Groundwater Monitoring System Certification (Revised)

Walter Scott Jr. Energy Center
Coal Combustion Residual Monofill
Pottawattamie County, Iowa

Revised Copy: November 30, 2021

Original Copy: October 15, 2017

Terracon Project No. 05157640

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

11/30/2021

Michael B. Reif, P.E. (date)

License number 23945

My license renewal date is December 31, 2022

Pages or sheets covered by this seal:
Groundwater Monitoring System Certification (Revised)

Prepared for:

MidAmerican Energy Company
Walter Scott Jr. Energy Center
Council Bluffs, Iowa

Prepared by:

Terracon Consultants, Inc.
Omaha, Nebraska

GROUNDWATER MONITORING SYSTEM CERTIFICATION (REVISED)
WALTER SCOTT JR. ENERGY CENTER
COAL COMBUSTION RESIDUAL MONOFILL
POTTAWATTAMIE, IOWA

Terracon Project No. 05157640
November 30, 2021

1.0 INTRODUCTION

The Monofill is an existing coal combustion residual (CCR) landfill that receives materials from the Walter Scott Jr. Energy Center (WSEC) facility. Both the WSEC facility and the Monofill are located in Pottawattamie County, Iowa. The location of the WSEC facility and the Monofill are depicted on the attached Figure 1. The Monofill is permitted under the Iowa Department of Natural Resources (IDNR) Operating Permit No. 78-SDP-26-06P issued May 2, 2007, with subsequent amendments. The site was developed as a Monofill in 2007 (Cell 1) and began receiving CCR in September 2007. The Monofill was constructed with a composite liner system including a 2-foot compacted clay liner and 60-mil high density polyethylene (HDPE) plastic liner. Since the site was developed as a Monofill, additional cells have been added. Monofill Cells 2, 3S, and 3N (2008), Cell 4 (2010), Cell 5 (2011), and Cell 6 (2012) were constructed and receiving CCR materials prior to October 19, 2015. Construction of Cell 7 commenced prior to October 19, 2015, and was completed in 2016. Construction of Cell 8 commenced in 2019 and was completed in 2020. Completion of Cell 9 construction and initial receipt of CCR is tentatively planned for late 2021. The location of each cell is depicted on the attached Figure 2.

As a result of Cell 9 construction at the Monofill, the groundwater monitoring system was modified. During June 2021, monitoring well MW-241R was decommissioned, and monitoring well MW-250 was installed. Existing monitoring wells MW-105 and MW-108 were converted from groundwater elevation monitoring only locations to groundwater elevation monitoring and groundwater sampling locations. The locations of these monitoring wells are depicted on the attached Figure 2.

On April 17, 2015, the United States Environmental Protection Agency (USEPA) issued the final version of the CCR rule for regulation and management of CCR materials at coal-fired units under subpart D of the Resource Conservation and Recovery Act (RCRA). The Federal CCR rule (40 CFR, Part 257) became effective on October 19, 2015 and applies to the WSEC Monofill.

As required by the Federal CCR rule 40 CFR 257.91 the owner or operator of the CCR unit must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that meet the following requirements:

- Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit,
- Accurately represent the quality of groundwater passing the waste boundary of the CCR unit.

The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of section 257.91. The Monofill groundwater monitoring system was initially certified on October 15, 2017. With modifications of the groundwater monitoring system at the WSEC Monofill conducted in 2019, the well network continued to meet the requirements of section 257.91 of the Federal CCR rule and was certified on January 20, 2020. With the modifications of the groundwater monitoring system at the WSEC Monofill conducted in 2021, it continues to meet the requirements of section 257.91 of the Federal CCR rule. The following sections in this report provide support of the certification.

2.0 SITE HYDROGEOLOGY SUMMARY

The WSEC Monofill (site) is located in the Missouri River Valley near Council Bluffs, Iowa. A Hydrogeologic Investigation Report (HIR) dated September 2006 details the site geology and hydrology for the Monofill CCR site. As indicated in the HIR, layers of sands, silts, and clays are found at the site which are consistent with alluvial flood plain deposits. There were no confining units identified in site borings, and vertical hydraulic gradients were minor in the aquifer. The alluvial aquifer is considered a contiguous unit with a single water table. Bedrock was not encountered in a boring that was drilled at the site to a depth of approximately 117 feet below ground surface (bgs), however, bedrock at the site is believed to be either shale or limestone. Based on previous groundwater monitoring event data collected from March 2016 through October 2019, the water table has an average elevation of approximately 961 feet above mean sea level (amsl) at the site. Groundwater flow at the site was generally to the west to northwest based on interpolation of groundwater elevation data collected during monitoring events from March 2016 through August 2017. During monitoring events conducted during the period from October 2017 through October 2019, groundwater flow at the site has been variable with flow directions to the east, northeast, southeast, northwest, southwest, or south. These variable groundwater directions appeared to be influenced by high river stage in the Missouri River due to flooding and planned releases from the upstream Missouri River reservoir system during the October 2017 through October 2019 period. During 2020 monitoring events, groundwater flow at the site was toward the Missouri River which was similar to groundwater flows calculated during the March 2016 through August 2017 monitoring events.

