

# NATURE AND EXTENT INVESTIGATION WELL PLACEMENT/DEVELOPMENT PLAN

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Date

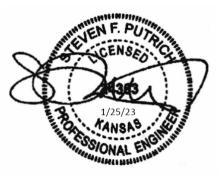


# NATURE AND EXTENT INVESTIGATION WELL PLACEMENT/DEVELOPMENT PLAN

TECUMSEH ENERGY CENTER BOTTOM ASH SETTLING AREA TECUMSEH, KANSAS

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for Evergy Kansas Central, Inc.

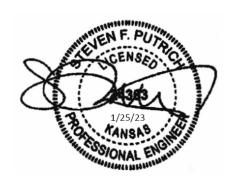




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### **Table of Contents**

			Page
	of Tab of Figu		ii ii
1.	Intro	oduction	1
	1.1	BACKGROUND 1.1.1 Monitoring Network 1.1.2 Statistically Significant Levels	1 1 2
	1.2	PURPOSE AND SCOPE 1.2.1 Purpose 1.2.2 Scope	2 2 3
2.	Nati	ure and Extent Groundwater Monitoring Well Installation	4
	2.1	40 CFR § 257.95(G)(1)(I)-(III) – NATURE AND EXTENT WELL INSTALLATION	4
3.	Nati	ure and Extent Groundwater Sampling	6
	3.1 3.2	40 CFR § 257.95(G)(1)(IV) – GROUNDWATER SAMPLING GROUNDWATER PROTECTION STANDARDS	6 6
4.	Asse	essment of Corrective Measures	7
	4.1	40 CFR § 257.95(G)(3)(I) – ASSESSMENT OF CORRECTIVE MEASURES	7
5.	Noti	ifications	8
	5.1 5.2 5.3	40 CFR § 257.95(G) – STATISTICALLY SIGNIFICANT LEVELS NOTIFICATION 40 CFR § 257.95(G)(2) – PROPERTY OWNER NOTIFICATION 40 CFR § 257.95(G)(5) – CORRECTIVE MEASURES NOTIFICATION	8 8 8
6.	Sche	edule	9
	6.1 6.2	MONITORING WELL INSTALLATION SCHEDULE NATURE AND EXTENT INVESTIGATION SCHEDULE	9







# **List of Tables**

Table No.	Title
1	Monitoring Well Construction Information
2	Proposed Schedule for Nature and Extent Investigation

# **List of Figures**

Figure No.	Title
1	Bottom Ash Settling Area Monitoring Well Location Map
2	Proposed Nature and Extent Groundwater Monitoring Wells
3	Proposed Shallow Monitoring Well Design
4	Proposed Deep Monitoring Well Design



#### 1. Introduction

This document is a well placement and development plan prepared pursuant to Paragraph 10.d. of the Consent Agreement and Final Order (CAFO) between the U.S. Environmental Protection Agency (USEPA) and Evergy Kansas Central, Inc. (Evergy) In the Matter of Evergy Kansas Central, Inc.: Docket No. RCRA-07-2023-0001 dated November 7, 2022. Paragraph 10.d. of the CAFO requires that Evergy provide a Nature and Extent Investigation Well Placement/Development Plan (Plan) for the Bottom Ash Settling Area (BASA) impoundment at the Tecumseh Energy Center (TEC).

#### 1.1 BACKGROUND

TEC is a closed coal fired power generation facility. While TEC was active, coal combustion residuals (CCR) were dewatered at the BASA and permanently disposed of at the TEC solid waste landfill. The BASA CCR management unit has ceased operations and been removed. All CCR material within the BASA has been removed, together with the berms that created the impoundment and all visible CCR material. The BASA site has been returned to its approximate pre-development surface grade.

Bottom ash slurry generated at TEC was sluiced and gravity fed to the BASA for settling. Excess water was decanted via gravity to the Clear Pond located north of the BASA, where it was gravity decanted again to Tecumseh Creek. Ultimately, the clear process water flowed into Tecumseh Creek and the Kansas River in accordance with the terms of a Kansas Pollutant Discharge Elimination System permit at Outfall 002X1. Bottom ash was recovered from the BASA, dewatered, and transported by truck to Ash Landfill 322.

Pursuant to Paragraph 10.d. of the CAFO, this Plan has been prepared for the BASA surface impoundment. The items requested by the USEPA in Paragraph 10.d. of the CAFO are provided below.

