 0.755 (1.35)	0.309 +/- 0.783 (1.60)	2.14 +/- 1.19 (1.58)	0.642 +/- 0.809 (1.43)	4.34 +/- 1.53 (1.74)	1.47 +/- 0.888 (0.965)	1.05 +/- 0.942 (1.50)	0.419 +/- 1.31 (2.65)	0.989 +/- 0.865 (1.13)

Notes:

Radiological results are presented as activity plus or minus uncertainty with MDC.
 MW-FGD-6 was resampled in August 2019 due to the laboratory's inability to accurately analyze the fluoride concentration from the June 2019 sampling event.
 Radiochemistry was also reanalyzed at MW-FGD-6 in August 2019 due to a suspected erroneous reading in the June 2019 analytical results.
Bold value: Detection above laboratory reporting limit or minimum detectable concentration (MDC)
 µS/cm = micro Siemens per centimeter
 ft btoc = feet below top of casing
 Deg C = degrees Celsius
 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
SUMMARY OF ANALYTICAL RESULTS - ASSESSMENT MONITORING
EVERGY KANSAS CENTRAL, INC.
JEFFREY ENERGY CENTER
FLUE GAS DESULFURIZATION LANDFILL
ST. MARYS, KANSAS

Location	Upgradient				Downgradient									
	MW-FGD-1		MW-FGD-6		MW-FGD-2			MW-FGD-3			MW-FGD-4			MW-FGD-9
Measure Point (TOC)	1239.05		1277.52		1184.20			1186.26			1188.43			1175.51
Sample Name	FGD-1-032619	FGD-1_062219	MW-FGD-1	MW-FGD-6	FGD-2-032719	FGD-2_062219	MW-FGD-2	FGD-3-032719	FGD-3_062219	MW-FGD-3	FGD-4-032719	FGD-4_062219	MW-FGD-4	MW-FGD-9
Sample Date	3/26/2019	6/22/2019	9/16/2019	9/16/2019	3/27/2019	6/22/2019	9/16/2019	3/27/2019	6/22/2019	9/16/2019	3/27/2019	6/22/2019	9/16/2019	9/16/2019
Final Lab Report Date	4/8/2019	7/5/2019	9/30/2019	9/30/2019	4/8/2019	7/5/2019	9/30/2019	4/8/2019	7/5/2019	9/30/2019	4/8/2019	7/5/2019	9/30/2019	9/30/2019
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
Final Radiation Lab Report Date	4/9/2019	7/16/2019	10/11/2019	10/15/2019	4/9/2019	7/16/2019	10/11/2019	4/9/2019	7/16/2019	10/11/2019	4/9/2019	7/16/2019	10/11/2019	10/11/2019
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
Lab Data Reviewed and Accepted	4/9/2019	8/5/2019	10/23/2019	10/23/2019	4/9/2019	8/5/2019	10/23/2019	4/9/2019	8/5/2019	10/23/2019	4/9/2019	8/5/2019	10/23/2019	10/23/2019
Depth to Water (ft btoc)	70.53	68.65	69.41	99.48	20.42	19.31	19.23	21.66	20.39	20.21	30.01	28.98	29.04	6.97
Temperature (Deg C)	14.3	15.33	16.88	14.69	14.8	16.41	16.63	15.5	17.72	16.38	14.7	16.26	17.72	17.29
Conductivity (µS/cm)	884	850	858	9726	1196	1266	1351	1356	1400	1517	1679	1800	1841	966
Turbidity (NTU)	0.37	0.34	0.38	0.54	0.72	0.77	0.31	0.41	1.28	0.06	0.45	0.58	0.36	0.52
Boron, Total (mg/L)	<0.10	--	0.11	9.8	0.23	--	0.21	0.15	--	0.15	0.28	--	0.30	0.48
Calcium, Total (mg/L)	98.2	--	92.2	583	182	--	201	192	--	197	226	--	240	116
Chloride (mg/L)	71.7	--	50.8	2100	54.6	--	65.5	83.9	--	98.0	113	--	134	38.0
Fluoride (mg/L)	0.39	--	0.25	0.91	0.39	--	<0.20	0.32	--	<0.20	0.42	--	<0.20	0.42
Sulfate (mg/L)	86.8	--	99.3	2790	333	--	426	380	--	419	539	--	640	251
pH (su)	7.4	--	7.3	7.0	7.3	--	7.2	7.2	--	7.2	7.2	--	7.0	7.3
TDS (mg/L)	539	--	524	6730	869	--	1030	1000	--	1080	1230	--	1480	667
Antimony, Total (mg/L)	<0.0010	<0.0010	--	--	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010	<0.0010	--	--
Arsenic (mg/L)	<0.0010	<0.0010	<0.0010	0.0047	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010	<0.0010	--	0.0025
Barium, Total (mg/L)	0.31	0.31	0.27	0.019	0.082	0.081	0.068	0.099	0.10	0.082	0.054	0.052	0.045	0.090
Beryllium, Total (mg/L)	<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	--	--
Chromium, Total (mg/L)	<0.0050	<0.0050	--	--	<0.0050	<0.0050	--	<0.0050	<0.0050	--	<0.0050	<0.0050	--	--
Cobalt, Total (mg/L)	<0.0010	<0.0010	<0.0010	0.0017	0.0017	0.0020	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0018
Lead, Total (mg/L)	<0.010	<0.010	--	--	<0.010	<0.010	--	<0.010	<0.010	--	<0.010	<0.010	--	--
Lithium, Total (mg/L)	0.016	0.013	<0.010	0.39	0.012	<0.010	<0.010	0.019	0.013	0.016	0.016	<0.010	0.013	<0.010
Molybdenum, Total (mg/L)	0.0014	0.0014	0.0013	0.036	0.0040	0.0041	0.0035	0.0058	0.0059	0.0052	0.0038	0.0038	0.0035	0.0095
Selenium, Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	0.0016	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Thallium, Total (mg/L)	<0.0010	<0.0010	--	--	<0.0010	<0.0010	--	<0.0010	<0.0010	--	<0.0010	<0.0010	--	--
Mercury, Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Fluoride (mg/L)	0.39	0.36	0.25	0.91	0.39	0.35	<0.20	0.32	0.34	<0.20	0.42	0.38	<0.20	0.42
Radium-226 & 228 Combined (pCi/L)	0.326 +/- 0.924 (1.93)	0.940 +/- 0.883 (1.33)	1.80 +/- 1.51 (2.47)	6.68 +/- 1.85 (1.43)	0.446 +/- 0.973 (2.04)	0.880 +/- 0.856 (1.43)	1.18 +/- 1.16 (1.93)	1.20 +/- 1.16 (2.06)	1.03 +/- 0.873 (1.34)	0.403 +/- 1.16 (2.38)	0.898 +/- 1.13 (2.12)	0.443 +/- 0.882 (1.69)	1.11 +/- 1.21 (2.13)	0.786 +/- 0.835 (1.51)