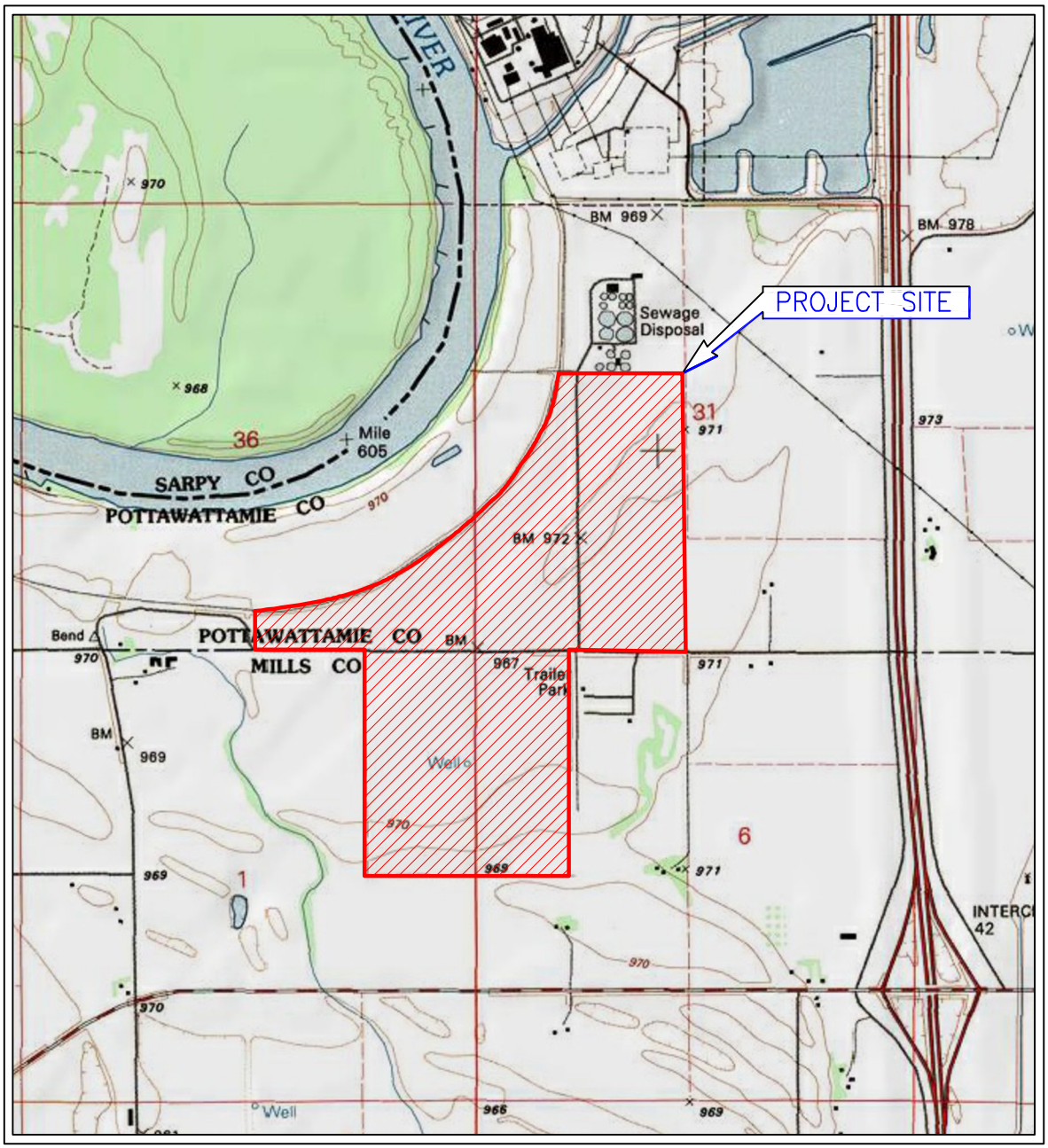
3.0 GROUNDWATER MONITORING SYSTEM

Based on the hydrogeologic information collected from the site and the general groundwater flow direction established during the March 2016 through August 2017 monitoring period, the current groundwater monitoring system for the Monofill consists of two water level elevation gauging only wells (MW-149, and MW-249), one background well (MW-133), five up-gradient wells (MW-156, MW-157, MW-227, MW-240R, and MW-250), two cross-gradient wells (MW-158 and MW-159), and nine down-gradient wells (MW-105, MW-108, MW-190, MW-191, and MW-244 through MW-248). The location of each site monitoring well is depicted on the attached Figure 2. Details regarding the groundwater monitoring system at the CCR Monofill are summarized on the attached Table 1.