#### 1.1.1 Monitoring Network

Consistent with Code of Federal Regulations Title 40 (40 CFR) § 257.90 through § 257.95, Evergy installed and certified a groundwater monitoring network for the BASA at TEC and collected eight rounds of groundwater samples for the analysis of Appendix III and Appendix IV baseline constituents. The groundwater monitoring network at the BASA includes one upgradient monitoring well (MW-7) and three downgradient monitoring wells (MW-8, MW-9, and MW-10); and one cross gradient well (MW-11) is used to monitor groundwater elevations for the purpose of establishing groundwater flow direction at each sampling event.

Monitoring well MW-7 was sited at a location considered to be representative of background groundwater conditions. Groundwater in the uppermost aquifer beneath the BASA historically flows in a northwest direction. The downgradient monitoring wells were sited based on site-specific conditions at locations considered sufficient to detect groundwater constituents in the uppermost aquifer passing the waste boundary of the unit. Due to space constraints, the downgradient monitoring wells were constructed in the berms surrounding the BASA. The locations of the monitoring wells are shown on Figure 1, and well construction details are provided in Table 1.



#### 1.1.2 Statistically Significant Levels

Results of the detection monitoring statistical evaluation completed in January 2018 identified statistically significant increased (SSI) concentrations of Appendix III constituents in downgradient monitoring wells relative to concentrations observed in upgradient monitoring wells. No alternative source was identified for the Appendix III constituents with SSIs. Accordingly, the groundwater monitoring program transitioned to assessment monitoring in June 2018.

In January 2019, Evergy completed statistical evaluations of groundwater quality results collected in September 2018, with data reviewed and accepted in October 2018, to determine if any of the Appendix IV constituents were present in groundwater samples collected from downgradient monitoring wells at concentrations at a statistically significant level (SSL) above the groundwater protection standard (GWPS). The statistical evaluation of the Appendix IV constituents identified a SSL for arsenic (MW-9 and MW-10) and cobalt (MW-9) above the GWPSs downgradient of the BASA.

An alternate source demonstration (ASD) was completed in February 2019 to address SSLs identified during the September 2018 semi-annual assessment monitoring sampling event which kept the BASA operating under an assessment monitoring program. In accordance with Paragraph 10.b. of the CAFO, the ASD was withdrawn. Statistical evaluation completed in December 2022 pursuant to Paragraph 10.c. of the CAFO identified SSLs for arsenic (MW-9 and MW-10) and cobalt (MW-9) above the GWPSs downgradient of the BASA.

#### 1.2 PURPOSE AND SCOPE

#### 1.2.1 Purpose

This document addresses requirements set forth in Paragraph 10.d. of the CAFO. In Paragraph 10.d., Evergy has consented to the following:

"Within ninety (90) days of the Effective date of this Consent Agreement and Final Order, Respondent shall provide a Nature and Extent Investigation Well Placement/Development Plan for the implementation and schedule for a nature and extent investigation at the BASA surface impoundment for historical statistically significant levels of arsenic and cobalt and any other appendix IV constituents identified as a statistically significant level in actions completed in (c) above. The plan shall include provisions that ensure compliance with all requirements set forth at 40 CFR § 257.95(g), except that any and all associated compliance requirements will be completed pursuant to the plan's schedule. The schedule shall provide for the initiation of nature and extent well drilling within one hundred and eighty (180) days of EPA approval of the Nature and Extent Investigation Well Placement/Development Plan."

The well installation program has been designed based on site-specific hydrogeology to meet the requirements of 40 CFR § 257.95(g). The subject monitoring wells will be sited at locations to characterize the extent of migration, if any, of cobalt and arsenic from TEC BASA. Depending on the concentration of cobalt and arsenic detected in groundwater samples collected from the newly installed wells, additional monitoring wells may be required to further delineate the plume.



#### **1.2.2** Scope

This document constitutes the Nature and Extent Well Placement/Development Plan described in Paragraph 10.d. of the CAFO and describes the placement of groundwater monitoring wells for characterization of the nature and extent of cobalt and arsenic concentration in groundwater at TEC BASA and the surrounding area pursuant to 40 CFR § 257.95(g). The specific requirements for this Plan listed in 40 CFR § 257.95(g) of the Rule are provided in Sections 2 through 5 of this Plan and are in bold italic font, followed by a short narrative describing how each Rule requirement has been met.