Notes:
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 MDC.
µS/cm = micro Siemens per centimeter
ft btoc = feet below top of casing
Deg C = degrees Celsius
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
Bold value: Detection above laboratory reporting limit or minimum detectable concentration (MDC).

TABLE III

ANNUAL ASSESSMENT GROUNDWATER MONITORING - DETECTED APPENDIX IV GWPS

JUNE 2019 SAMPLING EVENT

JEFFREY ENERGY CENTER

FLUE GAS DESULFURIZATION LANDFILL

Well #	Background Value*	GWPS
CCR Appendix-IV Barium, Total (mg/L)		
MW-FGD-1 (upgradient)	0.316	NA
MW-FGD-2		2
MW-FGD-3		2
MW-FGD-4		2
CCR Appendix-IV Cobalt, Total (mg/L)		
MW-FGD-1 (upgradient)	0.001	NA
MW-FGD-2		0.006
MW-FGD-3		0.006
MW-FGD-4		0.006
CCR Appendix-IV Fluoride, Total (mg/L)		
MW-FGD-1 (upgradient)	0.416	NA
MW-FGD-2		4.0
MW-FGD-3		4.0
MW-FGD-4		4.0
CCR Appendix-IV Lithium, Total (mg/L)		
MW-FGD-1 (upgradient)	0.017	NA
MW-FGD-2		0.040
MW-FGD-3		0.040
MW-FGD-4		0.040
CCR Appendix-IV Molybdenum, Total (mg/L)		
MW-FGD-1 (upgradient)	0.008	NA
MW-FGD-2		0.100
MW-FGD-3		0.100
MW-FGD-4		0.100
CCR Appendix-IV Radium-226 & 228 Combined (pCi/L)		
MW-FGD-1 (upgradient)	0.8	NA
MW-FGD-2		5
MW-FGD-3		5
MW-FGD-4		5
CCR Appendix-IV Selenium, Total (mg/L)		
MW-FGD-1 (upgradient)	0.001	NA
MW-FGD-2		0.05
MW-FGD-3		0.05
MW-FGD-4		0.05

Notes and Abbreviations:

* Background value based on data collected through June 2018

mg/L = milligrams per Liter

pCi/L = picoCuries per Liter

CCR = Coal Combustion Residuals

MCL = Maximum Contaminant Level

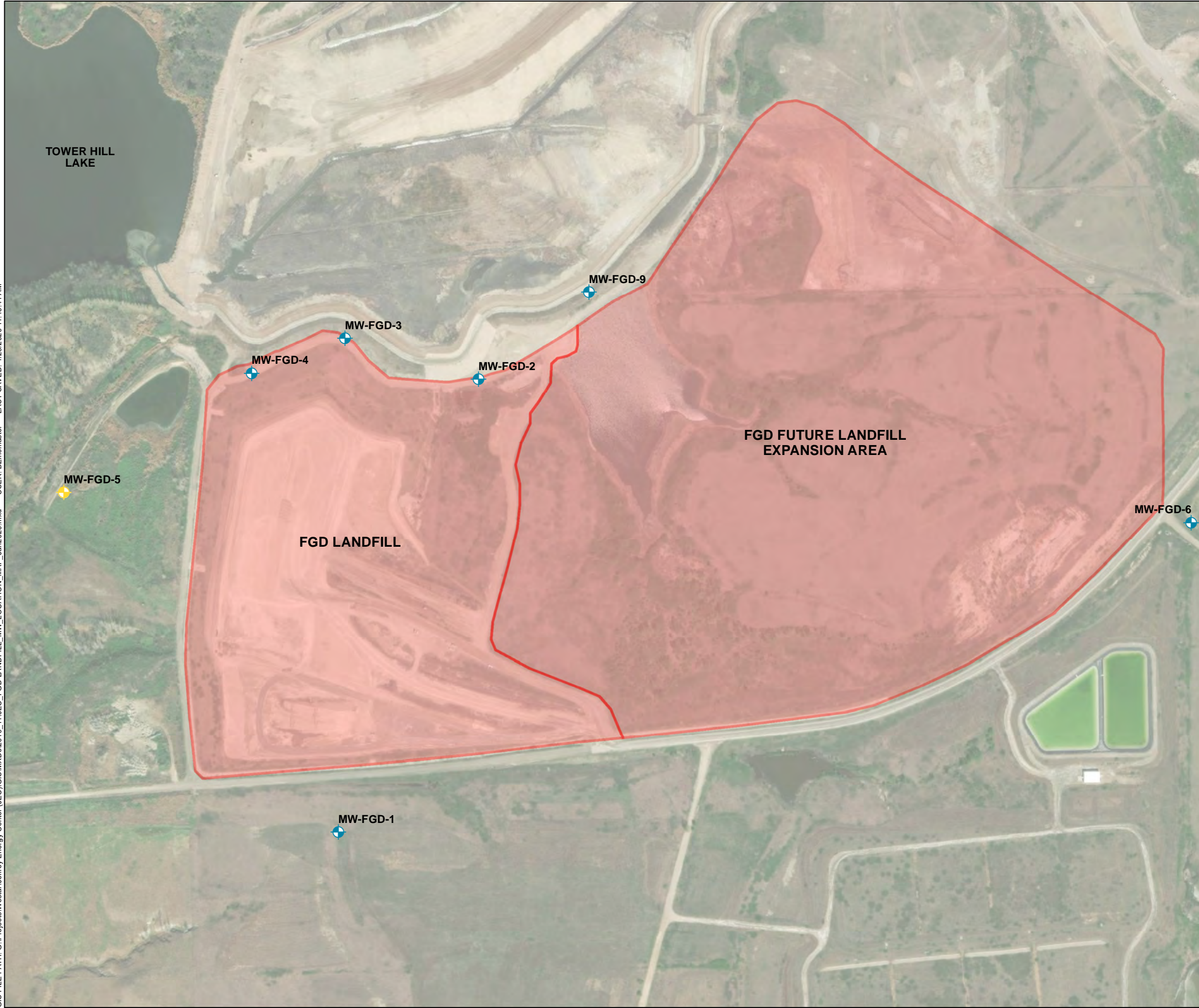
RSL = Regional Screening Level

GWPS = Groundwater Protection Standard




NA = Not Applicable

FIGURE

GIS FILE PATH: G:\Projects\Western\Jeffrey Energy Center (JEC)\GIS\MXDs\2019_11\JEC_FGD LANDFILL_MW_LOCATION_MAP_Jan2020.mxd — USER: DZinmaster — LAST SAVED: 1/23/2020 11:16:41 AM

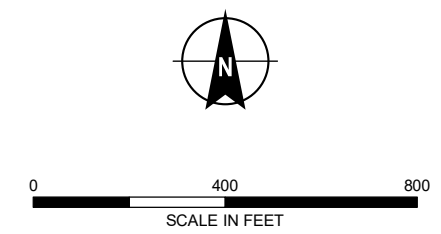


LEGEND

-  MONITORING WELL
-  PIEZOMETRIC OBSERVATION ONLY
-  FGD LANDFILL LIMITS OF DISPOSAL AREA

NOTES

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



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

**FGD LANDFILL
MONITORING WELL
LOCATION MAP**

JANUARY 2020

FIGURE 1