4.0 RECORD OF REVISIONS AND UPDATES

Date	Revision/Update	By Whom
01-20-2020	Updated Monofill cell construction information. Monitoring wells MW-143, MW-233, MW-242, and MW-243 were decommissioned, and monitoring wells MW-246 through MW-249 were installed during 2019. Updated groundwater flow direction summary. Certified the modified groundwater monitoring system.	Terracon Consultants, Inc.
11-30-2021	Updated Monofill cell construction information. Monitoring well MW-241R was decommissioned, and monitoring well MW-250 was installed during June 2021. Monitoring wells MW-105 and MW-108 were converted to groundwater gauging and sampling locations. Updated groundwater flow direction summary. Certified the modified groundwater monitoring system.	Terracon Consultants, Inc.

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

1 .5 0 KILOMETERS 1 2

1000 0 1000 2000

METERS

1 .5 0 1

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

CONTOUR INTERVAL 10 FEET

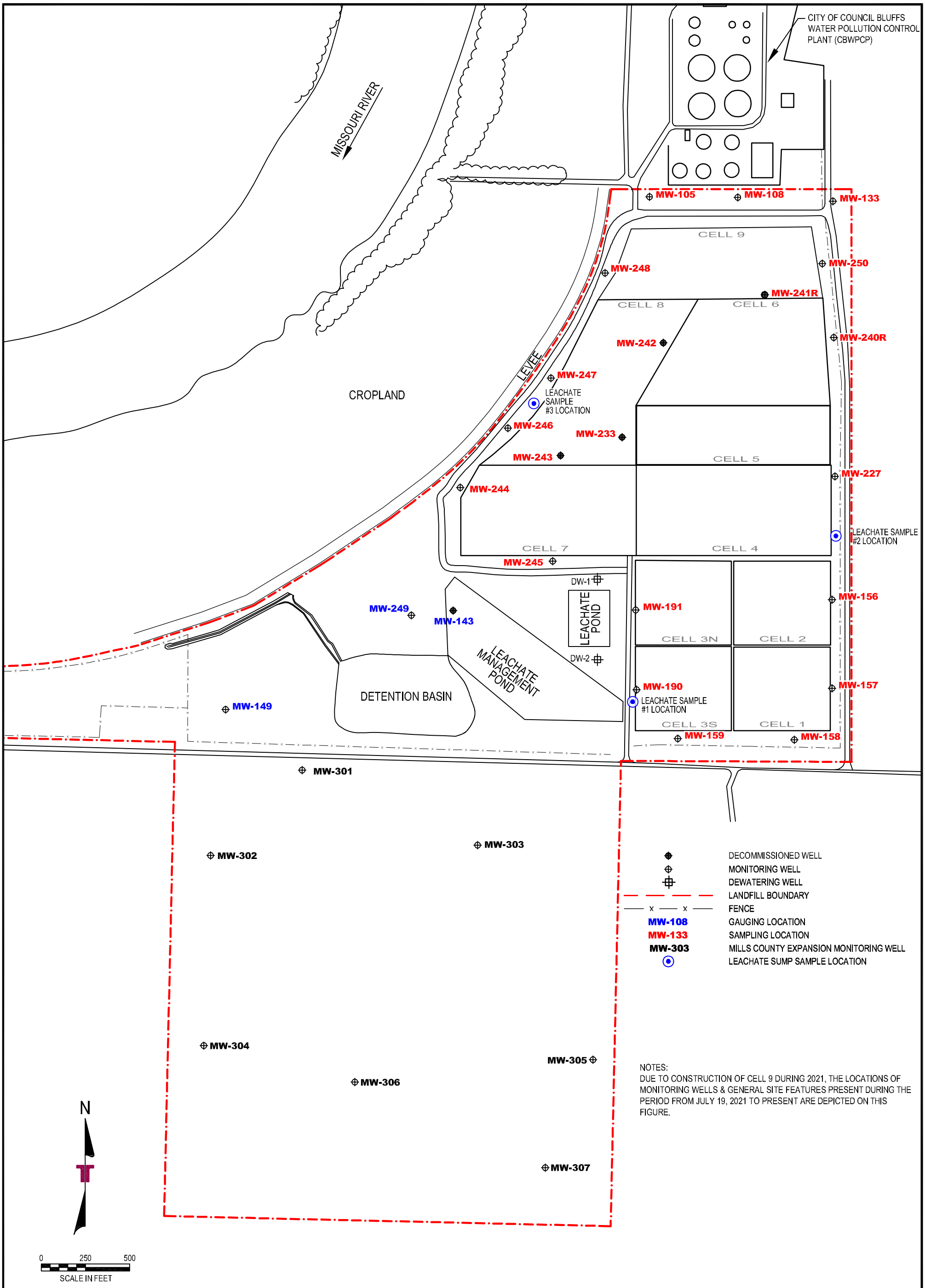
NATIONAL GEODETIC VERTICAL DATUM OF 1929

N

COUNCIL BLUFFS SOUTH, IOWA
QUADRANGLE
1994
7.5 MINUTE SERIES (TOPOGRAPHIC)

Project Mngr: RDW	Project No. 05157640	Terracon Consulting Engineers and Scientists	TOPOGRAPHIC / LOCATION MAP
Drawn By: PAI	Scale: AS SHOWN	15080 A CIRCLE OMAHA, NE 68144	MIDAMERICAN ENERGY COMPANY
Checked By: RDW	File No. 05157640C32	PH. (402) 330-2202 FAX. (402) 330-7606	WALTER SCOTT JR. ENERGY CENTER
Approved By: MBR	Date: 10/18/21		CCR MONOFILL
			COUNCIL BLUFFS IOWA

FIG. No. 1



NOTES:
DUE TO CONSTRUCTION OF CELL 9 DURING 2021, THE LOCATIONS OF MONITORING WELLS & GENERAL SITE FEATURES PRESENT DURING THE PERIOD FROM JULY 19, 2021 TO PRESENT ARE DEPICTED ON THIS FIGURE.