#### 2. Nature and Extent Groundwater Monitoring Well Installation

#### 2.1 40 CFR § 257.95(g)(1)(i)-(iii) – NATURE AND EXTENT WELL INSTALLATION

- (i) Install additional monitoring wells necessary to define the contaminant plume(s)
- (ii) Collect data on the nature and estimated quantity of material released including specific information on the constituents listed in appendix IV of this part and the levels at which they are present in the material released;
- (iii) Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with paragraph (d)(1) of this section

In accordance with 40 CFR § 257.95(g)(1)(i)-(iii) of the Coal Combustion Residuals Rule, the Plan will define the horizontal and vertical extent of cobalt and arsenic in groundwater and will include installation of additional monitoring wells both upgradient and downgradient of the TEC BASA, and at least one monitoring well at the Evergy property boundary downgradient of the TEC BASA (MW-15; Figure 2). The new wells will also allow the collection of data to estimate the quantity of material released, the corresponding Appendix IV constituents, and quantities of those constituents.

The proposed monitoring well locations were selected based on available site-specific technical information obtained during drilling, installation, and testing of the original monitoring wells at the BASA, including stratigraphy, lithology, hydraulic conductivity, and porosity, and with site-specific data developed during previous characterization activities (Figure 2). The final location of the monitoring wells may be adjusted based on drill rig clearance, minor topographic features, and Evergy property location.

Based on historic groundwater elevation data, the groundwater flow direction is toward the northwest, and the water bearing geologic formation nearest the natural ground surface at the BASA is composed of poorly sorted glacial till material that includes clay, sand, and gravel. The proposed shallow monitoring wells will be installed to a depth of approximately 30 to 40 feet and will be screened within the glacial till material directly above the shale confining unit that underlies the BASA (Figure 3). Proposed shallow monitoring wells MW-15 through MW-17 are sited at locations hydraulically downgradient of BASA to define the horizontal extent of arsenic and cobalt in the uppermost aquifer. Well MW-15 is also located at the Evergy property boundary pursuant to 40 CFR § 257.95(g)(1)(iii). The proposed location of shallow monitoring wells MW-18 and MW-19 are located hydraulically upgradient of BASA to assist in defining the groundwater flow direction and providing additional analytical data representative of background groundwater quality that has not been affected by leakage from the unit. The proposed monitoring wells will be designed and installed in accordance with 40 CFR § 257.91(e).

The proposed deep boring locations will be utilized to provide characterization of the shale confining unit that underlies the BASA. Depending on the thickness of the shale, two deep contingency monitoring wells may be installed and screened within a lower water bearing unit below the shale confining unit, not greater than 100 feet below ground surface (Figure 4). These deep contingency monitoring wells (MW-20 and MW-21), if installed, will be located upgradient and downgradient of the BASA, respectively, to define the vertical extent of arsenic and cobalt beneath BASA as well as providing additional characterization of the shale confining unit. The deep contingency well MW-20 is located



upgradient and will provide additional background information from the water bearing unit beneath the shale confining unit.

Following initial groundwater sampling from the monitoring wells described above, additional contingency monitoring wells (MW-22 [deep] and MW-23 [shallow]) may be installed to further define the extent of arsenic and cobalt in groundwater downgradient of the BASA. The MW-23 proposed location is sited at the Evergy property boundary.

All newly installed monitoring well seals will be allowed to set for a minimum of 12 hours prior to well development. The wells will be developed by the swabbing, bailing, airlifting, and/or pumping methods. Development will be complete once the monitoring well is visibly clear and sediment free, turbidity is reduced to less than 10 Nephelometric Turbidity Units (NTU) or has stabilized, and when pH, temperature, and conductivity have stabilized. Water level elevations will be measured with a decontaminated water level indicator throughout the well development.



#### 3. Nature and Extent Groundwater Sampling

#### 3.1 40 CFR § 257.95(g)(1)(iv) – GROUNDWATER SAMPLING

Sample all wells in accordance with paragraph (d)(1) of this section to characterize the nature and extent of the release.

Nature and extent groundwater samples will be collected from the newly installed nature and extent monitoring wells in accordance with 40 CFR § 257.95(g)(1)(iv) within 30 days of monitoring well development. Representative groundwater samples will be collected from the wells using a portable bladder pump in accordance with the sampling and analytical procedures outlined in the site-specific Sampling and Analysis Plan. Groundwater samples will continue to be collected at the newly installed nature and extent monitoring wells on a semi-annual basis in accordance with 40 CFR § 257.95(d)(1).

All samples will be analyzed for Appendix III and detected Appendix IV constituents pursuant to 40 CFR § 257.95(d)(1) by a laboratory certified by the State of Kansas. Data validation and usability assessment will be performed in accordance with guidance and requirements established in the documents titled USEPA National Functional Guidelines for Inorganic Data Review (USEPA, 2020)<sup>1</sup> and the Evaluation of Radiochemical Data Usability (Paar, 1997).<sup>2</sup>

#### 3.2 GROUNDWATER PROTECTION STANDARDS

Data generated from this effort will be compared to the GWPS previously established for the BASA in accordance with the 40 CFR § 257.95(d)(2). If the concentration of detected Appendix IV constituents is less than the GWPS, the delineation of the extent of the plume in that area will be considered complete. If Appendix IV constituents are detected at levels above the GWPS, additional sampling and/or monitoring wells may be installed to fully delineate the plume.

HALEY ALDRICH

<sup>&</sup>lt;sup>1</sup> U.S. Environmental Protection Agency, 2020. National Functional Guidelines for Inorganic Superfund Methods Data Review. EPA-540-R-2017-001. January.

<sup>&</sup>lt;sup>2</sup> Paar, J.G., 19978. Evaluation of Radiochemical Data Usability. April.

### 4. Assessment of Corrective Measures

#### 4.1 40 CFR § 257.95(g)(3)(i) – ASSESSMENT OF CORRECTIVE MEASURES

#### Initiate an assessment of corrective measures as required by § 257.96

Within 90 days of detecting one or more constituents in Appendix IV at SSLs above the GWPS from the statistical evaluation completed in accordance with Paragraph 10.c. of the CAFO, Evergy will initiate an assessment of corrective measures pursuant to 40 CFR § 257.96. The assessment of corrective measures will be completed within 180 days, unless there is a demonstrated need for additional time to complete assessment due to site-specific conditions or circumstances.



#### 5. Notifications

#### 5.1 40 CFR § 257.95(g) – STATISTICALLY SIGNIFICANT LEVELS NOTIFICATION

If one or more constituents in appendix IV to this part are detected at statistically significant levels above the groundwater protection standard established under paragraph (h) of this section in any sampling event, the owner or operator must prepare a notification identifying the constituents in appendix IV to this part that have exceeded the groundwater protection standard. The owner or operator has completed the notification when the notification is placed in the facility's operating record as required by § 257.105(h)(8).

Within 30 days of detecting one or more constituents in Appendix IV at SSLs above the GWPS from the statistical evaluation completed in accordance with Paragraph 10.c. of the CAFO, Evergy will prepare a SSL notification and place the notification in the facility's operating record.

#### 5.2 40 CFR § 257.95(g)(2) – PROPERTY OWNER NOTIFICATION

Notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site if indicated by sampling of wells in accordance with paragraph (g)(1) of this section. The owner or operator has completed the notifications when they are placed in the facility's operating record as required by § 257.105(h)(8).

Within 30 days of detecting one or more constituents in Appendix IV at SSLs above the GWPS at nature and extent monitoring wells located off Evergy property, a notification will be provided to all persons who own or reside on land that directly overlies any part of the plume of contamination.

Following monitoring well drilling, installation, and development, new nature and extent monitoring wells may take 12 months or longer to provide representative concentrations of constituents. The proposed 30-day notification will be provided following at least three groundwater sampling events at off-site nature and extent monitoring wells following a sampling schedule outlined in Section 3.1 of this Plan.

#### 5.3 40 CFR § 257.95(g)(5) – CORRECTIVE MEASURES NOTIFICATION

Notification stating that an assessment of corrective measures has been initiated.

Within 30 days of detecting one or more constituents in Appendix IV at SSLs above the GWPS from the statistical evaluation completed in accordance with Paragraph 10.c. of the CAFO, Evergy will prepare a notification stating that an assessment of corrective measures has been initiated.



### 6. Schedule

#### 6.1 MONITORING WELL INSTALLATION SCHEDULE

In accordance with Paragraph 10.g. of the CAFO, within 180 days of USEPA approval of this Plan, Evergy will install the additional wells and initiate sampling according to the schedules included in the approved Plan.