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
15080 A CIRCLE OMAHA, NE 68144
PH. (402) 330-2202 FAX. (402) 330-7606

MONITORING WELL LOCATION MAP

MIDAMERICAN ENERGY COMPANY
WALTER SCOTT JR. ENERGY CENTER
CCR MONOFILL
COUNCIL BLUFFS IOWA

DESIGNED BY:	RDW
DRAWN BY:	PAI
APPVD. BY:	MBR
SCALE:	AS SHOWN
DATE:	10/18/21
JOB NO.	05157640
ACAD NO.	05157640C32
FIGURE NO.:	2

TABLE 1

WALTER SCOTT JR. ENERGY CENTER
COAL COMBUSTION RESIDUAL MONOFILL
POTTAWATTAMIE COUNTY, IOWA
TERRACON PROJECT NO. 05157640

GROUNDWATER MONITORING WELL SYSTEM

			Screened Interval			
Well ID	TOC (ft NAVD 88)	Total Depth (ft BTOC)[1]	Top (ft NAVD 88)		Bottom (ft NAVD 88)	Classification
MW-105	968.78	25.48	953.30	-	943.30	Down-gradient
MW-108	968.31	25.46	952.85	-	942.85	Down-gradient
MW-133	970.71	25.46	955.25	-	945.25	Background
MW-149	970.12	19.50	960.62	-	950.62	Gauging Only
MW-156	975.68	23.00	963.08	-	953.08	Up-gradient
MW-157	975.10	25.30	960.10	-	950.10	Up-gradient
MW-158	973.60	25.35	958.65	-	948.65	Cross-gradient
MW-159	973.60	25.30	958.70	-	948.70	Cross-gradient
MW-190	975.22	27.24	958.38	-	948.38	Down-gradient
MW-191	976.48	26.16	960.72	-	950.72	Down-gradient
MW-227	976.45	24.15	962.30	-	952.30	Up-gradient
MW-240R	975.60	30.36	960.24	-	945.24	Up-gradient
MW-244	980.06	31.9	963.16	-	948.16	Down-gradient
MW-245	983.34	33.8	964.54	-	949.54	Down-gradient
MW-246	983.46	33.0	965.46	-	950.46	Down-gradient
MW-247	982.30	33.2	964.10	-	949.10	Down-gradient
MW-248	982.91	34.1	963.81	-	948.81	Down-gradient
MW-249	969.35	17.6	956.75	-	951.75	Gauging Only
MW-250	978.54	30.8	962.74	-	947.74	Up-gradient

Notes:
TOC = Top of casing.
BTOC = Below top of casing.
ft = Feet.
ID = Identification.
NAVD88 = North American Vertical Datum, 1988.
[1]Installed Depth