#### 6.2 NATURE AND EXTENT INVESTIGATION SCHEDULE

Nature and extent investigation items outlined in Sections 2 through 5 of this Plan will be initiated in accordance with the schedule provided in Table 2.



# **TABLES**

#### TABLE 1

#### MONITORING WELL CONSTRUCTION INFORMATION

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

Location	Well Identification	Well Installation Date	Casing Diameter (inches)	Blank Casing Type	Screened Casing Type	Slot Size (inch)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Well Depth (feet bgs)	Depth to Water <sup>a</sup> (feet btoc)	Water Level Elevation (feet amsl)	Water Column Depth (feet)	Northing <sup>b</sup>	Easting <sup>b</sup>	Ground Surface Elevation (feet amsl) <sup>c</sup>	Top of Casing Elevation (feet amsl) <sup>c</sup>
Bottom Ash Settling Area																
	MW-8	5/27/2015	2	Schd 40 PVC	Schd 40 PVC	0.020	12	22	22	18.40	851.34	3.60	271159.2111	2001886.2591	867.09	869.84
Downgradiant	MW-9 <sup>d</sup>	7/6/2015	2	Schd 40 PVC	Schd 40 PVC	0.020	12	22	22	-	-	-	271115.6500	2001608.3036	864.89	868.66
Downgradient	MW-10	5/27/2015	2	Schd 40 PVC	Schd 40 PVC	0.020	12	22	22	18.10	851.54	3.9	270957.7952	2001594.1357	864.84	869.11
	MW-11	4/9/2016	2	Schd 40 PVC	Schd 40 PVC	0.020	20	30	30	25.56	851.29	4.44	270892.7851	2001649.954	873.94	876.85
Upgradient	MW-7	7/6/2015	2	Schd 40 PVC	Schd 40 PVC	0.020	24	34	34	25.04	854.69	8.96	270755.4546	2001876.9832	875.38	878.19

#### Notes:

#### Monitoring Well Used for Piezometric Observation Only

amsl - above mean sea level

bgs - below ground surface

btoc - below top of casing

Schd 40 PVC - Schedule 40 polyvinyl chloride



<sup>&</sup>lt;sup>a</sup> Depth to water from groundwater elevation survey on December 5, 2019.

<sup>&</sup>lt;sup>b</sup> Data Source: Evergy Kansas Central, Inc (f/k/a Westar Energy, Inc.) Tecumseh Energy Center, August 2016.

<sup>&</sup>lt;sup>c</sup> Survey elevations revised February 2020 after well casings were shortened during unit closure activities prior to the September/October 2019 groundwater sampling event.

 $<sup>^{\</sup>it d}$  Monitoring Well MW-9 was dry during the December 2019 sampling event and a depth to water was unsuccessful.

# TABLE 2 PROPOSED SCHEDULE FOR NATURE AND EXTENT INVESTIGATION

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

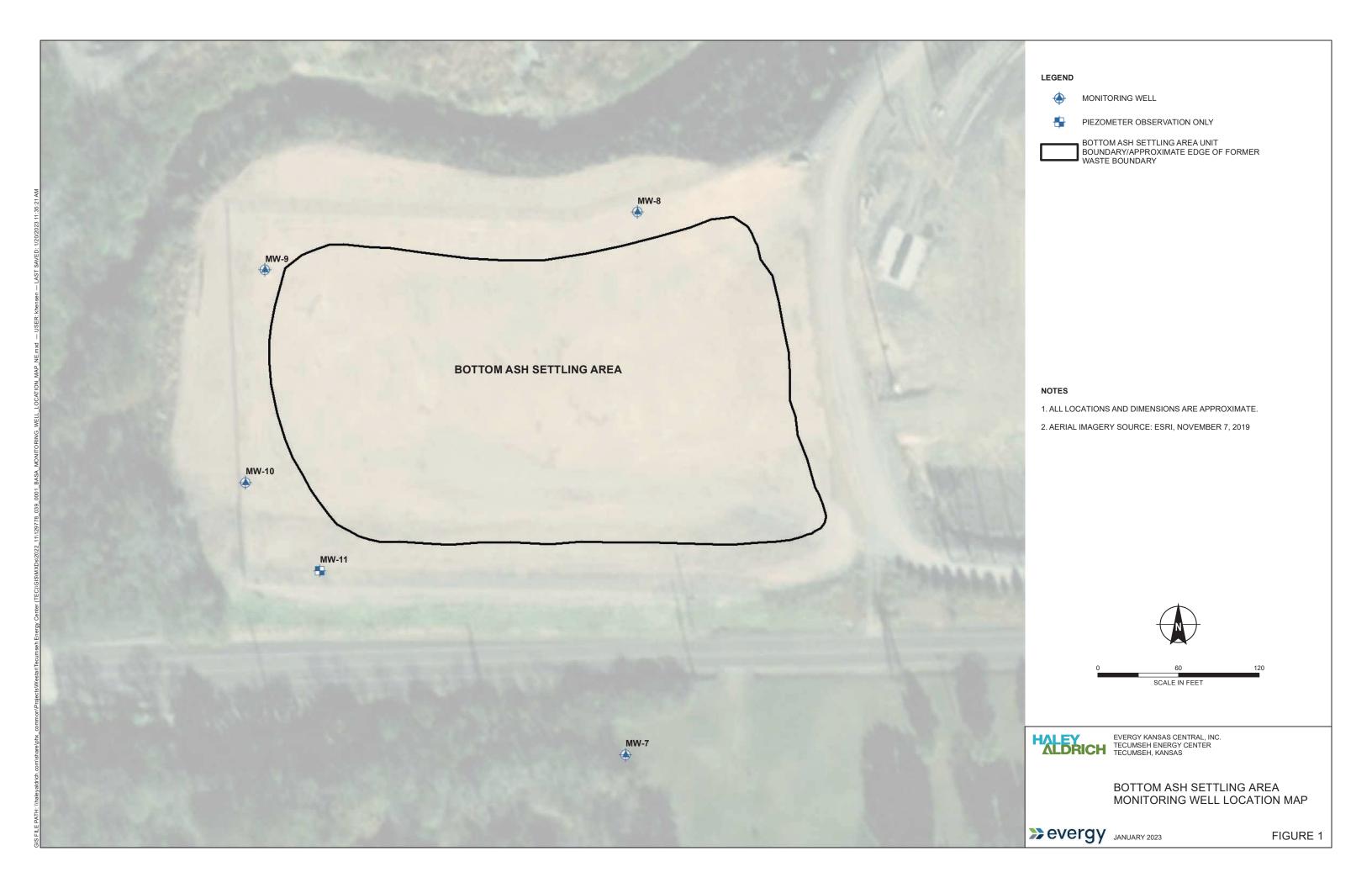
Schedule Item <sup>1</sup>	CCR Rule Regulation	Estimated Start Date								
Assessment Monitoring Program and Nature & Extent Investigation										
Initiate an Assessment of Corrective Measures	40 CFR § 257.95(g)(3)(i) 40 CFR § 257.96(a)	Within 90 days of detecting Appendix IV SSLs from statistical analyses completed under Paragraph 10.c. of the CAFO								
Initiated Nature and Extent Investigation Drilling	40 CFR § 257.95(g)(1)(i)-(iii)	Within 180 days of USEPA approval of this Plan <sup>2</sup>								
Initial Groundwater Sampling for newly installed Nature and Extent Monitoring Wells	40 CFR § 257.95(g)(1)(iv)	Within 30 days of monitoring well development at newly installed nature and extent monitoring wells, and then on a semi-annual basis								
Groundwater Protection Standards comparison	40 CFR § 257.95(d)(2)	Within 30 days of obtaining validated results from nature and extent groundwater sampling events								
	Notifications									
Statistically Significant Level Notification	40 CFR § 257.95(g)	Within 30 days of detecting Appendix IV SSLs from statistical analyses completed under Paragraph 10.c. of the CAFO								
Corrective Measures Notification	40 CFR § 257.95(g)(5)	Within 30 days of detecting Appendix IV SSLs from statistical analyses completed under Paragraph 10.c. of the CAFO								
Property Owner Notification	40 CFR § 257.95(g)(2)	Within 30 days of detecting Appendix IV SSLs at nature and extent monitoring wells located off Evergy property following at least three (3) groundwater sampling events as outlined in Section 5.2 of this Plan.								

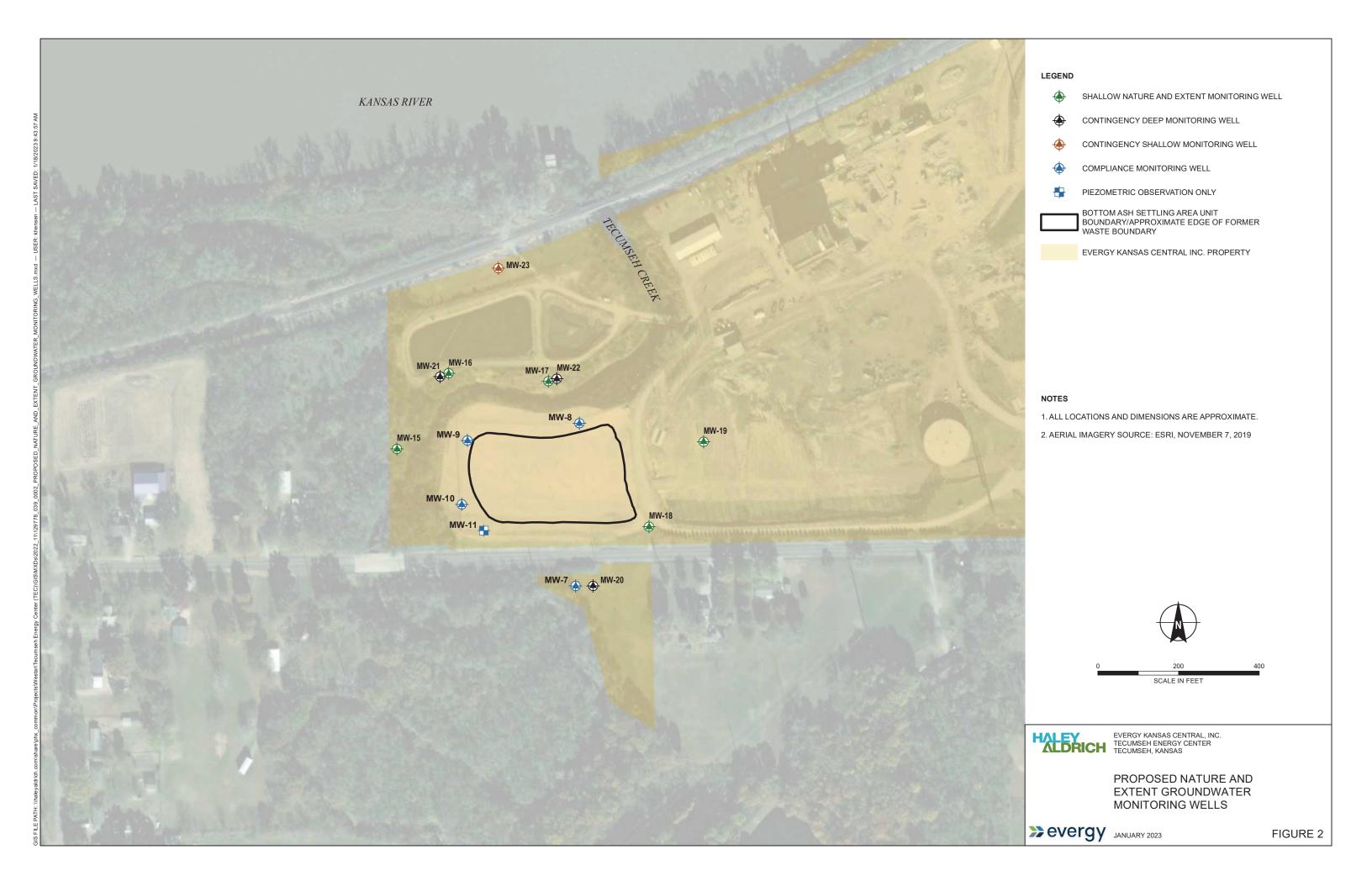
#### Notes:

- 1. Proposed schedule address the requirements in Paragraph 10.d. of a consent agreement between the U.S. Environmental Protection Agency (EPA) and Evergy Kansas Central, Inc. dated November 7, 2022
- 2. Well Placement/Development Plan (Plan) for Nature and Extent Investigation of Appendix IV Constituents at the BASA surface impoundment CAFO = Consent Agreement and Final Order
- CCR = Coal Combustion Residual
- CFR = Code of Federal Regulation
- SSL = Statistically Significant Level
- USEPA = U.S. Environmental Protection Agency



# **FIGURES**





PROPOSED SHALLOW MONITORING WELL DESIGN

NOT TO SCALE JANUARY 2023

FIGURE 3

PROPOSED DEEP MONITORING WELL DESIGN

NOT TO SCALE JANUARY 2023

FIGURE 4